Cleveland CBD

Parking Study

CEB06577

Prepared for
Redland City Council

November 2014

Cardno
Shaping the Future

Document Information

Prepared for	Redland City Council
Project Name	Parking Study
File Reference	CEB06577 Cleveland CBD Parking Study 2014 11 24.docx
Job Reference	CEB06577
Date	November 2014

Contact Information

Cardno (Qld) Pty Ltd
ABN 57 051 074 992

Level 11 Green Square North Tower
515 St Paul's Terrace
Locked Bag 4006
Fortitude Valley Qld 4006
Telephone: 07 3369 9822
Facsimile: 07 3369 9722
International: +61 7 3369 9822
transportqld@cardno.com.au
www.cardno.com.au

Document Control

Version	Date	Description of Revision	Author Initials	Author Signature	Reviewer Initials	Reviewed Signature
0.1	08/09/2014	First Draft for Client Review	ARS	Original Signed	ASJ	Original Signed
0.2	26/09/2014	Second Draft for Client Review	ARS	Original Signed	ASJ	Original Signed
0.3	21/10/2014	Revise Yield	ARS	Original Signed	ASJ	Original Signed
1	13/11/2014	Economic Component	ARS	Original Signed	ASJ	Original Signed
2	24/11/2014	Final Review	ARS		ASJ	

Version	Reason for Issue / Stage of Deliverable	Approver Initials	Approved Signature	Approved Release Date
0.1	First Draft for Client Review	ASJ	Original Signed	08/09/2014
0.2	Second Draft for Client Review	ASJ	Original Signed	26/09/2014
0.3	Revised Yield	ASJ	Original Signed	20/10/2014
1	Economic Component	ASj	Original Signed	13/11/2014
2	Final Review	ASJ		24/11/2014

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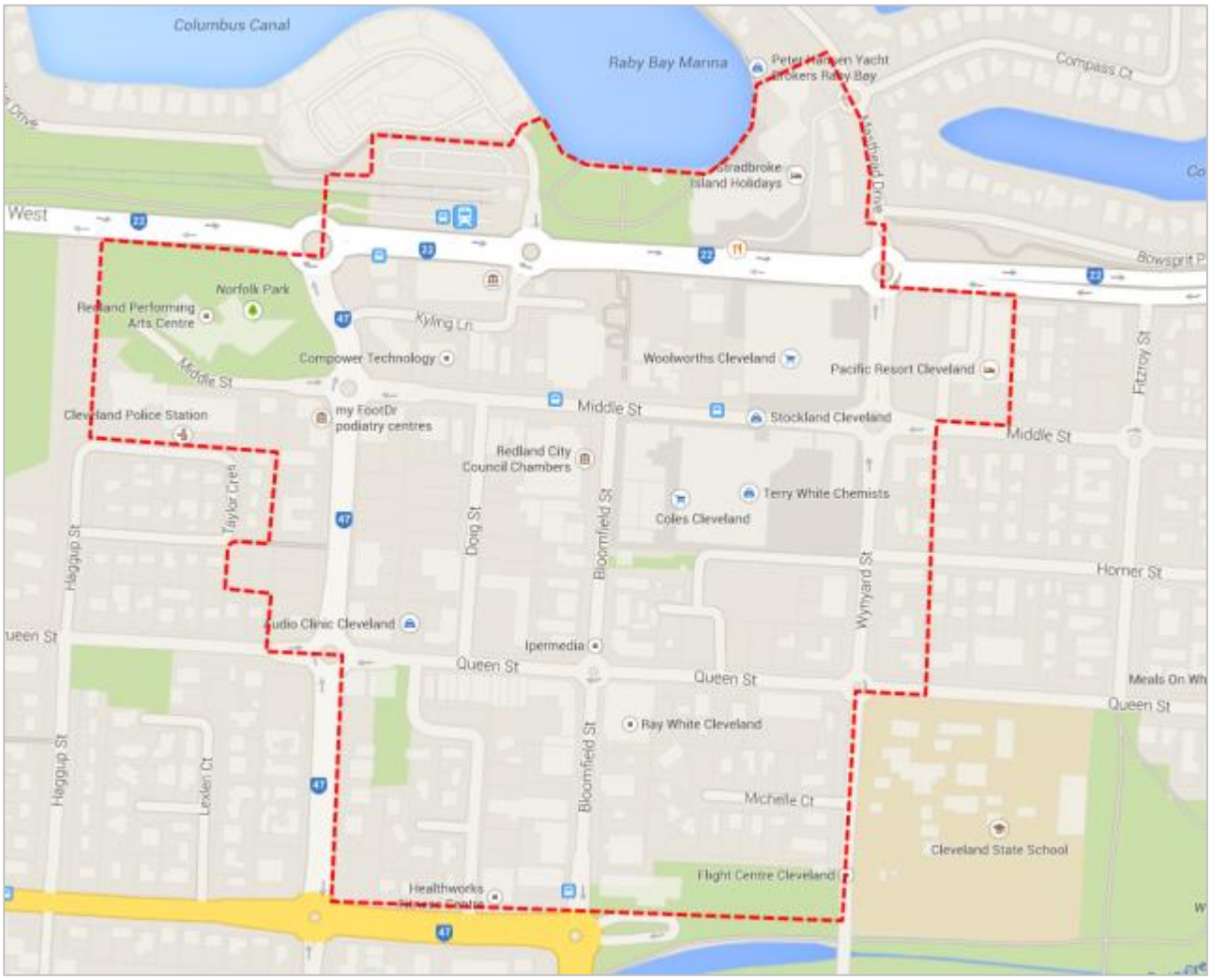
1 Introduction

1.1 Overview

Cardno (Qld) Pty Ltd (Cardno) has been commissioned by Redland City Council (RCC) to undertake a detailed parking study of the Cleveland CBD. This study includes a detailed review of the existing land-use composition and car parking characteristics within the Cleveland CBD, as well as consideration of future land-use scenarios and parking requirements. The study area is illustrated on Figure 1-1 below.

Figure 1-1 Study Area



1.2 Previous Studies

RCC has previously commissioned two parking studies for the Cleveland CBD, including:

- Cleveland CBD Parking Study, TTM Consulting (Qld) Pty Ltd (TTM), July 2003
- RCC Cleveland Strategic Parking Study, GHD, July 2006.

1.2.1 TTM Report

This report suggests that there is a bias towards medium and long-term parking supply within the Cleveland CBD. The report also estimated a peak parking requirement of 3,065 spaces based on TTM's past experience on similar projects. When compared to the existing supply of 2,933 spaces, the estimated demand equates to a shortfall of approximately 350 spaces. As a result, TTM recommended a minimum parking rate of 3.5 spaces per 100sq.m for all future development within the Cleveland CBD, to meet this requirement.

TTM also suggested that the shortfall could be accommodated via a new public parking structure providing at least 350 spaces to fulfil the estimated parking deficit. However, it was noted that in order to cater to future demand, the new parking structure could be constructed to accommodate up to 500 spaces for efficiency.

However, a detailed parking survey undertaken by TTM recorded a maximum of 2,500 parked vehicles within the Cleveland CBD, which suggests approximately 400 parking spaces were vacant during peak periods. This renders the recommendation for an additional public parking structure to accommodate existing demands to be inaccurate. Furthermore, the parking strategies recommended by TTM are heavily focussed on providing sufficient parking spaces based on unchanged travel behaviour. Given the potential for significant improvements in public transport and active transport initiatives, maintaining the suggested minimum parking rate may not be necessary.

1.2.2 GHD Study

This report suggests that the majority of parking within the Cleveland CBD is concentrated to the north, mainly surrounding the train station and the retail and commercial core along Middle Street and Bloomfield Street. It was reasoned that given the aging population, users would prefer minimising walking distance to the retail and commercial core, and therefore parking would be in high demand around this area.

Given that the report was prepared before the Cleveland Centre Master Plan was released, the assumptions relating to the future development yields within the Cleveland CBD did not align with the current vision. Nevertheless, three (3) broad parking strategies were recommended, including:

- Publically available off-street Parking Strategy - delivery of long-term parking spaces with the result of shifting all-day parking away from street frontages
- On-Street Parking Strategy - delivery of short-term parking spaces with the result of reducing congestion and increasing pedestrian facilities
- Demand Management Strategy - focus on improving the overall operation of the Cleveland CBD through streamlined management of parking areas.

Although the study assumptions do not align with the Cleveland Centre Master Plan, the focus on methods that would be utilised to reduce the reliance on car parking and increasing the use of modes other than private cars does align with the Redlands Planning Scheme.

1.2.3 Summary of Previous Recommendations

The key recommendations between these studies focussed on consolidating publically available off-street parking areas and maintaining on-street parking at the retail and commercial core of Middle Street and Bloomfield Street. The introduction of paid parking schemes was also suggested, as were policies to encourage new developments to provide shared parking areas and to limit staff parking though demand management strategies. Table 1-1 summarises the differing points between the two documents.

Table 1-1 Previous Studies – Summary of Recommendations

Theme	TTM Report	GHD Report	Summary
Parking Demand Analysis	Deficit of 350 spaces; it was recommended that at minimum an additional 350 spaces should be provided. If a new public parking structure is constructed, provision for up to 500 spaces should be considered.	Surplus of 700 spaces.	Based on surveyed demands, there is a surplus of parking within the study area.
Recommended Parking Rates	A minimum parking rate for new developments of 3.5 spaces per 100sq.m.	Strongly recommended consolidating parking areas for staff and visitor use.	Redlands Planning Scheme rates are high compared to the Cleveland CBD parking demand.
Methods of Staff Parking Demand Management	Reduce the provision for staff parking and encourage public transport use.	Develop a commuter travel plan and encourage carpooling with reserved spaces, provide free public transport tickets, restrict long-term parking, provide end of trip facilities or active transport users, and provide pool bicycles for employees.	Restricting commercial and employee parking is an easy method of reducing parking demand with relatively small economic impact.

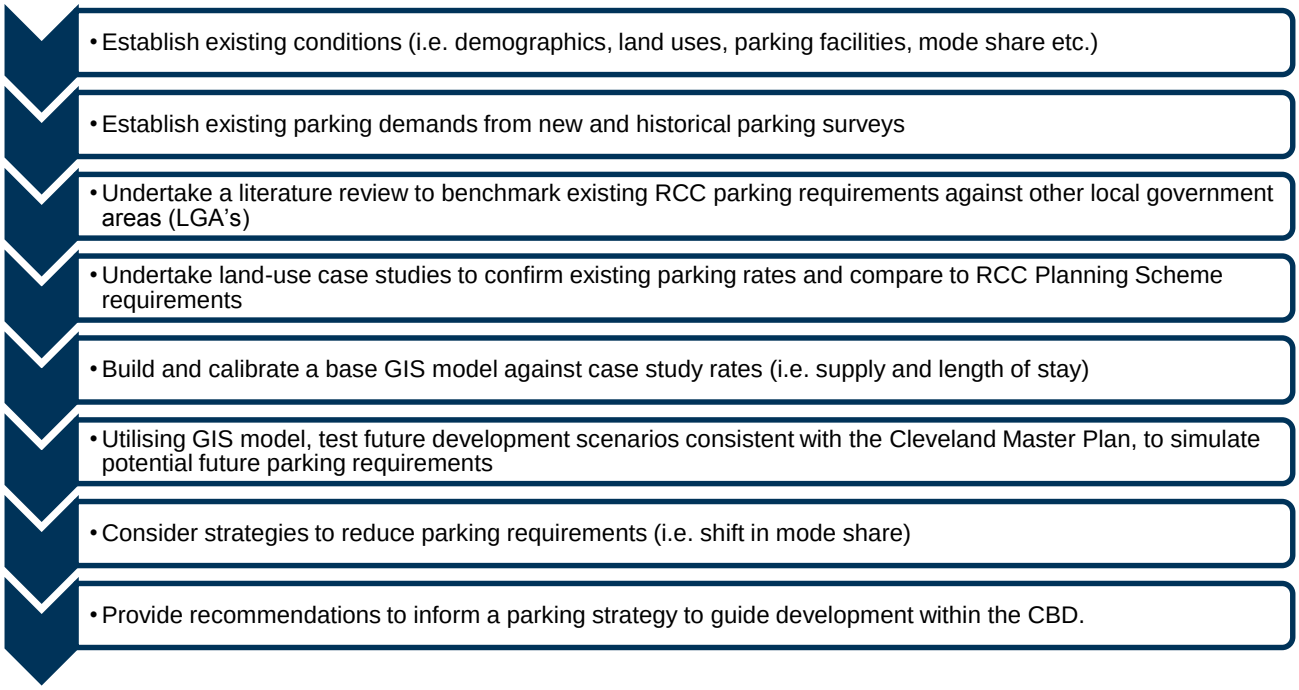
1.3 Intent of Study

The intent of this study is to build upon the work previously undertaken by TTM and GHD and ultimately provide recommendations to inform a contemporary parking strategy to guide development within the Cleveland CBD.

1.4 Scope of Works

The scope of works follows the steps shown on Figure 1-2.

Figure 1-2 Scope of Works



1.5 References

Through the course of this study, the following documents have been examined and referred to:

> Brisbane City Council, Draft City Plan: Transport, Access, Parking and Servicing Policy, June 2014
> City of Gold Coast, Gold Coast Planning Scheme 2003, amended Jan 2010
> City of Gold Coast, Draft City Plan 2015, 2014
> City of Portland, Parking and Loading Code, June 2013
> Department of Infrastructure and Planning, Transit Oriented Developments: Guide for Practitioners in Queensland, Oct 2010
> Department of Transport and Main Roads, Travel in South-East Queensland: Principal Activity Centres, May 2012
> GHD, Redland Shire Council Cleveland Strategic Parking Study, July 2006
> Ipswich City Council, Ipswich Planning Scheme: Parking Code, Jan 2006
> Logan City Council, Logan Planning Scheme 2006, March 2006
> Moreton Bay Regional Council, Redcliffe City Planning Scheme 2005: Car Parking Schedule, 2008
> New South Wales Government, Sydney Local Environment Plan, June 2014
> Standards Australia, AS/NZS 2890 Parking Facilities Part 1 Off-street Parking (2004)
> Redland City Council, Cleveland Centre Master Plan, July 2010
> Redland City Council, Parking Restrictions in Cleveland, Aug 2013
> Redland City Council, Redland Parking Guide, December 2013
> Redland City Council, Redlands Planning Scheme: Access and Parking Schedule, 2013
> Scottish Government, Scottish Planning Policy, June 2014
> TTM Consulting (Qld) Pty Ltd, Cleveland CBD Parking Study, July 2003
> Sunshine Coast Council, Sunshine Coast Planning Scheme 2014: Transport and Parking Code, 2014
> Victorian Department of Transport, Planning and Local Infrastructure, Melbourne Planning Scheme, June 2014.

2 Existing Situation

- Establish existing conditions (i.e. demographics, land uses, parking facilities, mode share etc.)

2.1 Overview

The purpose of this section is to establish existing conditions. Specifically, this section documents the existing demographics, land uses, parking facilities, sustainable transport facilities and mode share within the Cleveland CBD as well as potential interaction with the Toondah Harbour, in terms of parking. This is intended to establish the current situation in the Cleveland CBD in relation to travel, and parking.

2.2 Demographics

Redland City is projected to increase in population by 55,000 people (to 198,300) in the period to 2036[1]. This equates to an additional 2,180 people per year. Cleveland and Ormiston are expected to account for 15% of this increase (or 344 people per year). Cleveland is expected to account for 76% of this local growth, presumably in the form of higher density residential product. To the south of Cleveland, Thornlands is projected to increase by 10,600 people (or 19% of the LGA growth), much of this will occur in the form of new detached housing.

The areas of Cleveland and Ormiston are different in several demographic aspects when compared to the broader Redland LGA:

> The community is older with 21% of the population 65 years and over (Redland LGA 14.5%).
> 31% of the housing is attached or units (Redland LGA 12.8%).
> A higher proportion of households (43% vs 38%) are couples without children.
> 38% of dwellings are fully owned (38% vs 31%) while there also is a higher proportion of rental dwellings (30% vs 25%).

2.2.1 Implications

Based on population growth alone, the demand for population driven services and facilities hosted in Cleveland has the potential to expand by 40% to 50% in the next 20 plus years. In order to cater to this demand, the land owners, business operators and developers will need to cater to the changing needs of the market as demand changes and evolves. This estimate is conservative as it does not take account of the increase in demand that can be attributed to the change in demographic profile.

The local suburbs (Cleveland and Ormiston) are urban areas in transition with older low density forms of development being replaced (over time) by attached and higher density forms of residential development. The inclusion of a greater population base in the Cleveland CBD will underpin demand for a greater range of lifestyle, service and core retail facilities.

[1] QGSO medium series projections 2014

2.3 Existing Land Uses

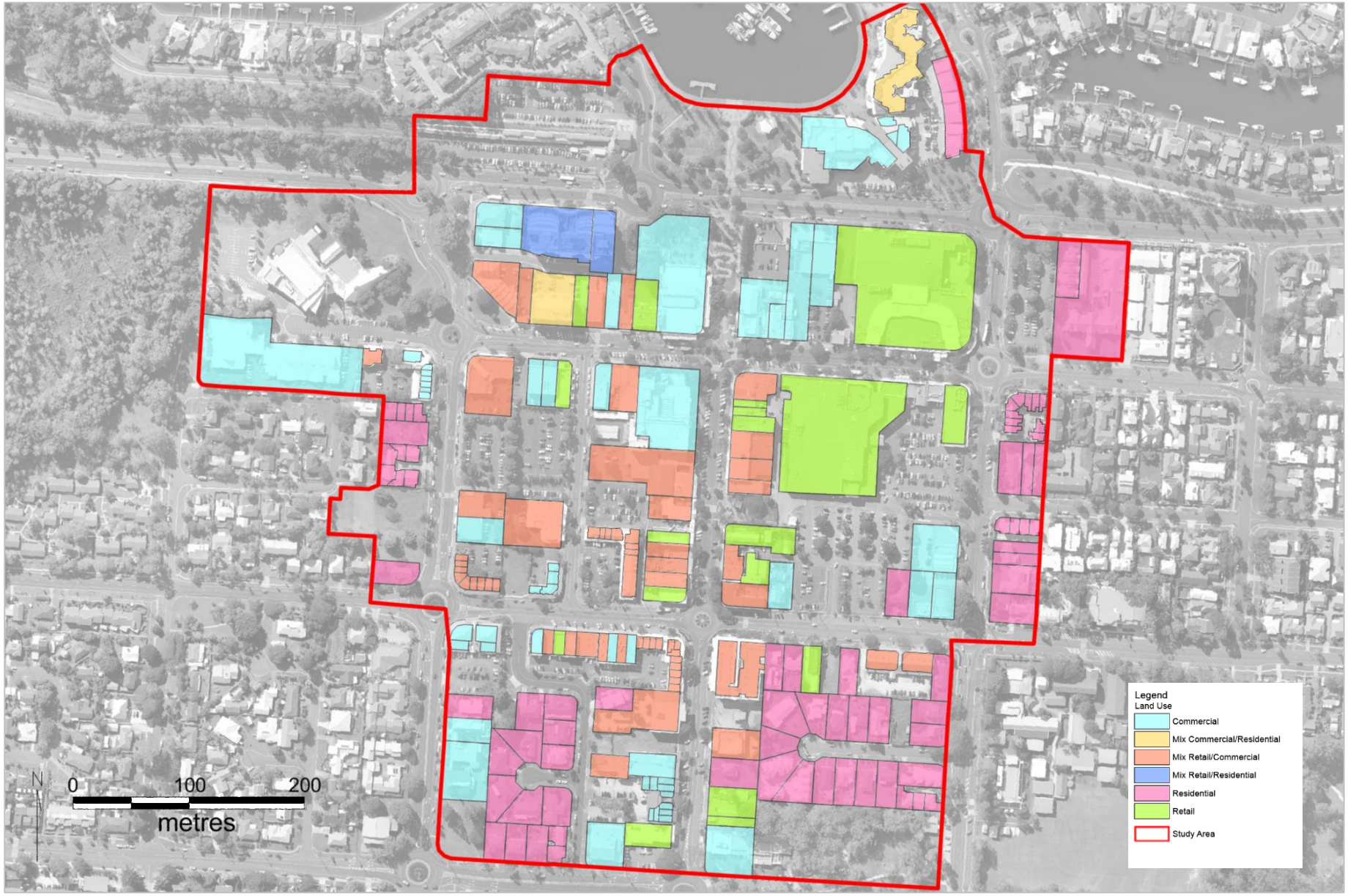
Redlands Planning Scheme provides land-use categories (zones) for each parcel of land within the study area. Cardno have simplified these land-uses categories into categories of similar parking demand generation as follows:

- Residential
- Commercial
- Retail
- Other.

The “other” category covers land-uses that could not be grouped into the categories of “residential”, “commercial” and “retail” due to differences in their characteristics. These land uses include childcare centres, convention centres, hotels, public buildings, and the railway station.

For the purposes of this assessment, childcare centres, public buildings, and hotels are treated as commercial property due to their similar uses during the peak weekday period that is the subject of this assessment. The Redlands Performing Arts Centre is excluded from the study, as it is represents an occasional use. The Cleveland Railway Station parking demand is assumed to fill park-and ride capacity, with excess parking satisfied outside of the study area (along Shore Street West) Figure 2-1 below illustrates the locations of each existing land-use.

Figure 2-1 Existing Land Uses



Existing gross floor area has been obtained through the application of GIS:

- Using GIS mapping tools and aerial photography, Cardno traced the building footprint of each area of land shown in Figure 2.1
- To account for unutilised building footprint such as eaves, undercover car parking and stairways, the modelling assumed 80% of the building footprint is usable (and therefore potential GFA)
- The storeys of each building was determined from Nearmap imagery, on-site inspections of the Cleveland CBD, and input from RCC
- GFA of each building was assumed to equate to the building footprint area, multiplied by the number of storeys

The existing land use illustrated on Figure 2-1 and existing Gross Floor Area is summarised in Table 2-1 below.

Table 2-1 Table 2.1 Existing Gross Floor Area per Land-use

Development Category	Number of Dwellings	Gross Floor Area (GFA)
Residential	227	(refer to no. of dwellings)
Commercial	N/A	43,188 sq.m
Retail	N/A	33,204 sq.m
Other	N/A	2,891 sq.m

2.4 Existing Parking Facilities

2.4.1 Overview

This section establishes existing parking demands from new and historical parking surveys. The current parking scheme in place for the Cleveland CBD is based on time restrictions, rather than paid parking. Parking orientations in the Cleveland CBD are generally rear to kerb angle parking to reduce travel speeds and increase pedestrian safety. Outside the Cleveland CBD the parking times are unrestricted, unless signed otherwise. Parking is monitored by RCC parking inspectors multiple times a day. Certain areas are exclusively for private use, such as the Stockland Cleveland Shopping Centre (Stockland Cleveland), however parking is publicly accessible.

2.4.2 Parking Areas

The available parking facilities have been divided into three (3) categories including:

- **On-street parking** is any available parking within the road-reserve. This excludes disabled bays, loading bays, and bus zones. Where parking bays are not marked or informal, the number of available parking spaces is estimated based on the size of formal parking bays
- **Publically available off-street parking** refers to publically available off-street parking, such as Council-owned parking areas
- **Internal parking** is parking for the sole use of one property. Parking facilities such as the Cleveland Shopping Centre car park have been categorised as internal parking. Small private parking spaces such as those behind shops have been identified from aerial imagery and accounted for, in order to reflect the utilisation of these parking areas in the modelling.

2.4.3 Duration of Stay

To simplify the supply of parking for the purposes of modelling, the parking supply of the Cleveland CBD has been categorised into three (3) categories: short, medium, and long-term parking. The supply of parking has been allocated to these categories based on existing parking restrictions as summarised in Table 2-2. The "internal parking" referred to above, is unrestricted, and therefore is classed as long-stay parking.

Table 2-2 Parking Duration of Stay

Category	Duration of Stay
Short-term	0 – 2 hours 59 minutes
Medium term	3 hours - 5 hours 59 minutes
Long-term	6+ hours

2.4.4 Provision

The following sources have been utilised to determine the existing parking supply within the Cleveland CBD:

- 2006 Publically Available Off-street Parking Survey undertaken by TTM Consultants
- Cleveland CBD Parking Guide, Redland City Council, December 2013
- On-street Parking Inventory undertaken by Cardno, 7th July 2014
- Nearmap aerial imagery.

For publically available off-street parking, the number of spaces and 'duration of stay' characteristics have been extracted from the RCC Parking Guide as well as TTM's parking inventory. For on-street parking, the number of spaces and time restriction has been determined based on a site inspection undertaken by Cardno on 7 July 2014. Internal parking has been determined based on a provision of two parks per retail dwelling, and an inventory of informal and private parking taken from Nearmap Aerial Imagery. The inventory of internal parks serves to adjust the demand for parking that is served by users parking on private properties in self-maintained parking.

2.4.5 Summary

Table 2-3 presents the existing parking supply within the Cleveland CBD Study Area.

Table 2-3 Parking - Existing Supply

Type of Parking	Total	Short -term	Mid- term	Long- term
Internal Parking (Including Stockland Cleveland)	1,173	-	-	-
On-Street Parking	678	24	430	224
Publically Available Off-street Parking (Excluding Stockland Cleveland)	1,484	77	414	993
Total	3,335	121	844	1,217

The parking supply in Table 2.1 shows a greater quantum (3,335) of parking compared to the parking supply suggested in the TTM report (a total of 2,933 spaces). The difference can be attributed to the greater consideration given in this report and its research, to informal and private parking areas, which contribute to the higher parking numbers.

Figure 2-2 shows the existing public parking supply. The figure illustrates the publically available off-street and on-street parking supplies within the Cleveland CBD, categorised by the parking time period restrictions.

Figure 2-2 Parking - Existing Public Parking Supply

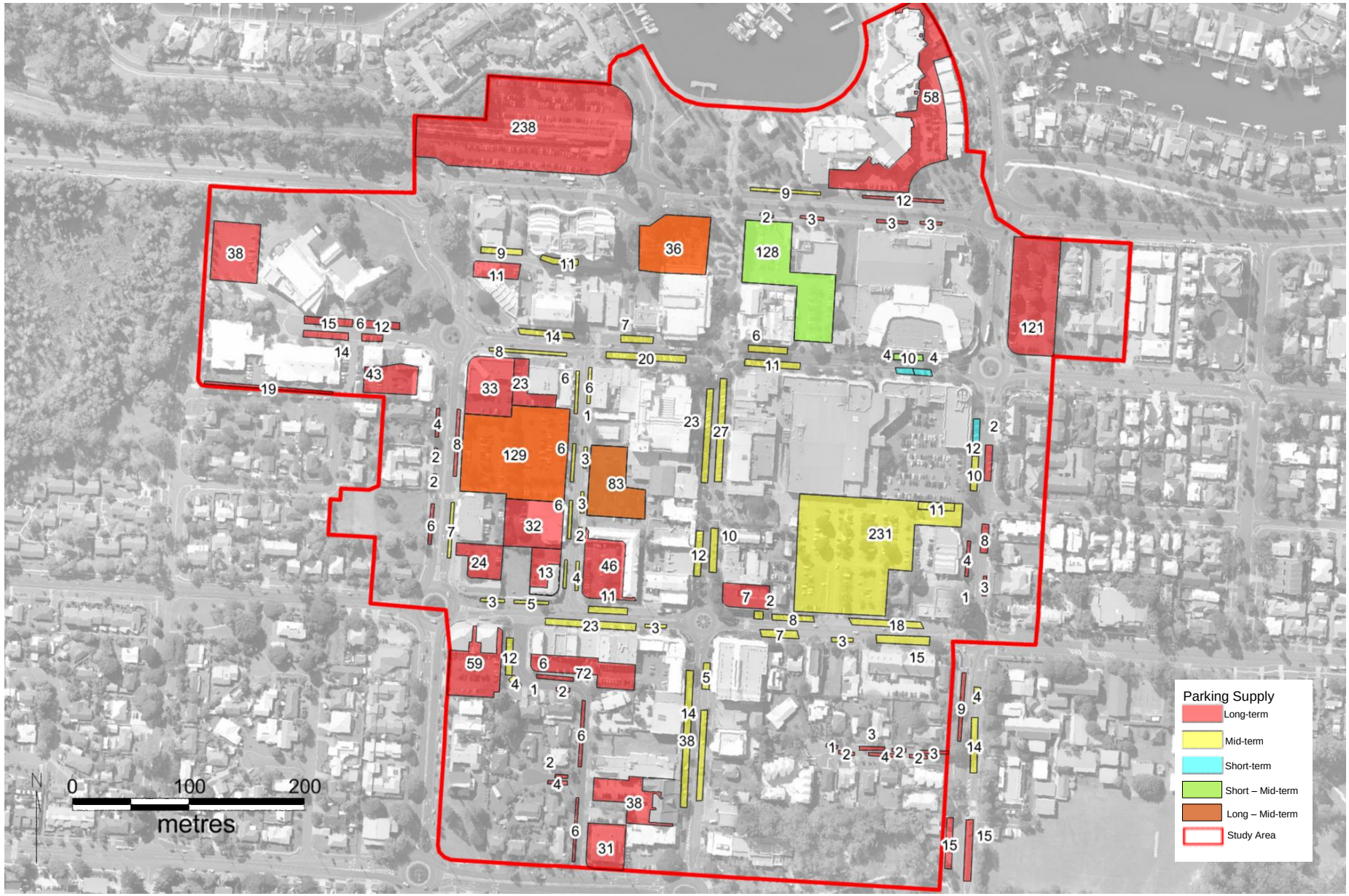
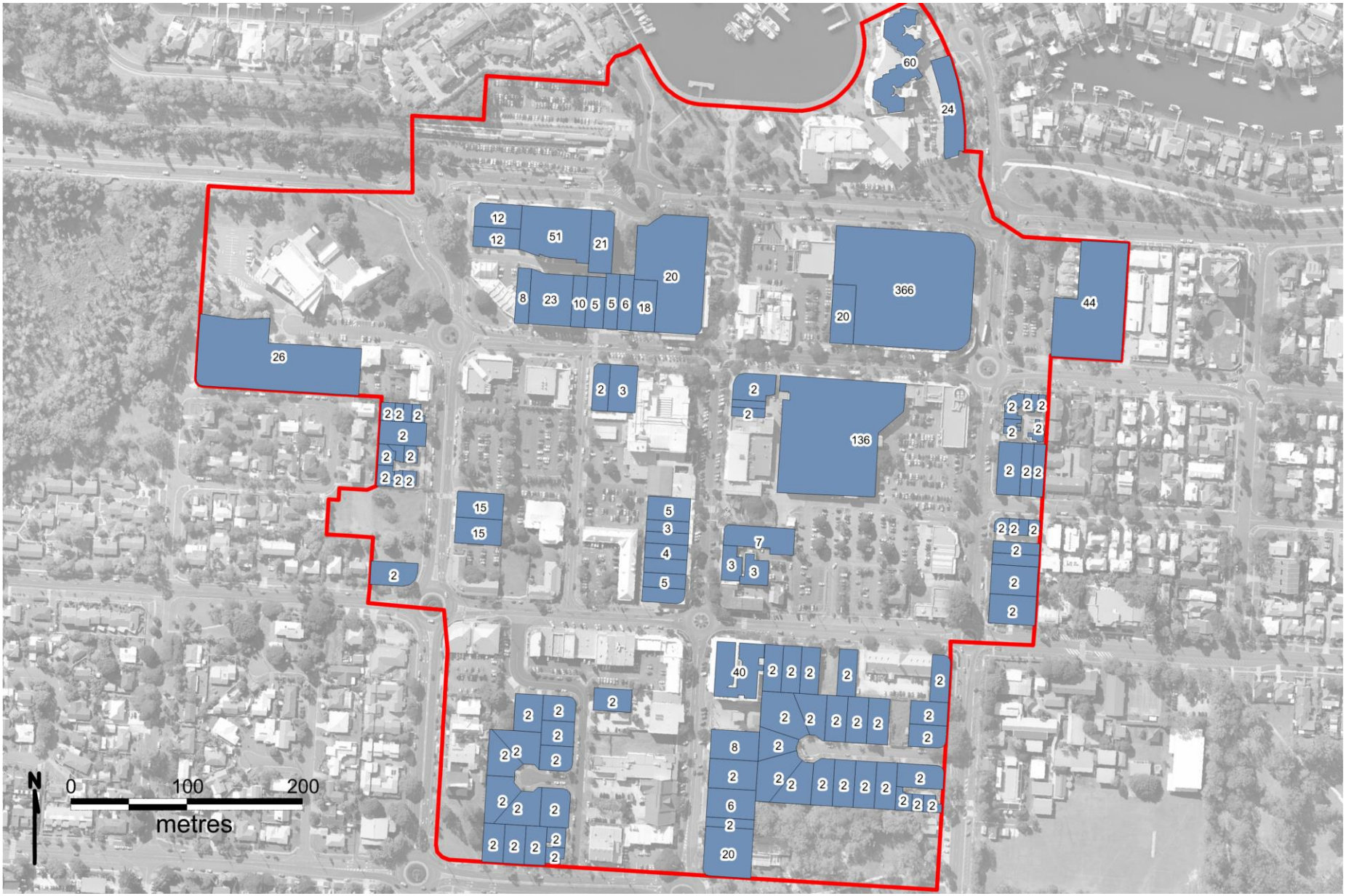


Figure 2-3 below shows the existing internal parking supply. The numbers of carparks shown in Figure 2.3 are the number of car parks observed from aerial imagery as described in section 2.4.4. This study adopts these figures in the report's methodology and these are included in the total quantum of parking in the study area. The number of car parks on Figure 2-3 shown on each property represents the parking spaces that are "reserved" for a single property's use for tenants and customers only, and therefore does not represent public parking supply. It follows that, although these carparks do not represent public parking supply, they do contribute to a reduction in the total demand for public parking, and so are adopted as a reduction against a property's parking demand.

Some "reserved" car parks within the study area serve multiple properties and purposes, which cannot be easily modelled in the GIS system. As a result, these spaces "reserved" for multiple purposes have been modelled as publically available off-street parking, instead of internal parking. This means that all users will technically be able to access the parking, not just the reserved tenancies.

The nature of the GIS parking model would limit the risk of these spaces being occupied by public users due to the assumption that land uses closer to the car parks (i.e. the reserved tenancies) will be offered first preference. These assumptions are discussed in detail in Section 5.

Figure 2-3 Parking – Existing Internal Supply (Number of spaces)



2.5 Existing Parking Demands

- Establish existing parking demands from new and historical parking surveys

2.5.1 TTM Parking Surveys

TTM parking surveys performed for RCC on the 8 July 2006, were collated and mapped to show the baseline parking use in 2006. Surveys were conducted between 10:00am and 12:00pm, and between 2:00pm and 4:00 pm.

The surveys were undertaken via a simplistic methodology whereby a survey enumerator counted the number of vehicles each 30 minutes, without taking note of how long people stayed in each park. This means that the TTM parking surveys, as well as being dated (2006), utilised a methodology with room for improvement, and the analysis cannot provide information on whether the Cleveland CBD has appropriate levels of short/medium/long-term parking provision.

Analysis of the TTM survey results illustrated that the peak parking occurred between 11:00am and 11:30am. The surveys reported variance in parking utilisation during the day. For example, at 2:00pm, some areas had dropped in utilisation by up to 20%. Figure 2-4 and Figure 2-5 illustrate the parking provision at 11:00am and 11.30am, and 2:00pm to 2:30pm respectively to illustrate this drop in utilisation.

Figure 2-4 Parking – Survey Parking Utilisation (TTM) – 11:00am to 11:30am (2006)

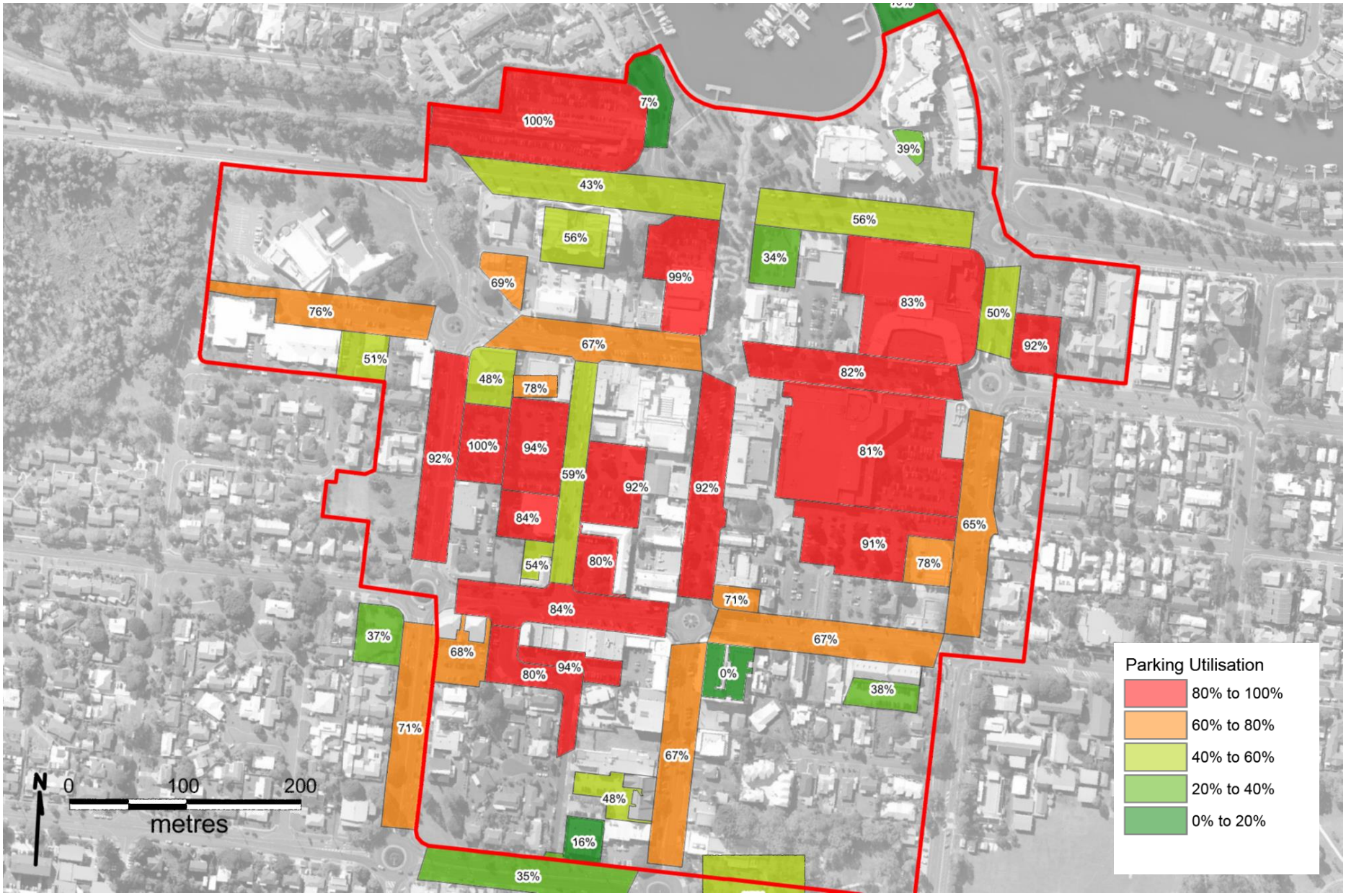


Figure 2-5 Parking - Survey Parking Utilisation (TTM) – 2:00pm to 2:30pm (2006)

2.5.2 Austraffic Parking Surveys

To supplement the 2006 TTM surveys, Austraffic was commissioned as part of this report (2014) to undertake surveys in order to obtain duration-of-stay information for the various land-uses within the Cleveland CBD. Due to the survey method adopted by Austraffic (2014) which employed more intensive and thorough survey techniques, a smaller survey area was captured. However, the survey methodology of Austraffic (2014) was deliberately designed to ensure the Austraffic data could be compared to the TTM (2006). The aim of obtaining more recent data through Austraffic (2014) was to ensure no major changes have occurred since TTM surveys (2006), as well as to provide insight into how long users are staying in the Cleveland CBD, and to obtain other parking usage patterns that could not be reliably deduced from TTM (2006) surveys.

The Parking utilisation of the Cleveland CBD from the Austraffic (2014) parking survey is shown below on Figure 2-6, and 2-7. The parking utilisation in Figure 2.6 is for the same time periods shown in the TTM (2006) survey in Figure 2.4.

The figures show there is little difference between the 2006 survey data and the 2014 survey data. Therefore, throughout this report, the 2006 TTM survey data is able to supplement the Austraffic (2014) survey data where required, for purposes of analysis and assessment.

Figure 2-6 Parking - Survey Parking Utilisation (Austraffic) – 11:00am to 11:30am (2014)

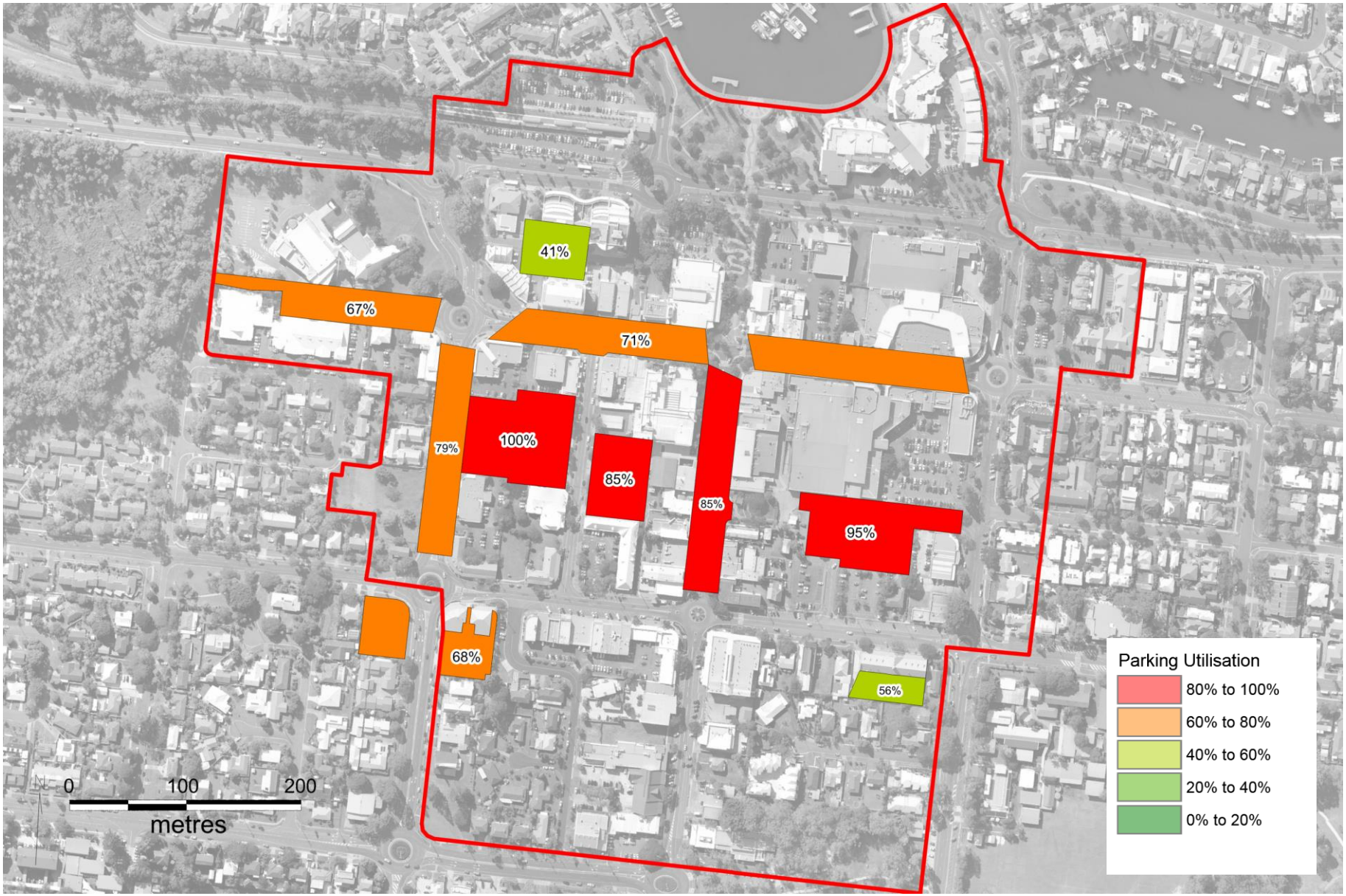
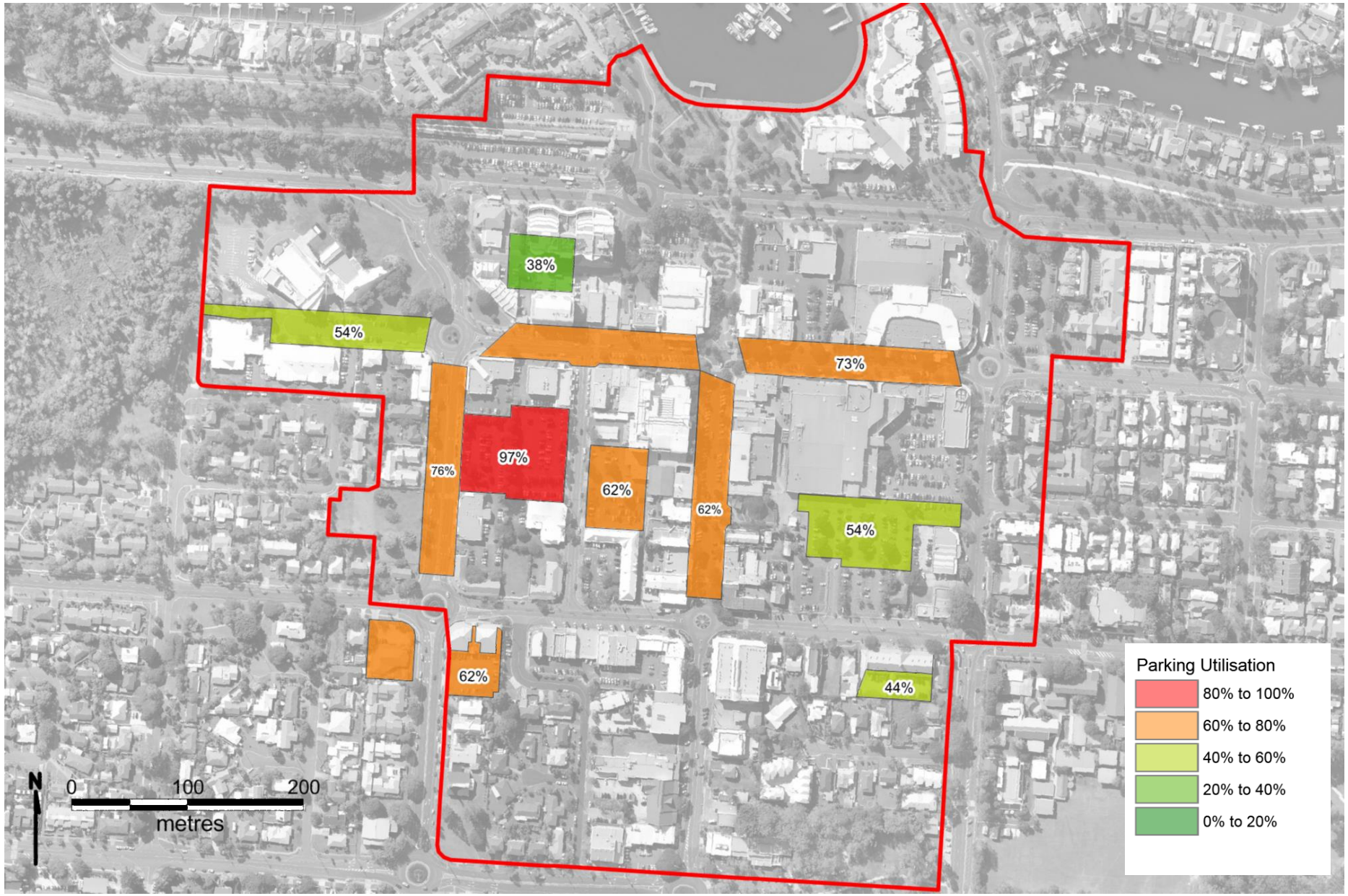


Figure 2-7 Parking - Survey Parking Utilisation (Austraffic) – 2:00pm to 2:30pm (2014)



2.5.3 Summary

The surveys above show there is a strong demand for parking in the centre core of the Cleveland CBD, with utilisation of 80-90% in the Cleveland CBD between Middle Street and Queen Street during the peak period. Long-term parking in the vicinity of the Cleveland Railway Station, as well as the park and ride facility appeared fully utilised in the TTM surveys.

On-street parking showed slightly lower utilisation than unrestricted publically available off-street parking. This would be reflective of the parking restrictions in place on the on-street parking within the study area, which can have the effect of having parkers favour unrestricted parking over restricted parking.

Private ("reserved") parking areas that were surveyed in the TTM surveys show a lower utilisation (55%) than surrounding parking areas. This is shown in the analysis of existing parking demand in Table 2-4.

Table 2-4 Parking - Existing Demands

TTM Survey (2006)	Total	Short-term	Mid-term	Long-term	Reserved
TTM Survey Supply	3149	581	847	1307	414
Peak Demand (11:00-11:30)	2327	363	710	1013	241
Available Spaces	822	218	137	294	173
Utilisation	74%	65%	84%	78%	55%

Reserved parking has an utilisation of 55% at its peak. This indicates that fewer of the carparks were occupied at the time of the survey, and that could be due to a policy that requires the reservation of parking spaces for tenants and customers only, being enforced, allowing spaces to remain available for the tenants and customers of these properties.

The analysis suggests that mid-term and long-term parking has a high utilisation during the peak. While some parking was identified as full in the survey data, the data does not necessarily represent an overall shortfall as there are other available long-term parks within the Cleveland CBD. Therefore, there is not necessarily a shortfall in long-term parking if users are willing to utilise more difficult to reach parks, or parks farther away from their desired destinations.

The analysis also shows that the supply and utilisation of short-term parking is relatively low compared to the mid-term and long-term parking. Because of the nature of the surveys, it is possible that the short-term parking is underreported. That is, the high turnover of these spaces means that the surveyor is likely to miss short-term users parked in short-term spaces.

Overall, the surveys conducted by TTM (2006) found 822 spaces available at the peak period, with 649 spaces publically available.

Further analysis of the demand for each category of parking is considered within the parking case studies in Section 4.6 of this report.

2.6 Sustainable Transport Provisions

The three (3) transport services currently available in the Cleveland CBD include rail, taxi and bus. The Queensland Rail Cleveland Station is the end of the line for the Bowen Hills-Cleveland line train service. Seven (7) bus routes also service the station. Figure 2-8 highlights the locations of the train station and bus stops within the Cleveland CBD. Table 2-5 collates the frequency of bus and train services in the Cleveland CBD during peak periods.

As listed in Table 2-5, the Cleveland train line and Bus Route 250 services provide the highest frequency of services into the Cleveland CBD during the peak hours of travel. Taking account of all public transport services, there is a frequency of approximately one service every three minutes during the peak hours of travel in the Cleveland CBD area.

Within the Cleveland Station, 238 car parking spaces are available for short-term and park-and-ride users. Bicycle facilities and bike lockers are also available at the station. Accessibility features, such as access paths, tactile edges, accessible toilets and accessible parking, are provided throughout this station.

Figure 2-8 Sustainable Transport Provisions

Table 2-5 Sustainable Transport Provisions

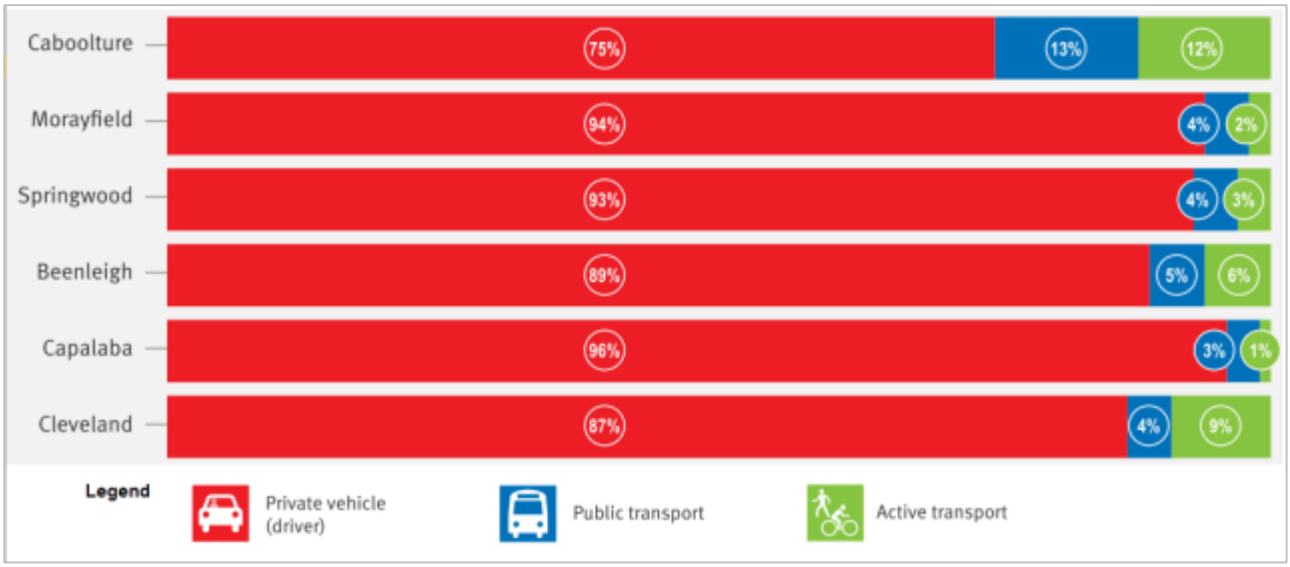
Public Transport Service	Number of Services per Hour			
	7 – 8am	8 – 9am	12 – 1pm	1 – 2pm
Bowen Hills-Cleveland Train Line	4	4	2	2
Bus Route 250: Redland Bay-Brisbane City	4	4	4	4
Bus Route 252: Capalaba-Cleveland	1	2	2	2
Bus Route 255: Cleveland-Birkdale	1	2	2	2
Bus Route 258: Toondah Harbour-Cleveland	2	2	2	2
Bus Route 272: Victoria Point-Cleveland	2	3	5	5
Bus Route 274: Victoria Point Jetty-Cleveland	2	3	2	2
Bus Route 275: Thornlands-Brisbane City	2	0	0	0
Total Services per Hour	**18**	**20**	**19**	**19**

2.7 Existing Mode Share

A report issued by the Department of Transport and Main Roads (TMR) stated that the Cleveland principal activity centre generated 9,000 trips per day (from 2004 and 2007 household travel survey data). The *Travel in south-east Queensland: Principal Activity Centres* report, issued May 2012, also provided information on the mode share for the various activity centres. As shown on Figure 2-9, 87% of trips made to Cleveland were by private vehicle. This results in a significant demand for parking within the Cleveland CBD.

In comparison to the majority of the other principal activity centres in the greater Brisbane area, there is a relatively high mode share for active transport (walking/cycling). However, in terms of public transport, Cleveland operates with quite a low mode share of 4%. There is potential to increase public transport use, constrain parking, and increase density and active encouragement of public transport use.

Figure 2-9 Mode Share - Comparison with Selected Activity Centres



Source: *Travel in south-east Queensland: Principal Activity Centres,* Department of Transport and Main Roads, May 2012

2.9 Toondah Harbour

2.9.1 Introduction

Toondah Harbour is a Priority Development Area (PDA) located to the east of the Cleveland CBD, and is currently the location of the main ferry terminal to Stradbroke Island in addition to some commercial and recreational boating uses. The main goal of the PDA is to diversify the economic base of the area with increased residential and commercial uses.

2.9.2 Toondah Harbour Parking Provision

Toondah Harbour has a unique operation as a facility for recreational boating and for ferry users, which will become more unique after the development envisaged by the PDA is achieved. Currently, there are approximately 850 parking spaces in the PDA, most of which are highly utilised and for the whole day/overnight.

The PDA documents currently envisage parking in the area to increase by further 600-700 parking spaces in the future, to service the commercial and retail uses in the precinct. It is also envisaged that the residential dwellings would have their own parking spaces.

The calculation of parking requirements at Toondah Harbour was assessed on the basis that any development should meet the current planning scheme. Should the parking rates identified in the latest PSA Consulting "Review of Car Parking Rates for Redland City Council" be adopted by RCC the future parking provision could drop, but not by a number that is significant.

2.9.3 Transport Relationship between Toondah Harbour and the Cleveland CBD

The Cleveland CBD is vitally important to the Toondah Harbour PDA for several transport reasons:

> All public transport services servicing Toondah Harbour either originate or end in the Cleveland CBD
> There are key existing and/or future cycling links between the two centres
> Toondah Harbour is likely to constitute a leisure draw for the residents of the Cleveland CBD.

The distance between the two precincts is not considered to be excessive for a leisure walk (approximately 20mins walking time assuming a walking speed of 1.2m/s). Figure 2-10 illustrates the two precincts, with a 15 minute walking isochrone illustrated for the heart of the Cleveland CBD.

This type of distance is likely to be prohibitive for shared trips. For example, visitors to the locality would not park in one area and walk to the other to use the facilities. It is therefore considered that the parking demands and provisions for both would not impact on one another.

Figure 2-10 Toondah Harbour - Proximity of Cleveland CBD

2.9.4 Associated Parking Opportunities

Although a detailed investigation of the parking requirements and issues associated with the Toondah Harbour PDA has not been provided in this report, it is possible to draw some parallels between this and the Cleveland CBD. Toondah Harbour is different in nature to an established Principal Activity Centre such as the Cleveland CBD. Nonetheless, the same principles of operation and provision could be achieved. For instance the mix of a car parking core in addition to individual onsite parking for development is likely to work as well for the increased densities at Toondah as the Cleveland CBD. In addition, the methods of reducing reliance on private car use would significantly reduce the costs associated with the provision of car parking.

2.10 Economic Overview

2.10.1 Study Area

The Cleveland CBD generally extends 720m (north- south) and 750m (east-west) and includes the main business area, retail centres, rail station and fringing residential.

The existing ground floor area (retail, commercial and business uses) is outlined below. It is dominated by a built form that is low rise in scale and modest in density.

Table 2-6 Existing Land Uses

Development Category	Number of Dwellings	Gross Floor Area (GFA)
Residential	227	(refer to number of dwellings)-
Commercial	N/A	43,188 sq.m
Retail	N/A	33,204 sq.m
Other	N/A	2,891 sq.m

2.10.2 Current Role and Function

Cleveland is the only Principal Activity Centre in Redlands and hosts in the order of 35,000 square metres (sq.m) of retail floor space (refer to Table above). The greatest concentration of retail floor space is the Stockland Cleveland Shopping Centre which is 15,719 sq.m in size[2]. This centre is anchored by Woolworths (4,031 sq.m) and Coles (3,536 sq.m) supermarkets. In addition to its retail functions, Cleveland CBD is the administrative centre of Redland City and also hosts a significant amount of lifestyle and entertainment based at the marina and adjacent areas.

The Cleveland CBD has the physical capacity to host the range of intended uses. However, like any other Principal Activity Centre, this capacity is moderated by other considerations including land price, fragmentation of ownership and appeal as an investment.

2.10.3 Market Metrics

2.10.3.1 Rents

Net rents of prime properties in Cleveland are in the range of $500 to $800 per square metre per annum. Rents for secondary locations range from $300 to $500 per square metre with small tenancies in the range of $150 and $300 per sq.m.

2.10.3.2 Sales and Ownership

The core area of the Cleveland CBD is a tightly held precinct with the average property being owned for 15 to 20 years. A number of the properties have been in the same ownerships for 40 years plus. There was one reported sale of a retail site in 2013 with a 1,436 sq.m Bloomfield Street site selling for $2.82 million. There has been one reported retail sale this year with a 405 sq.m John Street site selling for $465,000.

In addition to the sites described above there are several strata titled office sites sold every year. These suites tend to be in the 50 to 150 sq.m range and sell for between $3,500 and $4,500 per sq.m.

The ownership of the study area is generally fragmented with many of the smaller sites in diverse ownership.

2.10.4 Analysis

The Cleveland CBD functions as a traditional town centre with a range of retail and facilities intended to service the everyday needs of local residents. This is supported by a range of commercial and service professionals that respond (in large part) to the presence of the Council chambers. The core area of the Cleveland CBD is tightly held in generally fragmented ownership. Under these circumstances, site amalgamation for the purpose of redevelopment is generally difficult and expensive.

[2] Source: Property Council of Australia

2.11 Summary

Key points regarding the existing situation are summarised below:

- Population to increase by 44% over 25 years (i.e. 131,210 people in 2006 to 188,471 people in 2031)
- The Cleveland CBD has a mix of uses including 227 dwellings and 69,200sq.m of commercial and retail uses
- The Cleveland CBD has approximately 3,335 parking spaces, which are made up of 1,484 publically available off-street spaces, 678 on-street spaces and approximately 1,173 private spaces (i.e. Stockland Cleveland etc.)
- The Cleveland CBD is well serviced by existing sustainable transport facilities including rail, bus and taxi
- Mode share in the Cleveland CBD breaks down to 87% private vehicle, 4% public transport and 9% active transport. This provides opportunity to grow active and public transport usage
- Given the distance between the Toondah Harbour and the Cleveland CBD, it is unlikely that visitors would park in the Cleveland CBD and walk to Toondah Harbour, and vice versa.

3 Literature Review

- Undertake a literature review to benchmark existing RCC parking requirements against other local government areas (LGA's)

3.1 Overview

This section undertakes a literature review to benchmark existing RCC parking requirements against other local government areas (LGA's).

Cardno has been engaged to provide advice and recommendations leading to a contemporary Cleveland CBD parking strategy to inform the improvement of future parking in the Cleveland CBD area of South East Queensland. As part of this commission, a literature review of previous and current documents was undertaken. This section will summarise the document findings of this review.

As a result of consultation with the RCC, the following documents were highlighted as relevant to the parking study and were included in this literature review:

> Parking Restrictions in Cleveland, Redland City Council, August 2013
> Redland Planning Scheme, Redland City Council
> Review of Car Parking Rates, PSA Consulting Australia, August 2014
> Other council planning schemes, and
> Transit Oriented Development: Guide for Practitioners in Queensland, Department of Infrastructure and Planning, October 2010
> Cleveland Centre Master Plan Development: relationships between built form and the street, AECOM, 2010.

3.2 Parking Restrictions in Cleveland, Redland City Council

This study involved a trial initiated within the Cleveland CBD to monitor the effects of extending certain on-street parking zones from a 2-hour limit to a 3-hour limit for a 6-month period. Before the trial commenced, 30.5 infringements per month were issued, however during the 2-month period, only 16.5 infringements per month were issued. Following these results, it was recommended the 3-hour limit should be retained, rather than reinstating the 2-hour limit or further relaxing the limit to 4 hours. It was noted that the number of infringements does not necessarily equate to improved efficiency of the trial, however the level of satisfaction for business owners and visitors were likely to have been improved, as evidenced by the lack of complaints received regarding the trial.

3.3 Redlands Planning Scheme, Redland City Council

The parking rates mentioned within the Redlands Planning Scheme were developed based on predicted demand for each land use. Whether these are a current and accurate representation of the parking demand remains uncertain without a thorough parking study. The existing parking rates for the Bloomfield Street core were indicated as suitable following a recent site visit. Past reviews have indicated that outer regions of the Cleveland CBD generate less parking, particularly less short-term parking, compared to the core areas. A reduction in parking rates suggests a positive shift away from a reliance on cars, providing an opportunity to use current parking areas more efficiently.

3.4 Review of Car Parking Rates, PSA Consulting Australia

The overall objectives of this study are listed below:

> Evaluate the effectiveness of the current car parking provisions to inform parking provision rates as part of the Redlands Planning Scheme 2015
> Identify robust and defendable car parking rates of provision for residential and commercial centre uses applicable to development, both in centre and at other locations across Redland City.

As part of this study, PSA Consulting undertook a review of the car parking rates and other provisions related to car parking contained in the following existing and draft planning schemes as baseline data informing the review of car parking rates for the RCC:

> Brisbane City Plan 2014
> Draft Gold Coast City Plan 2015
> Draft Logan Planning Scheme 2015.

PSA Consulting also undertook a review of contemporary literature and planning techniques related to car parking contained as supporting information which were considered as part of the review of car parking rates for the RCC, including the following documents:

> Next Generation Planning handbook
> Principles of Sustainable – Medium Density Infill Housing in South East Queensland
> UDAL Medium Density Housing Review
> Redland ILTP Review 2013, PSA Consulting.

Travel demand measures were evaluated by PSA Consulting to assess their applicability to reviewing car parking rates. PSA Consulting considered the method of car parking substitution to be potentially applicable in Redland City where a development can be demonstrated to practically cater for alternate transport modes or vehicle forms. The applicability of the unbundled car parking method was considered to be of low applicability in Redland City, as the urban construct (form, density and mix of uses) to support the development of large shared parking facilities was not present.

PSA Consulting also undertook a review of factors that share a strategic relationship to demand for car parking that are unique to Redland City and should be considered as part of the review of car parking rates for the RCC, including the following:

> Cost of Providing Car Parking Spaces
> Car Ownership trends:
> Quantity of Cars Per Household
> Vehicle Types and Form
> Travel Trends Analysis
> Demographic and Housing Profile
> Redland City Settlement Pattern and Urban Form
> Public Transport Service Planning and Improvements.

Population growth will also result in a corresponding increase in the number of cars in Redland City. This increase in the vehicle population will generate a need for additional car parking spaces which could be accommodated by either on-street or publically available off-street parking. The magnitude of forecast demand for car parking spaces was considered by PSA Consulting as part of their review to ensure an appropriate balance is achieved between the cost of development, urban amenity and road function.

3.4.1 Summary of Recommendations

This study examined in detail the car parking rates currently administered by RCC. Through the review PSA Consulting confirmed that existing RCC policy was generally well resolved, technically detailed and of a sound standard catering for Redland City's unique geographic, demographic and transportation profile. Overall PSA Consulting were of the opinion that only minor policy adjustments are justifiable.

3.5 Other Sources

3.5.1 Other South-East Queensland Council Planning Schemes

Parking rates from other planning schemes were reviewed to offer a comparison to RCC rates. Generally, it was found that for residential uses, the parking rates did not vary greatly except where visitor spaces were required. For commercial and retail uses, rates were generally consistent except for Maroochydore and Brisbane City where reduced rates were specified. The parking rates outlined in the Redlands Planning Scheme represent higher rates for lower density dwellings, however is generally consistent with other planning schemes, particularly Ipswich, Brisbane and Caboolture, for office and shop uses.

3.5.2 Other Interstate Council Planning Schemes

A broader review looking at interstate and international standards was also undertaken. With regards to Penrith and Wollongong, these cities have been recognised as major activity centres in New South Wales and hence reasonably similar in character and development as Cleveland. For reference to regional centres, parking rates for Sydney and Melbourne were compared to present an upper benchmark for larger centres.

The reviewed planning documents referred to a mix of maximum and minimum parking rates. With the exception of Penrith, the residential parking rates were generally lower than Redlands (However, this could be attributed to the high frequency transport links at Penrith).

Compared to the Redlands parking rates, the office and shop rates were also generally lower, resulting in less parking. Given the similarity in character between Cleveland, Penrith and Wollongong, the parking requirement for commercial uses was double that in Cleveland compared to Penrith and Wollongong.

The detailed research to ascertain the unique circumstances of each locality (Penrith, etc) and whether variations in parking requirements was due to “location specifics” was not undertaken for this report. However, by comparison, the Redlands Planning Scheme parking rates still appear higher than necessary.

3.5.3 Transit Oriented Development: Guide for Practitioners in Queensland

The Transit Oriented Development Guide is a document which outlines appropriate guidelines for the design and implementation of Transit Oriented Developments (TOD). TOD is a planning concept that promotes the development of a network of well-designed, human-scale urban communities focused around transit stations.

The Cleveland Centre Master Plan already aligns with many of the TOD guidelines, such as the following:

> Use of appropriate land uses
> Suitably located park-and-ride facilities
> Locating parking in basements and behind buildings
> Providing short-term on-street parking
> Parking for developments.

3.5.4 Cleveland Centre Master Plan Development: relationships between built form and the street

As part of the Cleveland Masterplan process, AECOM produced the Cleveland Centre Master Plan Development: relationships between built form and the street (July 2010). As part of this study, Aecom conducted land-yield modelling of the Cleveland CBD Masterplan, to determine the land-yields of the future Master Plan. The report summarised the following:

> The purpose is to provide additional design guidance for the implementation of the Cleveland Masterplan
> The report considered items such as sun shade, building layout and design and other items to improve the livability of the future Cleveland CBD
> Land-use modelling was undertaken to determine the likely number of residential dwellings, as well as the likely retail and commercial Gross Floor Areas of the future development.

These key assumptions have been used to inform this study.

3.6 Summary

Key points from the literature review are summarised below:

> Extending parking limits from 2-hours to 3-hours may improve compliance
> A reduction in parking rates suggests a positive shift away from a reliance on cars
> Existing RCC parking policy is generally well resolved, technically detailed and of a sound standard catering for Redland City’s unique geographic, demographic and transportation profile
> Existing RCC parking policy is generally consistent with other council planning schemes, particularly Ipswich, Brisbane and Caboolture, for office and shop uses
> Existing RCC parking policy is generally higher than requirements for similar LGAs in NSW
> The Cleveland Centre Master Plan aligns with many of the TOD guidelines.

With the exception of the BCC core parking rates, all planning documents refer to minimum parking rates. These will always provide an oversupply of parking spaces given the propensity of engineers to calculate the ultimate requirement for an overall land use/study area, convert that to spaces per square metre, and convert that to policy representing a "minimum" parking requirement (this example deliberately simplified), and set that as a minimum. This practice, via the calculation of an"ultimate" requirement, tends to assume a "worse case scenario", leading to parking policy with high parking rates. As such, the traditional way of thinking about the ultimate requirement as the minimum should be challenged in order to develop a sustainable Cleveland CBD.

4 Cleveland Centre Master Plan

4.1 Overview

This section provides an overview of the Cleveland Centre Master Plan. As this is an approved Council document, it has been used throughout the study as the over-arching document serving as a blue print for planning and development in the Cleveland CBD. The Cleveland Centre Master Plan was prepared by AECOM, PSA Consulting and Connell Wagner (now Aurecon) in July 2010.

4.2 Proposed Development Plan

4.2.1 Identified Land Uses

The Cleveland Centre Master Plan has identified the land uses for future development, as shown in Figure 4-1. The majority of the Cleveland CBD is to comprise mixed use development, surrounded by residential and public uses. The Cleveland Centre Master Plan also focuses on increasing density in the Cleveland CBD area with an increase in employment population and a shift from detached to attached housing provision.

Figure 4-1 Cleveland Centre Master Plan - Identified Land Uses

Source: *Figure 14: Land Use*, Cleveland Centre Master Plan, July 2010

Activated frontages alongside pedestrianised links are a major feature of the Cleveland Centre Master Plan, providing a more traditional town centre environment for the Cleveland CBD. There is also a noticeable shift away from placing high importance on private vehicles, with improvements to public transport and active transport facilities being a clear vision of the Cleveland Centre Master Plan. TMR has released a call for expressions of interest for the design and delivery of the Cleveland station transit precinct which was presented as part of the Cleveland Centre Master Plan. It is envisioned the precinct will include a mixed use development with improved bus-rail interchange facilities.

4.2.2 Overarching Cleveland Centre Master Plan Elements

There are a number of overarching organising elements embedded within the Cleveland Centre Master Plan. The following traffic and transport related elements have been extracted from the document for ease of reference:

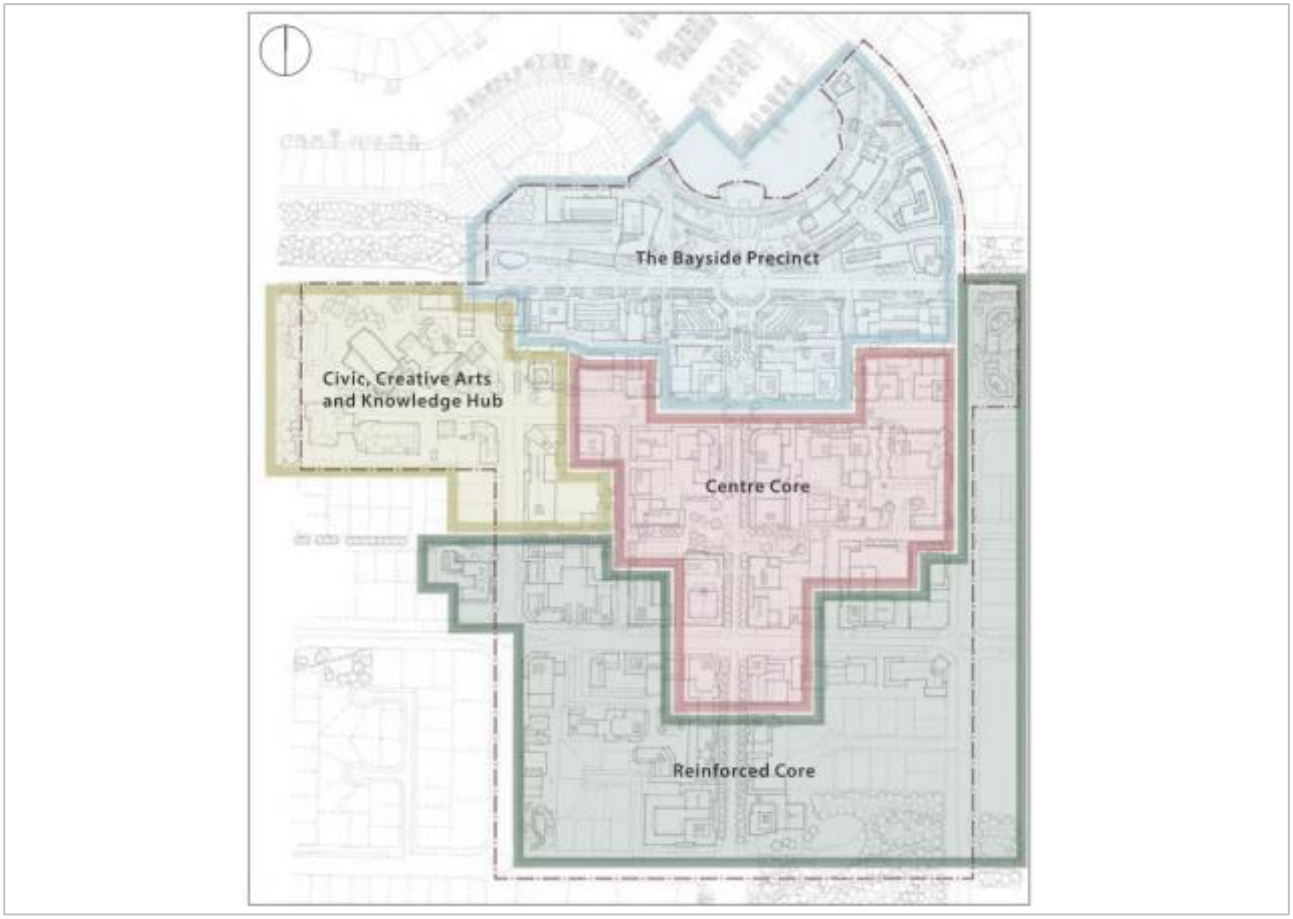
- Increase the variety and volume of activity in the Cleveland CBD, building on its existing strengths and augmenting these with built form to accommodate more mixed use development and remove voids in the Cleveland CBD's urban grain
- Facilitate the development of a mixed use leisure and residential precinct that makes the most of the Centre's bayside location
- Enhance the user experience of movement routes through the Cleveland CBD to create a network of safe and attractive pedestrian and cyclist routes
- Allow for ongoing effective access to parking within the Cleveland CBD, while the long-term strategy to encourage a modal shift towards public transport is established, and ensure that parking opportunities are accessible from inner ring roads
- Deliver Transport Orientated Development (TOD) at Cleveland Station that maximises the development opportunity of the land and creates a high quality and accessible transport interchange with facilities for public transport passengers and cyclists. The attractiveness and convenience of the development and the services and facilities it offers contributing to achieving a modal shift away from the private car and towards cycling and use of public transport
- Deliver a high quality and well-connected public space network that includes provision for all ages
- Include effective and efficient infrastructure provision.

4.2.3 Character Areas

The character areas, as identified in Figure 4-2, would build upon the strengths of the existing Cleveland CBD Centre and provide the opportunity for Cleveland CBD to become an attractive and vibrant mixed use destination of significant scale and regional draw.

- New urban form would be used to define the Bayside Precinct frontage, integrating the currently underutilised and vacant sites to establish a strong and dynamic address on Shore Street West
- The Centre Core will build upon the existing success of Bloomfield Street and Middle Street as the Cleveland CBD's principal day-to-day shopping destination, where this street will be reinforced in the Cleveland Centre Master Plan with additional frontage and floor area to for Cleveland's High Street, at the heart of the Cleveland CBD
- The emerging focus for the arts at the western end of Middle Street is to be reinforced with the provision of development to accommodate a range of community uses and educational facilities, establishing a key focus for the arts and learning in the Cleveland CBD
- The Reinforced Core is a Cleveland Centre Master Plan strategy for the wider Cleveland CBD to be extended through the principle of consolidating underutilised sites and providing development that accommodates a diverse mix of uses.

Figure 4-2 Cleveland Centre Master Plan - Character Areas



Source: *Figure 13: Character Areas*, Cleveland Centre Master Plan, July 2010

4.2.4 Development Intensity

The Cleveland Centre Master Plan seizes upon the need to increase development volume as an opportunity to redefine the Cleveland CBD's urban character and utilise greater variety in height to create landmarks, gateways, emphasise corners and important buildings and increase the opportunities for residents and visitors to appreciate views out across Raby Bay and towards the outlying islands.

A key outcome of the Cleveland Centre Master Plan is the creation of active and pedestrian scale streets to unify the Cleveland CBD. Currently the connection strength of the grid structure is undermined by significant areas of surface car parking, which create voids in the Cleveland CBD's built form and undermine the strength and continuity of its landscape. In order to maintain the 'village feel', as well as aid the legibility and permeability of the Cleveland CBD, the Cleveland Centre Master Plan formally introduces a number of smaller routes and pedestrian links at strategic locations within the structure of the proposed development. Figure 4-3 below shows the building area, and building heights suggested by the Cleveland Centre Master Plan.

Figure 4-3 Cleveland Centre Master Plan – Development Intensity

Source: *Figure 15: Building Heights*, Cleveland Centre Master Plan, July 2010

Within the Cleveland Centre Master Plan, the greatest building height, set at a maximum of eight storeys, has been focussed around the bay to capitalise on views to the bay. Across the urban blocks within the Centre, height ranges between five to eight storeys.

4.3 Cleveland Centre Master Plan Parking Provision

Broadly, the Cleveland Centre Master Plan indicates a desire for a shift away from private vehicle usage. Potential methods of developing a modal shift include the establishment of the Cleveland station transit precinct, and the investment in active transport infrastructure. However, parking will still be regarded as a necessity.

Therefore, parking has been identified to be incorporated via dedicated parking structures to be sleeved within mixed use buildings. On-street parking will be retained along Shore Street West to maintain activated frontages, in addition to some basement parking where appropriate or necessary. Figure 4-4 illustrates the areas which have been identified within the Cleveland Centre Master Plan for consolidated parking within the Cleveland CBD area. Parking at the transit precinct has been proposed to be provided at the rear of the building, accessed via Harbourview Court.

Figure 4-4 Cleveland Centre Master Plan - Identified Parking Areas

Source: *Figure 30: Urban Elements*, Cleveland Centre Master Plan, July 2010

4.4 Future Economic Role and Function

The following list highlights the main characteristics that shape investment and appeal of any centre. Two of which (shop/tenancy and public/private domain) are internal to the Cleveland CBD with the characteristics of the catchment and broader market/consumer/retail trends being external drivers. A successful Cleveland CBD will individually and collectively maximise opportunities available in each of these four areas.

- Levels of appeal (shop fit out and customer interaction) - The greatest source of appeal for patrons is the fit out and activity conducted by the shops and other traders
- Public and private domain - The public domain is the basis for enhancing the level of pedestrian activity. An attractive, comfortable and safe environment created (or enhanced) by the local authority can trigger additional pedestrian activity and patronage. The parking strategy is central to the way the public domain is used
- Catchment characteristics - This includes the scale of the catchment (how far will people travel), popularity (how often they will visit) and the depth (size, profile and available expenditure).
- Market, consumer and retail trends - Local businesses respond to broader retail trends and/or provide a needed series of services. In order to remain relevant to the catchment population individual retailers will respond to these trends.

The doubling or trebling of the Cleveland CBD (as envisioned by the various statutory and policy documents) will require a significant expansion of the retail and office floor space in the study area. Such an evolution will be triggered when new employers locate in Cleveland CBD and the range of retail and service providers is significantly increased.

As a small retail/commercial core with a fragmented ownership base and long standing owners it is a risk that the Cleveland CBD will fail to evolve to meet the opportunities provided by a changing and expanding local population base or meet the targets ascribed by the various policies. There could be a role for Council to take a role of development advocate, particularly where new forms of development are concerned. It is understood RCC has developed a specialised role within the Priority Development Area team of Council to lead negotiations with private developers.

4.4.1 Implications for parking

In addition to the incremental expansion of retail and office uses presently located in Cleveland CBD, the area could host the following land uses:

- Small scale retail – this will depend (in part) on the efficient (and attractive) use of on-street car parking in and near the retail core supported by an appropriate level of publically available off-street spaces
- A discount department store. A major retailer of 5,000 to 8,000 sq.m would significantly expand the retail role and function of Cleveland as it would also trigger the development of additional speciality floor space. Such a development would require a significant site, but could also be accommodated as a second level in the Stockland Cleveland Shopping Centre. The DDS operator would want a dedicated shopping centre car park that could be utilised by patrons. Accordingly, any impact on Council provided car parking would be largely restricted to employee related parking
- Office. Any major increase in office floor space in the study area will be reliant to a major extent on the convenience and availability of parking for workers and customers. As no office building provides sufficient car parking for all users, a significant increase in office space will trigger the need for a multi-storey car park. This could be established on the site of one of the current at grade car parks
- Council as place-making leader and controller of key assets. This is normally the function held by a shopping centre owner.

4.5 Summary

Key points from the Cleveland Centre Master Plan review are summarised below:

- There is a focus on increasing density in the Cleveland CBD area with an increase in employment population and a shift from detached to attached housing provisions
- There is a desire to create a network of safe and attractive pedestrian and cyclist routes
- There is a long-term strategy to encourage a modal shift towards public transport
- There is a desire to deliver TOD at Cleveland Railway Station
- There is a desire to shift away from private vehicle usage. Nevertheless, parking will still be required
- Parking has been identified to be incorporated via dedicated parking structures to be sleeved within mixed use buildings
- Future development could enable the provision of attractive on-street parking, boosting retail appeal
- Opportunity exists for a discount department store
- Increase in office space is dependent on convenience to users.

5 Case Study – Parking Characteristics by Land Use

- Undertake land-use case studies to confirm existing parking rates and compare to RCC Planning Scheme requirements

5.1 Overview

This section undertakes land-use case studies, using actual existing land uses and parking allocations in the Cleveland CBD. These case studies illustrate the actual, real, existing parking that is supplied and hence the actual rates for existing land uses. This section then compares those observed rates to the rates required pursuant to the Redlands Planning Scheme requirements. The aim of this exercise was to determine whether the rates required pursuant to the Redlands Planning Scheme requirements are reflective of and applicable to the Cleveland CBD.

The rates derived from this study will also be used for input into the GIS parking demand model.

The case studies sites were selected based on the criteria listed below:

> The site must be self-contained
> The parking should have no restriction beyond being reserved for a certain type of building
> The car park should be slightly underutilised, to ensure that there is no latent parking elsewhere
> If possible the car park should service a homogenous land use to enable thorough examination.

For each case study site, the peak parking utilisation of the car park was determined and compared to the known Gross Floor Area (GFA) of the site. This comparison allowed for a likely average parking demand rate per unit of floor area to be calculated.

For each case study site, the duration of stay surveys, which were undertaken by Austraffic (presented in Section 2.5.2 of this report), were examined for each land-use on the site in order to determine a general break-up of overall demand into short, medium, and long-term parking demand, based on the relative proportion of each category to the total surveyed demand.

The demands and durations of stay outlined in the following sections refer to the parking demand for a ***required number of parking spaces***, rather than the parking demand as a result of the ***number of parking users***. The distinction between these two types of parking demand is important in order to model the mix of parking duration that is representative of reality. Importantly, this distinction ensures that the parking demand calculations are not biased by large numbers of short-term users that, due to the nature of their trip to the CBD can come and go, meaning one site could potentially be used by seven users, seven times over seven hours (one hour each: short-term being less than three hours), whereas one long-term user would only use the seven hour space once (long-term being greater than six hours).

5.2 Retail - Parking Rates

The following sites were utilised for the retail case study:

- Stockland Cleveland Shopping Centre
- Small retail centre at 107-113 Queen Street, Cleveland
- Small retail centre at 124 Queen Street, Cleveland.

Table 5-1 below provides a summary of the peak surveyed parking usage for each site. The calculation for the surveyed parking rate (expressed as spaces per 100sqm) is calculated as the parking usage divided by the GFA and converted to be expressed as per 100 sq.m. For example, in the case of 107-113 Queen Street, the peak parking usage of 26 spaces would be divided by 700 sq.m GFA then multiplied by 100 sq.m to attain 3.7 spaces per 100 sq.m.

Table 5-1 Parking Case Study – Parking Rates (Retail)

Area	GFA (sq.m)	Peak Surveyed Parking Usage		Surveyed Parking Rate (spaces per 100sq.m)	Source
Stockland Cleveland	15,719	12:00pm-12:15pm	339 spaces	2.2	Stockland Survey -2012
107-113 Queen Street	700	9:30am-10:00am	26 spaces	3.7	Austraffic Survey 2014
124 Queen Street	775	11:30am-12:00pm	38 spaces	4.9	TTM Survey - 2006
Utilised Parking Rate				**2.2**	(Adopted rate from the surveyed parking rate for Stockland Cleveland Shopping Centre)

* These study sites were chosen as there is a clear GFA that can be associated with them for analysis purposes.

A parking rate which can be utilised in later stages of the methodology is required. Therefore, Cardno has adopted the surveyed parking rate for Stockland Cleveland Shopping Centre (i.e. 2.2 trips/100sq.m), as it is considered the best simulation of activity centre parking. The Stockland Cleveland Shopping Centre represents the parking rate of a centre where shoppers are visiting multiple shops and attending to multiple errands.

As the Cleveland CBD is a centre, the retail components of the Cleveland CBD is treated as having similar characteristics to Stockland Cleveland Shopping Centre in the parking model, and there is likely cross-utilisation of parking. Therefore, the Stockland Cleveland Shopping Centre surveyed parking rate information provides the best reflection of the profile of demand for the retail components of the Cleveland CBD.

Table 5-2 below summarises the retail car parking rates required pursuant to the Redlands Planning Scheme requirements.

Table 5-2 RCC Retail Car Park Requirement Rates

Size	Parking Requirement
> 20,0001 sq.m	4.2 spaces per 100 sq.m GLA

A comparison of the surveyed parking demand from Table 5-1 (2.2, 3.7, 4.9 spaces per 100 sq.m and the adopted rate of 2.2 spaces per 100 sq.m) with the Redlands Planning Scheme parking requirements in Table 5-2 (4.2 spaces per 100 sq.m), shows that the surveyed parking demands are mostly lower than the rates required pursuant to the Redlands Planning Scheme requirement.

This is attributable to the surveyed results in Table 5-1 showing a typical weekday survey profile, whereas the Redlands Planning Scheme parking rates would instead consider the peak retail parking scenario, which would occur on a Saturday. As the GIS parking model is calibrated for a weekday peak period, it is considered more appropriate to adopt the surveyed parking demand rate. Therefore the surveyed parking rate has been adopted.

During retail peak operating periods, there is traditionally a steeper drop off in the parking requirements for other land uses. Therefore, the modelling of the operation on a weekday is a conservative assessment.

5.3 Retail - Duration of Stay

To determine the proportion of parking spaces that are required for short, mid, and long-term users, duration of stay (retail) data was analysed. Duration of stay (retail) data was obtained from the Austraffic surveys and analysed where applicable. Data was also obtained for other retail related parking in the vicinity of Middle Street (Doig and Queen Streets). The surveyed duration of stay (retail) data are shown in Table 5-3 below. Within Table 5-3, short-term refers to less than three hours, mid-term refers to between 3 hours and 5 hours 59 minutes, and long-term refers to 6 hours and above. A discussion of the adopted retail demand profile as presented in Table 5.3 is provided after Table 5-3.

Table 5-3 Parking Case Study – Duration of Stay Rates (Retail)

Location	Restriction	Short-term	Mid-term	Long-term
107-113 Queen Street (located behind the, Stockland Cleveland Shopping Centre)	Private Parking	42%	12%	46%
Doig Street Council (Doig Street Council car park)*	Various	41%	43%	16%
Queen Street on-street*	4P	92%	8%	0%
Middle Street on-street*	4P	76%	21%	3%
Adopted Retail Demand Profile	**-**	**45%**	**45%**	**10%**

* Different case studies were utilised for duration of stay, as the sites identified in Section 4.2 did not have duration of stay surveys. However, not having a clear GFA associated with these case studies was not a significant issue for duration of stay analysis.

The adopted retail demand profile was developed by taking into consideration the surveyed duration of stay (retail) data, and considers the following:

- On-street parking (Queen Street on-street, Middle Street on-street) is likely to be more attractive to short-term parking due to its convenience. This leads to an over-representation of short-term demand (92% and 76% respectively) in these surveys
- The 107-113 Queen Street parking is located behind the Stockland Cleveland Shopping Centre, making this area attractive for employees (contributing to the 46% long-term figure) and short-term parkers (contributing to the 42% short-term figure) that are unable to find parks on-street.
- The Doig Street Council car park duration of stay rates (retail) are likely to be the best reflection of overall retail parking demand, from the four locations, being well situated to service the range of longer term retail parkers
- The adopted retail duration of stay demand profiles reflect the higher results of longer duration of stay parking (55% (mid-term and long-term) compared to 45% for short-term). This higher proportion will reflect the larger number of spaces required to satisfy longer term parking demand. The adopted 45% attributed to short-term parking is representative of the higher turnover of shorter term parking.

Therefore the adopted retail demand profile reflects the retail parking demand for spaces independent of parking location. Due to the evidence in Table 5-3 the adopted retail demand profile is considered to be valid across the whole Cleveland CBD.

5.4 Commercial - Parking Rates

The number of suitable self-contained commercial developments which meet the criteria for a case study as outlined in Section 4.6.1 is limited within Cleveland. Nevertheless, Cardno has identified a suitable site at 143-147 Queen Street, Cleveland. Table 5-4 below shows the peak surveyed parking demand (commercial) for this site, with data attained from the Austraffic survey, and the subsequent rate of parking per unit of floor area.

Table 5-4 Parking Case Study - Parking Rates (Commercial)

Area	GFA (sq.m)	Peak Surveyed Parking Usage		Surveyed Parking Rate (spaces per 100sq.m)	Source
143-147 Queen Street	1,470	10:00am–10:30am	41 spaces	2.8	Austraffic Survey (2014)

The parking rate suggested by the surveyed commercial development (2.8 spaces per 100 sq.m) equates to approximately one space per 35 sq.m of floor area, which is slightly lower than the Redlands Planning Scheme requirement of one space per 30 sq.m. This indicates that the demand for commercial parking within the Cleveland CBD may be lower than the parking requirements for the RCC area as a whole.

5.5 Commercial - Duration of Stay

To determine the proportion of parking spaces that are required for short, mid, and long-term users, duration of stay (commercial) data was analysed. Duration of stay data was analysed at the 143-147 Queen Street site. Data was also obtained for other commercial related parking in the vicinity of 143-147 Queen Street to provide a robust analysis. The surveyed duration of stay profiles and the adopted demand profile are shown in Table 5-5 below.

Table 5-5 Parking Case Study – Duration of Stay Rates (Commercial)

Location	Restriction	Short-term	Mid-term	Long-term
143-147 Queen Street	Private Parking	18%	26%	56%
Waterloo Street	8P	16%	24%	60%
Council Car Park Doig/Waterloo Streets	8P	6%	24%	70%
Adopted Commercial Demand Profile	-	**10%**	**10%**	**80%**

The commercial parking demand profile should represent the pure commercial demand, across the entire Cleveland CBD. However, due to the nature of cross-utilisation occurring throughout centres, it is noted that the survey results will be slightly skewed as other land-uses, such as retail activity, will also be incorporated into the results.

The adopted commercial demand profile represents a heavy skew towards long-term parking (80%), as reflective of commercial developments with high employee parking demand, and less shorter term parking (20%) as it is reasoned that the surveyed duration of stay data includes the influence of surrounding land uses.

For example, the private car parking demand at 143-147 Queen Street is considered to be influenced by uncharacteristic short-term parking demand associated with the adjacent child care centre land uses, which would generate a high volume of short-term demand during the morning drop off and afternoon pick up peaks times.

The Waterloo Street parking is also considered to be subject to higher than average demand for short and medium term parking, due to the small portion of retail development. Therefore, the respective short-term demands for these locations (18% and 16% respectively) are considered to be higher than the average commercial land use. As a result, 10% has been adopted as a representative short-term demand profile.

5.6 Residential - Parking Rates

To determine residential parking demands, for the residential parking rate case study, Australian Bureau of Statistics data from the 2011 Census was utilised to determine the average vehicle ownership per dwelling. The ABS data is summarised in Table 5-6 below.

Table 5-6 Parking Case Study - ABS Data (Number of Dwellings per Household)

Category	Number of Households	Total Number of Vehicles
No motor vehicles	98	0
One motor vehicle	261	261
Two motor vehicles	159	318
Three motor vehicles	23	69
Four or more motor vehicles	9	36
Not stated	30	-
Not applicable	79	-
Total	**659**	**684**

The above data suggests an average vehicle ownership per dwelling of 1.24 vehicles per household. The calculation is based on 684 vehicles being owned across 550 households, which exclude “Not stated” and “Not applicable” responses.

The above methodology needs to take into account that it is usually assumed on census night that households are asked to record all vehicles at the premises. This may influence results in Table 5-6, as two (potential) vehicles may be recorded due to a visitor’s vehicle being present rather than the real one (potential) vehicle which is the typical household vehicle. However, under the assumption that the number of vehicles visiting a residence will be offset by the number of residents away from home, i.e. that the overall vehicle count for the study area is balanced, the household ownership rate of 1.24 vehicles per dwelling has been adopted as the typical residential parking demand.

Table 5-7 below summarises the RCC Residential Car Park Requirement Rates for residential dwellings.

Table 5-7 RCC Residential Car Park Requirement Rates

Category	Spaces per Dwelling	Visitor Spaces per Dwelling
Dwelling House	2	-
Multiple Dwelling – Near Public Transport		
Small (<0.75 sq.m) or 1 bedroom	1	0.25
Other	1	0.25
Multiple Dwelling – Other		
Small (<0.75 sq.m) or 1 bedroom	1	0.5
Other	2	0.5
Apartment Block	1	0.25

The analysis of the census data in Table 5-6 (with a finding of 1.24 vehicles per dwelling) shows that the RCC Residential Car Park Requirement Rates (in Table 4-7, with a range of 1 to 2 spaces per dwelling) are generally in accordance with what would be required to accommodate the average number of vehicles per dwelling within the Cleveland CBD area.

Within the Cleveland CBD, the residential demand for parking is catered for entirely by internal parking at each of the residential dwellings i.e. no on-street or off-site parking. Therefore the categorisation of parking spaces into short, mid, and long-term users is not required and therefore has not been shown in the GIS parking model for residential parking demand, given that it generally does not impact on parking demand for other land uses.

5.7 Adopted Parking Assumptions

Table 5-8 provides a summary of the parking parameters adopted for this study.

Table 5-8 Adopted Parking Parameters

Land Use	Parking Rate	Short-term (0-3 Hours)	Mid-term (4-6 hours)	Long-term (6+ Hours)
Desirable Walking Distance		100m	200m	400m
Retail	2.20 spaces/100sq.m	45%	45%	10%
Commercial	2.80 spaces/100sq.m	10%	10%	80%
Residential	1.24 spaces/dwelling	Internal parking, therefore not applicable.-	Internal parking, therefore not applicable.-	Internal parking, therefore not applicable.-

6 Baseline Parking GIS parking model

- Build and calibrate a base GIS model against case study rates (i.e. supply and length of stay)

6.1 Overview

This section builds and calibrates a base GIS parking model against case study rates (i.e. supply and length of stay).

Cardno has developed a GIS parking model for the Cleveland CBD which is discussed in this section. The aim of utilising this analysis was to obtain a flexible platform upon which different scenarios (scenarios outlined in Section 6.2) could be tested both in the base case model (outlined in this section, Section 6), and the future case model (outlined in Section 7).

The GIS parking model is developed so that it allows different parking rates per land-use to be tested within the model to simulate changes in mode-share (i.e. increased public and active transport usage) and parking demand. The GIS parking model also allows the impact of land-use changes to be tested, for instance, for the Cleveland CBD, the addition or removal of internal parking spaces can be simulated. The GIS parking model also generates maps and graphics which allows the visual identification of parking patterns. These maps and graphics can then be used to better assess the demand and supply of parking.

The GIS parking model utilises land use assumptions (land use classification, yield, etc) and parking characteristics (parking rate, short/medium/long-term usage) to estimate peak parking demands within the Cleveland CBD. When these estimated peak demands are known, they are then compared to the surveyed demands (as outlined in Section 2.5.1). This ensures the GIS parking model is 'calibrated' and 'fit-for-use'. This calibration exercise improves the reliability of the GIS parking model and its application for estimating the future parking demand for each land use, as well as the areas of future parking demand, and the potential under-provision of parking.

6.2 Methodology

The following methodology has been adopted for this study:

> Define each parcel of land within the Cleveland CBD as a separate entity within the GIS parking model
> Assign a land use to each parcel of land (i.e. retail, commercial, residential etc.) in accordance with Figure 2-1
> Assign parking characteristics (parking rate) to each parcel of land based on the assigned land use based on parking survey data, which reflects the existing mode-share and parking behaviour.
> Estimate parking demands for each defined parking area based on the above assumptions
> Compare estimated parking demands to surveyed parking demands and adjust parking rates where applicable to ensure the GIS parking model is calibrated to best reflect existing surveyed parking demand
> Run the GIS parking model to simulate parking demands for the entire Cleveland CBD
> Compare parking demand outputs from the GIS parking model to existing parking supply to understand locations with parking deficit and oversupply.

The purpose of creating a GIS parking model for the Cleveland CBD is to use it to help understand the influence that land-use and parking supply will have on the supply of and demand for parking within the Cleveland CBD. The development of the GIS parking model will enable the testing of different land use and parking scenarios, the following of which have been analysed in this report:

> Existing parking supply and land uses, as outlined in Section 2.3
> Future land use and off-street parking supply in accordance with the Cleveland Centre Master Plan, existing on-street parking supply and parking rate assumptions as outlined in Section 5.7
> Future land use and off-street parking supply in accordance with the Cleveland Centre Master Plan, existing on-street parking supply and parking rate assumptions in accordance with TOD Guidance.

The GIS parking model is able to operate in two modes that have been named Cascading mode (outlined in Section 6.2.1) and Silo mode (outlined in Section 6.2.2).

6.2.1 Cascading Mode

In Cascading mode, within the GIS parking model, the model assumes users are not restricted in any way to the park they require and are able to park in any space that is available, while abiding to time restrictions. This mode is similar to reality in that within the GIS parking model, users requiring a long-term space are assumed to be keen to secure a park which best suits their all-day parking requirements. Therefore, within the GIS parking model, users requiring a long-term space are given first priority, reflecting the likelihood that long-term parkers arrive at the beginning of a typical weekday, and occupy the space for the most part of the day.

Within the GIS parking model, it is assumed that users requiring a mid-term space do not time their trip to the Cleveland CBD to coincide with availability of the better long-term spaces or mid-term spaces. Therefore, within the GIS parking model, mid-term users are given second priority for the preferred spaces. It therefore follows that short-term users are given third priority, as they are able to fill any remaining space that is available, considering the flexibility with respect to time restrictions. This mode of the GIS parking model is designed to be representative of the realistic behaviour of parking users.

Therefore for identifying the **utilisation of parking areas**, the cascading mode is used.

6.2.2 Silo Mode

In Silo mode, within the GIS parking model, each type of parking user (short, medium or long-term) is restricted to spaces made available for the nature of their visit to the Cleveland CBD, i.e. short-term users occupy short-term parks, mid-term users occupy mid-term parks etc. That is to say, this mode shows that a short-term user only demands a short-term park, which in reality would not be the case as if a mid or long-term space was available; a short-term user would occupy it. Therefore, this mode is considered to reflect a theoretical view of parking demand.

The effect of this is that the real demand for each category of time restriction is revealed. For instance, if there is an abundance of short-term users who park only in short-term spaces, the GIS parking model will, show an excessive demand for short-term spaces and subsequently an under supply of short-term spaces. Thus, the results of the GIS parking model in Silo mode can examine existing parking supply for each parking category. Ideally, when setting policy to account for the results of the GIS parking model in Silo mode, parking supply is able to be optimised for each time restriction category. For example, if there is an oversupply of mid-term parking but an undersupply of long-term parking, one strategy may be to shift excess mid-term parking supply to long-term parking, in order to control the total parking supply for the Cleveland CBD.

Therefore for identifying **unsatisfied parking demand** (the number of spaces required to satisfy parking demand) the silo mode is used.

6.2.3 Parking Assignment

In each of these modes, (Cascading mode and Silo mode) the GIS parking model assigns users to specific car parks through the use of these key inputs:

- Establishing a map of the existing parking supply network to understand where available parking is located
- Overlaying the land use parcels within the Cleveland CBD to understand the proximity of parking for each land parcel
- For Cascading mode, assign parking demand with first preference for long-term parking, mid-term then short-term, and within each user category, preference for closer parking locations in accordance with Table 6-1 below
- For Silo mode, assign parking based on proximity to available parking spaces with the key assumption being that people are prepared to walk further for longer term car-parking, in accordance with Table 6-1 below.

Through this methodology the GIS parking model will fill the car parks closest to the parking demand generator, within a specified distance, for each parking type.

6.2.4 Desirable Distance Threshold

A key assumption to the GIS parking model is the desirable distance threshold. For each parking duration of stay category, Cardno has selected a desirable distance threshold, that is considered reflective of the distance a user is willing to walk from their car park to their destination before they consider the distance too great and decide they are 'unable' to find a space. This is based on the size and context of the Cleveland CBD. The desirable distance is shown below on Table 6-1.

- Short-term parkers are considered to be prepared to park within 100m, or within the block the property is located
- For mid-term parkers, a desirable distance of approximately one block or 200m away was considered desirable
- Long-term users have been considered willing to walk from the edge of the study area to the centre, to find an available long-term space, therefore a desirable distance of 400m has been defined for these users.

To simplify the GIS parking model process, by way of illustration, the CBD may have one land use (shopping centre) and 25 parking spaces adjoining it (100m), 25 parking spaces at the back of the adjoining office tower (200m), and 25 spaces a block away (400m). The GIS parking model works on the assumption that a short-term user will only attempt to find a space within 100m before they consider they are unable to find a space and leave the network unsatisfied. In this case, where a short-term user cannot find an acceptable space, the GIS parking model counts this as unsatisfied demand. This process is repeated for each parking demand generator until all suitable car parks are full, thus providing an understanding of the unsatisfied demand for the Cleveland CBD.

Table 6-1 Parking - Duration of Stay Categories

Category	Duration of Stay	Desirable Distance
Short-term	0 hours - 2 hours 59 minutes	100m
Mid-term	3 hours - 5 hours 59 minutes	200m
Long-term	6+ hours	400m

The GIS parking model is that it assumes parkers will walk to their destination in a straight path from "point A" to "point B". This is slightly unrealistic, as in reality, a path would be chosen that follows available paths and roads. This would result in the users walking slightly further than the desirable distances suggested. However, this is not considered to have a significant impact on the overall operation of the GIS parking model and the path chosen by a typical walk through the Cleveland CBD to obtain a car park is not thought to diverge by a significant amount to the theoretical distances in Table 6.1.

6.3 Base Parking: GIS Parking Model Results

The advantage of the GIS parking model is that data is used throughout this study to estimate the levels of parking demand in the Cleveland CBD, the locations of greatest parking demand, as well as to determine the suitability of the existing parking supply. This is achieved through the GIS parking model applying the case study parking rates (Described in Section 5) to the building area data, and land-use data gathered (refer to Section 2.3)

6.3.1 Calibration

To confirm that the GIS parking model represents an accurate assessment of the parking supply and demand within the Cleveland CBD, a calibration process of the GIS parking model has been undertaken. A calibration factor (discussed below) was applied to the parking demands, in order to obtain a scenario from the GIS parking model that provided the best fit when compared to the actual and observed Austraffic and TTM survey results. This was undertaken in order to improve accuracy and reliability of the GIS parking model.

Figure 6-1 below shows the raw parking utilisation results of the non-calibrated theoretical GIS parking model in Cascading mode (described in Section 6.2.1) compared to the results from the observed Peak TTM parking survey, which was utilised as the parking benchmark. From Figure 6.1 it can be deduced that a calibration factor is necessary, as, the models (again illustrated in Figure 6-1) show an overutilization of parking as shown in the *Base GIS parking model parking utilisation* figure.

This calibration factor represents issues that may have, without the calibration factor, inadvertently biased the results of the GIS parking model, for example, parking cross-utilisation, and businesses not trading, or trading with a higher or lower than average parking demand.

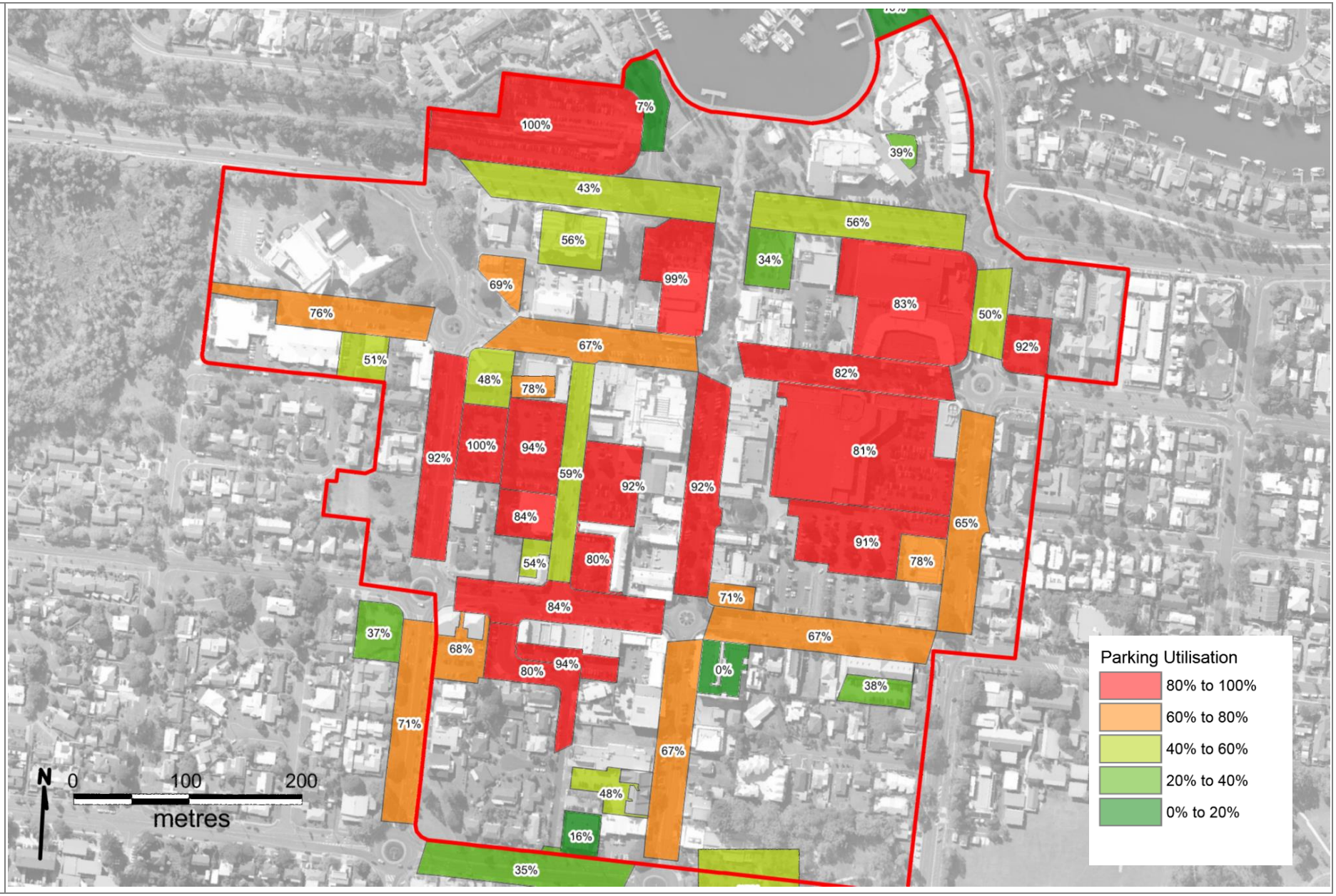
For the base case analysis, a reduction in demand to the non-calibrated theoretical GIS parking model of 15% was required to achieve a favourable match with the parking utilisation captured in the parking surveys undertaken. The third section of Figure 6-1 shows the results from the calibrated parking model.

Therefore with the calibration undertaken, the calibrated GIS parking model is fit for use for the analysis undertaken in this report.

Figure 6-1 Base GIS parking model Calibration Comparison (Cascading mode)

Calibrated Base GIS parking model parking utilisation

TTM Survey Parking Utilisation



6.4 GIS Parking Model Analysis

After calibration, the GIS parking model was operated in Cascading mode (section 6.4.1) and Silo mode (section 6.4.2). The outputs of both iterations are discussed below.

6.4.1 Cascading Approach

The cascading mode represents the most realistic behaviour of parking users where users park in any space that is available, while abiding to time restrictions. The base GIS parking model outputs are illustrated on Figure 6-2 and summarised in Table 6-2. This shows the case where short-term parkers and mid-term parkers will fill any available mid-term or long-term parking spaces. This is referred to as cascading demand.

Figure 6-2 Existing Case GIS parking model Parking Utilisation – Cascading

Table 6-2 Existing Case GIS parking model Parking Utilisation – Cascading mode

Parking Type	Total Parking Spaces	Demand for Parking Spaces	Utilisation of Parking Spaces
Short-term	101	101	100%
Mid-term	844	423	50%
Long-term	1217	899	74%
Total	2162* (as per Table 2-3, on-street 678, off-street 1,484)	1423	66%

*Does not include private car parking

The GIS parking model shows the centre of the Cleveland CBD, in the vicinity of Bloomfield St, Middle St, and Doig St has the highest rates of parking utilisation, with parking utilisation rates of 80 – 100%. This is representative of the higher demand for parking to access the Cleveland CBD core, compared to the outer land uses. Additionally, the Cleveland rail station park and ride facilities are also heavily utilised.

The utilisation rates outlined in Table 6-2 indicate that both the mid-term and long-term parking demand is adequately satisfied by parking supply, with 50% and 74% utilisation rates, respectively. This means that 50% and 26% space capacity is provided, respectively. In terms of short-term parking, however, all the supply is utilised by demand. This indicates that there is an opportunity to improve the amenity for short-term parkers by converting some of the capacity associated with mid-term or long-term parking to short-term parking. By implementing short-term parking at key locations, users are more likely to be able to find parking close to their desired location, instead of finding a free mid-term or long-term park in a more inconvenient location.

6.4.2 Silo Approach

The parking data was modelled using the silo mode of the GIS parking model, which models a car parking behaviour where users only park in a space zoned or appropriate for their duration of stay (this is not always realistic, as short-term users may choose or be forced to park in long-term parking). The GIS parking model's results show the demands for parking spaces that are not immediately satisfied by the existing provision of parking. Figure 6-3 shows the unsatisfied parking demand, highlighted in yellow, that is, those land uses where users are not able to find a desirable car park within the vicinity of the area, according to each user category.

Figure 6-3 Existing Case GIS parking model – Unsatisfied Parking Demand

The results of the silo mode of the GIS parking model (Figure 6-3) show distinct differences to the cascading mode of the GIS parking model. For example, in silo mode, when users are restricted to parks of their own type (short-term, mid-term, long-term), the silo mode of the GIS parking model shows a shortage of the provision of short-term and minor shortage of mid-term 4 hour street parking throughout the Cleveland CBD.

As a theoretical model, this silo mode of the GIS parking model reveals the imbalances in parking demand and supply for each **user category**. By comparison, when the GIS parking model is operated in Cascading mode (as shown in Figure 6-2), all users are able to find parking spaces **within their desired radius**. (i.e. in silo mode, a short-term parker may not be able to find a short-term space etc, in cascading mode short-term, mid-term, long-term parkers can all find some form of park).

6.5 Summary

The GIS parking model simulates the existing parking demand for the entire Cleveland CBD by 'filling in' the existing available parking supply and thus, identifying areas which have parking demands higher than the capacity of the site to provide spaces to satisfy the demand..

The Cascading mode, which represents a more realistic version of the Cleveland CBD parking operations, has identified that currently, across all parking types, (total of short-term, midterm and long-term) the Cleveland CBD operates at a peak parking utilisation of 66% and therefore the current parking supply provides 33% of excess capacity (broadly speaking, 33% of the total parking spaces are available).

The Silo mode, in comparison, presents a theoretical version of the Cleveland CBD parking operation, whereby the true demand for each parking category is assessed. The results of the GIS parking model indicate there is an undersupply of short-term parking areas throughout the Cleveland CBD. However, in reality, this demand will be able to be transferred to available longer term parking in the vicinity, thus the real parking operation would not be so extreme (i.e. short-term parkers would, in reality, seek a long-term park, thereby minimising the likelihood of a parking shortfall in "Silo mode").

However, within Silo mode, the GIS parking model, while providing results across all parking types, also provides results for different parking categories. When considering the three different parking categories, (short, mid and long-term parking), the GIS parking model identified that short-term parking areas are at capacity (100% utilisation of parking spaces) whereas mid-term (50% spare capacity) and long-term parking areas (26% spare capacity) provide spare capacity.

Therefore, there is potential to alter the parking regime within the Cleveland CBD, to provide a more equitable /efficient system, where a greater percentage of parking spaces are utilised to satisfy parking demand. The results of the GIS parking model show that such alterations could involve the conversion of mid-term and long-term spaces, which were shown to have spare capacity, to short-term spaces, to cater to the demand of short-term parking.

7 Future Land Use Methodology

- Utilising GIS model, test future development scenarios consistent with the Cleveland Master Plan, to simulate potential future parking requirements

This section of the report utilises the GIS parking model to test the future development scenario proposed in the Cleveland Centre Master Plan and to simulate potential future parking requirements for the Cleveland CBD.

This section of the report, describes the methodology and assumptions used to test the future parking demand of the Cleveland CBD in Section 8.

The future parking demand is tested using the same GIS parking model methodology as the base case GIS parking model in Section 6 of this report, however with revised inputs to represent the future parking demand and supply.

Key inputs to the GIS parking model are as follows.

> Future land use, and development yield (i.e. the future intensity of development and land use)
> Future parking demand rates per land use
> The supply of parking spaces in the future.

Each of these inputs are described further below.

7.1 Development Yield

Through the creation of the Cleveland Centre Master Plan, land yield modelling was undertaken in order to determine the likely land-yields that could be achieved through the implementation of the Cleveland Centre Master Plan as the Cleveland CBD evolves into a Principal Activity Centre over the next 20 years.

A variety of design considerations from the Cleveland Centre Master Plan influenced the yield analysis for the Principal Activity Centre over the next 20 years. A discussion and analysis of how those design consideration effect the yield analysis are beyond the scope of this report, details are available in “Cleveland Centre Master Plan Development: relationships between built form and the street, July 2010”. However, in broad, non-site specific terms, design considerations included:

> Setback to tower to limit overshadowing, reduce adverse wind effects and allow access to daylight (eg 6m – 12m)
> Locate active uses on the street such as shops, cafes and community services.
> Rear access loading zones and podium or basement car parks
> Building heights relate to sun access to main pedestrian street
> One floor of above ground parking provided per site.

Within the “Cleveland Centre Master Plan Development: relationships between built form and the street, July 2010”, the Cleveland CBD was separated into three precincts as shown on Figure 7-1 below, and the number of residential dwellings, Retail GFA, Commercial GFA, and the number of developer constructed parking spaces was determined for each precinct.

Table 7-1 below shows the results of the future land yield modelling for each precinct. These have been adopted as the future development scenario for the GIS parking model.

This future land yield modelling represents a significant increase in yield compared to the existing floor area of the Cleveland CBD, estimated in October 2014, which is shown in Table 7-2 (taken from Section 2.3 of this report) for reference.

Figure 7-1 Cleveland Centre Master Plan Future Built Form

Figure 37: Precincts for Plot Ratio Allocation

Table 7-1 Land Use - Future Land Use

	Development Category	Number of Dwellings	Gross Floor Area (GFA)
Precinct A	Residential	721	-
	Commercial	-	36,031 sq.m
	Retail	-	18,016 sq.m
Precinct B	Residential	494	-
	Commercial	-	39,318 sq.m
	Retail	--	19,659 sq.m
Precinct C	Residential	199	-
	Commercial	-	37,565 sq.m
	Retail	-	18,782 sq.m
Total	**Residential**	**1,414**	**-**
	Commercial	**-**	**112,913 sq.m**
	Retail	**-**	**56,456 sq.m**

Table 7-2 Existing Land Uses

Development Category	Number of Dwellings	Gross Floor Area (GFA)
Residential	227	-
Commercial	-	43,188 sq.m
Retail	-	33,204 sq.m
Other	-	2,891 sq.m

7.2 Future Parking Demand Scenarios

Two parking demand scenarios were adopted to model the future development scenario in the GIS parking model. These scenarios were selected to model the parking demand of the future Cleveland CBD:

1. If the future parking behaviour remains the same as the existing behaviour (existing parking demand case)
2. If the parking demand is lowered as a result of policy change and urban design principals. (low parking demand case).

In the existing parking demand case, the parking demand rates (car parks per unit of floor area) were adopted from the existing case study results provided in Section 6.3. The calibration factor (calibration factor discussed in section 6.3.1) was not applied when the existing parking demand case was modelled. The effect of not using the calibration factor is that the results will show the effect on parking supply of the study area being fully utilised through full development and existing parking demand land-uses, and with little cross-utilisation of parking.

The low parking demand case (defined as the least amount of parking demand), for the Cleveland CBD was assumed to occur when objectives for Transit Oriented Development are achieved. Therefore this low parking demand case will be realised when the Cleveland CBD has planning policy, infrastructure, land use and development of a Transit Oriented Development. A Transit Oriented Development assumes that parking demand is lowered through the provision of an efficient public and active transport network.

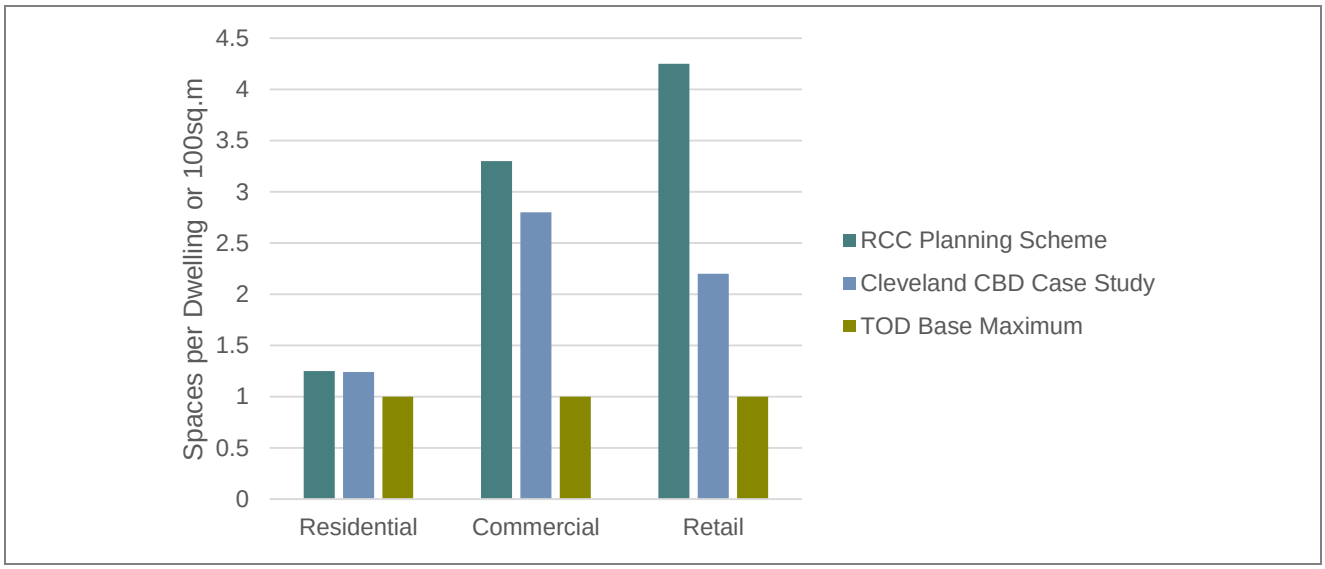
A current policy objective driving the redevelopment of the Cleveland CBD, is the provision of public and active transport, and should these policy objectives be achieved, it has been identified in the Cleveland Centre Master Plan analysis, that parking demand rates may drop to that of a TOD. Therefore the parking rates adopted for low parking demand case have been taken from the Queensland Government's "Transit Oriented Development Guide". However, TOD parking rates are considered by the industry to be ambitious and that the policies identified in TOD guidance should be considered.

The resultant parking demand rates are summarised on Table 7-3 below, with the RCC Planning Scheme rates shown for comparison.

Table 7-3 Future Parking Demand Rate Comparison

Land-Use	Redlands Planning Scheme Rates	Cleveland CBD Case Study Rates	TOD Preferred Maximum Rates
Retail	4.25 spaces/100 sq.m	2.2 spaces/100 sq.m	1 spaces/100 sq.m
Commercial	3.3 spaces/100 sq.m	2.8 spaces/100 sq.m	1 spaces/100 sq.m
Residential	1.25 spaces/dwg	1.24 spaces/dwg	1 spaces/dwg

Figure 7-2 Future Parking Demand Rate Comparison



7.3 Future Parking Supply

Future parking for the future development scenario will be supplied from three sources:

> Publically available off-street parking
> Publically available on-street parking
> Private development provided parking.

For the publically available off-street parking, the Cleveland Centre Master Plan has identified areas of multi-storey and ground level public parking, as shown below on Figure 7-3. Multi-storey parking is assumed to be three storeys. This is considered to be reasonable as thus would provide enough parking density to be worthwhile, while still being shielded and hidden by surrounding buildings, in line with Cleveland Centre Master Plan vision. For the projection of the number of publically available off-street parking spaces for the future development scenario the number of spaces is derived from the floor area of the publically available off-street parking areas identified in the Cleveland Centre Master Plan, at a rate of 28 sq.m per park as identified in Cleveland Centre Master Plan analysis. This would result in a total of 1,083 spaces of publically available off-street parking.

Figure 7-3 Future Off-street Car Parking Supply

In the future development scenario, publically available on-street parking is assumed to remain the same as the existing provision of publically available on-street parking, therefore the current provision of 678 spaces of publically available on-street parking has been adopted for the future development scenario.

The Cleveland Centre Master Plan suggests that each development site should provide one storey of private car parking within its development yield (Private development provided parking) (Assumptions are outlined in "Cleveland Master Plan Development: Relationship between the built form and the street" (CBD built form study) The CBD built form study states that private development provided parking should be measured at a rate of 28 sq.m per park. Table 7-4 below shows how many private development provided parking spaces would be provided in accordance with the parking identified by the Cleveland Centre Master Plan land-yield modelling.

Table 7-4 Future Off-Street Developer Parking Provision (Private development provided parking)

Precinct	Floor Area for Parking	Total Spaces
Precinct A	18,016 sq.m	643
Precinct B	19,659 sq.m	702
Precinct C	18,782 sq.m	671
Total	56,457 sq.m	2,016

Source: 091207_Task 1 Report_Built form and public realm_final.pdf.xlsx Model 2

Therefore the total available parking assessed in the future development scenario is as shown on Table 7-5 below

Table 7-5 Future Development Scenario Parking

Precinct	Spaces
Publically available off-street parking	1,083
Publically available on-street parking*	678
Private development provided parking	2,016
Total	3,777

*Assumes all on-street parking is retained refer to Table 2-3

7.4 Future Assumptions Summary

Table 7-6 summarises the assumptions used to determine the future development scenarios proposed in the Cleveland Centre Master Plan and to simulate potential future parking requirements for the Cleveland CBD in the GIS parking model that follows in Section 8.

Table 7-6 Future Land Use Assumptions Summary

Item	Assumption	Discussion
Land-use	▪ Cleveland Centre Master Plan land yield model (i.e. Figure 4-1)	▪ Agreed with RCC
Retail GFA	▪ One floor of retail per building	▪ Based on Cleveland Centre Master Plan land yield model
Commercial GFA	▪ Two floors of commercial per mixed-use building.	▪ Based on Cleveland Centre Master Plan land yield model
Residential Dwellings	▪ Remaining floors devoted to residential dwellings. Number of dwellings per storey As per plot ratio tables	▪ Based on Cleveland Centre Master Plan land yield model
Parking Provision	▪ Existing on-street parking unchanged ▪ Provision of public parking areas as per Cleveland Centre Master Plan, with identified multi-storey parking assumed to be 3 storeys. ▪ Each development provides 1 floor of parking above ground ▪ Parking provided at a rate of 28 sq.m per space	▪ Based on Cleveland Centre Master Plan land yield model, and likely future provision of parking.

8 Future Parking Modelling

• Utilising GIS model, test future development scenarios consistent with the Cleveland Master Plan, to simulate potential future parking requirements

This section reports the results of the assessment on future parking demands of the future Cleveland CBD which were obtained through the GIS parking model.

Two future parking scenarios are modelled:

> Future land uses with existing parking demand rates, and
> Future land uses with low parking demand rates.

The modelling within this section applies the assumptions and methodology described in Section 7, this section reports the results of the GIS modelling undertaken to assess future parking demands of the future Cleveland CBD.

8.1 Broad Overview

Prior to two future parking scenarios being modelled, a broad overview of the parking demand of the future Cleveland CBD has been undertaken. This broad overview determines, on a high level, the deficit or surplus of parking in the future development scenario. Further analysis that considers the type, and location of parking is then undertaken in the following sections.

The methodology for the broad overview included:

> Applying the parking demand and supply assumptions and methodology described in Section 7.
> Determining, the gross parking demand of the future Cleveland CBD,
> Comparing the gross parking demand of the future Cleveland CBD with the gross parking supply of the future Cleveland CBD.

Table 8-1 shows the future parking requirements for the future development scenario, with the existing parking demand (Cleveland CBD Case Study Rates) and the low parking demand (TOD Base Maximum Rates). Given the future development scenario parking supply of 3,777 spaces. Table 8-1 shows that if, in the future, parking behaviour and parking demand do not change from the present behaviours, there will be a shortage of 2,360 spaces in the future. However, if parking behaviours do change in the future and parking rates lower to that of a TOD, in the future, there will be a surplus of approximately 670 spaces in the Cleveland CBD.

Table 8-1 Future Parking Demand Overview

Land Use	Land Use	Land Use Yield (Refer table 7.1)	Parking Demand Rate (Refer table 7.3)	Total Future Parking Demand	Compared To Future Supply (Refer to table 7.5)
Future at existing parking rates (Cleveland CBD Case study Rates)	Commercial	112,914 sq.m	2.8 spaces/100sq.m	3,162	-
	Retail	56,457 sq.m	2.2 spaces/100sq.m	1,222	-
	Residential	1,414 dwg	1.24 space/dwg	1,754	-
	Total	**N/A**	**N/A**	6,139	**-2360 (shortfall of spaces)**
Future at low parking rates (TOD preferred maximum rates)	Commercial	112,914 sq.m	1 spaces/100sq.m	1,129	-
	Retail	56,457 sq.m	1 spaces/100sq.m	565	-
	Residential	1,414 dwg	1 space/dwg	1,414	-
	Total	**N/A**	**N/A**	3,108	**+670 (Surplus of spaces)**

A potential limitation of the data provided in Table 8-1 is that it provides a broad view of the future Cleveland CBD parking supply. To overcome this limitation, Section 8.2 and 8.3 provides a detailed analysis of specific sites and two scenarios:

> Future land uses with existing parking demand rates, and
> Future land uses with low parking demand rates.

8.2 Scenario 1 – Future Land Uses with Existing Parking Demand Rates

The broad analysis presented in section 7 and 8.1 of this report provides an outline of a shortfall or surplus of parking spaces across the entire CBD. However, the analysis does not provide results on whether specific sites within the Cleveland CBD are modelled to have extra capacity for parking. These results can be obtained by a more thorough analysis through the GIS parking model.

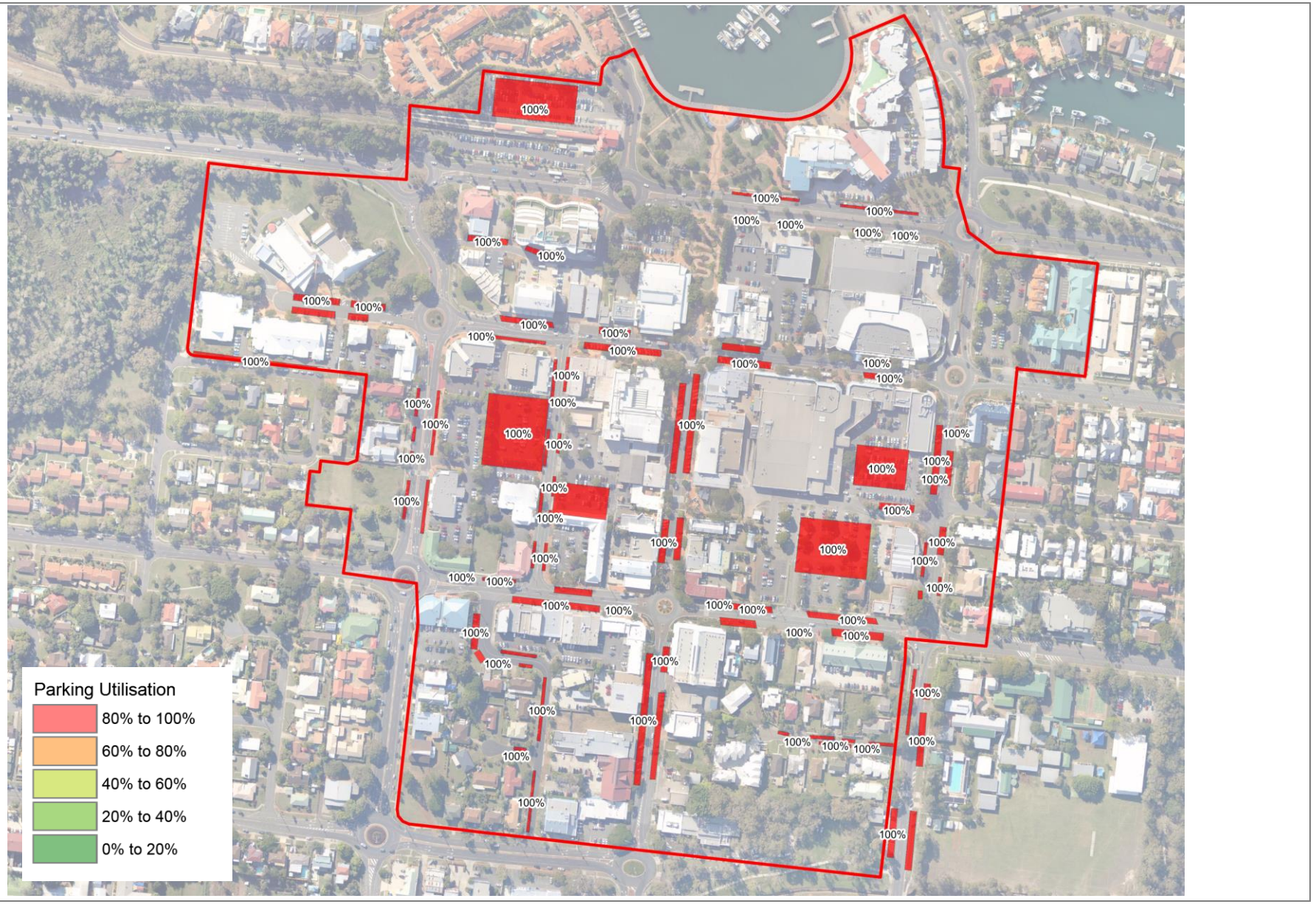
Testing of the future development scenario devised in Section 7 has been undertaken utilising the GIS parking model, to determine usage patterns. The GIS parking model applies various findings from sections 5 and 6 of this report on parking demand behaviour, parking demand rates and parking utilisation.

Figures 8-1 and 8-2 show the results of this analysis and present data on unsatisfied demand and parking utilisation for a scenario which models future land uses with existing parking demand rates, under the assumption that parking demand behaviour, and therefore parking demand rates remain the same as rates established in the Cleveland CBD parking case studies determined in Section 5.

The resultant excess parking demand, and parking utilisation are shown on Figure 8-1 and 8-2 respectively.

Figure 8-1 Future Scenario 1 - Development Parking: Unsatisfied Demand

Figure 8-2 Future Scenario 1 – Parking Supply Utilisation



This scenario suggests that if existing parking behaviour and usage is to continue unchanged, and development is to occur in accordance with the Cleveland Centre Master Plan, then there will be a significant shortage in parking. Figure 8-1 shows the number of additional spaces required per property to satisfy the demand for parking (or alternately provided by additional public or shared parking facilities). Figure 8-2 shows that all available publically available parking is 100% utilised if one floor of parking is provided per building, and public parking is provided as described in section 7.3.

Therefore, for Future Scenario 1: Future land uses with existing parking demand rates future development case:

> If existing parking demand is to continue, then each new development would need to construct one floor of parking, (as specified in the future land-yield model and highlighted in the assumptions in section 7.3) plus an additional number of spaces as shown on Figure 8-1
> If additional spaces are required as shown in the GIS parking model and Figure 8-1, it is likely this Future Scenario would result in costly development in the requirement to construct costly car parking
> If RCC required a parking regime and planning scheme policy that avoids excessive parking demands, planning scheme policy may need to reduce the amount of development that could occur on each site. If a shortage of parking was regarded as a significant issue by some stakeholders, a decision may be required as to whether parking problems are of a magnitude to warrant a review of developments and their car parking, as a measure to avoid a real or perceived car parking problem.

8.3 Scenario 2 – Future Land Uses with Low Parking Demand Rates

As outlined above, the broad analysis presented in Section 7 and 8.1 of this report provides an outline of a shortfall or surplus of parking spaces across the entire CBD. However, the analysis does not provide results on whether specific sites within the Cleveland CBD are modelled to have extra capacity for parking. These results can be obtained by a more thorough analysis through the GIS parking model.

Testing of the future development scenario devised in Section 7 has been undertaken utilising the GIS parking model, under the assumption that parking demand behaviour, and therefore parking demand rates will reduce as a result of policy, and urban design initiatives.

Therefore, for this scenario, it is assumed that the parking rate of the Cleveland CBD would be reduced to that of a Transit Oriented Development (TOD) as described in Section 7.2

Figures 8-3 and 8-4 show the results of this analysis and present data on demand and parking utilisation for a scenario modelling future land uses with low parking demand rates.

Figure 8-3 shows the excess parking demand (number of spaces), i.e. the number of additional parking spaces that are required to satisfy the parking demand of each site. There is some unsatisfied parking demand in the northwest corner of the Cleveland CBD. In the Cleveland Centre Master Plan, there is limited public parking identified in close proximity to this area, therefore these users are unable to find suitable short and mid-term parking within the modelled short-term 100m and mid-term 200m desirable radii (see Section 6.2.4).

Figure 8-4 shows some public parking is underutilised, as modelled users are unwilling to walk the additional distance to park away from the north-western corner of the Cleveland CBD. This is caused by an unwillingness of parkers in the GIS parking model to walk further, rather than there being a lack of parking provision. Therefore this finding is an anomaly caused by the GIS parking model assumptions and should be disregarded.

Therefore, to satisfy the total future parking demand of the Future Scenario 2: Future land uses with low parking demand rates future development case:

> Overall, there is little requirement to build additional parking. By lowering parking demand rates to that of a TOD, the requirement to build costly basement, or multi-storey parking is reduced.

Figure 8-3 Future Scenario 2 - Development Parking: Unsatisfied Demand

Figure 8-4 Future Scenario 2 - Development Parking Supply Utilisation

8.4 Summary

The largest single impact on the future provision of parking is the rate of parking demand. As shown in the above future case scenarios, when the parking demand is lowered to that consistent with a TOD, the supply of parking to meet this demand is significantly reduced (with only one floor of parking per site required to be constructed (which is an assumption based on Cleveland Centre Master Plan land yield model in Table 7.6)). If parking behaviours do not change, the parking demand will increase with the increased floor area being constructed, which could potentially require large portions of land to be devoted to parking or costly basement parking.

While the provision of parking as a requirement of new development will occur through the implementation of the Redlands Planning Scheme, and future planning schemes, it is likely that the development industry would prefer to avoid the cost of basement, or multi-storey car parking where possible. Similarly, it is likely that certain community groups would not be advocates for multistorey parking. Therefore, the goal of implementing a future development scenario close to Scenario 2 would be the future optimum pattern of development regarding the provision of parking.

Future Scenario 2: (Future land uses with low parking demand rate) found that overall, there is little requirement to build additional parking. By lowering parking demand rates to that of a TOD, the requirement to build costly basement, or multi-storey parking is reduced.

Therefore, implementation of the Cleveland Centre Master Plan which is consistent with scenario 2 (low parking demand rate) would require initiatives to:

> Encourage a modal shift towards public transport
> Deliver Transport Orientated Development (TOD)
> Improve mixed use and the attractiveness and convenience of the CBD, contributing to achieving a modal shift away from the private car.

These initiatives would require parking to be incorporated in development throughout the Cleveland CBD via a relatively low number of dedicated parking structures, sleeved within mixed use buildings, on-street parking would be retained, and in addition there would be some new basement parking. For this scenario, it is likely that the parking would be public parking, provided by the public sector, as opposed to being privately run and privately provided. However, due to the resultant lower demands for parking, parking requirements for developments to provide parking for their site could be reduced and subsequently, relaxations to parking requirements could be considered. To fund the public parking, development contributions from new development could be sought. Development contributions to fund public parking could be an attractive option to the develop industry as a trade-off for the relaxations in parking restrictions made possible through the implementation of a TOD like scenario.

Therefore, in summary, by encouraging higher density of development, and the provision of effective public and active transport networks, behavioural change will become easier to achieve, and the pressure on the available parking will ebb as the Cleveland Centre Master Plan is fully implemented. However it is critical that this is supported by planning policies, and other measures, to ensure there is not a requirement to build additional parking in the future. Potential strategies for the reduction in parking demand are detailed in Section 10 below.

9 Future Parking Modelling – Sensitivity

A future development scenario has been devised to represent a 'minimum intervention' scenario, whereby Council does not provide public parking structures, and instead requires that development provides enough parking to cater for their own needs.

The same tests and assumptions have been used here as in Section 8. A high parking demand (existing parking demand) and a low parking demand (TOD parking demand) scenario has been tested, however instead of the provision of public parking as on Figure 7-3, the provision of public parking was modelled as shown on Figure 9-1 showing the removal of two multi-storey car parks in the central CBD. All other land-use assumptions are carried over from section 9, to maintain consistency to enable comparison between scenarios.

Figure 9-1 Future Parking Provision - Sensitivity

Due to the removal of two multi-storey car parks in the centre of the Cleveland CBD, the parking locations shown on Figure 9-1 result in a reduced number of spaces, as shown on Table 9-1. Figure 9.1 and Table 9.1 show that removing two multi-storey parking structures from the provision of public parking as on Figure 7-3 results in a reduction in publically available off street parking from 1,083 spaces to 360 spaces (a reduction of 723 spaces) compared to the future parking scenario tested in Section 8.

Table 9-1 Future Development Scenario Parking – Sensitivity

Precinct	Spaces
Publically available off-street parking	**360**
Publically available on-street parking *	678
Private development provided parking	2,016
Total	**3,054**

*Assumes all existing on-street car parking is retained

9.2 Broad Overview

Prior to the two future parking scenarios (Future land uses with existing parking demand rates, and future land uses with low parking demand rates) being modelled with detailed analysis of the "sensitivity" results (Table 9.1), a broad overview of the parking demand of the future Cleveland CBD has been undertaken.

This broad overview determines, on a high level, the deficit or surplus of parking in the future development scenario. Further analysis that considers the type, and location of parking is then undertaken in the following sections.

The methodology for the broad overview included:

> Applying the parking demand and supply assumptions and methodology described in Section 7.
> Determining, the gross parking demand of the future Cleveland CBD,
> Comparing the gross parking demand of the future Cleveland CBD with the gross parking supply of the future Cleveland CBD.

Table 9-2 shows the effect of the "sensitivity" data and the future parking requirements for the future development scenario, with the existing parking demand (Cleveland CBD Case Study Rates) and the low parking demand (TOD Base Maximum Rates). Table 9-2 shows that if, in the future, parking behaviour and parking demand do not change from the present behaviours, and if, for future Cleveland CBD development, it is assumed there is the removal of two multi-storey car parks in the centre of the Cleveland CBD, there will be a shortage of 3083 spaces in the future. However, if parking behaviours do change in the future and parking rates lower to that of a TOD, and if, for future Cleveland CBD development, it is assumed there is the removal of two multi-storey car parks in the centre of the Cleveland CBD in the future, there will be a shortfall of approximately 54 spaces in the Cleveland CBD.

Table 9-2 Future Parking Demand Overview

Land Use	Land Use	Land Use Yield (Refer table 7.1)	Parking Demand Rate (Refer table 7.3)	Total Future Parking Demand	Compared To Future Supply (Refer to table 7.5)
Future sensitivity at existing parking rates (Cleveland CBD Case study Rates)	Commercial	112,914 sq.m	2.8 spaces/100sq.m	3,162	-
	Retail	56,457 sq.m	2.2 spaces/100sq.m	1,222	-
	Residential	1,414 dwg	1.24 space/dwg	1,754	-
	Total	**N/A**	**N/A**	6,139	**-3083 (shortfall of spaces)**
Future at low parking rates (TOD preferred maximum rates)	Commercial	112,914 sq.m	1 spaces/100sq.m	1,129	-
	Retail	56,457 sq.m	1 spaces/100sq.m	565	-
	Residential	1,414 dwg	1 space/dwg	1,414	-
	Total	**N/A**	**N/A**	3,108	**-54 (shortfall of spaces)**

9.3 Scenario 3 – Future Land Uses with Existing Parking Demand Rates - Sensitivity

This section presents analysis identical to that assessed in Section 8.2 with the exception of the removal of the two multi-storey car parks as shown on Figure 9-1. Therefore this scenario tests:

> Future land-uses as devised in the Cleveland CBD Masterplan
> On-street Parking as existing
> Off-street parking as devised in the Cleveland CBD Masterplan (With two multi-storey parking structures removed as shown on Figure 9-1)
> Development provided parking at a rate of 1 floor per site (in line with Masterplan assumptions)
> Parking demand the same as existing parking demand rates (i.e. the same demand per square meter as the current Cleveland CBD).

The results of the analysis are shown on Figure 9-2 and Figure 9-3 below.

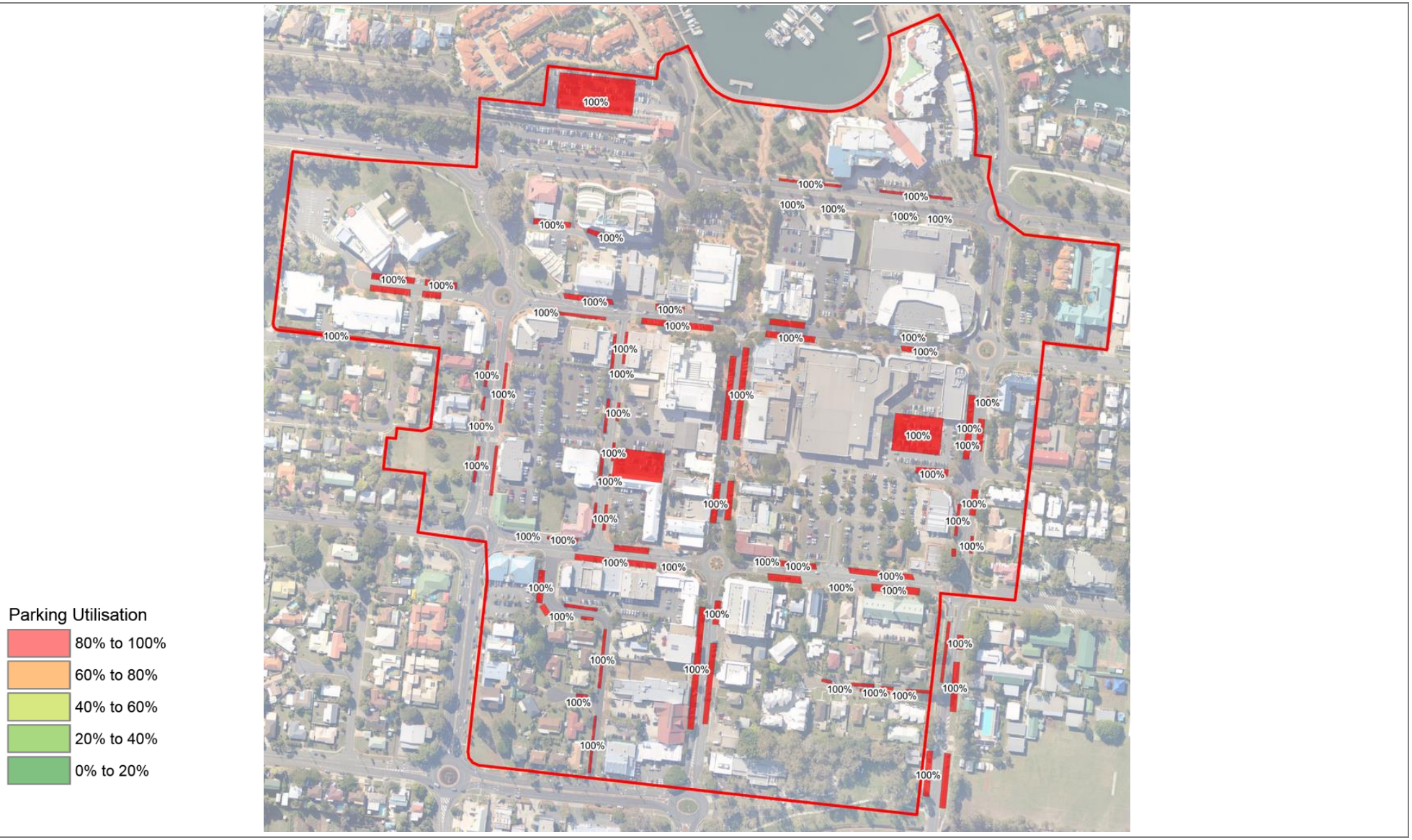
Figure 9-2 shows the unsatisfied parking demand for each building. This figure can be directly compared to Figure 8-1. As can be seen, the unsatisfied demand is greater with the removal of the two public parking facilities shown on Figure 9-1. Across the whole CBD however, there remains a deficit in parking.

Figure 9-3 shows the utilisation of the parking supply across the Cleveland CBD. It shows that all parking spaces are fully utilised.

This scenario shows that there remains a deficit in the supply of parking. It is shown that with the existing demand for parking per unit of floor area, and the greater floor area due to the Cleveland Masterplan, additional parking is required to satisfy demand. This parking may be provided either by developers of publically supplied parking.

Figure 9-2 Future Scenario 1 - Sensitivity - Development Parking: Unsatisfied Demand

Figure 9-3 Future Scenario 1 - Sensitivity - Development Parking: Supply Utilisation



9.4 Scenario 4 – Future Land Uses with Low Parking Demand Rates – Sensitivity

This section presents analysis identical to that assessed in Section 8.3 with the exception of the removal of the two multi-storey car parks as shown in Figure 9.1. Therefore, Scenario 4 tests:

> Future land-uses as devised in the Cleveland CBD Masterplan
> On-street Parking as existing
> Off-street parking as devised in the Cleveland CBD Masterplan (With two multi-storey parking structures removed as shown on Figure 9-1)
> Development provided parking at a rate of 1 floor per site (in line with Masterplan assumptions)
> Reduced parking demand, with rates representing a Transit Oriented Development across the Cleveland CBD. This represents a scenario whereby the demand for parking is reduced due to increased use of public transport, walking and cycling.

The resultant parking demand, and parking utilisation are shown on Figure 9-4 and 9-5 respectively.

Figure 9-4 shows the number of additional spaces required per property to satisfy the demand for parking (unsatisfied demand). . This figure can be directly compared to Figure 8-3. . As shown in Figure 9.4, the unsatisfied parking demand in Figure 9.4 is approximately the same as the unsatisfied parking demand in Figure 8.3. Figure 9.4 shows that across the majority of the CBD, there is no unsatisfied demand with the provision of parking in this scenario. There remains some unsatisfied parking demand in the north-western sector of the CBD. The area of this unsatisfied parking demand is slightly larger than in Figure 8-3, due to the removal of the two public parking facilities shown on Figure 9-1.

Figure 9-5 shows the utilisation of the parking supply across the Cleveland CBD. Figure 9-5 can be compared directly to Figure 8-4. Figure 9-5 shows that within this scenario (Scenario 4), parking is now nearly fully utilised within the central CBD, with only the fringes of the CBD underutilised.

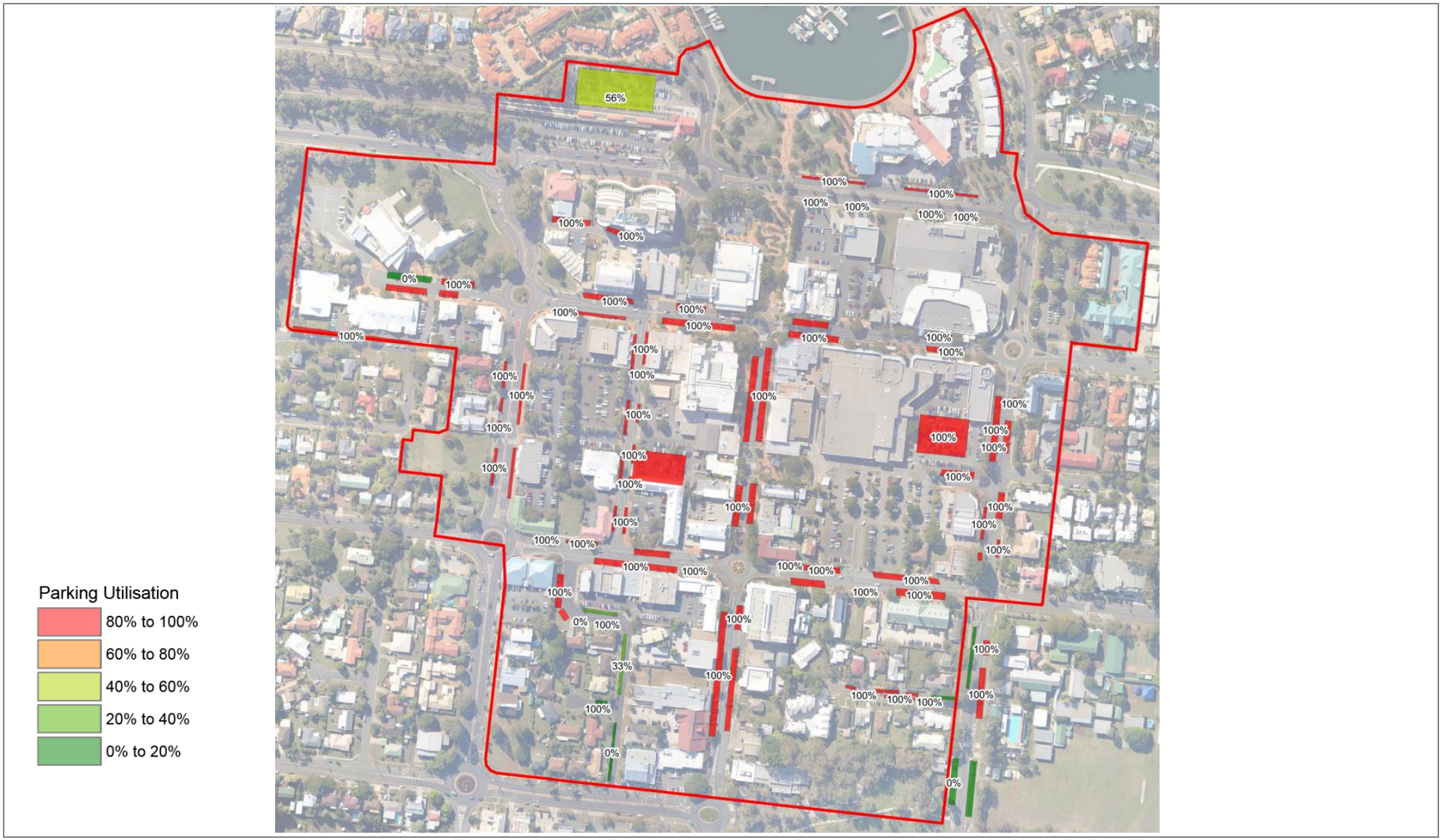
This scenario shows that the availability of parking in this scenario closely matched the demand for parking, with only localised unsatisfied demand that may be accommodated elsewhere in the CBD, or outside the study area.

Therefore, for Future Scenario 4:

> Should the parking requirements of Cleveland CBD be lowered to that specified in the TOD rates the requirement to build costly additional parking (either by extra basements or public multi-storey) would be largely removed. However, the parking rates identified in TOD guidance are extremely optimistic and difficult to achieve in suburban areas. These rates are something that RCC should aim towards, however it should be kept in mind that achieving such targets are far in the future.

Figure 9-4 Future Scenario 2 - Sensitivity- Development Parking: Unsatisfied Demand

Figure 9-5 Future Scenario 2 - Sensitivity - Development Parking: Supply Utilisation



10 Parking Demand Reduction Measures

• Consider strategies to reduce parking requirements (i.e. shift in mode share)

10.1 Introduction

The parking demand rate is the key item that will dictate the required parking provision in the Cleveland CBD in the future. As shown in the above future case models, when the parking demand is lowered to that consistent with a TOD, the supply of parking to meet this demand becomes much more manageable, with a smaller portion of the land required to be devoted to parking.

Should parking behaviours not change, the parking demand quickly becomes unmanageable, requiring large portion of land be devoted to parking or costly parking structures. Therefore any future parking strategies to be adopted must keep the management of parking demand at the forefront.

The levels of parking density required to support the implementation of the Cleveland Centre Master Plan, require the construction of multi-storey car parks, or basement car parks. These quickly become expensive for developers to construct themselves. The provision of publicly provided central car parking that developers may buy into, instead of the construction of their own basements and parking structures would be attractive more attractive as developers look to reduce costs.

Therefore, there are two thrusts to the strategies:

> Parking provision model
> Demand reduction strategies.

The parking provision GIS parking model has largely been dealt with in Chapter 8, however less thought has been put into how the latent parking demand can be reduced.

10.2 Parking Reduction Strategies

A key implementation challenge for the Cleveland Centre Master Plan will be the achievement in the reduction of parking demands. Importantly, some of the most important methods of reducing reliance on private car use (and parking) are already being proposed as part of the Cleveland Centre Master Plan. These are as follows:

> Increase density of development – Most successful cities with low private car use are examples where there is high density. The Cleveland Centre Master Plan has the potential to deliver up to 8 storeys in the Cleveland CBD
> Mixed Use Development - Mixed use development allows access to a greater variety of services within a walkable distance, thereby decreasing car use. This includes an appropriate mix of commercial and retail services, jobs, community infrastructure and open space. The Cleveland Masterplan has the potential to improve convenience and reduce vehicle trips by providing further jobs and retail within a walkable distance
> Provision of Transit Hubs and Interchanges - Locations that have access to more than one public transport service or the potential for interchange between different services offer exceptional accessibility benefits and facilitate a high level of intermodal connection. In turn, this high quality level of transit provides an attractive alternative to private car use. The Masterplan provides for the redevelopment of the Cleveland Railway Station, which would provide opportunity for the development of a high quality transit interchange.

Other proposals that should be considered to ensure the best chance of meeting the parking rates consistent with a TOD are identified below.

10.2.1 Bicycle Parking and End-of-Trip Facilities

The Austroads Cycling Aspects of Austroads Guides outlines the bicycle parking requirements for a diverse range of land uses. It also provides guidance regarding end-of-trip facilities, which is supplemented by Queensland Government guidance. The Queensland Development Code MP4.1 – Sustainable Buildings outlines the requirements for end-of-trip facilities for a range of land uses including commercial office buildings, shopping centres, tertiary education facilities and hospitals.

All future development should be provided with high quality end of trip facilities to encourage the users of the developments to travel by foot and cycle.

10.2.2 Improved Public Transport Network Frequency

The frequency of transit will influence the level of modal shift that can be achieved. Transit service can be expanded and improved in several ways, for instance by improving:

- Frequency
- Reliability
- Travel time
- Hours of operation
- Service and comfort.

Focusing on these items will encourage people to utilise public transport and more importantly use it as the main mode of travel. While the end jurisdiction of this lies with Translink, RCC can lobby for increased funding.

10.2.3 Precinct Car Share Schemes

Car sharing is a convenient and reliable way for residents to access a car when needed, without car ownership and/or reducing the need for owning a second car. Sharing cars reduces demand for new cars and encourages more sustainable travel patterns, as members use public transport and walk and cycle more than people who don't share a car.

Car sharing reduces demand for new cars and encourages more sustainable travel patterns, as members use public transport and walk and cycle more than people who do not share a car. Current car sharing providers include GoGet, which operate in Brisbane, Sydney and Melbourne. Sydney's Central Park development recently collaborated with GoGet to provide car sharing for the precinct, to cater to and instigate a reduction in car ownership. As a result, approximately half the apartments had parking. Given the inner-city location and proximity to public transport, this reduced parking provision may well be a sustainable solution for the Cleveland CBD.

10.2.4 Car Parking Levy

A car parking levy is a levy on parking spaces within a liveable district generally applied to any non-residential publically available off-street spaces used or reserved for a motor vehicle. Similar to the cash-in-lieu scheme, essentially the RCC would charge the levy for each parking space on an annual basis. Developers usually pass the charge onto tenants or visitors which would have the effect of deterring these users from driving. Another method of pricing parking spaces to manage demand is performance based pricing. Depending on the actual demand for parking, the pricing structure would vary in order to maintain target occupancy. When demand exceeds the target occupancy, prices are increased to manage demand. Alternatively, when demand falls below the desired occupancy, pricing is relaxed.

10.2.5 Bike Share Schemes

A bicycle sharing system is a service in which bicycles are made available for shared use to individuals on a very short-term basis. Bike-share has seen explosive, global growth over recent years. As of April 2013 there were around 535 bike-sharing programmes around the world, made of an estimated fleet of 517,000 bicycles.

Many bike-share systems offer subscriptions that make the first 30–45 minutes of use very inexpensive, encouraging their use as transportation. In most bike-share cities, people seeking a bicycle for casual riding over several hours or days are better served by bicycle rental than by bike-share.

Bike-share use is made more predictable with Smartphone mapping apps which show where nearby stations are located and how many bikes are available at each station. This is also important for riders looking to return a bike; they need to know if there is a dock open at a certain station, since stations can fill up with bikes.

10.2.6 Green Travel Plans

A green travel plan (GTP) is an action plan to encourage people to reconsider their daily travel patterns. They aim to provide information about the travel options available for daily trips, as well as develop incentives and strategies, to get people to change their travel behaviour. GTPs include a range of measures to support active and sustainable transport modes, both for commuting journeys and for business travel.

GTP's have been made mandatory for development approvals in various locations around the world and can have a significant impact in ensuring companies and people think about their travel behaviour.

10.3 Summary

There are three key parking reduction strategies that are clearly proposed in the Cleveland Centre Master Plan:

> Increased density of development;
> Mixed use development; and
> Provision of transport hubs and interchanges.

Other polices that could be pursued by RCC, and some are at various levels of investigation or implementation include:

> Bicycle parking and end of trip facilities;
> Improved public transport network frequency;
> Precinct car share schemes;
> Car parking levy;
> Bike share schemes; and
> Green travel plans.

11 Economic Evaluation of Future Parking Strategies

• Provide recommendations to inform a parking strategy to guide development within the CBD.

11.1 Introduction

Within Table 11-1, the evaluation assesses the market and transitional issues needing to be addressed for the Cleveland CBD to evolve into the precinct envisioned by the Cleveland Centre Master Plan. The transition requires planning for the following broad land use changes:

> Residential dwellings will increase by 1,187, from 227 to 1,414
> Commercial floor space will increase by 69,725 sq.m, from 43,188 to 112,913 sq.m
> Retail floor space will increase by 23,252 sq.m, from to 56,456 sq.m.

The future built form assumptions represent the same degree of change to the existing Cleveland CBD as the changes in floor space. It is likely the future assumed building type (ground floor retail, two levels commercial and remainder residential) will provide significant challenges for development viability. Based on an assumption of an additional 69,725sq.m of Commercial GFA, the increase in commercial and retail floor space equates to 5,000 to 6,000 additional employees in the Cleveland CBD. This number of additional employees will outstrip the estimated provision of supply in the parking scenarios presented in this report.. This additional demand will potentially contribute to either:

> A modal shift away from using the car for the trip to work
> An increase in the supply of car parking (either public or private car parking structures)
> Expensive development costs from the private sector being required to contribute to the provision of increasing carparking demands, and the movement of development to locations with less car parking requirements, and locations better able to cater for a non-car based local workforce.

In comparison to other Centres (CBDs), one of the Cleveland CBD's strengths, is that there is a large supply of publicly available car parking. Additional local employment, while being a fundamental contributor to the creation of a vibrant and active centre, might, over time, increase to a level that provides parking shortages. Parking shortages might reduce the impact of the CBD's strengths.

The economic evaluation in Table 11-1 takes the following as baseline assumptions in its discussion of "Existing Parking Demand Rates" (the basis of scenarios 1 and 3), in comparison with "Reduced Parking Demand Rates" (the basis of scenarios 2 and 4).

Assumption set 1: Existing Parking Demand Rates:

> Over time, the Cleveland CBD will develop as planned, in the Cleveland Centre Master Plan with the total car parking spaces being in the order of 6,139
> New parking will mainly be provided on each development site
> A multi-story car park (mainly for use by local workers) will become viable at some point
> The built form will be less 'mixed use' than assumed in the Cleveland Centre Master Plan, with most buildings being commercial or residential
> The Cleveland CBD will retain the current market advantages for new business, namely proximity to the rail station, Council offices and accessible local parking
> The retail core will be retained with the major expansion taking the form of a larger scale shopping centre (re)development which includes relatively high rates of car parking.

Assumption set 2: Reduced Parking Demand Rates:

> Over time, the Cleveland CBD will develop as planned in the Cleveland Centre Master Plan with the total car parking spaces being in the order of 3,000 to 4,000 (about the current amount)
> New parking will mainly be provided on each development site at a much lower effective rate than is presently the case
> The built form will be 'mixed use' as defined in the Cleveland Centre Master Plan with a focus on retail, commercial and residential buildings

- > The current strength of accessible parking will be replaced (over time) by the appeal of a mixed use/TOD environment
- > The retail core will be retained with the major expansion taking the form of a larger scale shopping centre (re)development with modest rates of on-site parking
- > The reduced parking rates will be enforced by Council.

Table 11-1 Economic Review

	Existing Parking Demand Rates	Reduced Parking Demand Rates
Ability to attract investors	The current 'over supply' of local parking is attractive to developers as this will be a selling point for businesses, workers and customers. Over time, this relative advantage will diminish, placing pressure on Council to develop parking structures with the target market being mainly local workers.	The investor (developer) would need to consider the viability of the project in the light of low parking rates. The restriction of car parking will act as a disincentive for development as many of the reduction strategies are local in nature and conflict with the broader regional role of Cleveland.
End State: publically available off street parking	If future development created difficulties in securing parking, the provision of sufficient publically available off-street public parking structures with a reasonable fee structure would be attractive to local office workers.	Cleveland's evolution as an attractive employment and retail venue will be assisted if effective alternatives exist to the perpetual supply of cost effective parking. In the absence of a 'price shock' (such as a significant increase in the price of oil) it is unlikely improved public transport and other strategies will effectively replace cost effective parking. This may limit the appeal of Cleveland as a retail and commercial office venue. Accordingly, the anticipated commercial and retail footprints anticipated in the Cleveland Centre Master Plan may not be delivered unless there is a significant supply of publically available off street parking in the form of multi-story structures.
Commercial office development	It is likely a modest amount of additional commercial office would be supported by the current publically available off-street car parks. The desire to attract greater levels of commercial and retail floor space will place demand on Council to develop parking structures.	The lack of available parking removes one of the current advantages that is held by the Cleveland CBD. This will act as a disincentive for any new development in the short to medium term. Unlike the major office precincts of the Brisbane CBD and the inner city suburbs, office development in Cleveland will be dominated by smaller buildings targeting small/medium local enterprises for some time to come. These enterprises place a high value on available parking.
Impact on target employment and economic activity	Existing parking demand rates will have little impact on the retail growth of the Cleveland CBD as any major retail (re)development will seek to provide sufficient customer parking on-site. However, the lack of cost effective parking for local workers may limit the appeal of the Cleveland CBD as a venue for many businesses.	Reduced parking demand rates will likely limit the commercial and retail role and function of the Cleveland CBD. As Cleveland will not provide a sufficient point of difference when compared to other (better regionally located) centres. The total floor space detailed in the Cleveland Centre Master Plan will not be delivered.
Impacts on the likely role and function	The achievement of the desired retail and commercial footprints will require the provision of cost effective parking structures, these can be public or private ventures. It is likely that a new shopping centre will develop their own multi story car park.	A perception from a developer perspective that there is insufficient parking availability, or restrictions in the number of spaces, could see the Cleveland CBD evolve on the current development path albeit at a lower scale and slower rate. Under these circumstances, it is highly unlikely the retail and commercial footprint would reach target levels in the next 40 plus years.
Impacts on retailers and businesses	An increase in commercial office activity would place higher 'value' on on-street spaces and car parks attached to the shopping centres. Paid parking and shorter time limits are likely to be necessary.	An increase in local activity would place higher 'value' on on-street spaces and car parks attached to the shopping centres. Paid parking and shorter time limits are likely to be necessary.

	Existing Parking Demand Rates	Reduced Parking Demand Rates
Implications for Council owned land.	Multi story parking structures will need to be in place ahead of demand in order to attract new commercial developers.	Development of parking structures would significantly 'lag' demand providing the best opportunity to provide sleeved or mixed use development. This would provide the lowest risk profile for the Council asset as any development would occur well into the future.
Conclusion	The extension of the status quo reinforces the traditional role of council as a provider of car parking. It is likely that Council would need to develop a multi-story car park to act as an incentive for the development of the target commercial floor space.	This strategy is more suited to a dedicated commercial precinct with a small retail footprint and high levels of public transport. A strategy where there is a concerted cap on parking provision and a lack of public car parking could risk limiting the growth potential for Cleveland, this is particularly key with reference to commercial and retail provision.

11.2 Conclusion

The evolution of the Cleveland CBD into a type of place envisioned by the Cleveland Centre Master Plan is more likely to occur if the need and utilisation of parking (and other important market features) evolves in line with market expectations. Enforcing a TOD style outcome is a laudable policy approach which should be a future aspiration for the Cleveland CBD. However, the implementation of too many of the parking restrictions of TOD style polices too soon and without the dense development and sufficient public transport facilties could slow the redevelopment of Cleveland CBD.

The built form assumptions for the Cleveland Centre Master Plan (ground floor retail, two levels commercial and remainder residential) contained in the reduced parking demand scenario presented in this report is more likely to be achieved if there is a paradigm shift in the way business in conducted in SEQ. Currently, within SEQ, a mixed use building is more likely to be viable if sufficient demand separately exists for all elements of the building. At the present time, and accepting that the Cleveland Centre Master Plan presents a planning horizon for the next 20 years, the built form assumptions for the Cleveland Centre Master Plan are unlikely to be seen, as the identified catchment and probable economic role of the Cleveland CBD will not support the development of 69,725 sq.m of commercial office or 23,252 sq.m of retail.

Accordingly, a staged approach to the provision of car parking at revised rates (approaching TOD rates) is required if the desired economic and employment outcomes expressed in the Cleveland Centre Master Plan are to be achieved. Importantly, the future provision of car parking must evolve in line with broader market expectations and the effective use of public transport. Additionally, it must be acknowledged that some forms of development (in particular larger retail operators or shopping centres), will seek to control their own destiny and provide sufficient parking on-site.

From the perspective of the economics of the development of the Cleveland CBD regarding car parking issues, guidance includes:

> Allow the market (developers) to provide on-site car parking in accordance with their assessment of the market. The introduction of parking reduction strategies should not include a cap on the amount of parking that can be provided within a development
> Council should consider the retention of the current at grade car parks to facilitate the construction of multi-level structures when required. The development of multi-story car parks may be necessary to cater for worker parking
> Consideration should be given to introducing pricing as a way maximising utilisation of on-street and other desirable parking locations. The introduction of pricing will help acclimatise the users to paying, which will be a precondition for the viability of any multi-story car park.

12 Recommendations

• Provide recommendations to inform a parking strategy to guide development within the CBD.

12.1 Cleveland CBD Existing Land Use, Parking and Policy Case

> The Cleveland CBD has approximately 3,335 parking spaces, which are 1,484 publically available off-street spaces, 678 on-street spaces and approximately 1,173 private spaces (i.e. Stockland Cleveland etc.)
> In the existing Cleveland CBD, there is a surplus of parking, with 2006 surveys recording a surplus of 822 spaces, of which 649 were publically available. This data has been confirmed through 2014 surveys.
> Existing RCC parking policy is generally well resolved, technically detailed and of a sound standard, catering for Redland City's unique geographic, demographic and transportation profile. Existing RCC parking policy is generally consistent with other council planning schemes, particularly in areas like Ipswich, Brisbane and Caboolture, for office and shop uses.
> In a review of the entire Cleveland CBD parking situation, a GIS parking model of the existing land use and car parking, (in "cascading mode", which represents a realistic version of the Cleveland CBD parking operations), identifies that currently, across all parking types, (total of short-term, midterm and long-term), the Cleveland CBD operates at a peak parking utilisation of 66%, and therefore the current parking supply provides 33% of excess capacity (broadly speaking, 33% of the total parking spaces are available).
> Detailed analysis shows there is a general lack of short-term parking within the Cleveland CBD. This is due to the majority of on-street parking being zoned for 4 hour parking. Therefore, there is potential for some 4 hour parking to be re-zoned in high turnover areas.
> Case studies performed for the existing Cleveland CBD on pockets of retail, and commercial lands suggest the experienced parking demand was generally lower than the prescribed parking provision rates in the Redland City Council Planning Scheme. Therefore, there may be merit in a reduction in parking requirements for new development within the Cleveland CBD itself.
> An examination of different pockets within the Cleveland CBD found there is a strong demand for parking in the centre core of the Cleveland CBD, with utilisation of 80-90% in the Cleveland CBD between Middle Street and Queen Street during the peak period.
> Assessment of the parking environment using the GIS parking model shows there is lower demand for parking in the vicinity of Queen Street and Wynyard Street, due to the relatively lower density of development in this area. Given the general surplus of parking in the Cleveland CBD overall, there is merit for the redevelopment of some off-street Council controlled car parking within the CBD.

12.2 Future Cleveland Masterplan, Future Land Use, Parking, and Policy

> There are a number of overarching organising elements embedded within the Cleveland Centre Master Plan. Broadly, the Cleveland Centre Master Plan indicates a desire for a shift away from private vehicle usage. However, parking will still be regarded as a necessity.
> In scenario 1, in the future, with the planned floor space increases envisaged through the Cleveland Centre Master Plan, if parking behaviour, parking policy, and parking demand do not change from the present behaviours, there will be a shortage of 2,360 spaces in the future. (Importantly, this was based on the overall Cleveland Centre Master Plan assumptions that parking is to be provided by developers at a rate of one-floor per building). If there were a shortage of 2,360 spaces in the future, then large multi-story structures and basement parking could be required. This could potentially reduce the amount of usable floor area and lower the density of future development and create a disincentive to development. This is a negative outcome for the implementation of the Cleveland Centre Master Plan.
> In scenario 2, with the planned floor space increases envisaged through the Cleveland Centre Master Plan, if parking behaviours do change in the future, and parking rates lower to that of a TOD, in the future, there will be a surplus of approximately 670 spaces in the Cleveland Centre Master Plan. Therefore, in this situation, there is little requirement to build additional parking. By lowering parking

demand rates to that of a TOD, the requirement to build costly basement, or multi-storey parking is reduced. It should be noted that the parking rates identified in TOD guidance will be difficult to achieve with current behaviour.

> In scenario 3, scenario 1 was further refined to represent a 'minimum intervention' scenario, whereby Council does not provide public parking structures, and instead requires that development provides enough parking to cater for their own needs. This scenario modelled the removal of two multi-storey car parks in the centre of the Cleveland. Under this scenario, if parking behaviour and parking demand do not change from the present behaviours, and if, for future Cleveland CBD development, it is assumed there is the removal of two multi-storey car parks in the centre of the Cleveland CBD, there will be a shortage of 3083 spaces in the future.
> In scenario 4, scenario 2 was further refined to represent a 'minimum intervention' scenario, Under this scenario, if parking behaviours do change in the future and parking rates lower to that of a TOD, and if, for future Cleveland CBD development, it is assumed there is the removal of two multi-storey car parks in the centre of the Cleveland CBD in the future, there will be a shortfall of approximately 54 spaces in the Cleveland CBD. Therefore, for future scenario 4, overall, there is little requirement to build additional parking. By lowering parking demand rates to that of a TOD, the requirement to build costly basement, or multi-storey parking is reduced. It should be noted that the parking rates identified in TOD guidance will be difficult to achieve with current behaviour.
> An overall conclusion is that to avoid the construction of additional parking, parking demand reductions measures are necessary in order to reduce parking demand, before the parking supply becomes critical during the implementation of the Cleveland Centre Master Plan. Methods of parking demand reduction recommended include the reinforcement of strategies that are already proposed in the Cleveland CBD Masterplan and Redland Planning Scheme such as:
    - Increased density of development
    - Mixed use development
    - Provision of transport hubs and interchanges.
> Other polices that could be pursued by RCC, and some are at various levels of investigation or implementation include:
    - Bicycle parking and end of trip facilities
    - Improved public transport network frequency
    - Precinct car share schemes
    - Car parking levy
    - Bike share schemes and
    - Green travel plans.

Parking Study

APPENDIX A
GLOSSARY OF TERMS

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Shaping the Future

Glossary of Terms

Term	Definition
Active transport	Modes of transport which do not rely on motorised vehicles, such as walking, cycling, etc.
At Grade Parking	Parking on a single level on the ground
Calibration	Finessing a model with factors or minor revisions to accurately estimate the observed operation
Cascading mode	An analysis option within the GIS parking model which represents a realistic parking demand operation, whereby first preference for parking spaces is provided to long-term vehicles, second preference is provided to mid-term vehicles and final preference is provided to short-term vehicles
Cleveland CBD	The study area for the parking study, as shown on Figure 1-1
Commercial	Land use category utilised principally for providing business or professional advice, services or goods that are not physically on the premises or the office based administrative functions of an organisation[1]
Long-term parking	Parking area with a time restriction of 6 hours and more
Mid/Medium-term parking	Parking area with a time restriction of between 3 hours and 5 hours 59 minutes
Modal Shift	Moving a proportion of people from one mode share to another.
Mode Share	The percentage of people travelling by a certain mode of travel i.e. 4% of visitors to Cleveland CBD travel by Public Transport
Multi-Storey Car Parking	Parking over several levels with ramps accessing each level
Off Street Parking	Parking spaces that are accessed via driveways away from the public road
On Street Parking	Parking spaces at the side of public roads
Parking demand	The amount of vehicles with drivers searching for a parking space
Parking supply	The amount of parking spaces available for use
Parking utilisation	The rate of *parking demand* expressed as a proportion of *parking supply*
Private Car	Car parking that is privately owned and operated, this can be open to the public or retained for the private use of the owner
Public Car Parking	Car parking that is available to the public, usually owned and operated by a local government authority or state government
Public transport	Modes of transport which are available for public use with set charges, e.g. buses, trains, etc.
Residential	Land use category utilised as long-term accommodation, such as houses, units, etc.
Retail	Land use category utilised for the display, sale or hire of goods and services
Short-term parking	Parking area with a time restriction of between 0 hours and 2 hours 59 minutes
Silo mode	An analysis option within the GIS parking model which represents a theoretical parking demand operation, whereby drivers are restricted to the parking category of their intended use i.e. short-term parkers occupy short-term spaces only, etc.
Transit Oriented Developments (TOD)	Mixed use residential and employment areas, designed to maximize access to public transport through higher density development and pedestrian-friendly street environments[2]

1 Redlands City Planning Scheme, Schedule 3 – Dictionary, Redland City Council, 2014

2 Transit Oriented Development: Guide for Practitioners in Queensland, Queensland Government, October 2010