



# Ivanhoe Activity Centre and Surrounds Car Parking Strategy

draft

**Client //** Banyule City Council  
**Office //** VIC  
**Reference //** 16M1310000  
**Date //** 10.01.18

# Ivanhoe Activity Centre and Surrounds

## Car Parking Strategy

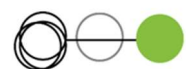
Issue: A-Dr4 10.01.18

Client: Banyule City Council  
Reference: 16M1310000  
GTA Consultants Office: VIC

### Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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# 1. Introduction

## 1.1 Background

Ivanhoe is experiencing significant growth in residential population with the increase in multi-unit dwelling subdivisions. Extra housing choices such as one and two bedroom dwellings are sought, particularly in and around the commercial heart of Ivanhoe. In addition, the centre is expanding from a retail and community point of view, with an increasing café and dining presence, two busy supermarkets, a large civic centre, a busy library, growing schools and two train stations.

As such, a parking strategy is required to understand and manage the existing and future parking demand and supply within the Ivanhoe Activity Centre and surrounding area.

Car parking is a key demand management tool and has the potential to greatly influence urban form, transport patterns and investment. While private vehicles will remain as a key transport mode for accessing the Centre in the future, the negative aspects of car use need to be addressed to support the ongoing growth, vibrancy and investment in the centre. Car parking management will play a key role in mode shift in the longer term, in conjunction with ongoing investment in public transport, active travel and creating a vibrant and attractive public realm.

GTA was engaged by Banyule City Council in October 2015 to prepare the Ivanhoe Parking Plan (herein referred to as 'the Plan') to effectively balance the existing and future supply and demand of parking in the Centre, and manage the expectations of community and business along with supporting the wider social, environmental and economic objectives of Council.

## 1.2 Purpose

The aim of the Strategy is:

*To understand and best manage the existing and future parking demand and supply within the Ivanhoe Activity Centre and surrounding area.*

The objectives of this project are:

- *To identify car parking needs and issues within the Ivanhoe Activity Centre and surrounding area, including an updated understanding of the parking supply and demand.*
- *To understand the current shortfall or surplus of long term and short term parking within the activity centre.*
- *To understand the anticipated parking impact of future development within the activity centre.*
- *To provide objectives and strategies to best manage parking and resources within the activity centre to respond to the identified issues and accommodate existing and future parking and transport demands. This could include changes to the Planning Scheme.*
- *To provide background work and supporting information for the future preparation for a Parking Overlay for the Ivanhoe Activity Centre.*



### 1.3 Scope of this Report and Methodology

The scope and methodology for the overall project is shown graphically in Figure 1.1.

**Figure 1.1: Scope and Methodology**

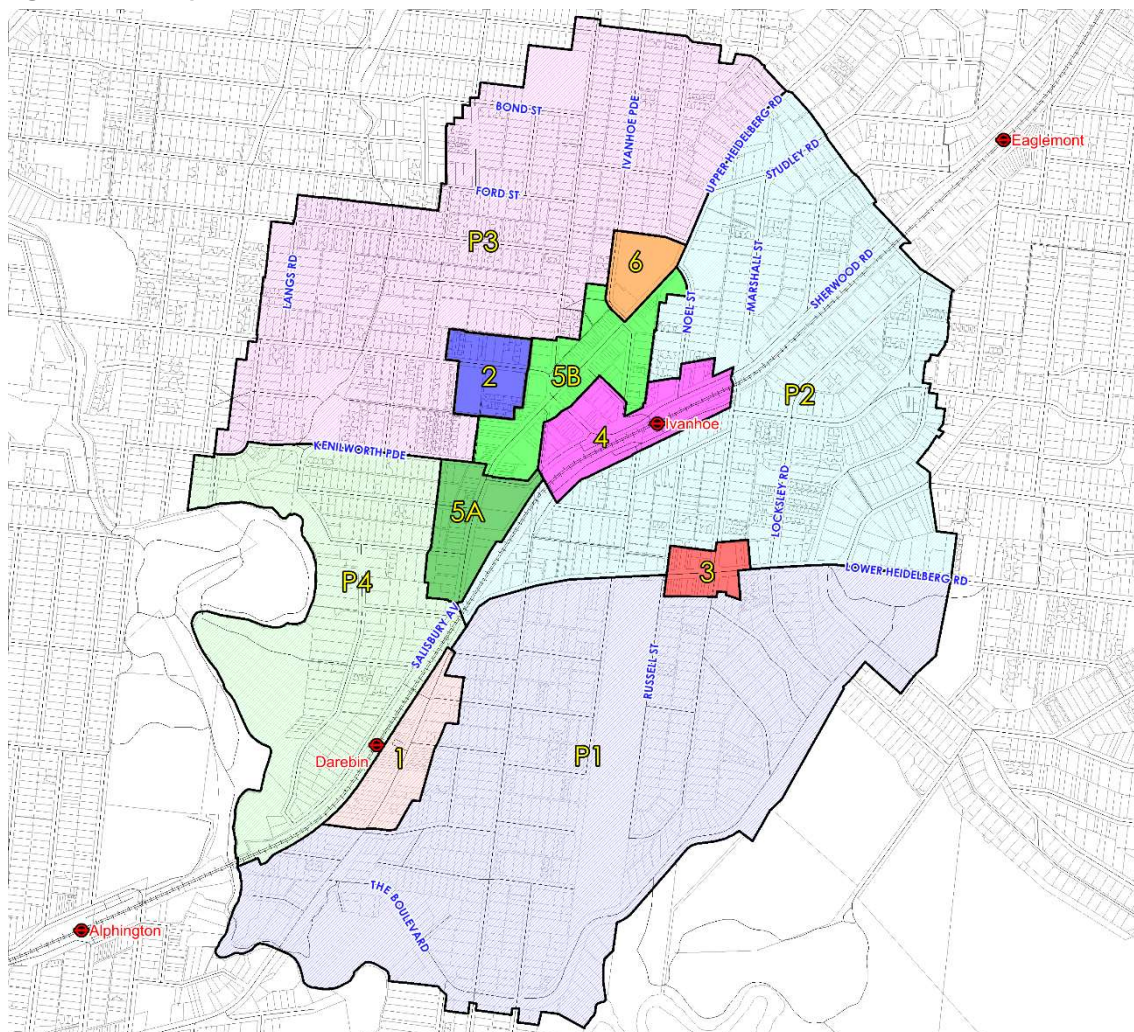


### 1.4 Study Area

The study area for the Strategy is defined by the commercial centres within Ivanhoe, as outlined in the Ivanhoe Structure Plan, with an approximate 400m peripheral boundary surrounding this core area. A 400m peripheral boundary has been used to reflect the typical distances that a visitor would be prepared to walk between their parked vehicle and destination. This is also consistent with the Banyule Activity Centre Car Parking Policy which identifies that higher-density car parking could be located within less than 5 minutes' walk, or 400m of the activity centre's core.

The commercial areas have been divided into seven precincts (1, 2, 3, 4, 5A, 5B and 6) while the peripheral areas divided into four precincts (P1, P2, P3 and P4). The study area and precincts are shown in Figure 1.2.

Figure 1.2: Study Area



Base Map Source: Planning Maps Online

## 1.5 Reference Documents

In preparing this report, reference has been made to a number of documents, including:

- GTA Issues and Opportunities report (dated 04.03.16)
- GTA letter titled: Ivanhoe Car Parking Strategy Parking Objectives and Principles (dated 17.03.16)
- Banyule Integrated Transport Plan 2015-2035
- Banyule Activity Centre Car Parking Policy and Strategy
- Banyule Resident Parking Permit Policy, and system operation
- Banyule Place: Resident Parking Permit Policy 2016-2020
- Banyule Trader Permit Parking areas and system operation
- Banyule Planning Scheme including relevant Clauses and Overlays as referenced
- Ivanhoe Activity Centre Structure Plan
- Ivanhoe Civic Precinct Master plan
- Plan Melbourne 2017-2050
- Car parking inventory, demand, and duration of stay data collected by Traffic Focus
- recent planning permits issued in the study area

- existing floor area and land use data
- forecast population and land use growth as detailed within the economic report prepared by Urban Enterprise titled "*Ivanhoe Floorspace Study*" commissioned by Banyule City Council (dated April 2017)
- parking infringement data (infringements issued and reason and realisation of fine)
- parking revenue and fine revenue data.

## 2. Strategic Context

### 2.1 Overview

It is important to acknowledge the significant existing studies and policy documents which relate to transport planning, land use, and car parking within Ivanhoe.

Car parking policies can have a number of effects on the overall attractiveness and performance of activity centres. There are a range of physical attributes of centres that affect how activity centres respond to car parking policy:

- The availability of viable alternative modes of travel, and following from this the ability to use car parking as an effective travel demand management tool.
- The economic role of car parking to support employment, retail and services.
- The diversity of land uses in the centre, and the ability to share car parking resources between uses.

In order to establish a sound basis for the Ivanhoe Parking Plan, a review of the relevant state and local planning policy and other reference documents has been undertaken.

The knowledge gained from this literature view is used to assist in identifying gaps or key issues, to align the study with the current vision and objectives of Ivanhoe, and to target further stages of work.

A detailed summary of a number of background documents is provided in Appendix A, with a short summary of the key policy directions included below.

### 2.2 Key Policy Directions

Various State policy documents, including Plan Melbourne and the Transport Integration Act 2010, provide guidance for the Ivanhoe Activity Centre. The following policy directions are noted as being relevant to the study area:

- **‘Transport choice’ is central to providing equitable access to employment and services.** Transport choice means that there are a number of viable and attractive options, such as walking, cycling, public transport or private vehicles. Transport choice is also intrinsically linked to urban form. Providing activity centres with a range of employment, retail, educational and community services in close proximity to where people live means that people will have more choices for their daily travel needs.
- **All investment decisions should be informed by a road user hierarchy.** In Victoria, the SmartRoads Network Operating Plan / Road User Hierarchy tool developed by VicRoads is the appropriate planning tool to determine the road user hierarchy across the road network. Access and circulation for car parking needs to be considered under the overall road user hierarchy.
- **Promoting sustainable transport (walking, cycling and public transport)** is generally endorsed on a state-wide basis and is important for a wide range of reasons:
  - Healthy, active communities – there is a strong link between active transport and the health and wellbeing of the community.
  - Socially connected, liveable communities – places where people walk, cycle and use public transport are likely to perform better on a range of social indicators.

- Transport efficiency – increased use of sustainable transport has environmental and economic benefits through reduced greenhouse emissions and reduced space required for vehicle movement and storage, including car parking.
- Access for all members of the community – a large number of people in the community don't or can't drive, and the provision of attractive and viable alternative means of transport is a key factor in whether a community is affected by transport disadvantage.
- Safety – Increased sustainable and active transport improves safety and perceptions of safety.
- **Planning for new development must consider providing for and promoting sustainable and active transport modes** in accordance with the road user hierarchy. This includes a requirement for major developments to integrate with the transport network, including public transport and cycling.

## 2.3 Activity Centre Context

The Ivanhoe Activity Centre is located 9km north-west of the Melbourne CBD. It is a sought-after location due to its natural beauty, proximity to the CBD and range of services. Some residential blocks have been subdivided creating an increase in multi-unit dwellings in the area. A variety of housing choices, such as one and two bedroom dwellings, are desired in the area, mostly in and around the commercial core. This enables residents to live closer to the heart of Ivanhoe, which in turn supports a range of food, retailing, recreation, and entertainment and services that enliven the area and local economy.

The Ivanhoe Activity Centre Structure Plan provides a plan to direct and manage change and growth whilst protecting residential areas from undue development. It encourages ecologically sustainable energy, water and construction principles in design for new developments. This policy aims to slow down traffic while still enabling existing residents the ability to access their homes. New housing, employment, retail and entertainment is aimed to be located near good public transport facilities rather than in residential streets which also helps to reduce congestion within the Centre, as people are able to walk to meet many of their daily needs.

## 2.4 Travel Demand Management

Car parking supply and management is a key travel demand management tool, with the potential to act as a key lever in supporting mode shift to more sustainable travel modes. Car parking policy generally supports reductions in car parking in activity centres, as reduced car trips can support a wide range of economic, social and environmental goals.

However, reductions in car parking must be made with regard to the availability of alternative modes of travel. Reducing car parking without providing viable alternatives may simply reduce investment and undermine the economic success of a centre. Under a triple bottom line approach to transport planning, changes to parking policy must be made with regard for the overall prosperity and sustainability of the activity centre.

## 2.5 Ivanhoe Structure Plan

The Ivanhoe Structure Plan 2014 identifies a selection of parking related actions as reproduced in the following. It is relevant to understand the status of a number of these actions and how these



influence the development of a Parking Strategy for Ivanhoe. This discussion is provided following each action.

### **Action 1**

*Develop a specific parking plan for Ivanhoe, consistent with the Banyule Activity Centre Car Parking Policy, including the requirement for new developments to provide appropriate car parking.*

This report actions this item.

### **Action 2**

*Investigate the potential for extra car parking in the Civic Precinct, Ivanhoe Plaza and Ivanhoe and Darebin railway station Precincts.*

This strategy will address the future needs for the provision of parking and confirm or recast the needs for public parking to be provided by Council (refer Sections 8, 9 and 10 of this strategy). In addition, separate considerations have been undertaken specifically for the redevelopment of the Civic Precinct to understand the demand needs of that site.

### **Action 3**

*Seek to maintain the existing level of public car parking in all existing car parking areas as a minimum should they be developed for alternate uses.*

This report will consider the parking needs of the centre (refer Sections 8, 9 and 10 of this strategy).

### **Action 4**

*Continue to exclude new multi-unit dwelling developments from access to residential car parking permits in accordance with the Banyule Activity Centre Car Parking Policy.*

A separate residential parking permit policy responding to this item has been prepared by Council which informs the preparation of this parking strategy.

### **Action 5**

*Encourage new multi-unit dwelling developments to adopt car sharing schemes to reduce overall car parking demands.*

The encouragement of car sharing opportunities is to be considered as part of this strategy (refer Recommendation 14 of this strategy).

### **Action 6**

*Consider the development of a Parking Overlay in the Planning Scheme to more accurately reflect parking demand and to collect funds for additional parking requirements for Ivanhoe.*

The need and merits of the development of a Parking Overlay are to be considered as part of this strategy (refer Section 11 and Recommendation 19 of this strategy).

### **Action 7**

*Consider flexibility around car parking requirements in recognition of the fact that people have diverse needs and in some instances they may not require a car park.*

This report will assess the current and future parking needs of the centre and consider ways in which flexibility can be provided to react to the changing nature of transport and the parking needs of residents, staff and customers (refer Sections 10 of this strategy).

## 2.6 Car Parking Planning In Ivanhoe

Some aspects of car parking planning have already occurred within the Banyule municipality through the development of the Banyule Activity Centre Car Parking Policy and Strategy. These documents aim to provide and manage an appropriate balance of car parking for residents, traders and visitors of the Activity Centre. They acknowledge car parking as a valued and finite commodity and recognise the needs of different users. These documents also acknowledge that in areas of intense development, restricted car parking rates can be provided in keeping with local alternative transport provisions.

## 2.7 Resident Parking Permit Policy 2016-2020

As part of the on-going car parking planning with the Banyule City Council area, the Residential Parking Permit Policy was recently updated to reflect changes within the area and current best practices. This document provides clear guidance on vehicle access, parking for residents and visitors and consideration for cyclists, public transport and the wider local community. In preparing this Plan, GTA has considered the impacts and purpose of the Residents Parking Permit Policy, particularly as it relates to the strategy recommendations for the precinct.

## 2.8 Summary

There are a number of State and local policy documents that provide appropriate guidance on provision and management of car parking within and around the Ivanhoe Activity Centre. These documents provide a plan to manage growth and the associated increase in parking and transport that comes with it. They aim to protect surrounding residential areas from the impact of this growth, as well as ensuring that appropriate change occurs. These documents play a key role in shaping the form and function of the Ivanhoe Activity Centre.

## 3. Best Practice Case Studies

### 3.1 Benchmarking within Victoria

In order to assist in developing best practice parking management strategies, a number of case studies have been undertaken of other municipalities to provide commentary on the management and enforcement of car parking within their Activity Centres:

- Melbourne City Council
- Moreland City Council
- City of Greater Bendigo
- Yarra City Council
- Brimbank City Council
- City of Greater Geelong

A topical summary of matters relevant to car parking is provided in the following sections:

#### 3.1.1 Parking Management

- All municipalities have time-restricted car parking within their Activity Centres.
- All municipalities have paid on-street parking in place, with the exception of Brimbank City Council.
- Melbourne, Yarra and Brimbank control parking within residential areas primarily through parking permit policy. Greater Geelong control this with the use of time-restrictions only (predominately 2P parking).
- The following public policy and/or guidelines are implemented in regards to parking provision for new developments:
  - **Melbourne City Council:** Parking Overlays (Schedules 1 to 13) including parking minimisation practices (Statutory minimums); Off-street Parking Limitation Policy.
  - **Moreland City Council:** Standard Clause 52.06 (Column A rates).
  - **Greater Geelong:** Parking Overlay Schedule 1 specifying varied parking rates for the Armstrong Creek Town Centre, otherwise Standard Clause 52.06 (Column A rates).
  - **Yarra City Council:** Standard Clause 52.06 (Column A rates).
  - **Greater Bendigo:** Parking Overlay Schedule 1: specifying varied parking requirements within the Bendigo Central Business District.
  - **Brimbank City Council:** Planning Scheme (Column A).

#### 3.1.2 Enforcement Process

- **Yarra City Council**
  - Yarra typically has 15 full time staff enforcing car parking on any day. During the evening, six staff enforce parking areas from Monday to Wednesday, and eight staff from Thursday to Sunday, due to heightened demands and non-compliance over the weekend.
  - There are 12 defined areas, which officers patrol at their discretion to target problem areas.
  - Parking officers use the 'walk and chalk' method, however following a recent trial will be rolling out in-ground sensors within approximately 7,000 spaces, using a Schweers system.

- Yarra City Councils pay-by-phone spaces generated approximately 18,000 transactions per day. Council is progressively attempting to scale back the number of coin-operated spaces (to approximately 1 per 12 bays) due to maintenance costs however there is a legal requirement to maintain the ability for cash payment.
- **Moreland City Council**
  - Moreland employ nine full-time parking officers, running staggered shifts to cover both AM and PM clearway times (i.e. Sydney Road and Lygon Street) as well as night times and targeting school hours as required. The estimated patrol area covers approximately 10,000 spaces (of which 4,500 have in-ground sensors) over 5 precincts which are patrolled daily.
  - Moreland have an eService for reporting illegal parking. Council plans enforcement in specific problem areas such as clearways, around schools, or night time over-staying along Activity Centres.
  - For enforcing pod-enabled parking, parking officers have hand-held PDA devices which pre-populate fields for issuing infringements, however the officer is required to attend in order to record vehicle details and print the infringement notification.
  - A smartphone app is available to parking officers which links to in-ground sensors to determine clusters where overstaying is happening. This enables a real-time reactive approach to overstaying. However, the system is not perfect as permit exceptions to time restrictions are not recognised.
  - Council is investigating the roll-out of a smartphone app which will utilise in-ground sensors and existing software to provide real-time vacancy information to the public.
  - In ground sensors are located within approximately 40% of all patrolled car parking areas.
  - Council has three off-street paid car parking areas, however on-street car parking is currently free (with a couple of minor exceptions).
- **Greater Bendigo City Council:**
  - Bendigo employs 6.9 equivalent full time staff who has additional duties aside from the enforcement of car parking. Patrol hours are 7am-5:30pm Monday to Friday, 8:30am-5:30pm Saturday and 11am-4pm Sunday, and cover in the order of up to 5,000 on & off street public car parking spaces.
  - Officers rotate through a set of scheduled areas to ensure coverage and that parking enforcement isn't bunching. This predominately includes the CBD but also some residential areas.
  - Officers all use a handheld device provided by DCA (Database Consultants Australia).
- All councils interviewed (including Moreland, Bendigo and Yarra identified that revenue from infringements was diverted back into consolidated revenue, and not allocated to specific priorities.

### 3.1.3 Parking Fees and Permit Costs

**Table 3.1: Permit Costs**

Municipality	Business or Trader Permits	Resident Permits [1]
Melbourne City Council	<p><b>Reserved parking bays:</b> Special events or loading. Fee applies \$0 - \$88</p> <p><b>Medical practitioner parking permit:</b> Reserved parking around specific hospitals, \$110</p> <p><b>Tradesperson permits</b> available to residents who require access for a tradesperson to work at their property - \$10/week</p>	<p>Policy varies within four zones:</p> <p><b>Carlton, North and West Melbourne:</b> First permit \$20, Second Permit \$80, Visitor voucher booklet (18) \$20. Max 2 per dwelling. Resident options include single or dual vehicle (transferable)</p> <p><b>Parkville Gardens:</b> First permit \$20, Visitor voucher booklet (18) \$2</p> <p><b>Central city and Docklands:</b> Not available</p> <p><b>All permit areas:</b> Single permit (single vehicle), Dual permit (transferable for 2 vehicles), transferable permit (any vehicle including visitors). Permits \$20 each</p>
Moreland City Council	<p><b>Trader permit:</b> \$85 (12 month). 2 allowed per business.</p>	<p>First permit \$32 Second permit \$84 Visitor permit book of (10 daily) \$15 Weekly visitor permit \$9.50 Max. 2 per household, Max 1 per household if having a crossover.</p>
City of Greater Bendigo	No scheme.	Residential parking permits are available to residents located in time restricted zones who have no off street parking.
Yarra City Council	<p>Business permits are only issued to properties with no off-street parking.</p> <p><b>1st permit</b> - for first 10 metres of street frontage OR, if in a Retail Zone, for first 5 metres of street frontage \$114</p> <p><b>2nd permit</b> - based on additional ten metre increments of street frontage \$210</p> <p><b>Subsequent</b> - based on additional ten metre increments of street frontage \$210</p>	<p>1st permit \$32.70 2nd permit \$84 3rd permit \$158 Temporary Permit: Free 12 month Transitional Permits: Free 2 weeks</p>
Brimbank City Council	No scheme.	Residents will be provided with one permit per vehicle, plus two Visitors Permits per residence.
City of Greater Geelong	<p>\$1678.00 per annum per permit – Geelong Central Activities Area – GST Inc.</p> <p>\$562.00 per annum per permit – other business areas – GST Inc.</p> <p>\$107.00 per month - Wesley Off-Street Car Park only – GST incl.</p> <p>There is a waiting list.</p>	<p>Provided to residents who have a time restriction out the front of their properties and within designated zones.</p> <p>Maximum of two permits will be issued to a household.</p> <p>No charge.</p>

[1] In general, residents within recent multi-storey development (potentially after a given date) or on titles subdivided after a given date are not eligible for resident parking permits.

## 3.2 International Practice

International case studies on parking management in international urban centres have been sought from the report titled 'Europe's Parking U-Turn: From Accommodation to Regulation' prepared by the Institute for Transportation and Development Policy (ITDP) in 2011.

As the title suggests, the report highlights the changing focus of various European cities which has evolved from an unregulated market catering to observed demand, to the current state of various economic, regulatory and physical design strategies to manage parking and travel demand rather than supply.

Table 3.2 canvasses various European cities and outlines which initiatives are currently being implemented in the management of car parking.



**Table 3.2: Policies applied in European Cities**

Policies	Amsterdam	Antwerp	Barcelona	Copenhagen	London	Munich	Paris	Stockholm	Strasbourg	Zurich
<b>Pricing Mechanisms</b>										
Kerbside Charges	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Progressive Fee Structures		✓								✓
Off-Street Price Harmonisation		✓							✓	
Residential Permits	✓	✓	✓		✓	✓	✓	✓		
Workplace Levies										
Ring Fencing			✓		✓				✓	
<b>Regulatory Measures</b>										
Supply Caps	✓									✓
Minimum provisions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maximums provisions				✓						✓
Transit Based Min/Max Reductions	✓	✓			✓		✓		✓	✓
Access Bans			✓							
Emissions Reduction Goals	✓			✓			✓			✓
Public-Private Partnership		✓	✓		✓	✓	✓	✓		
<b>Advanced Technologies</b>										
Electronic Parking Guidance Systems			✓			✓	✓		✓	✓
Smart Meters							✓			
Pay by phone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Scan Cars	✓									

Source: ITDP, 2011

The following key points are highlighted:

- Charged on-street car parking is prevalent in most European cities.
- Barcelona and Munich have used 'Ring Fencing' which is a practice whereby revenue from car parking is divested into specific sustainable transport funding, such as the Barcelona Bike Share scheme.
- Despite progressive attitudes to vehicular use minimisation, and progressive policies such as congestion pricing in London, most cities still apply minimum provisions for car parking supply, whilst some also simultaneously prescribe maximums.
- In Zurich, the parking supply cap means that any new off-street spaces result in existing on-street spaces being repurposed, enabling a constant supply.
- A number of cities have outsourced parking contracts to the private sector, such as the case of Antwerp, where in 2001 all enforcement was transferred to a private firm, allegedly resulting in a more effective and efficient enforcement scheme.
- Pay-by-phone is common in many European cities.
- In Amsterdam, rather than implementing 'smart meters' (i.e. sensors) enforcement is carried out by vans equipped to digitally scan number plates to determine their compliance.

It is noted that the above generally relate to parking in large city centres and may not all be entirely appropriate to metropolitan Activity Centres such as Ivanhoe. Nevertheless, the international examples provide a good snapshot of emerging trends in managing parking.

## 4. Transport Network Characteristics

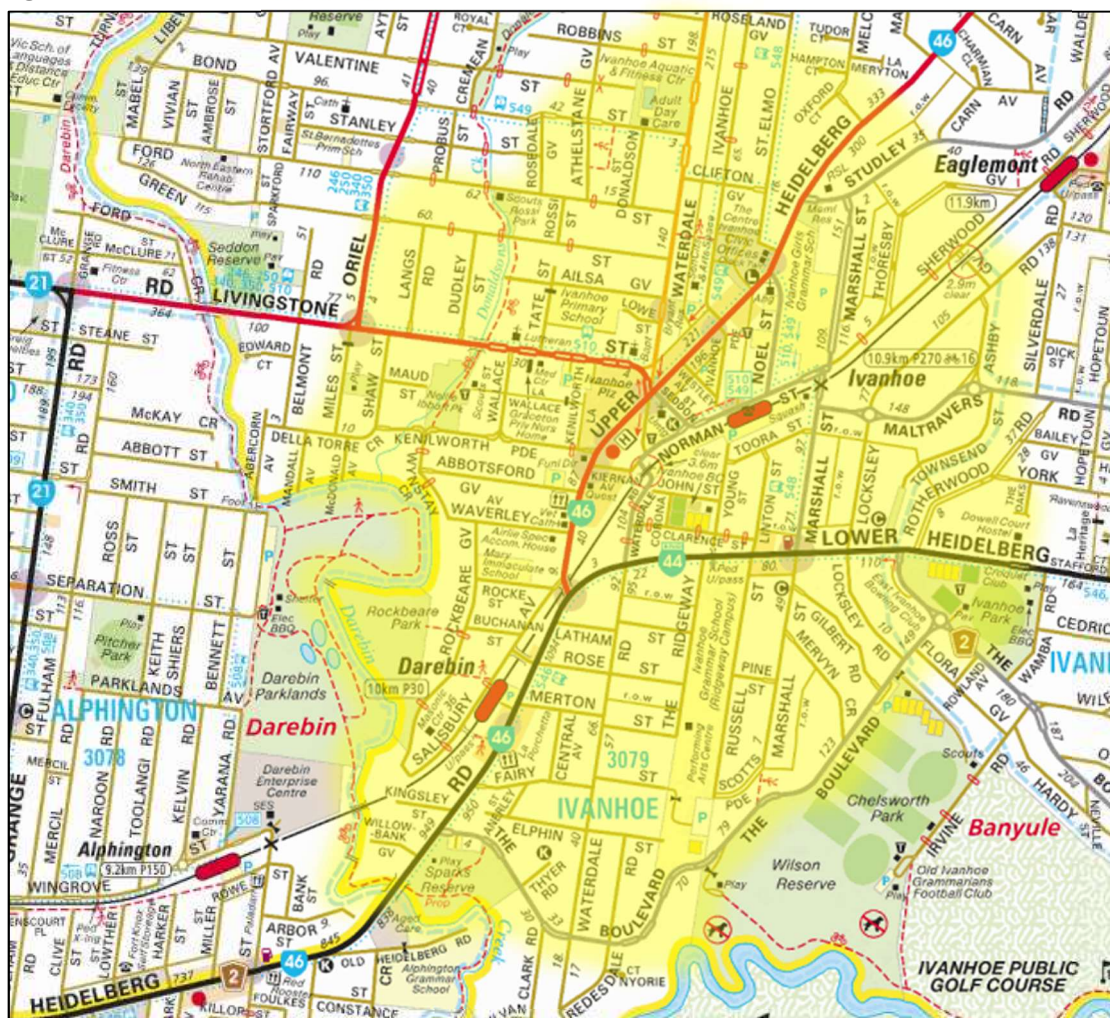
### 4.1 Road Network

An understanding of access from the road network is important as it shapes the way the majority of users access the centre to make decisions about where to park. This understanding can then be used to help inform car parking way finding strategies for the study area.

Access to the Ivanhoe Activity Centre from the arterial road network is available from Upper Heidelberg Road to the northeast, Heidelberg Road to the southwest, Lower Heidelberg Road to the east and Livingstone Street to the west. The main road through the Activity Centre is Upper Heidelberg Road, which extends in a northeast-southwest direction.

The Ivanhoe road network is shown in Figure 4.1.

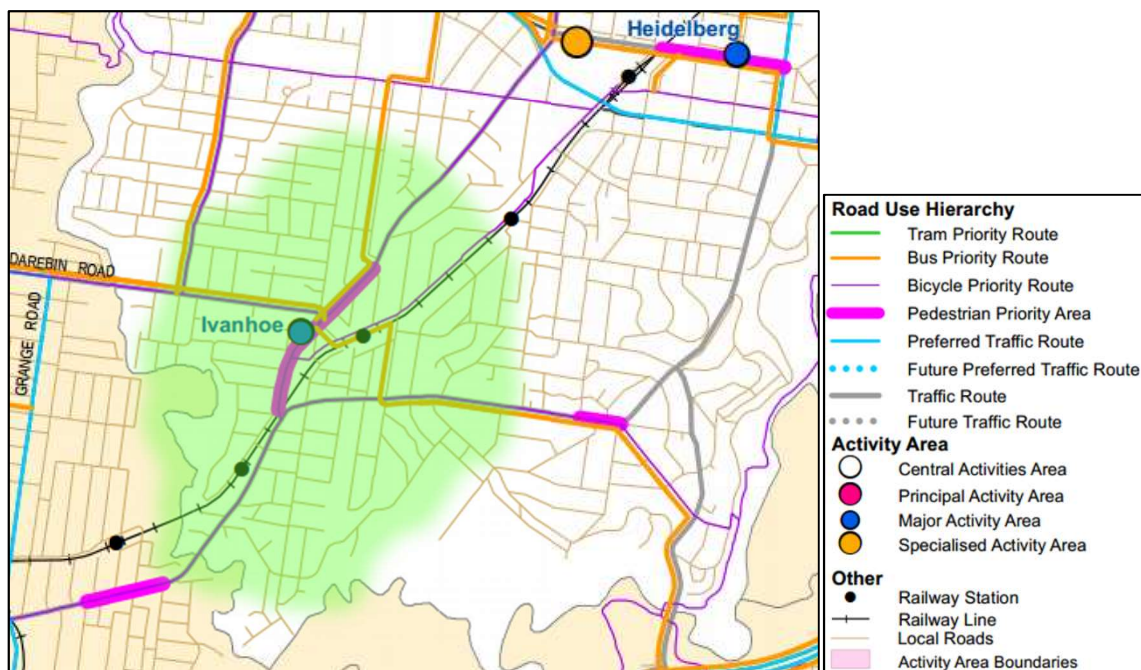
Figure 4.1: Ivanhoe Road Network



### 4.1.1 SmartRoads

SmartRoads is a VicRoads policy which sets 'modal' priorities on the road network, with those modes within the study area shown in Figure 4.2.

**Figure 4.2: Smart Roads within Ivanhoe**



The SmartRoads map shows that:

- there is a pedestrian priority route along Upper Heidelberg Road between Heidelberg Road and Ivanhoe Parade
- there is a bicycle priority route along Heidelberg Road, Lower Heidelberg Road, Upper Heidelberg Road, Livingstone Street, Norman Street and Sherwood Road
- there are bus priority routes along Livingstone Street, Upper Heidelberg Road, Ivanhoe Parade, Norman Street, Marshall Street and Lower Heidelberg Road
- there are no existing or future preferred traffic routes through the study area.

## 4.2 Sustainable Travel Network

The demand for car parking and ability to use parking management as a travel demand management strategy, while maintaining the accessibility and success of an activity centre, has an intrinsic link to the quality and availability of alternate travel modes, such as public transport, cycling and walking.

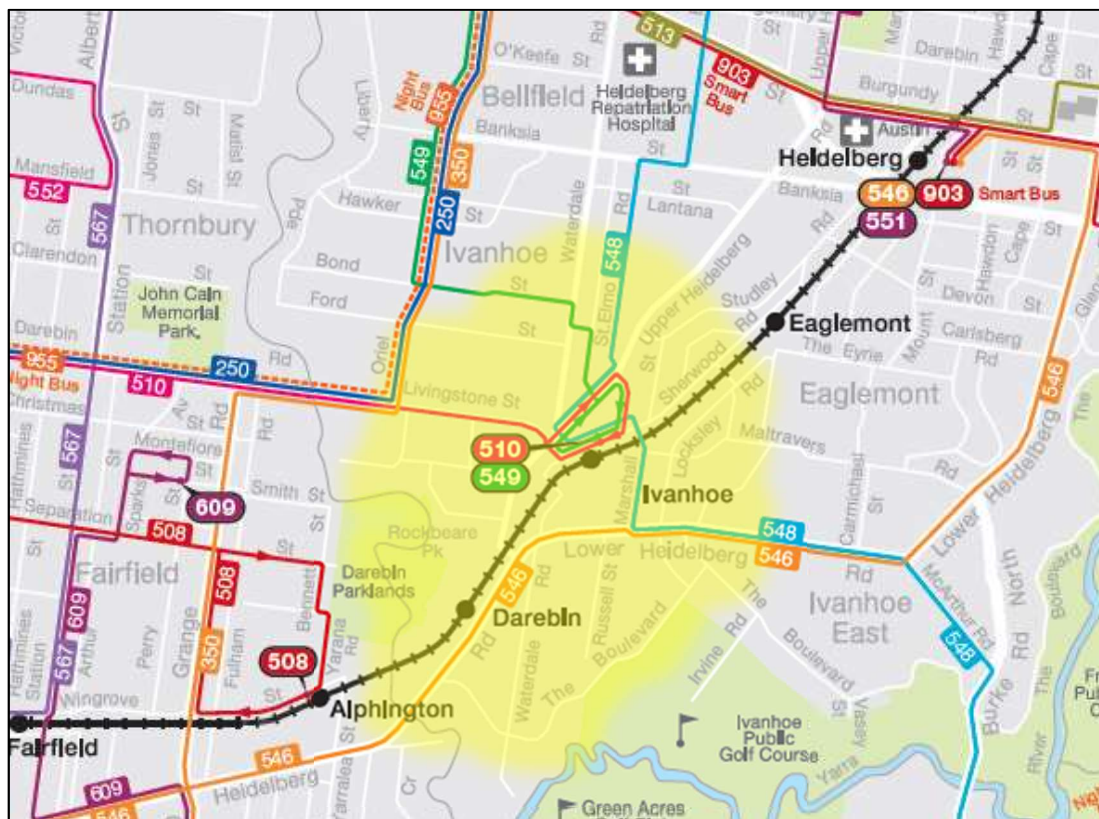
In this regard, a brief summary of the alternative access opportunities is set out below.



#### 4.2.1 Public Transport Network

The public transport network in the vicinity of the Ivanhoe Activity Centre is shown in Figure 4.3.

**Figure 4.3: Ivanhoe Public Transport Network**



As shown in Figure 4.3, Ivanhoe and Darebin Stations on the Hurstbridge Line extends along the southern side of the main Ivanhoe commercial core, but central within the study area. The station plays a key role in facilitating city bound commuter trips, as well as serving visitors, customers and employees to Ivanhoe.

It is noted that existing patronage data available through PTV indicates that patronage at Ivanhoe Station has decreased by 15% and decreased by 11% at Darebin Station over the six year period between 2008/09 and 2013/14 financial years.

In addition to train, there are some bus services running to the Ivanhoe Activity Centre that provide a viable alternative for local visitors, customers and employees.

Access to the centre via bus provides a viable alternative mode of travel, particularly for employees. Bus travel could assist in reducing demand for long-term car parking in the Activity Centre.

#### 4.2.2 Cycling Network

Overall, the existing cycling network within the study area and connecting to surrounding residential areas is limited and discontinuous. However, the following key cycling facilities within and accessing the Centre include:

- on-road bicycle lanes along Lower Heidelberg Road from Upper Heidelberg Road to the east

- on-road bicycle lanes along Livingstone Street from Upper Heidelberg Road to the west
- on-road bicycle lanes along Studley Road from Marshall Street to the north-east
- off-road shared paths Donaldsons Reserve.

### 4.2.3 Pedestrian Network

The pedestrian network within and surrounding the study area is reasonably connected by footpaths on both sides of the majority of roads.

## 4.3 Travel Behaviour and Car Ownership

### 4.3.1 Mode Split

ABS – Journey to Work

A comparison of 2011 ABS Journey to Work Data<sup>1</sup> for the surrounding municipalities is provided in Table 4.1, with Figure 4.4 illustrating the location of these surrounding municipalities in relation to Banyule

Table 4.2 shows the mode-split percentage for employees within the Ivanhoe suburb.

It is noted that the data is based on one-mode only, (i.e. a multi-mode trip involving a car and train, is not included) and excludes 'car as a passenger' as a car mode.

**Table 4.1: ABS Journey to Work Data by Place of Employment – Method of Travel by Municipality**

Municipality	Car Driver	Walk	Public Transport	Bicycle	Other[1]
Melbourne	40.4%	6.5%	42.6%	4.3%	6.2%
Yarra	67.2%	6.4%	16.0%	4.8%	5.6%
Stonnington	73.3%	6.6%	12.7%	1.9%	5.5%
Moreland	79.4%	4.6%	5.8%	2.7%	7.5%
Glen Eira	80.6%	5.2%	6.6%	1.5%	6.1%
Boroondara	80.3%	4.7%	8.3%	1.4%	5.3%
Darebin	82.2%	3.5%	5.3%	2.2%	6.8%
<b>Banyule</b>	<b>84.4%</b>	<b>4.3%</b>	<b>3.9%</b>	<b>1.1%</b>	<b>6.3%</b>
Whitehorse	85.0%	3.1%	5.2%	0.7%	6.0%
Nillumbik	85.4%	3.9%	2.0%	0.4%	8.3%
Manningham	85.6%	2.7%	3.4%	0.3%	8.0%
Whittlesea	87.2%	1.6%	2.5%	0.5%	8.3%
Monash	88.3%	2.1%	3.1%	0.8%	5.7%

[1] Includes car passenger, taxi, truck, motorbike, and 'Other' as response

**Table 4.2: ABS Method of Travel Data – Ivanhoe Employees**

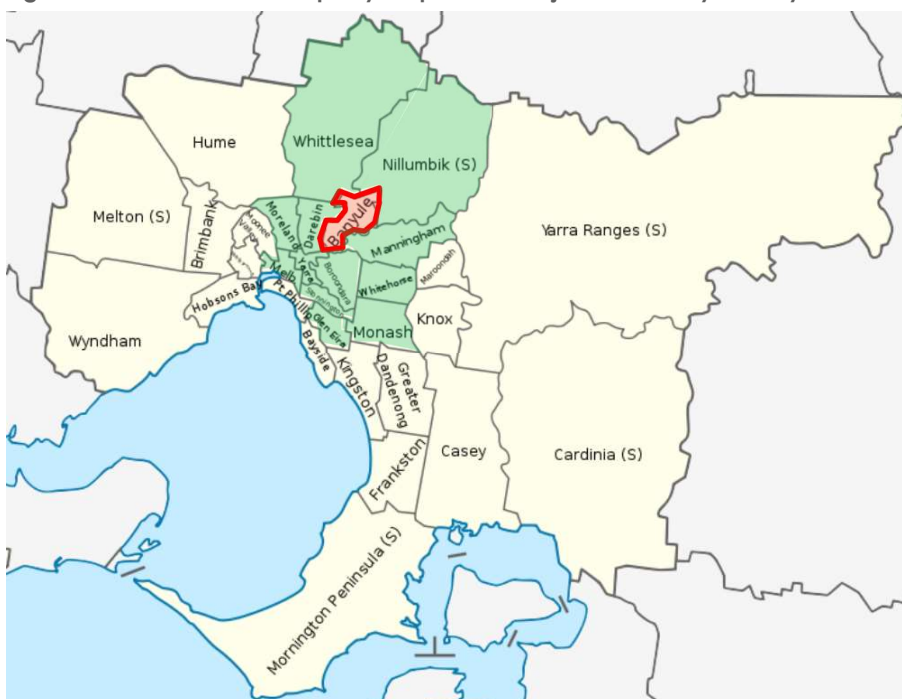
	Car Driver	Walk	Public Transport	Bicycle	Car Passenger	Other
Ivanhoe Employees (sample area includes suburb of Ivanhoe)	83.5%	5.5%	4.3%	1.3%	4.3%	1.2%

[1] Includes taxi, truck, motorbike, and 'Other' as response

<sup>1</sup> For place of work, for all employment categories



**Figure 4.4: Victorian Municipality Map – LGAs Adjacent the City of Banyule**



In comparing Banyule to other municipalities, Table 4.1 indicates that journey to work for 'car driver' is generally higher than adjacent middle-ring municipalities, but lower than outer metropolitan LGAs.

In comparing Banyule to Ivanhoe, Table 4.1 and Table 4.2 indicate that:

- 84.4% of all employees within Banyule and 83.5% of all employees within Ivanhoe and drove private motor vehicles to work.
- Banyule and Ivanhoe have a relatively low proportion of public transport users to get to work, with 3.9% and 4.3% of work trips, respectively.

#### VISTA 2009/10

Guidance on the existing travel characteristics for all trips by employees that work within the Banyule Local Government Area is able to be provided from the Victorian Integrated Survey of Travel Activity 2009 (VISTA 09). The travel habits of residents in each of the municipalities in Melbourne and major regional centres within Victoria was collected as part of VISTA 09 and provides guidance on existing mode splits.

On this basis, Table 4.1 provides a comparison of Journey to Work data (by destination LGA) and All Trips data (by origin LGA) for Banyule utilising VISTA 2009/10.

**Table 4.3: VISTA Data – Banyule LGA**

Dataset	Car Driver	Walk	Public Transport	Bicycle	Car Passenger	Other
Journey to Work	69.4%	6.7%	14.9%	2.3%	6.7%	0.0%
All Trips	53.8%	9.9%	4.2%	1.5%	30.2%	0.4%

The above VISTA 09 data indicates that a lower proportion of all trips are car driver when compared with work trips, especially in terms of car passenger and walking trips. It also indicates that a higher proportion of trips to work are taken by public transport than those taking public transport for all trips.

### 4.3.2 Car Ownership

The 2011 Census by the Australian Bureau of Statistics (ABS) indicates an average car ownership rate within the study area is **1.55 vehicles per household**, with 10% of households not owning any vehicle at all.

Further analysis of the study area, with respect of the 2011 Census ABS data for the various Statistical Area Level 1 (SAL1)<sup>2</sup> regions is presented in Table 4.4.

**Table 4.4: Average Car Ownership per Bedroom**

No. of Bedrooms	Average Car Ownership (Vehicles per Dwelling)	Dwellings with Zero Car Ownership
0 Bedroom (includes bedsitters)	0.00	100%
1 Bedroom	0.81	30%
2 Bedroom	1.14	15%
3 Bedroom	1.70	5%
4 Bedroom	2.15	2%
5 Bedroom	2.31	0%
6+ Bedroom	2.83	0%
<b>Average</b>	<b>1.55</b>	<b>10%</b>

Table 4.4 indicates that Ivanhoe has a relatively high car ownership level, with average car ownership rates ranging from 0 cars for bedsitter dwellings to 1.70 per 3 bedroom dwellings. Furthermore, it is noted that a proportion of bedsitter to 2 bedroom dwellings do not own a car, ranging from 100% to 15% respectively.

<sup>2</sup> It is noted that given the size and shapes of the various Statistical Areas Level 1, a number of Statistical Area(s) Level 1 that are mostly within the study boundary have been included in the review, and a few that are only partially within the study boundary have been discounted, as indicated within Appendix B. This discrepancy however is considered to be minor for the purposes of this assessment.

## 5. Consultation Summary

### 5.1 Overview

To inform the development of the Car Parking Strategy for Ivanhoe, members of the former Structure Plan advisory committee have been engaged to discuss car parking issues within the study area.

### 5.2 Stakeholder Feedback

#### 5.2.1 Meeting #1

The initial consultation session was undertaken in early December 2015 and the following stakeholder groups/organisations were in attendance:

- Banyule City Council (Meeting Convenor and Project Lead)
- GTA Consultants (Project Traffic Consultant for Council)
- Ivanhoe Uniting Church
- Ivanhoe Baptist Church
- Ivanhoe Girls Grammar
- Ivanhoe Traders and Local Residents.

A summary of the issues, insights and themes captured during this workshop are outlined below:

- Schools
  - Afternoon pick-up times are more intense due to students leaving at the same time (this is true for junior school as the senior school has more after-school activities).
  - Noel Street is busier than Marshall Street and has school bus stops. The staff car park is also accessed off Noel Street.
  - The Arts Centre (Core Precinct 6) hosts a number of community school events. Parking for these events typically occurs in the surrounding streets and behind Council buildings.
- Church
  - Weddings and Funerals utilise the existing on-site car park at the rear of the site (Uniting Church).
  - Available parking is an issue (Baptist Church), require minimum 3 hour spaces noting surrounding streets have permit parking restrictions.
- Retail Shops
  - Ground parking sensors (currently used in Heidelberg) are not preferred by traders as they may "put off" customers.
  - Traders would be ok with paying for parking if required.
  - Parking limits may be from 3P down to ½ P to allow more turnover of customers.
- General Issues
  - The development on the Commonwealth Bank site was provided with a waiver for providing visitor car parking on-site.
  - Planning should provide for more off-street car parking in Ivanhoe.

- Parking needs to be retained at Bryant Reserve and Cnr. Ivanhoe Pde/Westley Ave.
- Parking associated with the development of the civic precinct (Core Precinct 6) will cause traffic issues in Elder Street.
- West to east car travel across Ivanhoe is difficult.
- Public transport is not considered a reasonable alternative as it is not able to be used for many trips.
- Note issues with construction vehicle parking.
- No concerns noted with regard to the current provision of loading, disabled or taxi parking in the study area.

An additional response was provided by 'Friends of Ivanhoe Library' (via email) which indicated the following issues:

- Parking in Ivanhoe will be under greater pressure from current and future proposed developments.
- Parking should not be viewed as an automatic right for everyone at any time and should be managed to give priority to local residents and business. There should also be a range of parking to suit these users.
- Parking around the existing library and new learning hub should be managed to provide some shorter and some longer restrictions (for different services offered by the library) as well as disabled parking in the immediate vicinity (given the older demographic).
- All day parking being utilised by workers in the area and commuters is an issue which needs to be addressed separately by the relevant government/transport authorities.
- Time limited parking should be more strictly enforced to prevent all day parkers.
- Clearway zones should be strictly enforced (during the afternoon peak) on Heidelberg Road (near Core Precinct 1).

### 5.3 Summary

In the development of car parking strategies for the Ivanhoe study area, the issues raised through consultation will be supplemented by the analysis undertaken of existing conditions car parking data (including the car parking model).

The car parking strategies for Ivanhoe will seek to provide a balanced solution for all stakeholders including Council, traders and the community at large.

## 6. Existing Parking Conditions

### 6.1 Overview

Surveys of existing car parking facilities within the study area were undertaken on Thursday 19 and Thursday 26 November 2015 between 6:00am and 8:00pm and Saturday 21 and Saturday 28 November 2015 between 10:00am and 2:00pm.

The surveys included the following:

- on and off-street publicly available parking inventory
- hourly parking demand spot counts
- 15-minute parking duration of stay within Precincts 2, 4, 5A, 5B and 6.

It is noted that off-street private parking, such as those associated with specific commercial sites or tenancies not accessible to the general public (i.e. basement car parks and residential dwellings) were not included in the surveys.

As shown earlier in Figure 1.2, the car parking data has been aggregated into seven geographical precincts within the commercial areas of the study area (1, 2, 3, 4, 5A, 5B and 6) (as defined by the Ivanhoe Structure Plan) and four precincts within the peripheral residential area (P1, P2, P3 and P4).

It is noted that Thursday 19 November represented the peak day in terms of demands, with the commercial area demands peaking at 1pm.

### 6.2 Supply

The car parking inventory identified the supply of car parking within the identified precincts, including the restrictions applicable to each parking space.

The inventory identified a total supply of 6,376 car spaces at the peak parking time (1pm) consisting of 2,223 spaces within the commercial precincts and 4,153 spaces within the peripheral residential areas.

A summary of the car parking supply within each precinct by restriction type is shown in Table 6.1 and Figure 6.1.



Table 6.1: Ivanhoe Parking Supply by Area

Restriction Type	Commercial Precincts									Peripheral Precincts						Overall	
	1	2	3	4	5A	5B	6	Total		P1	P2	P3	P4	Total		Total	
								No.	%					No.	%	No.	%
Very Short Stay (VSS) (<1hr)	0	0	1	1	2	2	0	6	0.3%	2	3	9	0	14	0.3%	20	0.3%
Short Stay (SS) (1hr-2hr)	4	349	14	21	131	121	102	742	33.4%	128	85	122	43	378	9.1%	1120	17.6%
Medium Stay (MS) (3hr-4hr)	0	10	0	67	16	206	160	459	20.6%	53	286	0	28	367	8.8%	826	13.0%
Long Stay (LS) (>4hr)	94	19	11	346	125	46	29	670	30.1%	1,314	610	863	348	3,135	75.5%	3805	59.7%
Private [1]	41	8	13	4	34	159	31	290	13.0%	28	41	10	0	79	1.9%	369	5.8%
Other [2]	2	6	1	8	4	10	9	40	1.8%	15	4	5	1	25	0.6%	65	1.0%
Other [3]	0	0	5	7	0	4	0	16	0.7%	46	50	58	1	155	3.7%	171	2.7%
<b>Total</b>	<b>141</b>	<b>392</b>	<b>45</b>	<b>454</b>	<b>312</b>	<b>548</b>	<b>331</b>	<b>2,223</b>	<b>100%</b>	<b>1,586</b>	<b>1,079</b>	<b>1,067</b>	<b>421</b>	<b>4,153</b>	<b>100%</b>	<b>6376</b>	<b>100%</b>

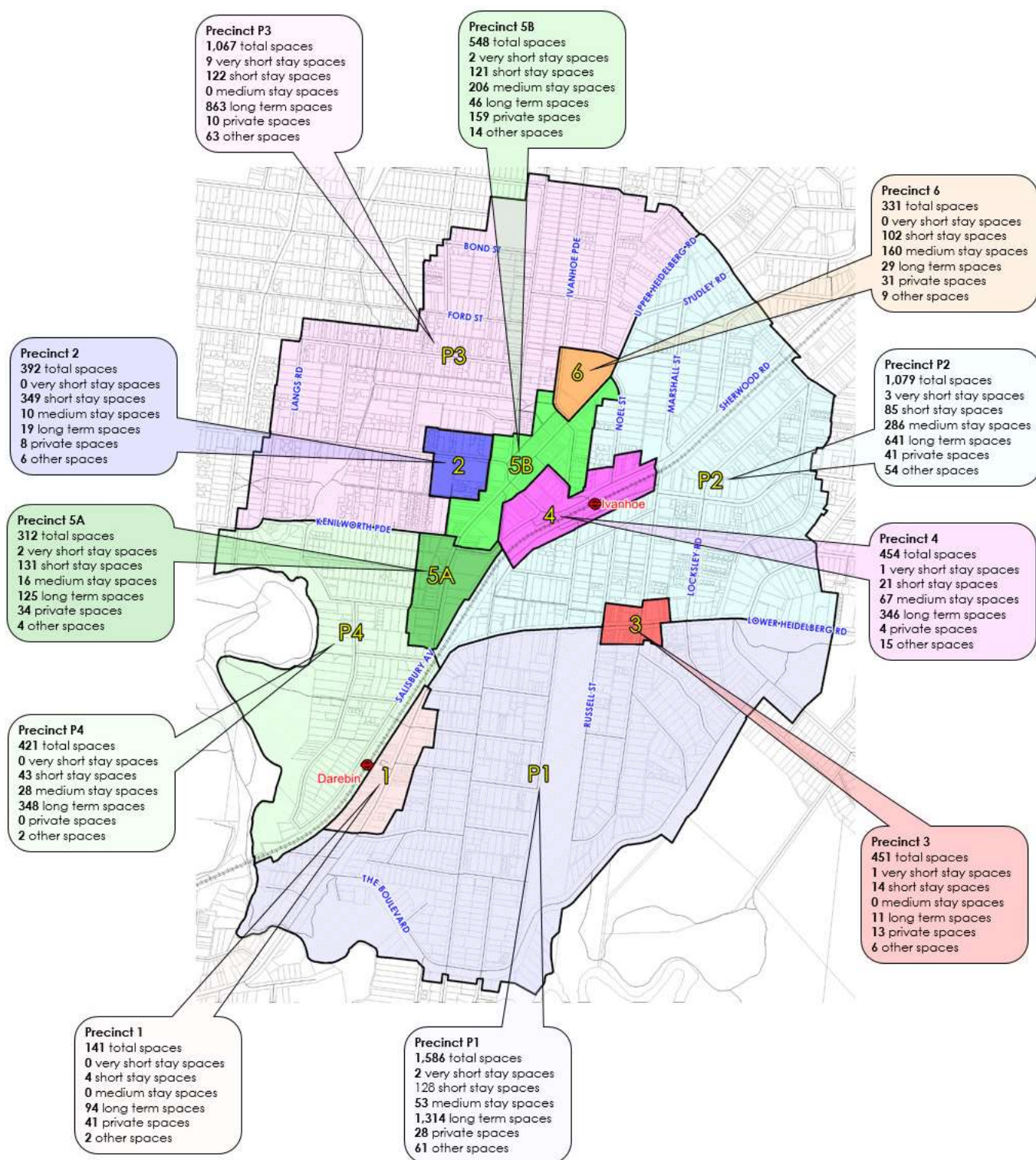
Note: The supply presented in the above table was surveyed at 1pm on Thursday 19 November 2015.

[1] Includes private, patient, permit, staff and family parking. May or may not have a set time limit.

[2] Includes disabled, loading and taxi zones

[3] Includes bus, clearways, no parking and no standing zones

Figure 6.1: Ivanhoe Parking Supply



In Summary, Table 6.1 and Figure 6.1 indicate the following:

#### Overall

- Overall the study area contains 6,376 parking spaces.
- Long stay parking (>4hr) constitutes 60% of space. Many of these 3,805 spaces are located in peripheral precincts.
- There are 65 spaces within the study area allocated to disabled, loading and taxi zones. Of these, 40 spaces are within the commercial precincts.
- Close to 10% of spaces are not publicly available.

#### Commercial Precincts

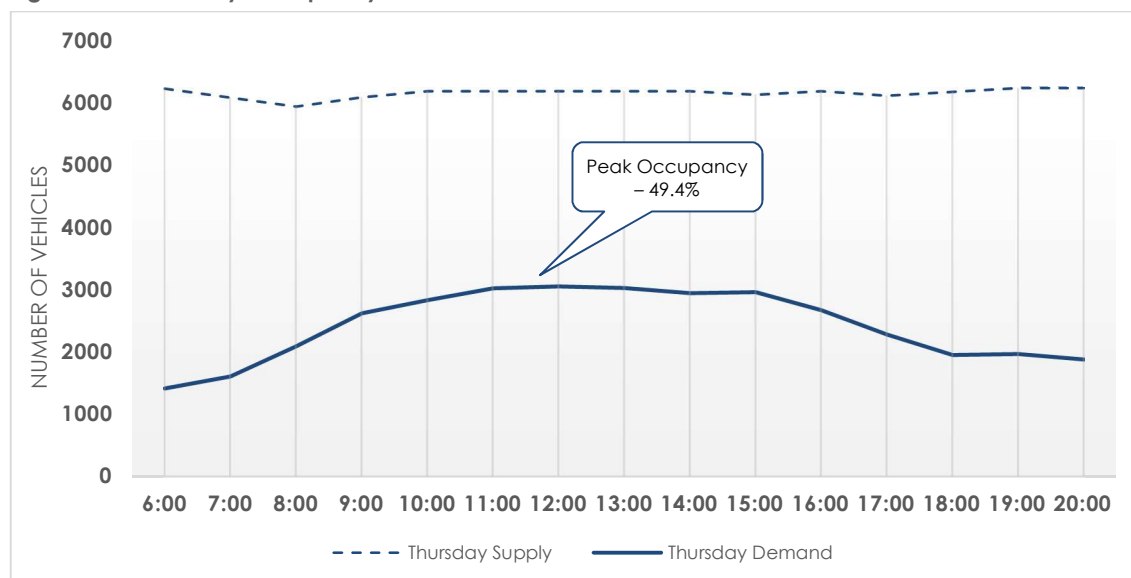
- The commercial precinct contains 2,223 spaces in total.
- There are 6 very short stay spaces with restrictions of 15min or 30min.
- Around a third of spaces (742) have short stay restrictions of 1P or 2P.
- Around 20% of spaces (459) have medium stay restrictions of 3P or 4P.
- Another 30% of spaces (670) are long stay spaces (over 4hrs).
- Precinct 4 contains the most long stay spaces (52%), as Ivanhoe Railway Station is within this precinct. These spaces are however technically restricted to rail commuters.
- There are a total of 139 spaces that require payment within the study area. These spaces are located on-street on Norman Street (Precinct 4) and off-street within the Woolworths car park lower level (Precinct 5A). These spaces have been allocated as long-stay as there is no maximum duration.
- It is noted that there are spaces along Salisbury Avenue near Darebin Station that now require payment (pay and display ticket), but were not ticketed spaces when these surveys were conducted in November 2015.

#### Peripheral Precincts

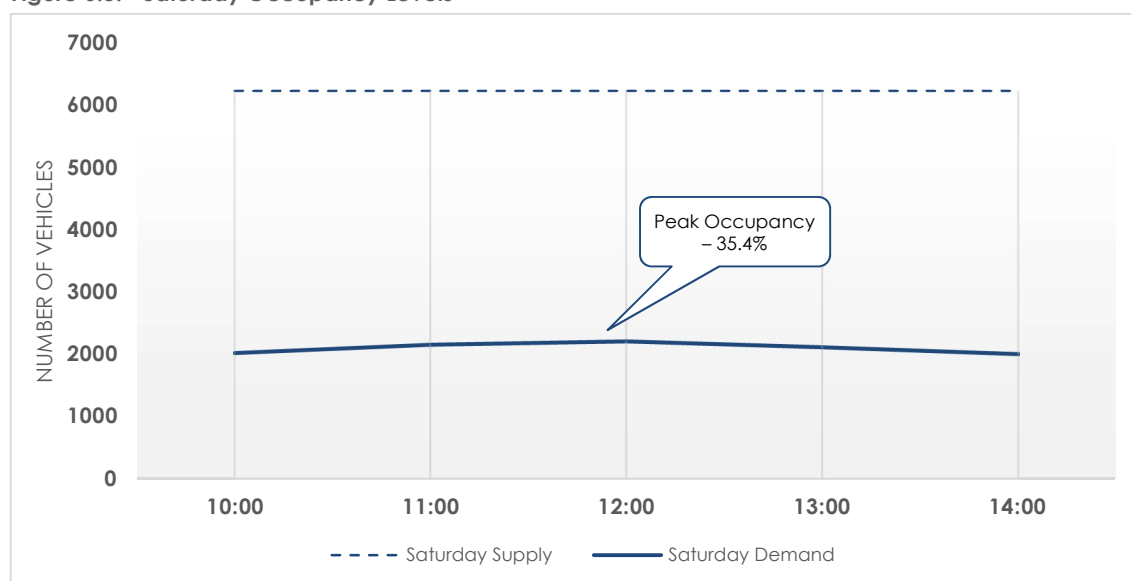
- The majority of parking (75.5%) within the peripheral residential areas is unrestricted, with the remaining mainly consisting of short stay (1P and 2P) and medium stay (3P and 4P).

## 6.3 Demand

Car parking demand surveys were completed at hourly intervals on the Thursday between 6:00am and 8:00pm and the Saturday between 10:00am and 2:00pm. The parking demands for Thursday and Saturday are shown in Figure 6.2 and Figure 6.3, respectively.

**Figure 6.2: Thursday Occupancy Levels**

Note: does not include Loading, Bus Zones, Clearways, No Standing, Taxi Zone, No standing and No Parking areas.

**Figure 6.3: Saturday Occupancy Levels**

Note: does not include Loading, Bus Zones, Clearways, No Standing, Taxi Zone, No standing and No Parking areas.

As can be seen from the above graphs, Thursday experienced higher demands, with the daily peak occurring at 12pm with 49.4% of spaces occupied. In comparison, Saturday's peak occurred at 12pm, with 35.4% of spaces occupied.

Given the higher demands surveyed on Thursday, further detailed analysis will therefore be restricted to Thursday data.

The overall car parking demands and the way in which car parking varies across the survey day within the commercial precincts and peripheral residential area is shown in Figure 6.4.

Figure 6.4: Ivanhoe Study Area – Commercial Precincts and Peripheral Precincts Demands

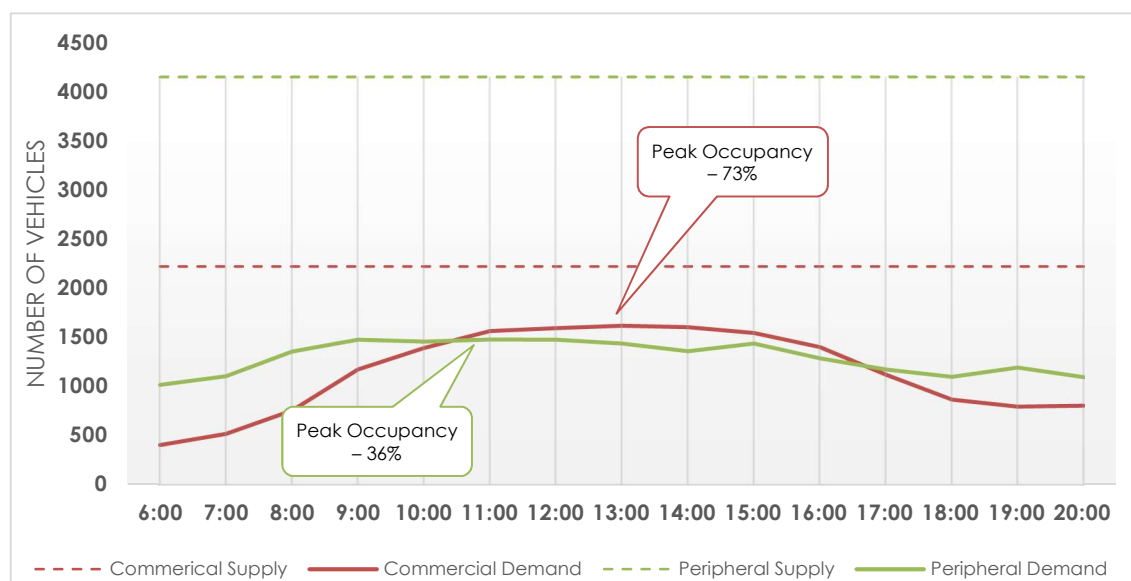


Figure 6.4 shows that the peak parking occupancy of 73% occurred at 1pm for the commercial precincts (noting that occupancy was generally high between 11am and 3pm), whilst the peak for the peripheral precincts of 36% occurred at 11am (noting that similar demands occurred throughout the day from 8am until 4pm).

To put these occupancy levels in context, a car parking occupancy of around 85% is typically considered to represent theoretical capacity. This occupancy level represents the equilibrium and a good utilisation of car parking and, given the dynamic nature of parking, provides the ability for drivers arriving to an area to find a car parking space without excessive circulation.

### 6.3.1 Commercial Precincts Demand

Figure 6.5 through Figure 6.11 illustrates the parking demand profiles within each of the commercial precincts and Table 6.2 provides a breakdown of car parking demands by restriction type as surveyed at 1pm on Thursday 19 November 2015.

Areas where demands exceed the theoretical 85% capacity level are shown in red in Table 6.2.



Figure 6.5: Precinct 1 (Darebin Station) –Parking Demand

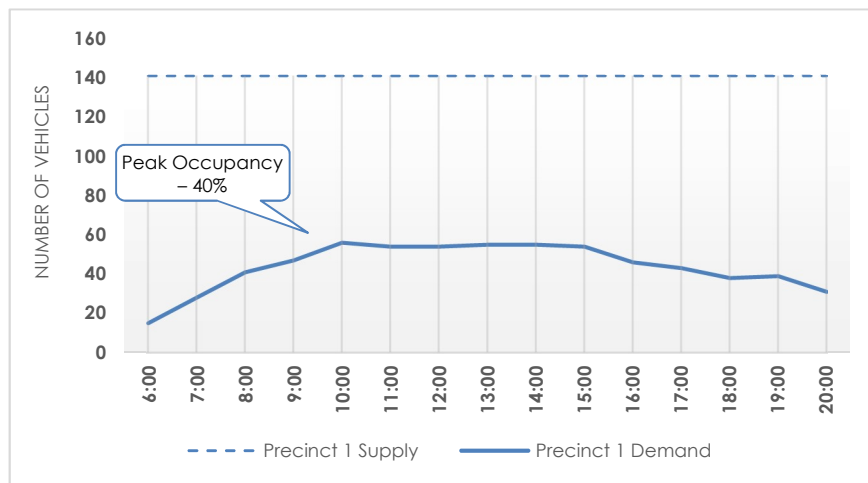


Figure 6.6: Precinct 2 (Livingston) - Parking Demand

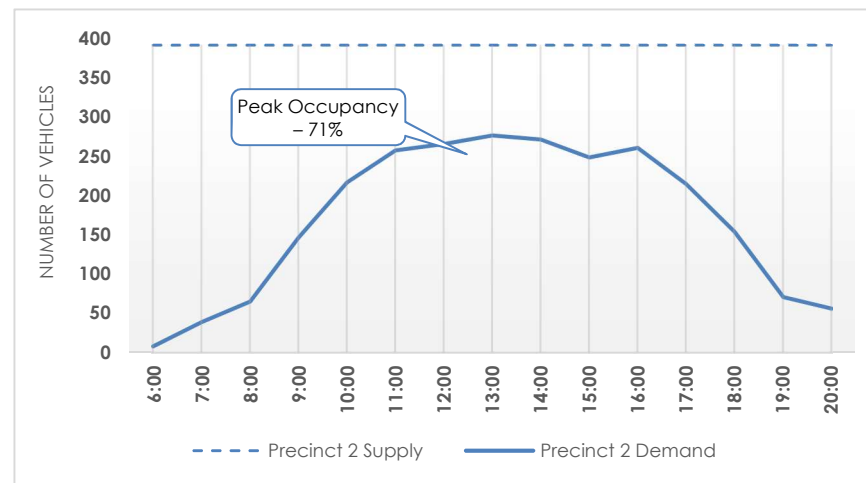


Figure 6.7: Precinct 3 (Marshall) - Parking Demand

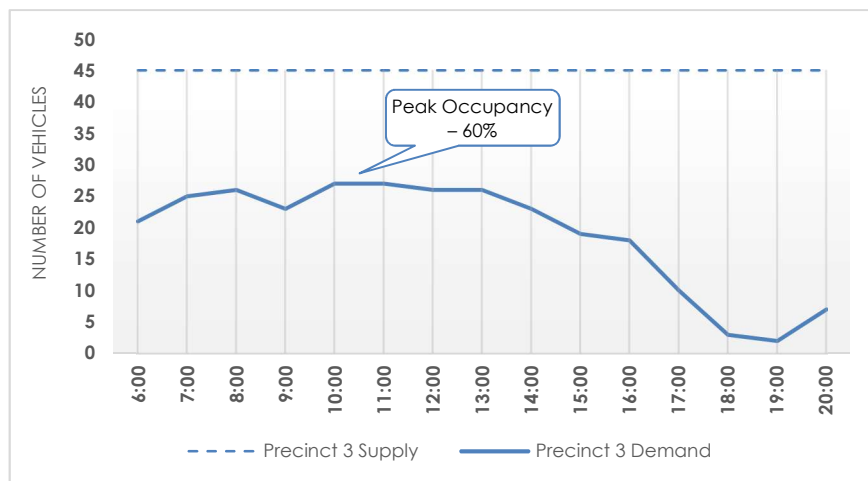


Figure 6.8: Precinct 4 (Ivanhoe Station) - Parking Demand

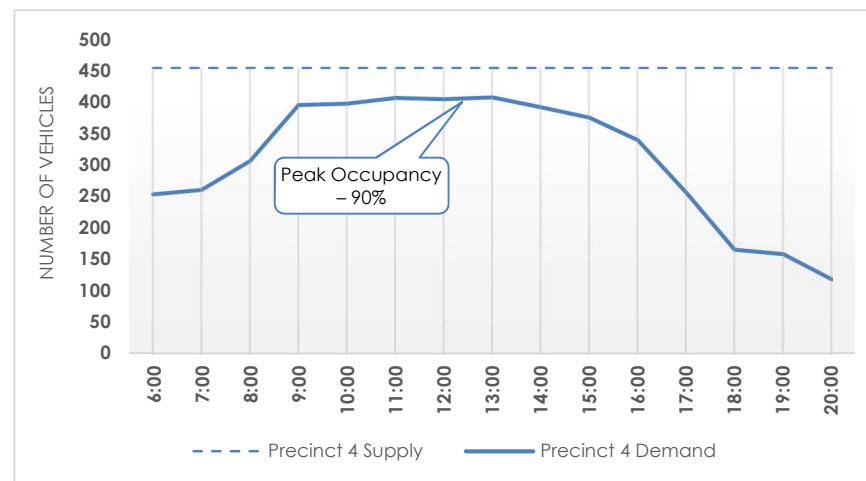


Figure 6.9: Precinct 5A (UHR-Lower) - Parking Demand

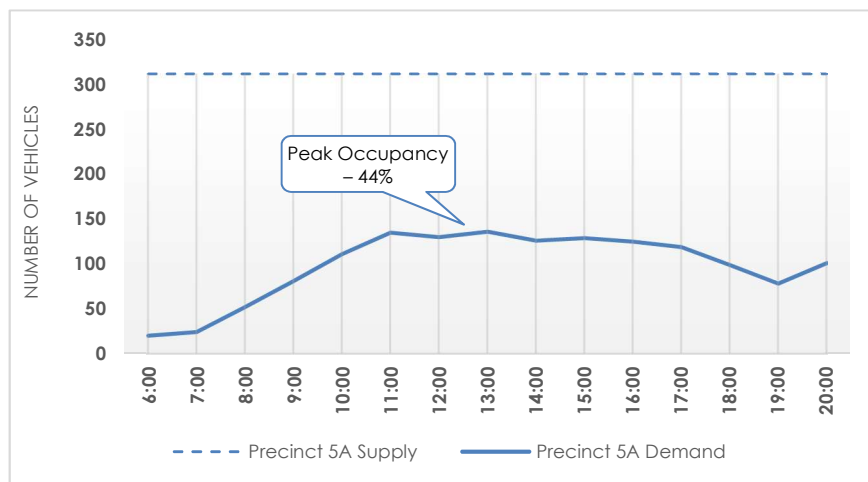


Figure 6.10: Precinct 5B (UHR-Upper) - Parking Demand

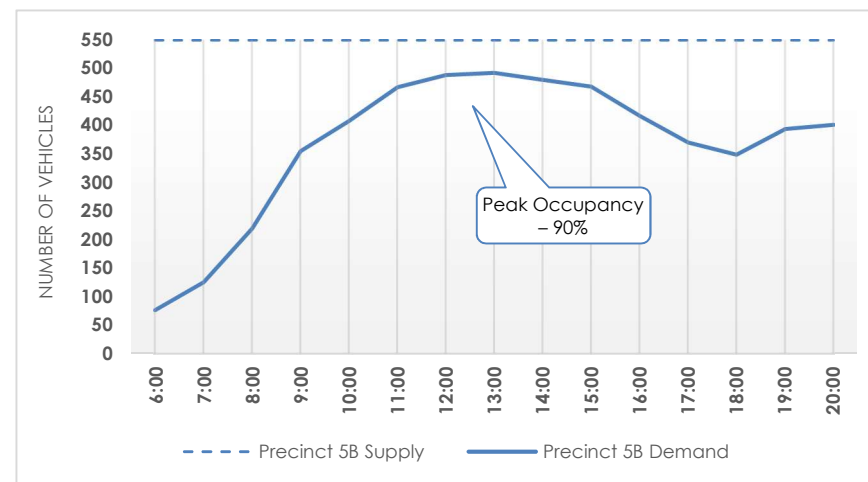


Figure 6.11: Precinct 6 (Civic Centre) - Parking Demand

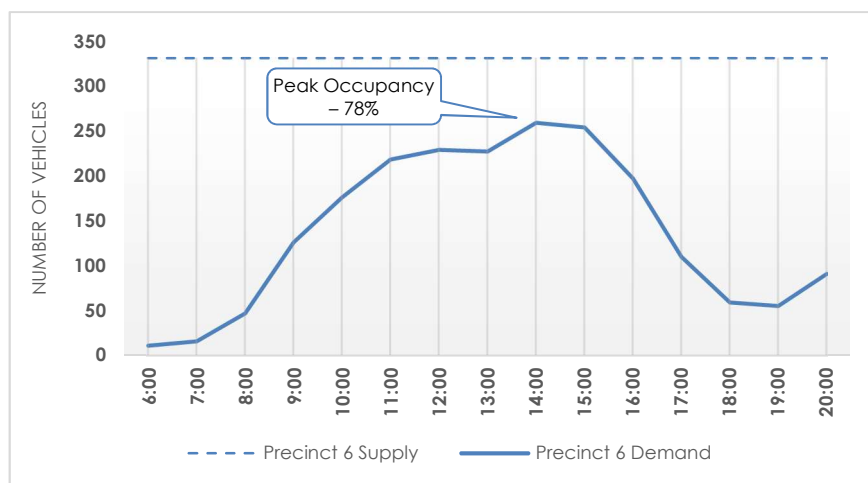


Table 6.2: Commercial Precincts Parking Demand (Thursday 19 November 2015 at 1pm)

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT 1 – Darebin Station				
Very Short Stay (VSS) (<1hr)	0	n/a	n/a	n/a
Short Stay (SS) (1hr-2hr)	4	3	75%	1
Medium Stay (MS) (3hr-4hr)	0	n/a	n/a	n/a
Long Stay (LS) (>4hr)	94	43	46%	51
Private [1]	41	8	20%	33
Other [2]	2	1	50%	1
Other [3]	0	n/a	n/a	n/a
Total	141	55	39%	86
PRECINCT 2 - Livingston				
Very Short Stay (VSS) (<1hr)	0	n/a	n/a	n/a
Short Stay (SS) (1hr-2hr)	349	238	68%	111
Medium Stay (MS) (3hr-4hr)	10	10	100%	0
Long Stay (LS) (>4hr)	19	17	89%	2
Private [1]	8	7	88%	1
Other [2]	6	5	83%	1
Other [3]	0	n/a	n/a	n/a
Total	392	277	71%	115
PRECINCT 3 - Marshall				
Very Short Stay (VSS) (<1hr)	1	1	100%	0
Short Stay (SS) (1hr-2hr)	14	6	43%	8
Medium Stay (MS) (3hr-4hr)	0	n/a	n/a	n/a
Long Stay (LS) (>4hr)	11	7	64%	4
Private [1]	13	7	54%	6
Other [2]	1	1	100%	0
Other [3]	5	4	80%	1
Total	45	26	58%	19
PRECINCT 4 – Ivanhoe Station				
Very Short Stay (VSS) (<1hr)	1	0	0%	1
Short Stay (SS) (1hr-2hr)	21	9	43%	12
Medium Stay (MS) (3hr-4hr)	67	66	99%	1
Long Stay (LS) (>4hr)	346	323	93%	23
Private [1]	4	2	50%	2
Other [2]	8	7	88%	1
Other [3]	7	0	0%	7
Total	454	407	90%	47
PRECINCT 5A – UHR-Lower				
Very Short Stay (VSS) (<1hr)	2	0	0%	2
Short Stay (SS) (1hr-2hr)	131	46	35%	85
Medium Stay (MS) (3hr-4hr)	16	13	81%	3
Long Stay (LS) (>4hr)	125	51	41%	74
Private [1]	34	24	71%	10
Other [2]	4	2	50%	2
Other [3]	0	n/a	n/a	n/a
Total	312	136	44%	176

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT 5B – UHR-Upper				
Very Short Stay (VSS) (<1hr)	2	1	50%	1
Short Stay (SS) (1hr-2hr)	121	117	97%	4
Medium Stay (MS) (3hr-4hr)	206	183	89%	23
Long Stay (LS) (>4hr)	46	46	100%	0
Private [1]	159	136	86%	23
Other [2]	10	8	80%	2
Other [3]	4	0	0%	4
Total	548	491	90%	57
PRECINCT 6 – Civic Centre				
Very Short Stay (VSS) (<1hr)	0	n/a	n/a	n/a
Short Stay (SS) (1hr-2hr)	102	81	79%	21
Medium Stay (MS) (3hr-4hr)	160	106	66%	54
Long Stay (LS) (>4hr)	29	12	41%	17
Private [1]	31	23	74%	8
Other [2]	9	5	56%	4
Other [3]	0	n/a	n/a	n/a
Total	331	227	69%	104
ALL PRECINCTS				
Very Short Stay (VSS) (<1hr)	6	2	33%	4
Short Stay (SS) (1hr-2hr)	742	500	67%	242
Medium Stay (MS) (3hr-4hr)	459	378	82%	81
Long Stay (LS) (>4hr)	670	499	74%	171
Private [1]	290	207	71%	83
Other [2]	40	29	73%	11
Other [3]	16	4	25%	12
Total	2,223	1,619	73%	604

Note: The demands presented in the above table were surveyed at 1pm on Thursday 19 November 2015.

[1] Includes private, patient, permit, staff and family parking. May or may not have a set time limit.

[2] Includes disabled, loading and taxi zones

[3] Includes bus, clearways, no parking and no standing zones

Figure 6.12: Commercial Precincts Parking Demand (Thursday 19 November 2015 at 1pm)

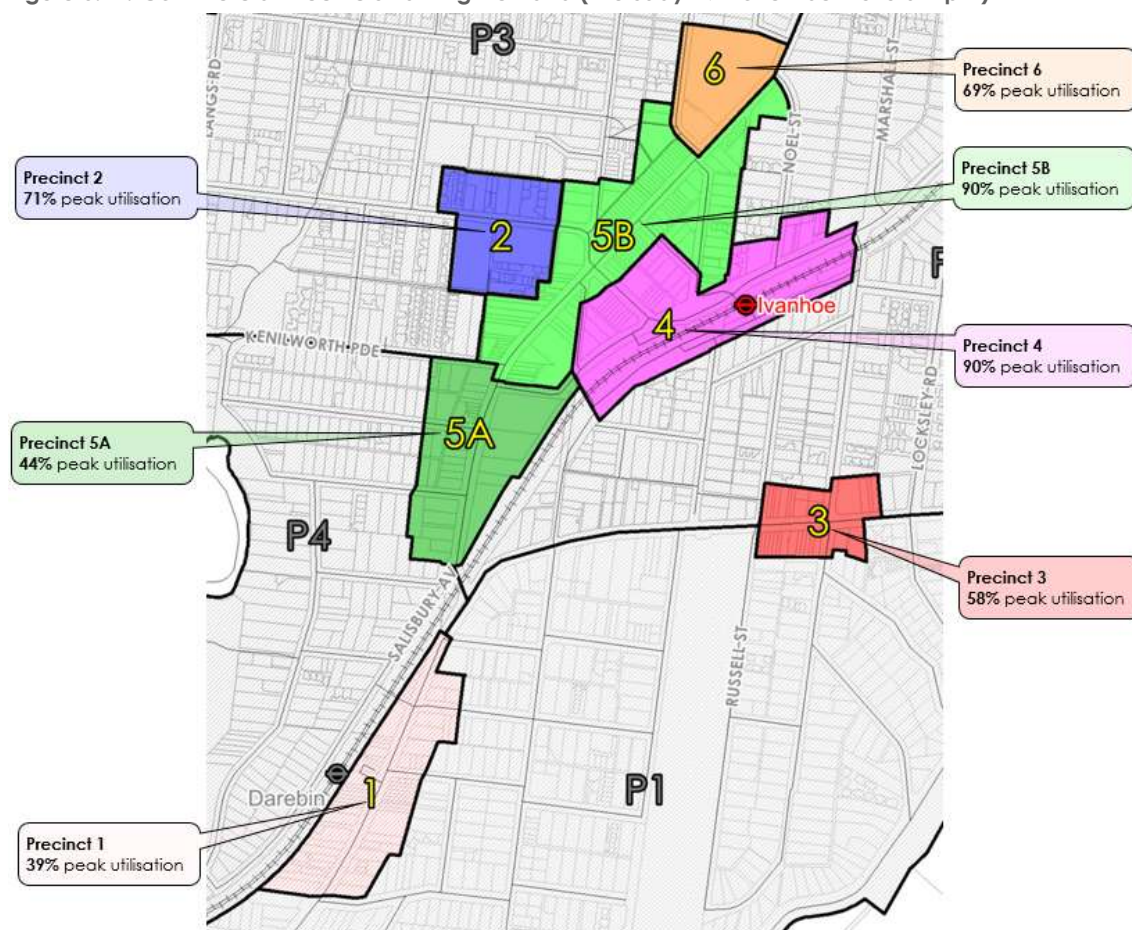


Figure 6.5 through Figure 6.11, Table 6.2 and Figure 6.12 indicate the following:

- Overall parking demands within the commercial precincts peak at 1pm with a demand of 1,619 spaces (73% occupancy).
- Across the commercial precinct, at 1pm:
  - the busiest restriction was the medium stay spaces (3hr-4hr), which experienced an occupancy level of 82%
  - the very short stay spaces had a limited supply, with only 6 spaces, however only two of these spaces (33%) were occupied
- **Precinct 1** generally experienced good levels of occupancy, with only short stay showing demands above 75% (with a total supply of only 4 spaces).
- **Precinct 2** experiences higher than ideal demands in both medium stay and long stay spaces, with 100% and 89% occupancy, respectively. The supply of these spaces, however, was quite low with only 10 and 19 spaces within the precinct, respectively.
- **Precinct 3** only experiences high demands in the very short stay and the other (disabled, loading and taxi zones) restrictions, each experiencing a demand of 100% at 1pm. It must be noted that each of these categories has a supply of one space each, so that it is very likely that these categories will experience 100% demands.
- **Precinct 4** experiences high demands in the medium stay and long stay restrictions, with an occupancy of 99% (66 cars) and 93% (323 cars), respectively. Precinct 4 includes parking around Ivanhoe Railway Station, including 50 all-day ticket spaces along Norman Street that do not exceed 64% occupancy throughout the day.



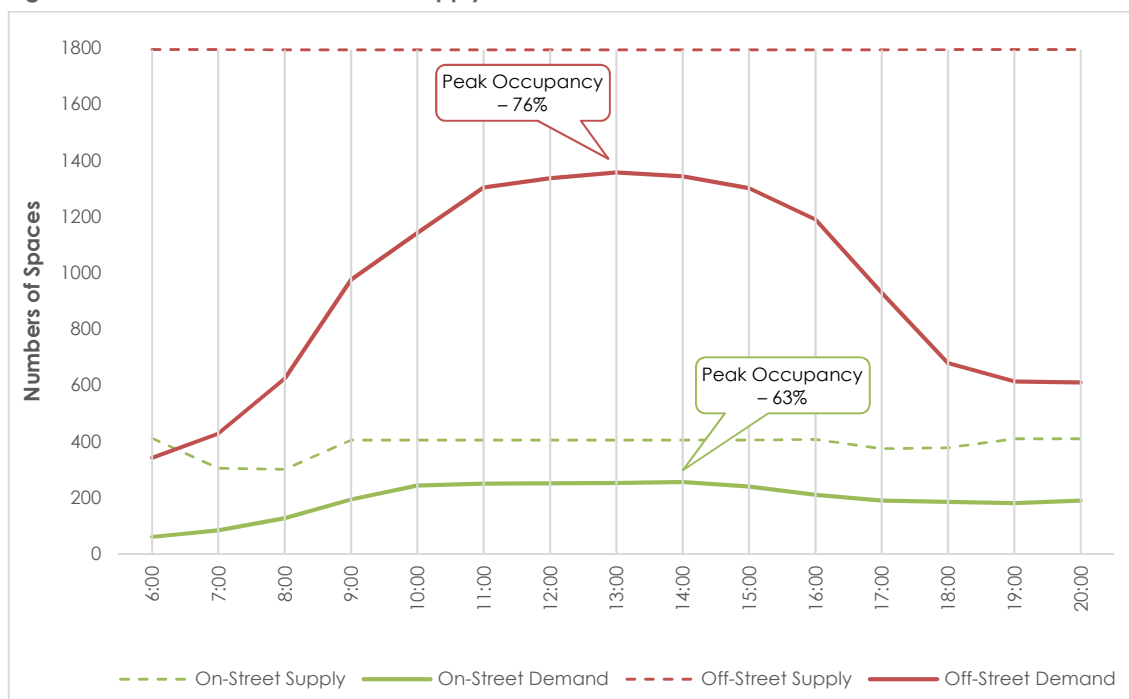
- **Precinct 5A** experiences reasonable demands across the restrictions, except for the medium stay parking where 81% of these spaces are occupied. There is a small supply of these spaces, however, with only 16 spaces within the precinct. While the long stay spaces only experience a demand of 41%, it should be noted that 71% of these 125 spaces are ticketed spaces within the Woolworths off-street car park. Should only unpaid spaces be counted, the long stay spaces within Precinct 5A would experience a demand of 75% (27 cars) at 1pm.
- **Precinct 5B** appears to experience the highest demand of all precincts, with its short stay, medium stay and long stay parking all generating demands of 97% (117 cars), 89% (183 cars) and 100% (46 cars) at 1pm, respectively. The other [2] category (disabled, loading and taxi zones) experienced demands of 80% (8 vehicles) and private parking within this precinct is also quite high, with 86% of spaces occupied.
- **Precinct 6** generally experienced adequate demands, with only the short stay parking reaching demands of 79% (81 cars) and demands reaching between 41% and 66% within the other public spaces.

### Off-Street and On-Street Demands

The distribution of off-street and on-street spaces within the commercial precincts were consistent throughout the day, with approximately 1,800 spaces located off-street and approximately 400 spaces located on-street (with approximately 300 on-street spaces between 7am and 8am).

The supply and demand of the off-street and on-street spaces for the commercial precincts from 6am until 8pm on Thursday are provided in Figure 6.13.

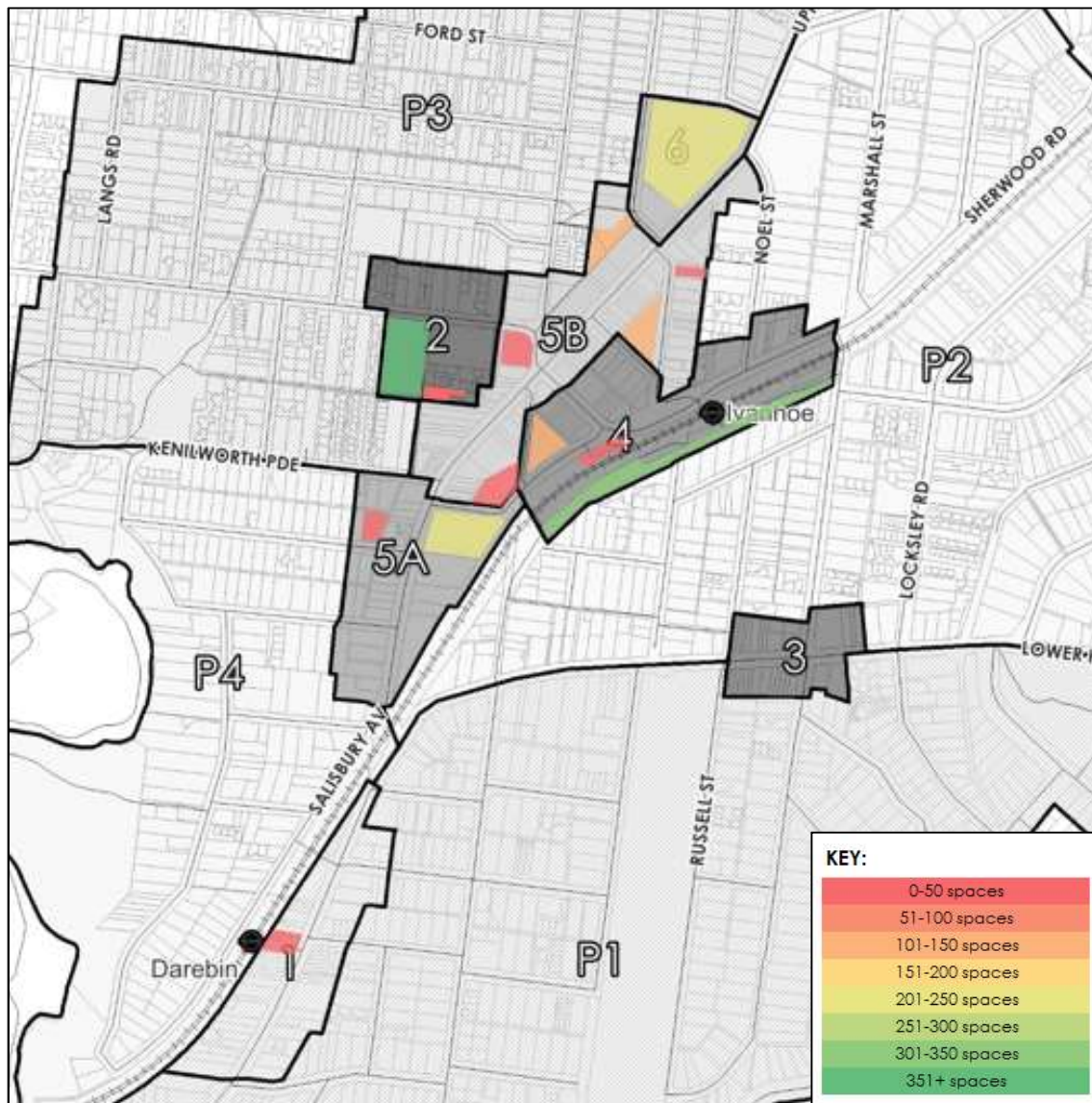
**Figure 6.13: Off-Street and On-Street Supply and Demand**



This graph shows that the off-street spaces are low in demand at the start and end of the day, with 19% occupancy of spaces at 6am, but that these spaces experience a higher peak in the middle of the day with above 73% occupancy between 11am and 3pm. Conversely, the on-street demand is more consistent throughout the day, with between approximately 50% and 63% of spaces occupied between 9am and 6pm.

The off-street spaces are located throughout the commercial precincts, as shown in the heat map presented in Figure 6.14.

Figure 6.14: Heat Map of Off-Street Parking Supply in Commercial Zones



### 6.3.2 Peripheral Precincts Parking Demand

Figure 6.15 through Figure 6.18 illustrates the parking demand profiles within each of the peripheral precincts and Table 6.3 provides a breakdown of car parking demands by restriction type.

Figure 6.15: Precinct P1 Parking Demand

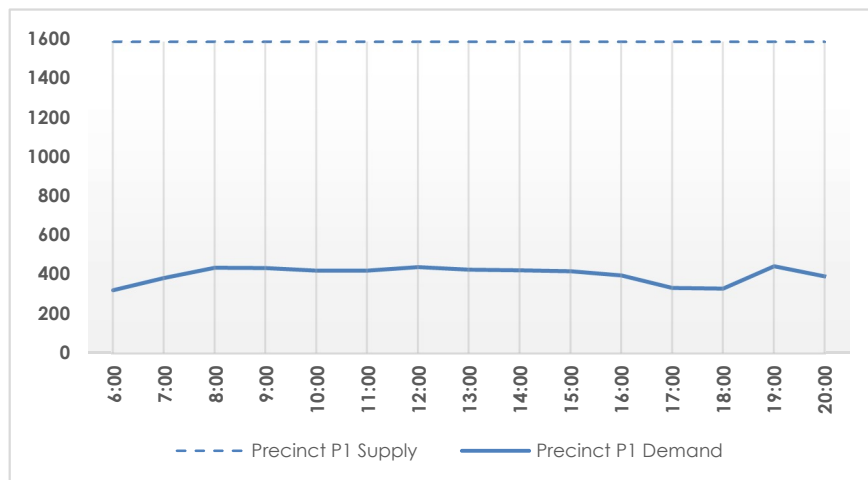


Figure 6.16: Precinct P2 Parking Demand

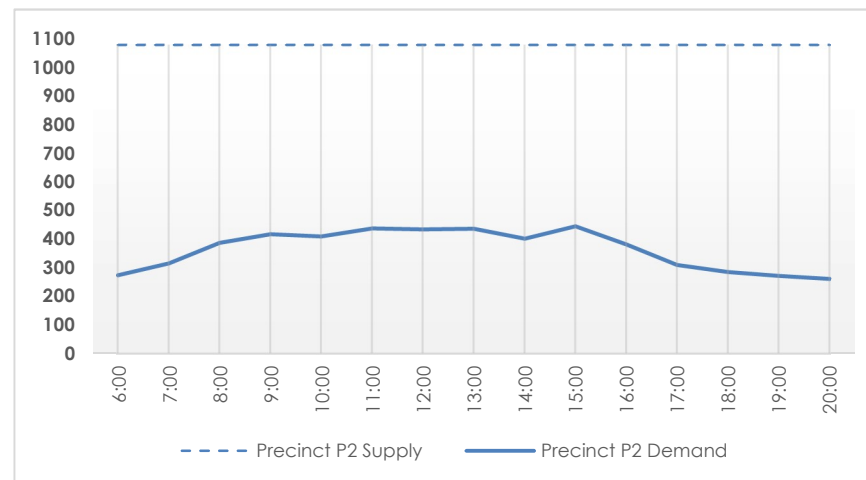


Figure 6.17: Precinct P3 Parking Demand

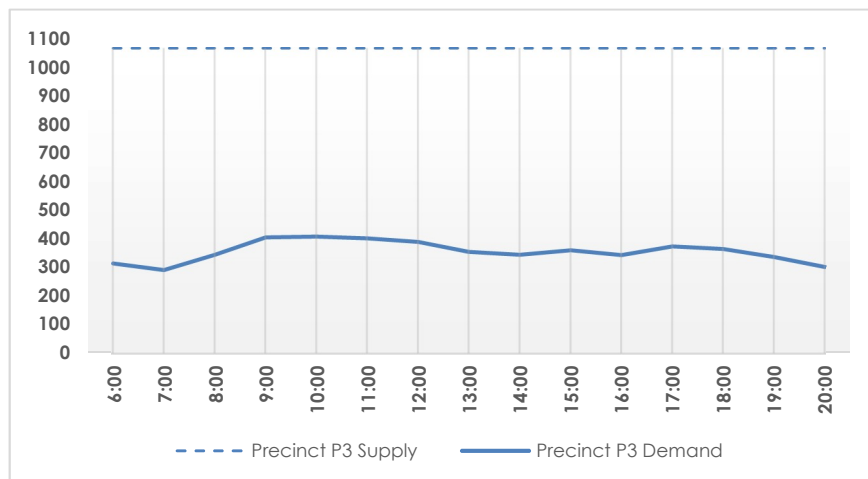


Figure 6.18: Precinct P4 Parking Demand

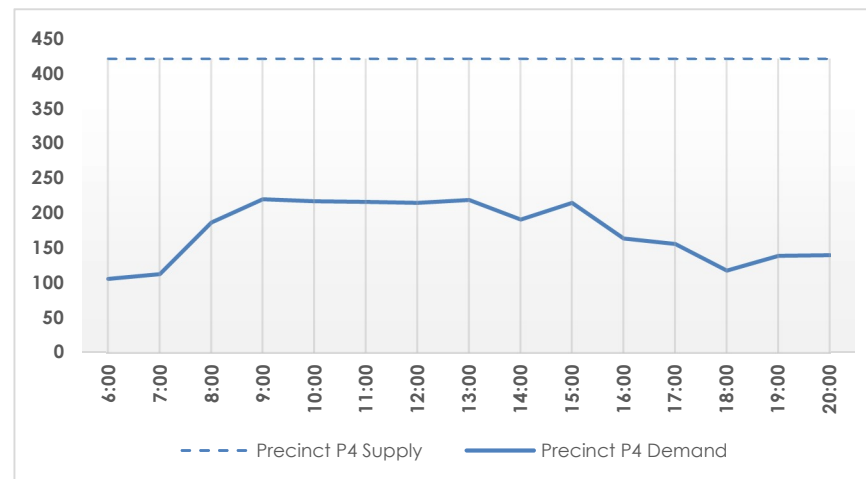


Table 6.3: Peripheral Precincts Parking Demand (Thursday 19 November 2015 at 1pm)

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT P1				
Very Short Stay (VSS) (<1hr)	2	0	0%	2
Short Stay (SS) (1hr-2hr)	128	32	25%	96
Medium Stay (MS) (3hr-4hr)	53	15	28%	38
Long Stay (LS) (>4hr)	1,314	348	26%	966
Private [1]	28	21	75%	7
Other [2]	15	9	60%	6
Other [3]	46	1	2%	45
Total	1,586	426	27%	1160
PRECINCT P2				
Very Short Stay (VSS) (<1hr)	3	0	0%	3
Short Stay (SS) (1hr-2hr)	85	26	31%	59
Medium Stay (MS) (3hr-4hr)	286	102	36%	184
Long Stay (LS) (>4hr)	610	281	46%	329
Private [1]	41	15	37%	26
Other [2]	4	0	0%	4
Other [3]	50	12	24%	38
Total	1,079	436	40%	643
PRECINCT P3				
Very Short Stay (VSS) (<1hr)	9	2	22%	7
Short Stay (SS) (1hr-2hr)	122	30	25%	92
Medium Stay (MS) (3hr-4hr)	0	n/a	n/a	n/a
Long Stay (LS) (>4hr)	863	318	37%	545
Private [1]	10	5	50%	5
Other [2]	5	0	0%	5
Other [3]	58	1	2%	57
Total	1,067	356	33%	711
PRECINCT P4				
Very Short Stay (VSS) (<1hr)	0	n/a	n/a	n/a
Short Stay (SS) (1hr-2hr)	43	25	58%	18
Medium Stay (MS) (3hr-4hr)	28	12	43%	16
Long Stay (LS) (>4hr)	348	182	52%	166
Private [1]	0	n/a	n/a	n/a
Other [2]	1	0	0%	1
Other [3]	1	0	0%	1
Total	421	219	52%	202
ALL PRECINCTS				
Very Short Stay (VSS) (<1hr)	14	2	14%	12
Short Stay (SS) (1hr-2hr)	378	113	30%	265
Medium Stay (MS) (3hr-4hr)	367	129	35%	238
Long Stay (LS) (>4hr)	3,135	1,129	36%	2,006
Private [1]	79	41	52%	38
Other [2]	25	9	36%	16
Other [3]	155	14	9%	141
Total	4,153	1,437	35%	2,716

Note: The demands presented in the above table were surveyed at 1pm on Thursday 19 November 2015.

[1] Includes private, patient, permit, staff and family parking. May or may not have a set time limit.

[2] Includes disabled, loading and taxi zones

[3] Includes bus, clearways, no parking and no standing zones

Figure 6.15 through Figure 6.18 and Table 6.3 indicate the following:

- At 1pm, there is a demand of 1,437 spaces (35%) within the peripheral precincts.
- Overall parking demands within the peripheral precincts peak at 11am with a demand of 1,479 spaces (36% occupancy).
- The peripheral precincts maintain a consistent demand (of between 31% and 35.6%) between 8am and 4pm.
- Demands outside this period do not fluctuate significantly, with the peripheral precincts maintaining a consistent demand of between 24.5% and 28.7%
- Within the publicly accessible car parking (that is, not including private, or either 'other' categories), Precinct P4 recorded the highest demands of 52% of spaces occupied. The remaining three precincts generally ranged between 26% and 42%.
- It is noted that day-time off-peak demands are slightly higher than the early morning and evening off-peak demands, which indicates a non-residential parking demand within these peripheral precincts.
- It is also noted that 1P and 2P parking restrictions are implemented on some residential streets within close proximity to the commercial precincts in order to balance short term parking needs of visitors to the activity centre with resident parking and to limit overspill of commuter and staff parking. The utilisation of 2P parking is relatively low in Precincts P1, P2 and P3 (25%, 31% and 25%, respectively), however in Precinct P4 this demand is much greater at 58% occupancy within these spaces.

## 6.4 Duration of Stay

As part of the car parking demand surveys, duration of stay surveys at 15-minute intervals were also collected within the commercial precincts (1, 2, 4, 5A, 5B and 6). It was agreed that duration of stay surveys within Precinct 3 were not required as this precinct is known to be less busy than the other commercial precincts.

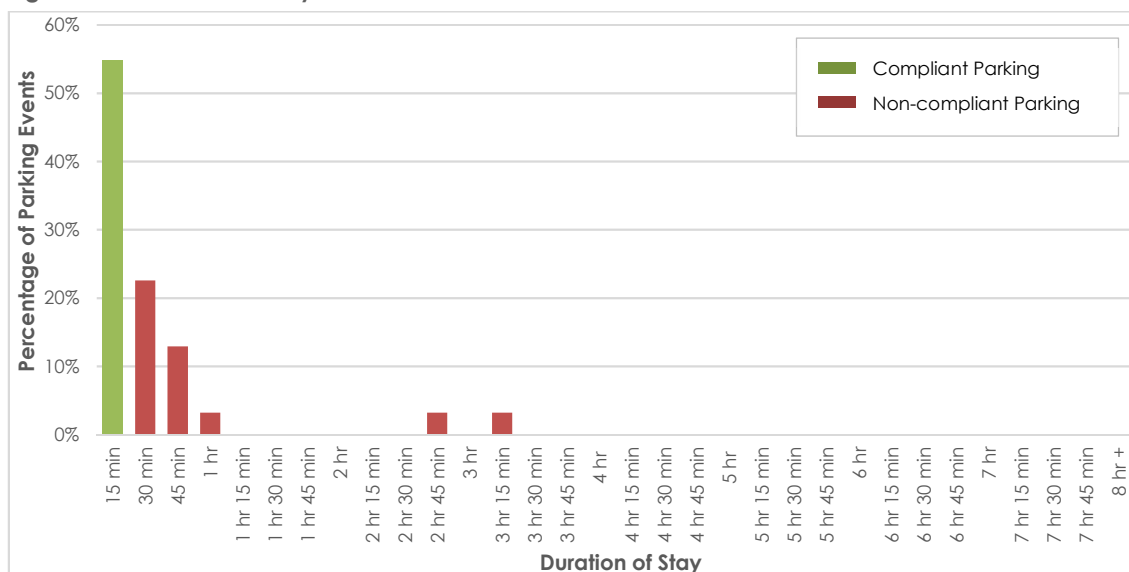
The associated results are discussed below.



### 6.4.1 15 Minute Parking

Figure 6.19 shows recorded duration that users were staying within the 15 minute zones (found only within Precinct 5B).

**Figure 6.19: Duration of Stay: 15 Minute Restriction**

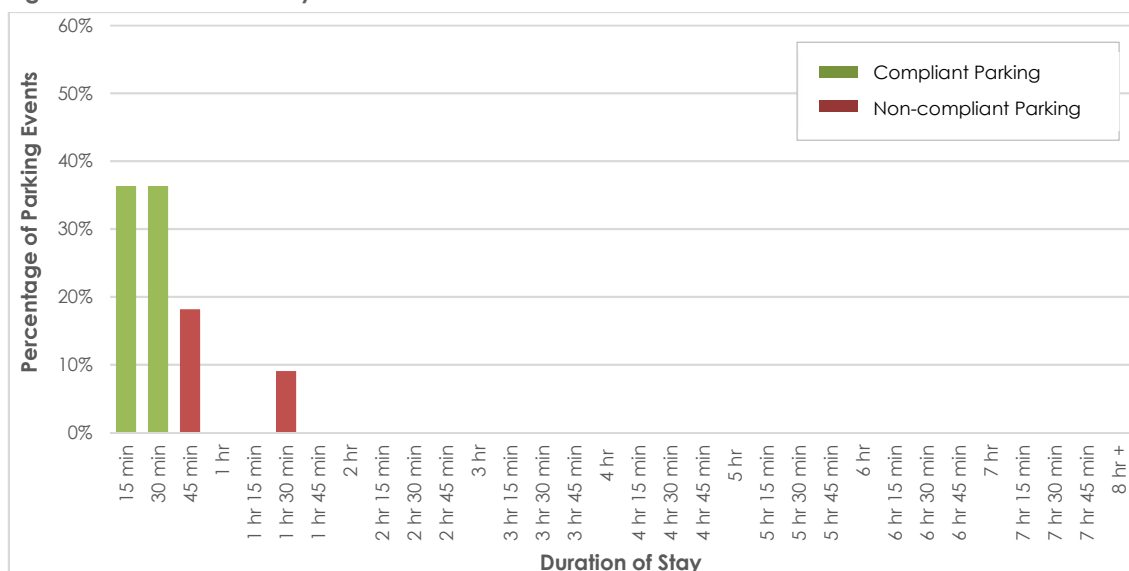


Just over half of users (55%) of the 15 minute time restricted parking spaces currently comply with the time restrictions. A further 23% of users stayed in their space for between 15 and 30 minutes. 23% of events (26 events) stayed within their space for more than 30 minutes.

### 6.4.2 30 Minute Parking

Figure 6.20 shows recorded duration that users were staying within the 30 minute zones (found only within Precinct 5A).

**Figure 6.20: Duration of Stay: 30 Minute Restriction**

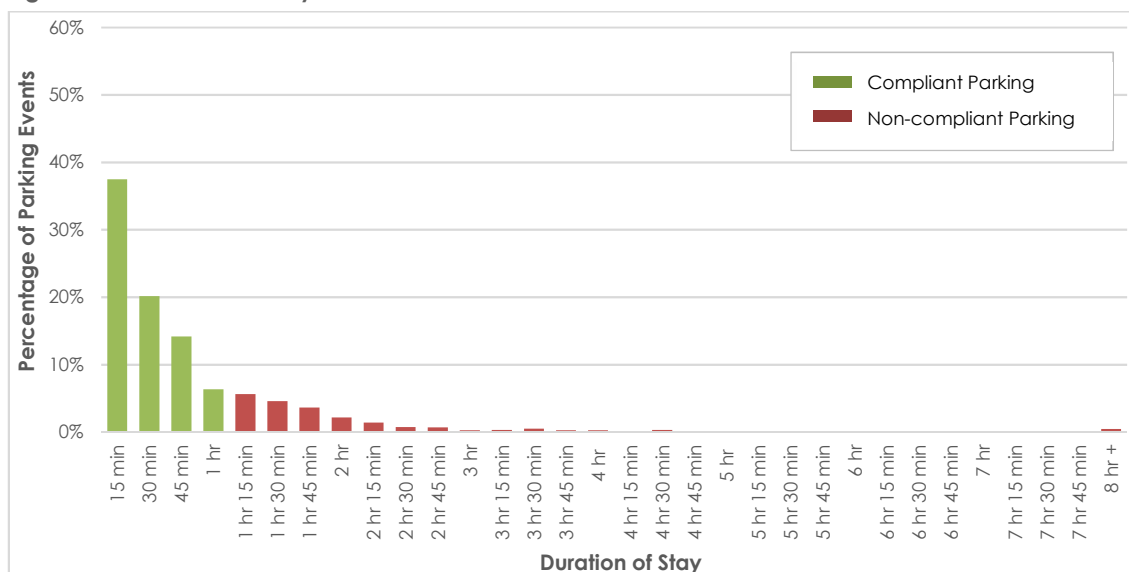


A majority of users (73%) of the 30 minute time restricted spaces comply with time restrictions. Three events (27%) were recorded as exceeding the 30 minute restriction. It should be noted that only a total of 11 parking occurrences were recorded within the 30 minute time restricted spaces.

### 6.4.3 1 Hour Parking

Figure 6.21 shows recorded duration that users were staying within the 1P zones (found within Precinct 1, Precinct 5A, Precinct 5B and Precinct 6).

**Figure 6.21: Duration of Stay: 1 Hour Restriction**

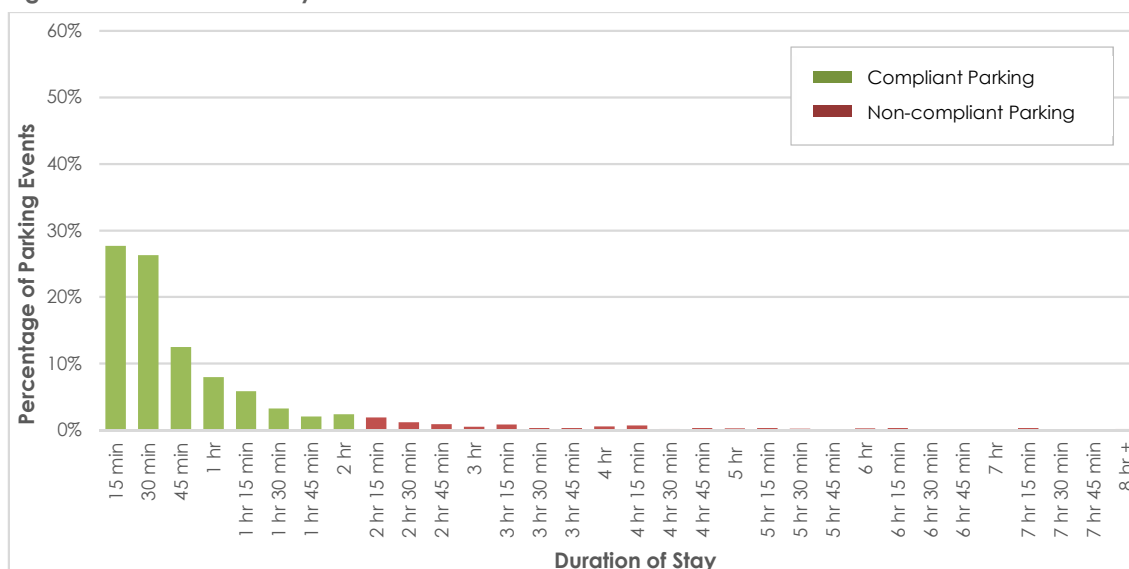


A majority of users (78%) of the 1P time restricted spaces currently comply with the time restrictions. Therefore, 22% of events (266 events) exceeded the 1P time restriction, with a majority of overstay events (16%) representing a parking during between 1 and 2 hours.

### 6.4.4 2 Hour Parking

Figure 6.22 shows recorded duration that users were staying within the 2P zones (found within Precinct 2, Precinct 5A, Precinct 5B and Precinct 6).

**Figure 6.22: Duration of Stay: 2 Hour Restriction**

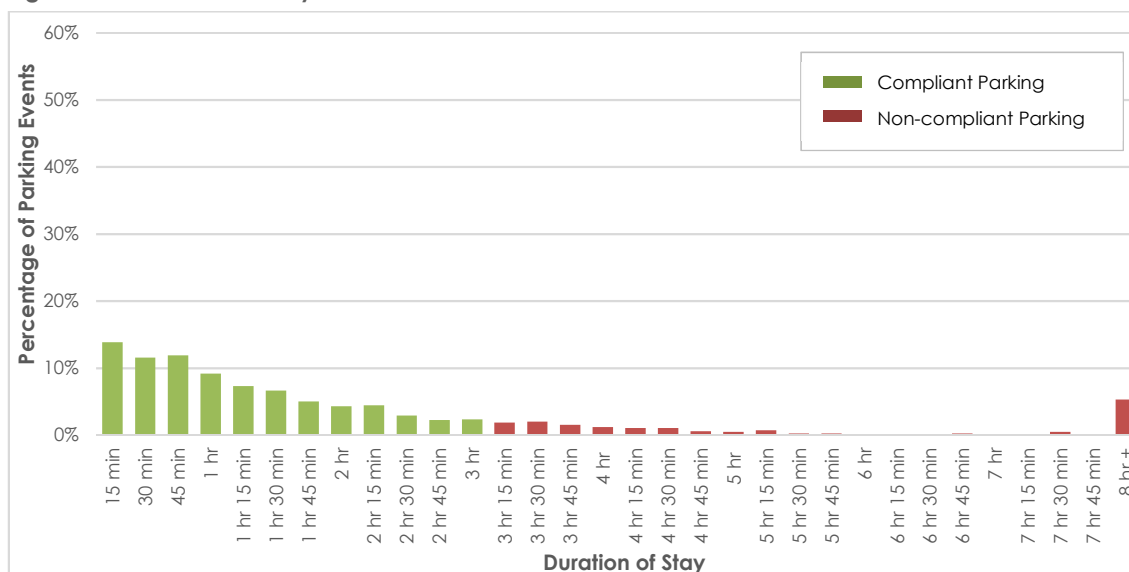


88% of events (2242 events) of the 2P time restricted spaces comply with the imposed restrictions and 12% of events (306 events) exceeded the 2P time restriction. In the order of 145 events (6%) stayed within the 2P spaces for four hours or greater. It is also noted that a large portion of events within the 2P zones (74%) only stayed within these spaces for 1 hour or less.

### 6.4.5 3 Hour Parking

Figure 6.23 shows recorded duration that users were staying within the 3P zones (found within Precinct 4, Precinct 5A, Precinct 5B and Precinct 6).

**Figure 6.23: Duration of Stay: 3 Hour Restriction**

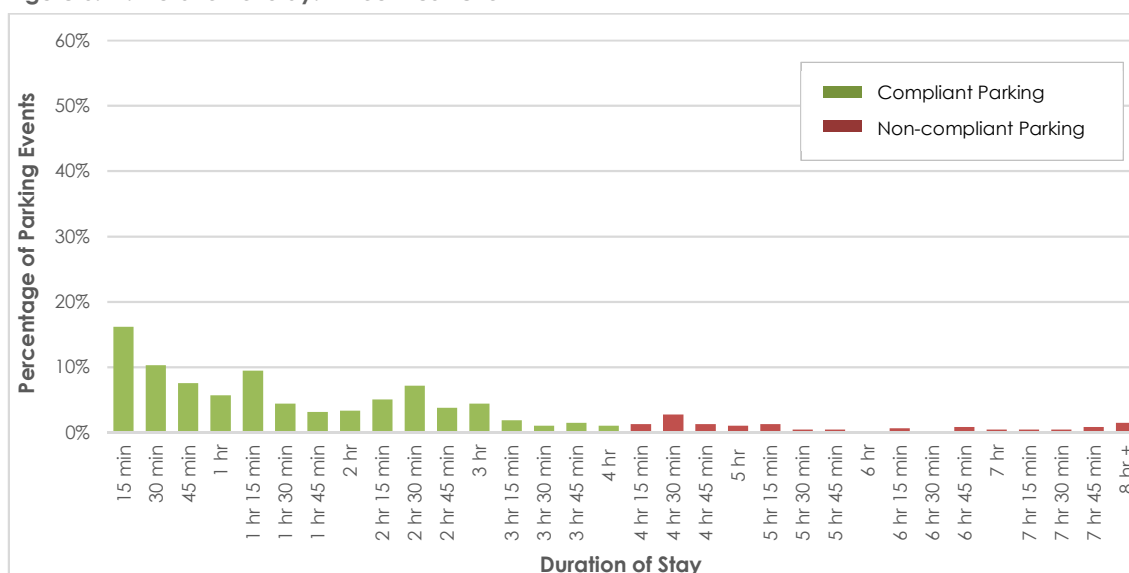


Within the 3P time restricted spaces, 82% of events (1006 events) complied with the time restrictions, with the remaining 18% of events (220 events) exceeding the limit. 5% of events (59 events) stayed within these 3P spaces for eight hours or greater. A significant number of events (70%) were only within these 3P spaces for 2 hours or less.

### 6.4.6 4 Hour Parking

Figure 6.24 shows recorded duration that users were staying within the 4P zones (found within Precinct 2 and Precinct 5B).

**Figure 6.24: Duration of Stay: 4 Hour Restriction**

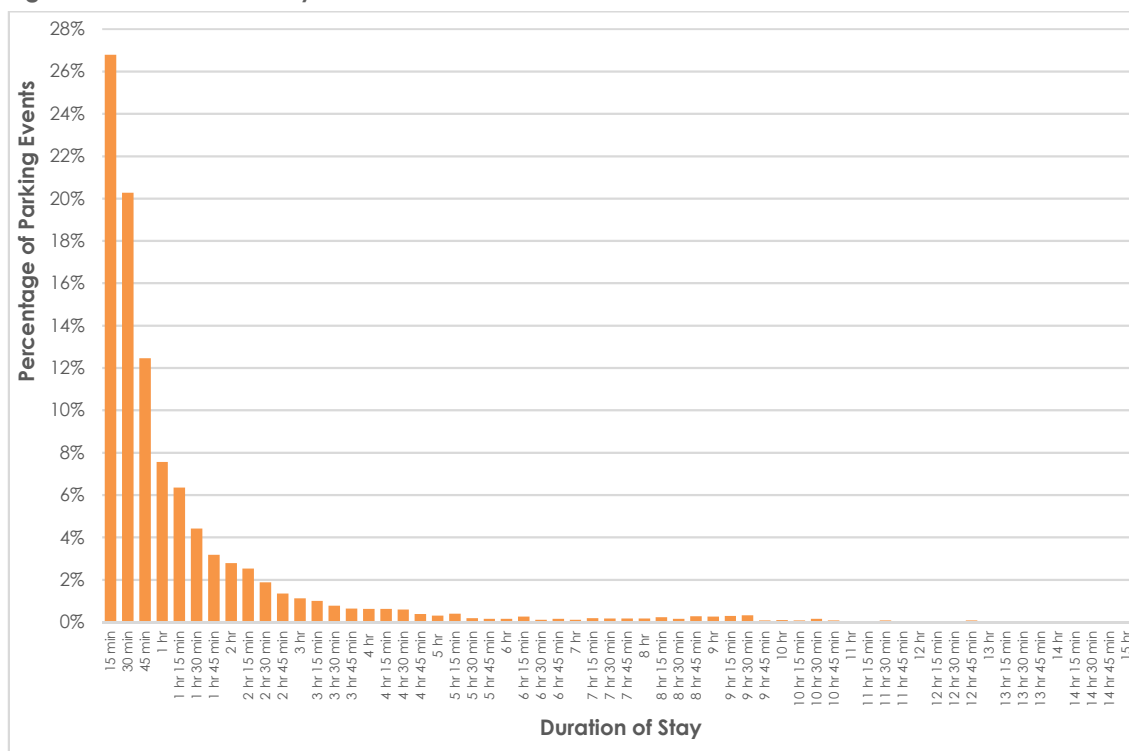


A majority of events (86%) of the 4P time restricted spaces currently comply with the time restriction and 14% of events (66 events) exceeded the 4P time restriction. 40% of parking events (189 events) within 4P zones were recorded as only parking for 1 hour or less.

## 6.4.7 All Time Restrictions

Figure 6.25 shows the recorded duration that users were staying within all of the time restricted zones (i.e. 15 minute, 30 minute, 1P, 2P, 3P and 4P) within Precincts 1, 2, 4, 5A, 5B and 6.

**Figure 6.25: Duration of Stay: All Restrictions**



This graph shows that:

- 67% (3,976) of parking events are for less than 1 hour
- 17% (991) of parking events are for 1 hour to 1 hour 45 min
- 7% (407) of parking events are for 2 hours to 2 hours 45 min
- 3% (180) of parking events are for 3 hours to 3 hours 45 min
- 6% (374) of parking events are for 4 hours or greater.

A comparison of the percentage of total spaces and percentage of total parking events by duration for the commercial precincts is provided in Table 6.4.

**Table 6.4: Comparison of Supply of Spaces and Parking Events**

Restriction		Percentage of Spaces	Percentage of Parking Events
Very Short Stay (VSS)	< 1 hour	0.3%	67%
Short Stay (SS)	1 hour – 2 hour	39.3%	17%
Medium Stay (MS)	3 hour – 4 hour	24.8%	10%
Long Stay (LS)	> 4 hours	35.6%	6%

Table 6.4 shows that the majority of events within the commercial precincts occur for less than an hour, however only 0.3% of spaces (5 spaces) within these precincts are restricted to 1P or less.

## 6.5 Parking for People with Disabilities

Details of the supply and demand for Disabled Parking spaces within the commercial precincts is shown in Figure 6.26, with the distribution of these spaces across the commercial precincts shown in Table 6.5. The duration of which users stay within disabled spaces is shown in Figure 6.27.

Figure 6.26: Supply and Demand of Disabled Spaces within Commercial Precincts

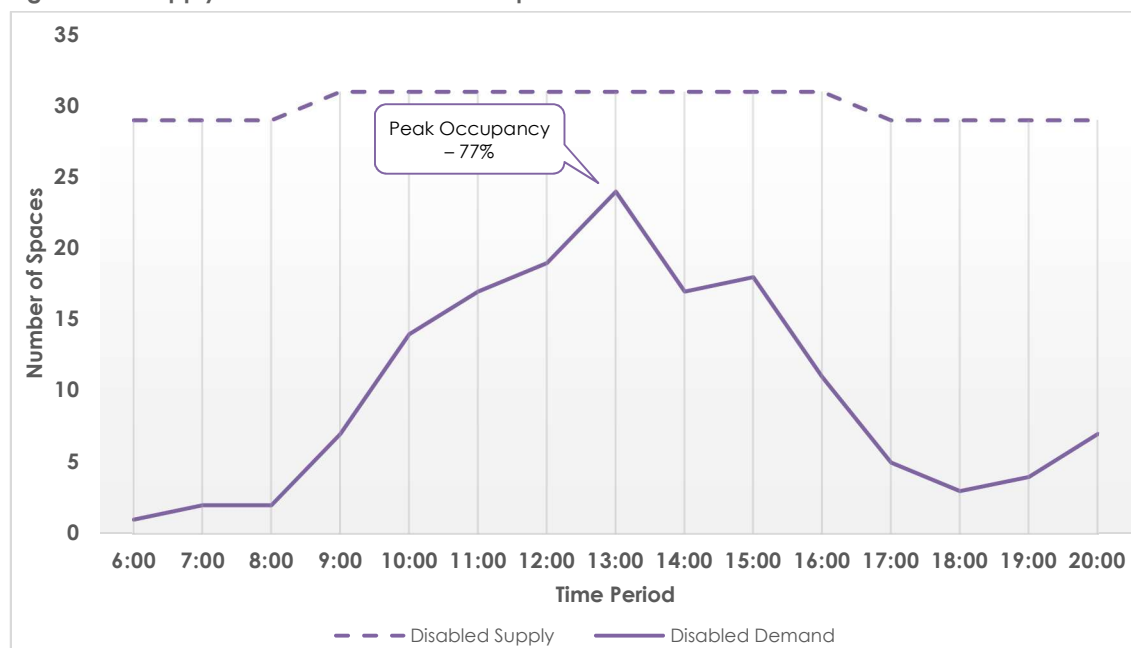
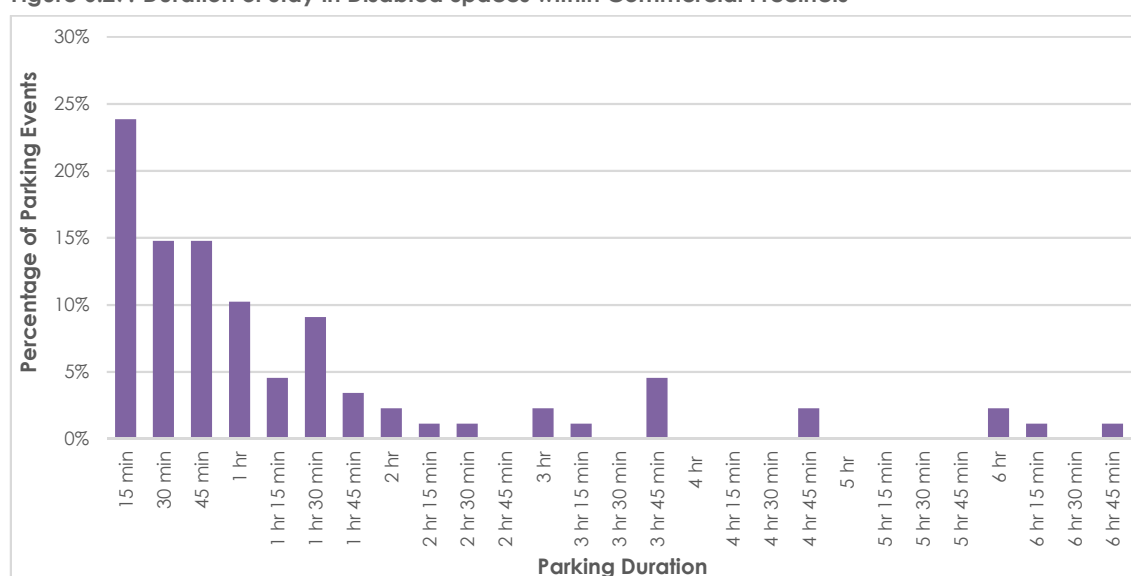


Table 6.5: Location of Disabled Spaces within Commercial Precincts

Precinct	Public	Private[1]	Total
Precinct 1 – Darebin Station	0	2	2
Precinct 2 – Livingston	0	6	6
Precinct 3 – Marshall	0	1	1
Precinct 4 – Ivanhoe Station	4	2	6
Precinct 5A – UHR-Lower	1	3	4
Precinct 5B – UHR-Upper	3	2	5
Precinct 6 – Civic Centre	6	1	7
<b>Total</b>	<b>14</b>	<b>17</b>	<b>31</b>

[1] Private parking is all parking within a private company car park, i.e. Coles, Safeway, a Kindergarten, etc. These spaces are accessible by the general public, but are not controlled by Council.

Figure 6.27: Duration of Stay in Disabled Spaces within Commercial Precincts





The following key points are noted with regard to parking for people with disabilities:

- Within the commercial precincts there are 31 accessible spaces between 9am and 4pm, with 29 spaces available outside these hours.
- There is an adequate utilisation of disabled car parking spaces, with the peak occupancy occurring at 1pm with 77% (24) of spaces utilised.
- There were a total of 88 parking events occurring within the 31 spaces within the commercial precincts.
- 64% of parking events (56 events) within disabled spaces involve the user staying for less than one hour, with a further 19% (17 events) staying between one and two hours in duration (therefore, a total of 83% staying for less than two hours).
- Only 7% of parking events (6 events) involved the user staying for four hours or greater. All of these instances occurred within Precinct 5B and Precinct 6.
- There are a total of 17 disabled parking spaces within the peripheral residential precincts, six of which are off-street and 11 are on-street.

### 6.5.1 Building Code of Australia

The Building Code of Australia (BCA) sets out guidelines for the number of disabled spaces required for different uses.

While there are a number of uses within the commercial precincts, applying the Class 6 – Retail requirement would provide a conservative idea of how many spaces should be provided in the commercial precincts.

Clause D3.5 of BCA 3013 states that for Class 6 – Retail, 1 space is required for every 50 car parking spaces or part thereof for up to 1000 car spaces and then 1 space for each additional 100 car parking spaces of part thereof in excess of 1000 car parking spaces.

Therefore, for the 2,223 spaces within the commercial precincts, 33 disabled spaces are required.

Given that the current provision of disabled spaces within these precincts is 31 disabled spaces, and that the BCA rate applied to these precincts is on the conservative side, it is considered that the current provision of disabled spaces within the study area is satisfactory.

## 6.6 Loading Zones

Details of the supply and demand for Loading Zone Parking spaces within the commercial precincts is shown in Figure 6.28, with the duration of which users stay within loading spaces is shown in Figure 6.29.

Figure 6.28: Supply and Demand of Loading Zone Spaces within Commercial Precincts

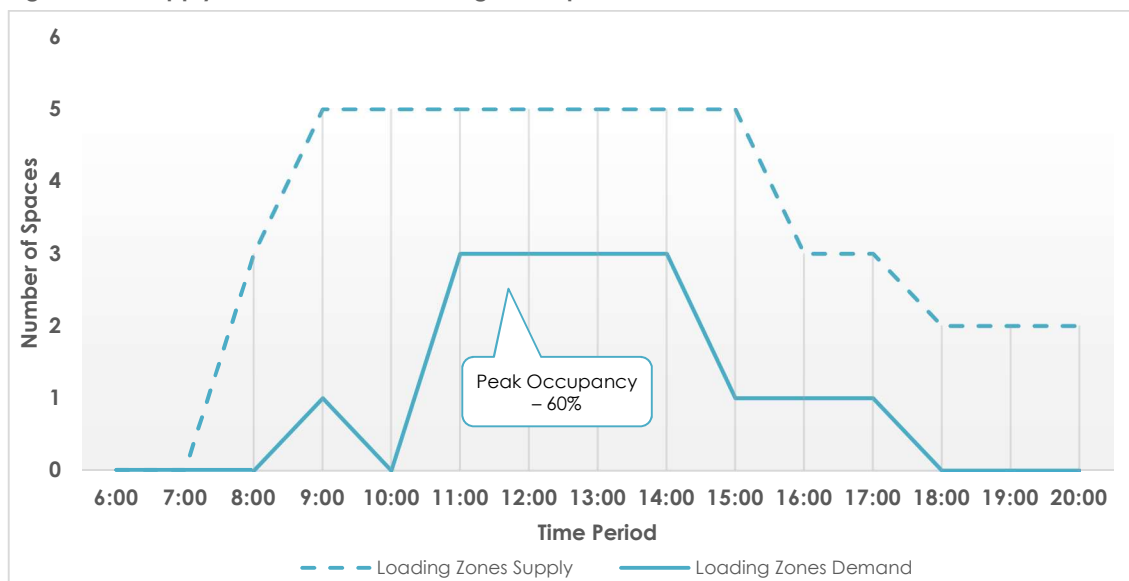
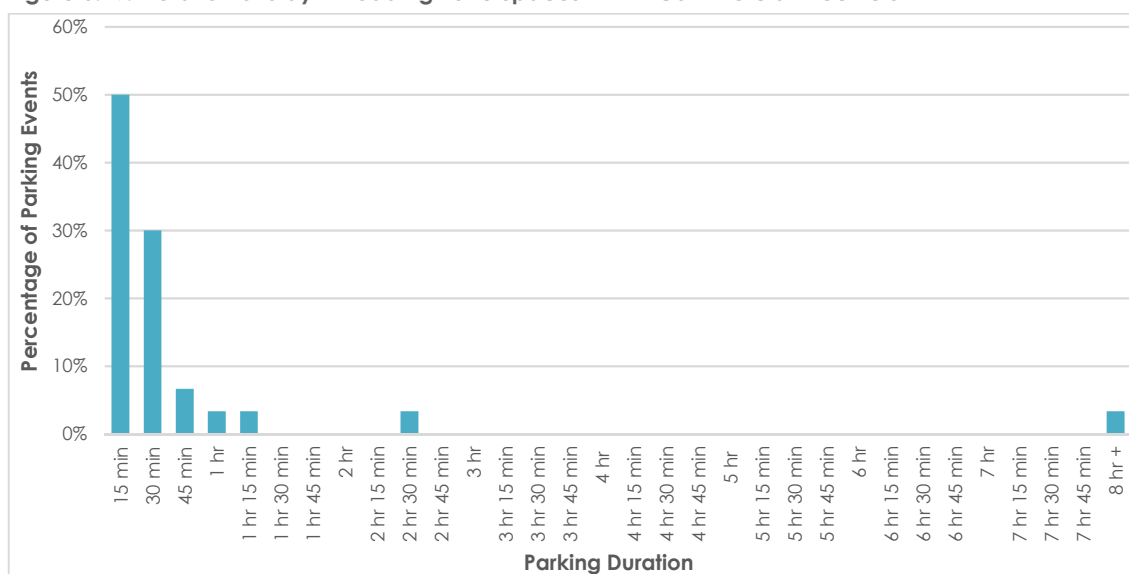


Figure 6.29: Duration of Stay in Loading Zone Spaces within Commercial Precincts



The following key points are noted with regard to parking for loading zones:

- Between 9am and 3pm there are five spaces allocated as loading zones within the commercial precincts.
- Three of the spaces are located in Precinct 5B and two in Precinct 6 within the Civic Centre off-street car park. It is noted that neither of the two spaces within the Civic Centre off-street car park were utilised.
- Between 11am and 2pm, peak occupancy of 60% (3 vehicles) occurred.
- Within Precinct 5B, there were 30 parking events within the 3 available spaces.
- 50% (15) of parking events occurred for 15 minutes or less.
- 40% (12) of parking events occurred for between 15 minutes and 1 hour.
- 10% (3) of parking events occurred for 1 hour or greater.
- One of the vehicles that parked within the loading zone stayed in the zone for 9 hours.

Given that there are only three loading spaces available within the Ivanhoe commercial core (all within Precinct 5B) and that these three spaces had an occupancy level of 100% between 11am and 2pm, it is considered that additional loading zones could be provided within the Ivanhoe commercial core between these hours. Furthermore, 50% of the parking events within loading spaces occurred for 15 minutes or less, and an additional 30% of parking events between 15 and 30 minutes, these spaces experience a high turnover which may be as a result of the low number of available loading spaces.

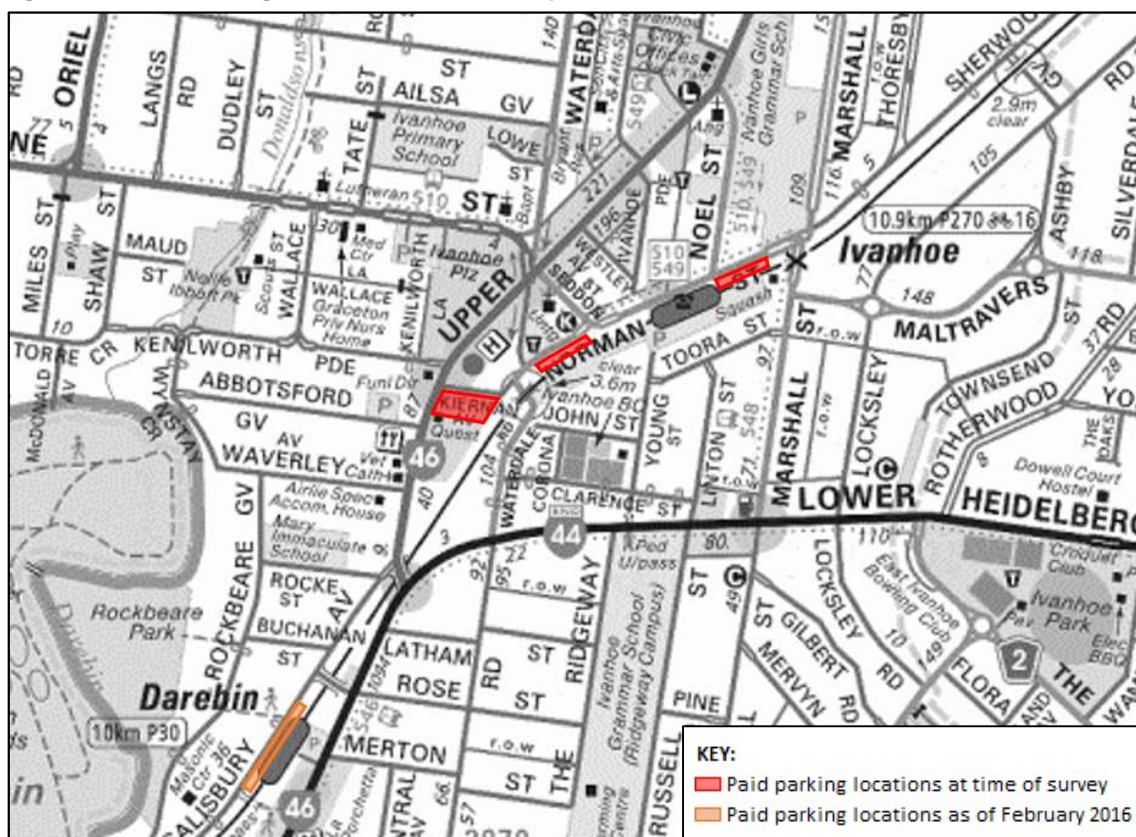
## 6.7 Paid Parking

Paid parking occurs within three locations in the study area, where a pay-and-display ticket arrangement occurs. These areas are located as follows<sup>3</sup>:

- along the southern side of Norman Street between Waterdale Road and Seddon Street.
- along the southern side of Norman Street between Noel and Marshall Street.
- within the lower level of the Woolworths off-street car park.

These locations are shown in Figure 6.30 and discussed further below.

Figure 6.30: Paid Parking Locations within the study area



<sup>3</sup> It should be noted that as of February 2016, an additional location along Salisbury Avenue adjacent to Darebin Station will be included as paid parking, however when the surveys were conducted in November 2015, these spaces were not paid.

### 6.7.1 Norman Street

The spaces along Norman Street are paid between 8am and 5pm, Monday to Friday. The fee is \$1 per hour or \$5 per day and users are not restricted in how long they stay.

There are 34 spaces located between Waterdale Road and Seddon Street and a further 16 spaces located between Noel Street and Marshall Street (adjacent to Ivanhoe Station), a total of 50 paid spaces along Norman Street.

Between Waterdale and Seddon Streets, the peak demand occurred at 12pm and 1pm, with 53% (18) of the spaces utilised. For comparison, the nearby 3P Uniting Church off-street car park (located on the other side of Norman Street) experienced demands of 100% and 99% at the same times, respectively.

Between Noel Street and Marshall Street, the peak demand occurred at 2pm and 3pm, with 94% (15) spaces occupied, which is consistent with the nearby parking demands within the Ivanhoe Station off-street car park and on-street parking along Noel Street. Given the time that peak demands occurred in these spaces and location of these spaces in proximity to the Ivanhoe Girls' Grammar School, these spaces may be being used as pick-up zones for the after-school period.

### 6.7.2 Woolworths Off-Street Car Park

The Woolworths Off-Street Car Park contains two different types of parking:

- 112 spaces located on the ground floor that have a maximum restriction of two hours duration, but are unpaid spaces.
- 89 spaces on the lower level that are paid between 7am and 6pm, every day, but users are not restricted in their length of stay<sup>4</sup>. These spaces are free for the first two hours, and then \$1 an hour thereafter, with 6 hours+ being \$4.

The paid spaces experience a peak demand at 11am of 27% (25 occupied spaces). The unpaid 2P spaces within this same car park experienced a peak demand of 42% (47 occupied spaces) at 4pm. While this demand is higher, it is not significant, and a number of spaces remain vacant within the free 2P area (65 vacancies).

To compare, the nearby Abbotsford Grove off-street car park, located to the west of Upper Heidelberg Road, experienced a demand of 86% (24) at this same time.

### 6.7.3 Demands of Paid Parking

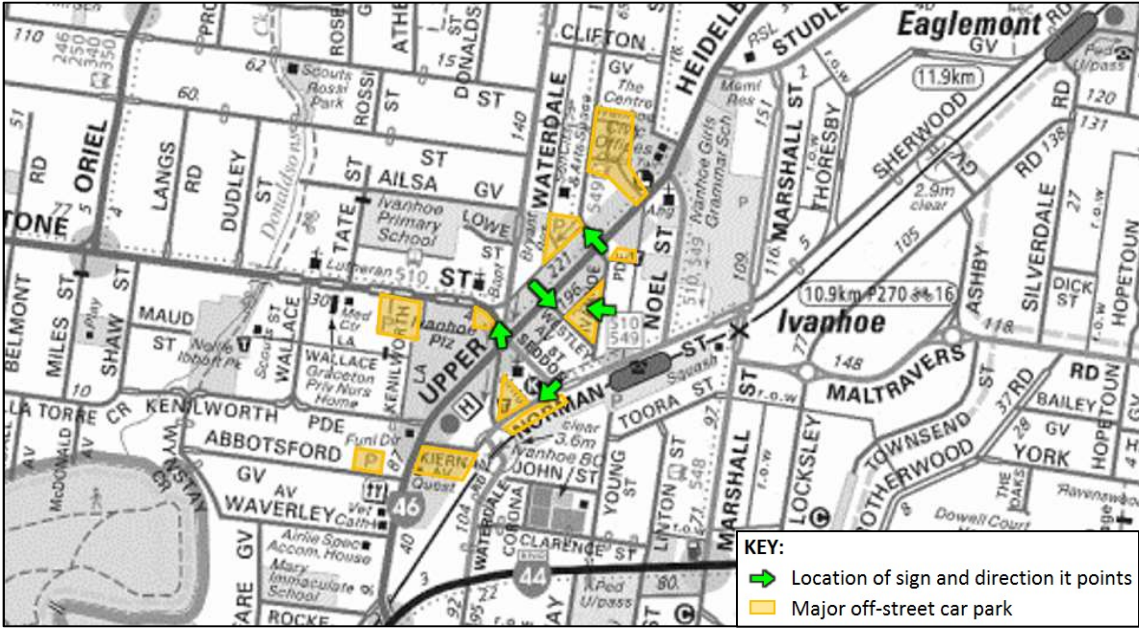
It is evident from the above that the demands of these paid parking locations are not as high as those in nearby free parking areas. This is expected as free parking will always be preferred by drivers to paid areas. This however emphasises the need to appropriately manage parking restrictions surrounding paid areas to ensure that parking events avoiding paid areas do not inappropriately spill into the surrounding area.

## 6.8 Wayfinding Signage

Some wayfinding signage exists throughout the commercial precincts of the study area, with locations of these signs, along with major off-street car parks, shown in Figure 6.31.

<sup>4</sup> It is noted that the car park closes for a brief period overnight.

Figure 6.31: Existing Wayfinding Signage within the Commercial Precincts





The location of some signs can make them difficult to see, as well as old signs still being used. Examples of these signs, their locations and their issues are shown in Table 6.6.

Table 6.6: Existing Signage

Photo	Location	Issue
	<p>South-west corner of Ivanhoe Parade and Upper Heidelberg Road.</p>	<p>Signage is hidden by the awning of the adjacent shop which makes it hard to see.</p>



Photo	Location	Issue
	North side of the Norman Street and Seddon Street intersection.	Signage is old-style green and white which blends into the background trees and makes it hard to see.  Signage is located very high up, which also makes it difficult to see.
	Western side of Ivanhoe Parade, leading into the Westley Avenue off-street car park.	Signage is old-style green and white which blends into the background trees and makes it hard to see.
	Western side of Upper Heidelberg Road, leading into the Ivanhoe Library off-street car park.	Signage has been turned around and is not facing the off-street car park.

## 7. Car Parking Model

### 7.1 Overview

A car parking model has been developed by GTA Consultants to estimate the car parking generating characteristics of the land uses within the Ivanhoe study area. Preparation and calibration of the model is the first stage in setting car parking rates which can be used to guide new development within the area.

A car parking model is created in spreadsheet form using the following inputs:

- land use data (classified by standard Planning Scheme definitions)
- typical car parking rates for uses contained within the applicable study precinct
- temporal distributions.

These inputs are used to generate a predicted car parking demand profile which is then compared to the existing car parking supply and demand information collected for the study area (as discussed earlier).

The car parking model inputs above, and the model calibration process are discussed further below.

### 7.2 Model Inputs

#### 7.2.1 Land Use Data

Banyule City Council has provided existing land use data, which demonstrates that the study area caters for approximately 91,400sqm of land use floor space and approximately 2,700 residential dwellings. The key land use floor areas within the study area include:

- **Office** (approx. 11,600sqm or 13% of the overall study area) & Municipal Office/Civic Centre (approx. 13,100sqm or 14% of the overall study area)
- **Shop** (approx. 13,100sqm or 14% of the overall study area)
- **Supermarket** (approx. 6,300sqm or 7% of the overall study area).

A complete list of the existing land uses, and their associated floor areas by precinct, within the study area is provided in Appendix C (Section C.1.1).

#### 7.2.2 Base Car Parking Rates

GTA Consultants have adopted where possible Clause 52.06 Column A car parking rates as "base" rates for the various uses found within study area.

The adopted "base" car parking rates are detailed in Appendix C (Section C.1.2).

#### 7.2.3 Temporal Demand Distributions

Each land use has a characteristic profile of parking accumulation throughout the day which is often referred to as the temporal profile. The temporal profile corresponds to the way in which the demand for car parking peaks at different times throughout the day, and these differ for each land use.

The key land use car parking temporal demand profiles are illustrated in Appendix C (Section C.1.3).

### 7.3 “Base” Car Parking Model

The combination of land use data, “base” car parking rates and temporal land use demand profiles allows for the prediction of car parking demands within the study area.

These predicted demands ideally will match with the recorded car parking demand results surveyed. However, in most instances, the predicted and actual demands do not match and calibration will allow for the determination of ‘actual’ car parking rates which represent the specific operational characteristics of the study area.

The base parking model is represented in Figure 7.1.

**Figure 7.1: Base Car Parking Model – Total Area**

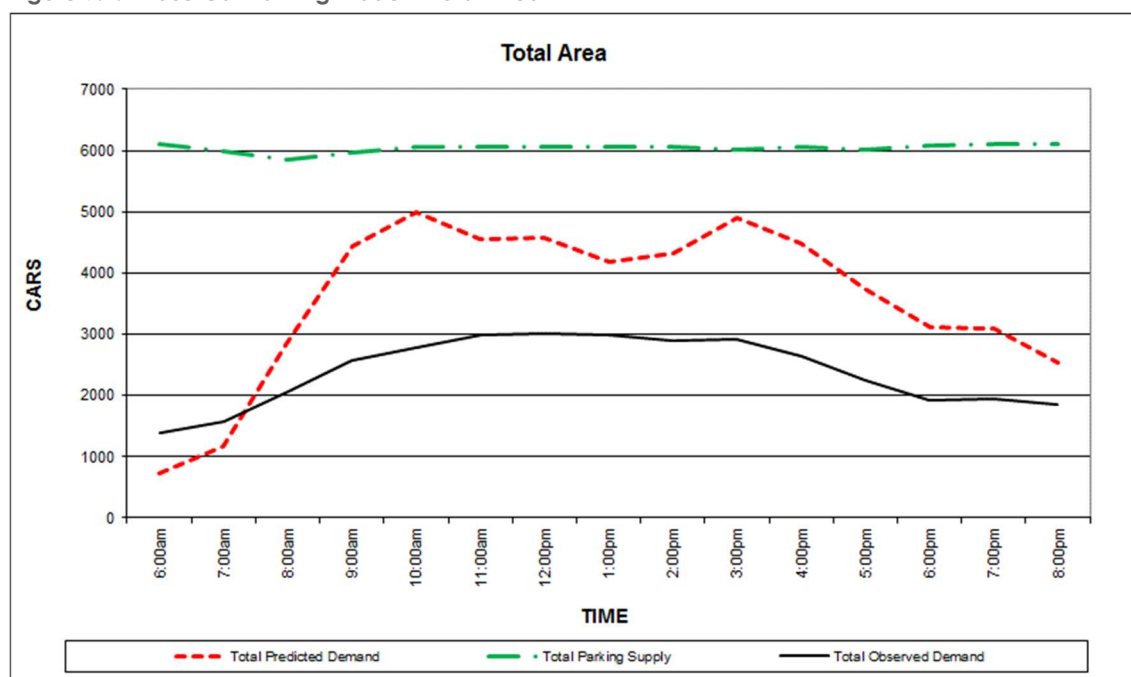


Figure 7.1 illustrates the following:

- The supply of car parking within the Ivanhoe study area being represented by the dashed green line.
- The observed car parking occupancy recorded during parking demand surveys being represented by the solid black line.
- The modelled car parking demands, utilising the key inputs, being represented by the dashed red line.

The “base” car parking model indicates that whilst both the actual and predicted demands show similarities in shape (temporal profile), the initial car parking rates from Column A of Clause 52.06 indicated a significantly higher than observed parking demand and would require further calibration to obtain a better “fit” of the model.

## 7.4 Calibration of the Model

In general, the following techniques are adopted for calibration of the car parking model:

- i Primary method – Adjust the car parking rates for the key land use groups. Minor land use groups only have a minor impact on the car parking model and as such large changes to car parking rates for these land uses would only result in minor changes to the calibration. On the contrary, minor changes to the major land use groups can have a large impact to the model and as such these rates can be more accurately determined.
- ii Secondary method - Adjust the land use temporal profiles. Adjustments to the temporal profiles are generally only made where it is evident that activity patterns / specific neighbourhood trends are not exactly representative of the adopted profile.

Having regard for the above, the following summarises the key calibration techniques adopted for the Ivanhoe car parking model:

- Car parking rates from Column B of Clause 52.06 of the Planning Scheme have been adopted where appropriate (including 'Bank', 'Food and Drink Premises', 'Hotel', 'Medical Centre', 'Office', 'Postal Agency', 'Shop', 'Veterinary Centre' and 'Warehouse').
- The peripheral precincts (which for the majority contain mostly residential land uses) have been 'calibrated' generally for on-street resident car parking demands which generally occur at the start and end of the day associated with trip ends i.e. overnight parking.
- Following further investigation, particular land use car parking rates (for 'Supermarket' and 'Dwelling (Visitor)') have been revised having regard for further empirical evidence contained within GTA Consultants' car parking rates database<sup>5</sup>. Further, the rate for 'Church' has been reduced given that its peak time of operation is on Sundays.
- Primary and Secondary School car parking rates were revised to match the recorded parking demands during peak periods around these areas.
- The car parking rate for 'Indoor Recreation Facility' largely comprises the Ivanhoe Aquatic Centre and has been revised to match with the demands recorded within the discreet car parking area on-site.
- The 'Municipal Office' use could be considered to function differently to a standard 'Office' use and the adopted car parking rate has been revised to match with demands recorded within the on-site car parking area.
- Commuter car parking areas were further investigated, with temporal profiles revised to match surveyed demands of the railway station parking areas.

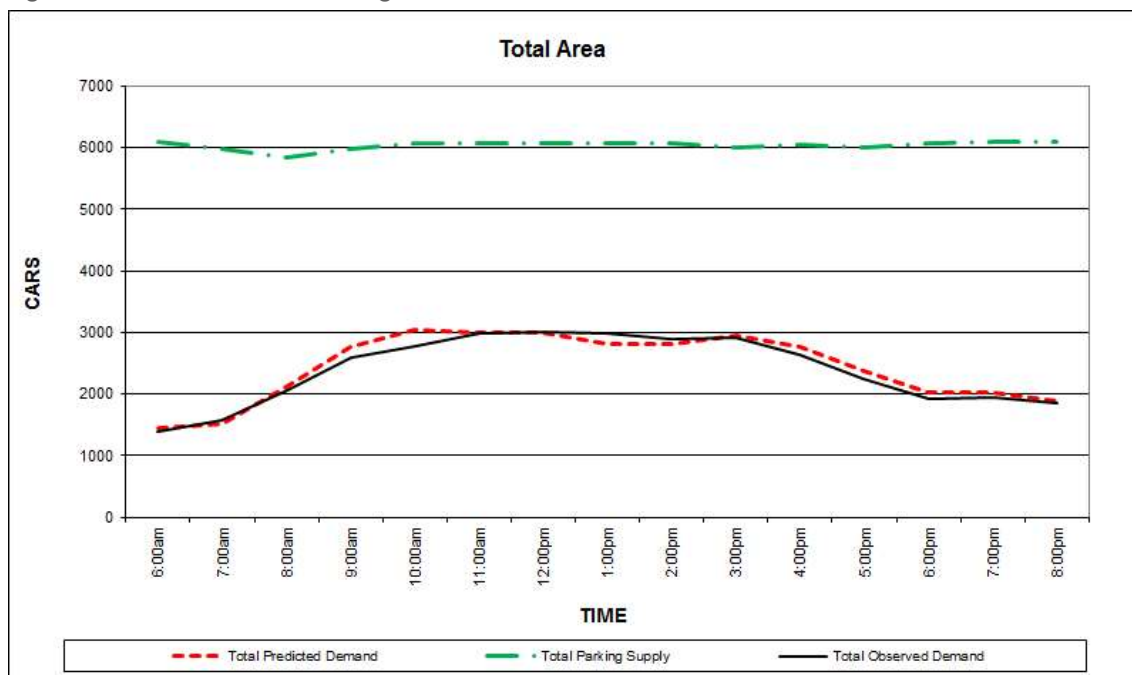
Following these modifications, GTA have confirmed the calibration of the model utilising the GEH statistic (Geoffrey E. Havers). The GEH statistic is a measure used to compare survey and traffic simulation models, and is a widely-used statistic throughout Australia and overseas.

The calibrated car parking model for the study area exceeds the required targets (as set out in Section C.2.1 of Appendix C) and is accordingly considered to be well calibrated and 'fit for purpose'.

The calibrated parking model is represented in Figure 7.2.

<sup>5</sup> This database includes rate averages based on survey data collected for a range of land uses completed by GTA or contained in reports prepared by other metropolitan transport planning consultants.

Figure 7.2: Calibrated Car Parking Model – Total Area



In calibrating the model, alterations have been made to car parking rates as well as the standard temporal profiles. These calibrated rates and profiles are now considered to better reflect the specific operating conditions of the study area and are further discussed within the following section.

For reference, Table 7.1 defines the car parking rates for the key land uses within the study area, as determined from the calibration of the base car parking model.

Importantly, the rates contained within the above table represent the peak rate for each use and, for a majority of these, the peak demand occurs during the day whilst some uses continue past regular 'business hours' and other uses such as restaurant premises peak in the evening and subsequently generate a lesser demand during the day.

Table 7.1: Key Calibrated Car Parking Rates (Weekday)

Land Uses	Calibrated Parking Rate	Unit (spaces per)
Convenience Restaurant	<b>0.132</b>	/sqm
Food & Drink Premises	<b>0.035</b>	/sqm
Indoor Recreation Facility	<b>0.03</b>	/sqm
Medical Centre	<b>0.035</b>	/sqm
Office	<b>0.03</b>	/sqm
Place of Assembly	<b>0.1</b>	/sqm
Primary School	<b>0.17</b>	/child
Restaurant	<b>0.132</b>	/sqm
Secondary School	<b>0.07</b>	/child
Shop	<b>0.035</b>	/sqm
Supermarket	<b>0.04</b>	/sqm
Dwelling [1]	<b>0.3</b>	/dwelling
Dwelling Visitor	<b>0.1</b>	/dwelling
Commuter	<b>1</b>	/space

[1] It should be noted that the car parking rate for residential dwellings relates to on-street car parking reliance only.

## 7.5 Interpretation of the Model Outputs

A comparison of the key calibrated car parking rates for Ivanhoe is provided within Table 7.2 against the relevant statutory parking requirements contained within Column B of Clause 52.06 of the Banyule Planning Scheme.



**Table 7.2: Comparison of Key Calibrated Car Parking Rates against Clause 52.06 (Car Parking)**

Key Land Uses	Calibrated Car Parking Rate (spaces per)	Clause 52.06 Car Parking Rates (spaces per)	
		Column A	Column B
Office	<b>3.0</b> /100 sqm	3.5 /100 sqm	3.0 /100 sqm
Shop	<b>3.5</b> /100 sqm	4 /100 sqm	3.5 /100 sqm
Supermarket [1]	<b>4.0</b> /100 sqm	5 /100 sqm	5 /100 sqm
Medical Centre **	<b>3.5</b> /100 sqm	5 /practitioner (first)	3.5 /100 sqm
		+3 /practitioner (all other)	
Motel [2]**	<b>0.5</b> /100 sqm	1 /unit	1 /unit
Place of Assembly **	<b>0.3</b> /patron	0.3 /patron	0.3 /patron

[1] Whilst there is expected to be a growth in retail shop floor space (see Section 7 of this report), at this stage no additional supermarket operator to the year 2031 is expected to be established in Ivanhoe.

[2] Assuming 1 unit of approx. 50sqm.

\*\* As discussed in Section 7 of this report, there is expected to be an uplift in floor space associated with Medical Centre, Motel and Place of Assembly land uses to the year 2031 and it is accordingly considered relevant to review these 'calibrated' car parking rates as part of this summary.

This table shows that the car parking rates for the key land uses within Ivanhoe are similar to or lower than those contained within Column B of Clause 52.06.

In this regard, the car parking model provides supporting evidence to the adoption of a specific set of car parking rates to apply for Ivanhoe. Beyond this, a breakdown of the model into individual precincts allows for a greater understanding of how car parking serves key locations and specific land uses.

Further details of the calibrated car parking model outputs are provided in Appendix D, whilst a summary of car parking supply (long-term vs. all 'other') versus predicted demands from the model for the overall study area is presented in Table 7.3.

**Table 7.3: Total Parking Supply vs. Predicted Demands (from Car Parking Model)**

Type	Car Parking at Peak Time		
	Actual Supply	Predicted Demand	Occupancy
All Other Spaces	2,220 spaces	1,474 spaces	66%
Long-Term	3,846 spaces	1,533 spaces	40%
<b>TOTAL</b>	<b>6,066 spaces</b>	<b>3,007 spaces</b>	<b>50%</b>

In relation to the above, a number of general observations are set out below:

- Overall it would appear that no additional car parking is fundamentally required at present to support existing car parking demands. This is noting that overall, occupancy is currently sitting at approximately 50% of the available supply.
- In general, on a precinct-by-precinct basis, predicted and observed demands are being met by the available supply. However, Core Precincts 3, 5A, 5B and 6 all feature predicted demands which exceed the available car parking supply (i.e. car parking demands are overspilling into other precincts<sup>6</sup>).
- The recorded car parking demands (from surveys) indicate that Core Precincts 4 and 5B accommodate car parking demands which exceed 85% occupancy.

<sup>6</sup> In an Activity Centre setting, the sharing of car parking between precincts will naturally occur. Moreover, the precincts specified as part of the study area allow for some meaningful analysis to be made however should not necessarily be considered the "boundary" of which car parking for land uses should be provided in totality.

## 8. Future Car Parking Demands

### 8.1 Overview

Car parking should be considered on a centre-wide basis rather than on a site-by-site basis, to support the centre's long-term viability. Spare on-street car parking capacity should not simply be allocated to new development on a first-come, first-served basis. Spare capacity can provide for car parking needs while new shared car parking facilities are developed or extended. It can provide for car parking needs while financial contributions are collected. If this capacity is lost in an early phase of development of a centre, it may be difficult to support the future incremental growth of the centre.

In order to forecast an estimate of future car parking demands, future floor space growth has been included into the calibrated car parking model to produce a future car parking model. The future model provides a 'Business as Usual' scenario reflective of car parking growth occurring at rates consistent with that currently being generated within the study area.

To gain an understanding of future car parking conditions within Ivanhoe (and hence to ensure that the most appropriate car parking rates are developed from the study), it is considered prudent to review anticipated floor area growth.

### 8.2 Future Growth

#### 8.2.1 Land Use Floor Areas

Information on future development within Ivanhoe is provided within the Ivanhoe Floorspace Study Report (prepared by Urban Enterprise on behalf of Banyule City Council, November 2016). This report indicates what additional development floor area can be expected within the study area up to the year 2036.

The following outlines the future growth predictions for the centre, including additional residential dwellings as well as a low to high development scenario for retail and commercial floorspace.

- **Residential Growth:** 1,413 dwellings
- **Land Use Growth:**
  - **Retail:** +7,000sqm to +10,000sqm
  - **Commercial:** +4,130sqm to +5,900sqm.
  - **TOTAL:** +11,130sqm to +15,900sqm.

For the purposes of undertaking a comparative future car parking demand assessment, the additional commercial floor area has been assumed to be standard 'office', whilst the retail floor area has been assumed to comprise of the following 'nested' land use categories:

- Shop
- Supermarket
- Food & Drink
- Restaurant
- Convenience Restaurant

The additional retail floor area has been distributed to the above categories consistent with the existing floor area totals.

### 8.2.2 Residential Growth Distribution

It is noted that there are a number of recently established or soon to be constructed residential apartment sites within the study area. These are accounted for within the overall residential projections made by Urban Enterprise. The Urban Enterprise report provides a summary of the areas where additional residential growth by 2036 is anticipated as follows:

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>○ <u>Commercial Precincts:</u></li> <li>○ <b>Precinct 1:</b> 198 dwellings</li> <li>○ <b>Precinct 2:</b> 58 dwellings</li> <li>○ <b>Precinct 3:</b> 93 dwellings</li> <li>○ <b>Precinct 4:</b> 190 dwellings</li> <li>○ <b>Precinct 5A:</b> 172 dwellings</li> <li>○ <b>Precinct 5B:</b> 199 dwellings</li> <li>○ <b>Precinct 6:</b> 32 dwellings</li> </ul> | <ul style="list-style-type: none"> <li>○ <u>Periphery Precincts:</u></li> <li>○ <b>Precinct P1:</b> 159 dwellings</li> <li>○ <b>Precinct P2:</b> 127 dwellings</li> <li>○ <b>Precinct P3:</b> 137 dwellings</li> <li>○ <b>Precinct P4:</b> 47 dwellings.</li> </ul> |
|---|---|

The car parking impacts of these developments have generally been considered as part of future planning for the area noting that it has been assumed that resident parking demands would, if provided, be generally located on individual development sites (as compared to being accommodated within public car parks).

The above assumption will be supplemented by appropriate strategies to manage potential off-site residential car parking demands within the study area. This is noting that residential development approvals should be coupled with appropriate on-street parking restrictions to ensure new residents cannot park (for long periods) on-street, such that the aims of providing lesser parking is achieved i.e. a reduced car ownership.

As such the further use of residential growth in this study will be limited to understanding the additional residential visitor parking demands which may be generated.

### 8.2.3 Commercial and Retail Floor Space Distribution

The Urban Enterprise report provides a breakdown of floor space across precincts. The retail floor space, as discussed in Section 8.2.1 has then been distributed across five retail categories proportionate with existing floor area totals in each precinct.

The distribution of retail and commercial floor space is shown in Table 8.1 and Table 8.2 for low and high development scenarios respectively.

### 8.2.4 Other Significant Future Developments and Residential Growth

Having regard for the anticipated land use floor area growth detailed above, it is noted that a significant redevelopment of the Ivanhoe Civic area (Commercial Precinct 6) is to be undertaken. This redevelopment is understood to be in addition to the future growth predictions identified in 8.2.1.

An indicative masterplan for the development of this site is reproduced in Figure 8.1, with further discussion of the proposal provided in Section 10 of this Strategy under the relevant sub-heading<sup>7</sup>.

<sup>7</sup> It is noted that as part of the proposal for the Civic precinct, the existing demand of 90 vehicles associated with the Council offices (which is relocating) is to be removed from the future car parking model and the parking provision on this site updated to reflect the future supply proposed by the Masterplan.

Figure 8.1: Ivanhoe Civic Precinct Masterplan – Commercial Precinct 6



Source: Banyule City Council website

**Table 8.1: Distribution of Future Land Use Floor Space (to the Year 2036) – Low Development Scenario**

Precinct	Commercial	Retail				
	Office	Shop	Supermarket	Restaurant	Conv. Restaurant	Food & Drink
1	593 sqm	614 sqm	-	-	392 sqm	-
2	430 sqm	220 sqm	508 sqm	-	-	-
3	314 sqm	487 sqm	-	-	-	46 sqm
4	471 sqm	799 sqm	-	-	-	-
5A	777 sqm	157 sqm	955 sqm	174 sqm	-	31 sqm
5B	1,301 sqm	1,662 sqm	-	291 sqm	-	253 sqm
6	244 sqm	296 sqm	-	72 sqm	-	44 sqm
<b>TOTAL</b>	<b>4,130 sqm</b>	<b>4,235 sqm</b>	<b>1,463 sqm</b>	<b>537 sqm</b>	<b>392 sqm</b>	<b>374 sqm</b>
<b>7,000 sqm [1]</b>						

[1] Note: subject to minor rounding errors.

**Table 8.2: Distribution of Future Land Use Floor Space (to the Year 2036) – High Development Scenario**

Precinct	Commercial	Retail				
	Office	Shop	Supermarket	Restaurant	Conv. Restaurant	Food & Drink
1	848 sqm	877 sqm	-	-	560 sqm	-
2	614 sqm	315 sqm	725 sqm	-	-	-
3	449 sqm	695 sqm	-	-	-	66 sqm
4	673 sqm	1,141 sqm	-	-	-	-
5A	1,109 sqm	224 sqm	1,365 sqm	248 sqm	-	44 sqm
5B	1,859 sqm	2,374 sqm	-	416 sqm	-	361 sqm
6	348 sqm	424 sqm	-	103 sqm	-	64 sqm
<b>TOTAL</b>	<b>5,900 sqm</b>	<b>6,050 sqm</b>	<b>2,090 sqm</b>	<b>767 sqm</b>	<b>560 sqm</b>	<b>535 sqm</b>
<b>10,000 sqm [1]</b>						

[1] Note: subject to minor rounding errors.

### 8.3 Future Additional Car Parking Demands

Adopting the additional land use floor areas up to the year 2036 and utilising the calibrated car parking model (i.e. applying the rates which represent existing conditions for Ivanhoe), a future car parking demand assessment can be completed.

The future car parking model for the low and high development scenarios is shown below in Figure 8.2 and Figure 8.3, respectively with full details provided in Appendix D.

Figure 8.2: Future Car Parking Model – Total Area (Low Scenario)

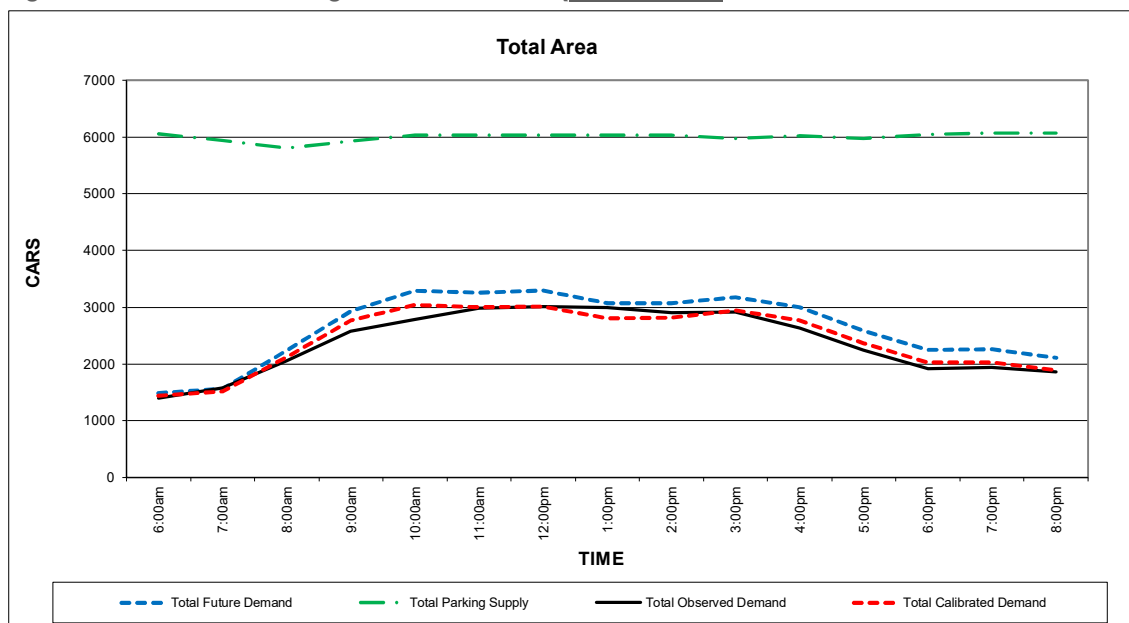
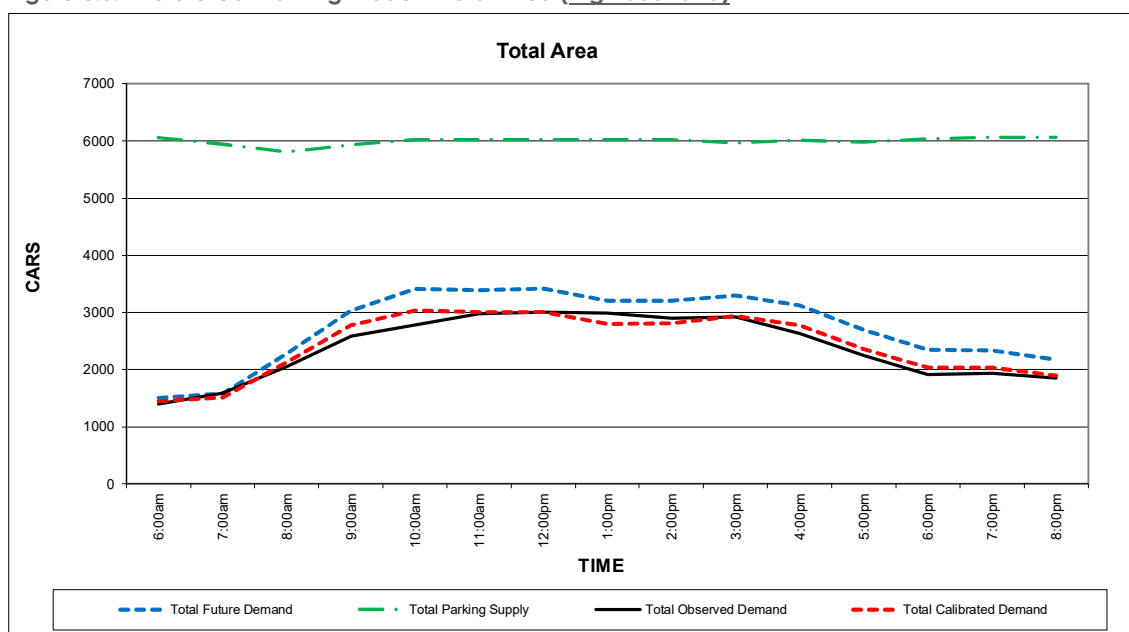


Figure 8.3: Future Car Parking Model – Total Area (High Scenario)



Given that the future model is based on current car parking generation rates, it would be expected that these demands would be conservative on the high side for the following reasons:

- Car parking rates tend to decrease with higher densification of urban areas (i.e. higher levels of walk up trade) and increased road network congestion.
- There is a policy vision and objective to actively reduce the reliance on the use of private motor vehicles.

Notwithstanding, Table 8.3 summarises the future parking demands for the two development growth scenarios.



**Table 8.3: Summary of Existing and Future Car Parking Conditions (Typical Weekday Lunchtime)**

Existing Car Parking		
Peak Supply	6,066 spaces	
Peak Demand	3,011 spaces	50% Occupancy
Future Car Parking – Low Scenario		
Peak Supply [1]	6,027 spaces	
Peak Demand	3,291 spaces	55% Occupancy
Net Car Parking Demand Increase	+280 spaces	
Future Car Parking – High Scenario		
Peak Supply [1]	6,027 spaces	
Peak Demand	3,421 spaces	57% Occupancy
Net Car Parking Demand Increase	+410 spaces	

[1] As indicated in Section 8.2.4, there is net change to the future supply and demand within the study area associated with the development of the Ivanhoe Civic Precinct.

It should be noted that the above summary does not consider where these additional demands will be located (i.e. on-site or on-street) or where current vacancies are located within the study area.

Further consideration of the above is provided through the development of car parking strategy recommendations as set out in section 10. These recommendations will seek to address the sufficiency of the existing car parking supply to accommodate the anticipated future land use growth within the study area (including review of the 'calibrated' or Business As Usual (BAU) car parking rates determined).

## 9. Summary of Issues and Opportunities

Having regard for the initial discussions and analysis presented in this report, the following outlines the key points of focus in the development of a set of car parking strategy recommendations as part of the next stage of this study.

### 9.1.1 Car Parking Provision and Demand

Parking surveys undertaken of the study area indicate a total supply of approx. 6,400 spaces. Peak demands were observed to occur on Thursday (a typical weekday), with an occupancy of approx. 50% recorded during the lunchtime period across the entire study area.

A breakdown between the commercial and periphery precincts indicates a peak parking occupancy of 73% and 36%, respectively (noting that 85% occupancy typically represents theoretical capacity). As such it would appear, on the whole, that sufficient car parking is currently being provided.

Some areas of parking and restriction types do however exceed the theoretical capacity level. As such further consideration should be given to how this parking resource is being advertised and managed (i.e. wayfinding signage for key parking areas to assist with turnover/circulation, time restrictions based on specific user demands/requirements etc.).

In this respect, it is understood that the availability of car parking to support economic function is key to the ongoing success and viability of the centre. The provision of additional car parking however must be balanced against the cost of such a provision, including who would fund it and other centre objectives which seek to encourage alternative forms of transport.

Given that overall parking supplies are sufficient to accommodate the overall demand, consideration should be given to a number of strategies, as identified below, which seek to best maximise parking availability and efficiency before consideration is given to construction additional parking facilities.

- Improve wayfinding signage to better identify to drivers where parking exists to maximise its use and minimise frustration of drivers searching for parking in high occupancy areas.
- Consider opportunities to create more parking of particular time restrictions in areas (based on user requirements) closer to complementary land uses to encourage sustainable growth and trade in particular areas.
- Consider opportunities to encourage mode-shift to reduce the reliance on car parking.

### 9.1.2 Car Parking Restrictions and Duration

Across all commercial precincts within the study area, the highest parking demand was observed for spaces with a 3-4hr time restriction (with an occupancy of 82%). More specifically, with the exclusion of Precincts 1, 5A and 6 (which experience demands of less than 85%), Precinct 2 and Precinct 4 experience high demands for longer stay spaces whilst Precinct 3 experiences high demand for short-stay parking. It is noted that Precinct 5B features high demands for all parking durations (from short-stay to long-stay), whilst peak occupancies of 76% and 63% were observed for off-street and on-street parking across all commercial precincts respectively.

Within the periphery precincts, parking occupancy was generally low with the highest demand recorded within Precinct P4 (of 52% occupied spaces). It is noted that short-stay parking is

generally provided on residential streets which are located nearby commercial areas to limit overspill commuter and staff parking.

Regarding time restricted car parking within the commercial precincts of the study area, it is noted that a high proportion of vehicles are parked for less than 1 hour (comprising approximately 67% of the total parking events). Noting that very short-stay parking (less than 1 hour in duration) makes up less than 1% of the total parking supply, whilst long-stay spaces within commercial precincts (>4hrs) only makes up 6% of the total parking events however 36% of the total supply is provided for this purpose. Accordingly, it would appear that the mixture of time restricted parking within the centre requires some further consideration to better accommodate user demands.

Further, duration of stay surveys undertaken of parking within the commercial precincts indicates that whilst some overstaying does occur, generally compliance with parking restrictions is acceptable.

More specifically, it should be noted that disabled parking provisions within the centre are considered generally acceptable however a higher number of spaces for loading may be required within the commercial precincts to cater for recorded demands.

Having regard for the above, the following strategies could be considered:

- In an activity centre context, it is desirable to encourage parking turn-over by restricting the most conveniently located on-street parking with short (or very-short) stay parking restrictions.
- Off-street parking is generally better suited to long-stay parking for those more likely to be willing to accept a level of inconvenience and longer walking distance from the intended destination (if overall their intended stay within the area is expected to be long).
- Very short-stay parking should be further encouraged within the core precincts to continue to encourage a high turnover of parked vehicles.
- Long-stay demands need not be accommodated within the core of the activity centre, with it often being preferential for these users (incl. staff and residential visitors) to park in peripheral areas to leave more convenient parking for customers.

### 9.1.3 Railway Station Car Parking and Impacts on Residential Areas

Car parking around the two railway stations within the study area (Ivanhoe and Darebin) currently reaches a high level of occupancy, with some notable overspill into residential areas particularly around Ivanhoe Railway Station. Overspill parking beyond the fringes of the periphery residential precincts does not appear to be currently occurring at this stage.

Regarding railway station parking, consideration will need to be given to Council's role in working with Public Transport Victoria (PTV) to ensure that parking associated with these railway stations does not adversely impact the operation of the commercial centre. This could include:

- Increasing the parking supply options
- Improve access to the station by other means (i.e. to reduce the reliance on vehicles to travel to the station)
- Continued management of parking restrictions by Council to protect the commercial centre.

#### 9.1.4 Existing and Future Travel Behaviours

At present, Ivanhoe is heavily car reliant with a journey to work mode share to car driver in the order of 84%. Whilst a mode shift could and will be sought for this area it would still be expected that in the future the centre will remain reasonably car dependant. Notwithstanding, average trip data for the broader municipal area of Banyule indicates that overall mode split to car driver is lower than Ivanhoe with an increased focus of the use of public transport.

#### 9.1.5 Existing Car Parking Demand and Management

The study area generates parking at rates generally consistent with those specified in Column B of Table 1 to Clause 52.06 of the Banyule Planning Scheme. These rates are reflective of 'Activity Centre' rates where a sharing of parking between different uses is prevalent.

Case studies indicate a consistent use of basic parking management techniques such as the use of time restricted parking and general enforcement to manage the parking system. This is consistent with practices currently adopted in Ivanhoe.

#### 9.1.6 Future Car Parking Demand and Management

Future land use growth projections for the study area of Ivanhoe are expected to generate an additional demand for in the order of 1,100 new car parking spaces by 2036 based on Activity Centre car parking rates.

Further consideration is required as part of the next stage of this car parking strategy to confirm viable options for accommodating the increased parking demands associated with projected land use growth in the area.

One of the primary strategies to be developed as part of this strategy is the formal inclusion of a Parking Overlay within the Planning Scheme which seeks to govern the level of car parking to be provided by new developments. Other options to be considered (but not limited to) include:

- parking provided on individual development sites
- utilising existing parking vacancies in the area
- the provision of new shared public car parking facilities
- investing in alternative travel modes to create a significant mode shift from private vehicle.

## 10. Car Parking Strategy

### 10.1 Introduction

The following details the development of a set of car parking strategy recommendations for the Ivanhoe Activity Centre and study area. These recommendations have been developed to suitably manage existing and future car parking provisions and land use car parking demands providing a 'balanced' solution which seeks to consider the needs of all stakeholders.

While issues have been established within earlier sections of this report, the response to those issues must be guided by a clear set of principles and objectives which can prioritise certain user groups or the way in which a response should be formed. These principles and objectives are discussed in the following Section 10.2.

### 10.2 Parking Objectives

#### 10.2.1 What Is Car Parking?

Before developing a set of parking strategy objectives and how these integrate with overall transport objectives we must have a comprehensive understanding of what car parking is.

As a general rule, land uses generate and attract patrons, customers, staff and / or residents resulting in economic activity. A by-product of access to these land uses is, in its simplest form, a 'trip'. Trips can be made by a variety of methods including (but not limited to) walking, cycling, public transport and / or the private motor vehicle.

Where does car parking enter this equation? Car parking provides an end of trip facility for the private motor vehicle mode. The type of land use has differing levels of attractiveness (i.e. trip generation) and therefore different requirements for car parking. Different uses also have different customer bases and in turn different needs in regard to their required length of stay. Accordingly, different types of car parking are required (for example, pick up drop off parking – 5 to 15 minutes, short stay parking – 1 to 4 hours and long stay parking – all day) to satisfy differing needs. In an Activity Centre setting a single parking event can serve a number of trip purposes and a single space can be shared between a number of users over the course of the day due to the differing temporal patterns of land uses.

With consideration for the above, it is important to have a sufficient amount of car parking relative to the Activity Centre's context, whilst balancing the different user group needs and the impacts associated with an over or under provision. The amount of car parking within a Centre can influence travel patterns and modes and can also be regulated through parking policies and pricing etc.

The cost of providing parking (by developer, Council, landowners or businesses) must also be recognised. Whether it be physical infrastructure cost, maintenance cost, management cost or lost opportunity cost, the cost of providing car parking is ultimately borne by parking users and by others (through increased rental, costs of goods and Council rates) whether they use it or not.

In this context, it is therefore important that parking be managed to:

- Recognise that a parking space doesn't attract people; it's the destination that attracts people.
- Enhance and not detract from Ivanhoe as a great destination.

- Encourage economic activity while advancing liveability.
- Ensure that Ivanhoe is not placed at a competitive disadvantage relative to other centres due to its car parking provisions.

### 10.2.2 Existing Activity Centre Objectives

Overarching transport objectives and parking objectives set out within existing policy documents (i.e. Banyule Activity Centre Car Parking Policy and Ivanhoe Structure Plan) provide a key starting point for the development of specific parking objectives to guide for how parking should be managed within the Ivanhoe Activity Centre.

In this respect, the key objectives as they relate to the management of parking from these references are set out below.

#### **Banyule Activity Centre Car Parking Policy**

Policy Implementation:

- Improving on-street car parking space management, so available spaces are used more efficiently to enable appropriate turnover.
- Revising Residential Parking Permit schemes for any residential area within generally 20 minutes walk of an activity centre core, to enable equitable access for on-street residential parking.
- Enabling higher-density car parking in preferred off-street locations, within generally less than 5 minutes walk or 400 metres of the activity centre's core. The design of any new or modified car parking facility will consider mixed-land use outcomes, signage & wayfinding and other works to support efficient access to and avoid all detrimental impacts on pedestrian environments.
- Implementing programs and infrastructure that will encourage and enable travel behaviour change that increases a propensity for walking, cycling and using public transport.
- A reduced rate of on-site car parking for new developments (below the current requirements of Section 52.06 of the planning Scheme), coupled with an increased commitment to delivering sustainable transport.
- A regular program of monitoring.

#### **Ivanhoe Structure Plan**

Objective:

- To ensure the Ivanhoe Activity Centre supports safe pedestrian and cyclist movement, integrated public transport, efficient vehicular movement and appropriate management of car parking and access. Infrastructure to be upgraded to meet the needs of a growing population.

Strategies:

- Maintain pre-existing levels of public car parking when redeveloping public car parks.
- Encourage mixed use development with sufficient public car parking in strategic locations.
- Encourage basement parking in multi-unit or mixed use developments.
- Continue to exclude new multi dwelling developments from access to residential car parking permits in accordance with the Banyule Activity Centre Car Parking Policy. This policy reduces the pressure on Accessible Residential Areas from the intrusion of car parking associated with commercial and higher density residential uses in the future.



- Encourage new multi-unit dwelling developments to adopt car sharing schemes to reduce overall car parking demands.
- Consider flexibility around car parking requirements in recognition of the fact that people have diverse needs and in some instances they may not require a car park.

### 10.2.3 Strategy Objectives and Guiding Principles

The recommendations of this strategy have been informed by a set of key objectives. These objectives are informed by relevant State and Local Government transport policy documents detailed earlier in this report and above, those of which play a key role in shaping the form and function of the Activity Centre.

The Strategy objectives are outlined in the Table 10.1 on the following page with further discussion around some of the guiding principles detailed in the subsequent sections.

**Table 10.1: Ivanhoe Strategy Objectives and Guiding Principles**

Strategy Objectives	Guiding Principles
<b>Ensure that an equitable and balanced provision of car parking is provided for the Activity Centre to satisfy needs.</b>	<ul style="list-style-type: none"> <li>○ Sustainable travel modes (i.e. walking, cycling, bus and train travel) are expected to increase in usage.</li> <li>○ Recognise the competing needs of different users including residents, traders and visitors within the Centre.</li> <li>○ Use a suitable road-space user hierarchy to inform strategy decisions.</li> <li>○ In assessing the appropriate quantum of car parking utilise relevant data and evidence.</li> <li>○ An appropriate balance of car parking is a peak repeatable occupancy in the order of 85% (this figure represents a good availability of parking and minimises vehicle circulation looking for a vacancy).</li> </ul>
<b>Promote greater travel choice and enable all users to utilise well integrated sustainable transport modes (rather than the private motor vehicle).</b>	<ul style="list-style-type: none"> <li>○ Give the opportunity for members of the community to walk to meet many of their daily needs.</li> <li>○ Support and enable sustainable travel use through upgrading infrastructure.</li> <li>○ Advocate and collaborate with stakeholders as necessary to provide the opportunity to use sustainable modes of travel.</li> </ul>
<b>Manage significant car parking intrusion and overspill into residential areas beyond the Activity Centre.</b>	<ul style="list-style-type: none"> <li>○ The benefits of living next to an Activity Centre must be considered in the contexts of a lower level of parking amenity in the surrounding streets.</li> <li>○ On-street car parking is a Council resource which can be shared between various users over the course of a typical day.</li> <li>○ People living adjacent to a major Activity Centre cannot expect the same level of amenity as those living in the residential hinterland (see <i>Naylor v Boroondara CC</i> [2005] VCAT 1082, 1 June 2005).</li> </ul>
<b>Utilise relevant management techniques and policy tools to reduce vehicle trips and best utilise / locate available car parking.</b>	<ul style="list-style-type: none"> <li>○ Acknowledge that car parking is valued and finite commodity.</li> <li>○ Reductions in car parking must be made with regard to the availability of alternative modes of travel (not giving consideration to this may reduce investment and undermine the economic success of the Centre).</li> </ul>
<b>Improve general amenity and safety for vulnerable road-space users within the Activity Centre.</b>	<ul style="list-style-type: none"> <li>○ A safe, accessible and sustainable road environment should be provided for all members of the community.</li> <li>○ Parking time limits are essential to manage parking turnover and generate availability in convenient areas (reducing walking distances for short-stay users).</li> <li>○ If required use parking pricing as a means to reinforce parking turnover, access to for preferred users and enforcement.</li> <li>○ Encourage street revitalisation, improved amenity and community safety.</li> </ul>

## 10.2.4 User Hierarchy Guidelines

The differing needs of road users and how these needs should be considered differently between commercial and residential areas within Ivanhoe, as a 'best practice' guide, is outlined within the Tables below.

**Table 10.2: Allocation of Parking – Commercial Areas**

Needs (Highest to Lowest)	Description
Disabled	In accordance with identified needs and relevant published standards.
PT Zone	Typically bus stop or taxi rank.
Loading Zone	Where off-street loading is not provided.
Bike Racks	Where space for footpath bicycle parking is not available.
Drop off / Pick up	Short term parking for drop off / pick up.
Customers / Shoppers	Time restrictions to vary from 15 minutes to 4 hours as required by the nature of the business / service, e.g. short term for post office, dry cleaner and longer term for consultations, hairdressers, restaurants and cafes.
Residential (including visitors)	Only applies in smaller centre with a mix of shop and residences; requires balancing of economic needs of the strip and surrounding residential amenity.
Traders and Local Employees	Local employees should not park in shopping strips where this undermines parking turnover that supports the businesses, but should be encouraged to use non-car based transport or in trader permit zones (if available).
Park and Ride	Parking for commuter use will only be considered where deemed to be appropriate and not to impact on residential amenity or economic viability.

**Table 10.3: Allocation of Parking – Residential Fringe Surrounding Commercial Areas**

Needs (Highest to Lowest)	Description
Disabled	Where individual residents qualify & no off-street parking exists
PT Zone	Typically bus stop or taxi rank.
Drop off / Pick Up	Short Term parking for student drop off / pick up
Residential [1]	Time restricted and/or permit parking as required
Short-term/Loading Zone	For local activity, e.g. corner milk bar (minimum 1 bay) to support a local business
Residential visitors	Appropriate time restricted
Customers	Managed to also allow for residential parking
Local employees	Managed to also allow for residential parking
Park-n-ride	Managed to also allow for residential parking

[2] While residential parking is identified to have a higher need than customer and employee parking this does not preclude parking by customers and employees in residential streets. This simply highlights that consideration of the needs of residential parking is required to ensure that these users can be suitably managed before allowing the intrusion of commercial parking into residential streets.

## 10.2.5 Acceptable Walking Distances

Acknowledgement must be given to appropriate walking distances between car parking locations and a user's intended destination. Generally, the time and distance which drivers are prepared to walk depends on the length of time which will be spent at their destination. Acceptable walking distance can also be impacted by the quality of the pedestrian environment, climate, line of site (can the destination be seen), and friction (barriers such as crossing busy roads).

The AustRoads Guide Information for Pedestrian Facilities (2012) references a number of different organisations and studies relating to pedestrian walking distance and safety. Specifically, these references indicate the following in Table 10.4 as a guide for acceptable walking distances to various activities.

**Table 10.4: Acceptable Walking Distances [1]**

Adjacent (Less than ~50m)	Short (Less than ~250m)	Medium (Less than ~400m)	Long (Less than ~500m)
People with disabilities Deliveries and loading Emergency services Convenience store	Grocery store Professional services Medical clinic Residents	General retail Restaurant Employees Entertainment centre Religious institution	Airport parking Major sport or cultural event Overflow parking

[1] Victorian Transport Policy Institute, Canada

As a general principle, Table 10.4 shows that the uses whose customers would stay for the shortest time typically accept the shortest walking distances, and as the time each user expects to spend at the destination increases the longer they find it acceptable to walk.

### 10.2.6 Activity Centre Parking

Differing approaches can be taken regarding the provision of car parking, particularly around Activity Centres where an interface exists between residential and commercial uses.

The use of peripheral area parking around centres is a common occurrence to support the core areas, which often results in intrusion into surrounding residential areas. While traditional residential areas are sought to be protected from commercial intrusion, those adjacent to an Activity Centre cannot necessarily expect the same level of amenity as those in outer residential areas. Indeed, the benefits of living close to an Activity Centre must also be considered in the context of a lower level of amenity.

This approach is reinforced within the VCAT decision *Naylor v Boroondara CC* [2005] VCAT 1082 (1 June 2005). On the question of residential amenity for people living directly adjacent to activity centres, it is the view of VCAT that *"people living adjacent to major Activity Centres and commercial areas cannot expect the same level of amenity as those living in the residential hinterland."*

While traditional approaches may seek to remove commercial parking from residential areas, the above identifies that parking in residential streets surrounding a city centre is acceptable and manageable.

### 10.2.7 Theoretical Capacity

Typically, parking utilisation in publicly available on-street car parking areas greater than 85%<sup>8</sup> represents a situation where drivers are unable to identify where vacant spaces exist and subsequently represents effective capacity. For off-street public car parks such as those that exist within the Ivanhoe Activity Centre, a level of 90% is more likely to represent the theoretical capacity as the car parks are not excessively large, the density of car spaces are higher when compared with typical on-street layouts and there are a limited number of choices when navigating through off-street car parks. Based on this, the theoretical capacity of the Ivanhoe Activity Centre is based on 85% for on-street spaces and 90% of off-street spaces.

Demands above these theoretical capacities can and do exist, including within the Ivanhoe Activity Centre. Generally, such levels of demand result in extra local traffic movements as vehicles circulate in search of a vacant car spaces. It is noted that the theoretical capacity (of 85% and 90%) is an aspirational target for broad level strategies such as this, as undertaken by Council. In more specific cases (i.e. development applications), the use of this spare capacity

<sup>8</sup> Donald Shoup, *The Price of Parking on a Great Street*, Parking World, February 2009

can be appropriate in localised areas surrounding a site where vacancies are more readily defined as suitable for purpose.

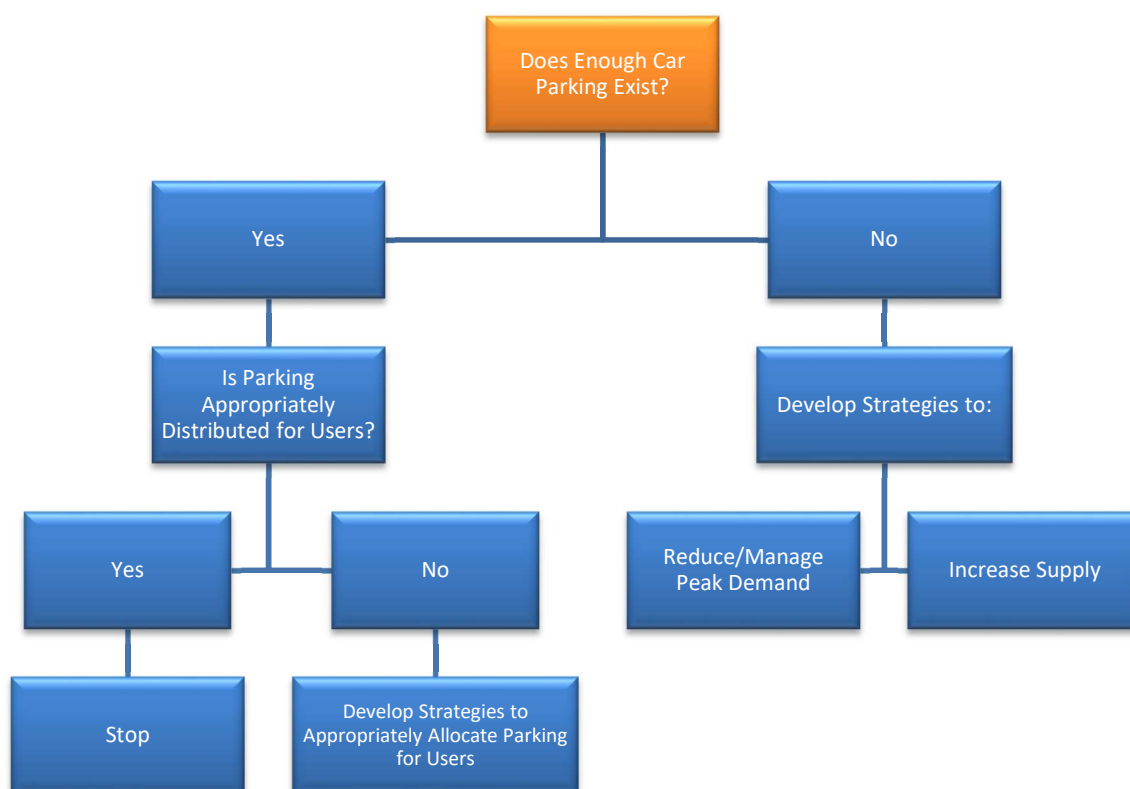
## 10.3 Managing Existing Car Parking

### 10.3.1 Does Enough Parking Exist?

No particular guideline or standard exists which specifies that car parking for an Activity Centre should be distributed into specific timeframes, proportions or locations. Indeed, a balance of different management techniques will be required in each case dependant on the individual uses contained within the centre.

However, the basis for developing strategies to manage existing car parking provisions must initially be formed by answering the fundamental question – does enough car parking exist to accommodate demand? From this point, a process can be followed to establish strategies to better manage the resource as set out within Figure 10.1 below.

**Figure 10.1: Management of Existing Car Parking – Step One**



In reviewing whether or not 'enough car parking exists' within the Ivanhoe study area, reference is made to the assessment of existing car parking demands earlier in this report and the car parking objectives and principles which have been established for this parking strategy.

The assessment of existing car parking demands undertaken within Section 6 of this report indicates that an overall study area car parking occupancy of 49.4% was recorded during the peak Thursday midday period. It is determined that suitable capacity exists within the study area when benchmarked against the 'theoretical' maximum 85% occupancy.

Notwithstanding, it is important to recognise that both the peripheral and commercial precincts feature varying parking characteristics and therefore should be reviewed separately and in more detail.

### Commercial Precincts

The commercial precinct parking demands are at their highest within business hours (i.e. 11:00am and 3:00pm) on a typical weekday, with a peak occupancy of 73% occurring at 1:00pm. Parking demands are currently being accommodated within theoretical capacity limits, however it is important to review these key areas to determine if the car parking resource is being appropriately distributed

### Periphery Precincts

The peripheral areas outside the commercial precinct areas experiences its peak demand at 11:00am featuring an occupancy of 36% (noting that similar demands occurred throughout the day from 8:00am until 4:00pm).

It is accordingly considered that there is enough car parking provided within the non-commercial areas to satisfy the current level of demand. It is also noted that the key user group for parking within these areas is residents, and accordingly, the existing supply would appear to be generally well restricted and distributed, with limited 'overspill' currently occurring within these areas from the commercial precincts.

## 10.3.2 Is Parking Appropriately Distributed for Users?

As per discussions above for the commercial precincts, a more effective management of existing car parking within the commercial precincts is required and it is important to review if it is being appropriately distributed. This is to ensure that maximum efficiency is being achieved for the various key user groups within the Centre.

**Figure 10.2: Management of Existing Parking – Step Two**





In this respect, the distribution of parking can be assessed having regard for the following key indicators as follows:

- by location
- by time-restriction.

These characteristics are discussed in further detail below.

### Car Parking by Location

The appropriate distribution of car parking by location is dependent on a number of factors which include pedestrian connectivity, topography/gradient of roads and paths and the occupancy of available car parking within nearby precincts.

To understand the appropriate distribution of car parking within the seven commercial precincts, a further breakdown of the occupancy levels for each precinct is outlined in Figure 10.3.

**Figure 10.3: Commercial Precinct Car Parking Occupancy Levels**



As identified in Figure 10.3, there are two commercial precincts (4 and 5B) which are approaching theoretical parking capacity, experiencing demands greater than the ideal 85% occupancy level. The two options available to mitigate the high car parking demands within these precincts are to build more car parking or encourage a sharing of parking (including nearby precincts).



Based on overall occupancy levels recorded for the Ivanhoe Activity Centre, it is not considered appropriate in this instance to pursue the construction of additional car parking. Rather, consideration should be given to encouraging the sharing of the existing car parking resource with adjacent precincts where available capacity exists.

The ability for adjacent commercial precincts to accommodate further car parking demand is indicated in Figure 10.3. In this respect, Precinct 2, 5A and 6 are located in close proximity to Precinct 4 and 5B, and, notwithstanding some minor topographical constraints, feature reasonably good pedestrian connectivity between these areas. In particular, it is noted that Precinct 5A is significantly underutilised as a parking resource (44% occupancy) for key land uses within central Ivanhoe.

Overall, it is evident that car parking within the commercial areas is reasonably well distributed by location but could be better utilised (through better awareness etc.) to serve existing demands.

### Car Parking by Time-Restriction

A review has also been undertaken of car parking occupancy by time restriction within the commercial precincts to determine the appropriateness of existing distributions. Table 10.5 provides a breakdown of car parking occupancy for particular restrictions within the commercial study area.

**Table 10.5: Overall Commercial Precinct Parking Demands (Thursday 19 November 2015 at 1:00pm) [1]**

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
ALL PRECINCTS				
Very Short Stay (VSS) (<1hr)	6	2	33%	4
Short Stay (SS) (1hr-2hr)	742	500	67%	242
Medium Stay (MS) (3hr-4hr)	459	378	82%	81
Long Stay (LS) (>4hr)	670	499	74%	171

[1] Table 10.5 excludes private and 'other' parking as previously noted in Table 6.2 of this report.

Table 10.5 highlights that all parking restrictions currently sit within theoretical occupancy level limits. It is noted that the demand for long stay parking is generally attributable to both Ivanhoe Train Station commuters and staff / employees working within the Centre. Whilst, the current level of demand for short and medium stay parking is generally associated with visitor demand for local businesses.

To further understand the effectiveness of the existing car parking restrictions within the commercial precincts, Table 10.6 has been reproduced from earlier in this report to highlight parking duration of stay. This information assists in identifying whether or not the current mixture of restrictions best respects the timeframes required for typical customer activities, noting that long stay parking provided within close proximity of key land uses in commercial precincts should be discouraged.

**Table 10.6: Existing Percentage of Parking Restrictions and Events in Commercial Precincts**

Restriction		Percentage of Spaces	Percentage of Parking Events
Very Short Stay (VSS)	< 1 hour	0.3%	67%
Short Stay (SS)	1 hour – 2 hour	39.3%	17%
Medium Stay (MS)	3 hour – 4 hour	24.8%	10%
Long Stay (LS)	> 4 hours	35.6%	6%

As indicated in Table 10.6, there are high level of parking events which are 1 hour or less in duration, notwithstanding only a small proportion of these spaces are provided within the

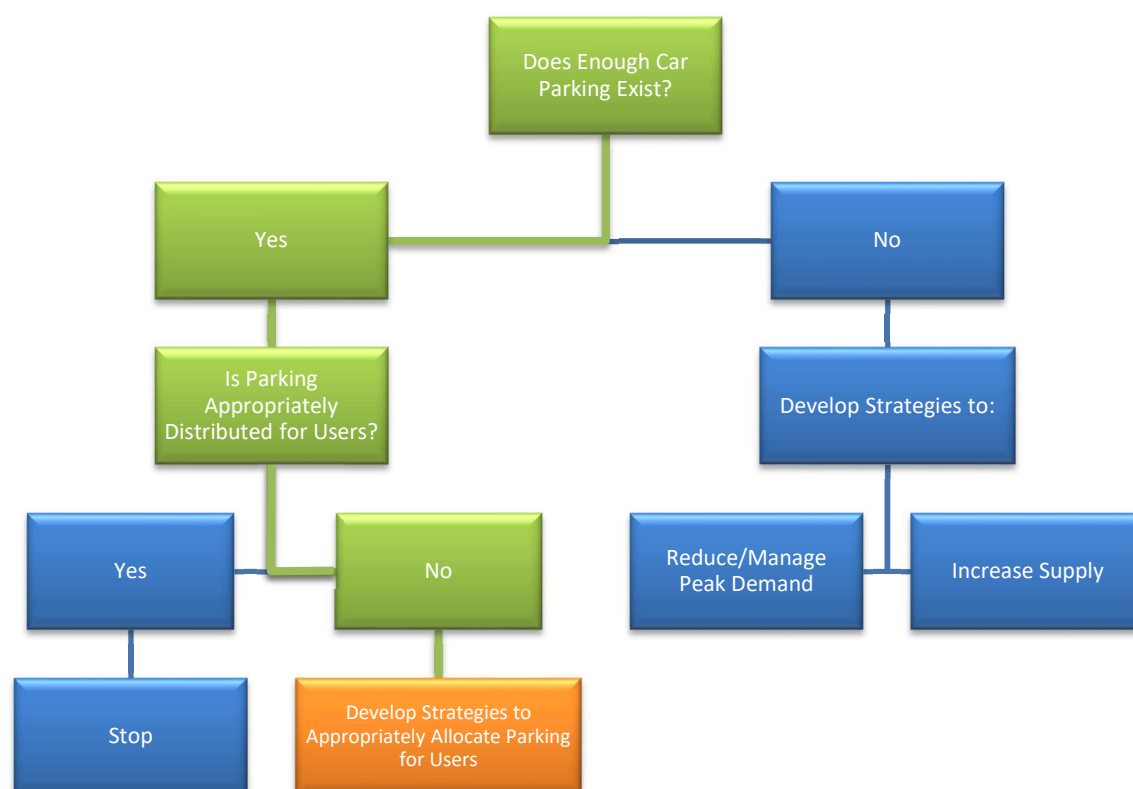
commercial precincts. It is also noted that there are a large proportion of long stay spaces provided which are greater than 4 hours in duration which are not being utilised currently. These types of spaces should be encouraged to exist within these primary areas.

Accordingly, there is an opportunity to develop strategies to better manage the mix of parking restrictions within the commercial precincts to better serve existing demands.

### 10.3.3 Develop Strategies to Appropriately Allocate Parking for Users

Based on an initial review it is considered that strategies are required to more appropriately allocate parking for users as per Figure 10.4.

**Figure 10.4: Management of Existing Car Parking – Step Three**



As discussed it is clear that at present, car parking is not appropriately distributed well, noting that both a better awareness of current parking locations and a better mix of time restrictions is required to satisfy user needs within the Ivanhoe study area.

The recommended strategies are outlined under the relevant sub-sections, including a mix of high-level and detailed precinct-by-precinct level concepts.

#### Car Park Wayfinding Signage

Theoretical capacities beyond 85% occupancy for on-street and 90% occupancy for off-street car parking facilities represents a perceived unavailability of spaces due to difficulty in directly locating a vacancy or extensive circulation required for a user to park a vehicle. This issue can be improved by providing clear advanced guidance to available parking areas. As outlined in Section 6.8 of this report, existing car park wayfinding signage was often inadequate in size, placement, clarity and clearance from obstructions.

To overcome these issues, it is recommended that a wayfinding signage strategy be implemented to improve the use of car parking that would otherwise not be found or fully utilised under constrained conditions (and within adjacent precincts where suitable vacancies exist).

As discussed, most notably, Precinct 5A is well positioned to cater for additional parking demands close to the centre of the activity centre with walking trips which range from short (<250m) to medium (<400m) distances to many associated land uses. Additionally, there are a number of pedestrian crossing facilities provided along Upper Heidelberg Road facilitating good east-west connectivity.

The recommendation for a formal signage strategy assists with maximising the use of available parking resources and minimising travel time spent circulating streets and car parking facilities to locate available spaces.

The potential location of key car park wayfinding signage is shown in Figure 10.5.

**Figure 10.5: Potential Wayfinding Parking Signage Locations**



#### **Strategy Recommendation 1**

Prepare a wayfinding signage strategy to maximise the use of off-street parking locations and minimise vehicle circulation. This may include the integration of electronic / dynamic parking signage.

#### **Car Parking Timeframes**

##### **Very Short Stay Restrictions**

Very short stay parking is a space which permits a vehicle to park for less than an hour. Typically, these spaces, including P15min or P30min parking, are located on the main streets for convenient access and turnover. Very short stay spaces are used to accommodate quick stopovers for customers purchasing a small goods such as from a supermarket, bakery, café or post office. Table 10.5 indicates that within the study area there is an overall supply of six very short stay car parking spaces.

The duration of stay information for all the commercial precincts, as presented in Section 6.4.7, shows that a large number of trips to the Activity Centre are between 15 and 30 minutes in duration. Of all events that occurred within the commercial precincts, it was shown that 27% and 20% were for 15 and 30 minutes respectively. This indicates that of all car parking events generated by the commercial precinct, approximately half of these parking events required a stay of up to 30 minutes.

In this instance, the demand for very short stay parking does not appropriately compliment the supply of these types of spaces within the commercial precincts. The introduction of more very short stay spaces at convenient and appropriate locations within the study area should be provided to cater for existing demands and provide commercial benefits to the local traders promoting a higher turnover of customers within conveniently located areas.

Specific locations for very short stay parking spaces has been identified and further discussed under each relevant precinct later in this report.

#### **Strategy Recommendation 2**

Introduce more very short-stay parking, with a particular focus on providing these spaces nearest to appropriate shopping areas within key commercial precincts (i.e. within Precinct 5B).

#### **Short Stay Restrictions**

The number of short stay car parking spaces is generally considered to be satisfactory with an occupancy level of 67%, noting an overall supply of 742 spaces.

The occupancy of short stay parking restrictions within each of the commercial precincts sits within theoretical capacity limits with the exception of Precinct 5B which experiences high levels of parking demand across all restrictions. Further consideration has been given to Precinct 5B in this regard to either increase the level of car parking supply or encourage excess short stay parking demands to be accommodated within other precincts.

In this instance, further strategies to manage short stay car parking are not required at this time.

#### **Medium Stay Restrictions**

As indicated in Table 10.5, there are 459 medium stay car parking spaces within the study area, which is made up of both 3P and 4P parking restrictions. Of the overall supply of medium stay parking, it is noted that the large majority of the 3P and 4P parking is contained within off-street car parking areas with a limited number of medium stay on-street car parking currently provided.

For various other Activity Centres it has been observed that staff will generally use the most convenient long-term spaces available (as they arrive first). This will result in shoppers/customers having to park further from their destination, thus creating the perception that inadequate short-term car parking exists.

The fundamental purpose of medium stay car parking is to service those customers seeking to stay for an extended period of time within the precinct over and above the typical short stay demands. Medium stay parking would typically be utilised by customers attending at restaurants, cafes and other such land uses that require an extended stay past the typical 1P and 2P time periods.

It is important to recognise that medium stay car parking located within the commercial precincts has not been introduced to service all day demands such as staff and other long stay commuters. Where convenient medium stay parking is located within the Activity Centre, it can be common practice for staff to utilise this parking by moving their vehicles once or twice per

day to avoid the need of parking further away in long stay areas. This does not serve the correct purpose of the medium stay car parking space allocation.

Duration of stay data within 4P parking spaces indicates that of the compliant parking within these areas, 94% of events were observed to be 3 hours or less. In this instance, it is therefore recommended that all 4P parking within the commercial precincts of the study area be converted to 3P parking as a maximum to permit shorter stays, increased turnover and discourage long stay parkers from utilising these areas.

### **Strategy Recommendation 3**

Convert all Council controlled 4P on-street and off-street parking within the commercial precincts of the study area to 3P as a maximum.

### **Long Stay Restrictions**

Parking demands that are long stay are typically associated with public transport commuters and local staff, contributing to an overall occupancy of 74% which is generally satisfactory from a capacity sense but is approaching the overall 85% theoretical capacity limit.

The large majority of long stay demands are captured within Precinct 2 and Precinct 4, which are associated with the Darebin and Ivanhoe Train Stations respectively.

Car parking strategies to address the specific commuter issues have been identified at individual precinct level and in this instance, further strategies to manage long stay car parking are not required at this time.

### **Distribution of Parking Restriction Types**

Having regard for the strategy recommendations above, the proposed principles for allocating car parking restrictions along the major road frontages within the Activity Centre have been identified in Figure 10.6 below.

**Figure 10.6: Activity Centre Car Parking Restriction Principles**

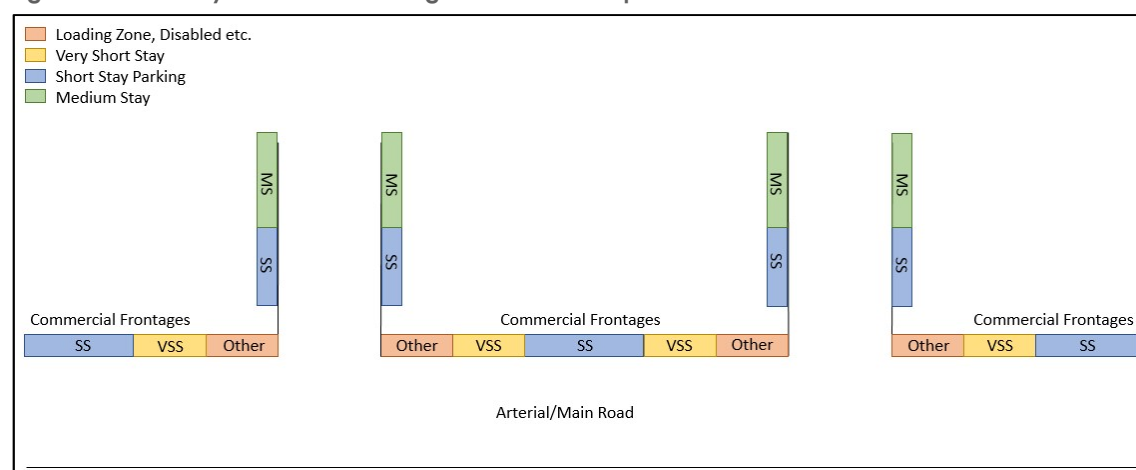


Figure 10.6 indicates that user-specific spaces (i.e. disabled, loading, bus and taxi) should be located at the extremities of the road segment, representing the most conveniently accessed spaces. Very short stay parking should be located either side of the short stay parking segments to capitalise on convenient location and accommodate high turnover of these spaces. Short stay spaces should be positioned in the centre of the road segment which are marginally less convenience for parking and a longer duration of stay is required.



The side road parking restrictions should accommodate additional short stay parking closest to the main commercial frontage. Those customers seeking to stay within the commercial precinct for a longer time period are accommodated in the medium stay parking areas on the side road past short stay spaces where there is a willingness to walk a further distance for longer duration of stay trips.

### 10.3.4 Precinct Specific Considerations

#### Precinct 1 – Darebin Station

Table 10.7 details the car parking demands within Precinct 1 of the commercial area.

**Table 10.7: Precinct 1 Car Parking Demands (Thursday 19 November 2015 at 1pm)**

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT 1				
Very Short Stay (VSS) (<1hr)	0	n/a	n/a	n/a
Short Stay (SS) (1hr-2hr)	4	3	75%	1
Medium Stay (MS) (3hr-4hr)	0	n/a	n/a	n/a
Long Stay (LS) (>4hr)	94	43	46%	51

As indicated above, car parking demands for publically available spaces are below the acceptable 85% threshold, both overall and for each parking restriction type. It is therefore appropriate to conclude that Precinct 1 generally operates satisfactorily, although it is noted that long stay parking represents 96% of publically available parking within the precinct and currently experiences a peak occupancy of 46%.

In this respect, consideration could be given to reviewing the mix of parking restrictions in the future, in particular, should demands dictate that more very short stay / short stay parking is required.

#### Precinct 2 - Livingston

Table 10.8 details the car parking demands within Precinct 2 of the commercial area.

**Table 10.8: Precinct 2 Car Parking Demands (Thursday 19 November 2015 at 1pm)**

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT 1				
Very Short Stay (VSS) (<1hr)	0	n/a	n/a	n/a
Short Stay (SS) (1hr-2hr)	349	238	68%	111
Medium Stay (MS) (3hr-4hr)	10	10	100%	0
Long Stay (LS) (>4hr)	19	17	89%	2

The large majority of car parking is short stay, noting that the majority of these spaces are 2P and located within off-street stations.

The location of Precinct 2, in close proximity to Upper Heidelberg Road, lends itself to catering for some of the demands generated by Precinct 5B. It is considered that the current mix of car parking restrictions, noting that the peak occupancy of short stay spaces sits at an appropriate 68%, and satisfies current car parking demands associated with the precinct and the surrounding area.



As indicated earlier, the improvement of wayfinding parking signage could assist in distributing demands to this Precinct, noting that the removal of 4 hour restrictions for the provision of more short stay parking appropriately promotes the level of turnover and customer priority required for the commercial areas.

#### Precinct 3 - Marshall

Table 10.9 details the car parking demands within Precinct 3 of the commercial area

**Table 10.9: Precinct 3 Car Parking Demands (Thursday 19 November 2015 at 1pm)**

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT 1				
Very Short Stay (VSS) (<1hr)	1	1	100%	0
Short Stay (SS) (1hr-2hr)	14	6	43%	8
Medium Stay (MS) (3hr-4hr)	0	n/a	n/a	n/a
Long Stay (LS) (>4hr)	11	7	64%	4

Precinct 3 contains 26 publically available parking spaces, a relatively small precinct when compared to other commercial precincts in Ivanhoe. Notwithstanding, it is considered that Precinct 3 car parking demands are appropriately satisfied by the existing car parking supply with a 43% and 64% car parking occupancy for short stay and long stay spaces respectively.

A review of the commercial land uses which exist within Precinct 3 indicate that short stay spaces would more readily be required, with customers staying for between 1 to 2 hours. Therefore, the location and restriction types currently observed within Precinct 3 are considered satisfactory.

However, as identified earlier, the demand for very short stay spaces is high and future investigation could be given to the car parking mix within Precinct 3 with specific consideration to the introduction of very short stay car parking spaces.

#### Precinct 4 – Ivanhoe Station

Precinct 4 primarily centres around the Ivanhoe train station with a number of associated car parks provided for train commuters. Table 10.10 details the car parking demands within Precinct 4 of the commercial area.

**Table 10.10: Precinct 4 Car Parking Demands (Thursday 19 November 2015 at 1pm)**

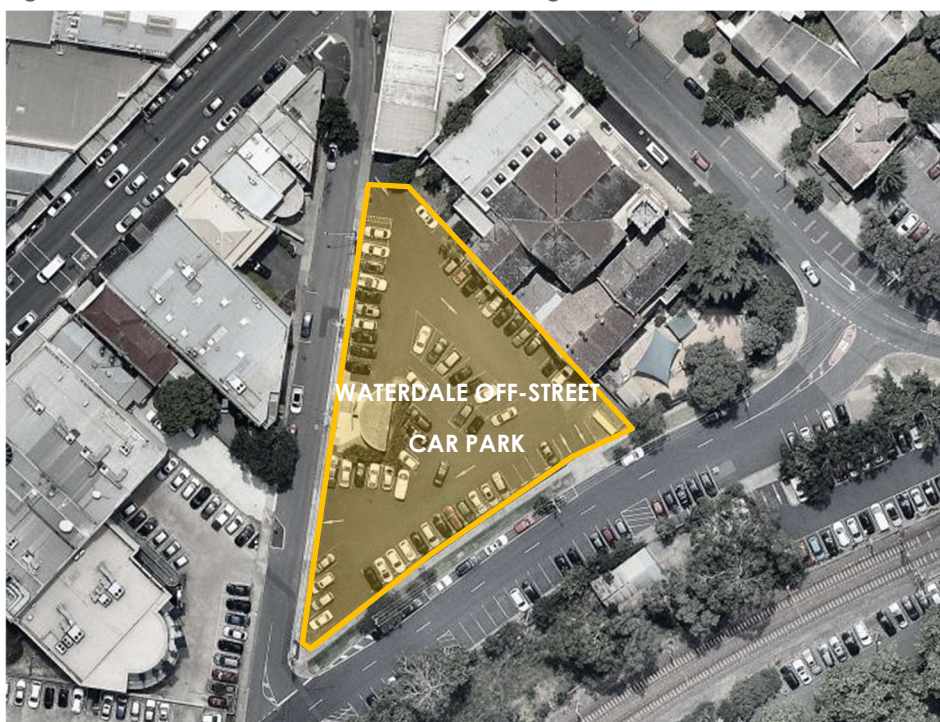
Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT 1				
Very Short Stay (VSS) (<1hr)	1	0	0%	1
Short Stay (SS) (1hr-2hr)	21	9	43%	12
Medium Stay (MS) (3hr-4hr)	67	66	99%	1
Long Stay (LS) (>4hr)	346	323	93%	23

Medium and long stay car parking demands within this precinct exceed theoretical (85%) capacities, with a peak occupancy of 99% and 93% respectively. A further review of the existing data indicates that long stay car parking at 6:00 am in the morning reaches a car parking occupancy of 72% (i.e. a demand of 248 spaces). This high level of car parking demand early in the morning indicates that public transport train commuters are required to arrive at Precinct 4 very early in the morning to ensure that they secure a long stay car parking space for the day.

Although car parking within the immediate vicinity of the rail commuter car parks is restricted to between short or medium stay parking, it is considered possible that a portion of overspill occurs within the local area. In particular, the duration of stay data presented in Section 6.4.5 for 3P restricted spaces, indicated that there were 59 parking events (approx. 5% of all 3P parking supply) where vehicles were parked for a period of 8 hours or greater in duration. There is a strong likelihood that these events are linked to train commuters or long stay staff trips to the study area.

An example of this is within the medium stay (3P) car parking areas located within the Waterdale Road Off-Street car parking area as highlighted in Figure 10.7.

**Figure 10.7: Waterdale Road Off-Street Car Parking Area**



Noting the high levels of train commuter demand and the opportunity for some of this commuter demand to impact the Waterdale off-street car park within Precinct 4, it is recommended that consideration be given to further reducing the time restrictions within this area to 2P, to further deter long stay parking events. The 2P restriction could be targeted during weekday time periods, with 3P time restrictions maintained on weekends to cater for the adjacent Uniting Church.

Furthermore, noting the high level of long stay commuter parking, it is recommended that Council liaise with VicTrack to review current trends at Ivanhoe Station and explore any opportunities to improve/cater for demands in the future.

#### **Strategy Recommendation 4**

Revise current 3P parking restrictions within the Waterdale off-street parking station to a maximum of 2P to further deter potential long-stay events.

#### **Strategy Recommendation 5**

Council to liaise with VicTrack to discuss current parking trends related to commuter parking at the Ivanhoe Railway Station and explore opportunities to improve/cater for future demands.

### Precinct 5A – UHR-Lower

Table 10.11 details the car parking demands within Precinct 5A of the commercial area.

**Table 10.11: Precincts 5A Parking Demands (Thursday 19 November 2015 at 1pm)**

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT 1				
Very Short Stay (VSS) (<1hr)	2	0	0%	2
Short Stay (SS) (1hr-2hr)	131	46	35%	85
Medium Stay (MS) (3hr-4hr)	16	13	81%	3
Long Stay (LS) (>4hr)	125	51	41%	74

Car parking demands across all restrictions within Precinct 5A are currently within manageable levels, noting that the majority of parking supplied within the precinct is either short or long stay parking, with peak occupancies of 35% and 41% respectively.

Noting that all parking within commercial precincts is recommended to be converted to a maximum of 3P restrictions, it is considered appropriate that available parking within the precinct be promoted to cater for surrounding high customer demands from nearby commercial precincts.

### Precinct 5B – UHR-Upper

Precinct 5B represents the major commercial precinct within the Ivanhoe Activity Centre with a varied mix of land uses primarily located along both sides of Upper Heidelberg Road. Table 10.12 details the car parking demands within Precinct 5B of the commercial area.

**Table 10.12: Precincts 5B Parking Demands (Thursday 19 November 2015 at 1pm)**

Parking Restriction	Supply	Demand (Occupancy)		Vacancies
		Spaces	%	
PRECINCT 1				
Very Short Stay (VSS) (<1hr)	2	1	50%	1
Short Stay (SS) (1hr-2hr)	121	117	97%	4
Medium Stay (MS) (3hr-4hr)	206	183	89%	23
Long Stay (LS) (>4hr)	46	46	100%	0

For the majority all of the short, medium and long stay parking supply experiences high levels of demand, exceeding theoretical capacity limitations. It is important to understand the nature of the high levels of parking demand, where excess demand can be accommodated elsewhere and what strategies can be implemented to better utilise the car parking spaces for the needs of the activity centre.

In considering the above and the need to preserve short stay car parking spaces within close proximity to the target land uses, it is recommended that all long stay spaces be replaced with medium to short stay spaces that will provide a higher turnover of commercial business for the precinct. Although this will displace some longer stay parking events which occur, it has been shown that Precincts 2, 5A and 6 have the available vacancies to cater for displaced demand.

#### **Strategy Recommendation 6**

Specifically reconfigure all long stay parking (4 hour or greater) within Precinct 5B to medium and/or short stay parking spaces.



As discussed in Section 6.4 and Section 10.3 of this report, there is a specific demand for shorter stay trips to the Activity Centre, at present, only two spaces exist along Upper Heidelberg Road. Given the supply of very short stay spaces does not complement existing demands, as per available duration of stay information, it is recommended that additional 15 and 30 minute spaces be introduced along Upper Heidelberg Road to facilitate a higher turnover of spaces in the most convenient location within the Activity Centre.

Figure 10.8 identifies the appropriate location where a number of spaces could be converted to very short stay parking within Precinct 5B along Upper Heidelberg Road.

**Figure 10.8: Proposed Change from 1P to 15min or 30min Parking**



#### **Strategy Recommendation 7**

Introduce more very short stay car parking spaces in those locations identified along Upper Heidelberg Road in Figure 10.8.

#### **Precinct 6 – Civic Centre**

Precinct 6 comprises the Ivanhoe Civic Precinct which is the current location for the offices of Banyule City Council. It is noted that this precinct is to be redeveloped as part of the relocation of Council to new offices in Greensborough.

GTA recently prepared a report (dated 14/03/17) which assessed the car parking implications of the proposed relocation of the Council offices and the redevelopment of the site into the 'Ivanhoe Community Hub and Learning Space.'

As part of the Traffic Impact Assessment for the site, a detailed assessment of the existing and future car parking conditions was undertaken which indicated that the site is expected to accommodate all future parking demands within the precinct. Specifically, it was assessed that the future car parking demand on the site would be in the order of 173 car parking spaces with a proposed overall car parking supply of 238 spaces.

In this instance, at peak occupancy the site could provide for up to 65 vacancies post-development which could also be utilised to cater for car parking demands within the adjacent Precinct 5B. It is noted that the proposed Community Hub could be expected to host a number of special events, however these events would likely be undertaken during evening time periods outside of the weekday peak period.

Given the proximity of Precinct 6 to the adjacent Precinct 5B, car parking within this area could be relied upon to cater for overspill demands and should be actively promoted in line with strategy recommendations presented earlier in this report.

## 10.4 Other Strategic Considerations

### 10.4.1 Paid Parking

The pricing of car parking can act as an extremely powerful demand management tool as it directly imposes a charge on the use of the car (in addition to the indirect charges associated with vehicle registration, fuel, maintenance and insurance).

While there are potential advantages and disadvantages with pricing, the general perception amongst traders is that the net effect will be negative. In this regard consideration has been given to the theoretical positives and negatives of paid parking systems:

#### Positives

- Would be likely to increase the turnover of car parking particularly within prime car locations increasing the availability of parking for additional customers to the centre.
- Encourages sustainable transport travel modes such as public transport, cycling walking and carpooling.
- Shopping 'browsing' expenditure may be increased by those waiting for public transport arrivals.
- Potential shifts in mode of travel reduce traffic congestion improving the amenity of an area further enhancing the overall attractiveness of a centre.
- Potential shifts in mode of travel reduce traffic congestion improving accessibility for new customers and for those who must drive to the centre.
- Anecdotally other centres introducing paid parking have not experienced significant reductions in trade.
- The collection of parking revenue can be reinvested within the centre from which it was collected to further enhance amenity, other forms of travel etc.

#### Negatives

- Trade may be diverted to other surrounding centres that have free parking.
- Shopping expenditure may be lessened due to drivers parking for lesser time.
- Shopping 'browsing at leisure' expenditure may be lessened as drivers seek to lessen the length of their parking stay or rush to avoid overstaying restrictions.
- Drivers may park elsewhere within the precinct to avoid paying for parking and creating intrusion into residential areas.

With respect to the Ivanhoe Activity Centre, paid parking occurs currently in three locations where a pay-and-display ticket machine is provided. Details of these areas have been identified in Section 6.7.

Car parking demands for the paid parking areas along Norman Street (50 spaces) near the Ivanhoe Train Station indicate a peak occupancy of 64% during the Thursday midday peak period. Demands for unrestricted spaces in the vicinity of the paid parking areas are very high (i.e. 90%+ occupancy) at 6:00am which is likely associated with early train commuter vehicles. By contrast, 42% occupancy recorded within paid parking areas at 9:00am suggests that the take-up of paid parking by train commuters is limited during the morning period.

In this respect, it is noted that there is a tendency for train commuters to avoid the Norman Street paid parking areas at the preference of unrestricted long stay free parking within the nearby area. However generally, it is considered that car parking restrictions within the vicinity of the Ivanhoe Train Station are appropriately distributed to mitigate any substantial impacts of overspill resulting from the paid parking and rail commuter spaces.

The paid off-street car park associated with the Woolworths supermarket (nearest the railway station) experiences a peak demand of 42% throughout the day, indicating that it generally appears to be a well-protected resource for customer only parking which is acceptable.

Overall, paid parking areas within the Ivanhoe Activity Centre generally appear to operate satisfactorily with no obvious indicators highlighting a need for expansion of the existing paid parking areas throughout the Centre. Nevertheless, it is recommended that an emphasis still be maintained to appropriately control parking restrictions surrounding paid areas to ensure that parking events avoiding fee parking do not inappropriately impact the surrounding / residential street areas.

#### 10.4.2 Parking Enforcement

Parking enforcement is important to ensure the available resource is being used as designed (i.e. drivers adhering to spaces restrictions appropriately). This encourages car parking turnover and the efficient use of parking spaces for multiple users in short term parking areas, noting an increased focus on more short-term parking opportunities within the Ivanhoe Activity Centre.

At present, whilst some overstaying within spaces does occur on occasion, generally car parking compliance is acceptable and accordingly current enforcement levels within the study area should be maintained. Noting that further very short and short stay parking will be provided in some areas these new areas of car parking should be monitored with caution until such time that drivers become more aware of the changes.

##### **Strategy Recommendation 8**

Regular parking enforcement services be continued throughout the study area, with a concentration within the Ivanhoe Activity Centre to promote the turnover and the efficient use of very short and short stay parking spaces.



## 10.5 Managing Future Car Parking

The approach to developing strategies for managing car parking demands associated with future development growth within the study area comprises two key steps as follows:

- i The first step requires consideration of the rate at which car parking should be provided within the area.
- ii The second step involves review of how future car parking demands will be accommodated.

## 10.6 Setting of Car Parking Rates

### 10.6.1 Policy Approach to Parking

A policy approach is recommended to govern the level of car parking which is allowed to be provided rather than simply allowing car parking demands to grow at their current rate. In this respect, the future growth of Ivanhoe, and its attractiveness for private sector investment, will be dependent on many factors including the availability of car parking and the rate at which it is to be provided in support of new development and land use change.

Notwithstanding the relationship between centre attractiveness and car parking provision, the adoption of the current statutory car parking rates (Clause 52.06 – Column A) for future development and land use change will not necessarily assist in making the centre more attractive, as it would likely result in the potential overprovision of car parking and the associated issue of traffic congestion amongst other health related negatives. In a similar vein, reducing car parking rates in a manner that results in a significant under provision of car parking could also be counterproductive.

With this in mind, a move towards a more balanced, controlled and strategic approach to car parking provision and management within the study area is considered to be critical<sup>9</sup>.

This approach requires a balance to be struck between:

- i requiring too much on-site car parking which increases the cost of development, decreases the attractiveness of development and potentially leads to increased traffic congestion levels within the study area, and
- ii limiting the amount of car parking to be provided on-site to the point where the offering is not attractive to the market<sup>10</sup>, results in an undersupply of car parking in the study area and unreasonably increases the reliance on alternate transport modes and increase car parking along abutting residential streets.

### 10.6.2 Area to which Car Parking Rates will Apply

In the setting of car parking rates, consideration also needs to be given to the area or precincts across which the rates will apply and whether car parking rates should be adopted for the entire study area, or, whether rates should vary in different locations.

Varying rates between precincts enables specific rates to be allocated to an area depending on their geographical location, providing scope for lower or higher parking rates to be provided

<sup>9</sup> This discussion should not be interpreted as implying that car parking is the sole or most important determinant of attractiveness for investment. Rather, it seeks to make the point that car parking is one factor in the investment decision and that it has the potential to be of significance.

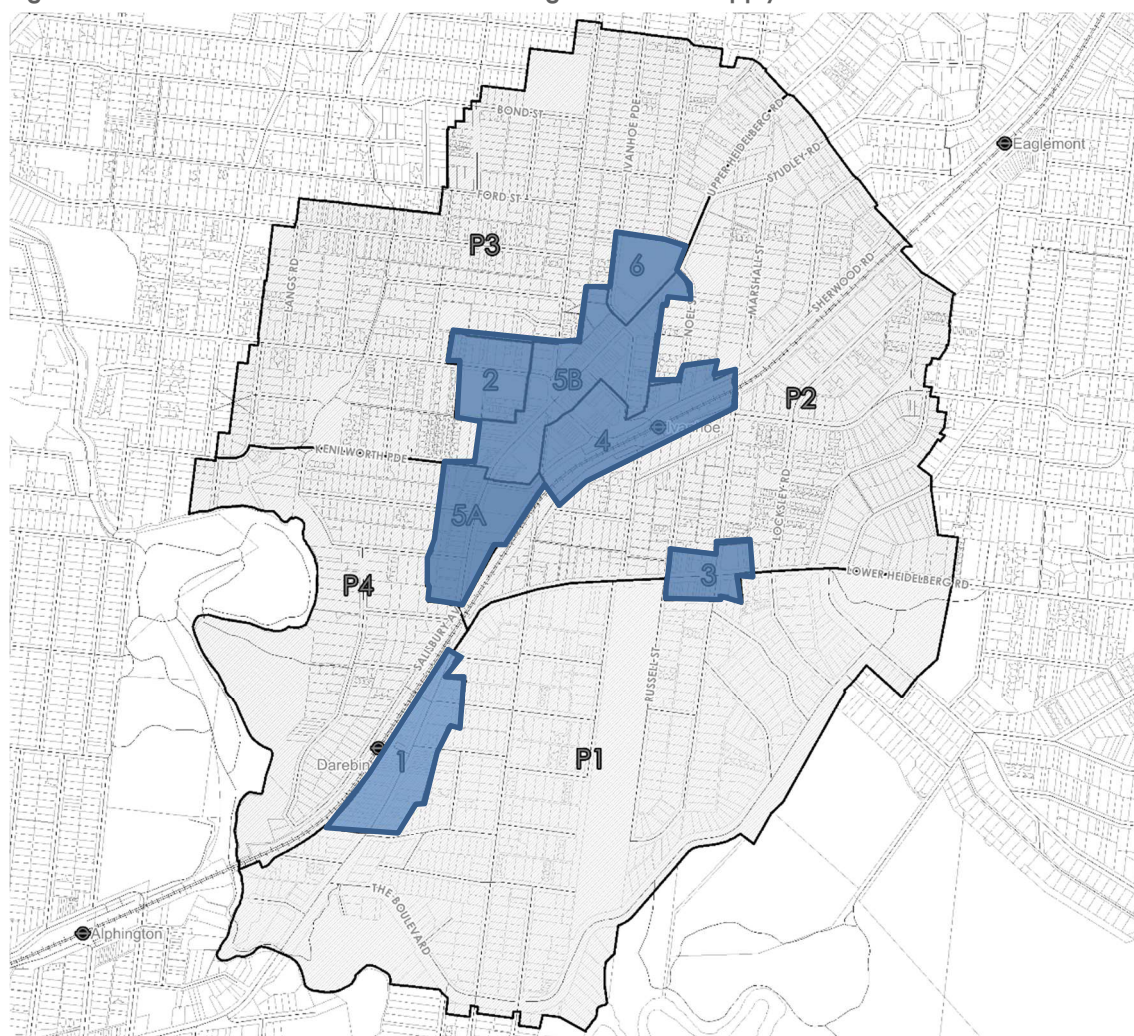
<sup>10</sup> It is assumed that the market will not develop a product it cannot sell.

dependent on the availability of a number of factors such as public transport, proximity to key amenities, sustainable transport infrastructure etc.

The commercial precincts (i.e. 1, 2, 3, 4, 5A, 5B and 6) are considered to be more conducive to accepting lower car parking rates given its proximity to sustainable transport modes. It is noted that the larger study area for this Strategy was investigated to better manage overall car parking issues including overspilling into residential areas adjacent key land uses.

Notwithstanding, a majority of the future growth within Ivanhoe is anticipated to occur within the city centre and in this respect, the areas considered appropriate for the application of reduced car parking rates are highlighted in Figure 10.9.

**Figure 10.9: Precincts Where Reduced Car Parking Rates Should Apply**



Base Map Source: Planning Maps Online

### 10.6.3 Maximum versus Minimum Parking Rates

If a single car parking rate is to be used, then consideration needs to be given as to whether the rate is a maximum or minimum (i.e. car parking cannot be provided on-site above or below the requirement respectively).

In this regard, a mechanism may be required to guard against the overprovision of car parking within the study area. This could be achieved by specifying maximum car parking rates for each

use, providing the benefit of clearly identifying the rates above which Council would not support a particular parking provision.

On the other hand, the adoption of minimum rates can be expected to guard against an under provision of car parking within the study area however they would not, on their own, guard against the overprovision of car parking; that is developers would retain the right to provide car parking at rates greater than those nominated. Notwithstanding, the existing strategies discussed earlier have been developed to manage the utilisation of car parking in the surrounding area.

Given that an under provision of on-site car parking is considered to be most critical to this strategy, it is recommended that minimum car parking rates be adopted in this instance.

#### 10.6.4 Future Commercial/Retail Development

Having regard for Table 7.2 of this report, there exists a strong similarity between the calibrated rates for key commercial and retail land uses and 'Column B' rates (similar to or lower than) for the key listed land use categories.

The above rates should be applied as a minimum rate within the commercial precincts of the study area. Noting that consideration could also be given to rates for other land uses (not specified in the Planning Scheme) calibrated as part of this Strategy.

It should be further noted that key strategic policy documents seek to prioritise walking, cycling and public transport trips ahead of the use of the private motor car. In this respect, a balance must be struck with car parking rates to support the objective to reduce car dependence. Therefore, in addition to the above consideration could be given to adopting a further reduction (in the order of 5% – 10%) of the Column B car parking rates to encourage a shift to the use of more sustainable transport modes.

As an example, future commercial (office) land use is considered to represent the most viable candidate for adopting reduced parking rates given that its parking generates a majority of its traffic during the peak traffic periods and parkers are generally at the site for the entire day. It follows that its parkers are typically more amenable to using public transport or active travel as an alternative to the motor vehicle.

#### 10.6.5 Future Residential Development

Car ownership data obtained from the ABS Census (Table 4.4 of this report) indicates that while an overall average car ownership rate of 1.55 vehicles per household exists, 30% of one-bedroom dwellings and 15% of two-bedroom dwellings do not own a car. This suggests that consideration of car parking rates lower than 'Column B' rates need to be investigated for new residential development within the Ivanhoe study area.

Consideration also needs to be given to the housing stock to which these standards will apply in the coming years. The current ownership characteristics are strongly influenced by the car ownership characteristics of detached dwellings on standard size residential blocks. Moving forward the growth in residential population will likely come from increased apartment style dwellings where residents are not likely to own cars at the same rate as existing dwellings.

The aspiration of encouraging walking, cycling and public transport use must also be addressed. The adoption parking standards the same or higher than current ownership trends would not seek to further encourage alternate modes of travel to the private car.

Merit also exists to provide a consistent approach across activity centres within the municipality. While the uniqueness of the area must be considered, if similar car ownership trends exist to other

areas there would be a benefit for simplicity and consistency reasons to adopt the same residential parking rate requirements. In this regard, a Parking Overlay has recently been introduced for the Heidelberg Activity Centre which identifies the resident car parking rates of 0.8 and 2 spaces per dwelling for 1 and 2 bedroom and 3 bedroom dwellings respectively.

Having regard to the above it is recommended that the following resident car parking rates be adopted, reflecting and balancing both current and aspirational parking needs:

- 1 and 2 bedroom dwellings: 0.8 spaces to each dwelling
- 3 or more bedroom dwelling: 2 spaces to each dwelling.

Notwithstanding, a further reduction of parking should be allowed at the discretion of Council. Such an allowance for dwellings to not have to provide car parking is however fundamentally underpinned by the following principles:

- that the residents occupying the dwellings will not own a car (i.e. developers may be aware that the resident will not own a car)
- the dwellings are aimed at encouraging active and public transport travel and for that reason do not provide car parking provision of future occupants
- different types of residential development (i.e. affordable housing and student accommodation).

Consideration by Council should therefore only be given to a reduction of car parking if the area surrounding the site is restricted in such a way that dwelling residents cannot feasibly own and store a car if choosing to live at this location or the dwelling type is targeted specifically to a buying market of residents who will not own a car.

Ultimately, if on-street restrictions are not restrictive it is likely that residents will purchase a dwelling and simply rely upon the surrounding existing long-term parking provisions, and thus the fundamental principles which underpin the reason for allowing a reduction are not achieved. As such, the strategy seeks to protect residential streets by providing supplementary car parking management techniques as discussed earlier.

In addition, for a parking requirement to be reduced, the following should apply:

- Consideration should be given to justification of a range of sustainable transport initiatives
- Consideration should be given to justification provided regarding the existing constraints of a development site in relation to the provision of car parking on-site
- Consideration should be given to justification provided regarding the net benefit (economic, commercial or otherwise) of the proposed development.

In summary, developers not providing on-site resident parking would be doing so with the acknowledgement that those dwellings would not be able to park on-street and subsequently would be targeted at residents and buyers who do not own a car.

With respect to residential visitors, Column B of Clause 52.06 recommends no specific provision for the use. This is not a reflection that no visitor car parking will occur rather, having regard for empirical data collected at similar uses throughout Victoria, visitor parking would be anticipated to generate a demand for 0.1 car spaces per dwelling. However, in many activity centres such as Ivanhoe, the time of peak residential visitor parking does not coincide with the peak time of the overall centre and can therefore be easily accommodated within public parking areas. Accordingly, the residential visitor car parking requirement set down by Column B of zero spaces in this instance is considered acceptable.

The use of nearby car parking vacancies where available should however be considered on a case-by-case basis as a means to satisfy residential visitor parking demands.



### 10.6.6 Use of Decision Guidelines

The use of decision guidelines to allow for variations to prescribed car parking requirements is an important element of any parking specification. They recognise that a single parking strategy is often insufficient to cover all eventualities and ultimately some flexibility is required to be included to cater for circumstances such as unique developments and changes over time (such as travel modes splits).

Accordingly, a set of decision guidelines are recommended to supplement the provision of car parking rates for the study area. At present it is acknowledged that existing land use car parking demands partially intrude into adjacent residential areas, however further impacts associated with future development parking demands are not acceptable.

In this instance, it could be considered appropriate that should new development seek a dispensation for providing car parking demands that this must be justified by available and suitable vacancies being provided within the commercial precincts only (i.e. within the areas highlighted in Figure 10.9 and not within the periphery areas). This would be to the satisfaction of the Responsible Authority.

#### **Strategy Recommendation 9**

Minimum car parking rates, as per Column B of Table 1 to Clause 52.06-5 (where specified), to be applied to the commercial precincts of Ivanhoe for all new (non-residential) land use development proposals.

#### **Strategy Recommendation 10**

Minimum car parking rates as follows to be applied to the commercial precincts of Ivanhoe for all new dwelling land use development proposals:

- 0.8 spaces to each 1 and 2-bedroom dwelling
- 2 spaces to each 3 or more bedroom dwelling
- 0 spaces to each dwelling for visitor purposes.

#### **Strategy Recommendation 11**

A dispensation (reduction) of car parking requirements can be sought but must be suitably justified and not impact upon the periphery precincts of the study area to the satisfaction of the Responsible Authority.

## 10.7 Accommodating Future Demands

Analysis indicates that anticipated development growth in the study area could generate new parking demands between approximately 340 and 500 additional vehicles (under the low and high development scenarios respectively), consisting of a mix of short-stay customer/visitor demands and long-stay staff demands.

It is noted that this demand does not include demands generated by residential dwellings which would be expected to be accommodated on each individual development site.

### 10.7.1 Commercial and Retail Car Parking

Further to the demand assessment, consideration needs to be given to the ways in which car parking could be provided to satisfy anticipated future car parking demands including:

- provide car parking on-site as part of any new development
- rely on existing vacant on-street car parking supplies within the study area
- create additional public car parking facilities.

Each of these options is explored in the following sections.

#### **Provide Car Parking On-Site**

Besides encouraging the provision of car parking on-site, some development land uses will naturally seek/require the provision of a discreet parking supply. This supply may be used to cater for staff demands and servicing requirements as these demands typically occur throughout the day and cannot be shared between multiple users. However, more importantly, an on-site parking supply may be required to provide the level of amenity that customers may typically expect of that use (e.g. supermarket customers may at times be required to wheel a trolley to their vehicle to unload shopping). In other instances (small shops, restaurants) it may not be viable to be able to accommodate parking on-site.

It should be noted that low on-site parking percentages for the restaurant/café, retail and shop uses are typical for an Activity Centre use within a set of strips shops and not associated with either a substantial office or supermarket use.

#### **Utilise Existing Car Parking Vacancies**

Existing vacant car parking represents a parking resource which should not be ignored when designing a car parking system. This parking often represents the most proximate and attractive parking for visitors to developments and can effectively and efficiently be shared between multiple land uses, particularly if land uses have peak parking requirements occurring at different times of the day.

As this often represents the most proximate and attractive parking, to not allow the use of this car parking in satisfying a development's car parking generation calculation, will often result in an underutilisation of the car parking provision which is provided on-site.

As such, in establishing the most appropriate way in which to cater for the future car parking demands some reliance on existing vacant parking could be considered.

#### **Provide New Public Car Parking Facilities**

Public off-street parking facilities provide the ability to share car parking between different uses which have peak parking times that do not coincide. Such facilities can also cater for both long term (staff) and short term (customer) demands. The provision of new public off-street car parking facilities are however costly and as such must be carefully planned to ensure that the facility will be effectively used to justify the construction cost and the value of the land which it uses, which could be potentially used for other more productive purposes.

Should a new public off-street car parking facility be required, consideration must be given to the following:

- Can such facilities be appropriately located?
- How would such facilities be funded?
- Can such facilities be located in a way to serve the areas where developments are to be located?



Notwithstanding the above, consideration needs to be given to whether or not there is sufficient demand to warrant building such facilities.

### 10.7.2 Provision of Parking On-Site

With respect to the future land use growth anticipated for the study area, a breakdown of each of these uses relating to their "reliance/preference" for providing on-site car parking is nominated below:

- Office: Majority on-site parking
- Retail: Majority off-site parking (some on-site parking for employees, however majority of customers parked off-site), however the supermarket type uses typically seek to accommodate additional parking demands on-site.

It is noted that on-site parking supply for commercial development should be generally provided for staff use, with visitor demands to be justified and accommodated on-street. Having regard for these preferences it could be assumed that new development on average may seek to accommodate in the order of 50% of parking on-site.

As such a car parking demand in the order of 140 to 205 spaces could be required to be accommodated within existing vacancies in the commercial precincts. Accordingly, the anticipated future car parking demands would be expected to increase existing peak occupancy levels within the commercial precincts to between 79% (under the low scenario) and up to 82% (under the high scenario). The upper limit being below the recommended theoretical capacity threshold of 85% occupancy.

### 10.7.3 Use of Surrounding Parking Vacancies

Noting the existing car parking demands within the central commercial precinct, there is an opportunity to rely on existing car parking vacancies within the centre to accommodate the demands of future development particularly for short-stay and some long-stay parking.

It is noted that while some capacity may exist in surrounding residential areas and this strategy recommends opportunities to manage commercial intrusion into surrounding residential areas, the further continued reliance of new development on surrounding residential areas is not considered appropriate.

### 10.7.4 Provision of a New Shared Off-Street Public Parking Facility

Based on the likely provision of future car parking demands on individual development sites and, existing management strategies proposed to improve the number of available existing parking vacancies within the study area, it would not appear that any warrants exist at this time to create a new car parking facility to service the centre.

It is also relevant to acknowledge that both a low and high land use growth scenario have been tested, and therefore this would indicate that some uncertainty remains around which of these options will eventuate. This gives further weight to, at this stage, there not being any warrants to construct new parking facilities.

Notwithstanding, the level of development should however continue to be monitored as should development growth exceed that predicted by the options; further investigation may be required.

### 10.7.5 Summary

On the basis of the above in order to manage the future car parking demands in the study area, it is recommended that car parking requirements associated with additional development in the area should be accommodated as follows:

- provide car parking on individual development sites
- utilise existing car parking vacancies available within the study area
- a combination of the above options for long-term and short-term car parking demands respectively.

#### **Strategy Recommendation 12**

Future car parking demands in the associated with new development should be accommodated through a mix of:

- provision of car parking on individual development sites
- utilising existing car parking vacancies available within the study area
- a combination of the above options for long-term and short-term car parking demands respectively.

### 10.7.6 Accommodating Residential Car Parking

Residential car parking growth has not been included as a part of the future car parking model for the study area for the following reasons:

- It has been assumed that resident parking demands would be provided on individual development sites rather than as part of shared public parking facilities.
- While it may be appropriate to approve developments which do not provide car parking for dwellings, such approvals should be coupled with appropriate on-street parking restrictions to ensure new residents cannot park (for long periods) on-street, and therefore such that the aims of providing less parking is achieved i.e. a reduced car ownership.
- Future residents are currently not afforded the ability to obtain a parking permit.

In this regard, future resident parking is not expected to contribute to the surrounding car parking demands.

## 10.8 Sustainable Transport Modes

In addition to the above car parking strategy discussions, incentives should be provided to promote sustainable transport modes, reducing car dependency for travel to/from and within the study area.

These incentives provide a "carrot" for encouraging the use of sustainable modes of transport and assist in removing the perceived barriers to travelling by bus, train, bicycle, and by foot, while making it relatively less attractive to drive.

A number of key sustainable transport strategy recommendations are detailed as follows.

**Strategy Recommendation 13**

Bicycle parking be provided for each residential dwelling without a car parking space at a minimum with bicycle parking encouraged for all residential developments (regardless of scale or height) in particular, those with excellent access to cycling facilities.

**Strategy Recommendation 14**

A minimum of 1 motorcycle or scooter parking space be provided for every 50 car parking spaces within any car park within the study area, with these spaces designed in accordance with the requirements of the relevant Australian Standard for Off-street Parking Facilities.

**Strategy Recommendation 15**

The preparation of Green Travel Plans should be required for new developments to encourage the use of sustainable transport modes.

**Strategy Recommendation 16**

Council should encourage and reasonably facilitate companies to set up a car share scheme for Ivanhoe at no cost to Council.

## 10.9 Monitoring

As developments are approved and constructed, it is likely that the on-street vacancies that exist today will slowly disappear throughout the study area.

It is therefore recommended that the study area is surveyed regularly to ensure that development and car parking within the study area is increasing in line with the levels predicted and that the strategy prepared is still current and appropriate. This level of monitoring will allow the policies and guidelines to be regularly updated as required.

In addition, given the recommended changes associated with the development of car parking strategies, and therefore possible changes to peoples travel habits, it would be recommended that the observation of car parking demands be reinvestigated following the changes, to understand the impacts that these changes have had to staff and customers mode of travel and parking location.

**Strategy Recommendation 17**

Banyule City Council undertake car parking surveys of the study area regularly to ensure that the level of car parking demand is increasing in line with anticipated land use growth and being managed in accordance with the objectives of this strategy.

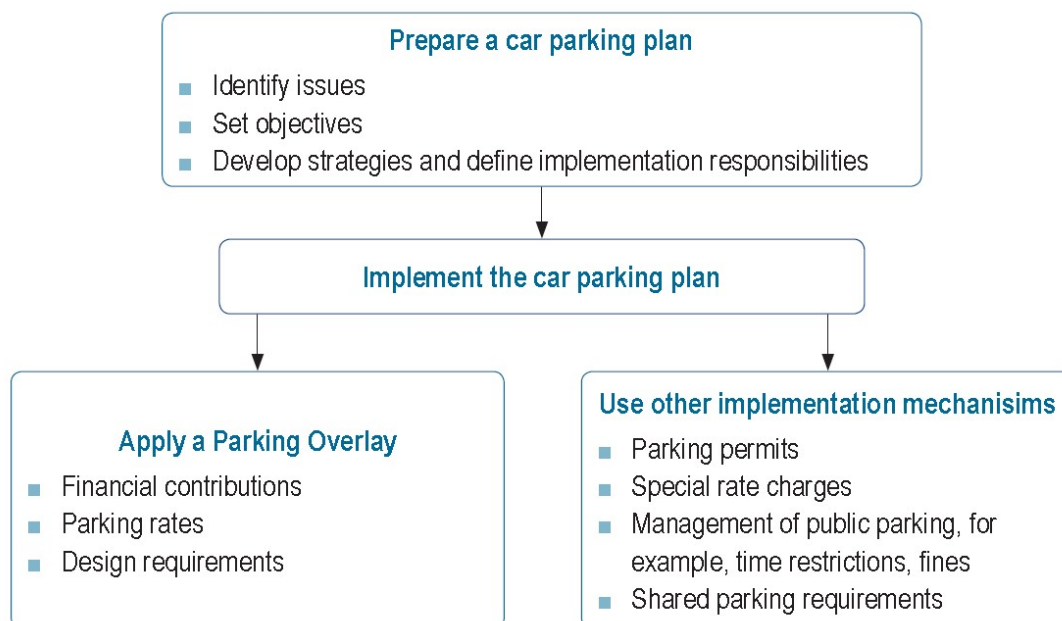
**Strategy Recommendation 18**

The car parking strategy be reviewed and updated regularly to reassess car parking demand levels and mode split aspirational targets.

## 11. Parking Overlay

The Victorian Planning Provisions Practice Note- The Parking Overlay (PN57) identifies that the outcomes of a car parking plan or strategy are likely to be implemented either through a Parking Overlay or other mechanism as shown in Figure 11.1.

Figure 11.1: Car Parking Plan and Parking Overlay



From the above strategy outcomes, it is evident that a number of recommendations require implementation through a Parking Overlay to provide them with the necessary statutory form to ensure they are enforceable and are applied consistently across the study area.

In respect of a Parking Overlay, PN57 describes the role of a Parking Overlay:

*"Once prepared, a car parking plan can provide the basis for, and be implemented by, a Parking Overlay or other appropriate implementation mechanism, such as:*

- *parking permits for residents, workers and visitors*
- *management of public and private parking (for example, through time restrictions or fines)*
- *special rate charges – a requirement for land owners to pay towards the related provision of new spaces*
- *shared car parking requirements."*

Such a plan may be borne by the need to address a number of issues.

*A number of physical, social and economic indicators may suggest the need to address car parking issues in a precinct, such as a precinct that:*

- *is undergoing a rapid rate of development or land use change*
- *attracts significant numbers of trips from elsewhere*
- *experiences high levels of traffic congestion*
- *has an established parking provision deficit and experiences physical or market conditions that affect the future provision of car parking*
- *experiences consistently lower or higher than average car parking demand.*

*A Parking Overlay implements a car parking plan in a statutory form."*

Specifically, those recommendations developed as part of this strategy, that would require incorporation within a Parking Overlay include:

#### **Strategy Recommendation 9**

Minimum car parking rates, as per Column B of Table 1 to Clause 52.06-5 (where specified), to be applied to the commercial precincts of Ivanhoe for all new (non-residential) land use development proposals.

#### **Strategy Recommendation 10**

Minimum car parking rates as follows to be applied to the commercial precincts of Ivanhoe for all new dwelling land use development proposals:

- 0.8 spaces to each 1 and 2-bedroom dwelling
- 2 spaces to each 3 or more bedroom dwelling
- 0 spaces to each dwelling for visitor purposes.

#### **Strategy Recommendation 11**

A dispensation (reduction) of car parking requirements can be sought but must be suitably justified and not impact upon the periphery precincts of the study area to the satisfaction of the Responsible Authority.

#### **Strategy Recommendation 12**

Future car parking demands associated with new development should be accommodated through a mix of:

- provision of car parking on individual development sites
- utilising existing car parking vacancies available within the study area
- a combination of the above options for long-term and short-term car parking demands respectively.

#### **Strategy Recommendation 13**

Bicycle parking be provided for each residential dwelling without a car parking space at a minimum with bicycle parking encouraged for all residential developments (regardless of scale or height) in particular, those with excellent access to cycling facilities.

#### **Strategy Recommendation 14**

A minimum of 1 motorcycle or scooter parking space be provided for every 50 car parking spaces within any car park within the study area, with these spaces designed in accordance with the requirements of the relevant Australian Standard for Off-street Parking Facilities.

#### **Strategy Recommendation 15**

The preparation of Green Travel Plans should be required for new developments to encourage the use of sustainable transport modes.

As such it is recommended that a Parking Overlay (Schedule X to Clause 45.09 of the Banyule Planning Scheme) be prepared to incorporate the above identified requirements.

The preparation of the Schedule to the Parking Overlay will include:

- Appropriate objectives – Which should be drawn from and be consistent with those parking related objectives developed within this strategy at Section 10.2.
- The incorporation of Strategy recommendation 9 – 15.
- The consideration of any additional decision guidelines that should be applied to supplement those decision guidelines identified in Clause 52.06-7 of the Banyule Planning Scheme.

**Strategy Recommendation 19**

Prepare a Parking Overlay (Schedule X to Clause 45.09 of the Banyule Planning Scheme) to incorporate strategy recommendations 9 – 15 and implement to Banyule Planning Scheme through Planning Scheme Amendment.



## 12. Recommendations & Implementation

### 12.1 Action Plan

Having regard for the identified recommendations the following actions table has been prepared.

Each identified action has been described providing the following information:

- Action Number
- Strategy Recommendation
- Priority
  - S – Short term representing 1 – 2 years
  - M – Medium term representing 3 – 5 years
  - L – Long term representing greater than 5 years
- Cost
  - L – Low cost representing less than \$50,000
  - M – Medium cost representing \$50,000 – \$200,000
  - H – High cost representing greater \$200,000

**Table 12.1: Action Plan**

Action No.	Action	Priority (S / M / L)	Cost (L / M / H)
1	Prepare a wayfinding signage strategy to maximise the use of off-street parking locations and minimise vehicle circulation. This may include the integration of electronic / dynamic parking signage.	M	M
2	Introduce more very short-stay parking, with a particular focus on providing these spaces nearest to appropriate shopping areas within key commercial precincts (i.e. within Precinct 5B).	S	L
3	Convert all Council controlled 4P on-street and off-street parking within the commercial precincts of the study area to 3P as a maximum.	S	L
4	Revise current 3P parking restrictions within the Waterdale off-street parking station to a maximum of 2P to future deter potential long-stay events.	S	L
5	Council to liaise with VicTrack to discuss current parking trends related to commuter parking at the Ivanhoe Railway Station and explore opportunities to improve/cater for future demands.	S	L
6	Specifically reconfigure all long stay parking (4 hour or greater) within Precinct 5B to medium and/or short stay parking spaces.	S	L
7	Introduce more very short stay car parking spaces in those locations identified along Upper Heidelberg Road in Figure 10.8.	S	L
8	Regular parking enforcement services be continued throughout the study area, with a concentration within the Ivanhoe Activity Centre to promote the turnover and the efficient use of very short and short stay parking spaces.	S	-
9	Minimum car parking rates, as per Column B of Table 1 to Clause 52.06-5 (where specified), to be applied to the commercial precincts of Ivanhoe for all new (non-residential) land use development proposals.	S	-
10	Minimum car parking rates as follows to be applied to the commercial precincts of Ivanhoe for all new dwelling land use development proposals: <ul style="list-style-type: none"> <li>○ 0.8 spaces to each 1 and 2-bedroom dwelling</li> <li>○ 2 spaces to each 3 or more bedroom dwelling</li> <li>○ 0 spaces to each dwelling for visitor purposes.</li> </ul>	S	-
11	A dispensation (reduction) of car parking requirements can be sought but must be suitably justified and not impact upon the periphery precincts of the study area to the satisfaction of the Responsible Authority.	S	-

Action No.	Action	Priority (S / M / L)	Cost (L / M / H)
12	Future car parking demands in the associated with new development should be accommodated through a mix of: <ul style="list-style-type: none"> <li>provision of car parking on individual development sites</li> <li>utilising existing car parking vacancies available within the study area</li> <li>a combination of the above options for long-term and short-term car parking demands respectively.</li> </ul>	S	-
13	Bicycle parking be provided for each residential dwelling without a car parking space at a minimum with bicycle parking encouraged for all residential developments (regardless of scale or height) in particular, those with excellent access to cycling facilities.	S	-
14	A minimum of 1 motorcycle or scooter parking space be provided for every 50 car parking spaces within any car park within the study area, with these spaces designed in accordance with the requirements of the relevant Australian Standard for Off-street Parking Facilities.	S	-
15	The preparation of Green Travel Plans should be required for new developments to encourage the use of sustainable transport modes.	S	-
16	Council should encourage and reasonably facilitate companies to set up a car share scheme for Ivanhoe at no cost to Council.	M	L
17	Banyule City Council undertake car parking surveys of the study area regularly to ensure that the level of car parking demand is increasing in line with anticipated land use growth and being managed in accordance with the objectives of this strategy.	M	L
18	The car parking strategy be reviewed and updated regularly to reassess car parking demand levels and mode split aspirational targets.	L	M
19	Prepare a Parking Overlay (Schedule X to Clause 45.09 of the Banyule Planning Scheme) to incorporate strategy recommendations 9 – 15 and implement to Banyule Planning Scheme through Planning Scheme Amendment.	S	L – M

## Appendix A

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### Planning Policy Review

## A.1 State Planning Policy

### A.1.1 Transport Integration Act 2010

The Transport Integration Act is the primary transport statute for Victoria, and has caused significant change to the way transport and land use authorities make decisions and work together. The Act incorporates a triple bottom line approach to decision making about transport and land use matters.

The Act requires that all transport agencies work together to achieve an integrated and sustainable transport system, and that agencies such as the DTPLI<sup>11</sup> take account of transport issues in land use decisions. The Act has been effective to date in changing the focus of organisations that traditionally only considered a single transport mode.

The Act:

- *unifies all elements of the transport portfolio to ensure that transport agencies work together towards the common goal of an integrated transport system*
- *provides a framework for integrated and sustainable transport policy and operations*
- *recognises that the transport system should be conceived and planned as a single system performing multiple tasks rather than separate transport modes*
- *integrates land use and transport planning and decision-making by extending the framework to land use agencies whose decisions can significantly impact on transport ("interface bodies")*
- *re-constitutes transport agencies and aligns their charters to make them consistent with the framework.*

The Act forms an overarching legislative framework for transport related state planning policies and has been integrated within the Victorian Planning Provisions (VPP). The Act guides the approach taken for the WCPS in ensuring all transport modes and their interaction with land use is considered holistically, as well as a basis on which to consult with the other relevant authorities that might be impacted by outcomes of the WCPS.

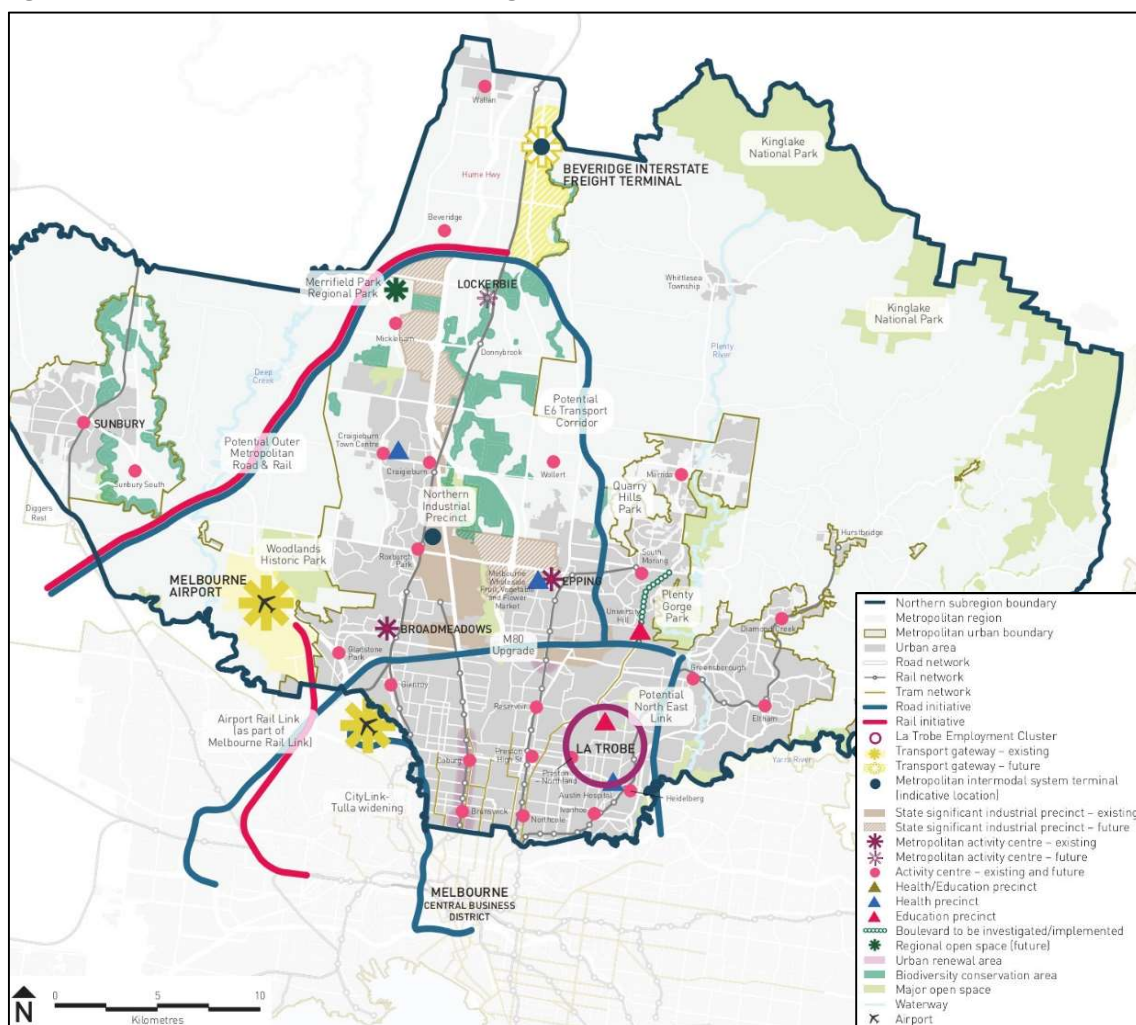
### A.1.2 Plan Melbourne

The Victorian Government released the Metropolitan Planning Strategy, Plan Melbourne (May, 2014) is intended to guide Melbourne's housing, commercial and industrial development through to 2050.

The Plan designates Ivanhoe as an Activity Centre. The Ivanhoe Activity Centre and its surrounds in the context of the Northern Subregion are illustrated in Figure A.1.

<sup>11</sup> Department of Transport, Planning and Local Infrastructure

Figure A.1: Plan Melbourne – Western Sub-Region



Source: Plan Melbourne

The designation of Ivanhoe as an Activity Centre encapsulates the strategic direction to enable a '20 minute neighbourhood' and provide access to a wide range of goods and services, as well as providing employment and a vibrant local economy. Plan Melbourne notes that through removing floor space caps on retail and office land uses, Activity Centres 'may grow unrestricted'.

### A.1.3 Victorian Planning Provisions – Clause 52.06 (Car Parking)

Clause 52.06 of the Victorian Planning Provisions nominates car parking requirements for new land uses, and specifies both the a 'standard rate' in Column A, and lower rates in Column B in 'Table 1: Car parking requirement' at Clause 52.06-5. The lower rates provided in 'Column B' can only apply if instructed by the Schedule to the Parking Overlay at Clause 45.09 of the Planning Scheme.

A detailed explanation of the operation of current Clause 52.06 can be found in 'Practice Note 22: Using the Car Parking Provisions' (April 2013), and 'Practice Note 57: The Parking Overlay' (April 2013) issued by the Department of Transport, Planning, and Local Infrastructure.

## A.2 Local Planning Policy

### A.2.1 Ivanhoe Activity Centre Structure Plan, December 2014

The Ivanhoe Major Activity Area has been identified as an area for future housing growth and activity. State Planning Policy requires that Councils prepare Structure Plans to plan for development in Major Activity Areas like Ivanhoe.

The Ivanhoe Activity Area Structure Plan provides an integrated vision for the Activity Area, which aims to guide change around the centre. The area is focused on the Ivanhoe Shopping strip on Upper Heidelberg Road and Lower Heidelberg Road, the Ivanhoe and Darebin Railway Stations and surrounding commercial, civic and residential areas.

The Plan produces realistic localised guidelines, consistent with State planning policy around Activity Centres. It aims to reduce development pressure in residential areas across Ivanhoe and allow growth to be directed to the most appropriate sites, close to railway stations and shops.

A number of strategies and objectives, focused around fundamental planning themes, have been identified in the Structure Plan. With regard to car parking, the Plan states that an important objective is to provide and manage an appropriate balance of car parking for residents, traders and visitors.

### A.2.2 Banyule Integrated Transport Plan, 2015-2035

The Banyule Integrated Transport Plan provides long-term direction in transport and land use decisions in Banyule. The Plan's vision is where:

*'Banyule is a city with accessible, sustainable and active communities, with good access to jobs, education, shopping and community opportunities within a safe transport network.'*

The Plan identifies six objectives that reflect the aspirations and principles developed to assist Council achieve an integrated and sustainable transport network, and improve the overall liveability of the municipality.

A number of methods are utilised to deliver the strategies and actions, including:

- updating and creating new policies and processes
- providing useful information and promoting ways to sustainable travel
- advocating and collaborating with other stakeholders
- supporting and enabling sustainable transport use through upgrading infrastructure.

### A.2.3 Banyule Activity Centre Car Parking Policy and Strategy

Banyule City Council has developed a car parking policy for the municipality which is a long term policy that applies to all Activity Centres within the LGA. It will guide the individual parking plans that will be developed for each Activity Centre and will ensure that parking changes will only occur where there is an issue and where the proposed changes are supported by the community. Its primary focus is on the Greensborough, Heidelberg and Ivanhoe centres.

#### **Policy**

The purpose of the Policy is to:

- "Provide a general starting point policy for each Activity Centre.
- Recognise Activity Centres as destinations for transport trips to enable local economic growth, community health and wellbeing.
- Acknowledge car parking as a valued and finite commodity.



- *Apply a strategic approach to car parking supply and management to recognise the competing needs of different users.*
- *Protect residential areas close to Activity Centres from intrusion of carparking associated with commercial and higher density residential uses.*
- *Recognise that in areas of intense development in Activity Centres – commercial or residential – restricted rates of carparking will be provided, in keeping with the local alternative sustainable transport provisions.*
- *Support a greater proportion of sustainable transport trips for walking, cycling, and public transport, to and within activity centres."*

### **Strategy**

The objectives of the Strategy are to:

- *"Promote a safe, accessible and sustainable road environment for all road users.*
- *Manage parking and parking infrastructure throughout Banyule in an equitable and balanced manner.*
- *Parking is a privilege, not a right. Streets are for a diverse range of road users (including, but not exclusively for, cars), and parking is a valid but conditional use of public space where the cost of using this space should be recognised.*
- *Consult key stakeholders in major decision-making processes that involve parking and parking infrastructure.*
- *Consider a wide range of policy tools and new transport technologies to improve parking in Banyule.*
- *Recognise the importance of curbing demand for on-street parking generated by many factors (such as increases in the population in Banyule and new developments).*
- *Facilitate access to commercial activities and other community facilities without negative impacts on residents.*
- *Existing residents should have a high probability of accessing on-street parking in the vicinity of their residence. Non-residential property will not be entitled to a residential parking permit.*
- *Recognise the hierarchy of users entitled to park in Activity Centres and that parking restrictions should be applied to ensure that parking is shared in a balanced manner among these users.*
- *Ensure parking infrastructure design, construction and management are environmentally friendly, encourage street revitalisation, improve amenity and community safety and increase economic activity."*

#### **A.2.4 Ivanhoe Civic Precinct Master Plan, June 2014**

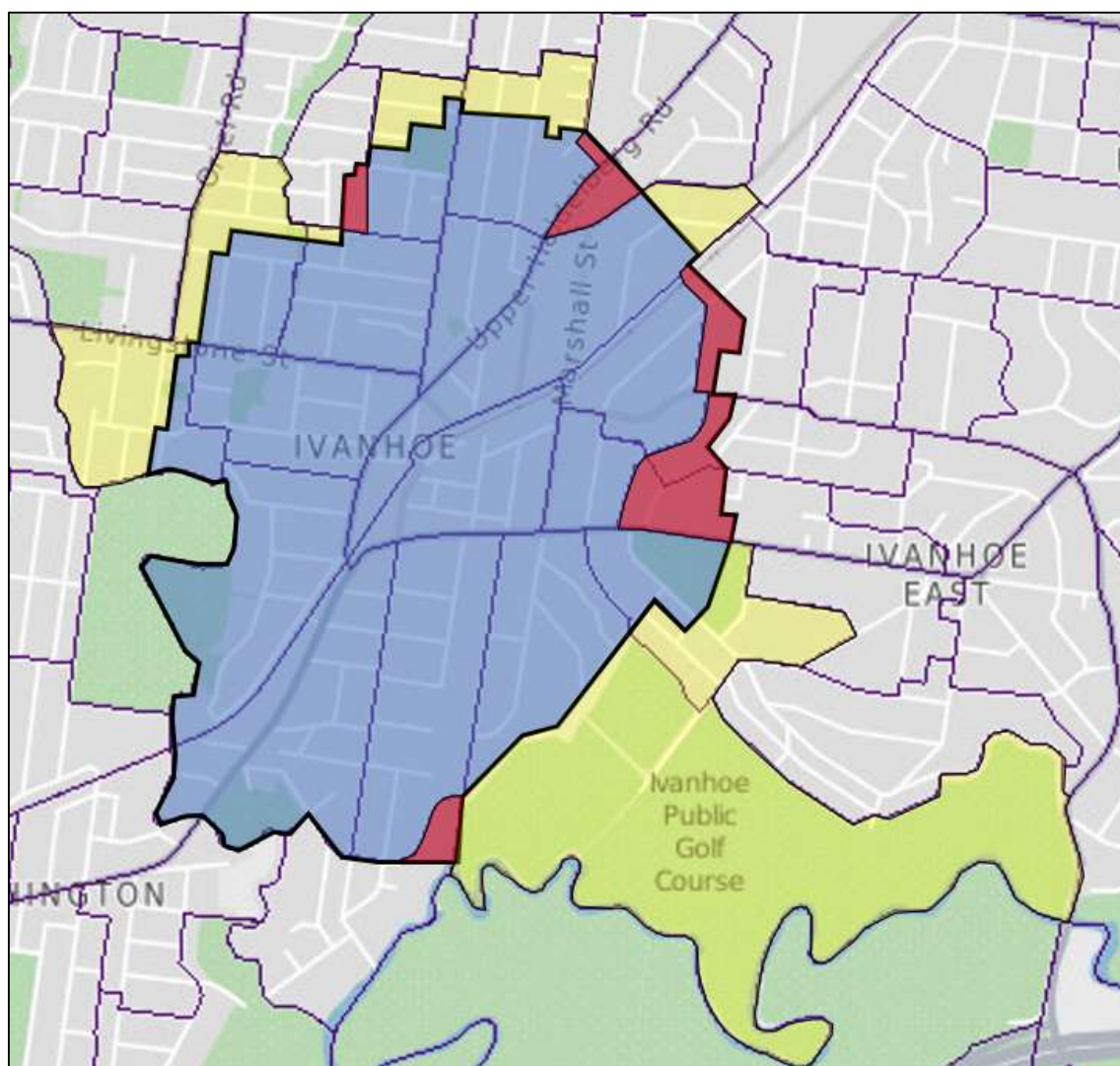
The Masterplan provides a number of objectives for the future of the Civic Precinct in Ivanhoe, with these objectives being around the new community learning hub, public spaces, car parking and traffic management and mixed use development. The car parking and traffic management objectives include:

- consolidating on-site car parking to single location at northwest of precinct
- providing service vehicle access
- maintaining safe pedestrian access across the site.
- only providing access to car park from St Elmo Road and Ivanhoe Parade.
- introducing traffic calming measures to Ivanhoe Parade
- considering traffic management interventions for junctions with St Elmo Road and Ivanhoe Parade off Upper Heidelberg Road.

## Appendix B

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### Ivanhoe Study Area Statistical Area(s) Level 1

**KEY:**

- Ivanhoe Study Area (Statistical Area(s) Level 1)
- Area not within Ivanhoe, but counted in statistical review
- Area within Ivanhoe but not counted within statistical review

## Appendix C

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### Car Parking Model Inputs

## C.1 Land Use Characteristics

### C.1.1 Land Use Scale

Existing land use data provided by Banyule City Council indicates that the study area caters for approximately 91,400sqm of land use floor space and approximately 2,700 residential dwellings.

The land uses fall into the following categories within study area: Bank, Car Park, Child Care Centre, Church, Convenience Restaurant, Dwelling, Food & Drink Premises, Funeral Parlour, Hotel, Indoor Recreation Facility, Medical Centre, Motel, Municipal Office, Office, Outdoor Recreation Facility, Place of Assembly, Postal Agency, Primary School, Residential Building, Restaurant, Retirement Village, Secondary School, Service Station, Shop, Supermarket, Telecommunications Facility, Vacant Land, Veterinary Centre and Warehouse.

The existing land uses and their associated floor areas are provided in Table C. on a precinct-by-precinct basis.

Table C.1: Ivanhoe Study Area “Base” Land Use Floor Area Data

Land Uses	Unit	Total	P1	P2	P3	P4	1	2	3	4	5A	5B	6
Bank	/sqm	1,233	0	0	0	0	0	0	0	0	0	1,233	0
Car Park	/sqm	7,680	0	0	0	0	0	7,650	0	30	0	0	0
Child Care Centre	/sqm	1,573	240	183	255	0	0	0	708	187	0	0	0
Church	/sqm	5,602	0	0	0	558	0	0	0	2,567	905	1,573	0
Convenience Restaurant	/sqm	196	0	0	0	0	196	0	0	0	0	0	0
Food & Drink Premises	/sqm	1,635	0	0	0	0	0	0	142	0	89	1,316	88
Funeral Parlour	/sqm	489	0	0	0	0	0	0	0	0	489	0	0
Hotel	/sqm	1,540	0	0	0	0	0	0	0	0	0	1,540	0
Indoor Recreation Facility	/sqm	5,700	0	0	4840	0	0	0	126	528	0	207	0
Medical Centre	/sqm	3,583	0	304	894	0	272	587	285	204	187	849	0
Motel	/sqm	1,960	0	0	0	0	0	0	0	0	1,960	0	0
Municipal Office	/sqm	13,131	0	0	0	0	0	0	0	0	0	0	13,131
Office	/sqm	11,653	0	0	0	740	1,480	0	1,281	186	3,036	4,930	0
Outdoor Recreation Facility	/sqm	1,829	1,102	391	26	0	0	0	0	0	0	310	0
Place of Assembly	/sqm	2,313	0	434	298	0	0	0	0	0	0	697	884
Postal Agency	/sqm	259	0	0	0	0	0	0	0	0	0	259	0
Residential Building	/sqm	4,811	0	0	4,811	0	0	0	0	0	0	0	0
Restaurant	/sqm	2,168	0	0	0	0	0	0	0	0	507	1,518	142
Retirement Village	/sqm	224	0	0	224	0	0	0	0	0	0	0	0
Service Station	/sqm	118	0	0	0	0	0	0	118	0	0	0	0
Shop	/sqm	13,140	0	0	0	0	306	1,527	1,505	105	458	8,656	584
Supermarket	/sqm	6,307	0	0	0	0	0	3,515	0	0	2,792	0	0
Telecommunications Facility	/sqm	548	0	0	0	0	13	0	0	0	0	536	0
Vacant Land	/sqm	279	0	0	279	0	0	0	0	0	0	0	0
Veterinary Centre	/sqm	133	0	0	0	0	0	0	0	0	133	0	0
Warehouse	/sqm	3,315	0	17	0	0	0	0	0	0	3,298	0	0
<b>Total Area</b>	<b>/sqm</b>	<b>91,418</b>	<b>1,342</b>	<b>1,329</b>	<b>11,627</b>	<b>1,297</b>	<b>2,266</b>	<b>13,279</b>	<b>4,164</b>	<b>3,807</b>	<b>13,855</b>	<b>23,623</b>	<b>14,828</b>
Dwelling	/dwelling	2,762	626	782	861	294	51	28	10	40	55	15	0
Dwelling Visitor	/dwelling	2,762	626	782	861	294	51	28	10	40	55	15	0
Primary School	/child	716	0	0	576	140	0	0	0	0	0	0	0
Secondary School	/child	2,500	1,500	1,000	0	0	0	0	0	0	0	0	0
Commuter	/space	342	0	0	0	84	0	0	0	258	0	0	0



### C.1.2 Land Use Parking Generation

GTA Consultants have adopted “base” land use car parking rates as the starting point for the car parking model as shown in Table C.2.

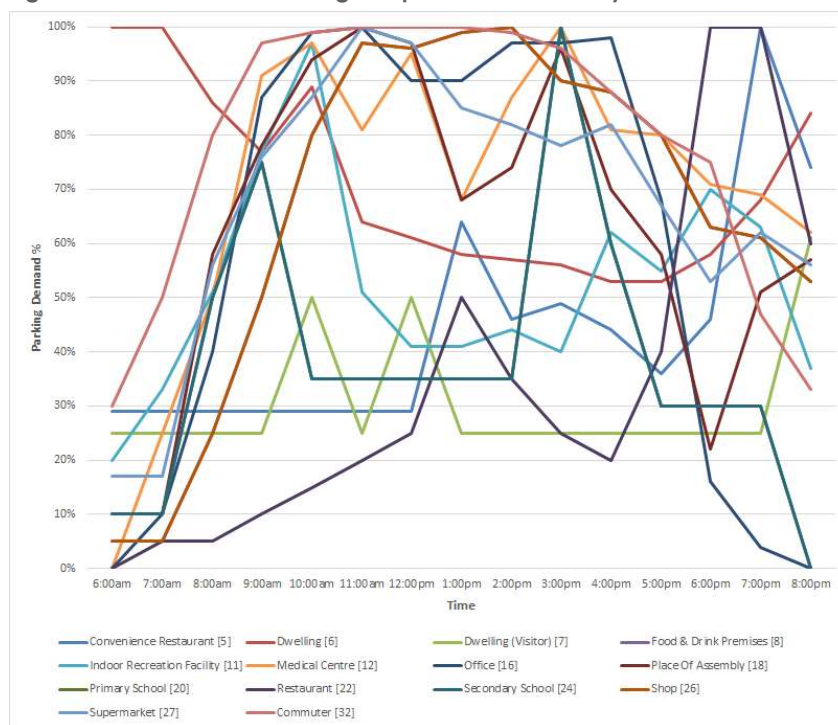
**Table C.2: “Base” Car Parking Rates for Key Uses**

Land Uses	Parking Rate	Unit (spaces per)
Convenience Restaurant	<b>0.1</b>	/sqm
Food & Drink Premises	<b>0.04</b>	/sqm
Indoor Recreation Facility	<b>0.13</b>	/sqm
Medical Centre	<b>0.14</b>	/sqm
Office	<b>0.035</b>	/sqm
Place of Assembly	<b>0.1</b>	/sqm
Primary School	<b>0.25</b>	/child
Restaurant	<b>0.132</b>	/sqm
Secondary School	<b>0.25</b>	/child
Shop	<b>0.04</b>	/sqm
Supermarket	<b>0.05</b>	/sqm
Dwelling	<b>0</b>	/dwelling
Dwelling Visitor	<b>0.2</b>	/dwelling
Commuter	<b>1</b>	/space

### C.1.3 Land Use Temporal Distributions

Temporal car parking demand profiles for the key existing land uses above are shown in Figure C.2 .

**Figure C.2: “Base” Car Parking Temporal Profiles for Key Uses**



## C.2 Calibration of the Model

### C.2.1 Model Fit

The GEH statistic is defined in the VicRoads Transport Modelling guideline as:

$$GEH_a = \sqrt{\frac{(M_a - C_a)^2}{\frac{1}{2}(M_a + C_a)}}$$

Where:  $M_a$  = modelled 1-way volume on link a  
 $C_a$  = surveyed 1-way volume on link a

VicRoads (2008) targets for applying the GEH statistic are:

- 50% of cases have a GEH < 5
- 80% of cases have a GEH < 10

The GEH statistic for each time period is shown in Table B.3.

**Table C.3: GEH Calibration Statistic**

Time	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm
GEH	1.23	1.76	1.46	3.65	4.73	0.40	0.07	3.52	1.70
Time	3pm	4pm	5pm	6pm	7pm	8pm			
GEH	0.44	2.62	2.50	2.59	2.08	0.75			

The above indicates a GEH of < 10 and <5 for 100% of the time periods.

## Appendix D

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### Car Parking Model Outputs (Base, Calibrated and Future)

#### Melbourne

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