Roads and Traffic Authority

Trip Generation and Parking Generation Surveys (Office Blocks)

Analysis Report

GTAconsultants

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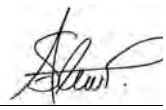
Analysis Report

Client: Roads and Traffic Authority
Reference: IS10510
GTA Consultants Office: Sydney

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By
A	08/09/10	Final	Katherine McCray/Alan Stewart	Alan Stewart / Greg Tucker	

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1. Introduction

1.1 Background

The Roads and Traffic Authority (RTA) first published *Policies, Guidelines and Procedures to Traffic Generating Developments* in 1984 which outlined all aspects of traffic generation considerations relating to various types of developments. This guideline was progressively updated, with the most recent version *Guide to Traffic Generating Developments* being issued in 2002.

The RTA was concerned that the previous data used to determine trip generation and parking rates was out of date, and a number of new land use categories had not been previously examined (i.e. business parks). In addition, there was increasing awareness that accessibility to public transport facilities was not adequately accounted for in previous research and that ongoing societal and economic changes, such as trading hours, changing demographics, car ownership rates, increasing fuel costs and toll effects and changing patterns of work and leisure had affected traffic generation rates.

GTA Consultants was commissioned by the RTA to undertake a study to determine contemporary traffic and parking generation rates for the land use *'Office and Commercial'* within Metropolitan and Regional New South Wales (NSW). This new information would replace the existing traffic and parking generation data contained with the *RTA's Guide to Traffic Generating Developments 2002*.

This report contains detailed analysis of surveys undertaken of 10 office blocks to determine more current traffic generation and parking requirement rates for the land use *"Office and Commercial".*

1.2 Project Overview

The main tasks involved in the project included:

- Identification of a selection of 15 sites suitable for surveying and analysis in Sydney and NSW Regional Area.
- Refinement of the 15 survey sites to 10 survey sites, based on the ease of surveying each site to ensure reliable data was collected and the appropriateness of sites to provide a suitable mix of sizes, public transport accessibility, parking provision and complexities to allow robust analysis.
- Undertaking on-site parking accumulation (car park in and out counts), pedestrian counts (total in and out of the building) and questionnaire surveys at each of the sites identified.
- Undertaking traffic counts on the road network adjacent to the site.
- Analysis of the survey data to determine person and vehicle based statistics, including daily trips, peak hour trips, peak vehicle trips in the AM and PM peak (of the principal adjacent road) and peak parking accumulation.
- Further analysis of the data from each surveyed site to establish traffic and parking generation rates, by comparing visitation to site and characteristics such as gross leasable floor area, parking demand, mode share and accessibility.
- Undertaking simple linear regression analysis and calculation of the correlation coefficient (R^2) to establish the key relationships by which to measure trip and parking generation.
- A review of the analysed data and results against external data sources from the TRICS database to determine if there are any similarities by which external trip and parking generation data can be applied in the NSW context.

2. Site Selection and Survey Details

2.1 Site Selection

Initially, a selection of 30 sites were identified by GTA Consultants as having potential for being surveyed as part of this study. These sites were selected on the basis of the following characteristics:

- sites located in Sydney (including a mix of inner, middle and outer locations) and in regional centres.
- sites recently constructed (where possible).
- sites having on-site parking provision.
- sites with a range of development sizes.
- sites with a range of accessibility scores based on RTA criteria.
- sites with a mix of land use types covering the following:
    - mixed small tenants
    - company head office or regional office
    - insurance and banking sectors
    - public sector
    - professional offices.

The list of 30 sites were then reduced to 10 sites based on their suitability and owner's approval.

2.2 Surveyed Sites

Of the ten sites selected for this study, eight (8) were located within the Sydney Metropolitan Area with the other two (2) located outside of the Sydney Metropolitan Area.

Of the eight within the Sydney Metropolitan Area two were located within the Inner Ring (0-10km), four located within the Middle Ring (10-20km) and two located within the Outer Ring (20-30km) of Sydney.

Details of the ten site locations are listed in Table 1.1 and indicated graphically in Figure 2.1.

Table 2.1: Selected Survey Sites

Site ID	Site Address
Sydney Metro Area	
OB1	100 Arthur Street, North Sydney (Inner Ring)
OB2	9 Help Street, Chatswood (Inner Ring)
OB3	4 Dawn Fraser Avenue, Sydney Olympic Park (Middle Ring)
OB4	33 McMahon Street, Hurstville (Middle Ring)
OB5	16 Giffnock Avenue, Macquarie Park (Middle Ring)
OB6	1 Smith Street, Parramatta (Middle Ring)
OB7	13-15 Moore Street, Liverpool (Outer Ring)
OB8	10-12 Lexington Drive, Bella Vista (Outer Ring)
Outside Sydney Metro Area	
OB9	24 Honeysuckle Drive, Newcastle
OB10	25 Atchison Street, Wollongong

These 10 sites were selected using the RTA site selection criteria methodology details of which are contained in Table 2.1. GTA Consultants verified six of the 10 sites by visiting them to confirm their suitability to be included within the study.

22 Honeysuckle Drive
Newcastle

10-12 Lexington Drive
Bella Vista

16 Giffnock Avenue
Macquarie Park

1 Smith Street
Parramatta

9 Help Street
Chatswood

4 Dawn Fraser Avenue
Sydney Olympic Park

100 Arthur Street
North Sydney

13-15 Moore Street
Liverpool

33 McMahon Street
Hurstville

77 Market Street
Wollongong

Legend

- Railway
- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Issue	Date	By	Chkd	Appd
P1	19-02-10	BL	AS	AS

Metres
0 4,000 8,000 16,000

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Client
Roads and Traffic Authority

Job Title
Trip and Parking Demand Surveys - Office Blocks

Drawing Title
Figure 2.1
Site Selection Location Plan

Scale at A3
1:300,000

Drawing Status
Preliminary

Job No	Drawing No	Issue
IS10510	001	P1

TABLE 2.2 - RTA TRIP GENERATION AND PARKING DEMAND STUDY 2009/2010 - FINAL SITE SELECTION LIST

		SITE LOCATIONS/SUBURBS									
		North Sydney	Chatswood	Sydney Olympic Park	Hurstville	Macquarie Park	Parramatta	Liverpool	Norwest	Newcastle	Wollongong
		1	2	3	4	5	6	7	8	9	10
Criteria No.	RTA Selection Criteria Description	Innovation Place, 100 Arthur Street, North Sydney, NSW 2060	CSR, 9 Help Street, Chatswood, NSW, 2067	CBA, 2-4 Dawn Fraser Avenue, Sydney Olympic Park, NSW, 2127	33 McMahon Street, Hurstville, NSW 2220	16 Giffnock Avenue, Macquarie Park, NSW 2113	Sydney Water, 1 Smith Street, Parramatta NSW 2150	13-15 Moore Street, Liverpool, NSW 2170	Argus Technologies, 10-12 Lexington Drive, Bella Vista NSW 2153	NIB Head Office, 22 Honeysuckle Drive, Newcastle, NSW 2300	77 Market St, Wollongong, NSW 2500
1	Fairly recent construction (Within 15 Years)	√	√	√	√	√	√	√	√	√	√
2	On-site parking provision	√	√	√	√	√	√	√	√	√	√
3	Ease of isolating site from other land uses / development types	√	√	√	√	√	√	√	√	√	√
4	Availability of Building Information. i.e. Floor Plans/Areas etc	√	√	√	√	√	√	√	√	√	√
5	Tenants/Occupiers Information (Staff, number of site parking spaces)	√	√	√	√	√	√	√	√	√	√
6	Simple Access to Parking Arrangements	√	√	√	√	√	√	√	√	√	√
7	Reasonable Geographic Spread (Inner/Middle/Outer Rings)	Inner Ring, (0-10km)	Inner Ring, (0-10km)	Middle Ring, (10-20km)	Middle Ring, (10-20km)	Middle Ring, (10-20km)	Middle Ring, (10-20km)	Outer Ring, (20-30 km)	Outer Ring(20-30km)	Regional	Regional
8	A range of sizes	20 storeys	8 storeys	4 storeys	5 storeys	5 storeys	17 storeys	4 storeys	4 storeys	6 storeys	8 storeys
9	A range of accessibility scores (RTA Methodology) Accessibility to Public Transport and other centres	AS = 0.9	AS = 0.9	AS=0.4	AS=0.9	AS=0.9	AS=0.9	AS=0.9	AS=0.6	AS=0.9	AS=0.9
10	A range of development types										
	Mixed Multiple Small Tenants	√- 11 Tenants	√ - 3 Tenants		√-Multiple Tenants	√-Multiple Tenants(3)		√-Multiple Tenants			√- Multiple Tenants
	Head Office or Regional Office (One Tenant)			√- 1 Tenant			√-1 Tenant		√-1 Tenant	√- 2 Tenants	√- 1 Tenant
	Private Sector - Insurance and Banking Offices			√-Banking						√-Health Insurance	
	Private Sector - Professional Offices	√-Construction	√-Building			√-Energy - Alstom		√ - Accountant/Medical Consultant	√-Electrical Goods	√-GHD - Engineering	√-Health Insurance
	Public Sector (State & Federal)						√ - Service Provider	√ - Employment Agencies			
	Landlord/Building Manager Contact Details	David Walton	Mark Bendall	Cathy Johnston (CBA Staff)	Chris Parker	Mark Unwin	Natt Chamkunthod	Irene Hluchan	Richard Farr	John Colic	Matt Cunningham
		0418 244 442	0407 131 112	(02) 9115 3501	(02) 9553 4188	0423 557 881	(02) 8849 3802	(02) 96024149	(02) 8884 0888	0406 380 016	0417 210 788
	Owners Details				Michael Roberts Strata (Lucio)	Stockland Property	Craig Heightman (02) 132092			CBRE	AHM
	Suitability confirmed by GTA Consultants on-site?	√	√	√	X	X	√	√	√	X	X
	Survey Date	√ - 08/12/2009	√ - 02/12/2009	√ - 25/11/2009	√ - 09/12/2010	√ - 10/12/2010	√-10/02/2010	√ - 03/12/2009	√ - 01/12/2009	√-4/02/2010	√-2/02/2010

2.3 Survey Details

The following surveys were undertaken between **7am-6:30pm on a weekday** as part of this study:

i Adjacent Road Network Peak Hour Traffic Volume Surveys (Tube Counts).
ii Parking Accumulation Surveys (Total In/Out - Off Street Parking Counts).
iii Pedestrian Movement Surveys (Total In/Out Pedestrian Counts).
iv Pedestrian Questionnaire Surveys.

Further building characteristics (Floor Space Dimensions, Business Types and Employee Numbers) were also obtained.

The surveys listed above were undertaken at each site by Austraffic between November 2009 and February 2010 with the building characteristics obtained by GTA Consultants.

Austraffic provided re-assurance of the integrity of the surveys and the quality of the data collected as part of this study which provided a level of confidence in terms of the analysis.

It should be noted that survey information relating to points (ii) to (iv) for the 4 Dawn Fraser Avenue site was provided directly from CBA through their car park and staff/visitor recording systems. Further staff travel characteristics were also provided from an on-line survey conducted on behalf of CBA as part of a separate transport study.

It is also important to recognise that due to recent downsizing in staff numbers at the site at Bella Vista, from approximately 130 staff to 34, a significant amount of the GFA was being underutilised. Therefore a reduced GFA of 1,200 m^2 was used in calculations for this site.

3. Survey Statistics and Methodology

3.1 Key Statistics

The survey data was analysed to determine the following key statistics:

Person-based statistics:

- Daily Person Trips (i.e. inward trips + outgoing trips, 'Car-based' and 'Other')
- Average Person Trips (per hour over the survey period)
- Peak Person Trips
- Person Trips in the AM and PM peak
- Peak Vehicle Hour Person Trips.

Vehicle-based statistics

For the two distinct periods of traffic generation, the peak activity time of the development itself and the peak activity times of the adjacent road network serving the development:

- Peak Vehicle Trips
- Peak Vehicle Trips in the AM and PM peak (of the principal adjacent road)
- Peak Parking Accumulation
- Average Vehicle Occupancy
- Total Daily Commercial Vehicle (CV) Trips
- Peak Commercial Vehicle (CV) arrivals and departures (for any one-hour period).

3.2 Key Variables

The trip and parking generation rates were calculated based on several of key variables including:

- Accessibility Score
- Mode Split
- Gross Floor Area
- Parking Demand.

The gross floor areas of the sites surveyed ranged from 1,200 m^2 to 34,131 m^2 and the on-site parking demand ranged from 28 to 798 spaces. Mode split of each site also varied from 2% to 72% of public transport use with eight of the ten sites having a high accessibility score of 0.9.

3.3 Trip Rates

Trip rates for each of the sites surveyed have been calculated using results from the parking, pedestrian movement and pedestrian questionnaire surveys.

The number of vehicle trips (visitors and staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day was able to be determined from the parking surveys.

However, these surveys do not capture the staff or visitors driving to the site who park either on-street or in alternative parking stations and therefore does not reflect the total vehicle movements generated to and in close proximity to this site.

A more robust method of capturing the total vehicle movements to, from and in close proximity of the site is to calculate the trip rates based on the total number of persons entering and exiting the site at various times of the day and applying the mode split proportions to these numbers.

The mode split was determined from the pedestrian questionnaire surveys and was considered to be representative of all staff and visitors.

Applying the car driver mode split to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours and throughout the day.

The average number of vehicle trips made by employees throughout the day, outside the daily commute to work, was able to be determined through the results of the pedestrian questionnaire survey.

3.4 Parking Rates

The peak on-site parking accumulation for each site was calculated using results of the parking surveys, which recorded total vehicles in and out of the on-site car parks.

The driver mode split proportion was applied to the total number of staff to calculate the total parking demand of each site. The amount of parking which occurred either on-street or in alternative car parking stations within close proximity of the site was calculated as the difference between the total parking demand and the peak on-site parking accumulation of each site.

Details of this survey methodology, on a site by site basis, are provided in Section 4.

4. Site by Site Trip and Parking Generation Analysis

4.1 OB 1 – Innovation Place, 100 Arthur Street, North Sydney

4.1.1 Site Summary

The Arthur Street site is located within close proximity to North Sydney station within the North Sydney CBD and is surrounded by commercial office blocks with key details indicated in Table 4.1.

Table 4.1: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[1]
1,136 (1,129)	20 floors, 31,400m² GFA	136 car spaces, 0 bike spaces	1 loading bay	Mon-Fri, 7:00am-7:00pm	14	Professional/ Financial	0.9

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.1.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.2.

Table 4.2: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	07:15-08:15	44	100%	0%	0.14/100m² GFA	0.32/parking space
PM Peak	17:00-18:00	33	0%	100%	0.11/100m² GFA	0.24/parking space
Daily	07:00-18:30	178	54%	46%	0.57/100m² GFA	1.31/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

There were a total of 13 commercial vehicles accessing the site over the survey period of which 8 arrived between 7:15am and 10:15am and the remaining 5 arrived between 11:00am and 1:15pm. The peak hour commercial vehicle movements into and out of the site (maximum 4 trips/hour) occurred during the morning period between 7:15am and 8:15am. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.3.

[1] The methodology for calculating the accessibility score is contained in the Data Report

Table 4.3: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	08:00-09:00	397
PM Peak	17:00-18:00	338
Daily	07:00-18:30	2,975

Figure 4.1 provides details of the building person accumulation over the survey period.

Figure 4.1: Person Accumulation

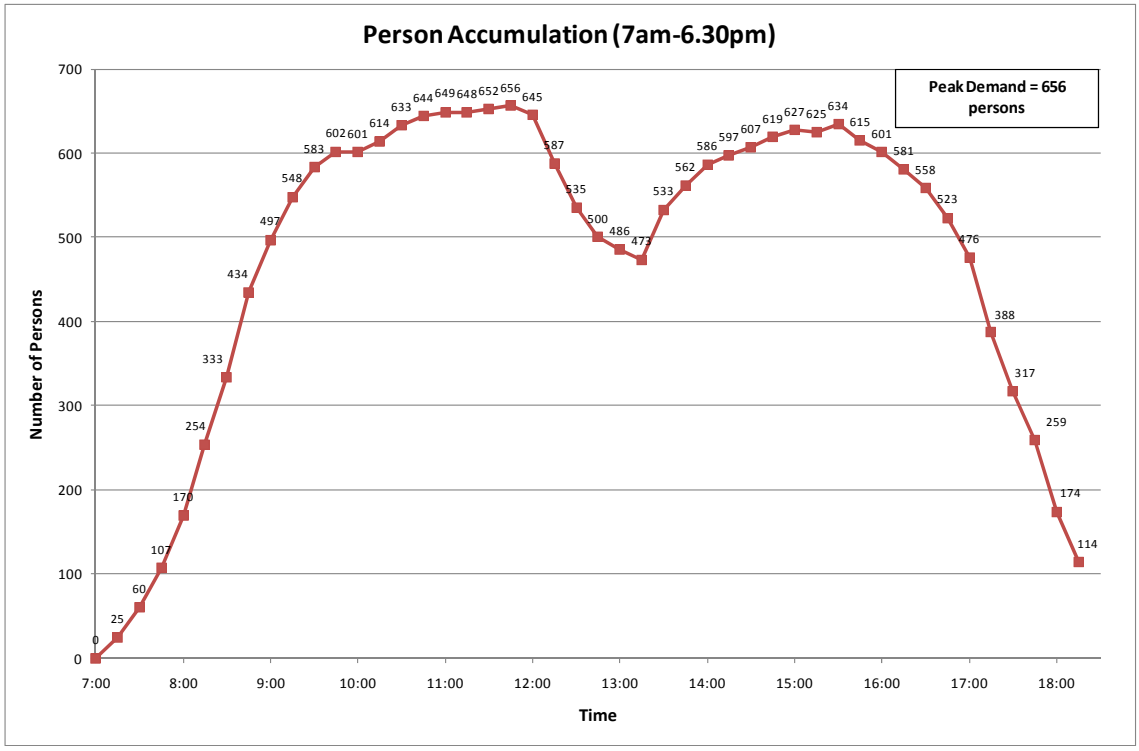
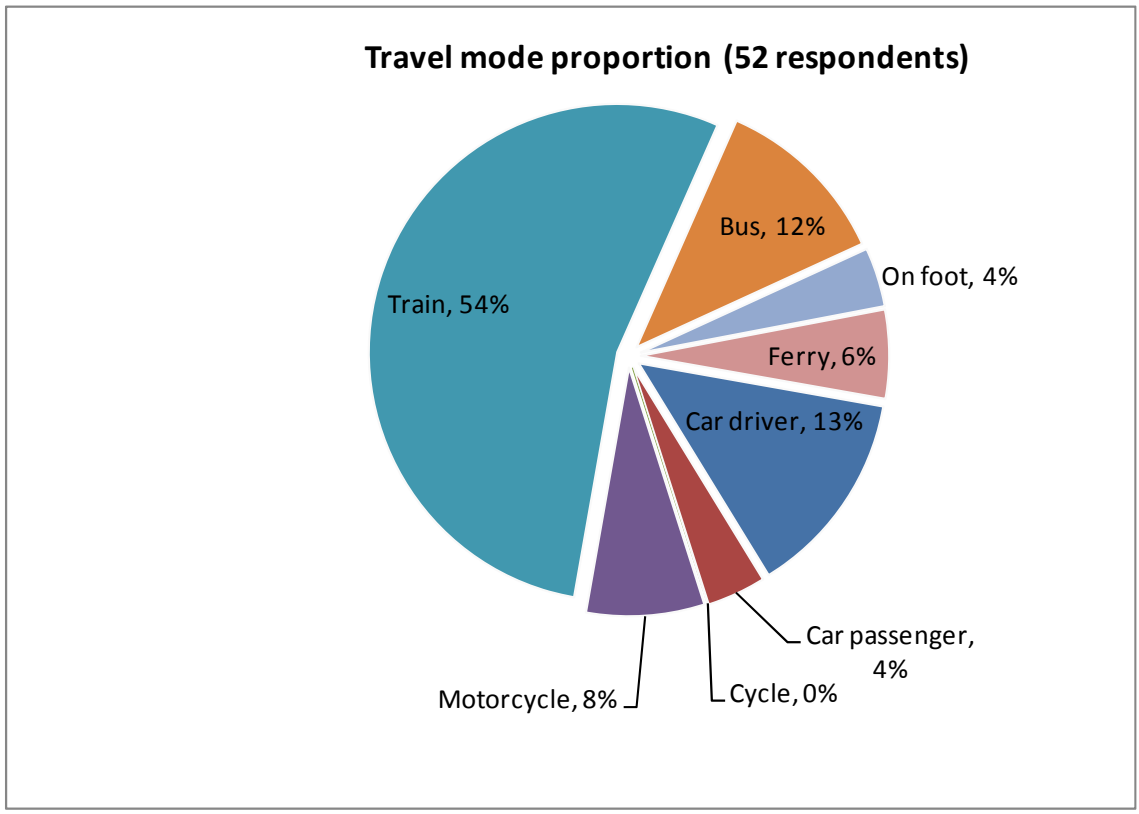


Figure 4.1 indicates that most people are at work during the morning peak period of 11:45am.

Mode Split Data

The mode split for this site, which was determined from the pedestrian questionnaire surveys, is shown in Figure 4.2 with the number of trips made whilst at work (i.e. non commuter trips) shown in Figure 4.3.

Figure 4.2: Mode Split



There were 52 respondents on the day of the survey at the North Sydney site which were all staff. This represented a sample size of approximately 5% as a percentage of the total staff.

The origin postcode data for the staff and visitors who completed the survey is provided in Appendix B.

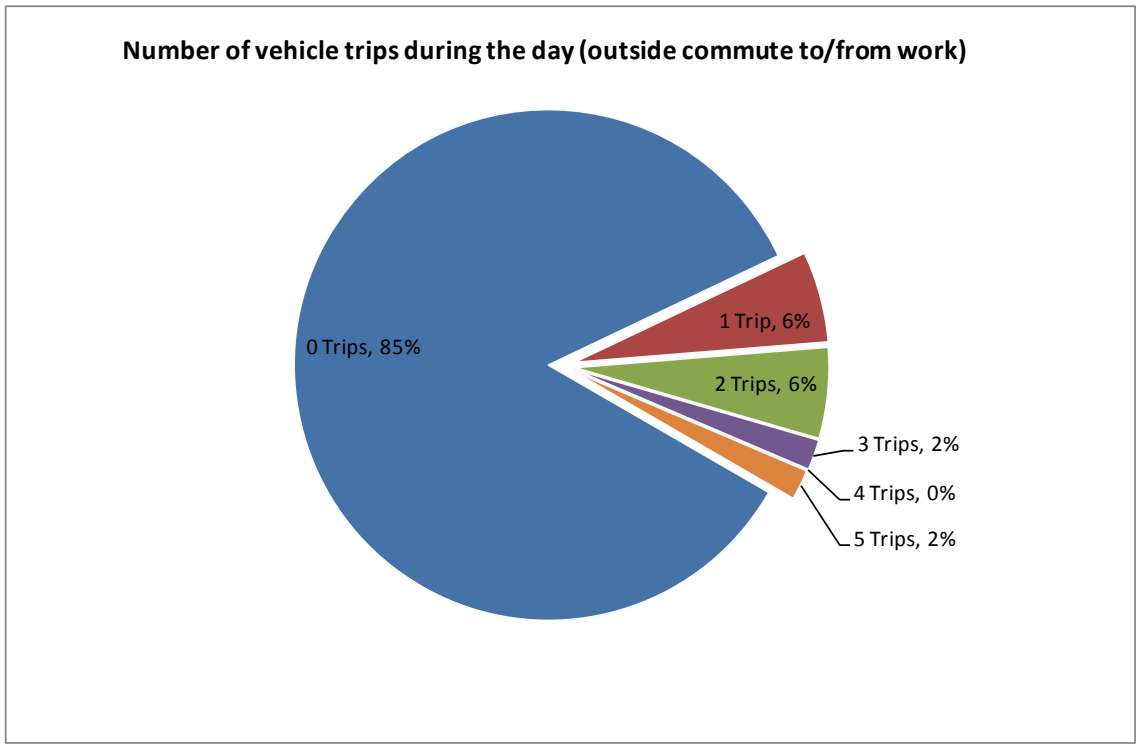
Figure 4.2 implies that 13% of people travelled to and from the site by private car, with 4% travelling by private car as a passenger[2], 72% travelling by public transport (train, bus and ferry), 8% riding a motorcycle and 4% walking. Nobody travelled to the site by bicycle.

Non-Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site is 0.34 vehicle trips/person as indciated in Figure 4.3.

[2] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.

Figure 4.3: Non-Commuter Period (During Working Hours) Trips



4.1.3 Trip Generation Analysis

Applying the car driver mode split (13%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours and throughout the day, as indicated in Table 4.4.

Table 4.4: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	08:00-09:00	397	13%	52	1.26/100m² GFA	0.17/100m² GFA
PM Peak	17:00-18:00	338	13%	44	1.08/100m² GFA	0.14/100m² GFA
Daily	07:00-18:30	2,975	13%	387	9.47/100m² GFA	1.23/100m² GFA

Road Network Peak Hour & Trips

The road network AM peak hour on Arthur Street is different from the site AM peak hour with the AM road network peak hour being **7:45am-8:45am.** The site PM peak hour and the road network peak hour are the same, i.e. **5:00pm-6:00pm**. The vehicle trips generated by the site during the road network peak hours were approximately 2% less during the AM peak hour and the same during the PM peak hour as indicated in Table 4.5.

Table 4.5: Survey Summary (Vehicle Trips during the Road Network Peak Hours)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	07:45-08:45	51	92%	8%	0.16/100m² GFA	0.38/parking space
PM Peak	17:00-18:00	44	5%	95%	0.14/100m² GFA	0.32/parking space

4.1.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in North Sydney Council's DCP and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.6. The on-site parking at this site is fairly generous given the location of the site in relation to North Sydney Transport Interchange and the accessibility issues resulting from congested main roads such as the Pacific Highway and Warringah Freeway.

Table 4.6: Parking Rates

Source	Parking Rates (Gross Floor Area)	
Existing Site (136 parking spaces)	1 space/231m²	1 space /8.35 staff (1,136 staff)
North Sydney Council DCP	1 space/400m² (North Sydney Centre)	
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.4 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.4: Parking Accumulation

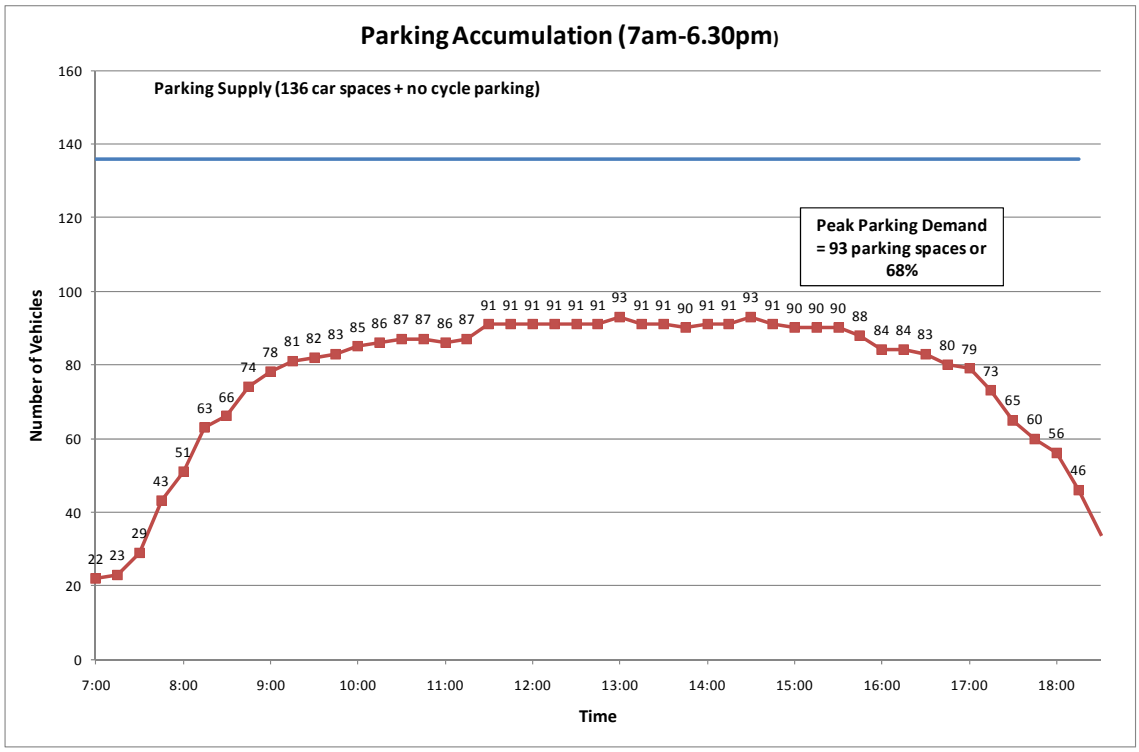


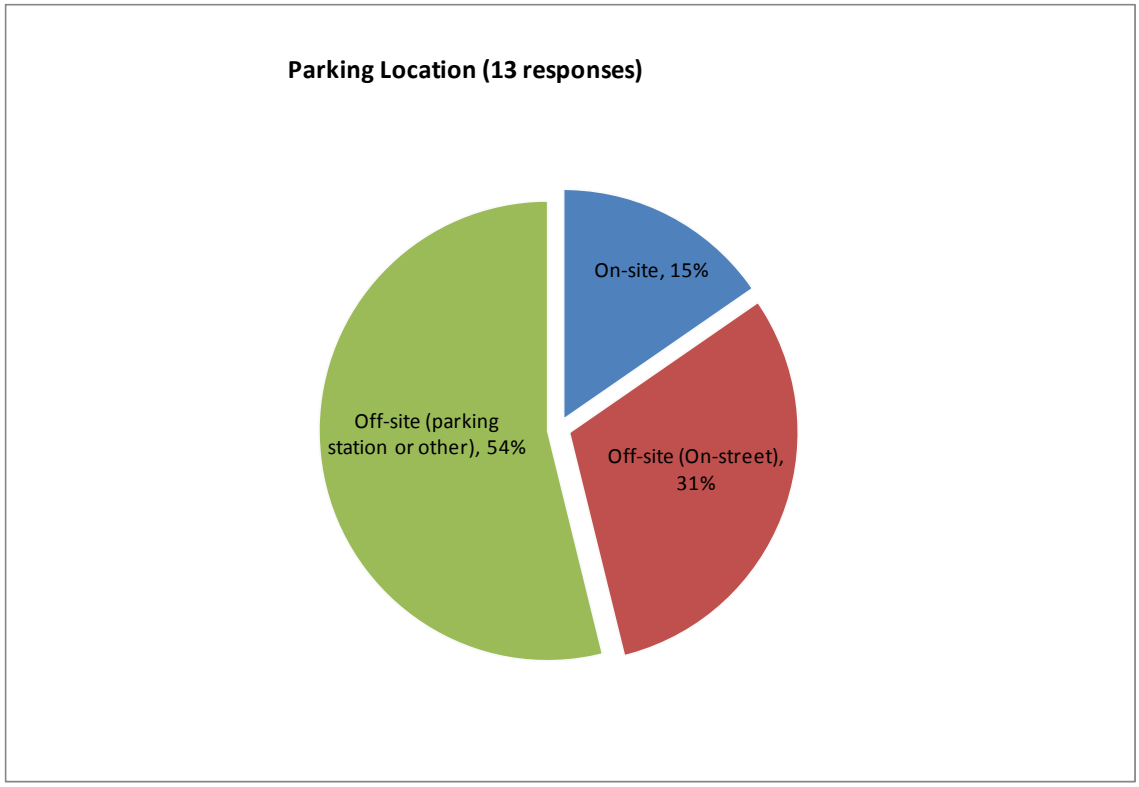
Figure 4.4 indicates a peak on-site car park occupancy of 68% equivalent to **93 parking spaces** out of the available 136 parking spaces which occurred at approximately 1:15pm-1:30pm and 2:30pm-2:45pm.

Off-Site Parking Data

There is short term metered on-street parking surrounding the site. Long term off-street parking is available at North Sydney Council car parks within the North Sydney CBD, which attract a fee. Long term parking is available at the Hornett Street and Ridge Street car parks, which are approximately 500 metres and 600 metres to the north of the site respectively. There is additional off-street parking in more than 10 privately owned parking stations within the North Sydney CBD, which are within 500 metres of the site, which offer short and long term parking.

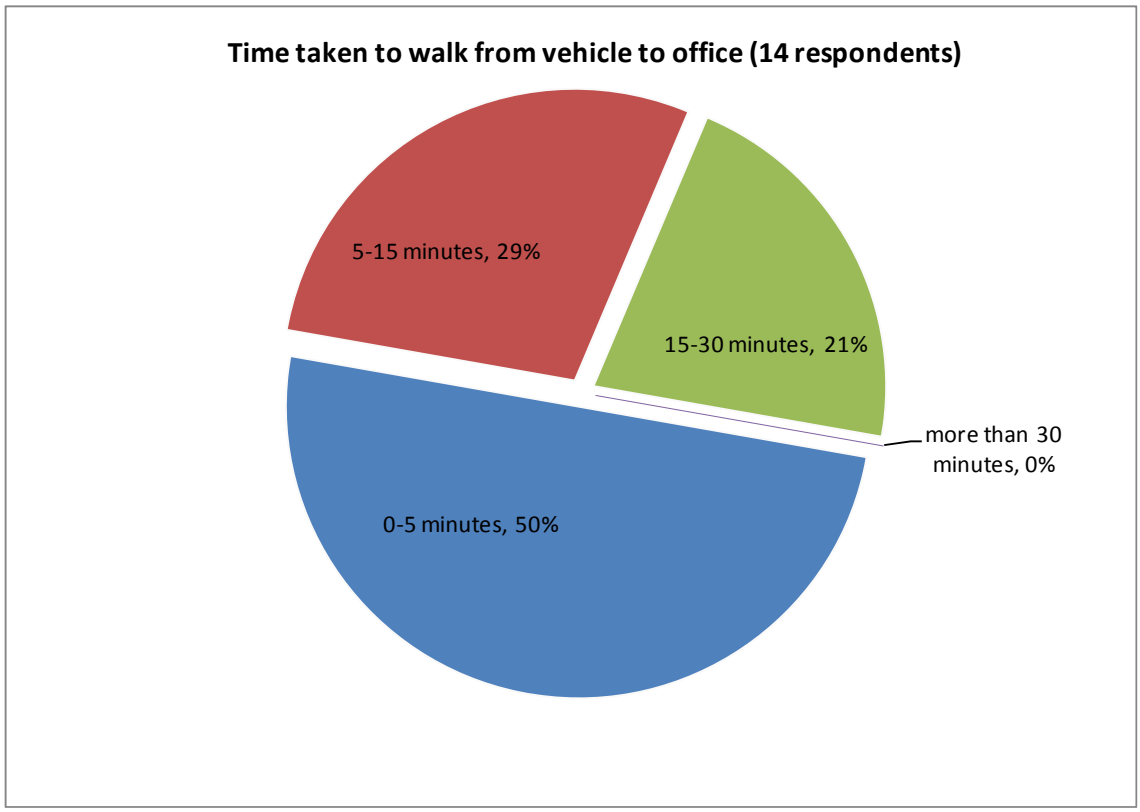
As shown in Figure 4.5, the results of the survey confirms there is a proportion of drivers who park either on-street or at another nearby parking station.

Figure 4.5: On and Off Street Parking Summary



It should also be noted that a significant proportion of drivers (50%) parked within close proximity of the site (0-5 minutes walk or within 400m) indicating the ease of finding a parking space close to the site as indicated in Figure 4.6.

Figure 4.6: Time to walk from off-site parking



Commercial Vehicle Parking Data

There was 1 loading bay provided on site for servicing of the building at 100 Arthur Street. Figure 4.7 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period, which indicates 7 additional loading bays are required to accommodate the commercial vehicle parking demand.

Figure 4.7: Commercial Vehicle Parking Accumulation

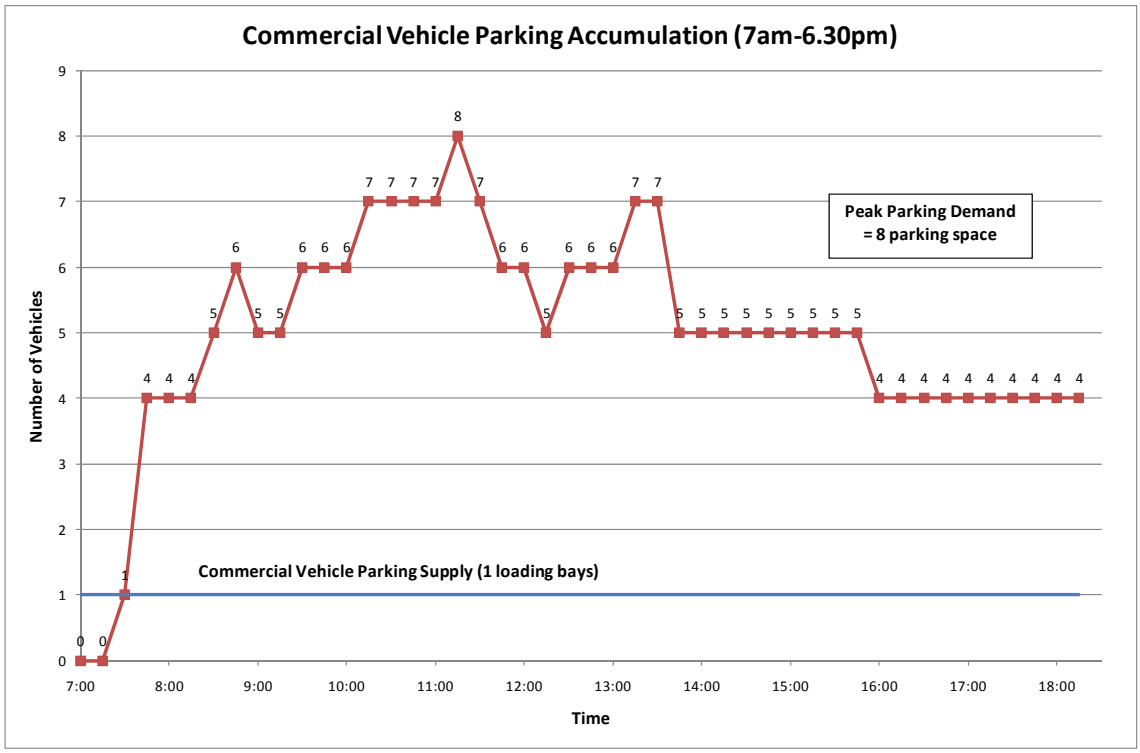


Figure 4.7 indicated the peak number of commercial vehicles using the on-site loading bays was 8, which occurred between 11:15am and 11:30am.

4.1.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.7.

Table 4.7: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
1,136	13%	148	93	55	0.47/100m² GFA

4.1.6 Public Transport Accessibility

North Sydney Transport Interchange Access

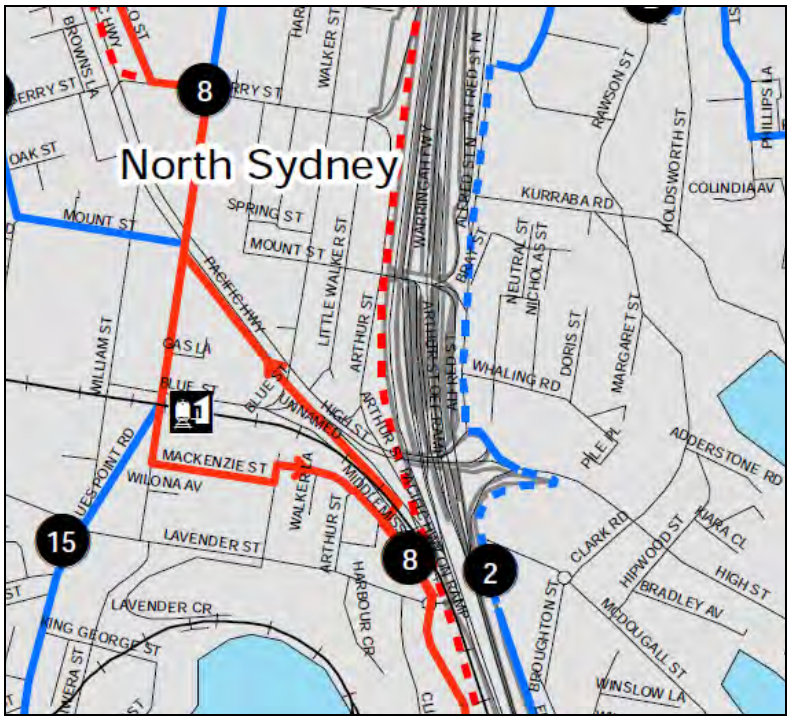
The 100 Arthur Street site is located within 400m of the North Sydney transport interchange with good pedestrian facilities (footpaths and controlled pedestrian crossings at the Pacific Highway) for staff and visitors accessing the interchange. The North Sydney Transport Interchange provides staff and visitors with an excellent choice of travel to various parts of greater Sydney, whether that is by bus or train.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Arthur Street site, that approximately **613 people walk** to and from the North Sydney Transport Interchange during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the North Sydney Bike Strategy is provided in Figure 4.8 which indicates Arthur Street is not part of the North Sydney Bicycle Network although there is an on-road regional route along the Pacific Highway and Miller Street and an off-road regional route along the Warringah Freeway.

Figure 4.8: North Sydney Bike Strategy Extract



The site has no bicycle parking spaces provided with the site and on the day of the survey there were no cyclists recorded accessing the site.

As this site has no bicycle parking**, a bicycle parking rate per employee cannot be determined**.

4.2 OB 2 – 9 Help Street, Chatswood

4.2.1 Site Summary

The Help Street site is located within close proximity of the Chatswood train station within the Chatswood CBD with key details indicated in Table 4.8.

Table 4.8: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[3]
397 (342)	8 floors, 10,214m² GFA	142 car spaces, 8 bike spaces	6 loading bays	Mon-Fri, 8am-5:30pm	3	Professional/ Building	0.9

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.2.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.9.

Table 4.9: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	07:45-08:45	42	100%	0%	0.41/100m² GFA	0.28/parking space
PM Peak	17:15-18:15	50	2%	98%	0.49/100m² GFA	0.33/parking space
Daily	07:00-18:30	231	54%	46%	2.26/100m² GFA	1.54/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

There were a total of 24 commercial vehicles accessing the site over the survey period of which 8 arrived between 8:15am and 10:00am, 8 between 11:00am and 2:00pm, 4 between 2:15pm and 4:00pm and 4 between 4:15pm and 6:00pm. The peak hour commercial vehicle movements into and out of the site (maximum 3 trips/hour) occurred during the morning period between 8:15am and 10:00am. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.10.

[3] The methodology for calculating the accessibility score is contained in the Data Report

Table 4.10: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	08:15-09:15	249
PM Peak	17:00-18:00	205
Daily	07:00-18:30	1,691

Figure 4.9 provides details of the building person accumulation over the survey period.

Figure 4.9: Person Accumulation

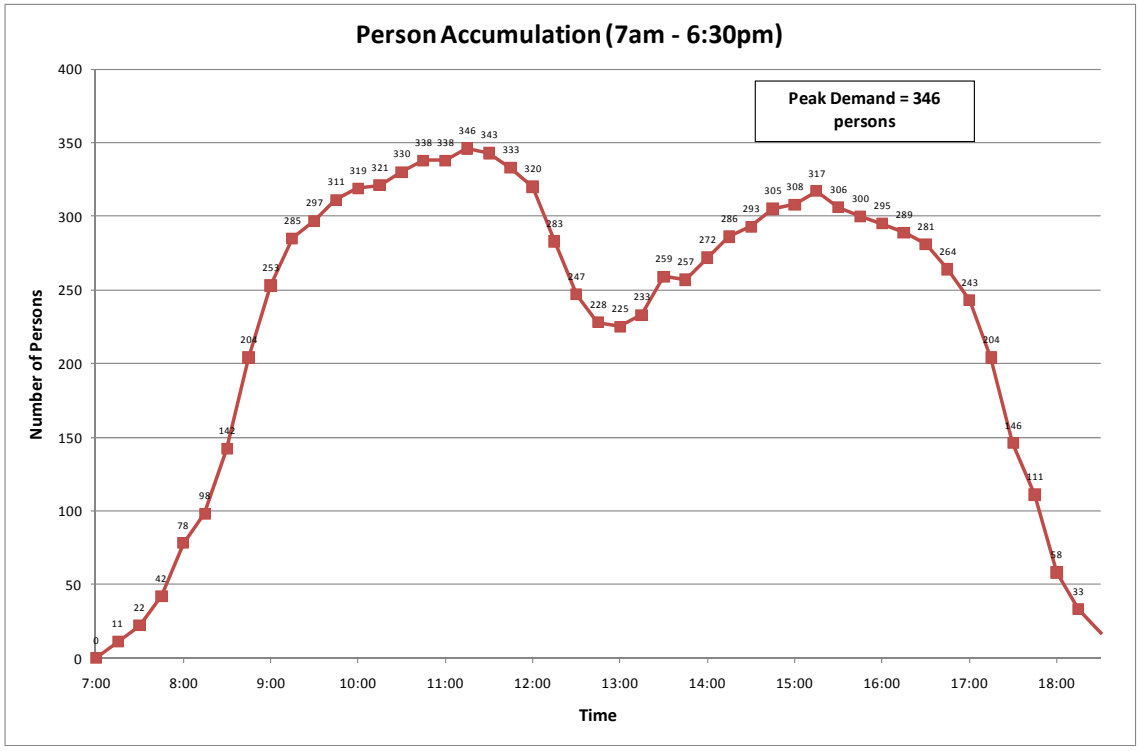
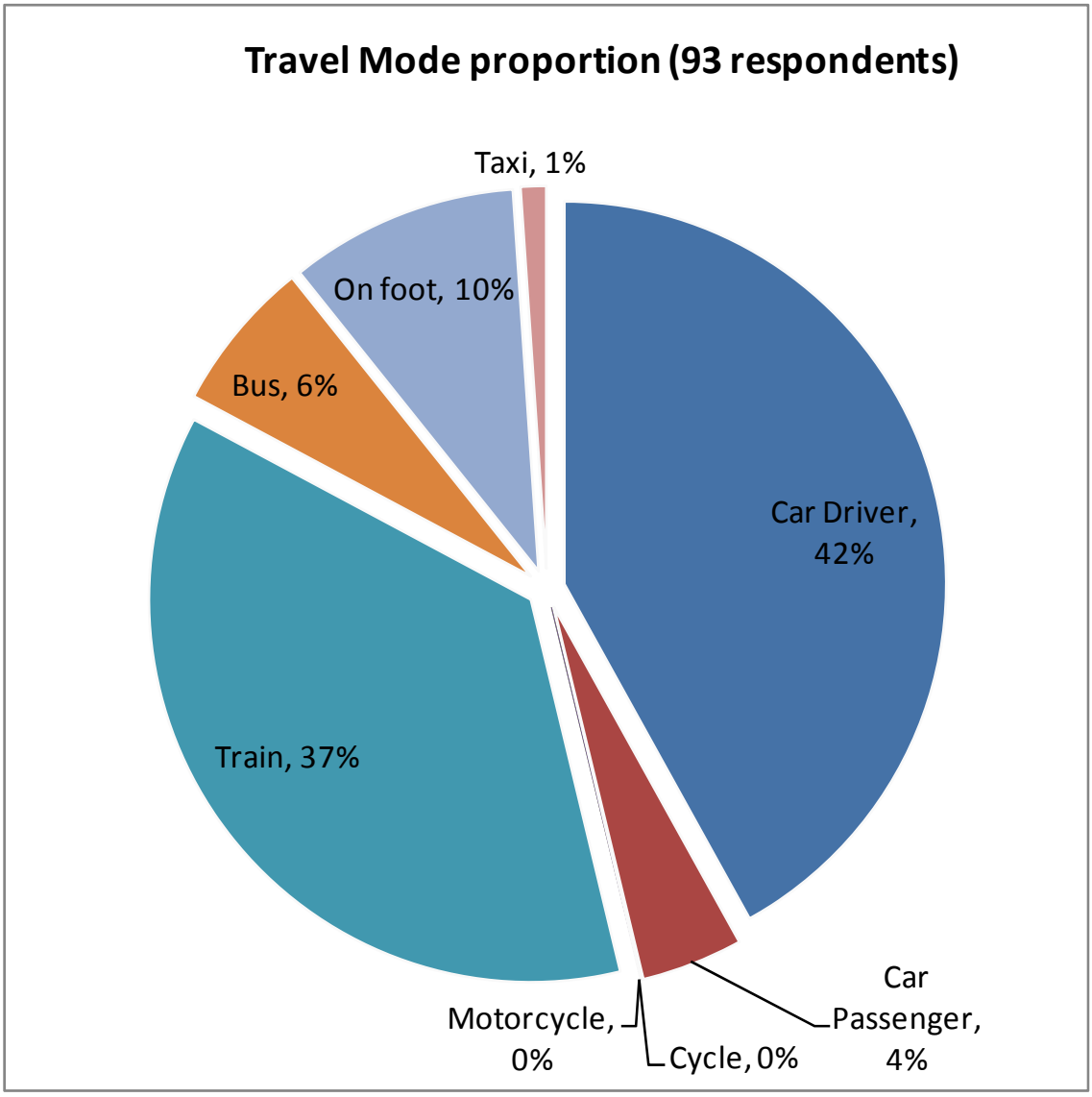


Figure 4.9 indicates that most people are at work during the morning peak period of 11:00am.

Mode Split Data

The mode split for this site, which was determined from the pedestrian questionnaire surveys, is shown in Figure 4.10 with the number of trips made whilst at work (i.e. non commuter trips) shown in Figure 4.11.

Figure 4.10: Mode Split



There were 93 respondents on the day of the survey at the Chatswood site which included 90 staff and 3 visitors. This represented a good sample size of approximately 27% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

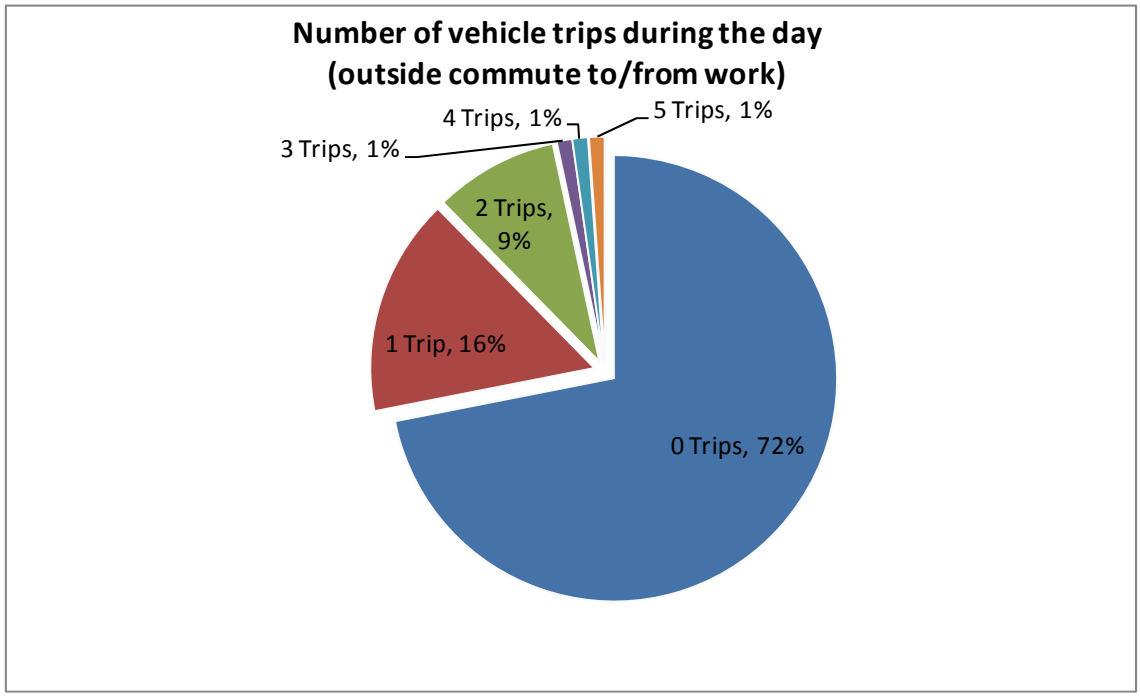
Figure 4.10 indicates that 42% of people travelled to and from the site by private car, with 4% travelling by private car as a passenger[4], 43% travelling to the site by public transport (train and bus), 10% walking and 1% catching a taxi[5]. Nobody travelled to the site by motorcycle or bicycle.

Non-Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site is 0.46 vehicle trips/person as indciated in Figure 4.11.

[4] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.
[5] The taxi trip was a visitor to the site.

Figure 4.11: Non-Commuter Period (During Working Hours) Trips



4.2.3 Trip Generation Analysis

Applying the car driver mode split (42%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours and throughout the day as indicated in Table 4.11.

Table 4.11: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	08:15-09:15	249	42%	105	2.44/100m² GFA	1.02/100m² GFA
PM Peak	17:00-18:00	205	42%	86	2.01/100m² GFA	0.84/100m² GFA
Daily	07:00-18:30	1,691	42%	710	16.56/100m² GFA	6.95/100m² GFA

Road Network Peak Hour & Trips

The **road network AM and PM peak hours** on Help Street are distinctly different from the site AM and PM peak hours with the AM and PM road network peak hours being **10:00am-11:00am and 3:45pm-4:45pm** respectively. The vehicle trips generated by the site during the road network peak hours were approximately 55% less during both the AM and PM peak hour, as shown in Table 4.12.

Table 4.12: Survey Summary (Vehicle Trips during the Road Network Peak Hours)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	10:00-11:00	47	59%	41%	0.45/100m² GFA	0.12/parking space
PM Peak	15:45-16:45	36	47%	53%	0.35/100m² GFA	0.09/parking space

4.2.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in Willoughby Council's DCP and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.13. The on-site parking at this site is fairly generous given the location of the site in relation to Chatswood Transport Interchange and the accessibility issues resulting from congested main roads such as the Pacific Highway, Victoria Avenue and Railway Street.

Table 4.13: Parking Rates

Source	Parking Rates (Gross Floor Area)		
Existing Site (150 parking spaces)	1 space/68m²	1 space / 2.65 staff (397 staff)	
Willoughby City Council DCP	1 space/60m² (Unrestrained)	1 space/110m² (Part Restrained)	1 space/200m² (Fully Restrained)
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites	

It would be reasonable to expect this site to have restrained parking given the availability of public transport (trains) however Council's current planning policies would only have come into effect after this building was constructed (i.e. post 1990).

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.12 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.12: Parking Accumulation

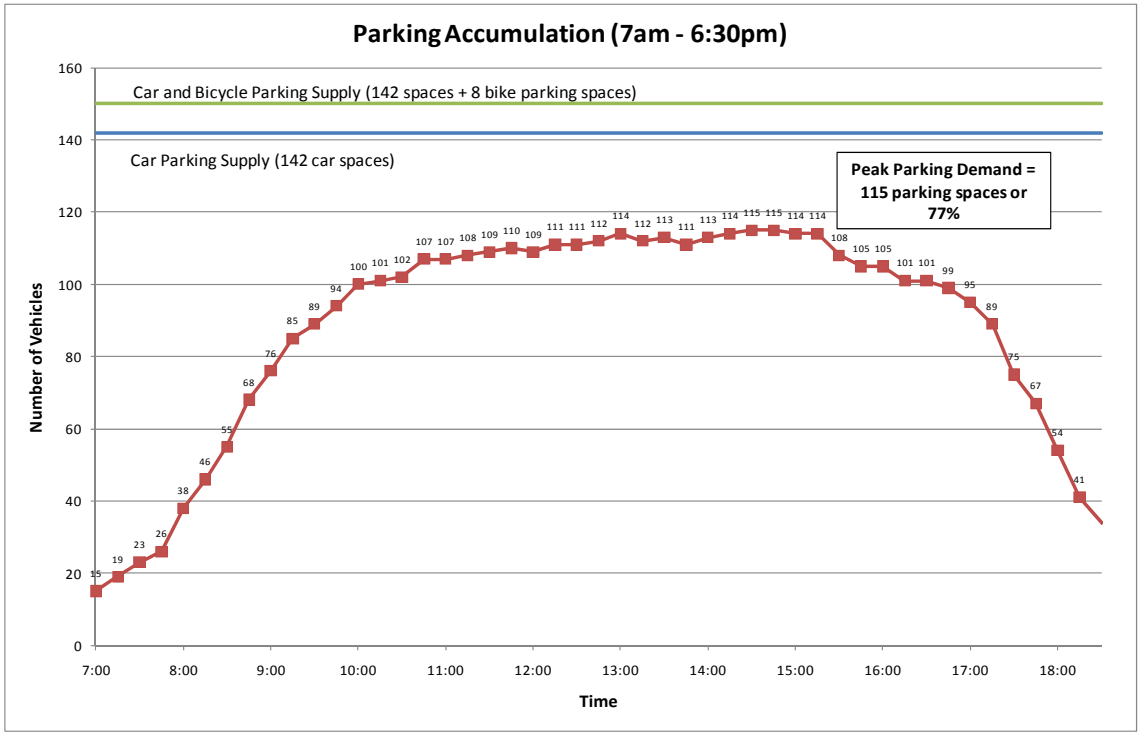


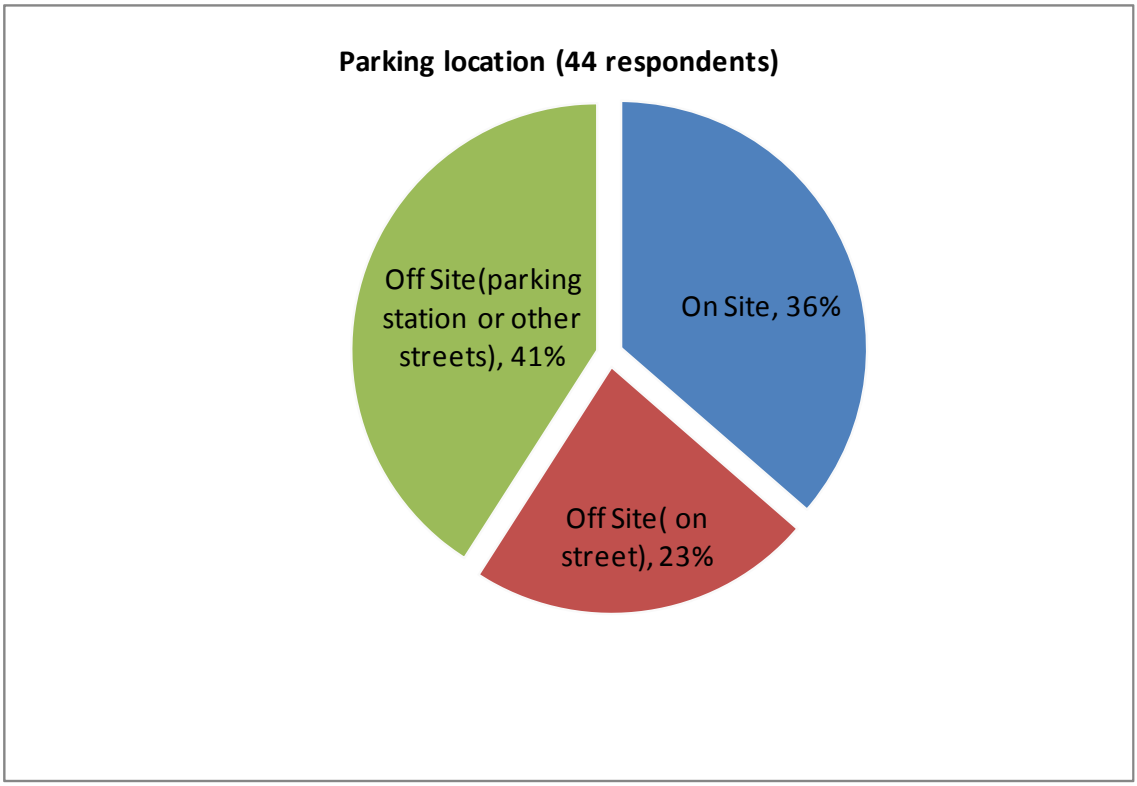
Figure 4.12 indicates a peak on-site car park occupancy of 77% equivalent to **115 parking spaces** out of the available 150 parking spaces which occurred at approximately 2:30pm-3pm.

Off-Site Parking Data

On-street parking within the vicinity of the site is time restricted and metered. Further from the site, in the residential areas to the west of the Pacific Highway, unrestricted on-street parking is available. Off-street parking is available in six car parks within 600 meters of the site, the largest of which is Chatswood Chase car park, with 2500 parking spaces.

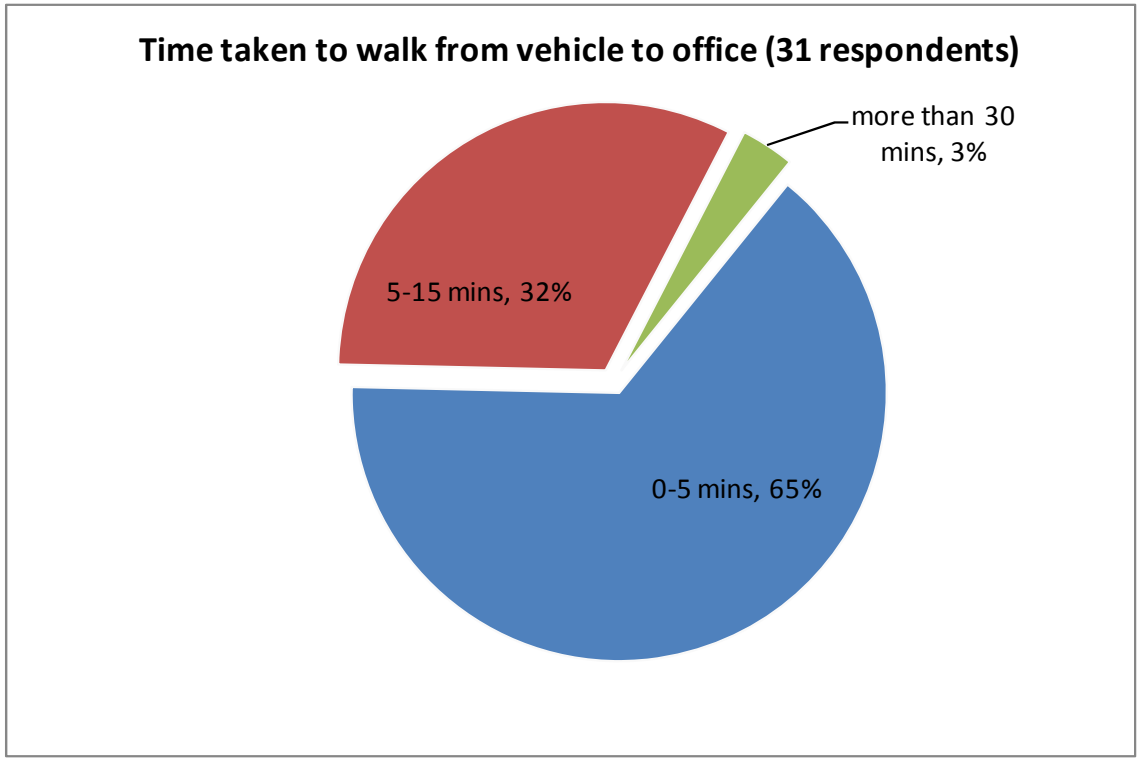
Figure 4.13 confirms there is a proportion of drivers who park either on-street or at another nearby parking station.

Figure 4.13: On and Off Street Parking Summary



It should also be noted that a large majority of drivers (65%) parked within close proximity of the site (0-5 minutes walk or within 400m) indicating the ease of finding a parking space close to the site as indicated in Figure 4.14.

Figure 4.14: Time to walk from off-site parking



Commercial Vehicle Parking Data

There were 6 loading bays provided on site for servicing of the building at 9 Help Street. Figure 4.15 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period.

Figure 4.15: Commercial Vehicle Parking Accumulation

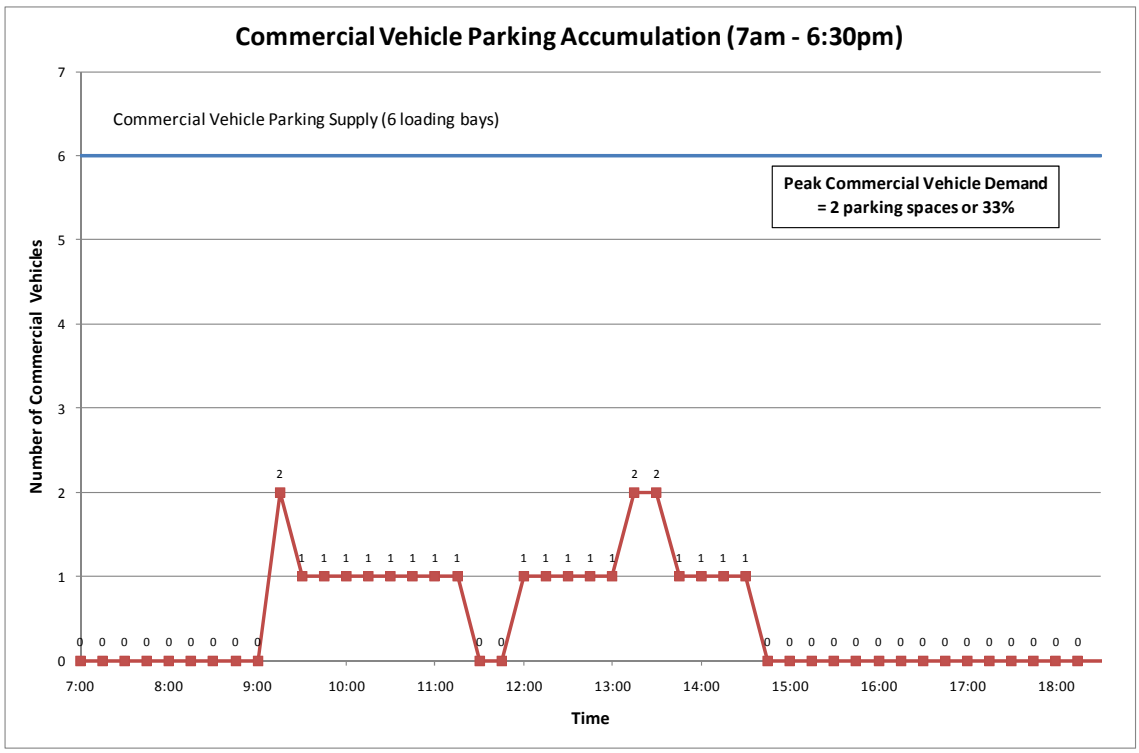


Figure 4.15 indicated the peak number of commercial vehicles using the on-site loading bays was 2, which occurred between 9:15am and 9.30am and between 1:15pm and 1:45pm.

4.2.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.14.

Table 4.14: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
397	42%	166	115	51	1.61/100m^2 GFA

4.2.6 Public Transport Accessibility

Chatswood Transport Interchange Access

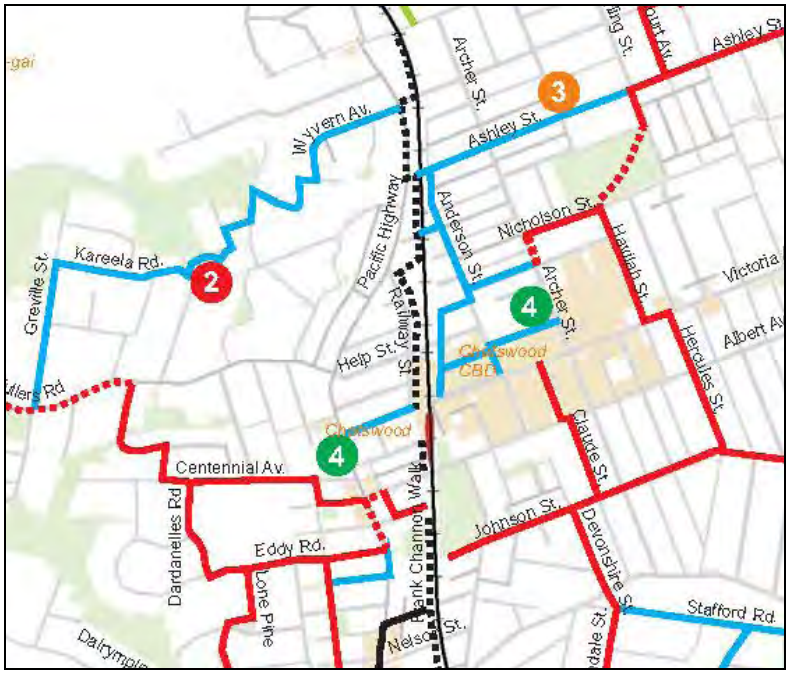
The 9 Help Street site is located within 400m of the Chatswood transport interchange with good pedestrian facilities (footpaths and controlled pedestrian crossings) for staff and visitors accessing the interchange. The Chatswood Transport Interchange provides staff and visitors with an excellent choice of travel to various parts of greater Sydney whether that is by bus or train.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Help Street site that approximately **150 people walk** to and from the Chatswood Transport Interchange during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the Willoughby Bicycle Network is provided in Figure 4.16 which indicates that Help Street is not part of the Willoughby Bicycle Network although there is a planned north/south off-road regional route and a high priority on-road local route close to the site.

Figure 4.16: Willoughby City Council Bicycle Network Extract



The site has 8 bicycle parking spaces provided with the basement car park but on the day of the survey there were no cyclists recorded accessing these spaces.

This equates to a rate of **1 bicycle parking space per 50 employees** or 2% of all staff.

4.3 OB 3 – 4 Dawn Fraser Avenue, Olympic Park

4.3.1 Site Summary

The Dawn Fraser Avenue site is located within close proximity of Olympic Park train station in the Sydney Olympic Park Precinct with key details indicated in Table 4.15.

Table 4.15: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[6]
2,400 (2,053)	4 floors 34,131m² GFA	798 car spaces, 104 bike spaces	7 loading bays	Mon-Fri, 8am-5:30pm	1	Professional/ Finance	0.4

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.3.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.16.

Table 4.16: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	08:00-09:00	158	98%	2%	0.46/100m² GFA	0.20/parking space
PM Peak	17:00-18:00	127	4%	96%	0.37/100m² GFA	0.16/parking space
Daily	07:00-18:30	797	54%	46%	2.34/100m² GFA	1.00/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

The vehicles entering and exiting the on-site car park was based on gate counts and not classified by vehicle type. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

As mentioned in Section 2.3, CBA engaged another transport consultant to undertake a staff survey at this site at the same time as GTA Consultants were collecting data as part of this study. In order not to duplicate information or undertake two surveys to the detriment of CBA staff, it was agreed that CBA would share the information obtained as part of their study.

The arrival and departure profiles for staff arriving and departing from the building were determined through the staff survey. These profiles have been used to calculate the total number of person trips entering and exiting the building during the AM and PM peak hours, as shown in Table 4.17.

[6] The methodology for calculating the accessibility score is contained in the Data Report

The number of person trips throughout the day was not recorded as part of the CBA staff survey and hence daily person trip rates were unable to be calculated.

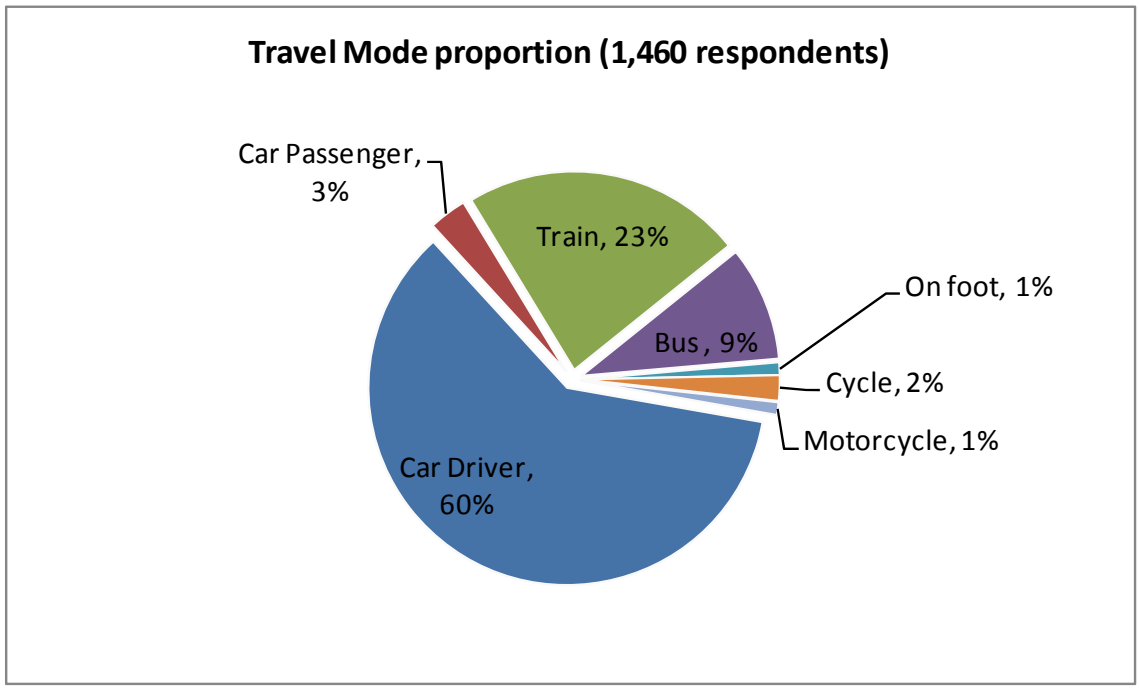
Table 4.17: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	08:00-09:00	842
PM Peak	17:00-18:00	801
Daily	-	-

Mode Split Data

The mode split for this site, which was supplied by CBA, is shown in Figure 4.17.

Figure 4.17: Mode Split



There were 1,460 respondents on the day of the survey at the Sydney Olympic Park site which were all staff. This represented a good sample size of approximately 61% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

Figure 4.17 indicates that 60% of people travelled to and from the site by private car, with 3% travelling by private car as a passenger[7], 31% travelling to the site by public transport (train and bus), 2% cycling, 1% by motorcycle and 1% walking.

4.3.3 Trip Generation Analysis

Applying the car driver mode split (60%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours as indicated in Table 4.18.

[7] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.

Table 4.18: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	08:00-09:00	842	60%	505	2.47/100m² GFA	1.48/100m² GFA
PM Peak	17:00-18:00	801	60%	481	2.35/100m² GFA	1.41/100m² GFA

The number of business trips made by car throughout the day was not included in the staff survey of CBA staff and therefore the number of trips outside the commute to work has not been calculated.

Road Network Peak Hour

The **road network AM and PM peak hours** on Dawn Fraser Avenue are distinctly different from the site AM and PM peak hours with the AM and PM road network peak hours being **8:15am-9:15am and 5:15pm-6:15pm** respectively. The vehicle trips generated by the site during the road network peak hours are likely to be slightly lower than the site AM and PM peak hour.

4.3.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in Sydney Olympic Park Authority's (SOPA) Master Plan 2030 and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.19. The amount of parking provided is significantly higher than SOPA's requirements and slightly lower than the RTA's requirements.

Table 4.19: Parking Rates

Source	Parking Rates (Gross Floor Area)	
Existing Site (798 car parking spaces)	1 space/43m²	1 space / 0.33 staff (2,400 staff)
SOPA Master Plan 2030	1 space/80m²	
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites

It would be reasonable to expect this site to have a lower parking provision given the availability of public transport (trains) however SOPA's current planning policies would only have come into effect after this building was constructed (i.e. post 2007).

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.18 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.18: Parking Accumulation

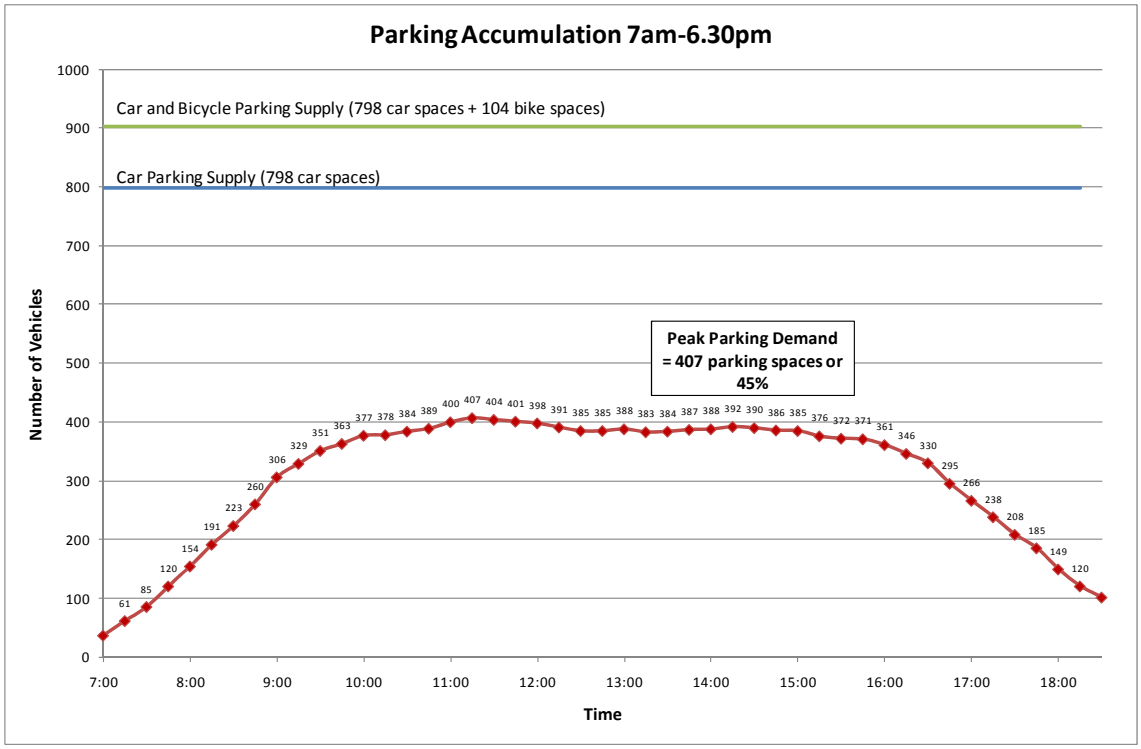


Figure 4.18 indicates a peak on-site car park occupancy of45% equivalent to **407 parking spaces** out of the available 902 parking spaces which occurred at approximately 11:00.

Off-Site Parking Data

There is a very limited number of free, but time-restricted on-street parking available in Sydney Olympic Park. There is no on-street long term parking available. Despite this, there is ample off-street parking available, with 10,000 spaces in the 6 car parks that surround the site. The closest car park is P6 located opposite the site at the intersection of Dawn Fraser Avenue and Australia Avenue. It provides 638 parking spaces for long term parking. P2 car park is located 550 metres south west of the site near the Sydney Aquatic Centre and provides 570 spaces for long term parking.

Commercial Vehicle Parking Data

Commercial vehicle parking data was not available for this site.

4.3.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.20.

Table 4.20: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
2,400	60%	1,440	407	1,033	4.22/100m^2 GFA

4.3.6 Public Transport Accessibility

Olympic Park Station Access

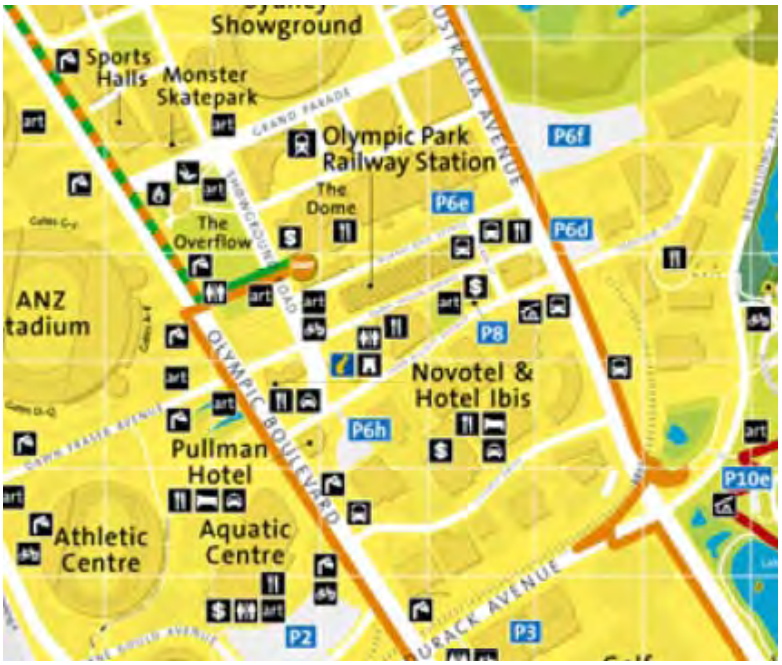
The Dawn Fraser Avenue site is located adjacent to Olympic Park train station, footpaths are provided for staff and visitors accessing the interchange. Sydney Olympic Park train station is situated on City Rail's Olympic Sprint line, which runs between Sydney Olympic Park and Lidcombe station. Four City Rail lines stop at Lidcombe station which provides staff and visitors with access to western and south-western Sydney, as well as the Sydney CBD.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Help Street site that approximately **550 people walk** to and from the Sydney Olympic Park train station during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the SOPA Bicycle Route map is provided in Figure 4.19 which indicates that Dawn Fraser Avenue is not part of the SOPA Bicycle Network although there are on road routes on Australia Avenue and Olympic Boulevard, close to the site.

Figure 4.19: SOPA Cycle Map Extract



The site has 150 bicycle parking spaces provided with the basement car park. The number of cyclists accessing the cycle parking on the day of the survey was not recorded.

This equates to a rate of **1 bicycle parking space per 16 employees** or 6% of all staff.

4.4 OB 4 – 33 McMahon Street, Hurstville

4.4.1 Site Summary

The McMahon Street site is in close proximity to Hurstville train station and is surrounded by mixed of retail, medical and commercial buildings with key details indicated in Table 4.21.

Table 4.21: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[8]
95 (85)	5 floors. 3,254m² GFA	66 car spaces, 0 bike spaces	0 loading bays	Mon-Fri, 8am-6:00pm	21	Professional/ Building	0.9

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.4.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.22.

Table 4.22: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	08:00-09:00	27	100%	0%	0.83/100m² GFA	0.41/parking space
PM Peak	16:45-17:45	17	0%	100%	0.52/100m² GFA	0.26/parking space
Daily	07:00-18:30	129	50.4%	49.6%	3.96/100m² GFA	1.95/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

There were a total of 2 commercial vehicles accessing the site over the survey period which arrived between 9:45am and 12:00pm and departed between 3:45pm and 5:45pm. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.23.

Table 4.23: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	09:45-10:45	119
PM Peak	15:30-16:30	77
Daily	07:00-18:30	802

[8] The methodology for calculating the accessibility score is contained in the Data Report

Figure 4.20 provides details of the building person accumulation over the survey period.

Figure 4.20: Person Accumulation

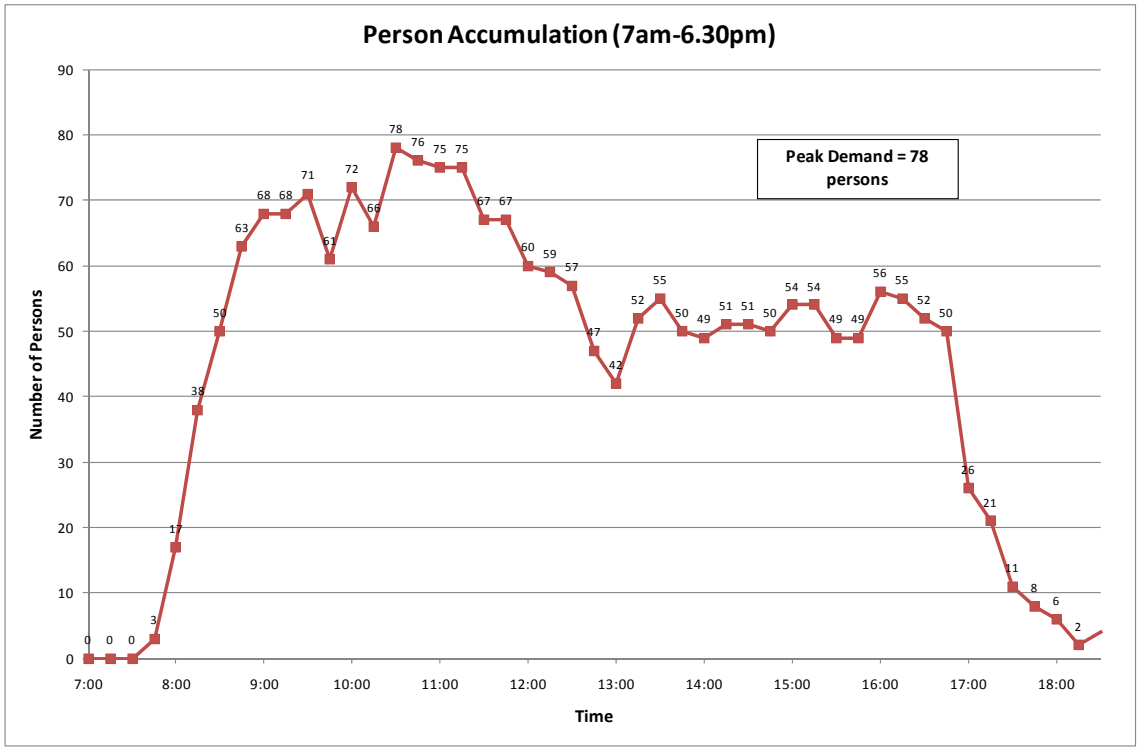
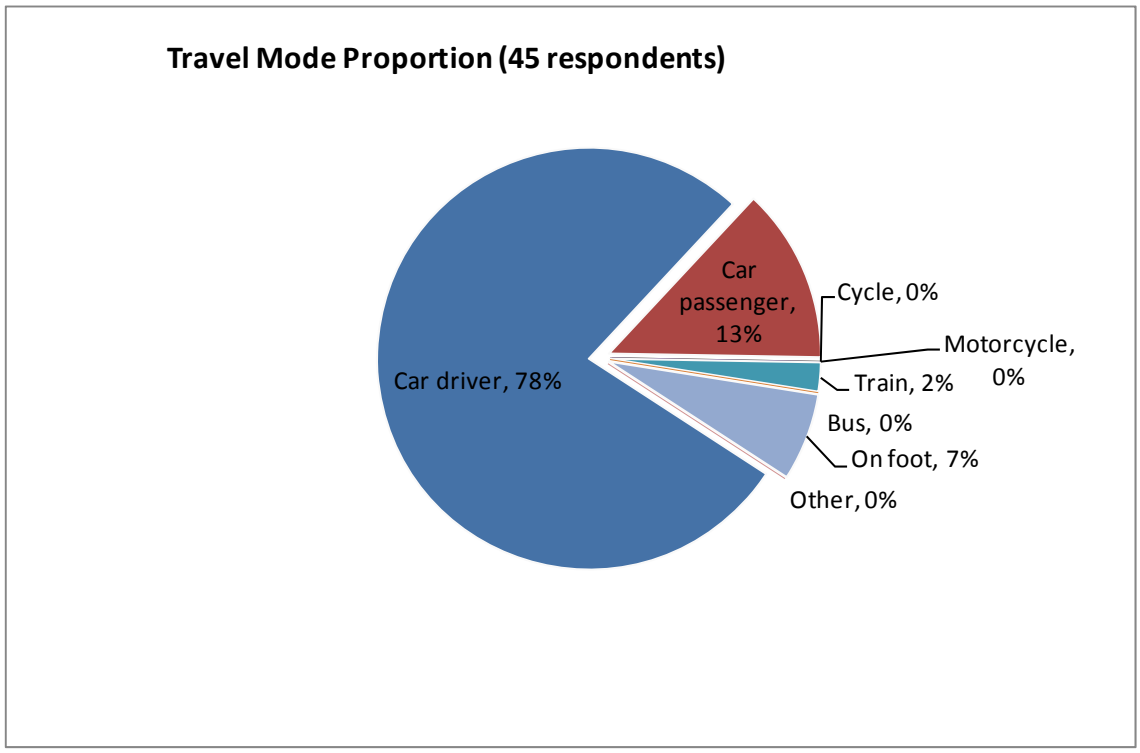


Figure 4.20 indicates that most people are at work during the morning peak period of 10:30am.

Mode Split Data

The mode split for this site, which was determined from the pedestrian questionnaire surveys, is shown in Figure 4.21 with the number of trips made whilst at work (i.e. not commuter trips) shown in Figure 4.22.

Figure 4.21: Mode Split



There were 45 respondents on the day of the survey at the Hurstville site which included 23 staff and 22 visitors. This represented a good sample size of approximately 24% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

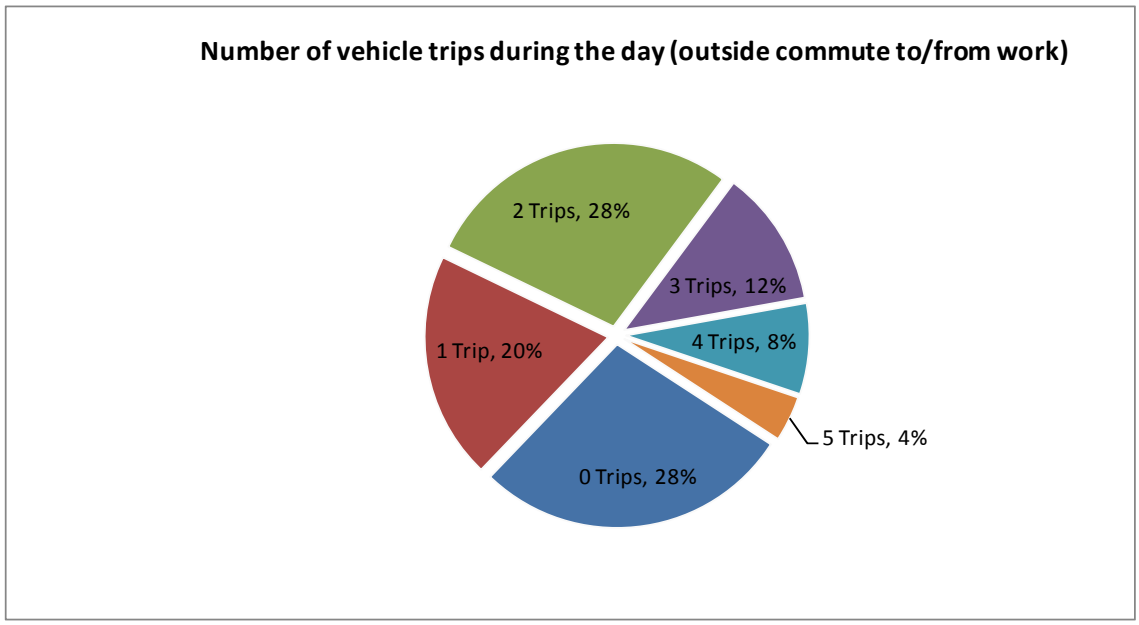
Figure 4.21 implies that 78% of people travelled to and from the site by private car, with 13% travelling by private car as a passenger[9], 7% walking and 2% by train. Nobody travelled to the site by bus, motorcycle or bicycle.

Non-Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site is 1.60 vehicle trips/person as indicated in Figure 4.22.

[9] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.

Figure 4.22: Non-Commuter Period (During Working Hours) Trips



4.4.3 Trip Generation Analysis

Applying the car driver mode split (78%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours and throughout the day as indicated in Table 4.24.

Table 4.24: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	09:45-10:45	119	78%	93	3.66/100m² GFA	2.86/100m² GFA
PM Peak	15:30-16:30	77	78%	60	2.37/100m² GFA	1.84/100m² GFA
Daily	07:00-18:30	802	78%	623	24.65/100m² GFA	19.15/100m² GFA

Road Network Peak Hour & Trips

The **road network AM peak hour** on McMahon Street is distinctly different from the site AM peak hour with the AM road network peak hour being **8:45am-9:45am.** The site PM peak hour and the road network peak hour are the same, i.e. **3:30pm-4:30pm**. The vehicle trips generated by the site during the road network peak hour were approximately 30% less during AM peak hour and the same during the PM peak hour, as shown in Table 4.25.

Table 4.25: Survey Summary (Vehicle Trips during the Road Network Peak Hours

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	08:45-09:45	65	63%	37%	2.00/100m² GFA	0.98/parking space
PM Peak	15:30-16:30	60	51%	49%	1.84/100m² GFA	0.91/parking space

4.4.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in Hurstville City Council's DCP and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.26. The on-site parking at this site is marginally higher than the requirements set out in Council's current planning policies and significantly lower than the RTA's requirements, which is reasonable to expect given the proximity to Hurstville Station.

Table 4.26: Parking Rates

Source	Parking Rates (Gross Floor Area)		
Existing Site (66 parking spaces)	1 space/49m²	1 space / 1.44 staff (95 staff)	
Hurstville City Council DCP	1 space/50m² (CBD fringe)	1 space/55m² (Intermediate)	1 space/60m² (CBD Core)
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites	

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.23 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.23: Parking Accumulation

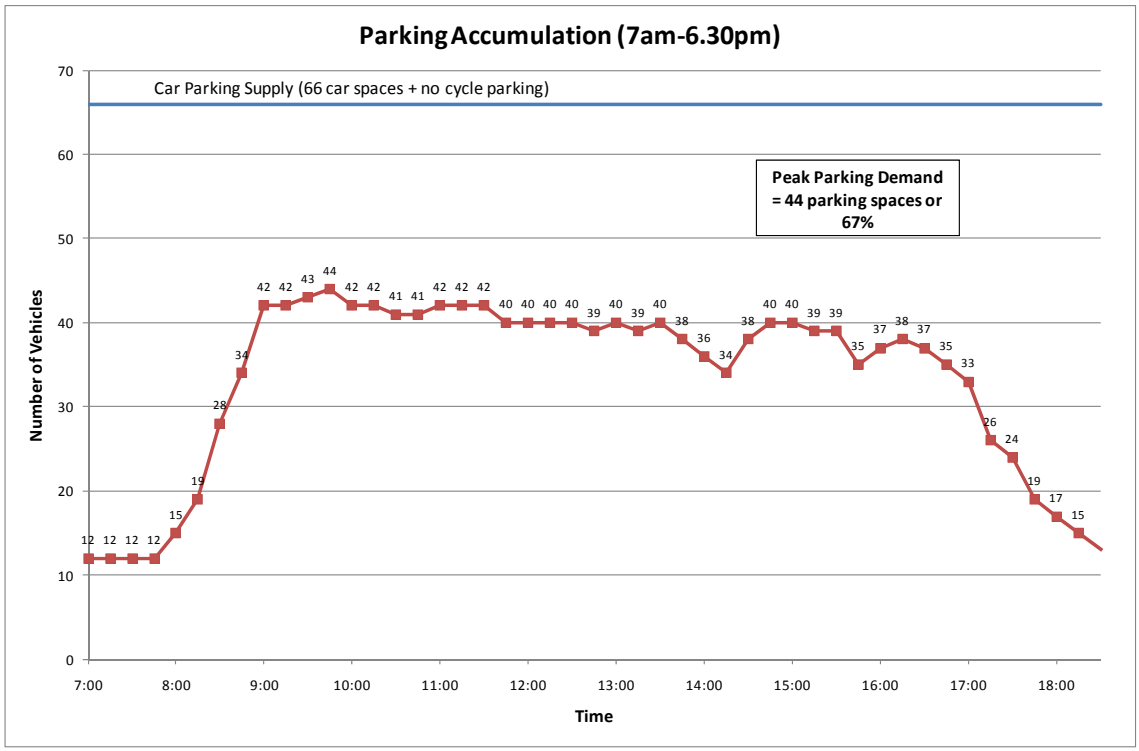


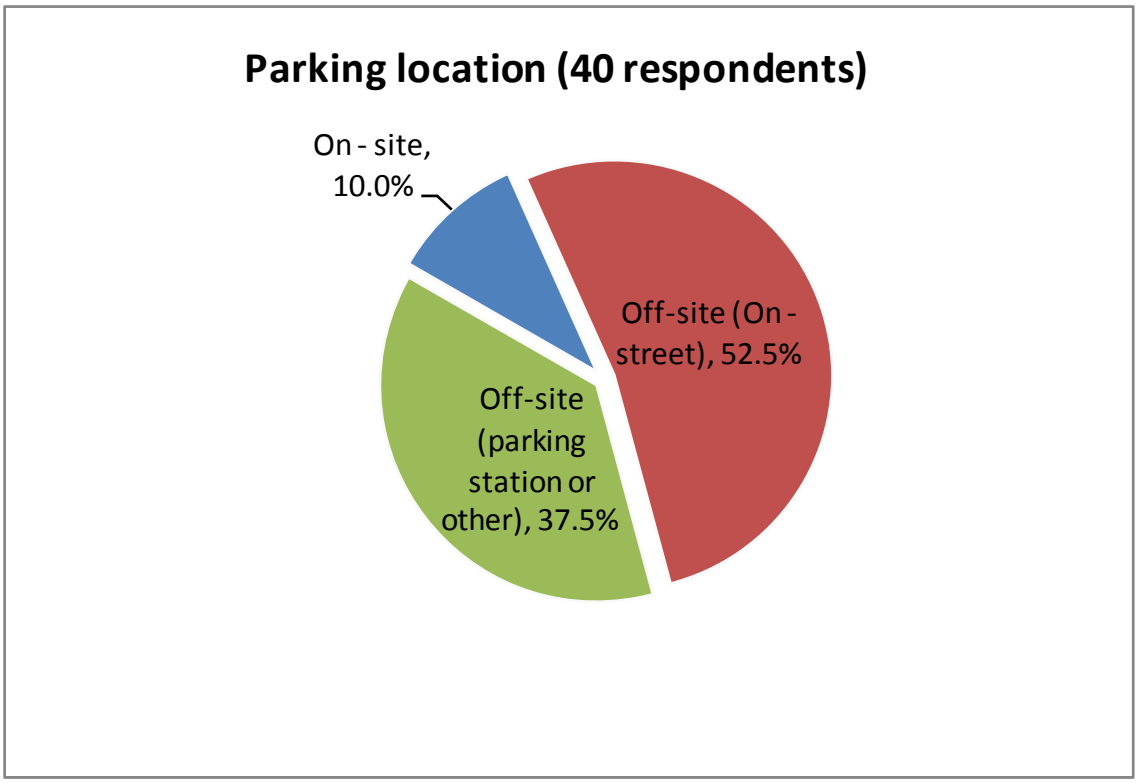
Figure 4.23 indicates a peak on-site car park occupancy of 67% equivalent to **44 parking spaces** out of the available 66 parking spaces which occurred at approximately 9:45am-10:00am.

Off-Site Parking Data

On-street parking surrounding the site is time restricted and metered in some areas. Long term off-street parking is located in several locations in the surrounding CBD area, within 400 metres of the site. Westfield Shopping Centre is located approximately 300 metres west of the site and has 3000 spaces available for free all day parking. There is also another 230 spaces available at the Hurstville Central Shopping Centre, located above Hurstville train station to the south, as well as council car parks located on Dora St and Carrington Avenue, which provide another 270 parking spaces.

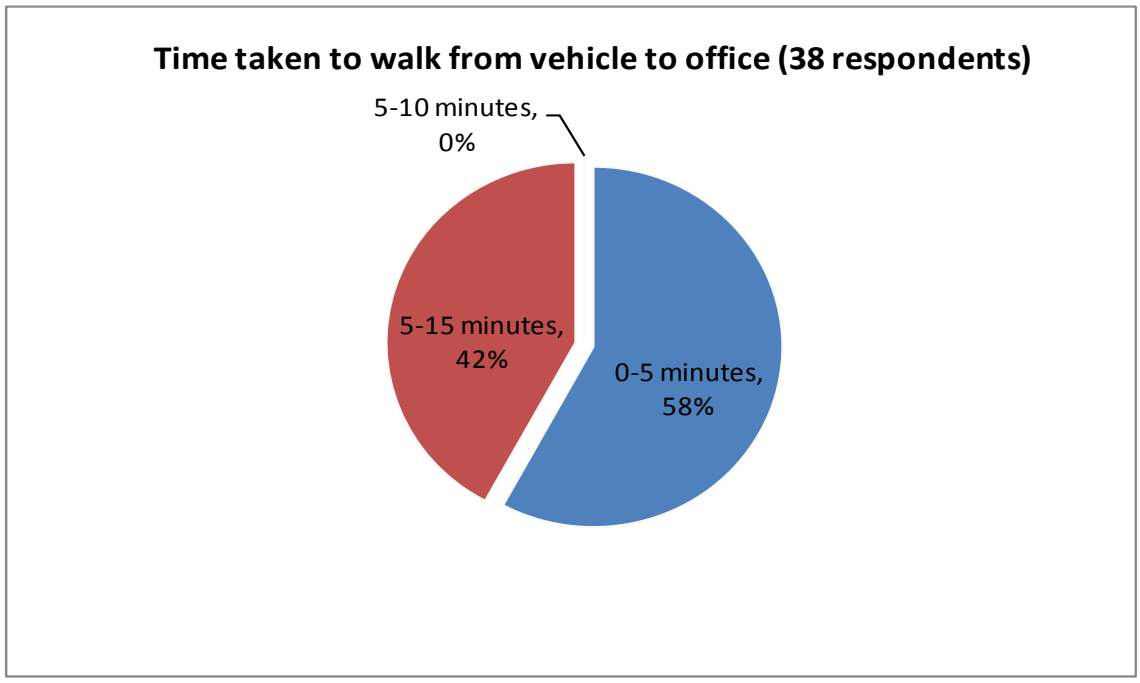
Figure 4.24 confirms there is a large proportion of drivers who park either on-street or at another nearby parking station.

Figure 4.24: On and Off Street Parking Summary



It should also be noted that a majority of drivers (58%) parked within close proximity of the site (0-5 minutes walk or within 400m) and the remaining drivers parking further away (10-15 minutes walk) indicating there may be a shortfall of parking in the immediate vicinity of the site as indicated in Figure 4.25.

Figure 4.25: Time to walk from off-site parking



Commercial Vehicle Parking Data

There were not any loading bays provided on site for servicing of the building at 33 McMahon Street. Figure 4.26 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period, which shows the need for the provision of loading bays.

Figure 4.26: Commercial Vehicle Parking Accumulation

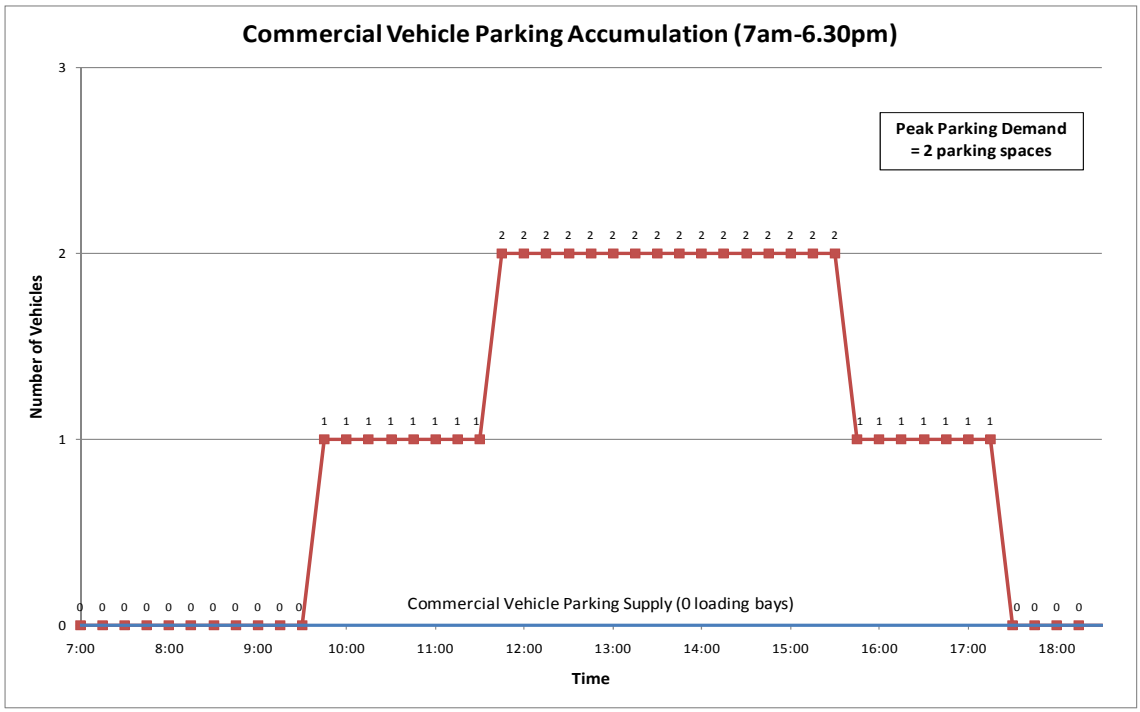


Figure 4.26 indicated the peak number of commercial vehicles accessing the site was 2, which occurred between 11:45am and 3:30pm.

4.4.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.27.

Table 4.27: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
95	78%	74	44	30	2.27/100m² GFA

4.4.6 Public Transport Accessibility

Hurstville Station Access

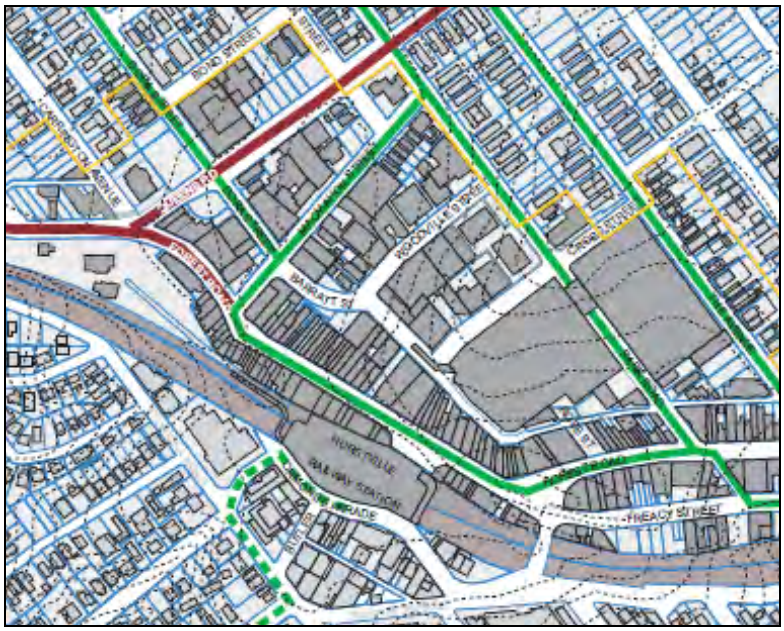
The 33 McMahon Street site is located within 400m of the Hurstville train station with good pedestrian facilities (footpaths and controlled pedestrian crossings) for staff and visitors accessing the interchange. Hurstville station is on the South line of the City Rail Network which provides direct connections to the City, Bondi Junction, Sutherland or to Cronulla.

It has been estimated that during the AM and PM peak period, based on current mode split data for the McMahon Street site that approximately **2 people walk** to and from Hurstville station during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the Hurstville City Centre Concept Master Plan is provided in Figure 4.27 which indicates there is an on-road cycle path along McMahon Street, which connects to Park Road in the northeast, Forrest Road in the southwest and Dora Street in the northwest.

Figure 4.27: Hurstville City Centre Concept Master Plan Extract



The site has no bicycle parking spaces provided with the site and on the day of the survey there were no cyclists recorded accessing the site.

As this site has no bicycle parking, a bicycle parking rate per employee cannot be determined.

4.5 OB 5 – 16 Giffnock Avenue, Macquarie Park

4.5.1 Site Summary

The site is located on Giffnock Avenue in the Macquarie Park Business District, a short distance from Macquarie Park train station with key details indicated in Table 4.28.

Table 4.28: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[10]
240 (240)	5 floors 5,748m² GFA	269 car spaces. 0 bike spaces	3 loading bays	Mon-Fri, 8am-6:00pm	3	Professional/ Building	0.9

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.5.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.29.

Table 4.29: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	08:00-09:00	78	95%	5%	1.4/100m² GFA	0.29/parking space
PM Peak	15:30-16:30	63	11%	89%	1.1/100m² GFA	0.23/parking space
Daily	07:00-18:30	450	53%	47%	7.8/100m² GFA	1.67/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

There were a total of 11 commercial vehicles accessing the site over the survey period of which 5 arrived between 7:15am and 10:30am, 3 between 11:00am and 12:45pm and 3 between 3:45pm and 4:00pm. The peak hour commercial vehicle movements into and out of the site (maximum 3 trips/hour) occurred during the morning period between 9:15am and 10:15am and in the afternoon between 3:00pm and 4:00pm. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.30.

Table 4.30: Survey Summary (Person Trips) – All Modes

Period	Time	Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	07:30-08:30	142
PM Peak	15:30-16:30	126
Daily	07:00-18:30	1,079

[10] The methodology for calculating the accessibility score is contained in Data Report

Figure 4.28 provides details of the building person accumulation over the survey period.

Figure 4.28: Person Accumulation

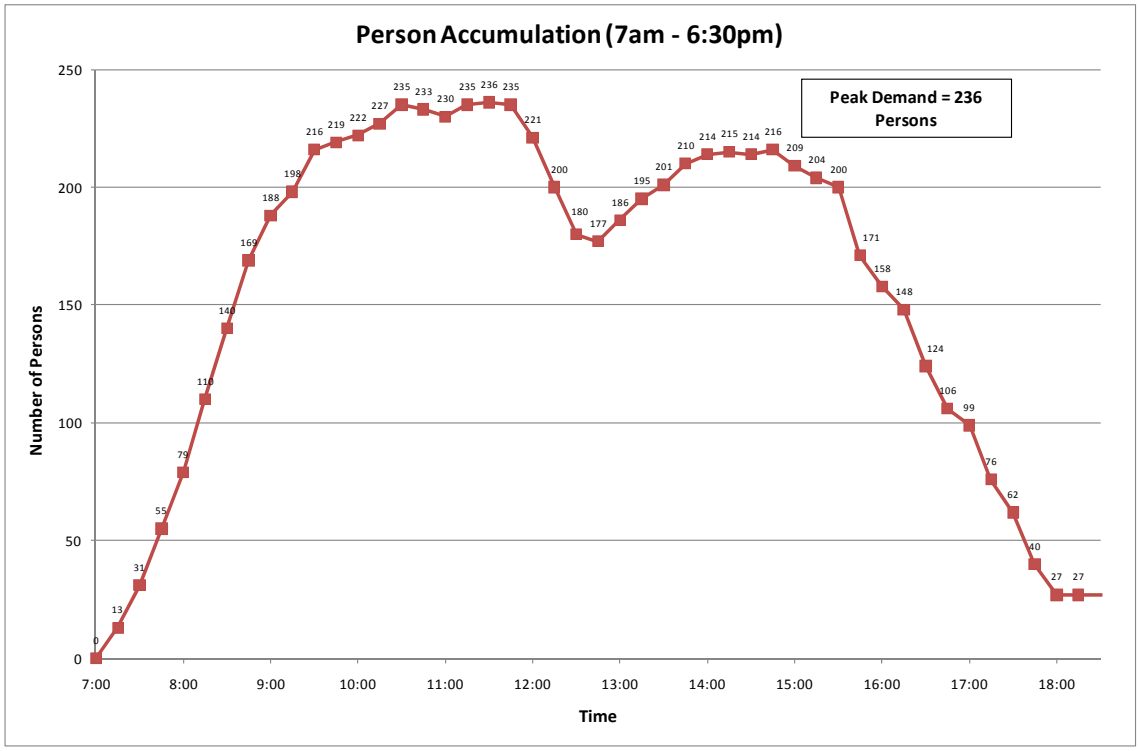
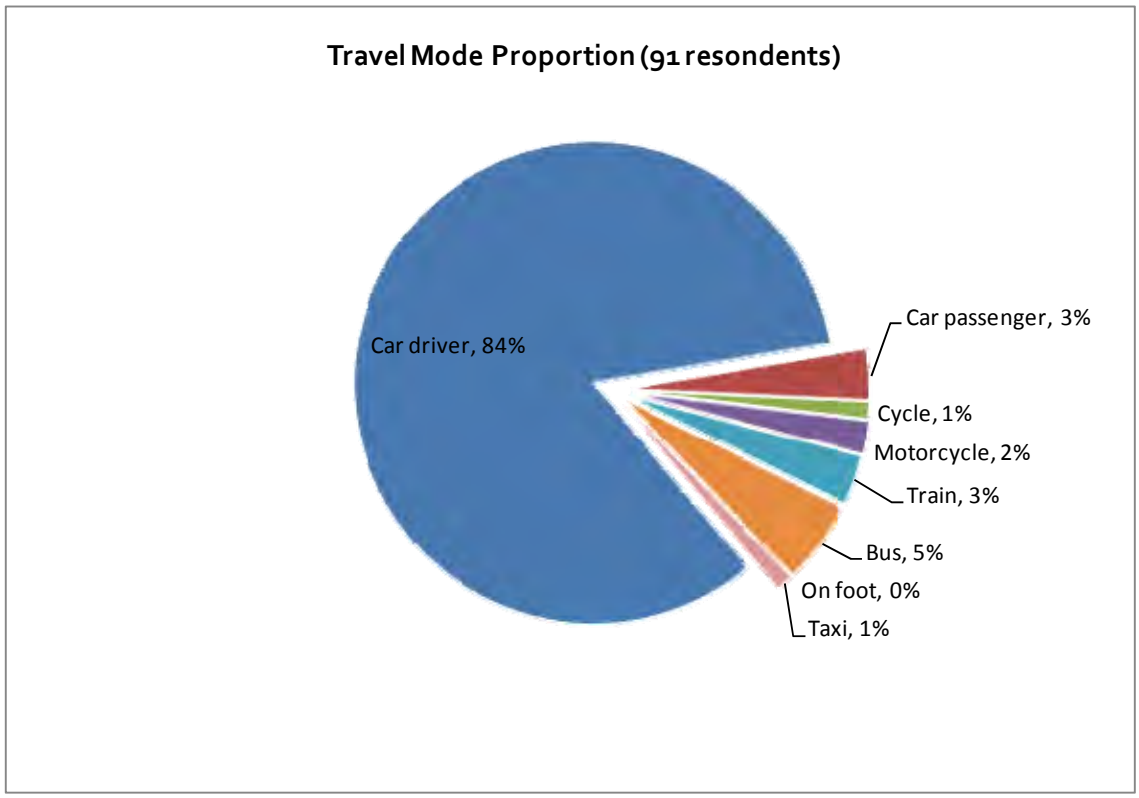


Figure 4.28 indicates that most people are at work during the morning peak period of 11:30am.

Mode Split Data

The mode split for this site which was determined from the pedestrian questionnaire surveys is shown in Figure 4.29 with the number of trips made whilst at work (i.e. not commuter trips) shown in Figure 4.30.

Figure 4.29: Mode of Travel



There were 91 respondents on the day of the survey at the Macquarie Park site which included 90 staff and 1 visitor. This represented a good sample size of approximately 38% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

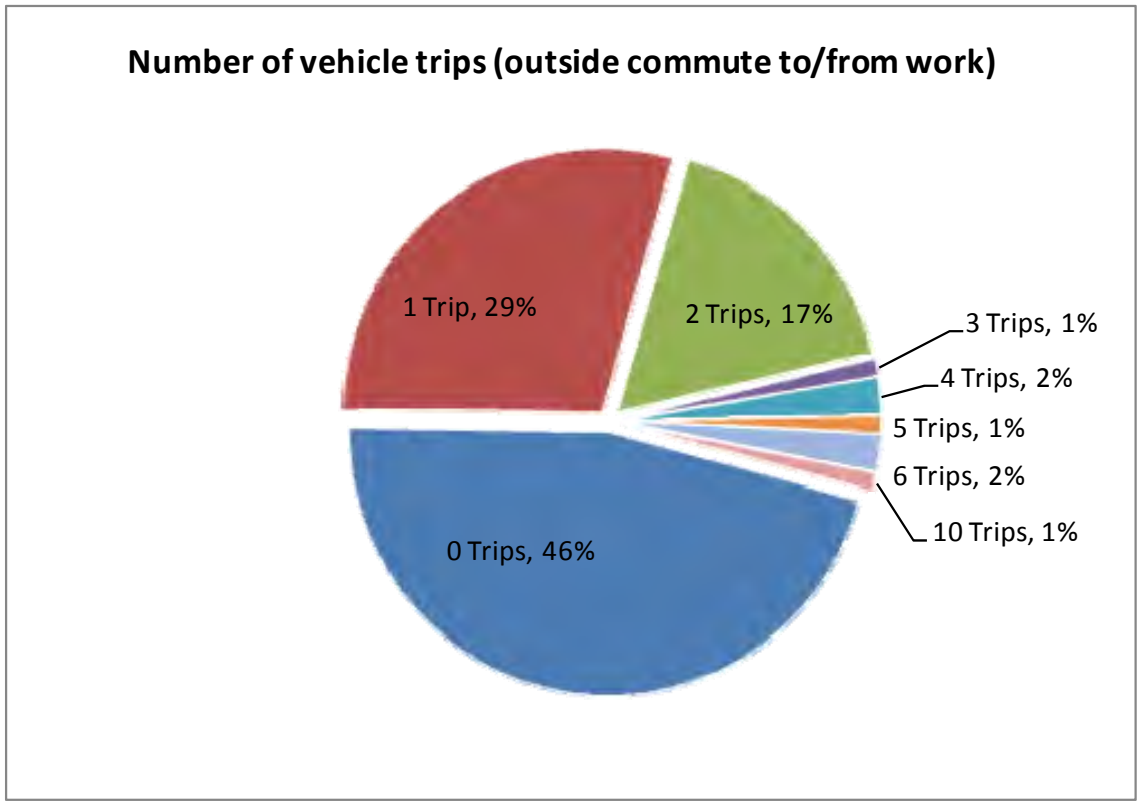
Figure 4.29 implies that 84% of people travelled to and from the site by private car, with 3% travelling by private car as a passenger[11], 8% travelling to the site by public transport (train and bus), 2% by motorcycle, 1% cycling and 1% catching a taxi[12]. Nobody walked to the site.

Non- Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site was determined to be 1.06 vehicle trips/person as indicated by Figure 4.30.

[11] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.
[12] The taxi trip was a member of staff.

Figure 4.30: Non Commuter Period (During Working Hours) Trips



4.5.3 Trip Generation Analysis

Applying the car driver mode split (84%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours and throughout the day as indicated in Table 4.31.

Table 4.31: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	07:45-08:45	142	84%	119	2.47/100m² GFA	2.07/100m² GFA
PM Peak	15:30-16:30	126	84%	106	2.19/100m² GFA	1.84/100m² GFA
Daily	07:00-18:30	1,079	84%	906	18.77/100m² GFA	15.76/100m² GFA

Road Network Peak Hour & Trips

The **road network PM peak hour** on Giffnock Avenue is distinctly different from the site PM peak hour with the PM road network peak hour being **4:30pm-5:30pm**. The site AM peak hour and the road network peak hour are the same, i.e. **7:45am-8:45am**. The vehicle trips generated by the site during the road network peak hours were the same and approximately 30% less during the AM and PM peak hour respectively, as shown in Table 4.32.

Table 4.32: Survey Summary (Vehicle Trips during the Road Network Peak Hours)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	07:45-08:45	119	90%	10%	2.07100m² GFA	0.44/parking space
PM Peak	16:30-17:30	72	14%	86%	1.25/100m² GFA	0.27/parking space

4.5.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in City of Ryde's LEP and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.33. The on-site parking at this site is fairly generous given the location of the site in relation to Macquarie Park station.

Table 4.33: Parking Rates

Source	Parking Rates (Gross Floor Area)	
Existing Site (269 parking spaces)	1 space/21m²	1 space / 0.89 staff (240 staff)
City of Ryde LEP	Not more than 1 space/46m²	Restrained not specified
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites

It would be reasonable to expect this site to have a lower parking provision given the congestion on the surrounding road network, the availability of public transport (trains) and Council's current planning policies which came into effect before this building was constructed (2008).

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations as indicated.

On-site Parking Data

Figure 4.31 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.31: Parking Accumulation

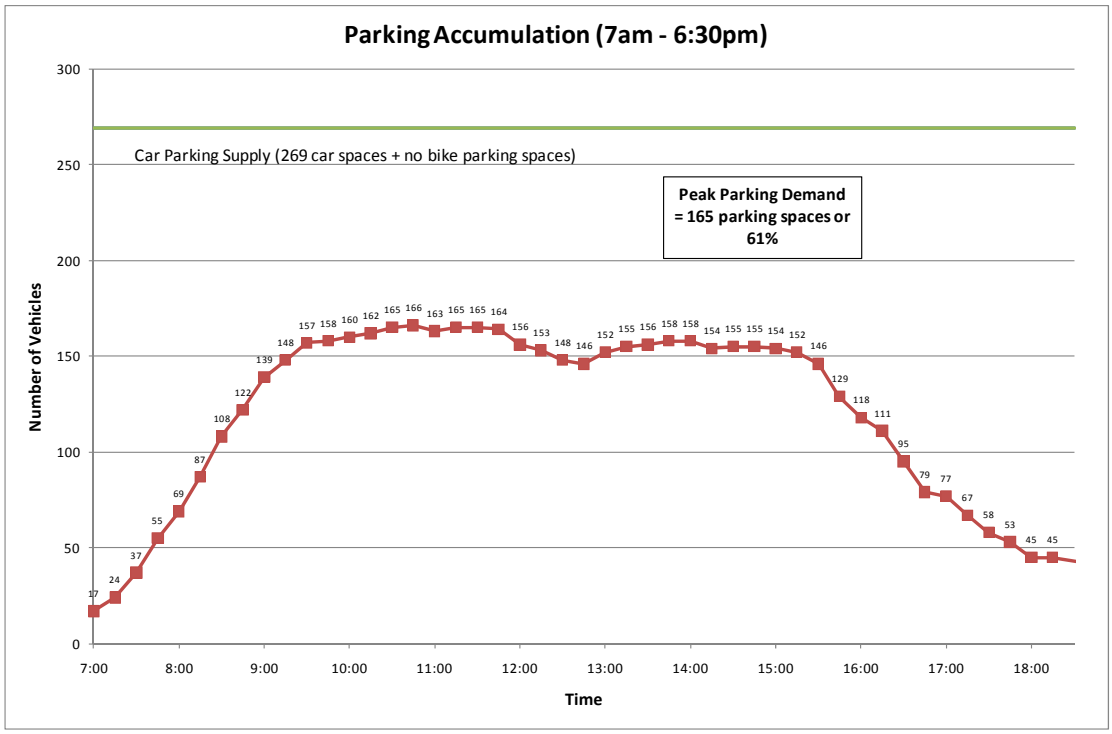


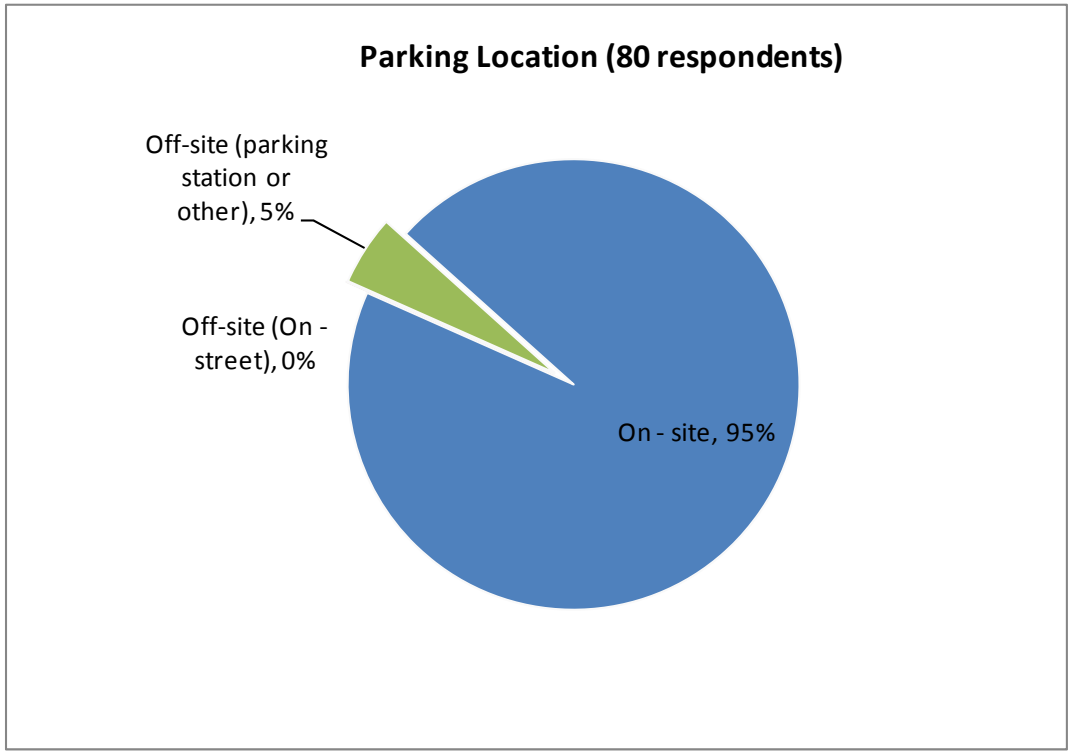
Figure 4.31 indicates a peak on-site car park occupancy of 61% equivalent to **165 parking spaces** out of the available 269 parking spaces which occurred at approximately 11:00am-11:30am.

Off-Site Parking Data

There is very limited on-street parking, due to the location of the site within a business park, where most buildings have private on-site parking for staff and visitors. The surrounding streets within the Macquarie Park corridor are metered and time restricted. Two hour time-restricted parking is located in the streets directly to the south of Epping Road. Unrestricted parking is available south of Kent Road, approximately 1.2 kilometres south of the site. Off street parking is also available at Macquarie University and Macquarie Shopping Centre to the west and northwest of the site.

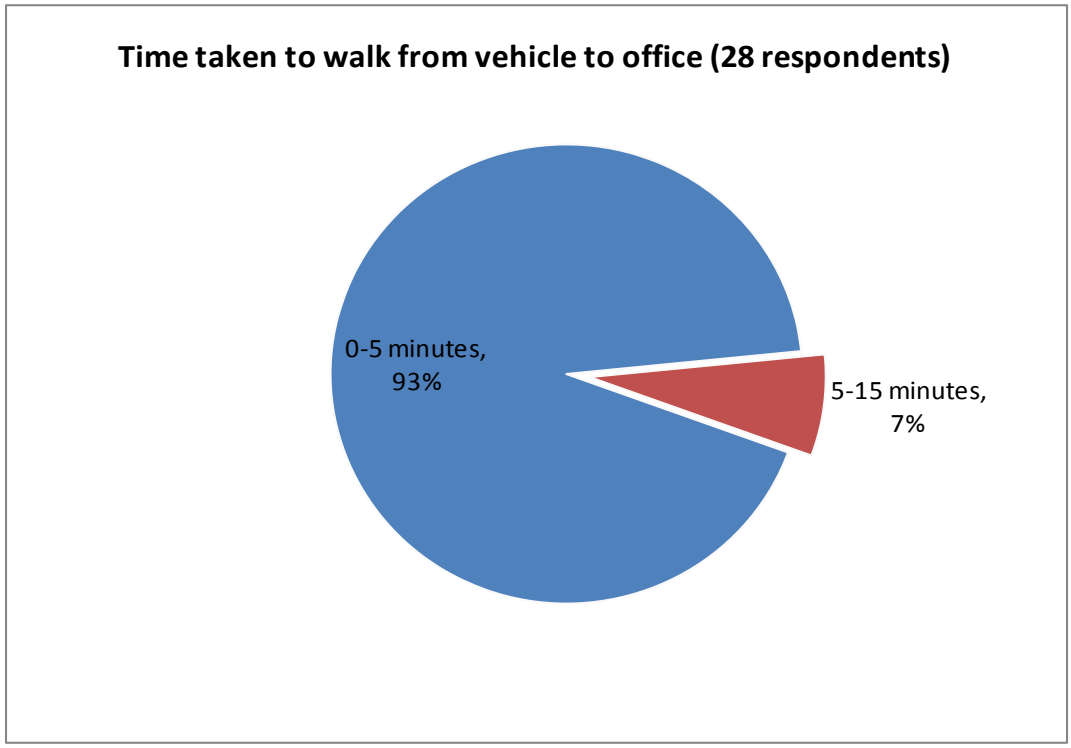
Figure 4.32 confirms there is a proportion of drivers who park either on-street or in alternative parking stations, i.e. off-site.

Figure 4.32: On and Off Street Parking Summary



It should also be noted that a large majority of drivers (93%) parked within close proximity of the site (0-5 minutes walk or within 400m) indicating the ease of finding a parking space close to the site as indicated in Figure 4.33.

Figure 4.33: On and Off Street Parking Summary



Commercial Vehicle Parking Data

There were 3 loading bays provided on site for servicing of the building at 16 Giffnock Avenue. Figure 4.34 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period.

Figure 4.34: Commercial Vehicle Parking Accumulation

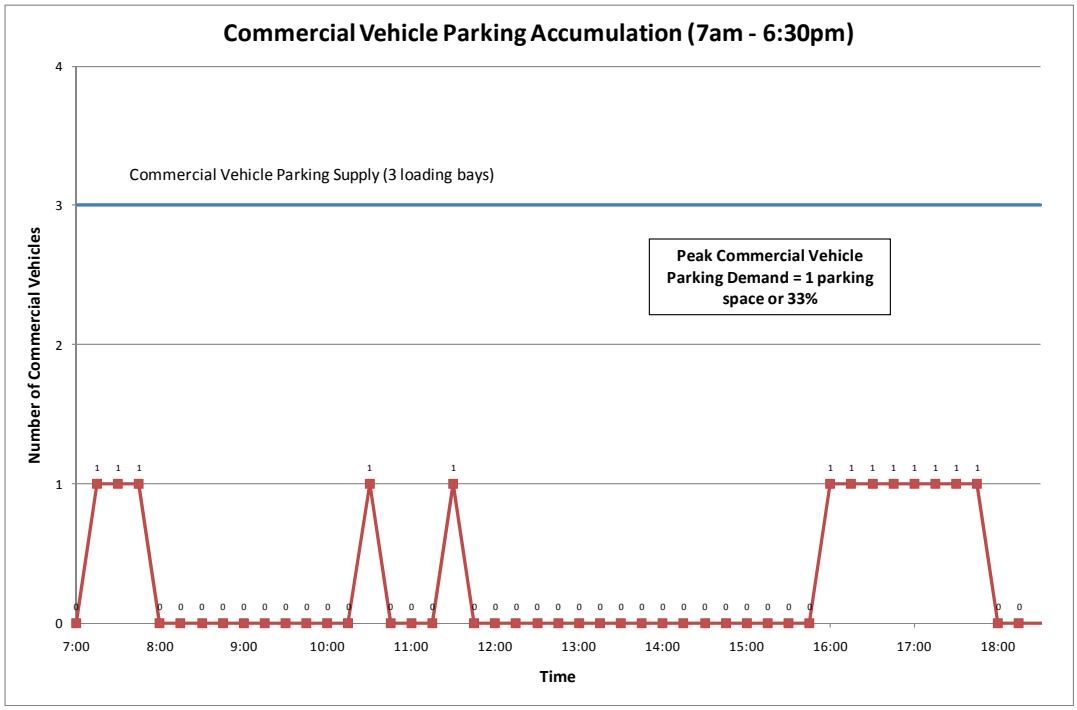


Figure 4.34 indicated the peak number of commercial vehicles using the on-site loading bays was 1, which occurred between 7:15am and 8:00am, at 10:30am, 11:30am and between 4:00pm and 5:45pm.

4.5.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.34.

Table 4.34: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
240	84%	202	165	37	3.57/100m² GFA

Applying the driver mode split proportions to the total number of staff equates to 202 drivers (i.e. 240 x 0.84) of which 165 parked on site leaving 37 drivers who parked either on the street or in alternative off street car parks in close proximity to the site.

4.5.6 Public Transport Accessibility

Macquarie Park Station Access

The 14 Giffnock Avenue site is located within 400m of Macquarie Park Station with good pedestrian facilities (footpaths and a pedestrian crossing on Giffnock Avenue) for staff and visitors accessing the station. Macquarie Park station is on the Northern line of the City Rail Network which provides direct connections to

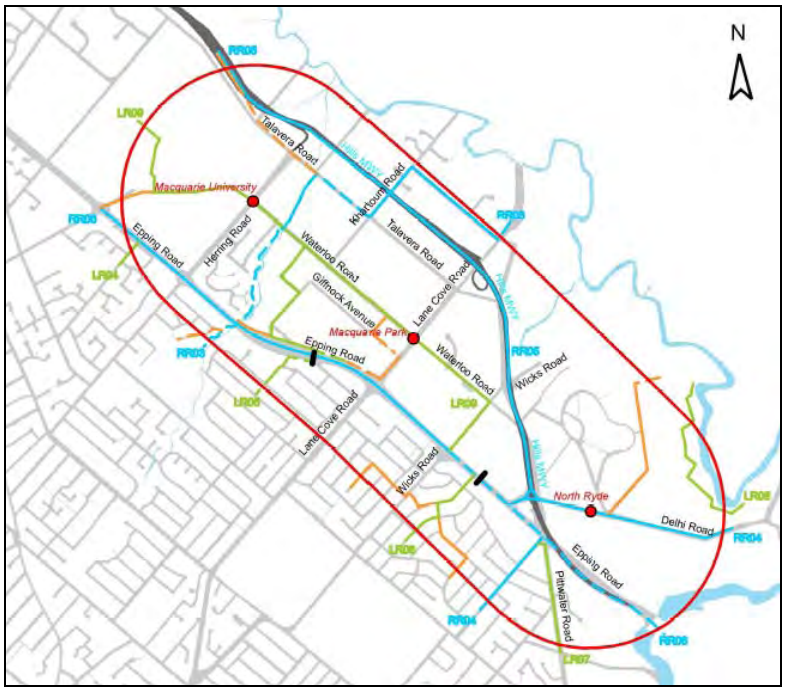
Epping, Chatswood and Hornsby, from which there are services into the City, Strathfield or to the Central Coast.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Giffnock Avenue site, that approximately **7 people walk** to and from Macquarie Park station during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the City of Ryde Integrated Transport and Land Use Strategy is provided in Figure 4.35 which indicates that Giffnock Avenue is not part of the bicycle network. However, there are regional bicycle on road routes on the M2 motorway, between Macquarie Park and Epping and along Epping Road. Access to the M2 motorway is approximately 900 metres from the site. There is also an off-road marked cycle route along Talavera Road, which is approximately 800 meters to the north of the site, which provides an alternate route to the M2 motorway between Macquarie Park in the south and Marsfield Park in the north.

Figure 4.35: City of Ryde Integrated Transport and Land Use Strategy Extract



The site has no bicycle parking spaces provided with the site but on the day of the survey there was one cyclist recorded accessing the site which indicates the need for bicycle parking.

As this site has no bicycle parking, **a bicycle parking rate per employee cannot be determined**.

4.6 OB 6 – 1 Smith Street, Parramatta

4.6.1 Site Summary

The Smith Street site is located within close proximity of the Parramatta train station within the Parramatta CBD with key details indicated in Table 4.35.

Table 4.35: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[13]
1,400 (1,225)	17 floors, 27,000m² GFA	252 car spaces, 150 bike spaces	3 loading bays	Mon-Fri, 7:00am-6:00pm	1	Professional	0.9

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.6.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table4.36.

Table 4.36: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	08:00-09:00	63	84%	16%	0.23/100m² GFA	0.16/parking space
PM Peak	16:15-17:15	58	17%	83%	0.21/100m² GFA	0.14/parking space
Daily	07:00-18:30	471	54%	46%	1.74/100m² GFA	1.17/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

There were a total of 46 commercial vehicles accessing the site over the survey period of which 11 arrived between 7:00am and 9:30am, 13 between 9:45am and 12:00pm, 13 between 1:00pm and 3:00pm and 9 between 3:15pm and 5:45pm. The peak hour commercial vehicle movements into and out of the site (maximum 9 trips/hour) occurred during the afternoon period between 1:00pm and 2:00pm. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.37.

[13] The methodology for calculating the accessibility score is contained in the Data Report

Table 4.37: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	08:00-09:00	387
PM Peak	16:15-17:15	349
Daily	07:00-18:30	5,114

Figure 4.36 provides details of the building person accumulation over the survey period.

Figure 4.36: Person Accumulation

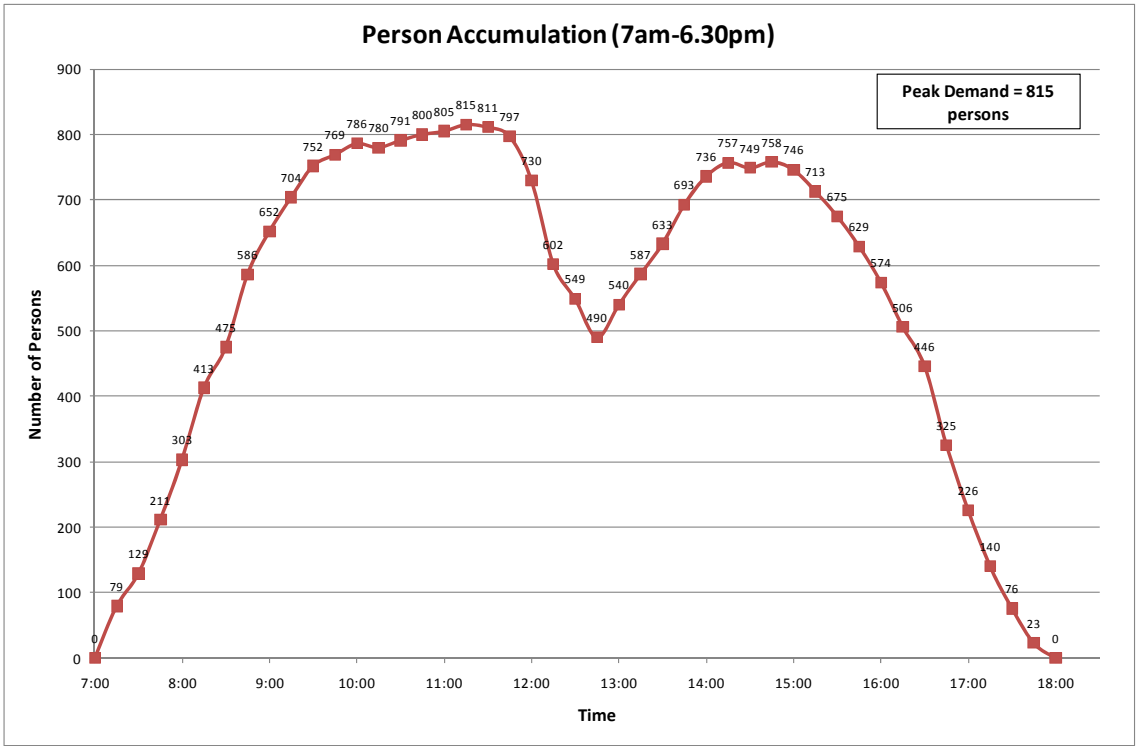
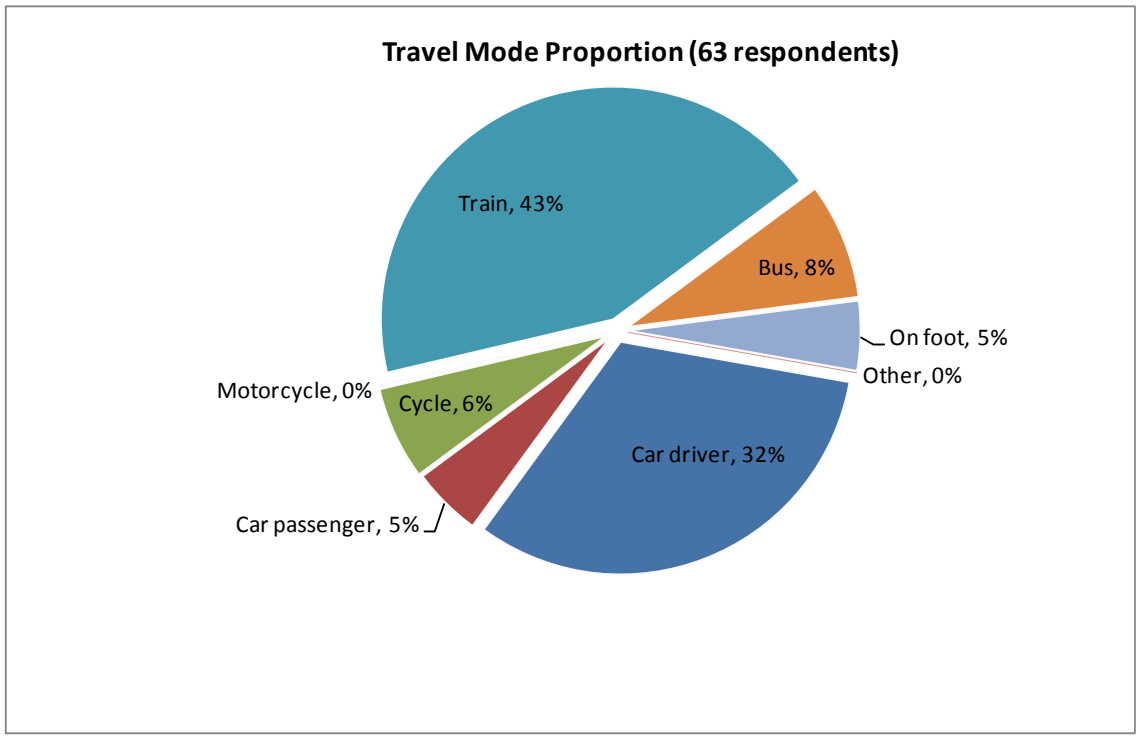


Figure 4.36 indicates that most people are at work during the morning peak period of 11:15am.

Mode Split Data

The mode split for this site, which was determined from the pedestrian questionnaire surveys, is shown in Figure 4.37 with the number of trips made whilst at work (i.e. not commuter trips) shown in Figure 4.38.

Figure 4.37: Mode Split



There were 63 respondents on the day of the survey at the Parramatta site which included 90 staff and 3 visitors. This represented a sample size of only approximately 5% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

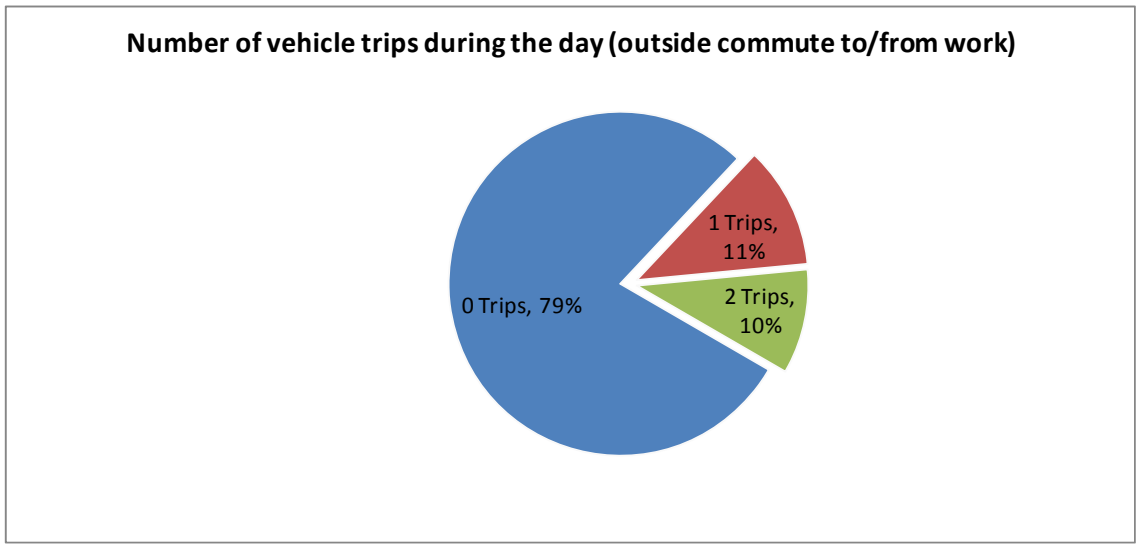
Figure 4.37 indicates that 32% of people travelled to and from the site by private car, with 5% travelling by private car as a passenger[14], 51% travelling to the site by public transport (train and bus), 5% walking and 6% cycling[15]. Nobody travelled to the site by motorcycle.

Non- Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site is 0.29 vehicle trips/person as indicated in Figure 4.38.

[14] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.
[15] The taxi trip was a visitor to the site.

Figure 4.38: Non-Commuter Period (During Working Hours) Trips



4.6.3 Trip Generation Analysis

Applying the car driver mode split (32%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours as indicated in Table 4.38.

Table 4.38: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	08:00-09:00	579	32%	185	1.43/100m² GFA	0.69/100m² GFA
PM Peak	16:15-17:15	518	32%	166	1.29/100m² GFA	0.61/100m² GFA
Daily	07:00-18:30	5,114	32%	1,636	18.94/100m² GFA	6.06/100m² GFA

Road Network Peak Hour & Trips

The **road network PM peak hour** on Smith Street was distinctly different from the site PM peak hour with the PM road network peak hour being **5:15pm-6:15pm**. The site AM peak hour and the road network peak hour are the same, i.e. **8:00am-9:00am**. The vehicle trips generated by the site during the road network peak hours were the same and approximately 55% less during the AM and PM peak hour respectively, as shown in Table 4.39.

Table 4.39: Survey Summary (Vehicle Trips during the Road Network Peak Hours)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	08:00-09:00	185	85%	15%	0.69/100m² GFA	0.46/parking space
PM Peak	17:15-18:15	75	5%	95%	0.28/100m² GFA	0.19/parking space

4.6.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in Parramatta City Centre DCP and Parramatta City Centre Local Environmental Plan 2007and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.40. The on-site parking is slightly lower than the Council's requirements; however the cycle parking provision is significantly higher than the Council's requirements.

Table 4.40: Parking Rates

Source	Parking Rates (Gross Floor Area)	
Existing Site (252 car and 150 cycle parking spaces)	1 space/107m^2	1 space / 5.56 staff (1,400 staff)
Parramatta City Council City Centre LEP	1 car parking space/100m2 GFA	Equivalent to one car parking space per 100 spaces or part thereof.
RTA	1 space/40m^2 (Unrestrained)	Restrained not specified. TBC through surveys of similar sites

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.39 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.39: Peak Parking Accumulation

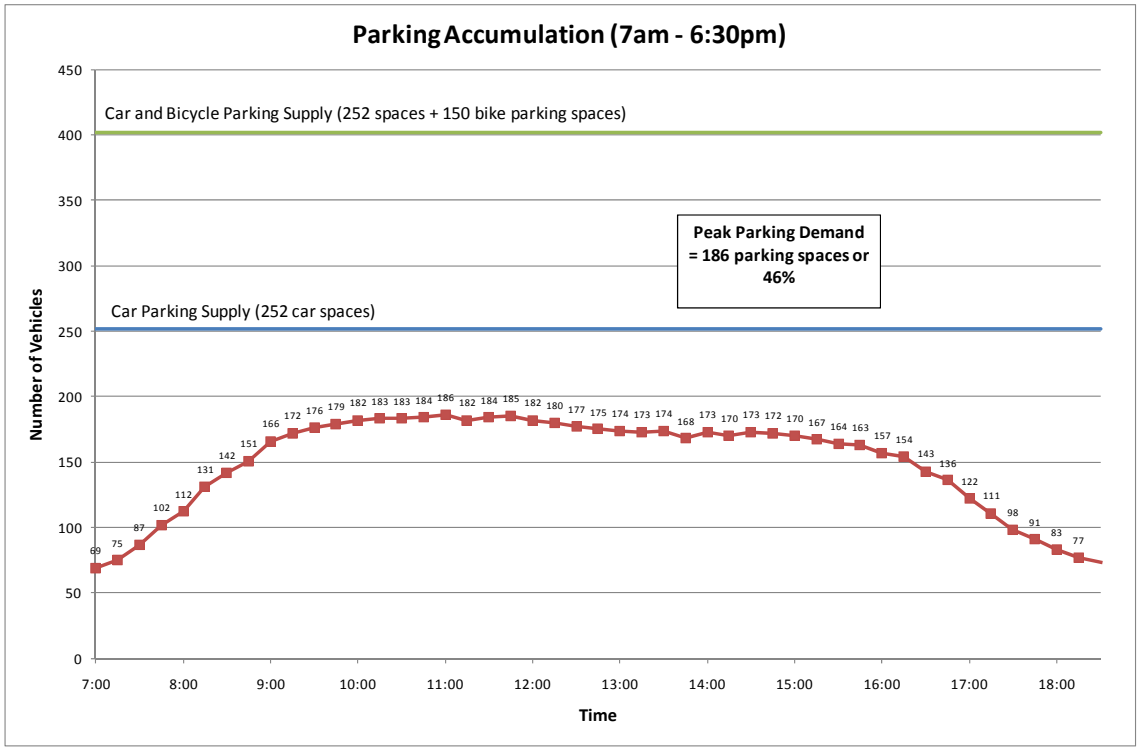


Figure 4.39 indicates a peak on-site car park occupancy of 46% equivalent to **186 parking spaces** out of the available 402 parking spaces which occurred at approximately 11:00am-11:15pm.

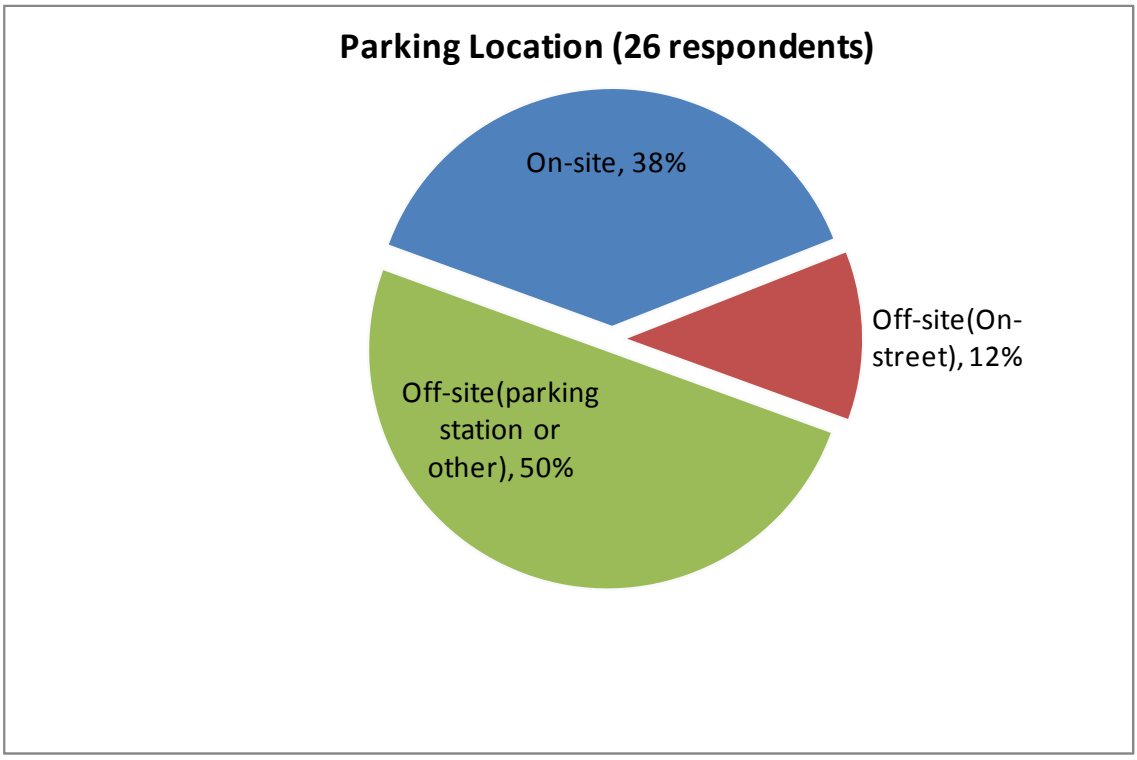
Off-Site Parking Data

On-street parking surrounding the site is metered with all day parking available. On-street parking is also available in the residential areas to the south of the site; however these spaces are time restricted with the exception of residents with permits.

Long term or all day off-street parking is available in a number of Council car parks, for varying fees, depending on the proximity to the CBD. The closest off-street car park is located in Horwood Place, approximately 250 metres north, which has 780 long stay parking spaces. There are also 1163 off-street all day parking spaces located at the Wentworth Street car park approximately 350 metres to the south of the site. Approximately 650 metres west of the site, Hunter Street car park also provides 550 all day parking spaces. There are also 4650 parking spaces located in Westfield Shoppingtown to the west of the site, where short term parking (under three hours) is free; long term parking is also available.

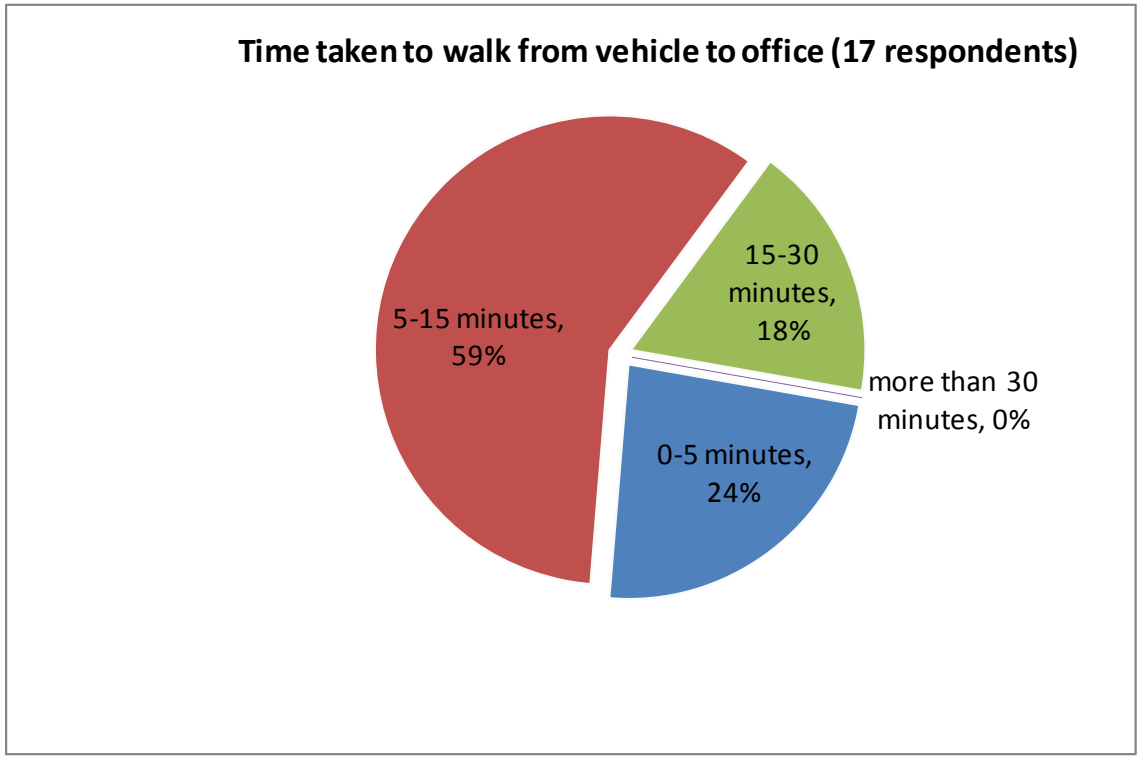
Figure 4.40 confirms there is a proportion of drivers who park either on-street or at another nearby parking station.

Figure 4.40: On and Off Street Parking Summary



It should also be noted that a large majority of drivers (59%) parked a short walk from the site (5-15 minutes walk or within 400m to 1200m) which reflects a proportion of staff parking off-site as indicated in Figure 4.41.

Figure 4.41: Time to walk from off-site parking



Commercial Vehicle Parking Data

There were 6 loading bays provided on site for servicing of the building at 1 Smith Street. Figure 4.42 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period.

Figure 4.42: Commercial Vehicle Parking Accumulation

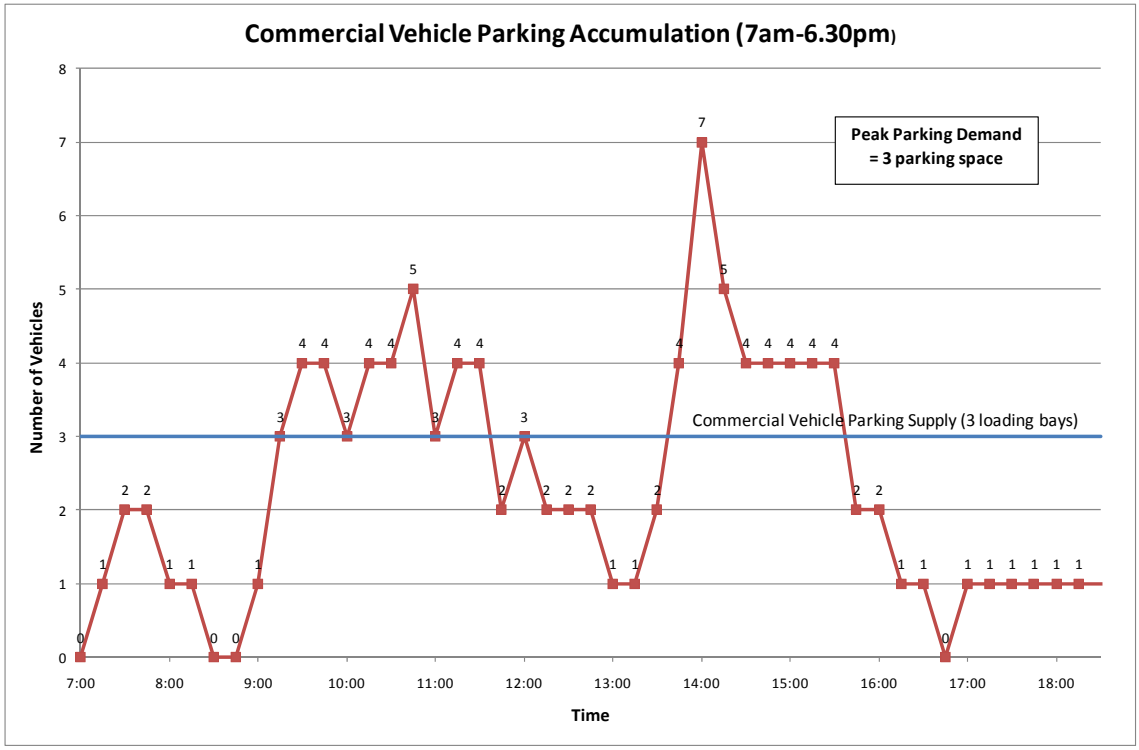


Figure 4.42 indicated the peak number of commercial vehicles using the on-site loading bays was 7, which occurred at 2:00pm.

4.6.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.41.

Table 4.41: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
1,400	32%	448	170	278	1.67/100m^2 GFA

4.6.6 Public Transport Accessibility

Parramatta Transport Interchange Access

The 1 Smith Street site is located within 400m of the Parramatta transport interchange with good pedestrian facilities (footpaths and pedestrian crossings) for staff and visitors accessing the interchange. The Parramatta Transport Interchange provides staff and visitors with an excellent choice of travel to various parts of greater Sydney whether that is by bus or train.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Smith Street site that approximately **600 people walk** to and from the Parramatta Transport Interchange during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the Parramatta Bike Plan is provided in Figure 4.43 which indicates that Smith Street is not part of the Parramatta Bicycle Network although there is a planned north/south on-road cycle route close to the site, along Hassall, Church and Marsden Streets.

Figure 4.43: Parramatta City Council Bike Plan Extract

The site has 150 bicycle parking spaces provided with the basement car park but on the day of the survey there were 16 cyclists recorded accessing these spaces.

This equates to a rate of **9 bicycle parking space per employee** or 11% of all staff.

4.7 OB 7 – 13-15 Moore Street, Liverpool

4.7.1 Site Summary

The Moore Street site is located a short distance from Liverpool train station in the Liverpool Town Centre and is surrounded by adjacent office blocks with key details indicated in Table 4.42.

Table 4.42: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[16]
99 (88)	4 floors, 2,817m² GFA	28 car spaces, 0 bike spaces	0 loading bays	Mon-Fri, 9:00am-5:00pm	9	Professional	0.9

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.7.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.43.

Table 4.43: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	07:15-08:15	9	89%	11%	0.33/100m² GFA	0.32/parking space
PM Peak	16:15-17:15	8	25%	75%	0.28/100m² GFA	0.29/parking space
Daily	07:00-18:30	52	50%	50%	1.85/100m² GFA	1.86/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

One commercial vehicle accessed the site over the survey period which arrived and departed between 7:30am and 8:00am. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.44.

Table 4.44: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	09:45-10:45	95
PM Peak	15:30-16:30	65
Daily	07:00-18:30	700

[16] The methodology for calculating the accessibility score is contained in the Data Report

Figure 4.44 provides details of the building person accumulation over the survey period.

Figure 4.44: Person Accumulation

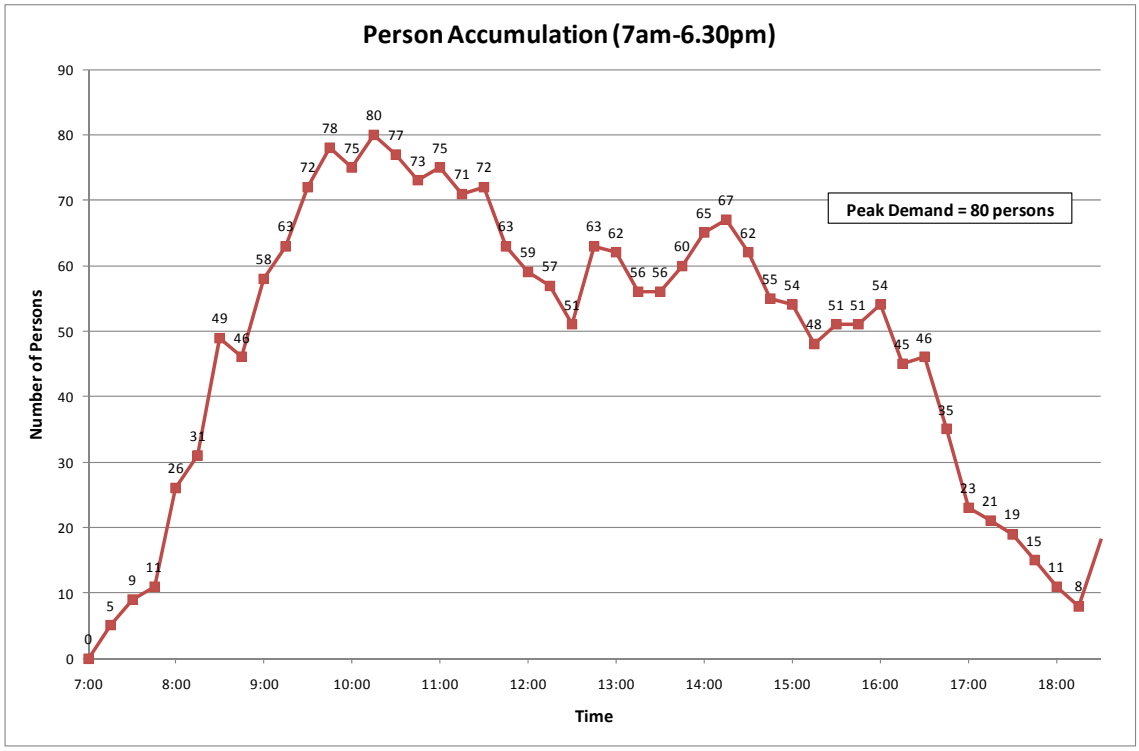
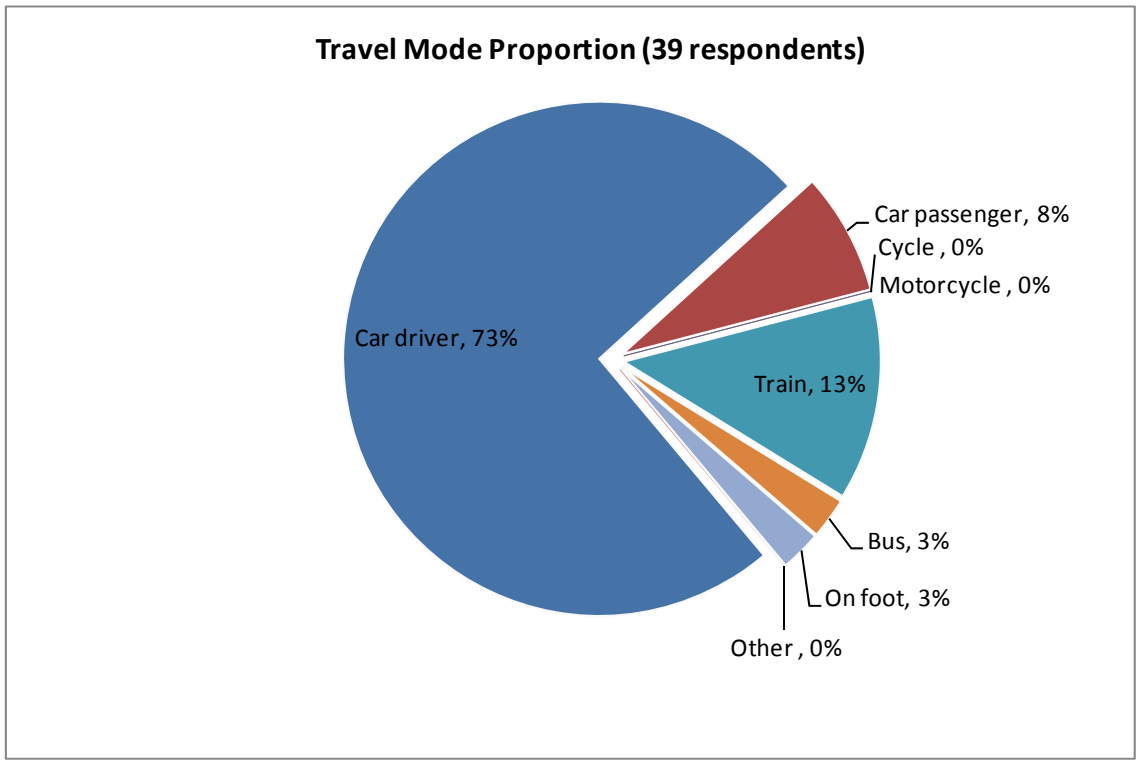


Figure 4.44 indicates that most people are at work during the morning peak period of 10:15am.

Mode Split Data

The mode split for this site, which was determined from the pedestrian questionnaire surveys, is shown in Figure 4.45 with the number of trips made whilst at work (i.e. not commuter trips) shown in Figure 4.46.

Figure 4.45: Mode Split



There were 39 respondents on the day of the survey at the Liverpool site which included 33 staff and 6 visitors. This represented a good sample size of approximately 33% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

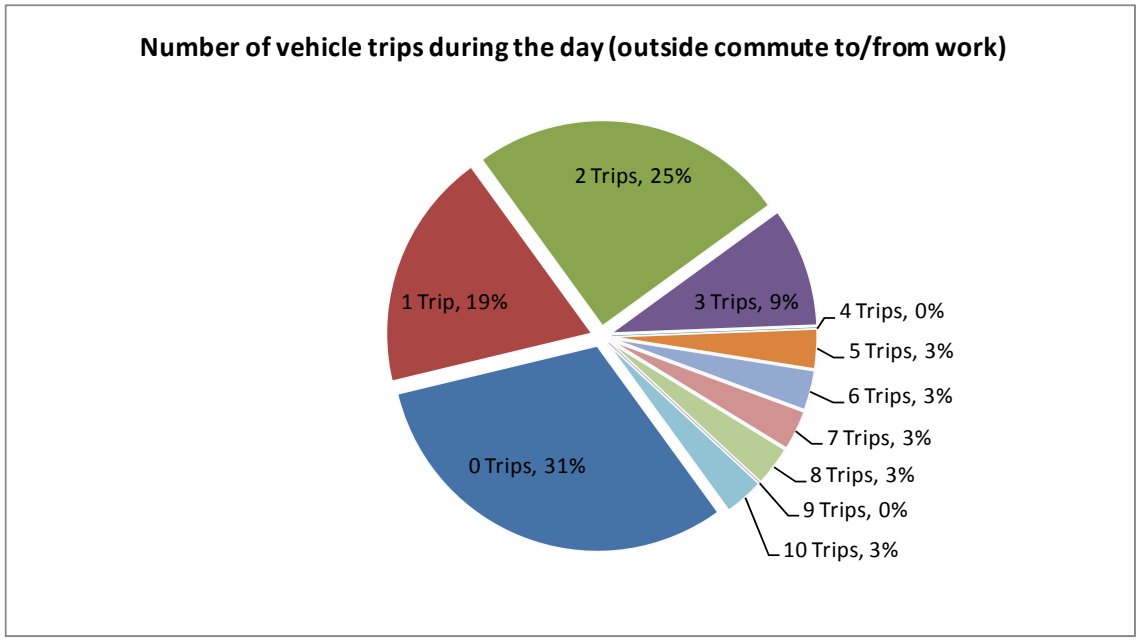
Figure 4.45 indicates that 74% of people travelled to and from the site by private car, with 8% travelling by private car as a passenger[17], 16% travelling to the site by public transport (train and bus) and 3% walking. Nobody travelled to the site by motorcycle, bicycle or taxi.

Non- Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site is 2.09 vehicle trips/person is indicatd in Figure 4.46.

[17] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.

Figure 4.46: Non-Commuter Period (During Working Hours) Trips



4.7.3 Trip Generation Analysis

Applying the car driver mode split (74%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours as indicated in Tables 4.45.

Table 4.45: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	09:45-10:45	95	74%	70	3.37/100m² GFA	2.48/100m² GFA
PM Peak	15:30-16:30	65	74%	48	2.31/100m² GFA	1.70/100m² GFA
Daily	07:00-18:30	700	74%	518	24.85/100m² GFA	18.39/100m² GFA

Road Network Peak Hour & Trips

The **road network AM and PM peak hours** on Moore Street are distinctly different from the site AM and PM peak hours with the AM and PM road network peak hours being **10:30am-11:30am and 3:15pm-4:15pm** respectively. The vehicle trips generated by the site during the road network peak hours were approximately 20% and 5% less during the AM and PM peak hour respectively, as shown in Table 4.46.

Table 4.46: Survey Summary (Vehicle Trips during the Road Network Peak Hours)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	10:30-11:30	57	44%	56%	2.02/100m² GFA	2.03/parking space
PM Peak	15:15-16:15	46	50%	50%	1.63/100m² GFA	1.64/parking space

4.7.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in Liverpool City Council's DCP and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.47. The on-site parking at this site is in accordance with the requirements set out in Council's current planning policies and significantly lower than the RTA's requirements, which is reasonable to expect given the proximity to Liverpool Station.

Table 4.47: Parking Rates

Source	Parking Rates (Gross Floor Area)	
Existing Site (28 parking spaces)	1 space/100m² GFA	1 space / 3.54 staff (99 staff)
Liverpool City Council DCP	1 space/100m² GFA (Unrestrained)	
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.47 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.47: Parking Accumulation

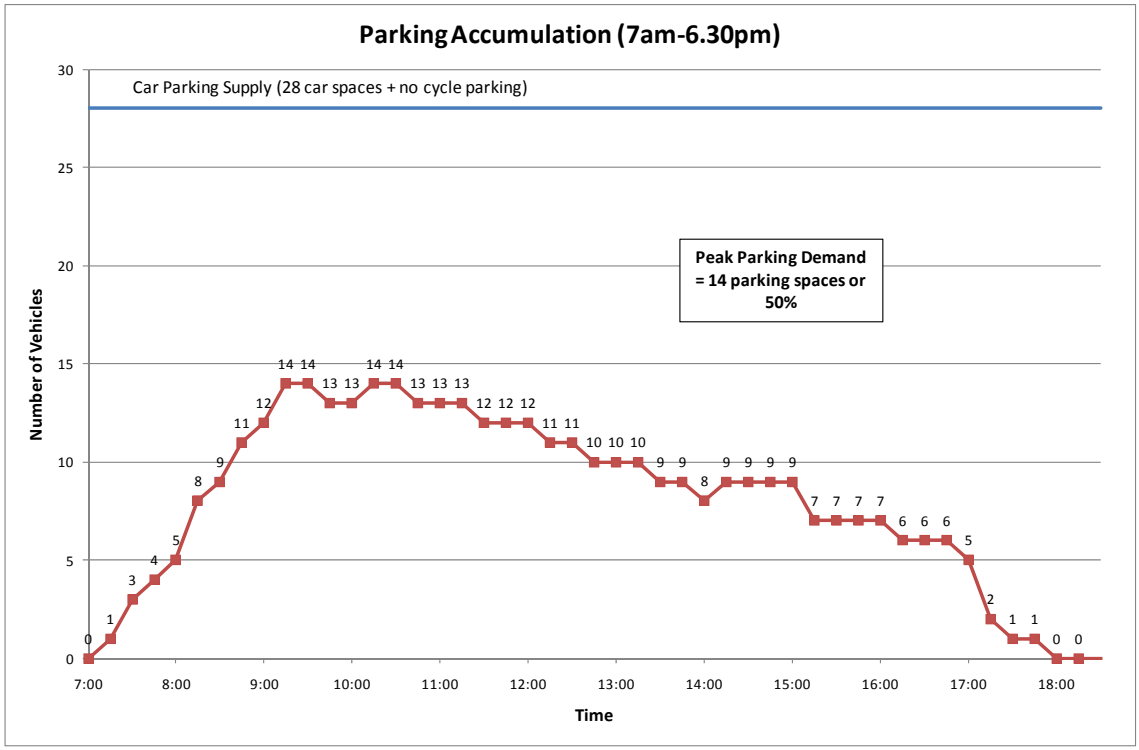


Figure 4.47 indicates a peak on-site car park occupancy of 50% equivalent to **14 parking spaces** out of the available 28 parking spaces which occurred at approximately 9:15am-9:45am and 10:15am-10:45am.

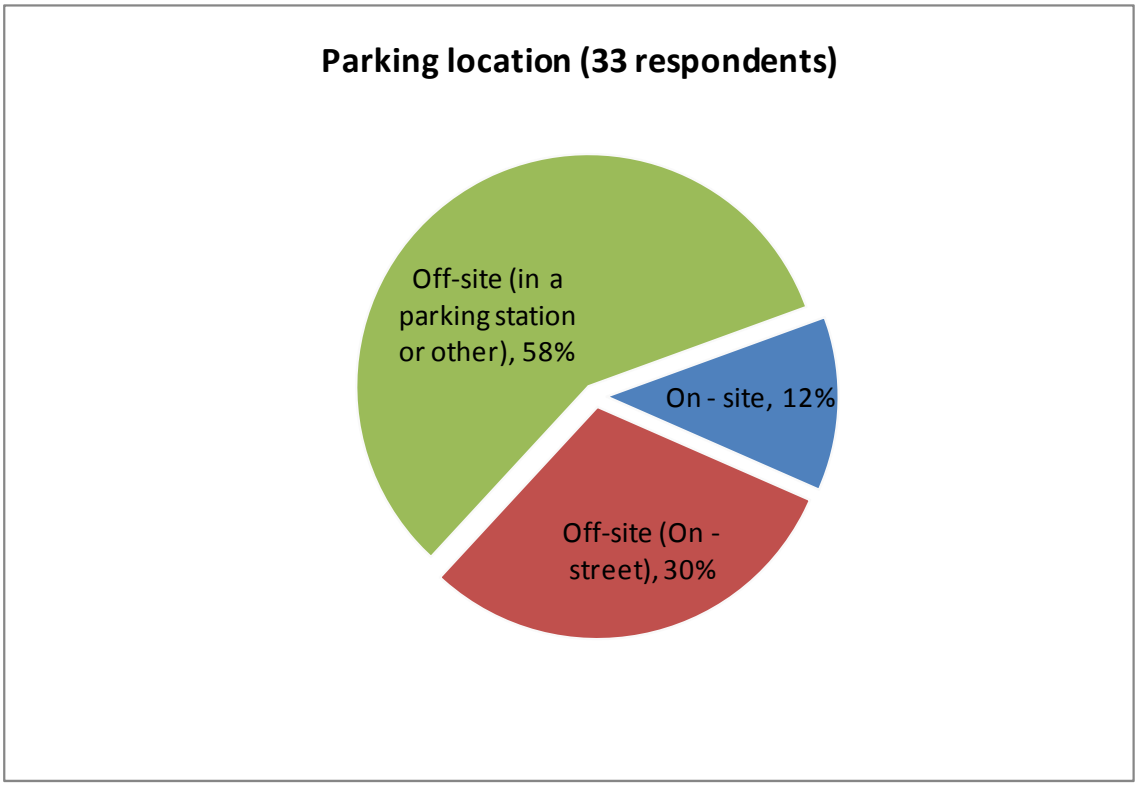
Off-Site Parking Data

On-street parking surrounding the site is time restricted and metered in some areas. There is some unrestricted on-street parking available in the residential areas outside the City Centre, approximately 600m south, and 1km west of the site.

Long term off-street parking is available in the Warren Serviceway car park in the lane at the rear of the building. There are 666 all day spaces available. There are also 250 spaces for long stay parking located at the Liverpool Plaza car park approximately 300m west of the site. There are also over 2500 spaces available in the Westfield Liverpool shopping centre where short term parking (under three hours) is free; long term parking is also available.

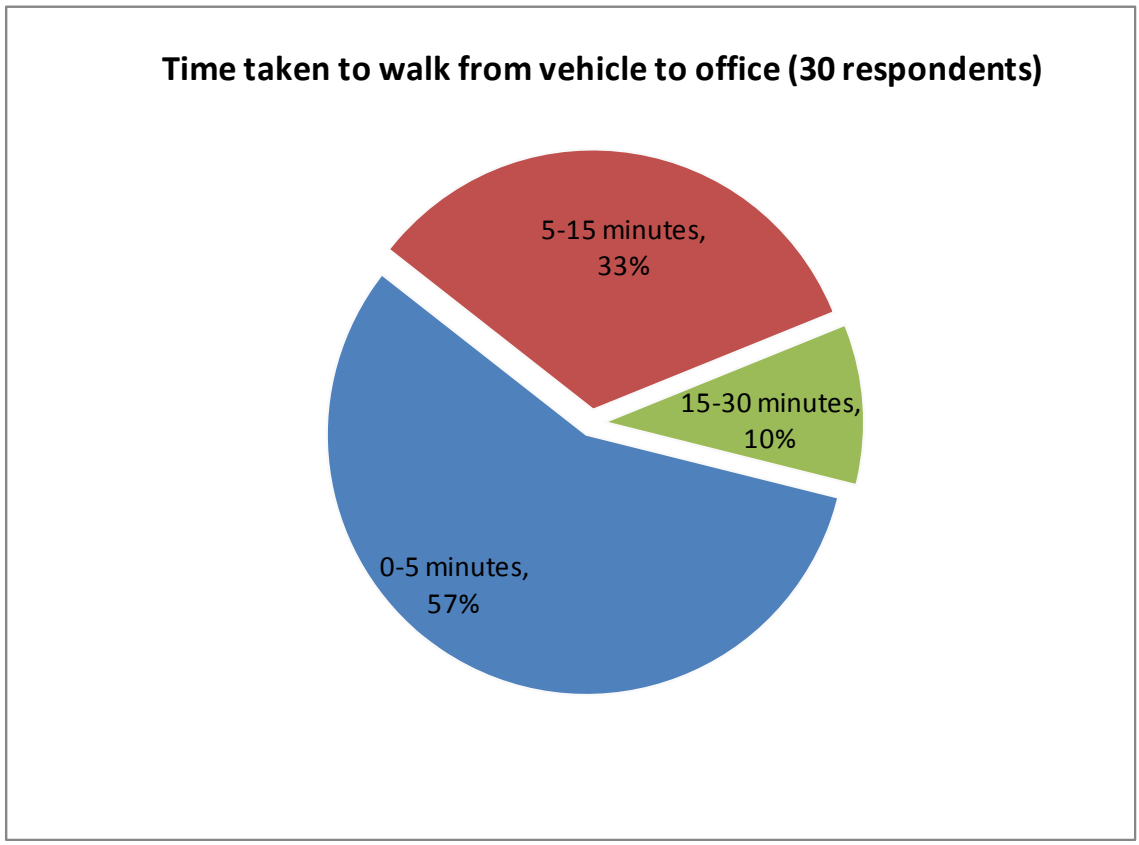
Figure 4.48 confirms there is a proportion of drivers who park either on-street or at another nearby parking station.

Figure 4.48: On and Off Street Parking Summary



It should also be noted that the majority of drivers (57%) parked within close proximity of the site (0-5 minutes walk or within 400m) indicating there was available parking spaces close to the site as indicated in Figure 4.49. There was also a significant proportion (33%) of drivers who parked further away (5-15 minutes walk) which may indicate the available on-street parking varies throughout the day and when demand increases parking in close proximity to the site becomes unavailable.

Figure 4.49: Time to walk from off-site parking



Commercial Vehicle Parking Data

No loading bays were provided on site for servicing of the building at 13-15 Moore Street. Figure 4.50 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period.

Figure 4.50: Commercial Vehicle Parking Accumulation

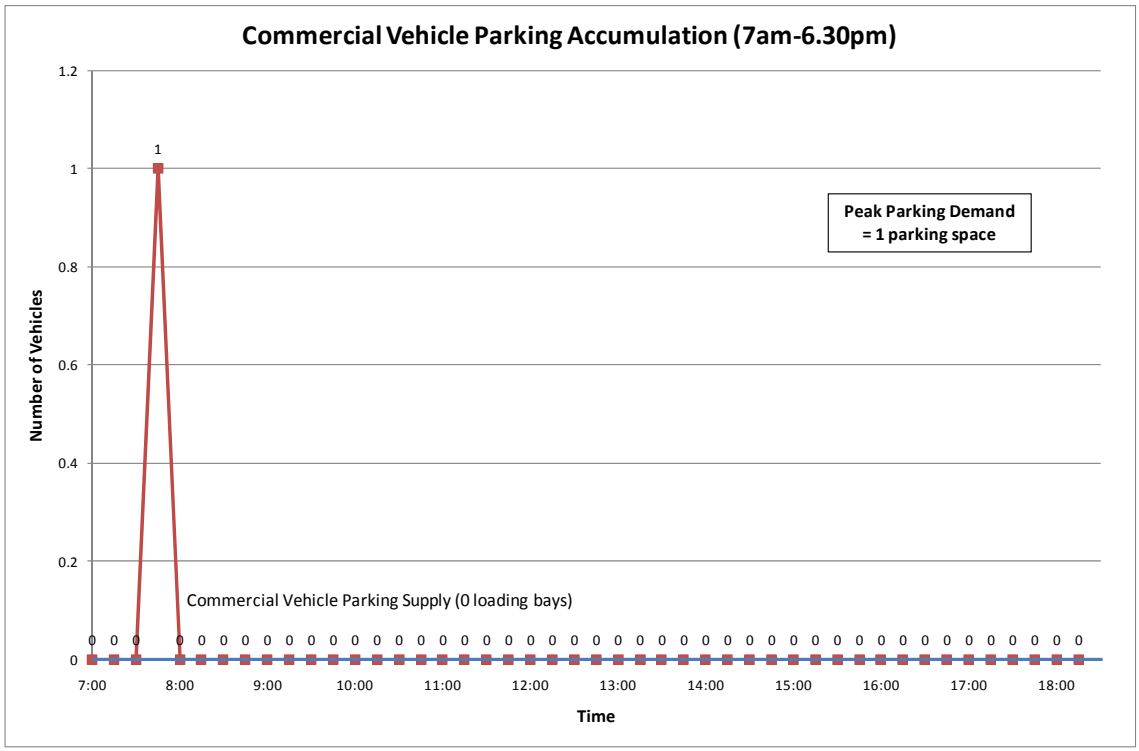


Figure 4.50 indicated the peak number of commercial vehicles using the on-site loading bays was 1, which occurred between 7:30am and 8:00am.

4.7.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.48.

Table 4.48: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
990	74%	74	14	60	2.63/100m^2 GFA

4.7.6 Public Transport Accessibility

Liverpool Transport Interchange Access

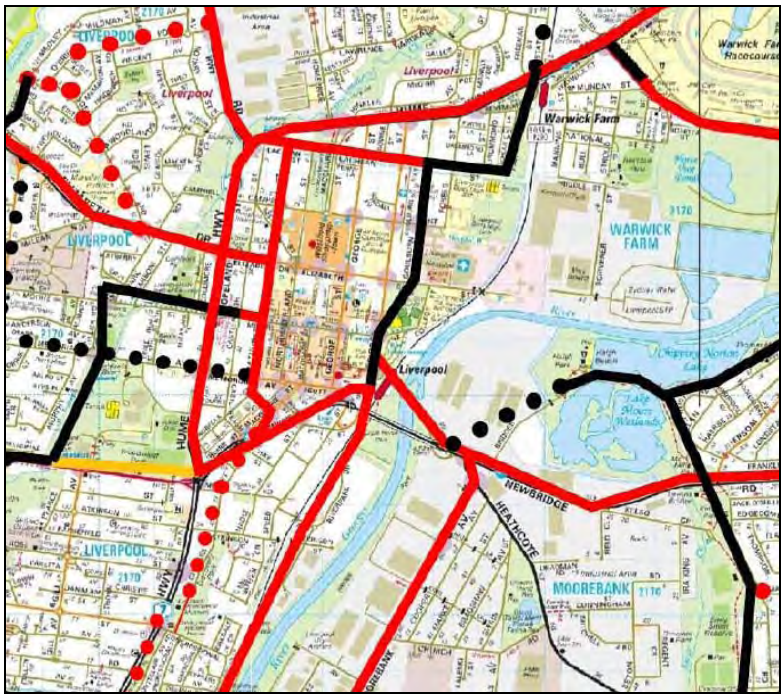
The 13-15 Moore Street site is located within 400m of the Liverpool station and Parramatta-Liverpool T-way services, with good pedestrian facilities (footpaths and controlled pedestrian crossings) for staff and visitors accessing the station and bus stops. Liverpool Transport Interchange provides staff and visitors with an excellent choice of travel to various parts of greater Sydney whether that is by train or bus.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Moore Street site, that approximately **3 people walk** to and from Liverpool Transport Interchange during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the Liverpool Bike Plan is provided in Figure 4.51 which indicates that Moore Street is not part of the Liverpool Bicycle Network although there is an off road cycleway along Bigge Street and Goulburn Street to the east of the site. Off-road cycleways are proposed along Lachlan Street to the north and Bathurst Street to the west of the site.

Figure 4.51: Liverpool City Council Bike Plan Extract



The site has no bicycle parking spaces provided with the site and on the day of the survey there were no cyclists recorded accessing the site.

As this site has no bicycle parking, **a bicycle parking rate per employee cannot be determined**.

4.8 OB 8 – 10 -12 Lexington Drive, Bella Vista

4.8.1 Site Summary

The Lexington Drive site is located in the Norwest Business Park in close proximity to Old Windsor Road and the North West Transit Way with key details indicated in Table 4.49.

Table 4.49: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[18]
34 (32)	4 floors, 1,200m² GFA	83 car spaces, 0 bike spaces	1 loading bays	Mon-Fri, 8:30am-5:00pm	1	Professional/ Technology	0.6

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.8.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.50.

Table 4.50: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	08:00-09:00	18	89%	11%	1.5/100m² GFA	0.22/parking space
PM Peak	16:45-17:45	6	0%	11%	0.5/100m² GFA	0.07/parking space
Daily	07:00-18:30	75	55%	45%	6.25/100m² GFA	0.90/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

There were a total of 5 commercial vehicles accessing the site over the survey period which all arrived between 8:00am and 10:30am. The peak hour commercial vehicle movements into and out of the site (maximum 3 trips/hour) occurred during the morning period between 8:00am and 9:00am. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.51.

Table 4.51: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	08:00-09:00	34
PM Peak	16:45-17:45	14
Daily	07:00-18:30	142

[18] The methodology for calculating the accessibility score is contained in the Data Report

Figure 4.52 provides details of the building person accumulation over the survey period.

Figure 4.52: Person Accumulation

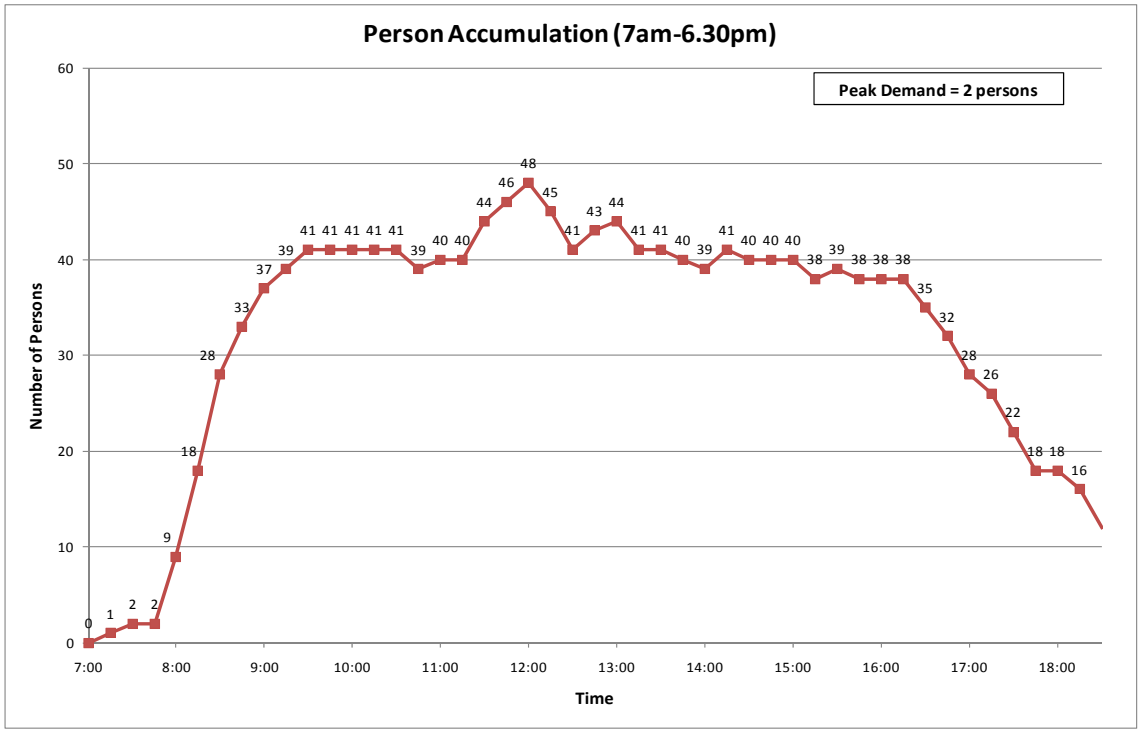
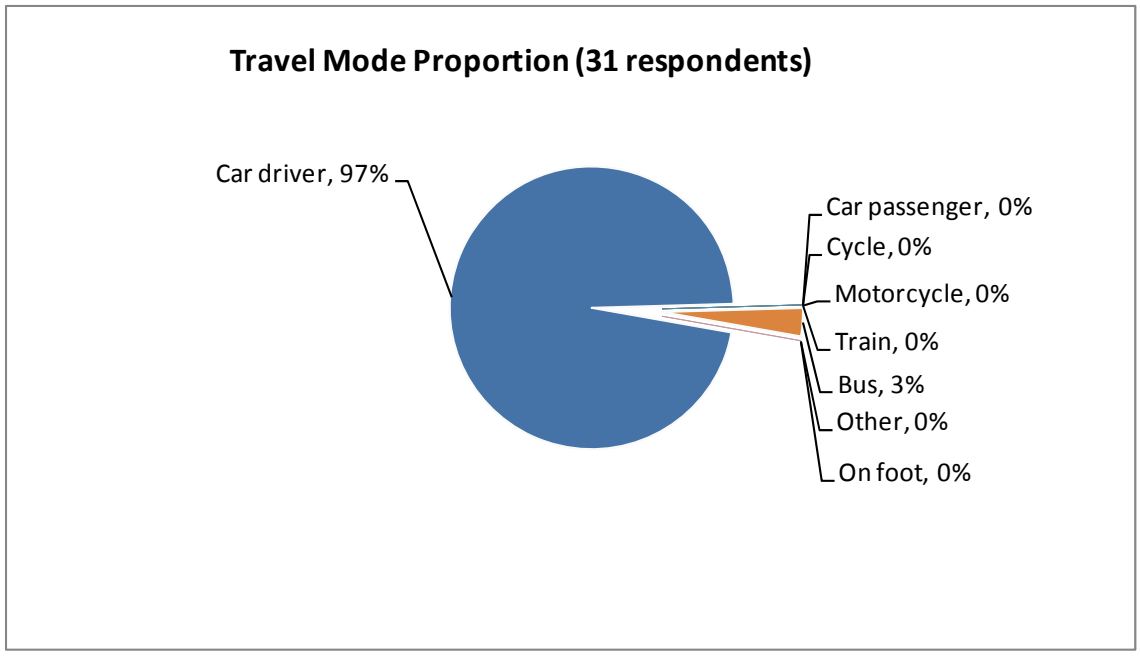


Figure 4.52 indicates that most people are at work during the morning peak period of 12:00pm.

Mode Split Data

The mode split for this site, which was determined from the pedestrian questionnaire surveys, is shown in Figure 4.53 with the number of trips made whilst at work (i.e. not commuter trips) shown in Figure 4.54.

Figure 4.53: Mode Split



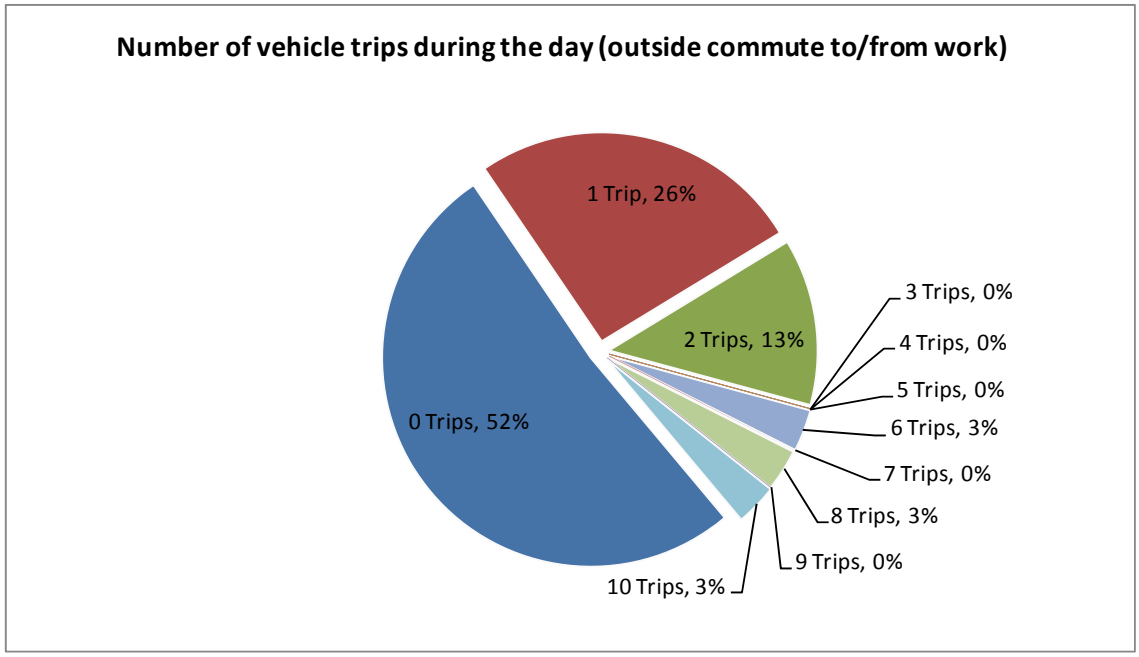
There were 31 respondents on the day of the survey at the Norwest site which included 29 staff and 2 visitors. This represented a good sample size of approximately 85% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

Figure 4.53 indicates that 97% of people travelled to and from the site by private car, with 4% travelling by public transport (bus). Nobody travelled to the site by bus, on foot, motorcycle or bicycle.

Non- Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site is 1.29 vehicle trips/person as indicated in Figure 4.54.

Figure 4.54: Non-Commuter Period (During Working Hours) Trips



4.8.3 Trip Generation Analysis

Applying the car driver mode split (97%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours as indicated in Table 4.52.

Table 4.52: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	08:00-09:00	34	97%	33	2.83/100m² GFA	2.75/100m² GFA
PM Peak	16:45-17:45	14	97%	14	1.17/100m² GFA	1.17/100m² GFA
Daily	07:00-18:30	142	97%	138	11.83/100m² GFA	11.50/100m² GFA

Road Network Peak Hour & Trips

The **road network AM and PM peak hours** on Lexington Drive are distinctly different from the site AM and PM peak hours with the AM and PM road network peak hours being **8:15am-9:15am and 4:00pm-5:00pm** respectively. The vehicle trips generated by the site during the road network peak hours were approximately 10% and 30% less during both the AM and PM peak hour respectively, as shown in Table 4.53.

Table 4.53: Survey Summary (Vehicle Trips during the Road Network Peak Hours)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	08:15-09:15	30	84%	16%	2.50/100m² GFA	0.36/parking space
PM Peak	16:00-17:00	10	0%	100%	0.83/100m² GFA	0.12/parking space

4.8.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in Baulkham Hills Shire Council's DCP and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.54. The parking provision at this relatively low, with the parking provision being approximately half of the Council's requirements. The proximity to the Liverpool to Parramatta Transit way and M2 and associated bus services may have reduced the need for parking on-site.

Table 4.54: Parking Rates

Source	Parking Rates (Gross Floor Area)	
Existing Site (83 parking spaces)	1 space/54m² [19]	1 space / 0.41 staff (34 staff)
Baulkham Hills Shire Council DCP	1 space/25m²	
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.55 provides details of the on-site parking accumulation for the site over the survey period.

[19] Based on the total GFA, not reduced GFA of 1200m²

Figure 4.55: Parking Accumulation

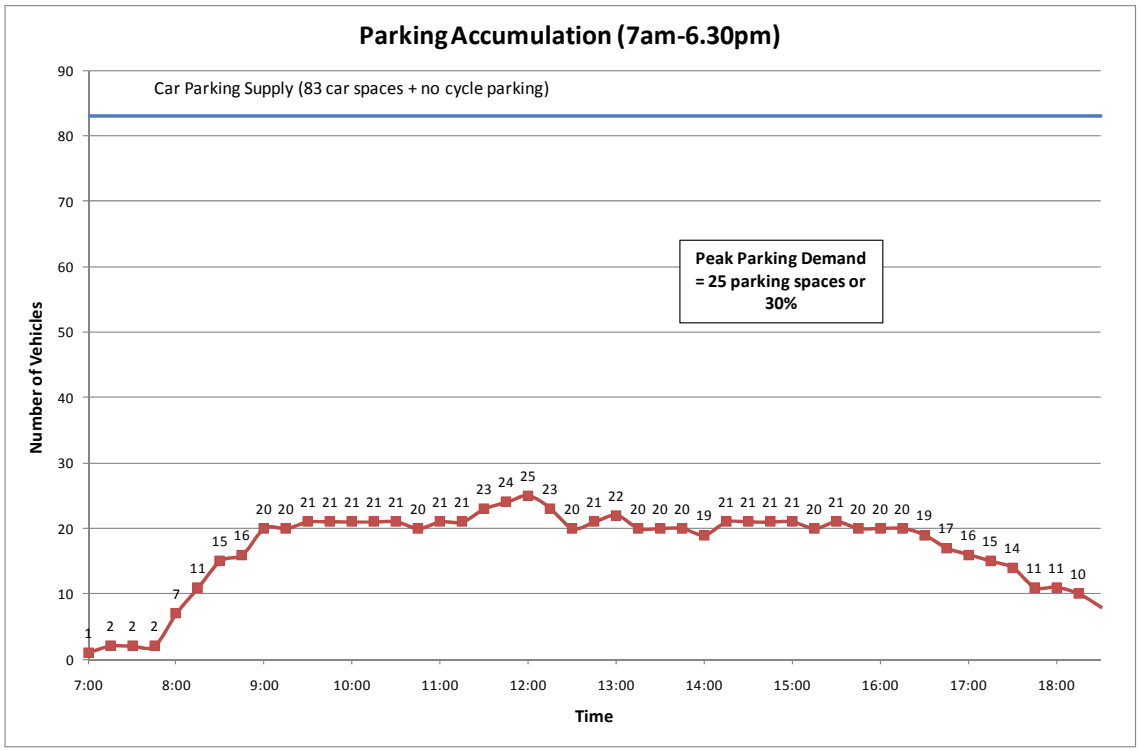


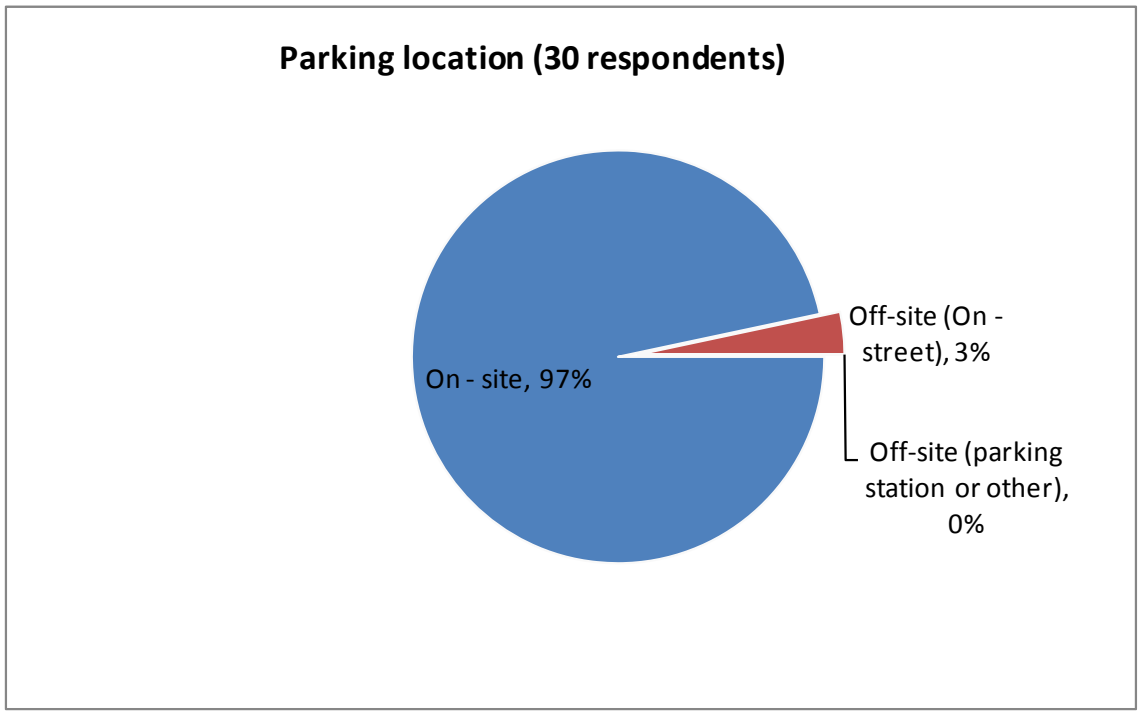
Figure 4.55 indicates a peak on-site car park occupancy of 25% equivalent to **25 parking spaces** out of the available 83 parking spaces which occurred at approximately 12:00pm-12:15pm.

Off-Site Parking Data

On-street unrestricted parking is available on Lexington Drive adjacent to the site. There is also unrestricted on-street parking in the residential areas external to the Norwest Business Park, approximately 800 metres to the east and west of the site. There are no designated off-street car parks provided for long term parking within Norwest Business Park.

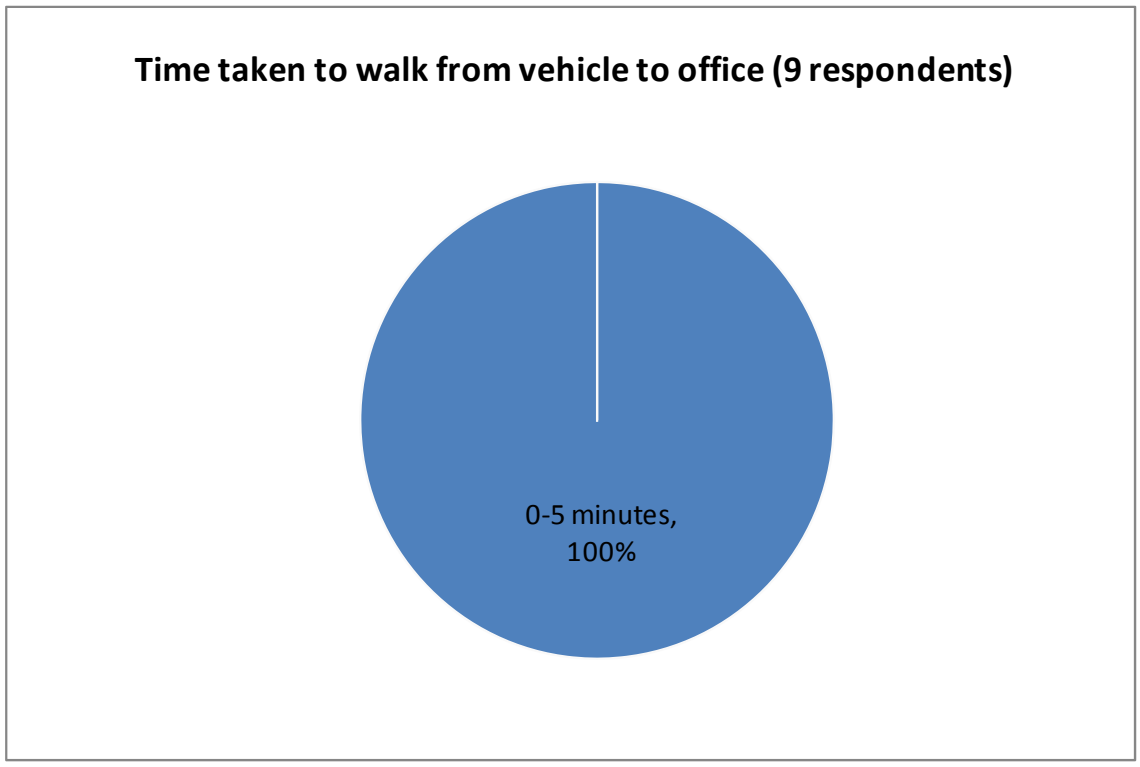
Figure 4.56 confirms there is a small proportion of drivers who park either on-street.

Figure 4.56: On and Off Street Parking Summary



It should also be noted that all drivers parked within close proximity of the site (0-5 minutes walk or within 400m) indicating the ease of finding a parking space close to the site as indicated in Figure 4.57.

Figure 4.57: Time to walk from off-site parking



Commercial Vehicle Parking Data

There was 1 loading bays provided on site for servicing of the building at 10-12 Lexington Drive. Figure 4.58 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period.

Figure 4.58: Commercial Vehicle Parking Accumulation

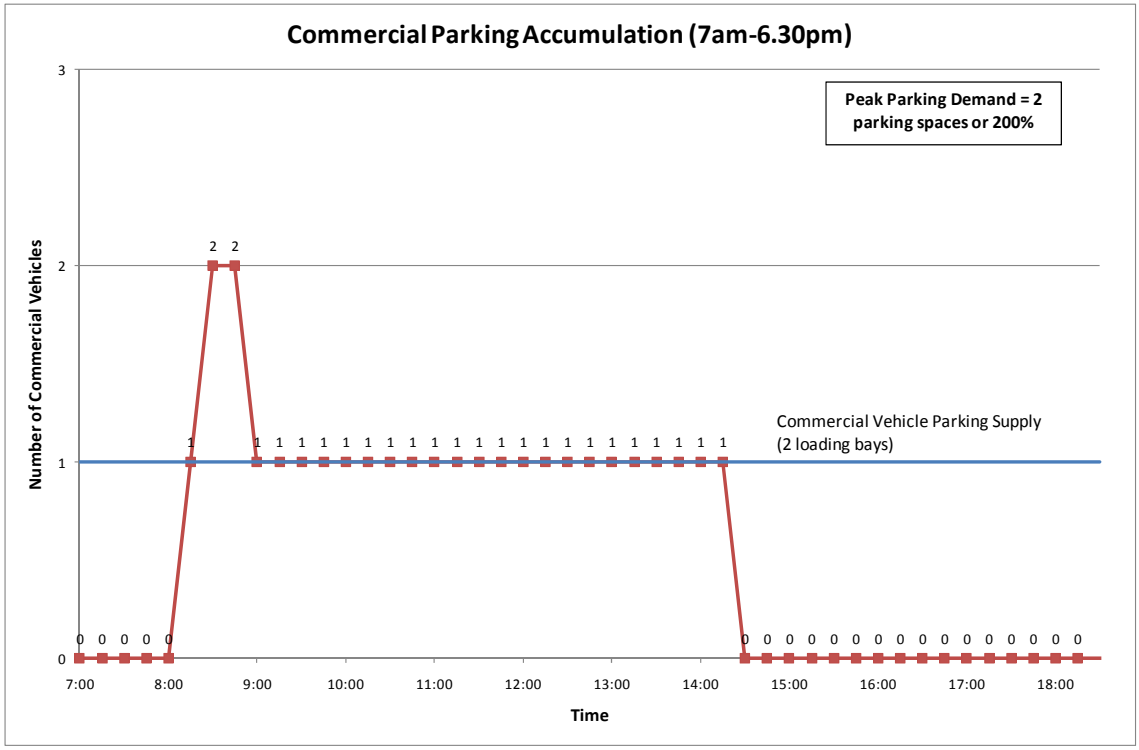


Figure 4.58 indicated the peak number of commercial vehicles using the on-site loading bays was 2, which occurred between 8:30am and 9:00am.

4.8.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.55.

Table 4.55: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
34	97%	33	25	8	2.78/100m² GFA

4.8.6 Public Transport Accessibility

Bus Service Access

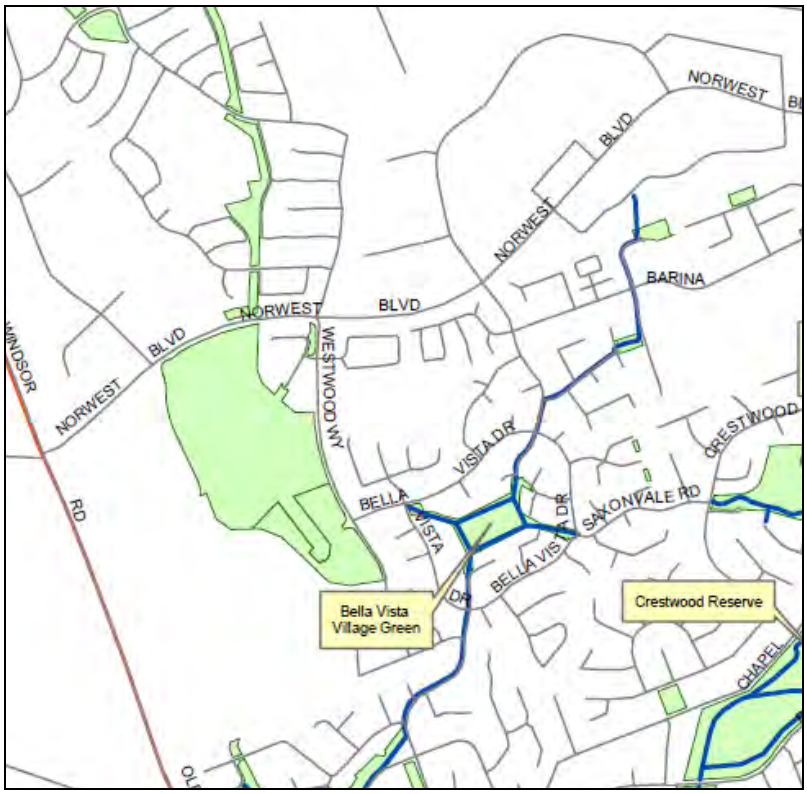
The 10 Lexington Drive site is located within 500m of several bus stops, with adequate pedestrian facilities (footpaths) for staff and visitors accessing the bus stops. The bus services which run along Norwest Boulevard, Old Windsor Road and the M7 provides staff and visitors with an access to key destinations such as the City, Parramatta, Epping, Castle Hill, Rouse Hill and Seven Hills.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Lexington Drive site that approximately **1 person walks** to and from a local bus stop during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the Baulkham Hills Shire off-road Bicycle Network is provided in Figure 4.59 which indicates that Lexington Drive is not part of the Baulkham Hills Shire Bicycle Network. The Westlink Cycleway, which is an off-road cycleway, which runs along the length of the M7, starts at Old Windsor Road/Norwest Boulevard, which is approximately 500 metre to the west of the site.

Figure 4.59: Baulkham Hills Shire Bicycle Network Extract



The site has no bicycle parking spaces provided with the site and on the day of the survey there were no cyclists recorded accessing the site.

As this site has no bicycle parking, **a bicycle parking rate per employee cannot be determined**.

4.9 OB 9 – 22 Honeysuckle Drive, Newcastle

4.9.1 Site Summary

The Honeysuckle Drive site consists of two buildings, with a walkway in between, and is within close proximity of Wickham train station within a commercial area in Newcastle West with key details indicated in Table 4.56

Table 4.56: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[20]
490 (490)	6 levels 12,182m² GFA	200 car spaces, 20 bike spaces	0 loading bays	Mon-Fri, 9:00am-5:00pm	2	Professional/ Engineering	0.9

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.9.2 Trip Survey Data

Car park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.57.

Table 4.57: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	08:00-09:00	89	97%	3%	0.73/100m² GFA	0.40/parking space
PM Peak	17:00-18:00	80	5%	95%	0.66/100m² GFA	0.36/parking space
Daily	07:00-18:30	466	51%	49%	3.83/100m² GFA	2.12/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

There were a total of 11 commercial vehicles accessing the site over the survey period of which 4 arrived between 7:30am and 8:15am, 2 between 12:30pm and 12:45pm and 5 between 2:45pm and 5:00pm. The peak hour commercial vehicle movements into and out of the site (maximum 4 trips/hour) occurred during the morning period between 7:45am and 8:15am. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.58.

[20] The methodology for calculating the accessibility score is contained in the Data Report

Table 4.58: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	08:00-09:00	172
PM Peak	16:45-17:45	191
Daily	07:00-18:30	2,213

Figure 4.60 provides details of the building person accumulation over the survey period.

Figure 4.60: Person Accumulation

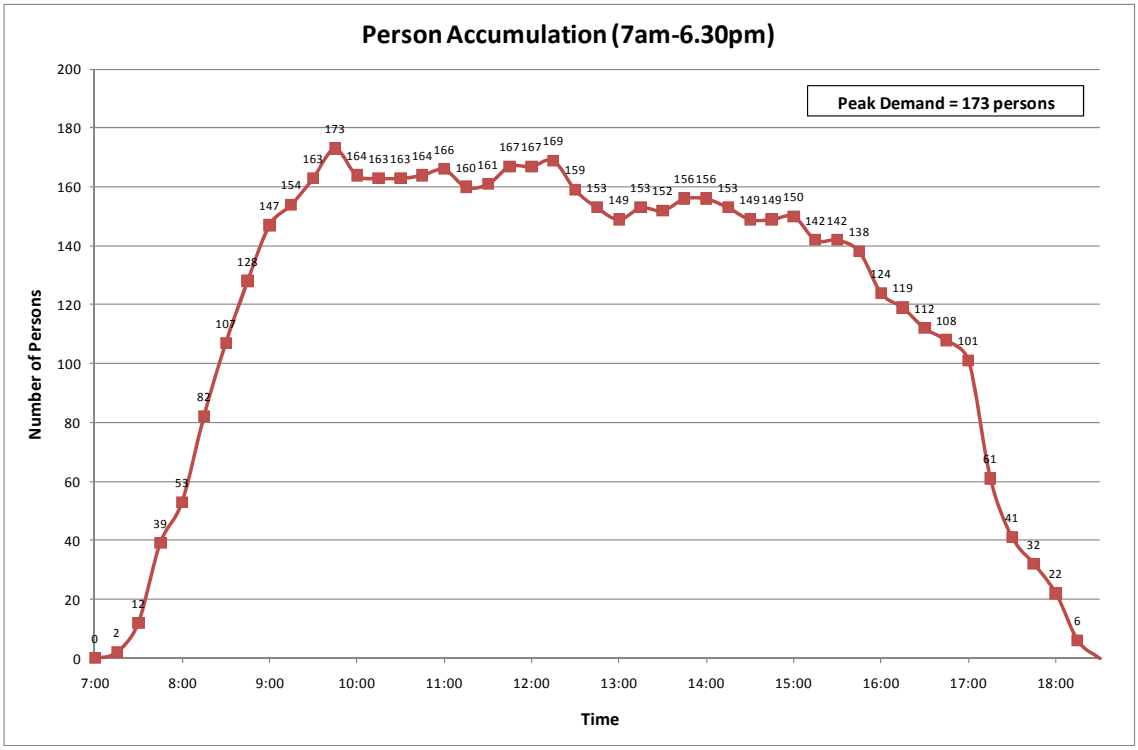
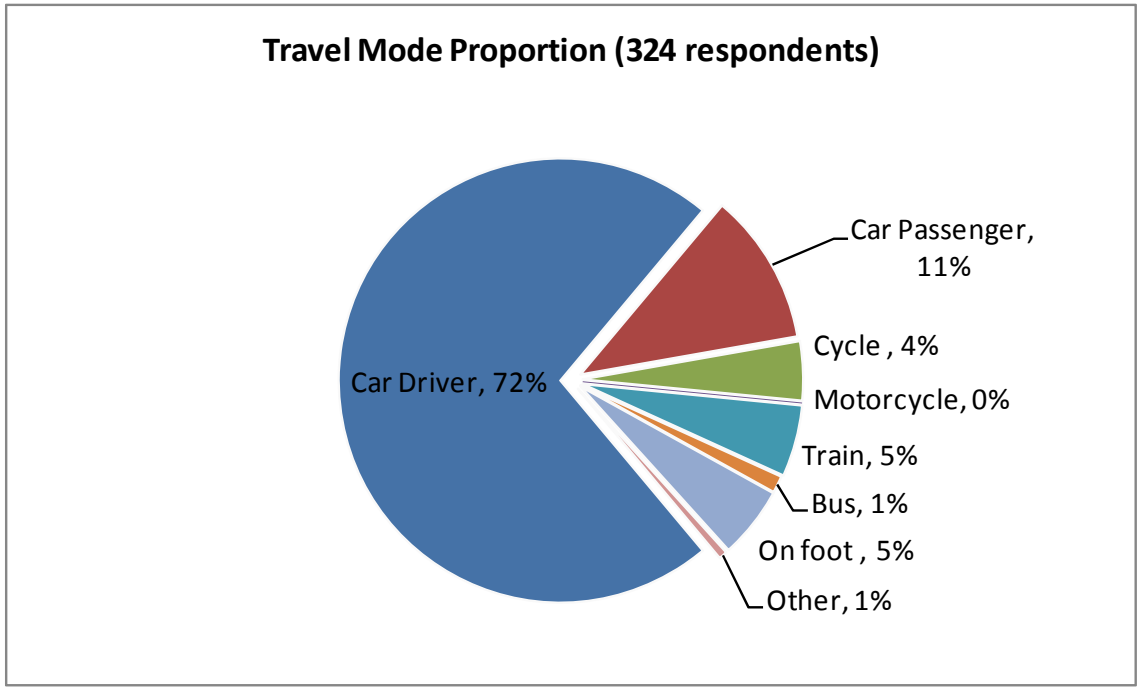


Figure 4.60 indicates that most people are at work during the morning peak period of 9:45am.

Mode Split Data

The mode split for this site, which was determined from the pedestrian questionnaire surveys, is shown in Figure 4.61 with the number of trips made whilst at work (i.e. not commuter trips) shown in Figure 4.62.

Figure 4.61: Mode Split



There were 324 respondents on the day of the survey at the Newcastle site which were all staff. This represented a good sample size of approximately 66% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

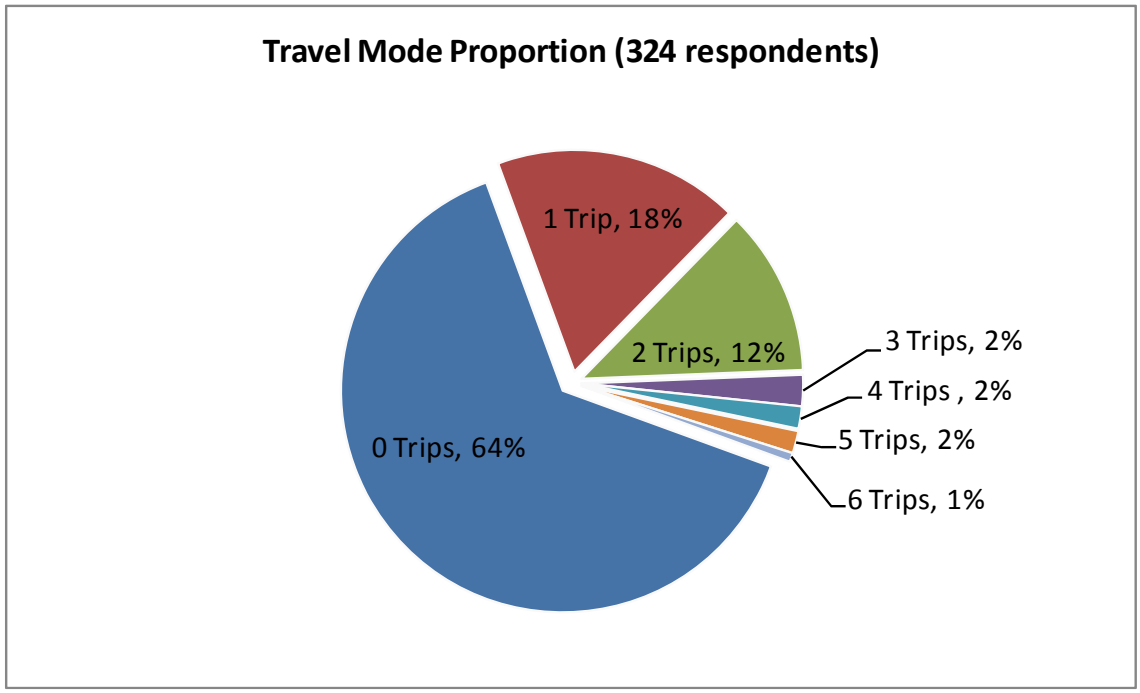
Figure 4.61 indicates that 72% of people travelled to and from the site by private car, with 11% travelling by private car as a passenger[21], 6% travelling to the site by public transport (train and bus), 5% walking, 4% cycling and 1% catching a ferry or plane. Nobody travelled to the site by motorcycle.

Non- Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site is 0.67 vehicle trips/person as indicated in Figure 4.62.

[21] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.

Figure 4.62: Non-Commuter Period (During Working Hours) Trips



4.9.3 Trip Generation Analysis

Applying the car driver mode split (72%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours as indicated in Table 4.59.

Table 4.59: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons	Total Vehicle Trip Rate
AM Peak	08:00-09:00	172	73%	126	1.41/100m² GFA	1.03/100m² GFA
PM Peak	16:45-17:45	191	73%	139	1.57/100m² GFA	1.14/100m² GFA
Daily	07:00-18:30	2,213	73%	1,615	18.17/100m² GFA	13.26/100m² GFA

Road Network Peak Hour & Trips

The **road network PM peak hour** on Honeysuckle Drive was distinctly different from the site PM peak hour with the PM road network peak hour being **5:00pm-6:00pm**. The site AM peak hour and the road network AM peak hour were the same, i.e. **8:00am-9:00am**.The vehicle trips generated by the site during the road network peak hours were the same and approximately 1% less during both the AM and PM peak hour respectively, as shown in Table 4.60.

Table 4.60: Survey Summary (Vehicle Trips during the Road Network Peak Hours)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	08:00-09:00	126	97%	3%	1.03/100m² GFA	0.57/parking space
PM Peak	17:00-18:00	137	14%	86%	1.12/100m² GFA	0. 62/parking space

4.9.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in Newcastle City Council's DCP and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.61. The on-site parking at this site is slightly lower than the Council's requirements; this is likely due to the accessibility to local public transport services.

Table 4.61: Parking Rates

Source	Parking Rates (Gross Floor Area)	
Existing Site (200 parking spaces)	1 space/61m²	1 space /0.41 staff (490 staff)
Newcastle City Council DCP	1 space/50m²	
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.63 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.63: Parking Accumulation

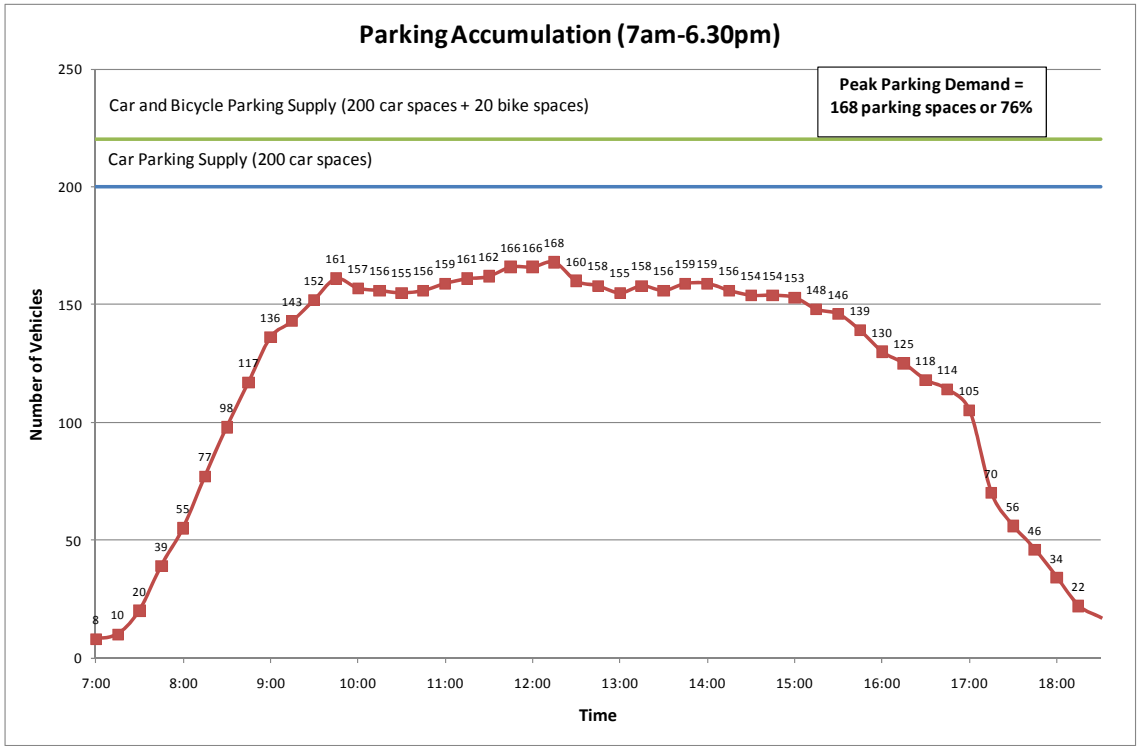


Figure 4.63 indicates a peak on-site car park occupancy of 76% equivalent to **168 parking spaces** out of the available 220 parking spaces which occurred at approximately 12:15pm-12:30pm.

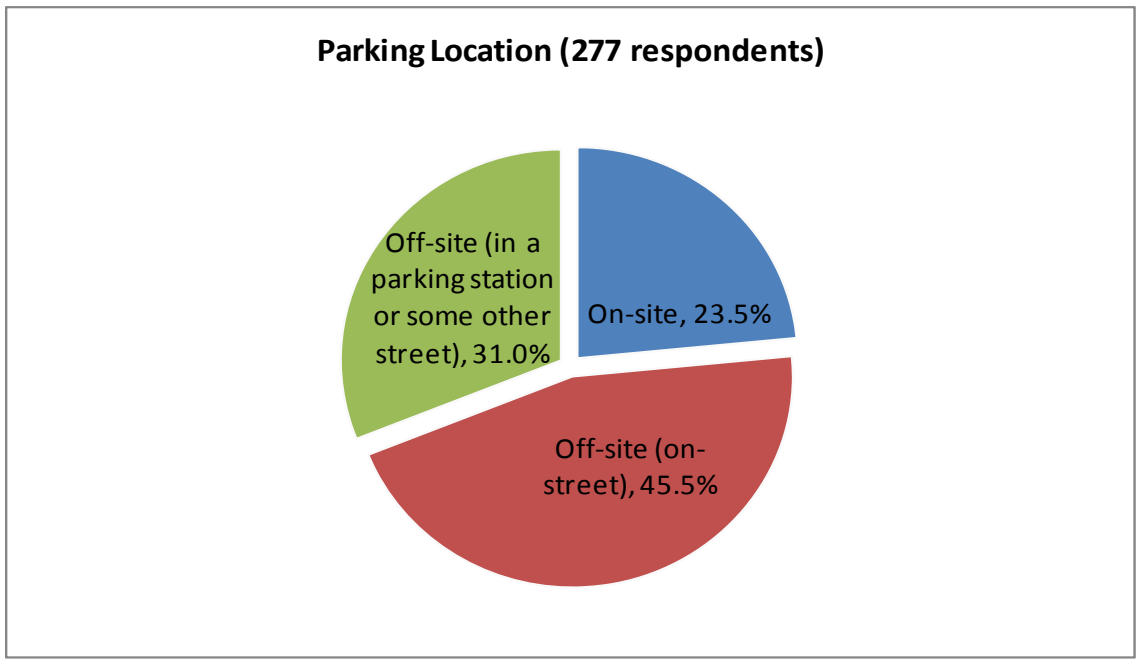
Off-Site Parking Data

Figure 4.64 confirms there is a proportion of drivers who park either on-street or at another nearby parking station.

On-street parking in the Honeysuckle precinct and the City Centre to the south is time restricted and metered for short term parking only.

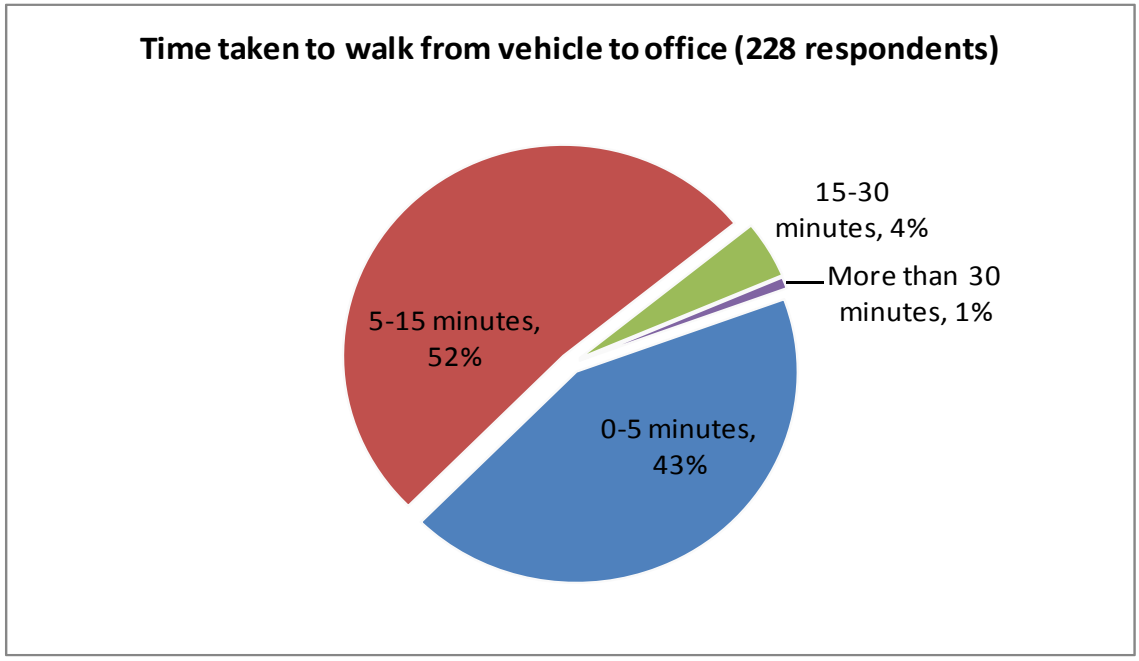
Off-street parking can be located at the Honeysuckle and Throsby car parks, which lie approximately 300m to the east and west of the site, respectively. They provide 613 metered spaces for all day parking. Off-street parking is also available south of the train line at the Civic West car park on Gibson St, approximately 1km walk from the site, which provides 470 parking spaces.

Figure 4.64: On and Off Street Parking Summary



It should also be noted that a large majority of drivers (65%) parked relatively close the site (0-15 minutes walk or within 1200m) indicating the ease of finding a parking space close to the site as indicated in Figure 4.65.

Figure4.65: Time to walk from off-site parking



Commercial Vehicle Parking Data

There were not any loading bays provided on site for servicing of the building at 22 Honeysuckle Drive. Figure 4.66 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period.

Figure 4.66: Commercial Vehicle Parking Accumulation

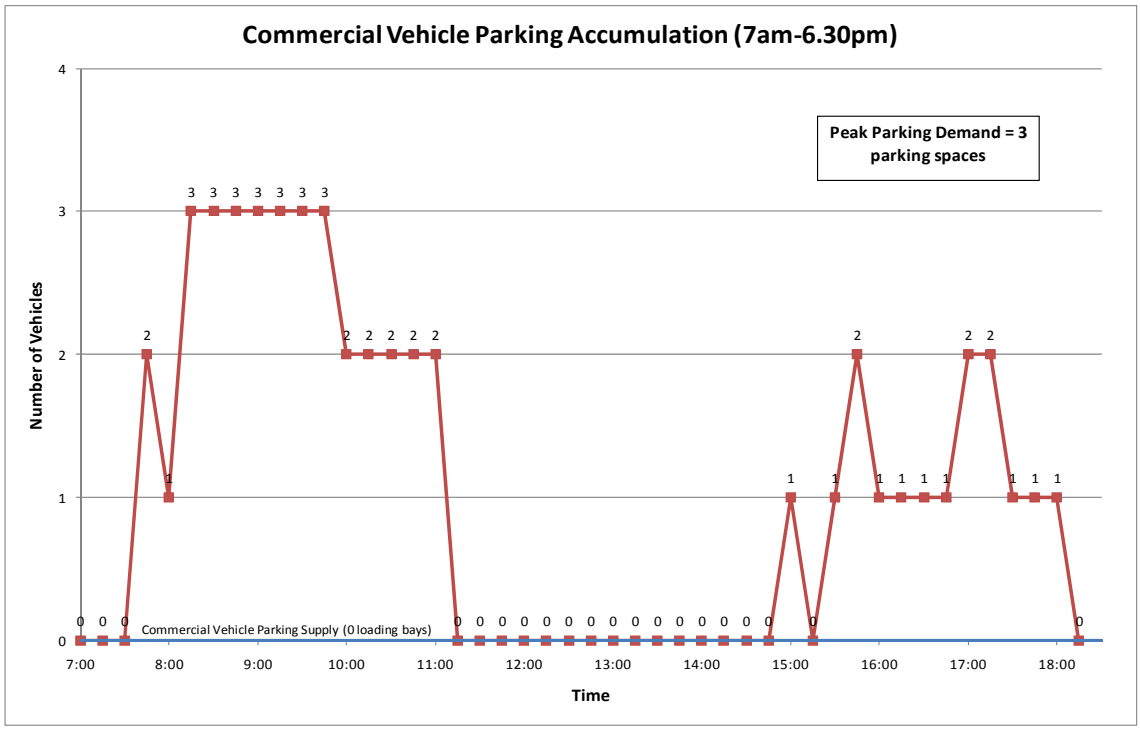


Figure 4.66 indicated the peak number of commercial vehicles using the on-site loading bays was 3, which occurred between 8:15am and 10:00am.

4.9.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.62.

Table 4.62: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
490	73%	358	168	190	2.94/100m² GFA

4.9.6 Public Transport Accessibility

Wickham Station Access

The 22 Honeysuckle Drive site is located within 400m of the Wickham Train station with footpaths provided for staff and visitors accessing the station. Wickham Station on the City Rail Hunter regional train line and direct services run to key destinations including Newcastle, Maitland, Wyong, Hornsby, Epping and Sydney CBD.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Honeysuckle Drive site that approximately **25 people walk** to and from Wickham train station during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the Newcastle Bike Plan is provided in Figure 4.67 which indicates that Honeysuckle Drive is part of the Newcastle Bicycle Network. There is an on-road cycle path running along Honeysuckle Drive and an off-road cycle path is proposed to the north of the site, along the foreshore.

Figure 4.67: Newcastle Bike Plan Extract

The site has 20 bicycle parking spaces provided with the basement car park and on the day of the survey there were one cyclist was recorded accessing these spaces.

This equates to a rate of **1 bicycle parking space per 25 employees** or 4% of all staff.

4.10 OB 10 – 77 Market Street, Wollongong

4.10.1 Site Summary

The Market Street site is in the Wollongong City Centre, a short distance from the Princes Highway and is surrounded by a mix of residential, retail and commercial buildings, with key details indicated in Table 4.63.

Table 4.63: Site Summary Details

Total Staff	Size	Parking Spaces	Loading Bays	Operating Hours	No of Tenants	Primary Industry	Accessibility Score[22]
380 (300)	8 levels 12,921m² GFA	133 car spaces, 0 bike spaces	1 loading bays	Mon-Fri, 8:15am-5:30pm	1	Professional/ Medical	0.9

Note: The total staff figure in brackets is the total number of staff on-site during the day of the survey.

4.10.2 Trip Survey Data

Car Park In & Out Vehicle Data

The number of vehicle trips (Visitors & Staff) entering and exiting the on-site car park during the AM and PM peak hours and throughout the day are shown in Table 4.64.

Table 4.64: Survey Summary (Vehicle Trips)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Vehicle Trip Rates	
Vehicle Based (Car Park In/Out)			In	Out		
AM Peak	08:00-09:00	45	100%	0%	0.35/100m² GFA	0.34/parking space
PM Peak	16:45-17:45	50	12%	88%	0.39/100m² GFA	0.38/parking space
Daily	07:00-18:30	203	51%	49%	1.51/100m² GFA	1.47/parking space

As described in Section 3.3, the above trip rates do not capture all the staff or visitors driving to the site and a more robust method is to calculate the trip rates by applying the vehicle mode split proportions to the total person trips recorded in the AM and PM peak hours.

Commercial Trip Data

There were a total of 4 commercial vehicles accessing the site over the survey period of which 2 arrived between 7:45am and 8:45am and 2 between 3:30pm and 4:45pm. The peak hour commercial vehicle movements into and out of the site (maximum 2 trips/hour) occurred during the morning period between 7:45am and 8:45am. Commercial vehicle trips have been included in the analysis of trip generation for the whole site.

Person Trip Data

The total number of person trips (Visitors & Staff) entering and exiting the building during the AM and PM peak hours and throughout the day are shown in Table 4.65.

[22] The methodology for calculating the accessibility score is contained in the Data Report

Table 4.65: Survey Summary (Person Trips) – All Modes

Period	Time	Total Person Trips (In & Out)
Person Based (Building In/Out)		
AM Peak	08:15-09:15	158
PM Peak	16:45-17:45	128
Daily	07:00-18:30	1,074

Figure 4.68 provides details of the building person accumulation over the survey period.

Figure 4.68: Person Accumulation

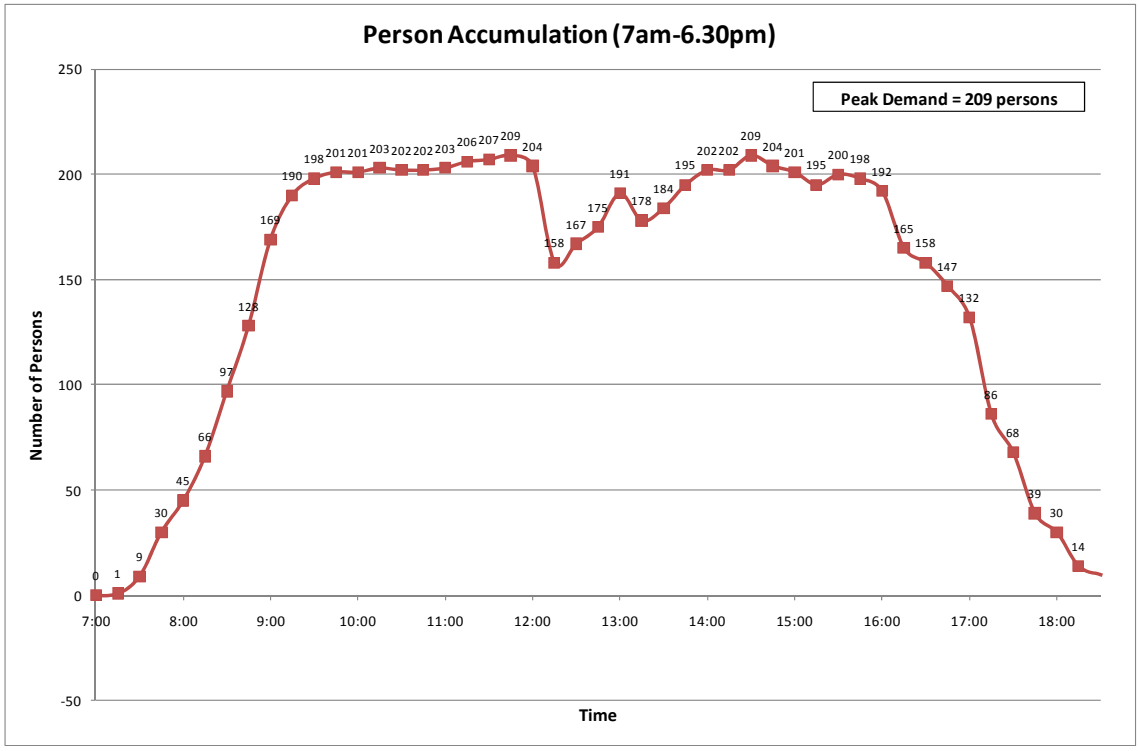
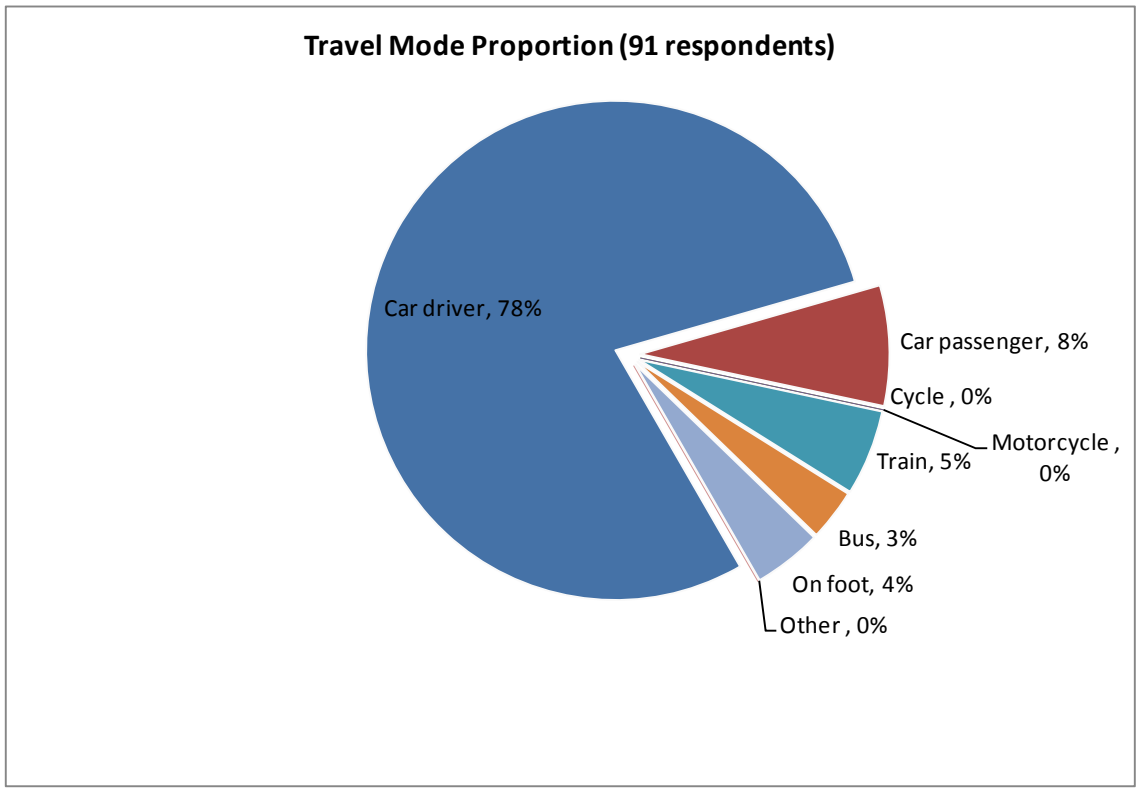


Figure 4.68 indicates that most people are at work during the morning and afternoon peak period of 11:45am and 2:30pm.

Mode Split Data

The mode split for this site, which was determined from the pedestrian questionnaire surveys, is shown in Figure 4.69 with the number of trips made whilst at work (i.e. not commuter trips) shown in Figure 4.70.

Figure 4.69: Mode Split



There were 91 respondents on the day of the survey at the Chatswood site which included 86 staff and 5 visitors. This represented a good sample size of approximately 23% as a percentage of the total staff. The origin postcode data for the staff and visitors who completed the survey is shown in Appendix B.

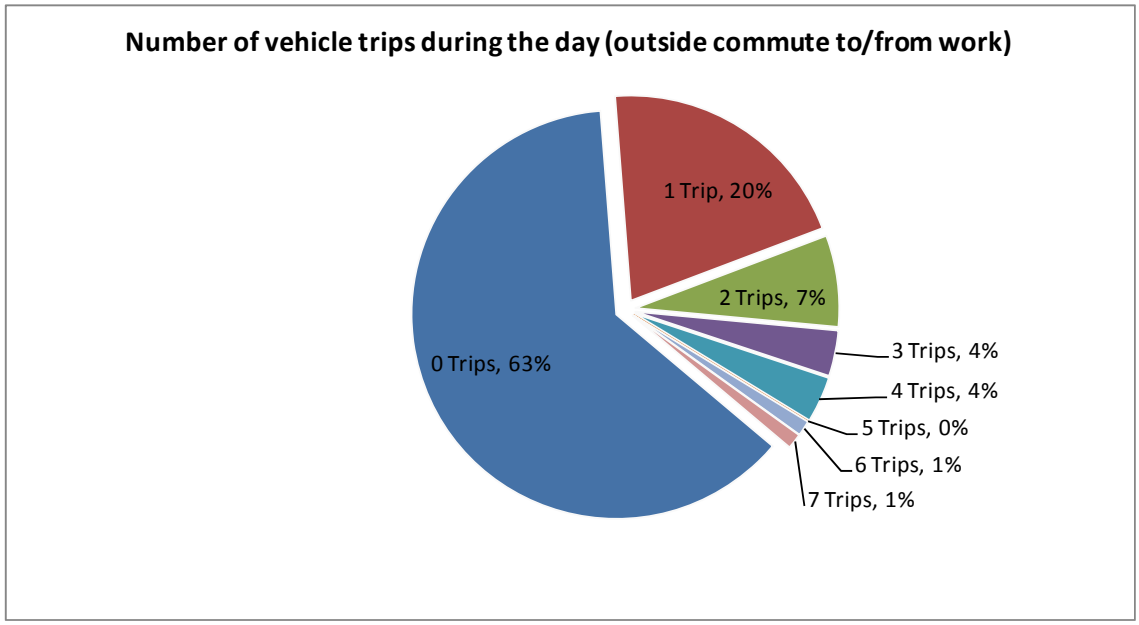
Figure 4.69 indicates that 78% of people travelled to and from the site by private car, with 8% travelling by private car as a passenger[23], 8% travelling to the site by public transport (train and bus) and 4% walking. Nobody travelled to the site by motorcycle or bicycle.

Non- Commuter Period Vehicle Trip Data

The average number of one-way vehicle trips made whilst at work (i.e. outside commute to and from work period) at the site is 0.76 vehicle trips/person as indicated in Figure 4.70.

[23] It has been assumed that all car passengers have travelled to the site with a work colleague and as such these trips are already accounted for.

Figure 4.70: Non-Commuter Period (During Working Hours) Trips



4.10.3 Trip Generation Analysis

Applying the car driver mode split (78%) to the person trips recorded over the survey period provides a reasonable estimate of trips generated by the whole site during the AM and PM peak hours as indicated in Table 4.66.

Table 4.66: Estimated AM/PM Peak Journey to Work & Daily Trips (Staff & Visitors)

Period	Time	Total Person Trips (In & Out)	Car Driver Mode Share	Total Vehicle Trips	Total Person Trip Rate (Persons)	Total Vehicle Trip Rate
AM Peak	08:15-09:15	158	78%	123	1.22/100m² GFA	0.95/100m² GFA
PM Peak	16:45-17:45	128	78%	100	0.99/100m² GFA	0.77/100m² GFA
Daily	07:00-18:30	1,074	78%	838	8.31/100m² GFA	6.49/100m² GFA

Road Network Peak Hour & Trips

The **road network AM and PM peak hours** on Market Street are the same as the site AM and PM peak hours with the AM and PM road network peak hours being **8:15am-9:15am and 4:45pm-5:45pm** respectively. Hence, the vehicle trips generated by the site during the road network peak hours were the same as the site AM and PM peak hours, as shown in Table 4.67.

Table 4.67: Survey Summary (Vehicle Trips during the Road Network Peak Hours)

Period	Time	Vehicle Trips (In & Out)	Proportion		Estimated Trip Rate	
Vehicle Based (All Vehicles In/Out)			In	Out		
AM Peak	08:15-09:15	123	89%	11%	0.95/100m² GFA	0.92/parking space
PM Peak	16:45-17:45	100	8%	92%	0.77/100m² GFA	0.75/parking space

4.10.4 Parking Survey Data

Existing Parking Rates

GTA Consultants compared the existing rate of parking of the site against the rates provided in Wollongong Council's DCP and the ***RTA's Guide to Traffic Generating Developments 2002*** as indicated in Table 4.68. The on-site parking at this site is low, which less than half the amount required by Wollongong Council. The site is well served by public transport, both trains and buses, and it is reasonable to expect the parking provision was reduced due to this.

Table 4.68: Parking Rates

Source	Parking Rates (Gross Floor Area)	
Existing Site (133 parking spaces)	1 space/97m²	1 space / 2.86 staff (380 staff)
Wollongong Council DCP	1 space/30m² (ground floor)	1 space/50m² (upper floor)
RTA	1 space/40m² (Unrestrained)	Restrained not specified. TBC through surveys of similar sites

Parking Generation (On & Off Site)

The parking generation for the site is based on current on-site parking (supply versus demand) together with parking which occurred either on street or in alternative parking stations, i.e. off-site.

On-site Parking Data

Figure 4.71 provides details of the on-site parking accumulation for the site over the survey period.

Figure 4.71: Parking Accumulation

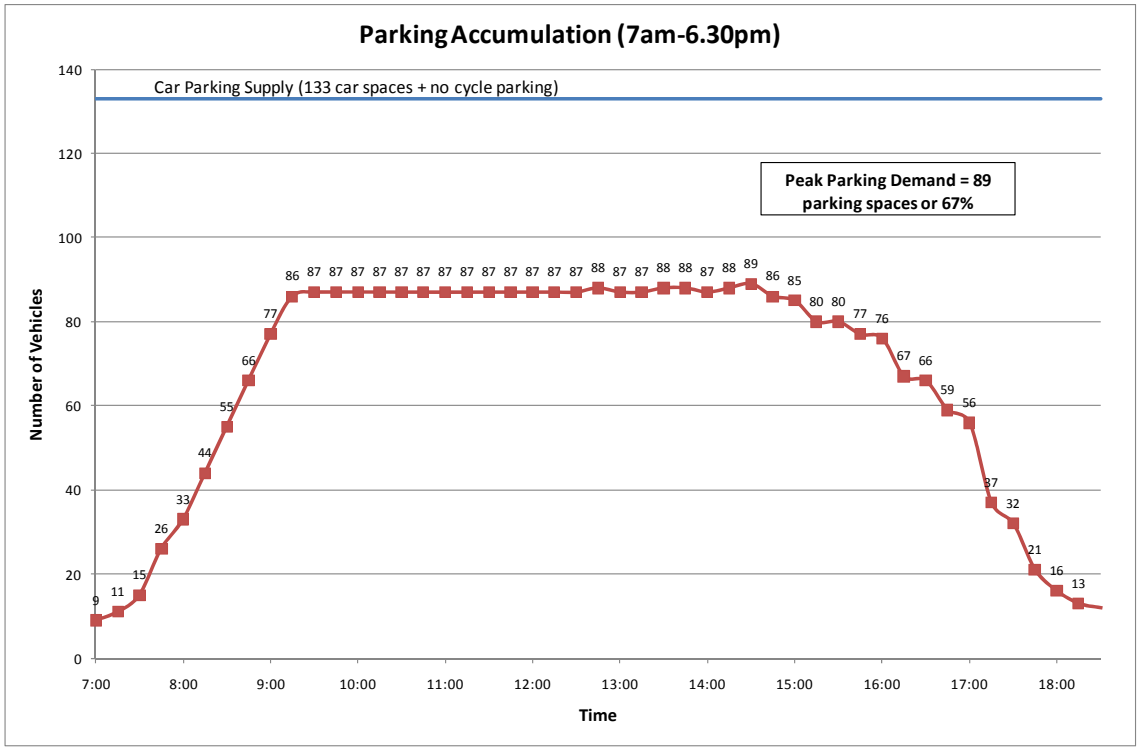


Figure 4.71 indicates a peak on-site car park occupancy of 67% equivalent to **89 parking spaces** out of the available 133 parking spaces which occurred at approximately 2:30pm-2:45pm.

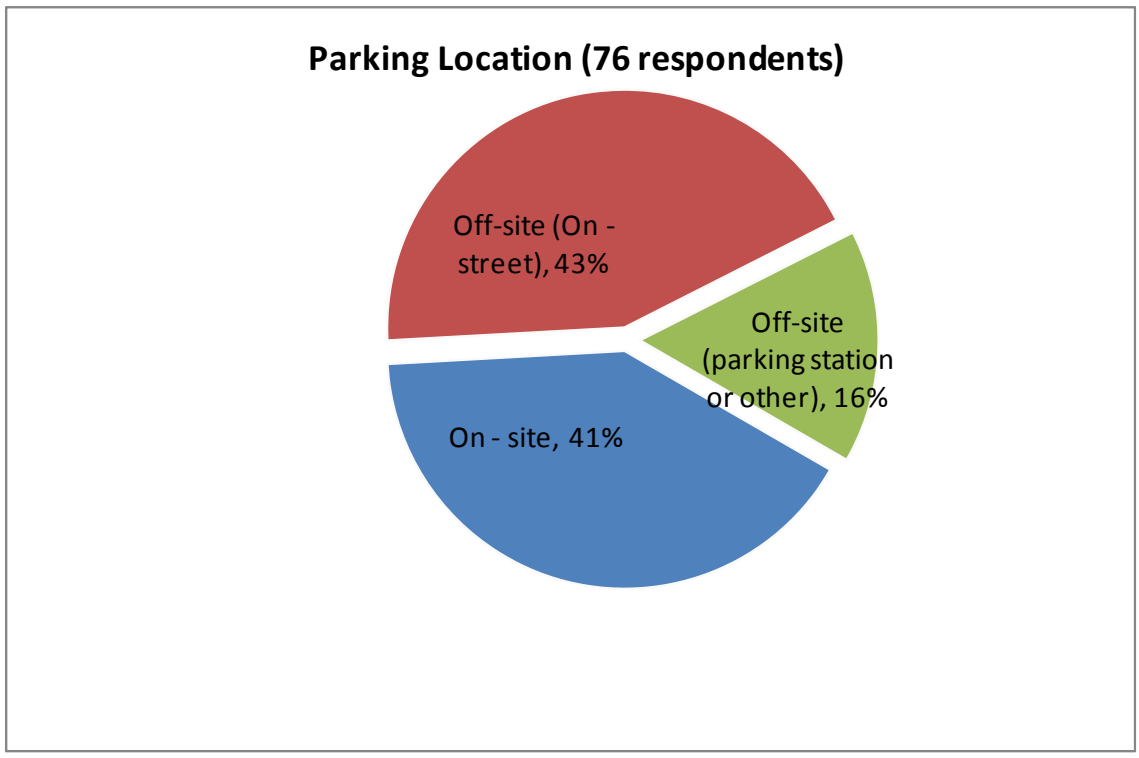
Off-Site Parking Data

On-street parking surrounding the site is time restricted and metered, except for the area west of Young St, and north of Victoria St. On-street parking in these areas is unrestricted.

Free long term off-street parking is available at396 spaces located at Wollongong train station approximately 600m south west of the site. There are also a number of paid off-street parking stations near the site. The Market St and Crown St car parks to the east, and the Keira St car park to the south, provide all day parking in over 1500 spaces.

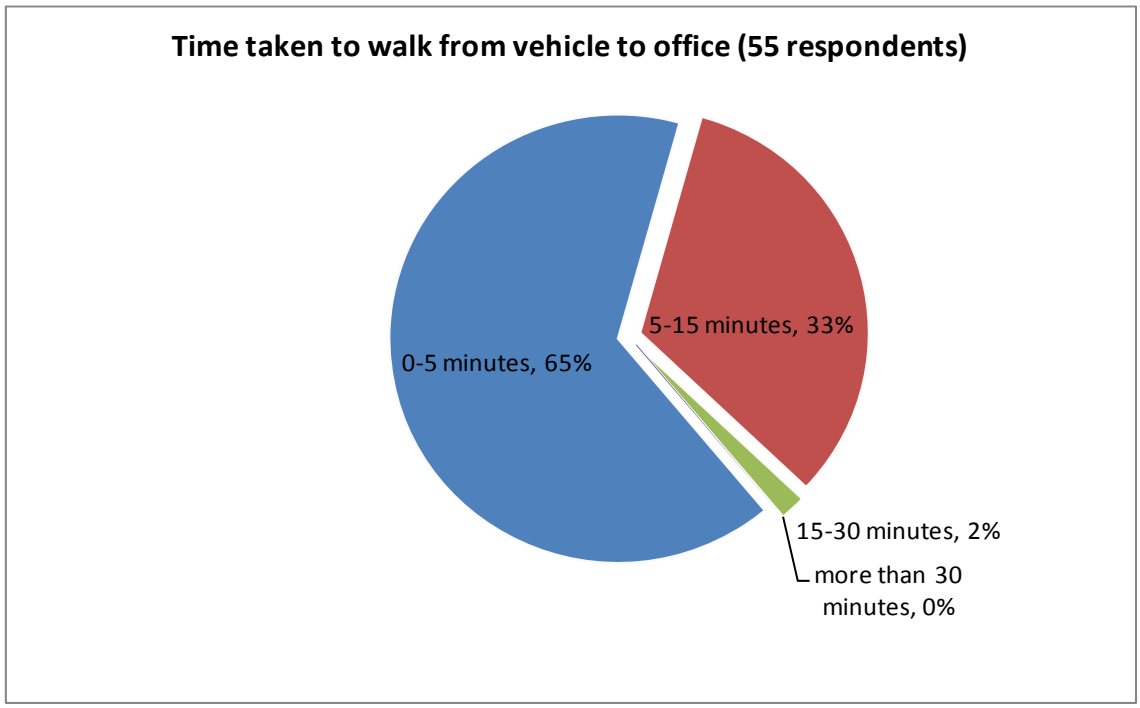
Figure 4.72 confirms there is a proportion of drivers who park either on-street or at another nearby parking station.

Figure 4.72: On and Off Street Parking Summary



It should also be noted that a large majority of drivers (65%) parked within close proximity of the site (0-5 minutes walk or within 400m) indicating the ease of finding a parking space close to the site as indicated in Figure 4.73.

Figure 4.73: Time to walk from off-site parking



Commercial Vehicle Parking Data

There were not any loading bays provided on site for servicing of the building at 77 Market Street. Figure 4.74 provides details of the on-site commercial vehicle parking accumulation for the site over the survey period.

Figure 4.74: Commercial Vehicle Parking Accumulation

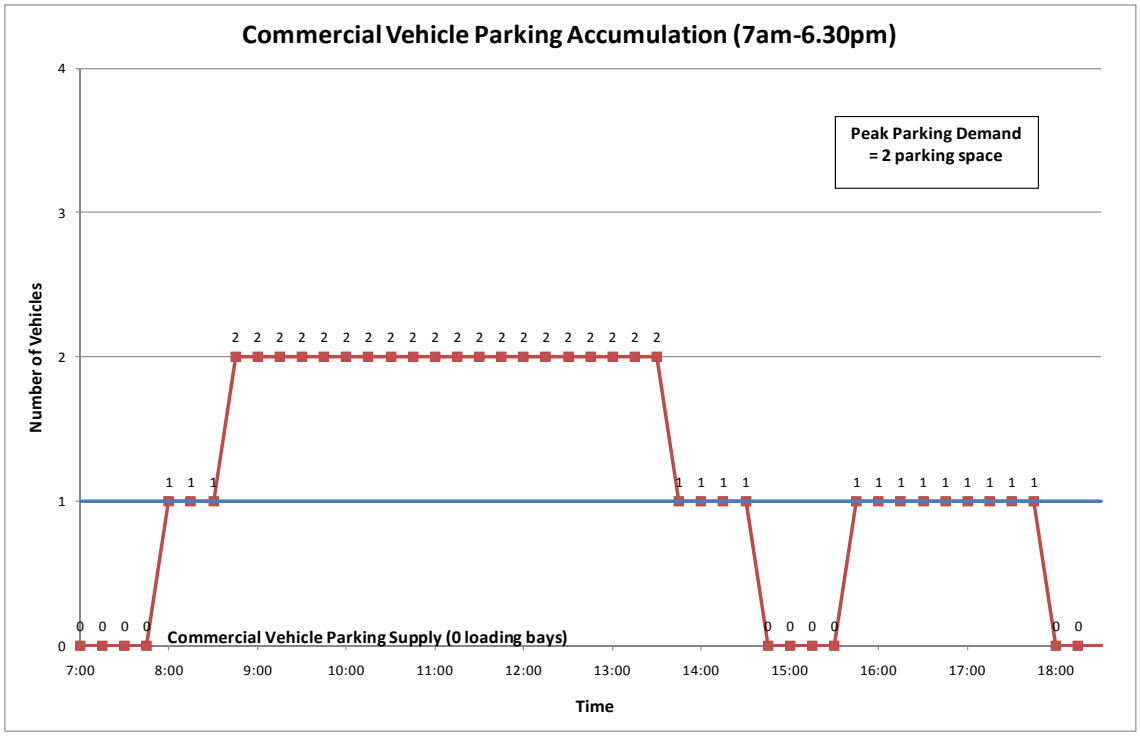


Figure 4.74 indicated the peak number of commercial vehicles using the on-site loading bays was 2, which occurred between 8:45am and 1:45pm.

4.10.5 Parking Generation Analysis

Applying the driver mode split proportions to the total number of staff provides a reasonable estimate of the total parking demand, including staff who parked on-site or either on the street or in alternative off street car parks in close proximity to the site as shown in Table 4.69.

Table 4.69: Parking Demand Rate

No. of Staff	Car Driver Mode Share	Total Drivers	Peak On-site Parking Accumulation	Off-site parking demand	Parking Demand Rate
380	78%	296	89	207	2.27/100m² GFA

4.10.6 Public Transport Accessibility

Wollongong Station Access

The 77 Market Street site is located within 400m of the Wollongong Train station with footpaths provided for staff and visitors accessing the station. Wollongong Station on the City Rail South Coast regional train line and direct services run to key destinations including Kiama, Sutherland, Hurstville and Sydney CBD.

It has been estimated that during the AM and PM peak period, based on current mode split data for the Honeysuckle Drive site that approximately **20 people walk** to and from Wollongong train station during the AM and PM peak period on their journey to and from work.

Bicycle Network & Parking

An extract from the Wollongong Bicycle Plan is provided in Figure 4.75 which indicates that Market Street is part of the Wollongong Bicycle Network. There is a proposed cycleway along Crown Street and Gladstone Avenue to the south.

Figure 4.75: Wollongong Bicycle Plan Extract

The site has no bicycle parking spaces provided with the site and on the day of the survey there were no cyclists recorded accessing the site.

As this site has no bicycle parking, **a bicycle parking rate per employee cannot be determined**.

A detailed summary of the analysis contained within this section of the report is provided in Appendix A.

5. Linear Regression

5.1 Introduction

Simple linear regression analysis of the survey data has been undertaken to determine the relationship between key variables. The correlation coefficient R^2, which represents the degree to which variation in trip behaviour is explained by variation of an independent variable, has been calculated for each relationship that has been considered. The R^2 value gives an indication of how well the regression line fits the real data points. A value of 0.8 or greater is considered to be acceptable.

The independent variables which have been analysed to determine the level of correlation between person and vehicle trips rates are:

- Accessibility score
- Car driver mode share
- Gross floor area
- Total parking demand.

These variables have also been analysed to determine if relationships exist between the variables themselves.

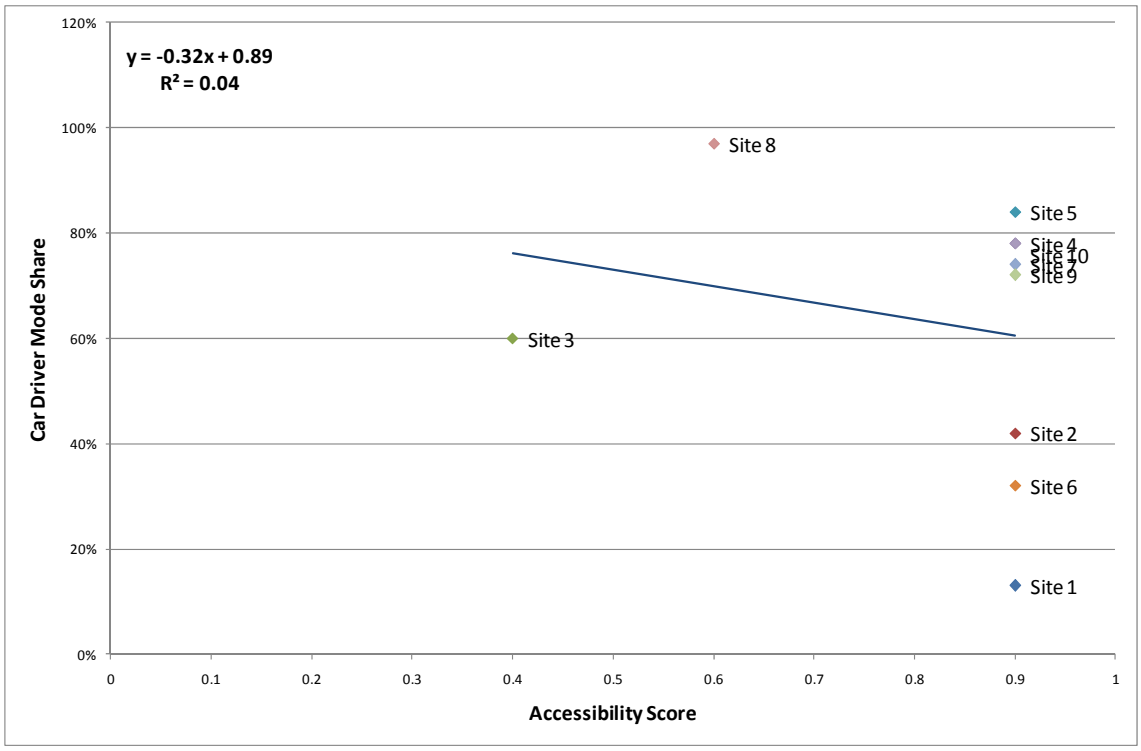
5.2 Independent Variables Relationships

5.2.1 Accessibility Score - Car Driver Mode Share

The accessibility score calculated for the sites surveyed ranged from 0.4 to 0.9, with one site having a score of 0.4, one site having a score of 0.6 and the remaining sites (8) having a score of 0.9.

Simple linear regression analysis of accessibility score and the car driver mode share is shown in Figures 5.1.

Figure 5.1: Accessibility Score – Car Driver Mode Share

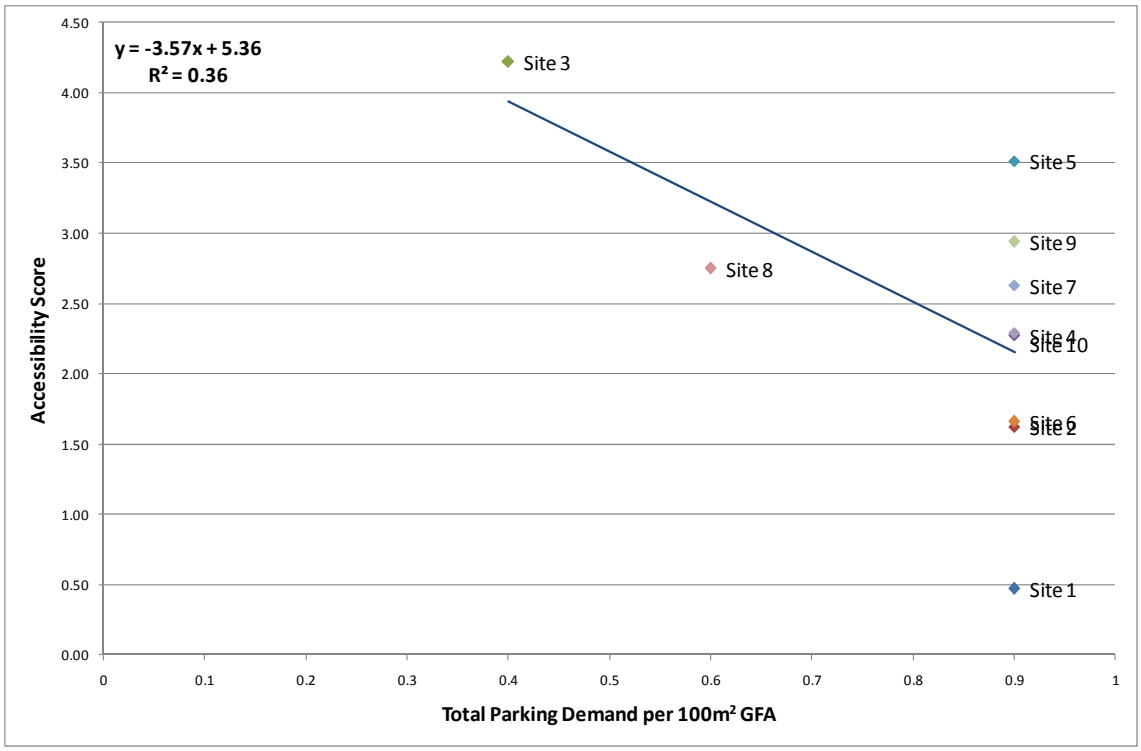


The R^2 values are 0.04 which is very low and indicates there is very little correlation between the accessibility score and car driver mode share.

5.2.2 Accessibility Score – Total Parking Demand

Simple linear regression analysis of accessibility score and total parking demand rate per 100m^2 GFA is shown in Figures 5.2.

Figure 5.2: Accessibility Score – Parking Demand Rate



The R^2 value is 0.36 which is low and indicates there is low correlation between the accessibility score and the total parking demand rate per 100m² GFA.

5.2.3 Total Parking Demand – Car Driver Mode Share

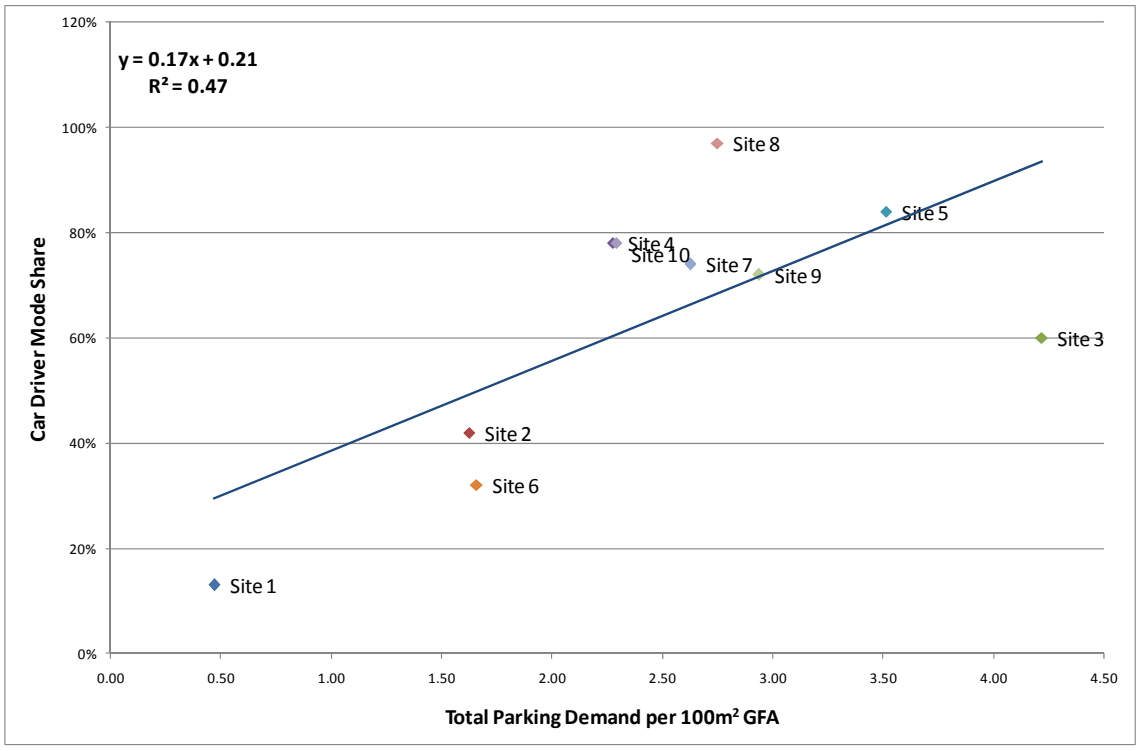
The total parking demand, including both on-site and off-site parking, for each of the sites surveyed is shown in Table 5.1.

Table 5.1: Parking Demand and Parking Demand Rates

Site	OB1	OB2	OB3	OB4	OB5	OB6	OB7	OB8	OB9	OB10
Total Parking Demand	148	166	1,440	74	202	448	74	33	358	296
Total Parking Demand per 100m2 GFA	0.47	1.63	4.22	2.27	3.51	1.66	2.63	2.75	2.94	2.29

Simple linear regression analysis of the car driver mode share and the total parking demand rate per 100m² GFA is shown in Figure 5.3.

Figure 5.3: Parking Demand Rate – Car Driver Mode Share

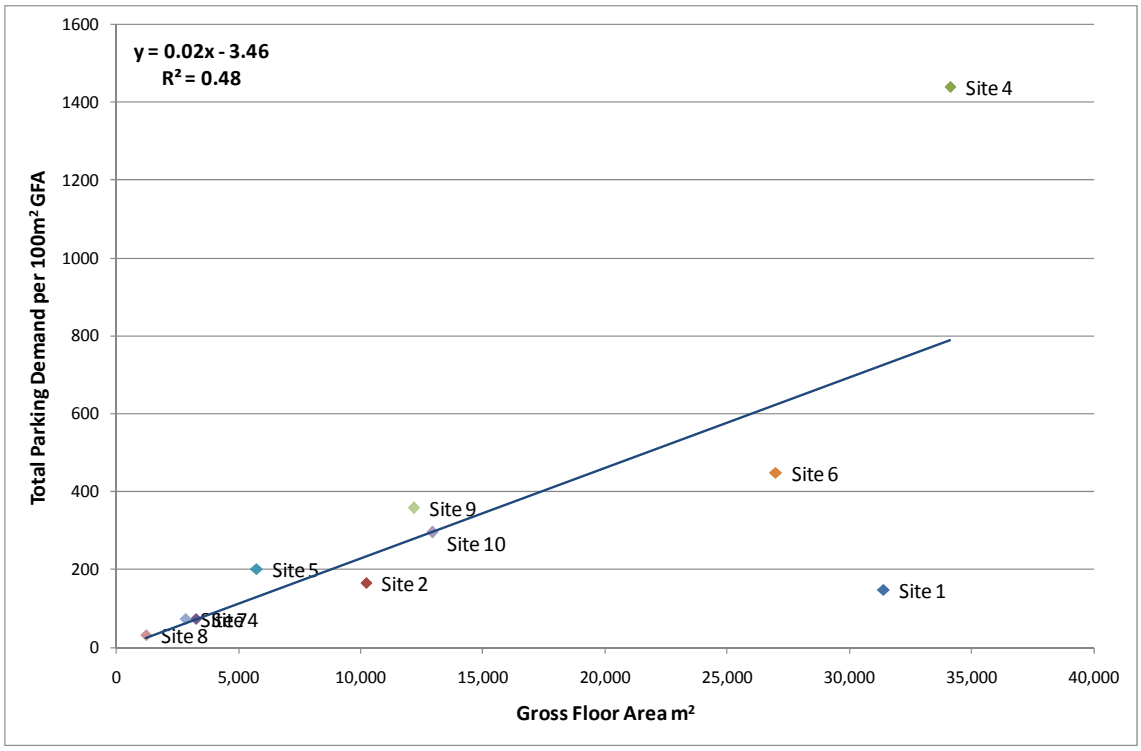


The R^2 value is 0.47 which is low and indicates there is low correlation between the car driver mode share and the total parking demand rate per 100m² GFA.

5.2.4 Gross Floor Area – Total Parking Demand

Simple linear regression analysis of gross floor area and total parking demand is shown in Figure 5.4.

Figure 5.4: GFA – Parking Demand



The R^2 value is 0.48 which is low and indicates there is low correlation between the gross floor area and the total parking demand.

5.2.5 Summary

The relationships between the following variables and the results of the simple linear regression analysis are shown in Table 5.2.

Table 5.2: Key Variables Analysis

	Accessibility Score	Car Driver Mode Share	Total Parking Demand	Gross Floor Area
Accessibility Score		XX	X	-
Car Driver Mode Share	X		✓	-
Parking Demand	X	✓		✓
Gross Floor Area	-	-	✓	

5.3 Vehicle Trips Relationships

Vehicle trip rates have been calculated for each site for the each of the following periods:

- Site AM and PM peak hours
- Daily
- Road Network AM and PM peak hours.

To determine if a relationship exists between the vehicle trip rates and key variables, simple linear regression analysis has been undertaken. The key variables examined include:

- Accessibility score
- Car driver mode share
- Gross floor area

- Total parking demand.

5.3.1 Accessibility Score

A summary of the vehicle trip rates by accessibility score are shown in Table 5.3.

Table 5.3: Vehicle Based Trip Rates

	Accessibility Score		
	0.4	0.6	0.9
AM Peak Hour			
Trips/100m² GFA	1.468	2.75	0.17 - 2.86
PM Peak Hour			
Trips/100m² GFA	1.41	1.17	0.14 - 1.84
Daily Trips			
Trips/100m² GFA	-	11.67	1.23 - 19.15
Road Network AM Peak			
Trips/100m² GFA	0.42	2.50	0.16 - 2.07
Road Network PM Peak			
Trips/100m² GFA	0.37	0.83	0.14 - 1.87

Simple linear regression analysis of the AM and PM peak hour and daily vehicle trip rates against the accessibility score is shown in Figures 5.5, 5.6 and 5.7.

Figure 5.5: Accessibility Score – AM Peak Vehicle Trips/ 100m² GFA

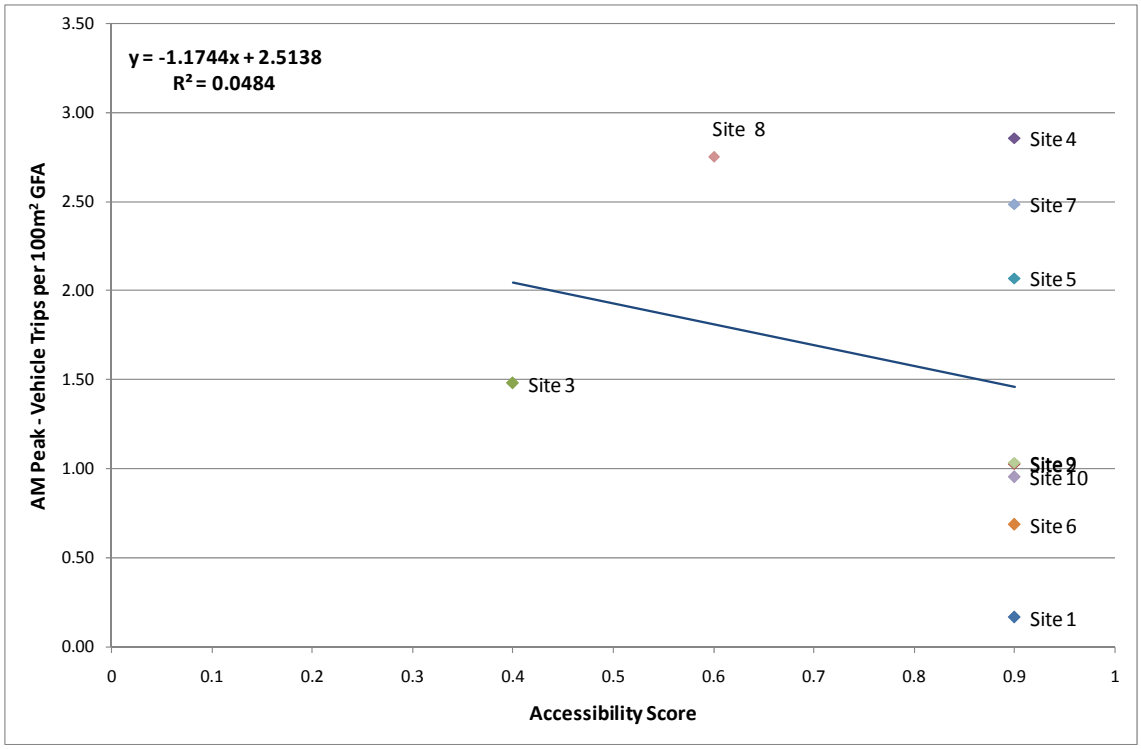


Figure 5.6: Accessibility Score – PM Peak Vehicle Trips/ 100m² GFA

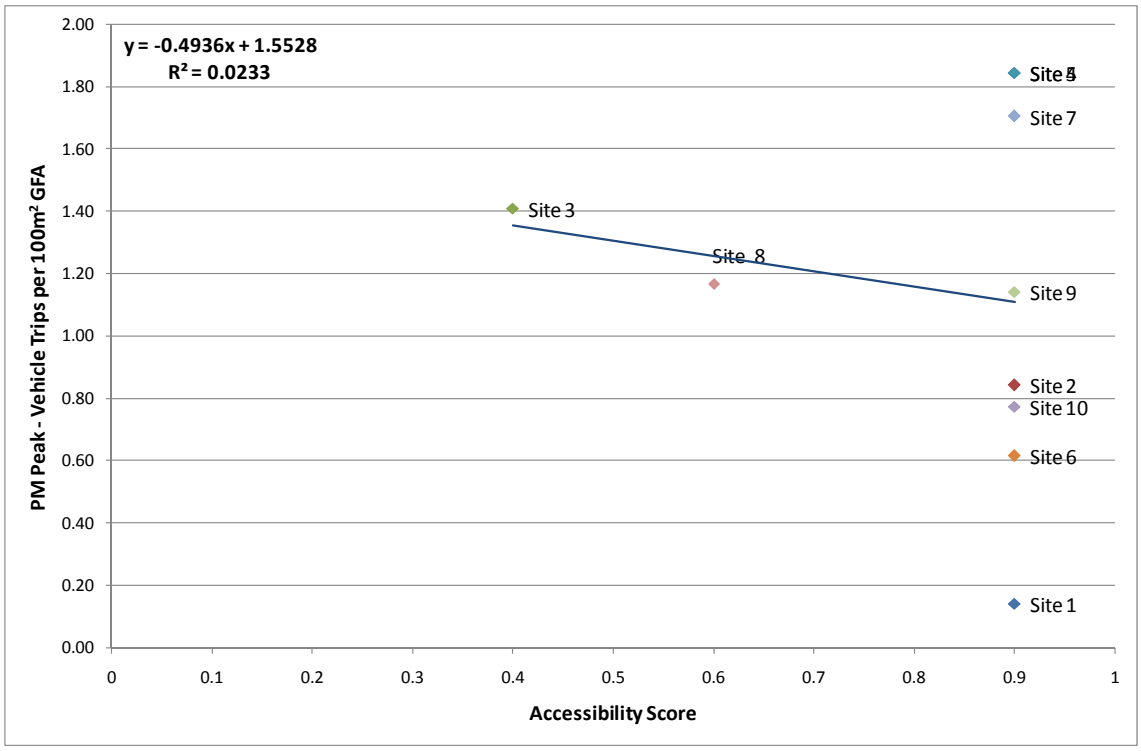
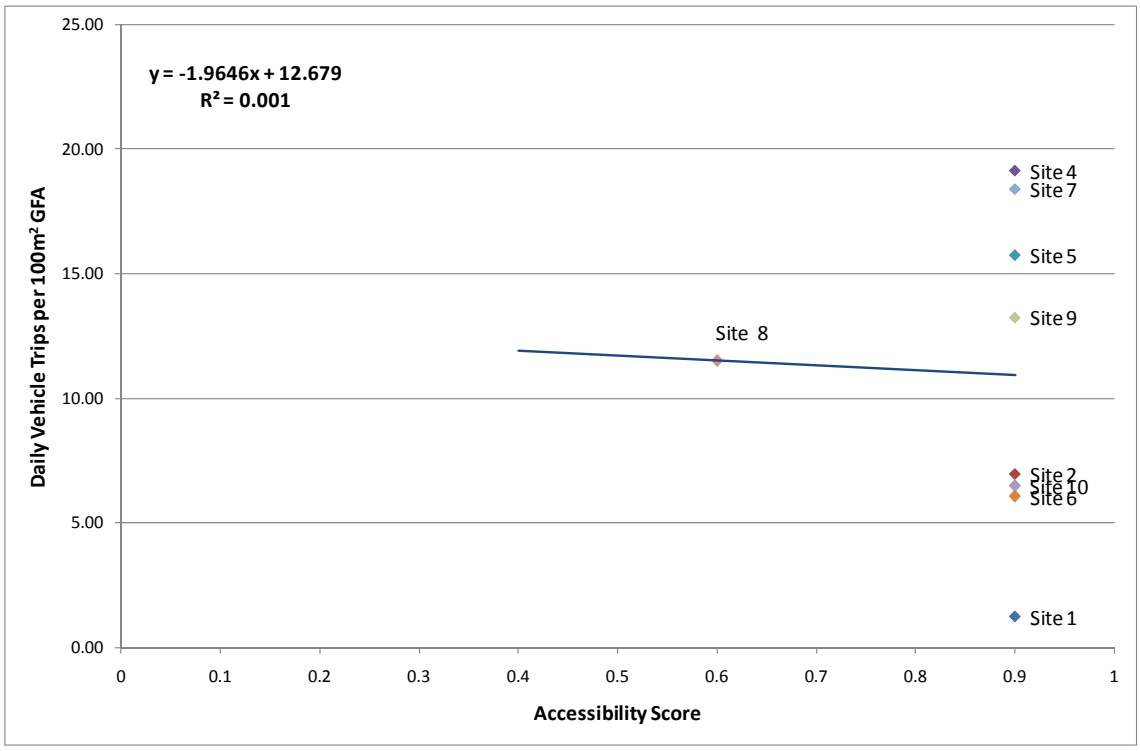


Figure 5.7: Accessibility Score – Daily Vehicle Trips/ 100m² GFA



The R^2 values are 0.05, 0.02 and 0.001 which are very low and indicate there is very little correlation between the accessibility score and the AM and PM peak hour and daily vehicle trip rates (per 100m² GFA).

5.3.2 Car Driver Mode Share

The car driver mode split identified for the sites surveyed ranged from 13% to 97%. Simple linear regression analysis of the AM and PM peak hour and daily vehicle trip rates against the car driver mode split is shown in Figures 5.8, 5.9 and 5.10.

Figure 5.8: Car Driver Mode Split – AM Peak Vehicle Trips/ 100m² GFA

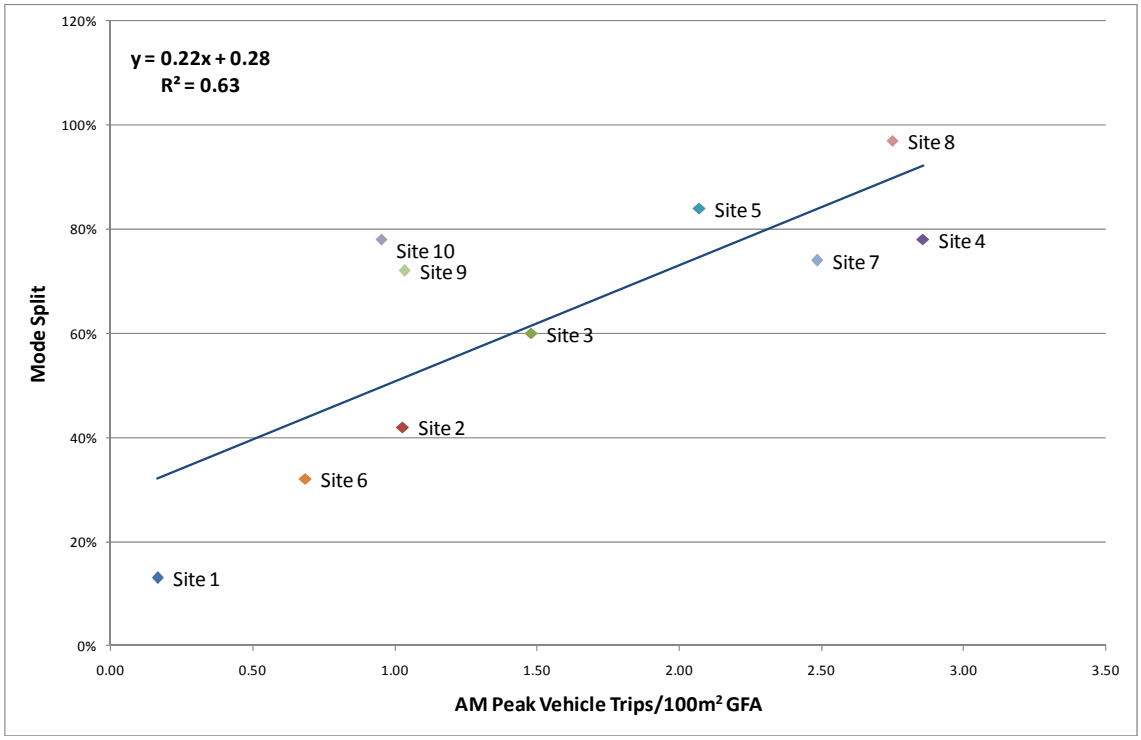


Figure 5.9: Car Driver Mode Split – PM Peak Vehicle Trips/ 100m² GFA

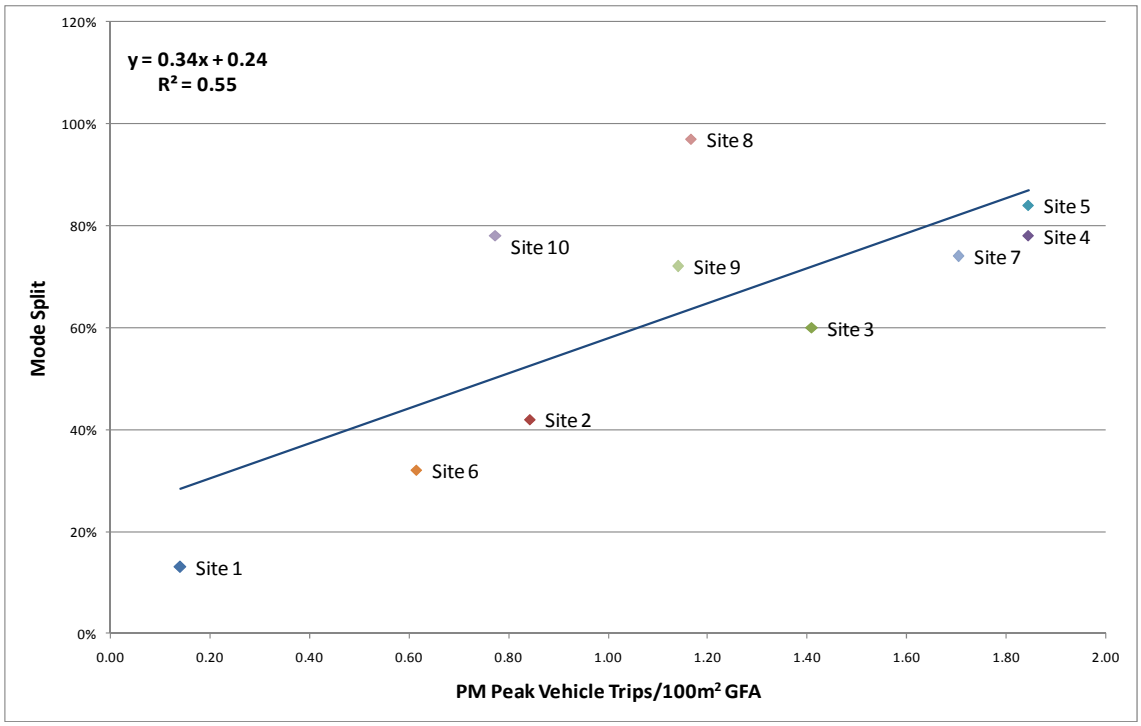


Figure 5.10: Car Driver Mode Split – Daily Vehicle Trips/ 100m² GFA

The R^2 values calcluated are between 0.53 and 0.63, which indicates there is moderate correlation between the car driver mode split and the AM and PM peak hour trips or the daily trips.

5.3.3 Gross Floor Area

The gross floor areas of the sites surveyed ranged from 1,200m² to 34,131m². Simple linear regression analysis of the AM and PM peak hour and daily vehicle trips against the gross floor area is shown in Figures 5.11 to 5.15.

Figure 5.11: Gross Floor Area - AM Peak Hour Vehicle Trips

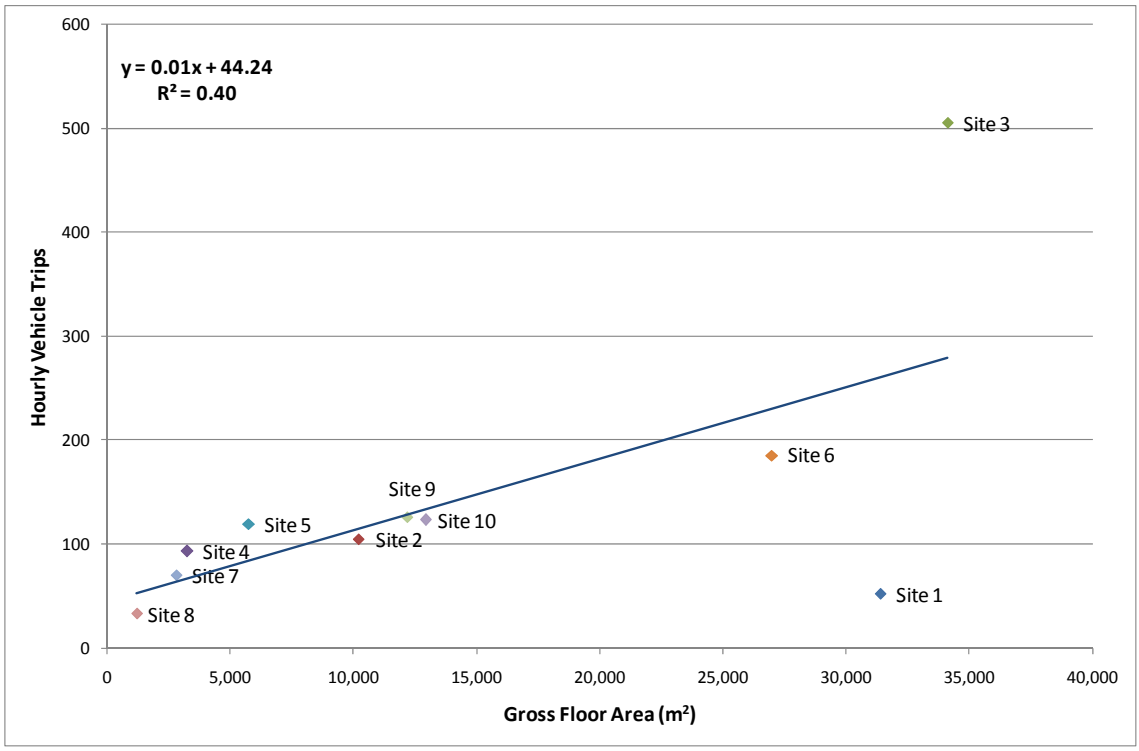


Figure 5.12: Gross Floor Area - PM Peak Hour Vehicle Trips

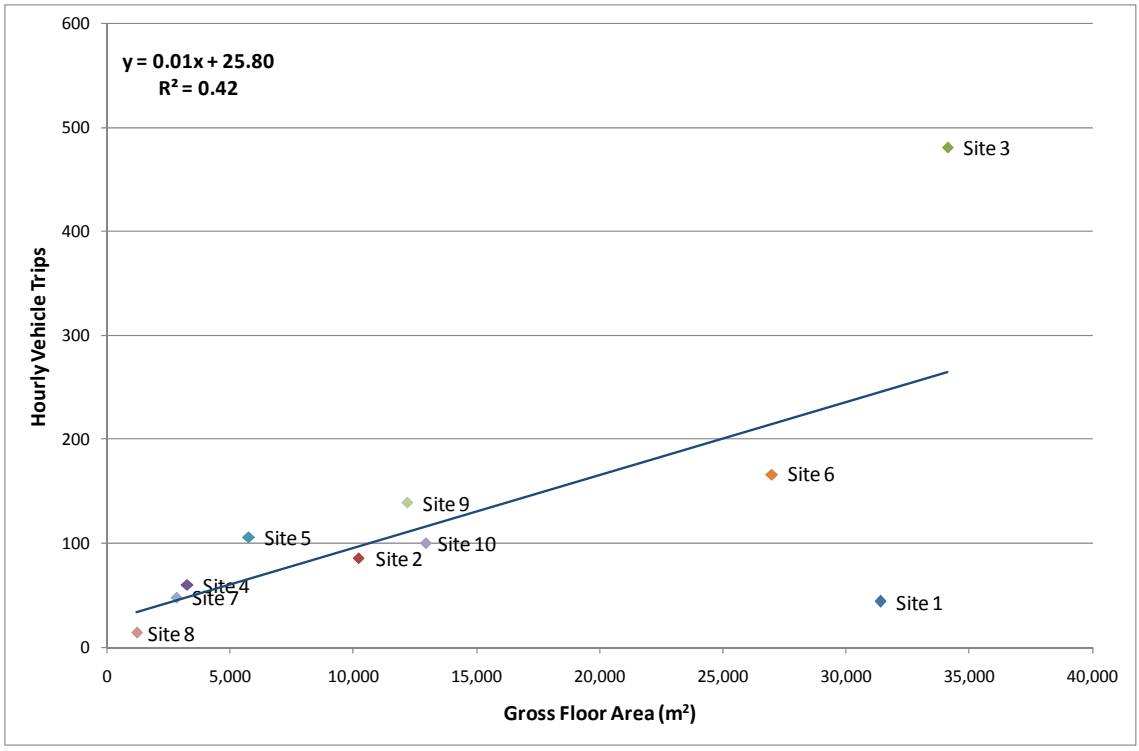


Figure 5.13: Gross Floor Area - Daily Vehicle Trips

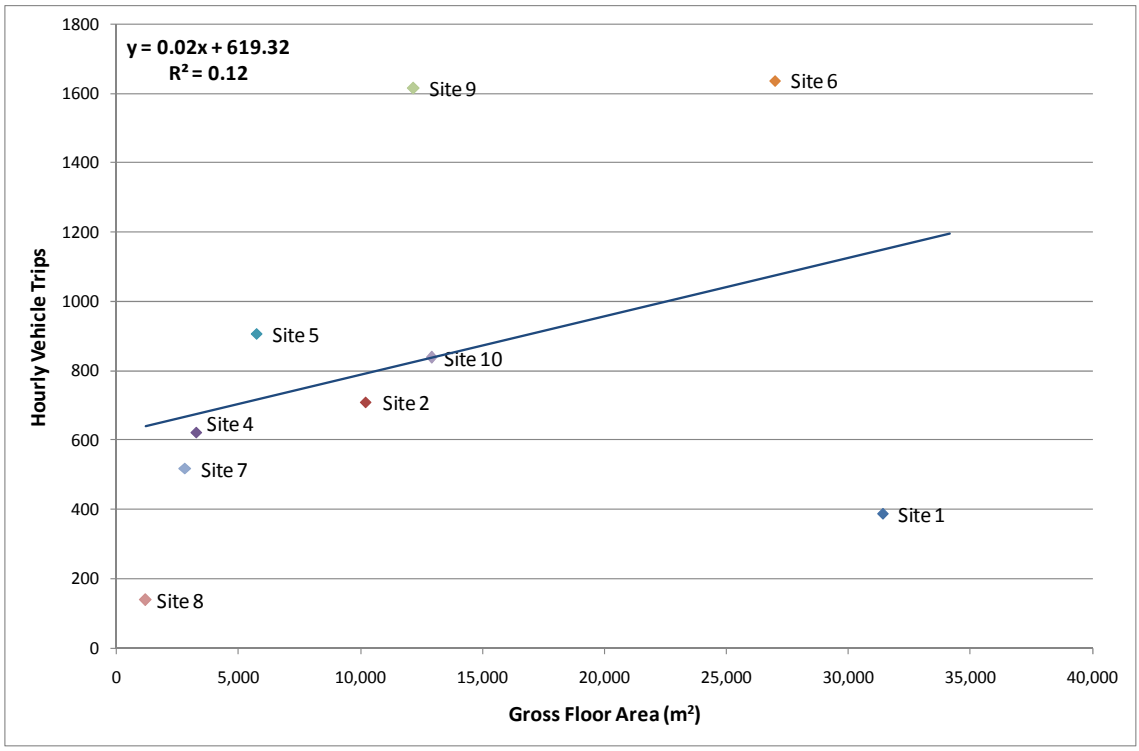


Figure 5.14: Gross Floor Area - Road Network AM Peak Hour Vehicle Trips

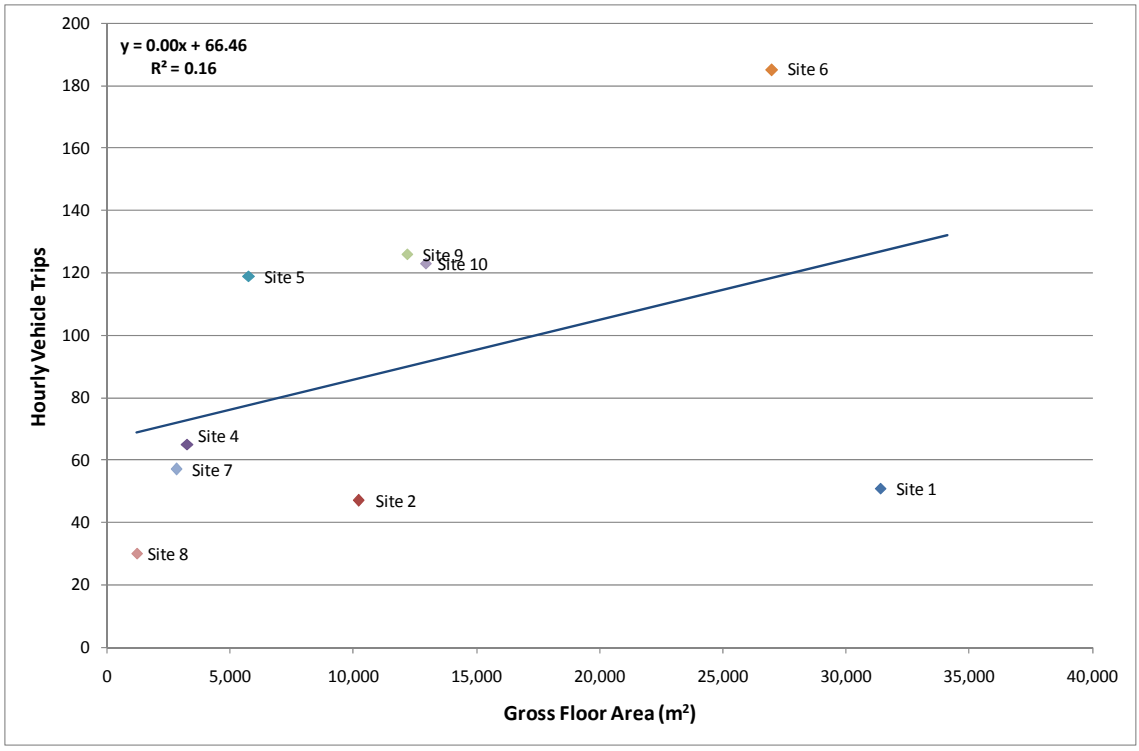
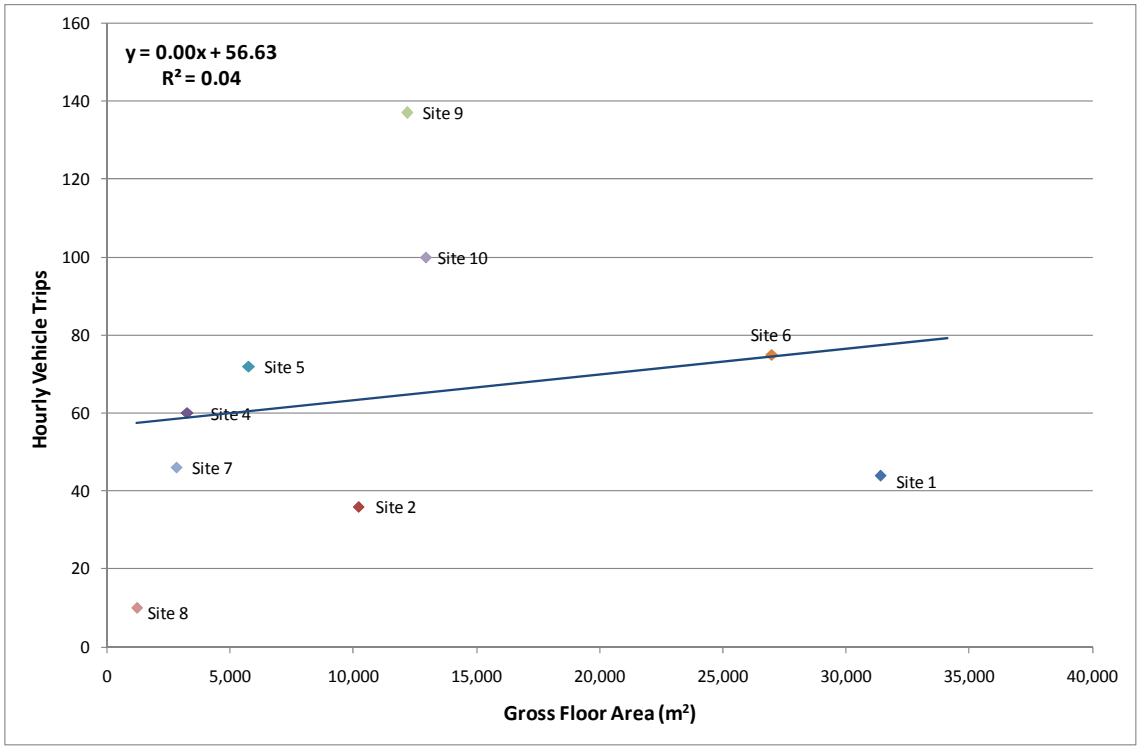


Figure 5.15: Gross Floor Area - Road Network PM Peak Hour Vehicle Trips



For the relationship between gross floor area and vehicle trips, the R^2 varies from 0.04 to 0.42. These are very low R^2 values and are unacceptable; therefore vehicle trip generation rates should not be based on the gross floor area.

5.3.4 Total Parking Demand

Simple linear regression analysis of the AM and PM peak hour and daily vehicle trips against the total parking demand, including both on-site and off-street parking, is shown in Figures 5.16, 5.17 and 5.18.

Figure 5.16: Total Parking Demand - AM Peak Hour Vehicle Trips

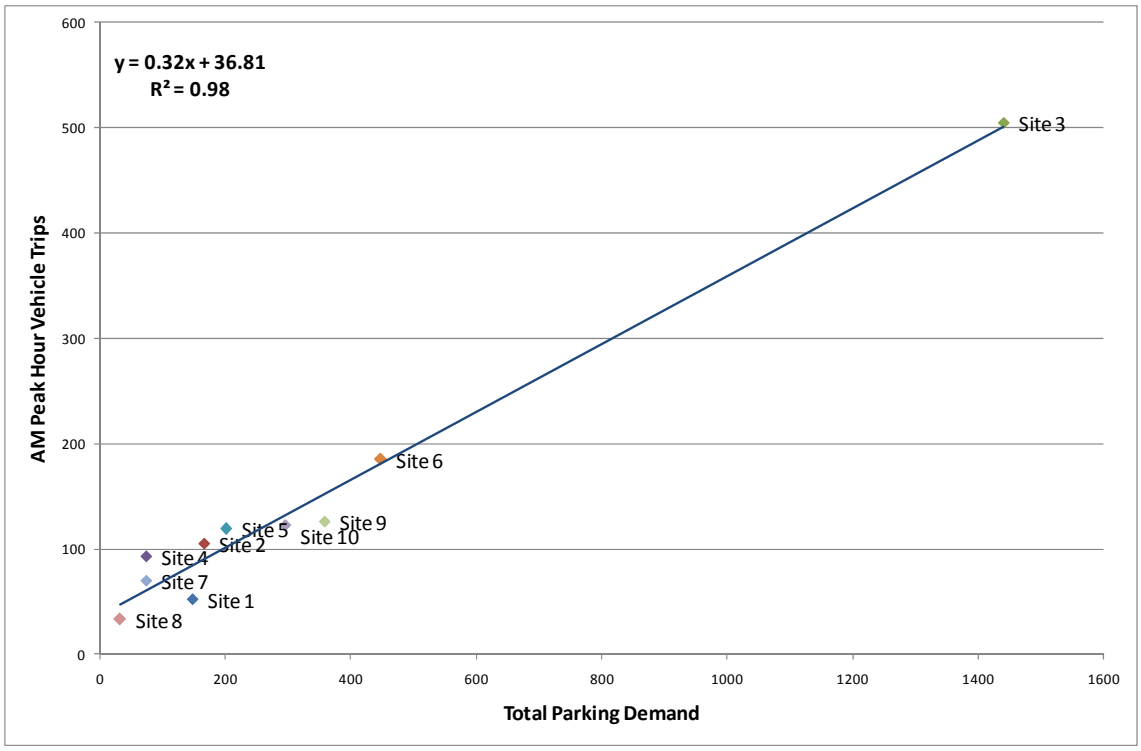


Figure 5.17: Total Parking Demand - PM Peak Hour Vehicle Trips

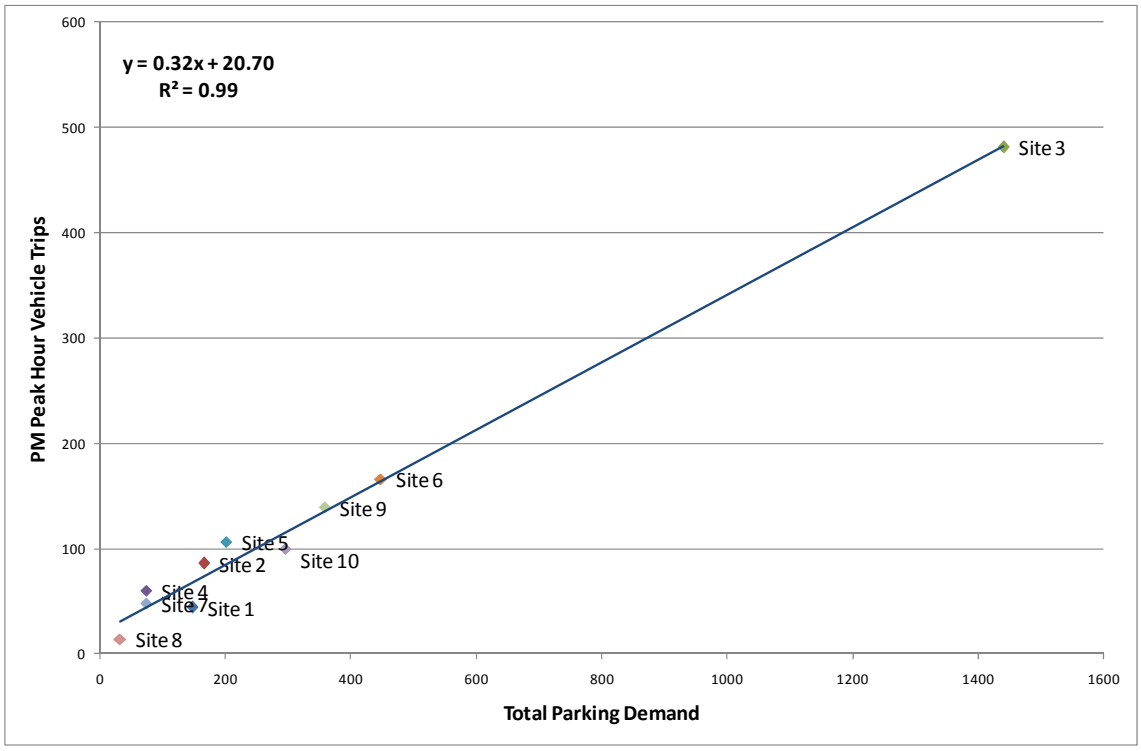
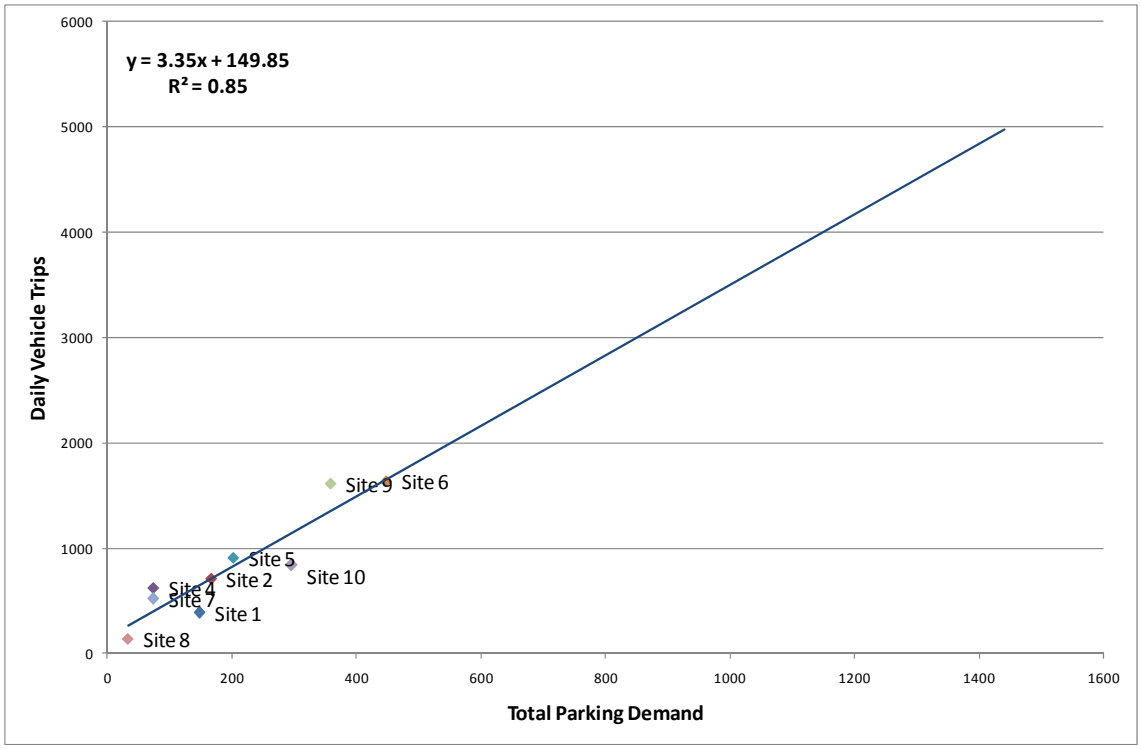


Figure 5.18: Total Parking Demand - Daily Vehicle Trips



For the relationship between the total parking demand and vehicle trips, the R^2 varies from 0.85 to 0.99. The highest R^2 values were calculated for the vehicle trips during the AM and PM peak hours and throughout the day. The R^2 values show there is a good correlation between the two variables of the total parking demand and vehicle trips during the AM and PM peak hours and throughout the day.

Simple linear regression analysis of the AM and PM road network peak hours against the total parking demand is shown in Figures 5.19 and 5.20.

Figure 5.19: Total Parking Demand – Road Network AM Peak Hour Vehicle Trips

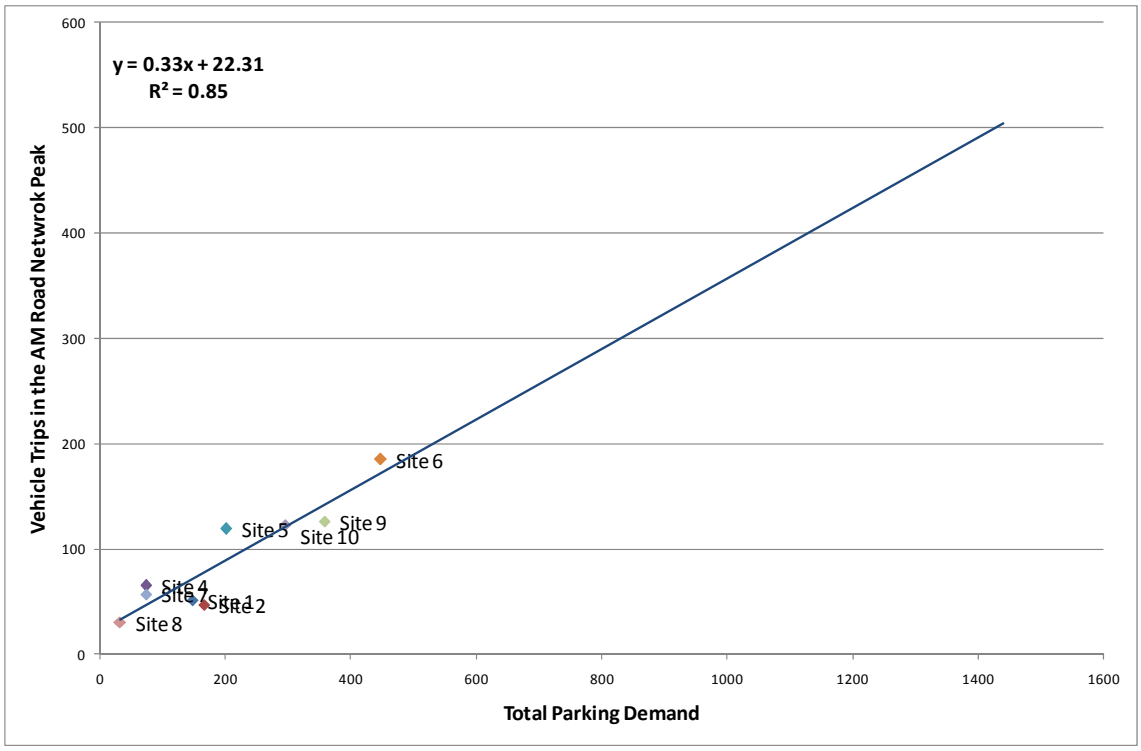
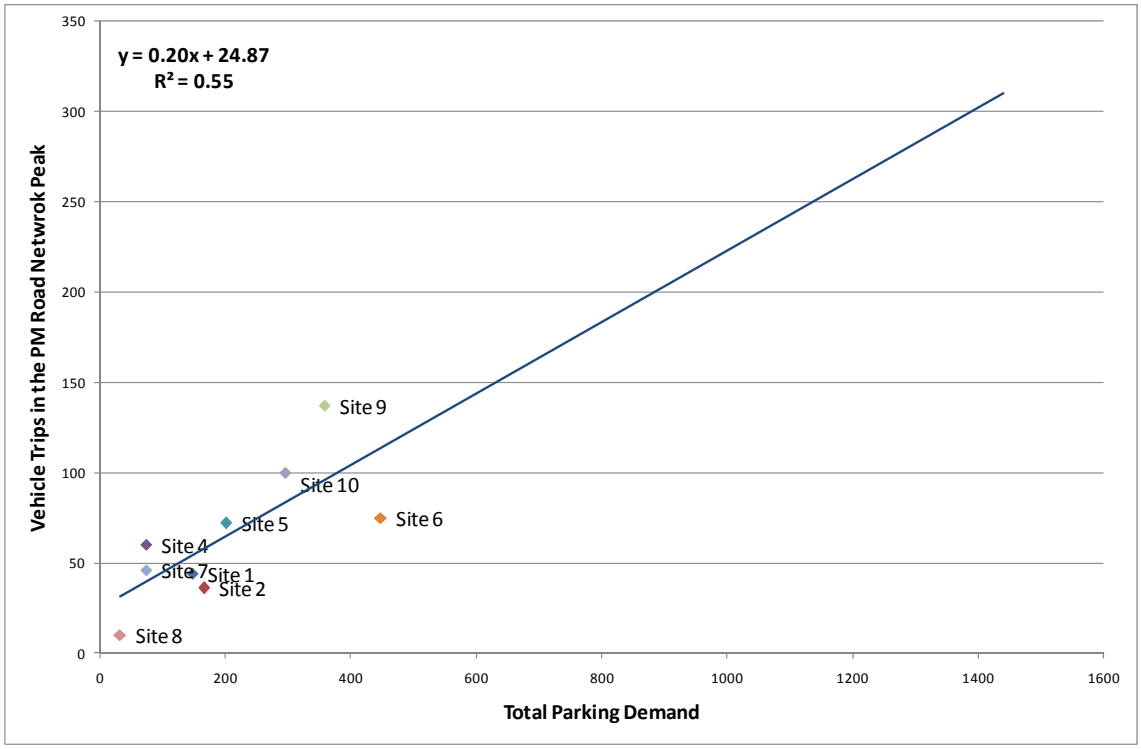


Figure 5.20: Total Parking Demand – Road Network PM Peak Hour Vehicle Trips



The R^2 values for the AM and PM road network peaks were lower, 0.85 and 0.55 respectively. While the R^2 value for the AM road network peak hour is high, the R^2 value calculated for the road network PM peak hour is lower and shows a moderate correlation. This is likely to be due to the variation in the time the road network PM peak hour occurs for each site.

5.4 Person Trips Relationships

Person trip rates have been calculated for each site for the each of the following periods:

- Site AM and PM peak hours
- Daily
- Road Network AM and PM peak hours.

To determine if a relationship exists between the person trip rates and key variables, simple linear regression analysis has been undertake. The key variables examined include:

- Accessibility score
- Gross floor area
- Total parking demand.

5.4.1 Accessibility Score

A summary of the calculated person trip rates by accessibility score is shown in Table 5.4.

Table 5.4: Person Based Trip Rates

	Accessibility Score		
	0.4 (1 site)	0.6 (1 site)	0.9 (8 sites)
AM Peak Hour			
Trips/100m² GFA	2.47	2.83	1.22 - 3.66
PM Peak Hour			
Trips/100m² GFA	2.35	1.17	0.99 - 3.14
Daily Trips			
Trips/100m² GFA	-	11.83	8.31 - 36.33
Road Network AM Peak			
Trips/100m² GFA	-	2.58	0.99 - 3.20
Road Network PM Peak			
Trips/100m² GFA	-	0.83	0.88 - 3.12

Simple linear regression analysis of the AM and PM peak hour and daily person trip rates against the accessibility score is shown in Figures 5.21, 5.22 and 5.23.

Figure 5.21: Accessibility Score Analysis – AM Peak Person Trips/ 100m² GFA

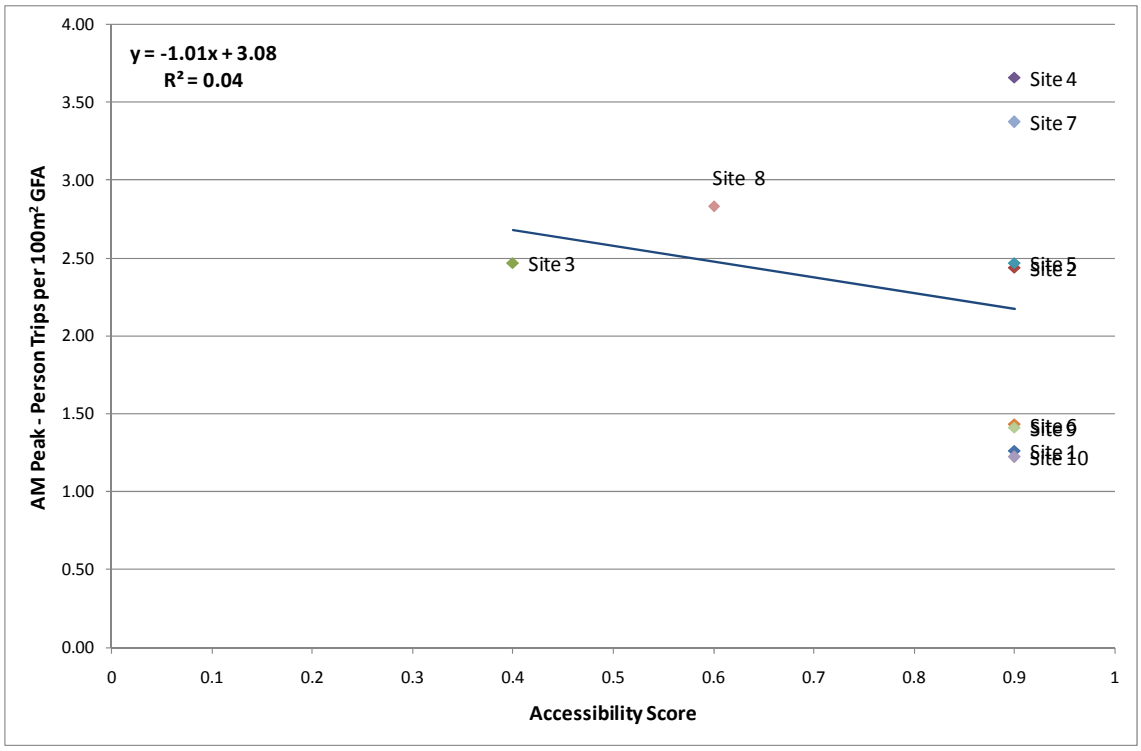


Figure 5.22: Accessibility Score Analysis – PM Peak Person Trips/ 100m² GFA

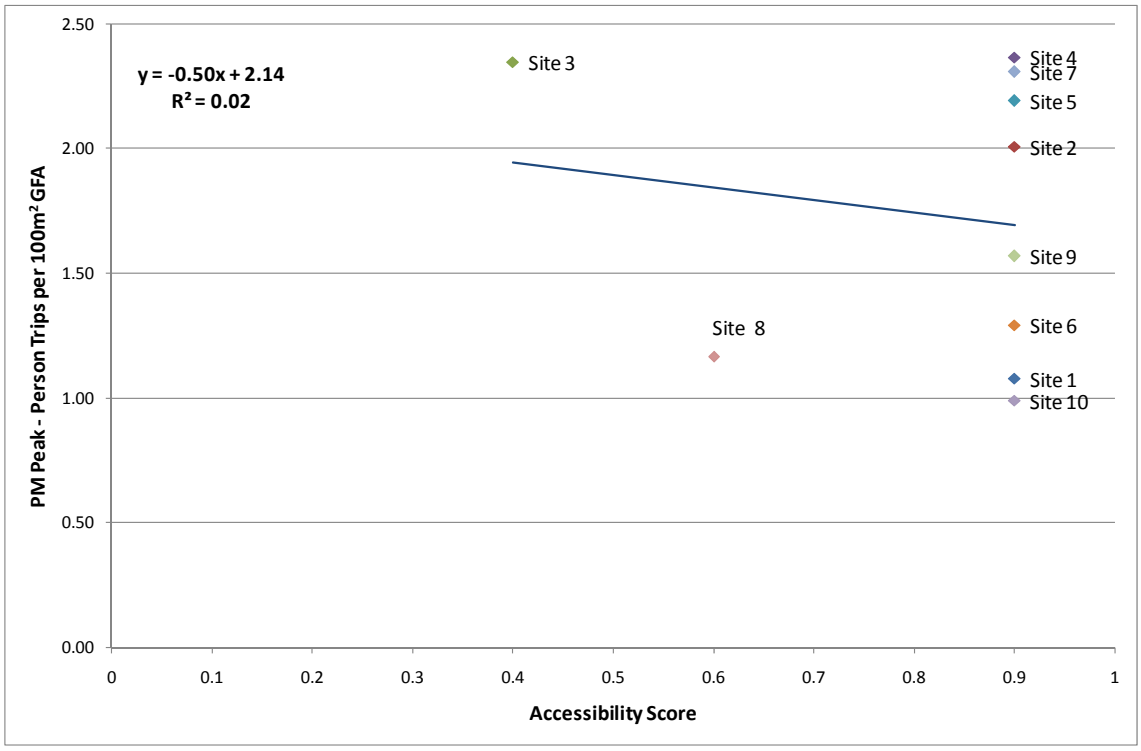
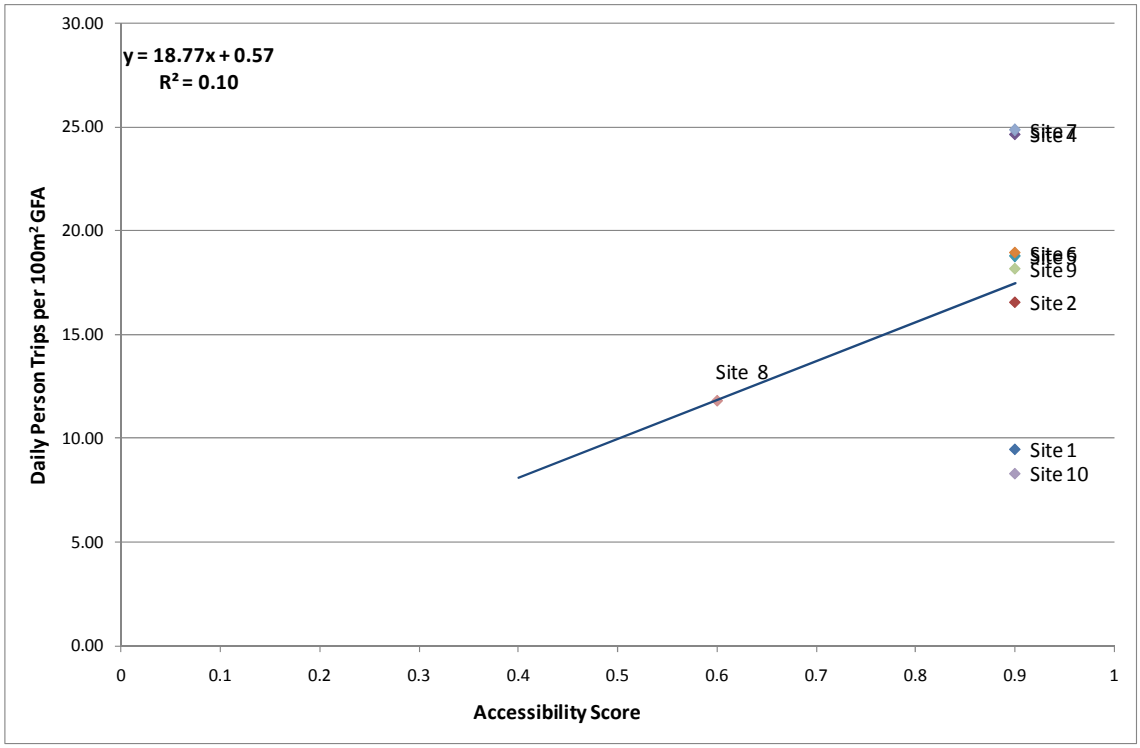


Figure 5.23: Accessibility Score Analysis – Daily Person Trips/ 100m² GFA



The R^2 values are 0.04, 0.02 and 0.10 which are very low and indicate there is very little correlation between the accessibility score and the AM and PM peak hour and daily person trip rates (per 100m² GFA).

5.4.2 Gross Floor Area

The gross floor areas of the sites surveyed ranged from 1,200m² to 34,131m². Simple linear regression analysis of the AM and PM peak hour and daily person trips against the gross floor area is shown in Figures 5.24 to 5.28.

Figure 5.24: AM Peak Hour – Person Trips

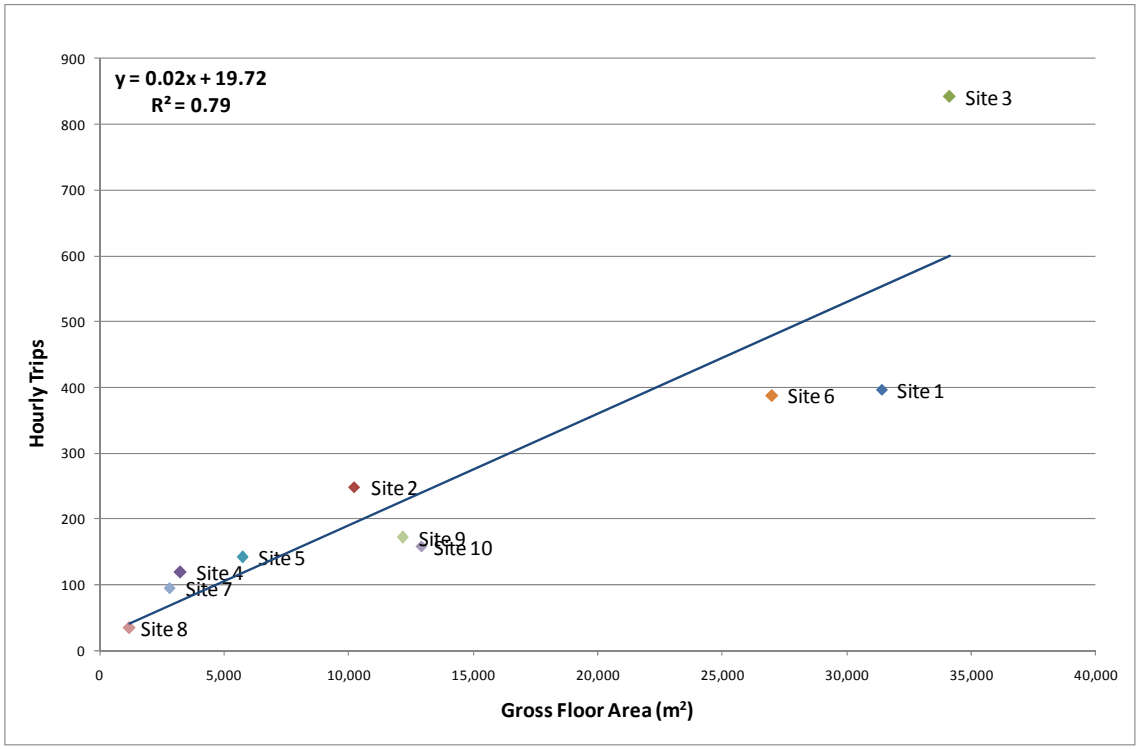


Figure 5.25: PM Peak Hour – Person Trips

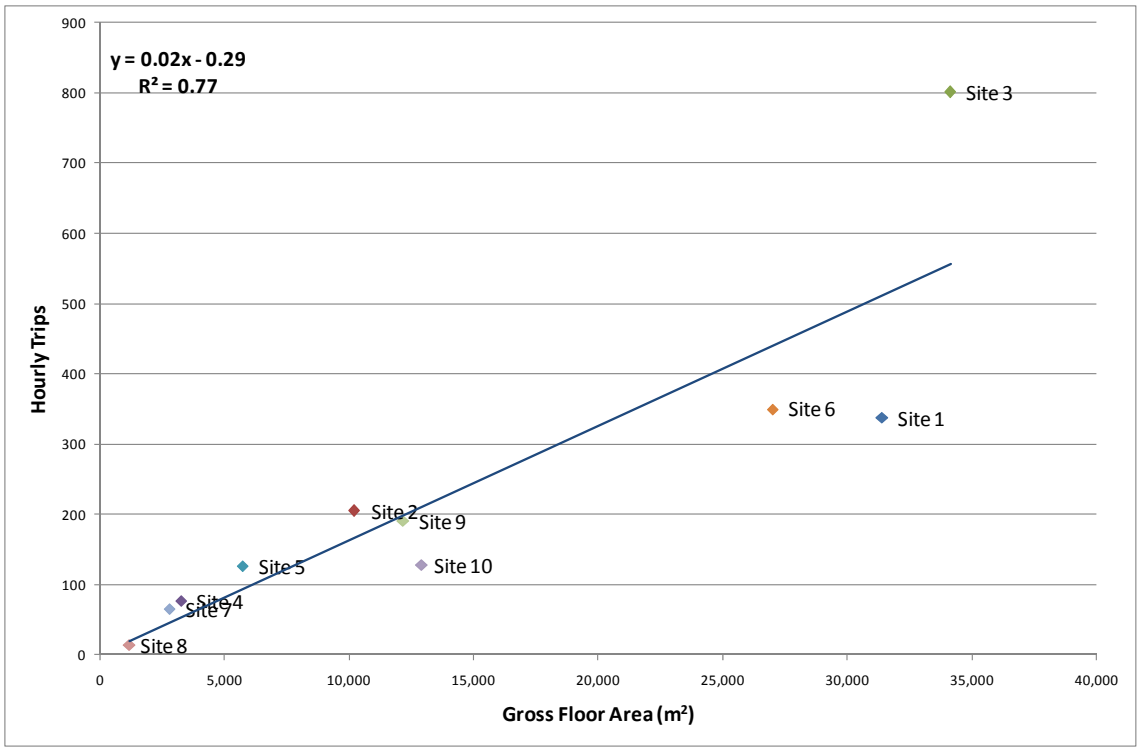


Figure 5.26: Daily – Person Trips

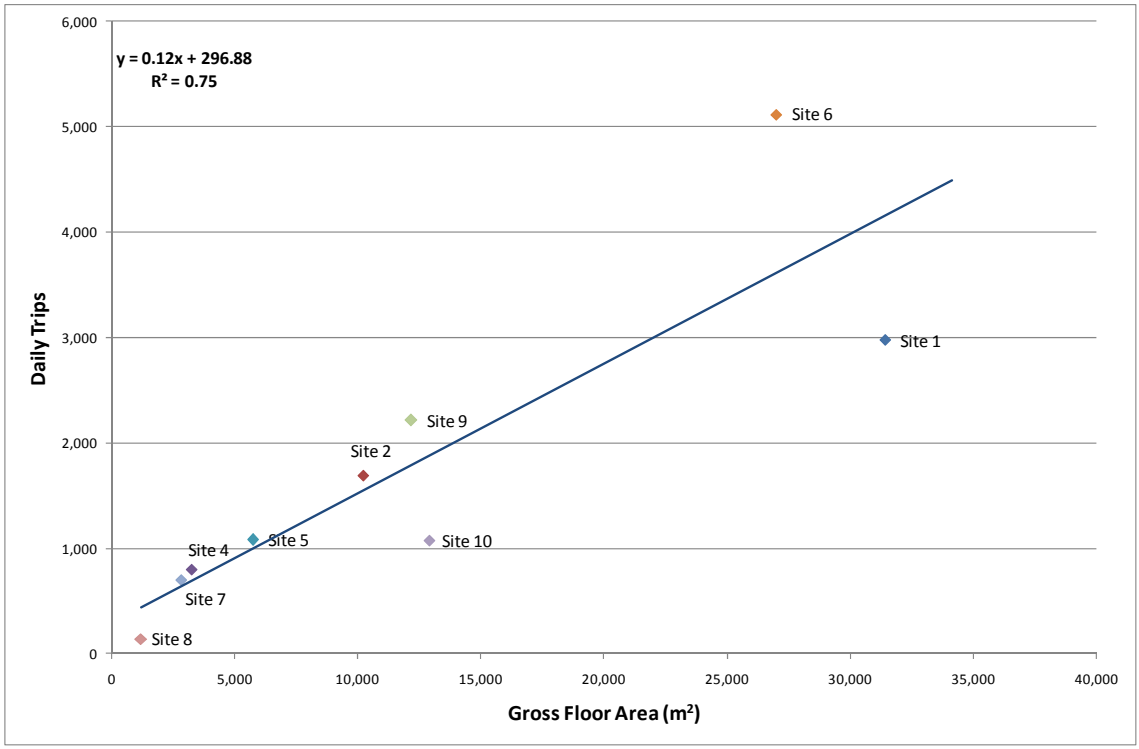


Figure 5.27: Road Network AM Peak Hour – Person Trips

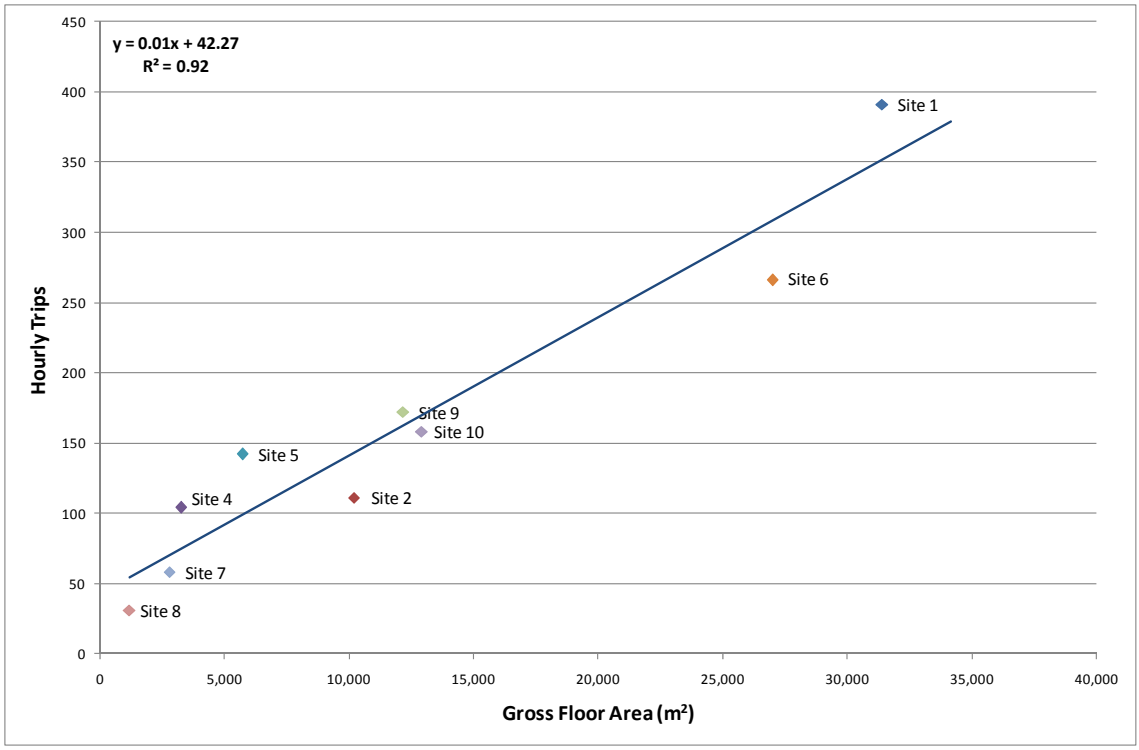
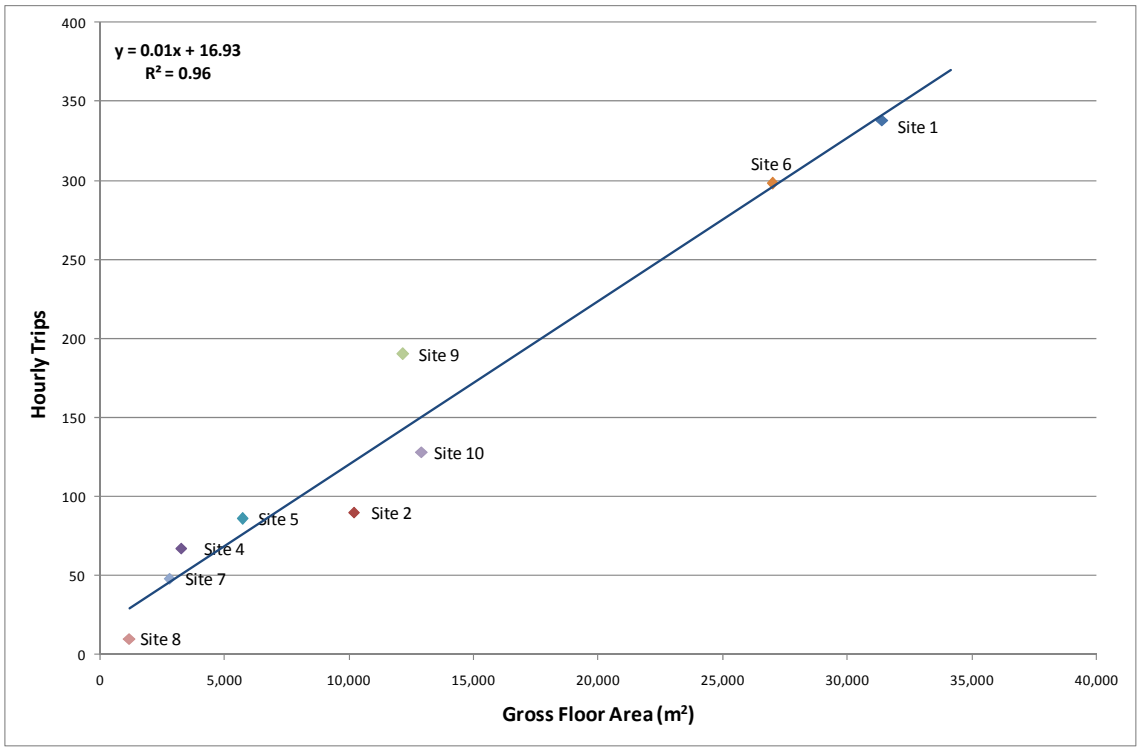


Figure 5.28: Road Network PM Peak Hour – Person Trips



For the relationship between gross floor area and person trips, the R^2 varies from 0.75 to 0.96. The R^2 value calculated for the relationship between GFA and the daily person trips was the lowest at 0.75, despite being the lowest value, it still indicates a reasonable level of correlation. The highest R^2 value for the relationship between person trips during the road network PM peak hour was the highest, with a value of 0.96 calculated. The R^2 value calculated for the relationship between gross floor area and person trips during each period considered shows a good level of correlation.

5.4.3 Total Parking Demand

Simple linear regression analysis of the AM and PM peak hour and daily person trips against the total parking demand is shown in Figures 5.29 and 5.30.

Figure 5.29: Total Parking Demand - AM Peak Hour Person Trips

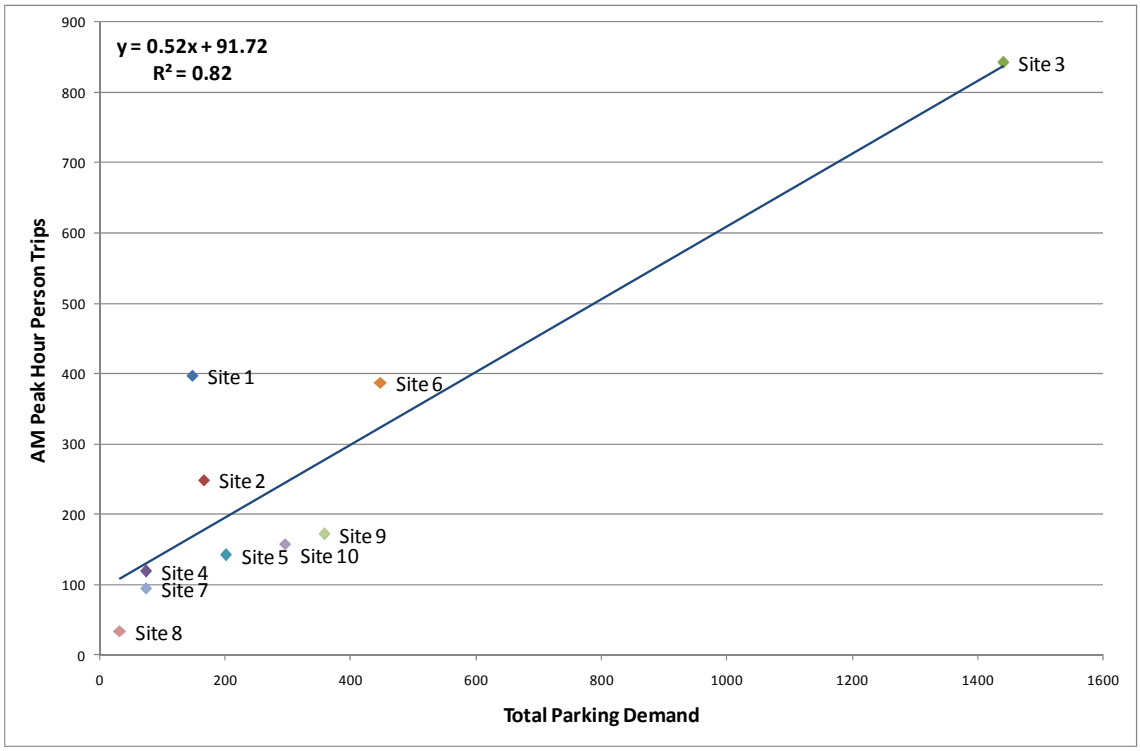
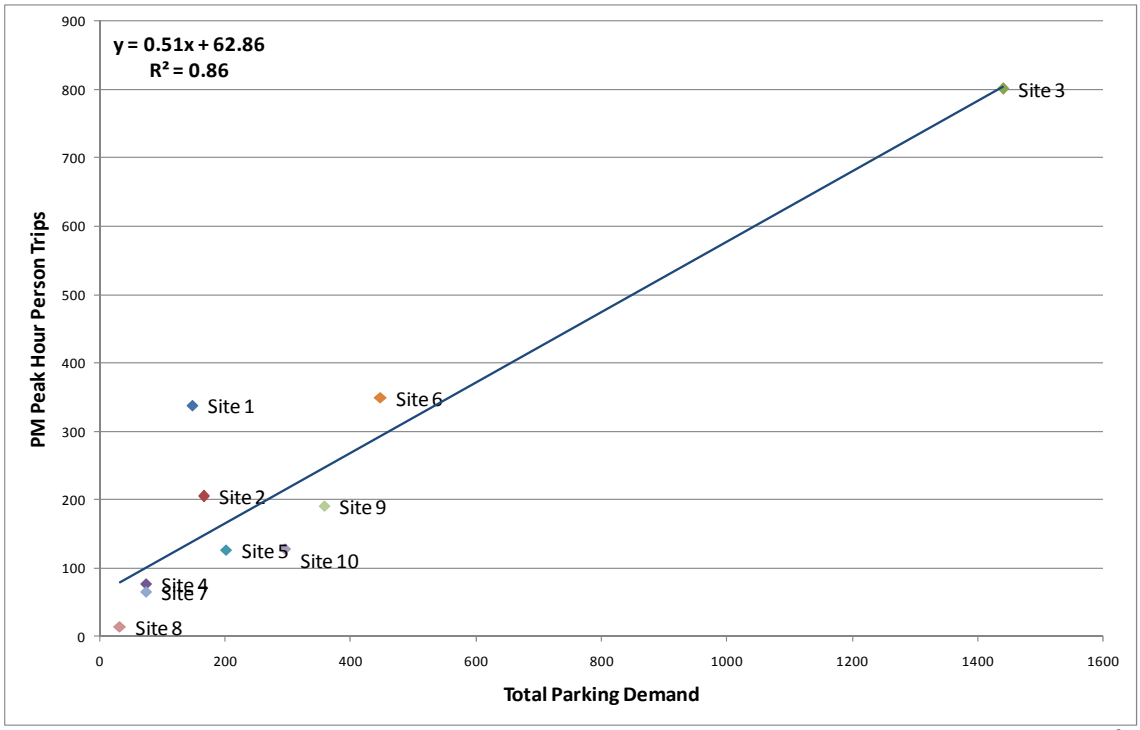


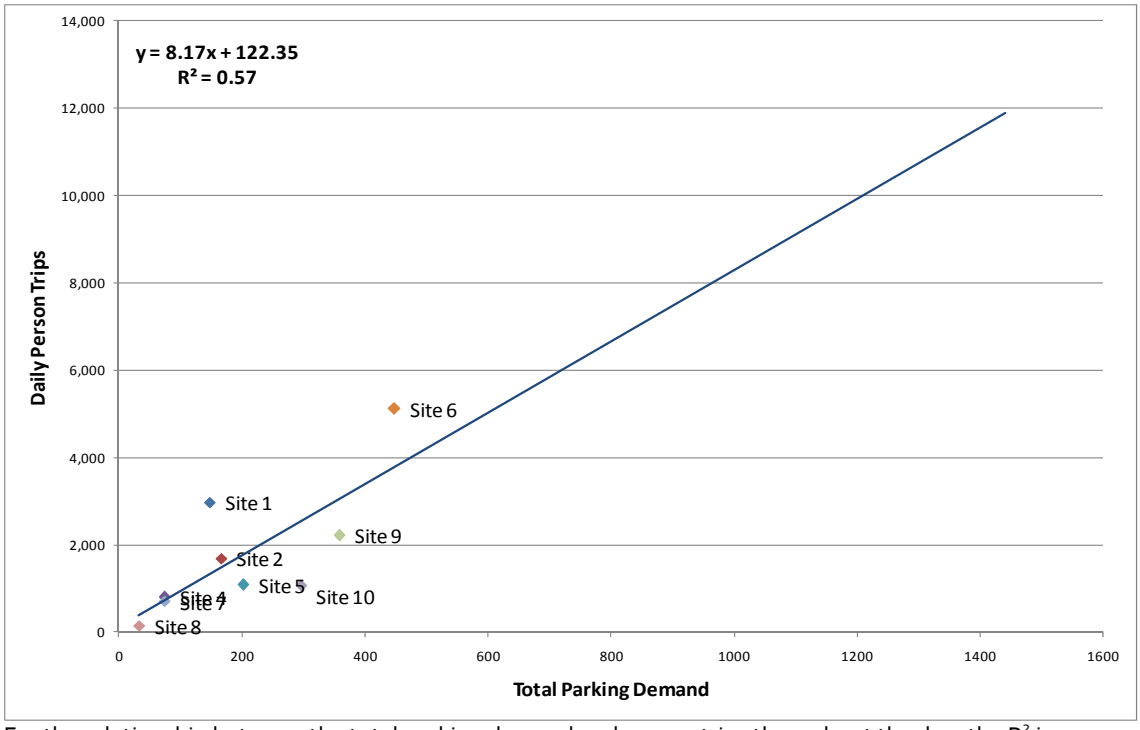
Figure 5.30: Total Parking Demand - PM Peak Hour Person Trips



For the relationship between the total parking demand and person trips in the AM and PM peak hour, the R^2 is 0.82 and 0.86 respectively. The R^2 values show there is a good correlation between the two variables of the total parking demand and person trips in the AM and PM peak hours.

Simple linear regression analysis of the AM and PM road network peak hours against the total parking demand is shown in Figures 5.31, 5.32 and 5.33.

Figure 5.31: Total Parking Demand - Daily Person Trips



For the relationship between the total parking demand and person trips throughout the day, the R^2 is 0.57. The R^2 values show there is a moderate correlation between the two variables of the total parking demand and person trips throughout the day.

Figure 5.32: Total Parking Demand - AM Road Network Peak Hour Person Trips

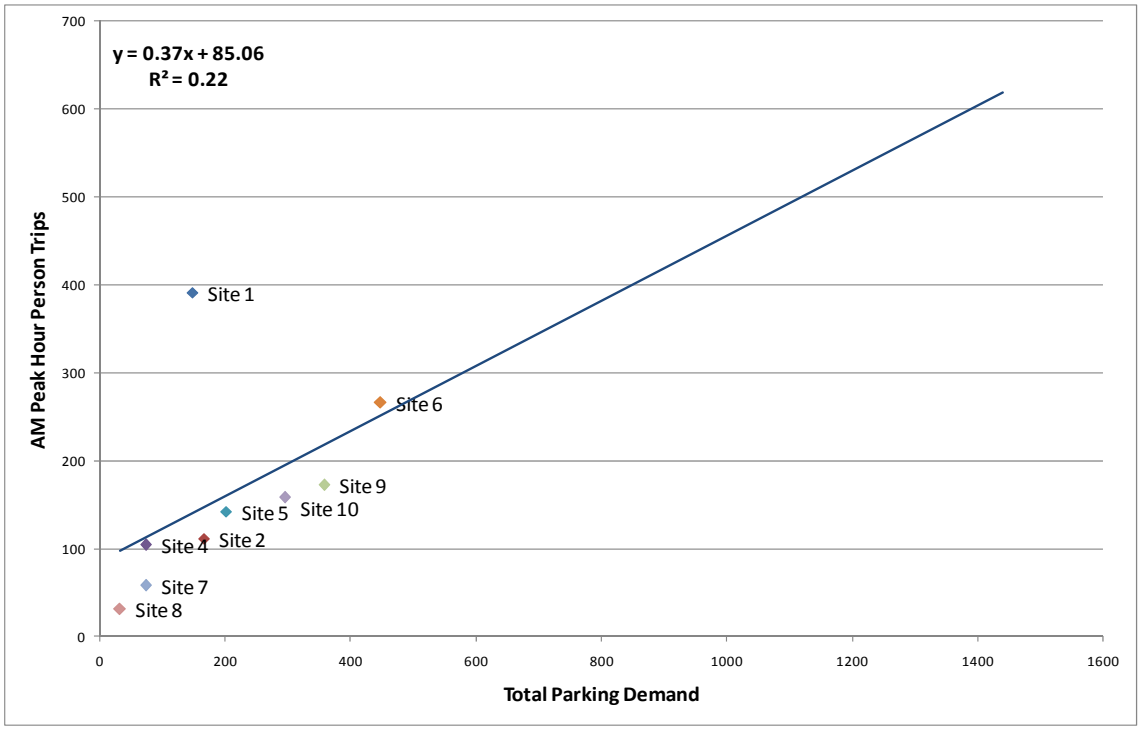
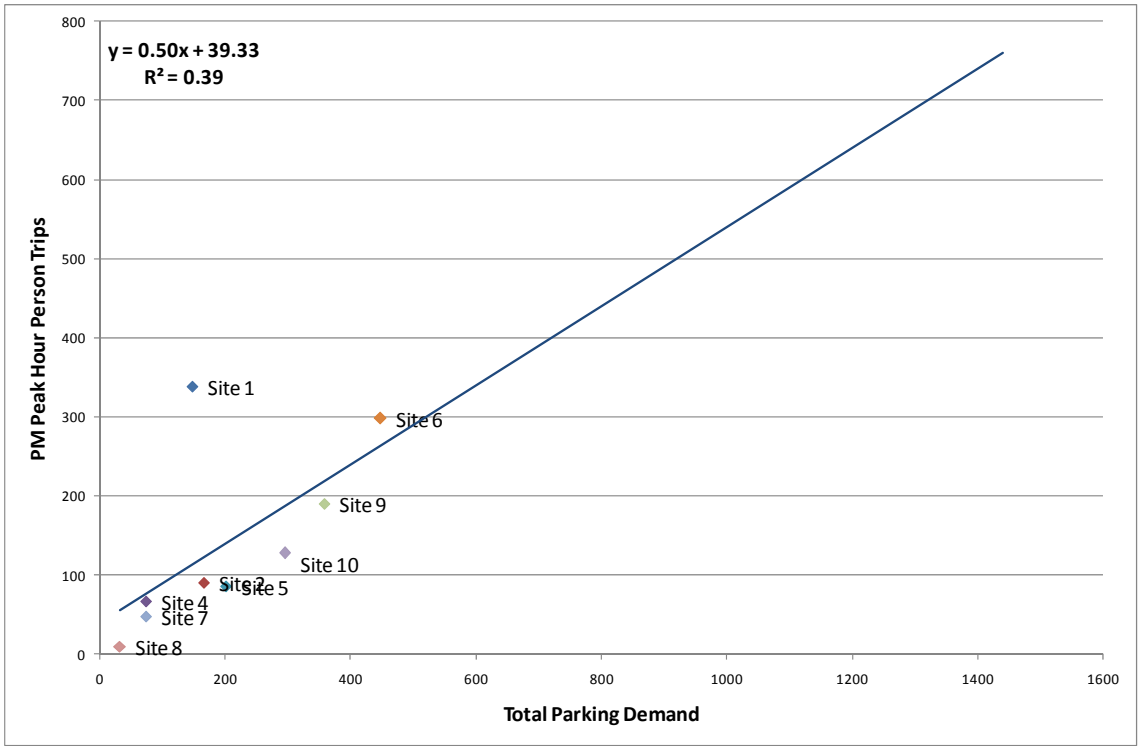


Figure 5.33: Total Parking Demand - PM Road Network Peak Hour Person Trips



For the relationship between the total parking demand and person trips in the AM and PM road network peak hour, the R^2 is 0.22 and 0.39 respectively. The R^2 values show there is a poor correlation between the two variables of the total parking demand and person trips in the AM and PM road network peak hours.

5.4.4 Conclusions

The linear regression analysis and the R^2 values calculated shows there are low, moderate and high levels of correlation between the key variable as the vehicle and person trip rates, as shown in Tables 5.5 and 5.6.

Table 5.5: Correlations between Key variable and Vehicle Based Trip Rates

	Accessibility Score	Car Driver Mode Share	Gross Floor Area	Total Parking Demand
AM Peak Hour Vehicle Trips	XX	✓	✓	✓✓
PM Peak Hour Vehicle Trips	XX	✓	✓	✓✓
Daily Vehicle Trips	XX	✓	X	✓✓
Road Network AM Peak Vehicle Trips	-	-	X	✓✓
Road Network PM Peak Vehicle Trips	-	-	X	✓

Table 5.6: Correlations between Key variable and Person Based Trip Rates

	Accessibility Score	Car Driver Mode Share	Gross Floor Area	Total Parking Demand
AM Peak Hour Person Trips	XX	-	✓✓	✓✓
PM Peak Hour Person Trips	XX	-	✓✓	✓✓
Daily Person Trips	XX	-	✓✓	✓
Road Network AM Peak Person Trips	-	-	✓✓	X
Road Network PM Person Trips Peak	-	-	✓✓	X

6. Survey Rates Analysis Summary

6.1 Key Details

A summary of the key details for each of the sites surveyed is shown in Table 6.1.

Table 6.1: Key Details

	OB1 North Sydney	OB2 Chatswood	OB3 Sydney Olympic Park	OB4 Hurstville	OB5 Macquarie Park	OB6 Parramatta	OB7 Liverpool	OB8 Norwest	OB9 Newcastle	OB10 Wollongong
Total Staff	1,136 (1,129)	397 (347)	2,400 (2,053)	95 (85)	240 (240)	1,400 (1,225)	99 (88)	34 (31)	490 (490)	380 (300)
Size	31,400	10,214	34,131	3,254	5,748	27,000	2,817	1,200	12,182	12,921
Car and Bicycle Parking spaces	136	150	902	66	269	402	28	83	220	133
Loading Bays	1	6	7	0	3	3	0	1	0	1
Accessibility Score	0.9	0.9	0.4	0.9	0.9	0.9	0.9	0.6	0.9	0.9

Of the ten sites surveys, eight of the sites scored an accessibility score of 0.9, which indicates there is good access to public transport. The remaining two sites, Sydney Olympic Park and Norwest, scored lower accessibility scores, 0.4 and 0.6 respectively, which indicates there is a lower provision of public transport in the vicinity of the site.

6.2 Vehicle Based Trip Rates

The vehicle trips rates based on the floor area for the site AM and PM peak hours, throughout the day and during the road network AM and PM peak hours are shown in Table 6.2.

Table 6.2: Vehicle Based Trip Rates

	OB1 North Sydney	OB2 Chatswood	OB3 Sydney Olympic Park	OB4 Hurstville	OB5 Macquarie Park	OB6 Parramatta	OB7 Liverpool	OB8 Norwest	OB9 Newcastle	OB10 Wollongong	Average
AM Peak Hour											
Trips	52	105	505	93	119	185	70	33	126	123	141
Trips/100m² GFA	0.17	1.03	1.48	2.86	2.07	0.69	2.49	2.75	1.03	0.95	1.55
PM Peak Hour											
Trips	44	86	481	60	106	166	48	14	139	100	124
Trips/100m² GFA	0.14	0.84	1.41	1.84	1.84	0.61	1.70	1.17	1.14	0.77	1.15
Daily											
Trips	387	710		623	906	1636	518	138	1615	838	819
Trips/100m² GFA	1.23	6.95		19.15	15.76	6.06	18.39	11.50	13.26	6.49	10.98
Road Network AM Peak Hour											
Trips	51	47	-	65	119	185	57	30	126	123	89
Trips/100m² GFA	0.16	0.46	-	2.00	2.07	0.69	2.02	2.50	1.03	0.95	1.19
Road Network PM Peak Hour											
Trips	44	36	-	60	72	75	46	10	137	100	64
Trips/100m² GFA	0.14	0.35	-	1.84	1.25	0.28	1.63	0.83	1.12	0.77	0.82

For these sites the vehicle trip rates range from:

- 0.17 to 2.86 vehicle trips per 100m² GFA in the AM peak hour
- 0.14 to 1.84 vehicle trips per 100m² GFA in the PM peak hour
- 1.23 to 19.15 vehicle trips per 100m² GFA throughout the day
- 0.16 to 2.50 vehicle trips per 100m² GFA in the road network AM peak hour
- 0.14 to 1.84 vehicle trips per 100m² GFA in the road network PM peak hour.

For these sites the average vehicle trip rates were:

- 1.55 vehicle trips per 100m² GFA in the AM peak hour
- 1.15 vehicle trips per 100m² GFA in the PM peak hour
- 10.98 vehicle trips per 100m² GFA throughout the day
- 1.19 vehicle trips per 100m² GFA in the road network AM peak hour
- 0.82 vehicle trips per 100m² GFA in the road network PM peak hour.

The vehicle trips rates were higher in the AM peak hour, compared to the PM peak hour for all sites, with the exception of the Newcastle site. The vehicle trips rates were higher in the road network AM peak hour, compared to the road network PM peak hour for all sites, with the exceptions of the Newcastle site.

The AM peak hour vehicle trip rates represented 8% to 17% of the total daily vehicle trips, with an average of 14%. The PM peak hour vehicle trips rates represented 9% to 15% of the total daily vehicle trips, with an average of 11%.

6.3 Person Based Trip Rates

The person based trips rates based on the floor area and the number of parking spaces for the AM and PM peak hours, throughout the day and during the road network AM and PM peak hours are shown in Table 6.3.

Table 6.3: Person Based Trip Rates

	OB1 North Sydney	OB2 Chatswood	OB3 Sydney Olympic Park	OB4 Hurstville	OB5 Macquarie Park	OB6 Parramatta	OB7 Liverpool	OB8 Norwest	OB9 Newcastle	OB10 Wollongong	Average
AM Peak Hour											
Trips	397	249	842	119	142	387	95	34	172	158	260
Trips/100m² GFA	1.26	2.44	2.47	3.66	2.47	1.43	3.37	2.83	1.41	1.22	2.26
PM Peak Hour											
Trips	338	205	801	77	126	349	65	14	191	128	229
Trips/100m² GFA	1.08	2.01	2.35	2.37	2.19	1.29	2.31	1.17	1.57	0.99	1.73
Daily											
Trips	2,975	1,691	-	802	1,079	5,114	700	142	2,213	1,074	1754
Trips/100m² GFA	9.47	16.56	-	24.65	18.77	18.94	24.85	11.83	18.17	8.31	16.84
Road Network AM Peak Hour											
Trips	391	111	-	104	142	266	58	31	172	158	159
Trips/100m² GFA	1.25	1.09	-	3.20	2.47	0.99	2.06	2.58	1.41	1.22	1.81
Road Network PM Peak Hour											
Trips	338	90	-	67	86	298	48	10	190	128	139
Trips/100m² GFA	1.08	0.88	-	2.06	1.50	1.10	1.70	0.83	1.56	0.99	1.30

For these sites the person trip rates range from:

- 1.22 to 3.66 person trips per 100m² GFA in the AM peak hour
- 0.99 to 2.37 person trips per 100m² GFA in the PM peak hour
- 8.31 to 24.85 person trips per 100m² GFA throughout the day
- 0.99 to 3.20 person trips per 100m² GFA in the road network AM peak hour
- 0.88 to 2.06 person trips per 100m² GFA in the road network PM peak hour.

For these sites the average person trip rates were:

- 2.26 person trips per 100m² GFA in the AM peak hour
- 1.73 person trips per 100m² GFA in the PM peak hour
- 16.84 person trips per 100m² GFA throughout the day
- 1.81 person trips per 100m² GFA in the road network AM peak hour
- 1.30 person trips per 100m² GFA in the road network PM peak hour.

The person trips rates were higher in the AM peak hour, compared to the PM peak hour for all sites, with the exception of the Newcastle site. The person trips rates were higher in the road network AM peak hour, compared to the road network PM peak hour for all sites, with the exceptions of Parramatta and Newcastle sites.

The AM peak hour person trip rates represented 8% to 24% of the total daily person trips. The PM peak hour person trips rates represented 7% to 13% of the total daily person trips.

6.4 Parking Requirements

6.4.1 Car Parking

The parking requirements for each site, including on-site and off-site parking, is shown in Table 6.4.

Table 6.4: Parking Requirements

	OB1	OB2	OB3	0B4	OB5	OB6	OB7	OB8	OB9	OB10	Average
Maximum Parking Demand	148	166	1440	74	202	448	74	33	358	296	323.9
Maximum Parking Demand/ 100m² GFA	0.47	1.63	4.22	2.27	3.51	1.66	2.63	2.75	2.94	2.29	2.4
On-site Parking Demand	93	115	407	44	165	170	14	25	168	89	129.0
On-site Parking Demand /100m² GFA	0.30	1.13	1.19	1.35	2.87	0.63	0.50	2.08	1.38	0.69	1.2

The maximum parking demand rates ranged from 0.47 to 4.22 parked cars per 100m² GFA, with an average of 2.4 parked cars per 100m² GFA with an average underlying car driver mode share of 63%.

The maximum parking demand rates ranged from 0.30 to 2.87 parked cars per 100m² GFA, with an average of 1.2 parked cars per 100m² GFA or approximately 50% of the total demand with an average underlying car driver mode share of 63%.

6.4.2 Commercial Vehicle Parking

The maximum commercial vehicle parking demand for the sites surveyed was low, with a peak demand of between 1 and 8 spaces, which represented between 0.02 and 0.17 spaces per 100m^2 GFA, with an average of 0.04 commercial vehicle parking spaces per 100m^2 GFA.

6.4.3 Cycle Parking

Of the ten sites surveyed, four sites provided cycle parking and cyclists were recorded accessing three of the sites. The cycle parking provision and demand is shown in Table 6.5.

Table 6.5: Cycle Parking Provision and Demand

	OB1	OB2	OB3	OB4	OB5	OB6	OB7	OB8	OB9	OB10
Cycle Parking Provision / employee	0%	2%	6%	0%	0%	11%	0%	0%	4%	0%
Cycle demand / employee	0%	0%	0%	-	0.4	1%	0%	0%	0.2%	0%

7. Conclusions

7.1 Surveys & Process

- To determine the trip generation and parking rates of offices block in NSW, ten sites were surveyed, of which eight were located within the Sydney Metropolitan Area and two located outside of the Sydney Metropolitan Area, in Newcastle and Wollongong.
- The surveys were undertaken between December 2009 and February 2010, outside of school and public holidays on a weekday between 7:00am and 6:30pm.
- Pedestrian questionnaire surveys were also undertaken to obtain additional travel behavioural information which was not able to be obtained through conventional traffic surveys. i.e. mode share, location of off-site parking, time to park etc.
- This survey information was used to calculate the vehicle trip rates by applying the car driver mode share to the total persons entering and exiting the building.
- The survey information was also used to calculate the total parking demand by applying the driver mode split proportions to the total number of staff. This included both on-site and off-site parking.
- On-site parking was determined from the peak on-site parking demand with the off-site parking being the difference between the total drivers and peak on-site parking demand.

7.2 Linear Regression Analysis

- Simple linear regression analysis was undertaken to determine the key data correlations between vehicle and person trips and four key variables of Accessibility, Mode Share, Gross Floor Area and Parking Demand, details of which, are summarised in Tables 7.1 and 7.2.

Table 7.1: Correlations between Key variables and Vehicle Based Trip Rates

	Accessibility Score	Car Driver Mode Share	Gross Floor Area	Total Parking Demand
AM Peak Hour Vehicle Trips	XX	✓	✓	✓✓
PM Peak Hour Vehicle Trips	XX	✓	✓	✓✓
Daily Vehicle Trips	XX	✓	X	✓✓
Road Network AM Peak Vehicle Trips	-	-	X	✓✓
Road Network PM Peak Vehicle Trips	-	-	X	✓

Notes: XX – No relationship, X – Poor relationship, ✓ Good relationship, ✓✓ Excellent/Very good relationship

Table 7.2: Correlations between Key variables and Person Based Trip Rates

	Accessibility Score	Car Driver Mode Share	Gross Floor Area	Total Parking Demand
AM Peak Hour Person Trips	XX	-	✓✓	✓✓
PM Peak Hour Person Trips	XX	-	✓✓	✓✓
Daily Person Trips	XX	-	✓✓	✓
Road Network AM Peak Person Trips	-	-	✓✓	X
Road Network PM Person Trips Peak	-	-	✓✓	X

Notes: XX – No relationship, X – Poor relationship, ✓ Good relationship, ✓✓ Excellent/Very good relationship

- For vehicle based trips there was poor correlation for the two key variables accessibility score and gross floor area.
- For vehicle based trips there was a very good correlation for the key variable parking demand. There was also a good correlation for the key variable car driver mode share for the vehicle trips for the site AM and PM peak and throughout the day.
- For person based trips there was a poor correlation for the key variable accessibility score. There was also a poor correlation for the key variable parking demand for the person trips in the road network AM and PM peak.
- For the person based trips there was a very good correlation for the key variable gross floor area. There was also a very good correlation for the key variable parking demand for the vehicle trips for the site AM and PM peak.

7.3 Average Trip & Parking Rates

- The average trip rates calculated for all sites, which have an underlying driver mode share of 63%, are indicated in Table 7.3.

Table 7.3: Average Trip Rates

Period	Average Person Trip Rate	Average Vehicle Trip Rate
AM peak hour	2.16 person trips/100m² GFA	1.55 vehicle trips/100m² GFA
PM peak hour	1.73 person trips/100m² GFA	1.15 vehicle trips/100m² GFA
Daily	17.47 person trips/100m² GFA	10.98 vehicle trips/100m² GFA

- Table 7.3 indicates a higher trip rate for the AM peak hour than the PM peak hour.
- The average parking rates calculated for all sites are indicated in Table 7.4.

Table 7.4: Average Parking Rates

Parking Demand Category	Average Parking Rate
Total peak parking demand	1 space/41m² GFA or 2.44 spaces/100m² GFA
On-site parking demand	1 space/83m² or 1.21 spaces/100m² GFA

- The average of the total peak parking demand was calculated to be 1 parking space per 41 m² GFA or 2.44 parked cars per 100m² GFA with the on-site parking demand approximately half of the total peak parking demand at 1.21 parked cars per 100m² GFA both with an underlying average car driver mode share of 63%.

7.4 Key Conclusions

7.4.1 Trip Generation

- In an ideal world the most comprehensive method for calculating traffic generation would be to apply the car driver mode share to the total person trips undertaken at a particular site.
- This method of calculation accounts for all trips associated with the site whether they are entering the site directly or parking in close proximity of the site.
- There are two issues that arise from this methodology. The first is that, in most cases, traffic engineers do not have the resources/luxury to obtain this information and secondly that in terms of applying the calculated traffic generation to the road network to assess the impacts it is difficult to determine what and where the impacts of those trips not entering the site directly would occur.

- If this method were to be adopted and the mode share and total person trips could be obtained, a level of judgement would still be required in understanding the off-site parking availability so that the correct levels of traffic generation could be applied to the correct parts of the road network.
- The average AM peak (1.55 trips/100m² GFA) and PM peak (1.15 trips/100m²) traffic generation rates, based on an underlying average car driver mode share of 63%, are distinctly lower than those used in the ***RTA Guide to Traffic Generating Developments 2002*** possibly implying that travel patterns have changed since July 1979 when the surveys were last undertaken for this land use.
- The results of the analysis of the ten sites within this study have indicated that for sites with a high car driver mode share (75%-97%) within inner Sydney the rate of trip generation ranges between **2.07 trips per 100m² GFA to 2.86 trips per 100m² GFA**.
- For the two sites outside of Sydney being, Newcastle and Wollongong, which also have high car driver mode shares of 72% and 78% respectively, the trip generation rates are distinctly lower at **1.03 trips per 100m² GFA and 0.95 trips per 100m² GFA respectively**.
- For the one site in North Sydney which had a very low car driver mode share (13%) the trip generation rate was only 0.17 trips per 100m² GFA.
- The traffic generation during the AM peak period was higher than for the PM Peak period for commercial office blocks which would be expected from this particular land use where most people arrive at work between a particular time (i.e. 8am-9am) in the morning but stagger their departure from work going home in the evening.
- The site traffic generation, on average, was 15% lower during the AM road network peak period.
- The site traffic generation, on average, was 20% lower during the PM road network peak period.
- This implies that if the traffic impact assessment is undertaken using peak hour traffic volumes then factors of 0.85 and 0.80 should be applied respectively to the total AM and PM traffic generation of the site. This would reflect the actual traffic impact on the road network.
- Employee densities calculated from this study indicated an average employee density of 27m² GFA per employee compared with an average of 21m² GFA per employee previously determined by the RTA.

7.4.2 Parking Generation

- It was identified that eight of the ten sites had restrained parking i.e. the total parking demand exceeded the parking supply.
- Even so the on-site parking demand indicated that the available parking spaces were not being used to their full capacity.
- The average parking rate was determined to be 1 space per 41m² GFA which is consistent with the parking rate used in the ***RTA Guide to Traffic Generating Developments 2002*** based on an underlying average car driver mode share of 63%.

8. External trip generation data application in New South Wales

8.1 Introduction

Further to the analysis undertaken in the previous sections of this report the RTA also requested that GTA Consultants review external trip generation data to determine, if possible, whether or not this data could be used in the New South Wales context.

GTA Consultants have not focused on other Australian states to make this comparison as the majority of the other States still rely heavily on the ***RTA Guide to Traffic Generating Developments 2002*** when determining traffic and parking generation rates for assessment of various development applications.

Although GTA Consultants sourced data from the USA, ITE and NZTDB, described and summarised in Sections 8.2 and 8.3 below, unfortunately mode share information for these sites was not available and as such no reasonable comparison could be made against the rates determined from the 10 sites of this study.

8.2 United States Institute of Transport Engineers (ITE) Data

ITE provides 11 categories for the land use "Office" (Refer Table 8.1) with trip generation rates provided for the average Weekday, Saturday and Sunday and morning and evening peak periods of the sites surveyed. It also provides trip generation rates for the weekday morning and evening peak periods which occur during the traditional commuting peak hours of the adjacent road network.

Table 8.1: ITE Office Land Use Categories

ITE Code	ITE Land Use Category
710	General Office Building
714	Corporate Headquarter Building
715	Single Tenant Office Building
720	Medical-Dental Office Building
730	Government Office Building
731	State Motor Vehicle Department
732	United States Post Office
733	Government Office Complex
750	Office Park
760	Research and Development Centre
770	Business Park

It importantly notes that in some cases data for the specific land use was limited and that in these cases some of the statistics presented would not necessarily accurately represent the trip generating characteristics of that particular land use.

For the General Office Building category it is indicated that related land uses are Corporate Headquarter Building, Single Tenant Office Building, Office Park, Research and Development Centre and Business Park.

The General Office Building and related uses with their corresponding trip generation rates are included in Table 8.2. These land uses had a reasonable sample study size.

Table 8.2: ITE Average Trip Generation Rates [1] Related Office Land Uses

Category Code.	Land use	Ave. Daily vehicle trips /100m² GFA	Ave. AM Peak Hour vehicle trips/100m² GFA	Ave. PM Peak Hour vehicle trips/100m² GFA
710	General Office Building	11.85	1.67	1.38
	No. of Studies	78	217	235
	Coefficient of Determination (R^2)	0.80	0.83	0.82
714	Corporate Headquarters Building	8.59	1.60	1.50
	No. of Studies	8	19	21
	Coefficient of Determination (R^2)	0.94	0.80	0.78
715	Single Tenant Office Building	12.45	1.94	1.86
	No. of Studies	14	42	42
	Coefficient of Determination (R^2)	0.52	0.77	0.78
750	Office Park	12.29	1.84	1.59
	No. of Studies	12	31	32
	Coefficient of Determination (R^2)	0.88	0.85	0.90
760	Research and Development Centre	8.73	1.31	1.15
	No. of Studies	28	33	35
	Coefficient of Determination (R^2)	0.72	0.75	0.75
770	Business Park	13.73	1.54	1.39
	No. of Studies	15	19	20
	Coefficient of Determination (R^2)	0.89	0.85	0.82
	Average Trip Rate	**11.27**	**1.65**	**1.48**

Notes:
1. Rates have been converted from square feet to square meters for the purposes of this analysis
2. Average rates have been calculated for Office land uses which had a reasonable sample size.

Table 8.2 indicates that the trip generation during the site PM peak period is less than during the AM peak period which is consistent with results of the 10 Sydney metro sites.

Table 8.2 also indicates that weekday average, AM and PM peak hour trip generation rates were 2.6%, 6.5% and 29% higher respectively than the trip generation rates of the 10 Sydney metro sites. These deductions should however be observed in the context that there was no corresponding average mode share information for these sites.

8.3 New Zealand Transport Data Bureau (NZTDB) Data

GTA Consultants received trip and parking generation rates from NZTDB in June 2010 for 13 sites which included 7 sites in Auckland, 4 sites in Christchurch, 1 site on the North Shore and 1 site in Waitakere. The 13 sites had a range of gross floor areas with 5 sites within the 0-1000m² range, 6 within the 4,000m² to 8,500m² range, 1 site just under 50,000m² and 1 site just over 490,000m². Details of public transport accessibility were limited and very broad as indicated in Table 8.3.

It is important to note that the parking demand rates provided related specifically to on-site parking and did not account for parking which occurred either on-street or in nearby parking stations. As such this information has not been included in the analysis.

Table 8.3: NZTDB Average Trip Generation Rates Commercial Office Land Uses

Site Ref No	Site Location	Gross Floor Area	Ave. Daily vehicle trips /100m² GFA	Ave. AM Peak Hour vehicle trips/100m² GFA	Ave. PM Peak Hour vehicle trips/100m² GFA	Public Transport Accessibility
3	Auckland	49,110	-	1.15	1.44	-
17	Auckland	491,100	-	0.22	0.20	-
33	North Shore	120	20.00	3.33	3.33	-
34	Waitakere	4,032	31.13	-	3.57	-
69	Auckland	8,384	12.51	2.28	1.24	-
87	Auckland	6,855	14.72	2.16	1.60	-
151	Auckland	7,850	-	1.99	1.99	-
152	Auckland	7,850	-	0.23	-	-
577	Christchurch	530	-	-	1.32	Moderate
585	Christchurch	900	-	-	0.89	Moderate
589	Christchurch	520	-	-	0.96	Moderate
591	Christchurch	400	-	-	1.50	Moderate
662	Auckland	4,886	-	1.08	1.39	High
Average Trip Rate			**19.59**	**1.56**	**1.62**	

Notes:
1. Average rates have been calculated based on information available.

Table 8.3 indicates that weekday average and AM peak hour trip generation rates were 78.5% and 0.5% higher respectively than the trip generation rates of the 10 Sydney metro sites and that the PM peak hour trip generation rate was 41% lower than the trip generation rate of the 10 Sydney metro sites.

These deductions should also be observed in the context that there was no corresponding average mode share for these sites.

Further detail of the trip and parking generation rates provided by NZTDB is included in Appendix E.

8.4 Trip Rate Information Computer System (TRICS) Data

The focus of this chapter is based on international data obtained from the UK ***Trip Rate Information Computer System (TRICS)*** where, in exchange for the results of this study finding, similar site trip and parking generation information for 10 UK sites were provided. (Refer Appendix F).

It is important to understand that the key variable which influences the rates of trip and parking generation is mode share which can vary substantially from location to location.

Site information from the TRICS contained mode share information and was compared against the information determined through this study. Further detail of the information and how it compares is described in Sections 8.4 and 8.5.

The characteristics of these sites were based on the criteria in Table 2.2 of this report and included 5 sites within a town centre and 5 sites on the edge of a town centre as defined by Figure 8.1.

Figure 8.1: Location Definition

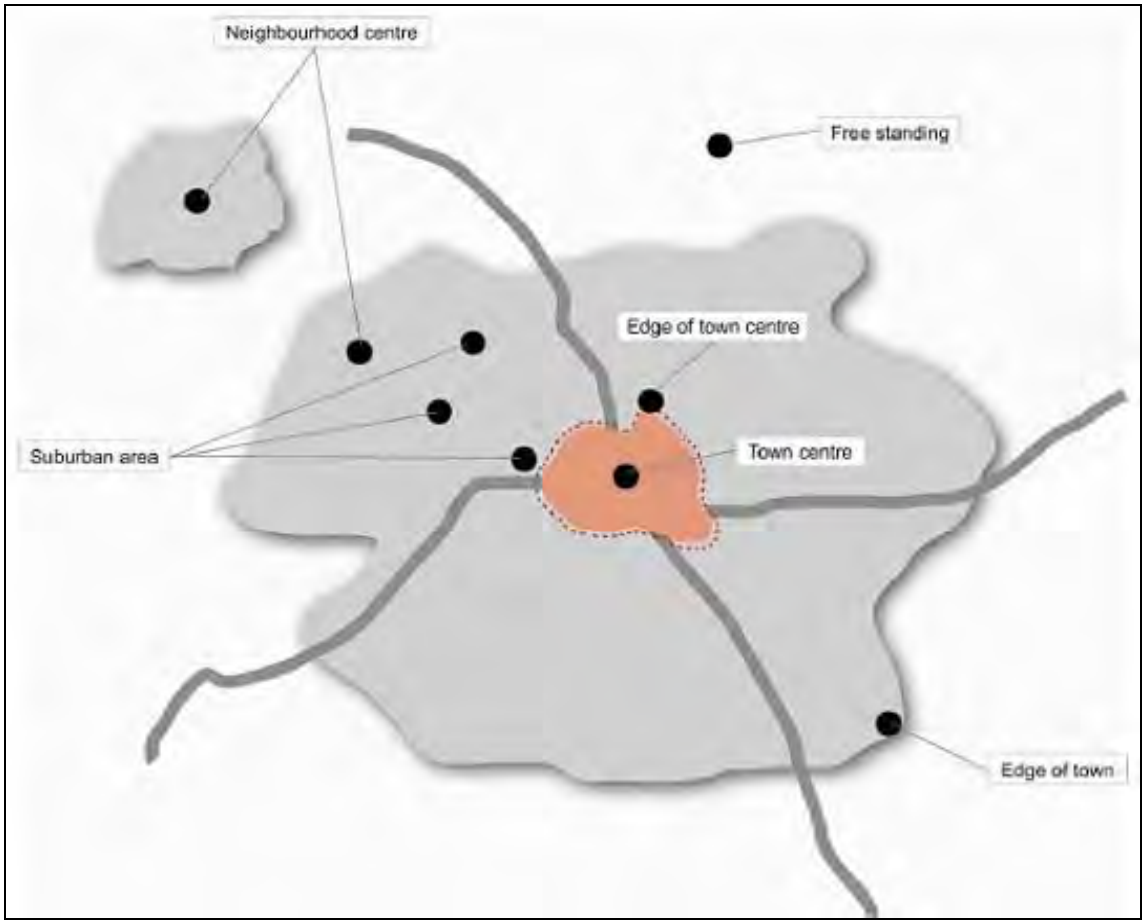


Table 8.4 was prepared so that a comparison of average trip rates could be made between the TRICS dataset and RTA study data set given that the TRICS data included mode share information.

Table 8.4: TRICS Average Trip Generation Rates Office Land Uses

Site Ref No	Site Location	Gross Floor Area	Ave. Daily vehicle trips /100m² GFA	Ave. AM Peak Hour vehicle trips/100m² GFA	Ave. PM Peak Hour vehicle trips/100m² GFA	Car Driver [1] Mode Share %
WR-02-A-01	Wrexham	2,500	20.64	2.28	4.00	52
TW-02-A-02	Newcastle	16,75	5.85	0.90	1.20	29
SC-02-A-10	Guildford	4,312	2.69	0.58	2.69	14
LE-02-A-02	Loughborough	6,913	13.28	1.49	1.59	86
LC-02-A-06	Blackburn	11,225	15.28	1.99	2.01	35
WY-02-A-01	Bradford	2,400	24.17	3.38	2.50	66
TW-02-A-01	Gateshead	645	20.62	2.79	3.10	75
TV-02-A-01	Middles borough	4,100	17.12	2.46	1.98	45
KC-02-A-05	Maidstone	32,793	5.80	1.17	1.19	37
CA-02-A-03	Peterborough	5,750	6.48	1.24	1.39	41
Average Trip Rates			**13.19**	**1.83**	**2.17**	**48**

Notes:
1. Car driver mode share has been determined by applying a car occupancy of 1.15.

Table 8.4 indicates that the average daily trip generation rate based on an underlying car driver mode share of 48% was 20% higher than this studies average daily trip generation rate based on an underlying car driver mode share of 63%. The average AM and PM peak hour trip generation rates were also higher than the corresponding rates determined from this study being 18% and 89% higher respectively.

The TRICS data did indicate however that a low vehicle mode share implies a lower vehicle trip generation rate as is the case for the Guildford site.

8.4.1 TRICS v RTA Dataset Analysis

Person Trips

GTA Consultants compared the daily, AM and PM peak hour person trips of the TRICS and RTA study data sets across all sites to determine if there were any similarities as indicated in Figures 8.2 to 8.4.

Figure 8.2: TRICS Data v Sydney Data (Daily Person Trips & Gross Floor Area)

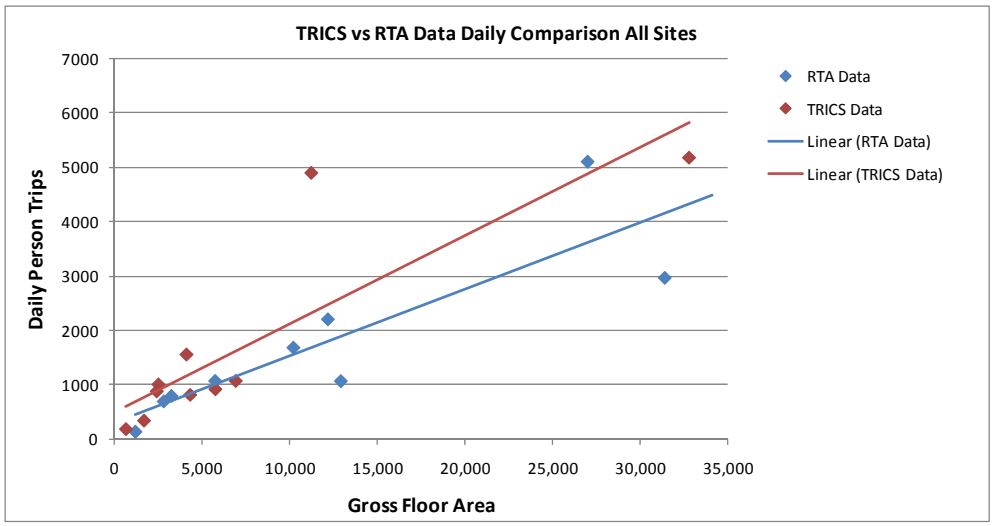


Figure 8.3: TRICS Data v Sydney Data (AM Peak Person Trips & Gross Floor Area)

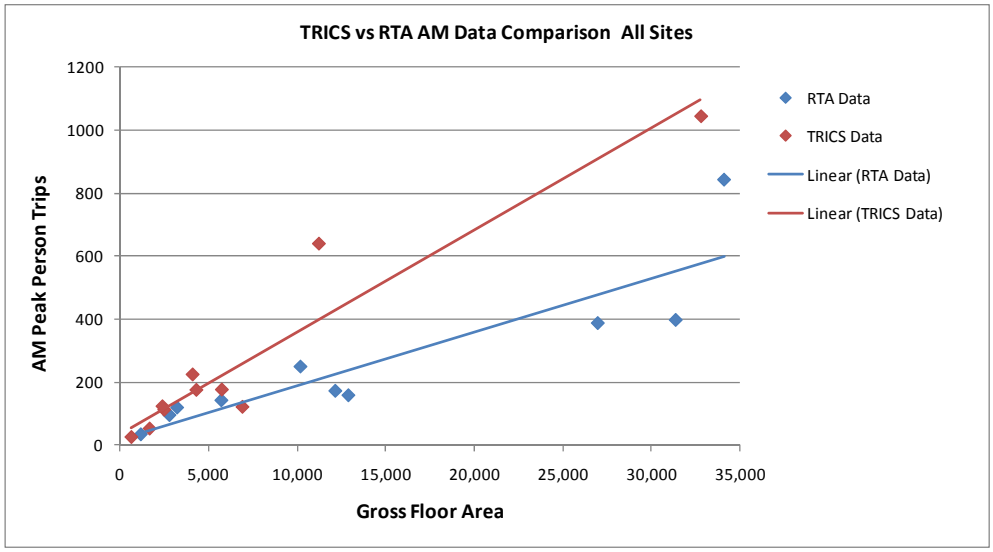
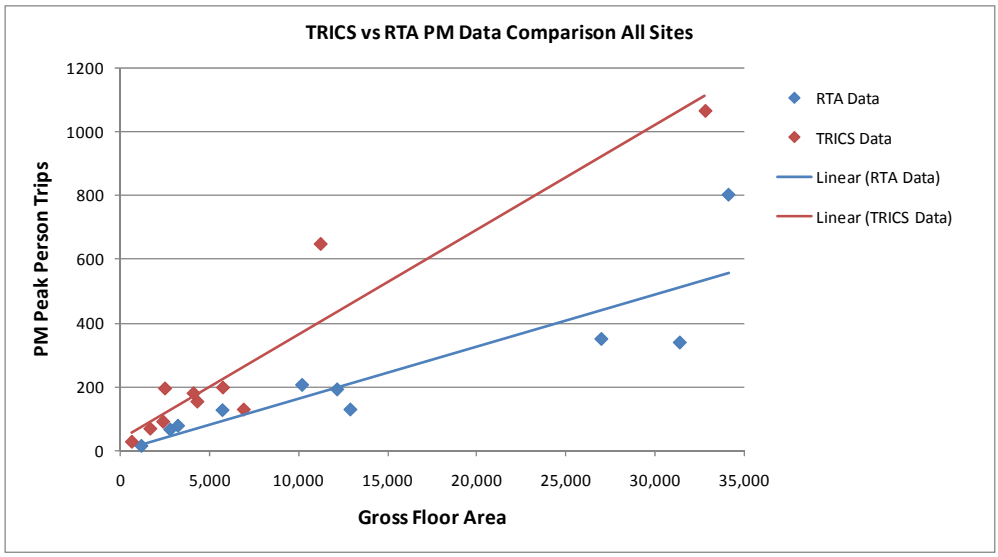


Figure 8.4: TRICS Data v Sydney Data (PM Peak Person Trips & Gross Floor Area)



Figures 8.2 to 8.4 indicate that for the sites at the lower end of the size scale the person trips were similar for the TRICS and RTA sites but as the sites got bigger the gap between the person trips got much larger. There was a common trend which indicated that as the gross floor area increased the person trips increased

GTA Consultants also compared the daily, AM and PM peak hour person trips per 100m^2 GFA of the TRICS and RTA study data sets across all sites to determine if there were any similarities as indicated in Figures 8.5 to 8.7.

Figure 8.5: TRICS Data v Sydney Data (Daily Person Trips & Gross Floor Area)

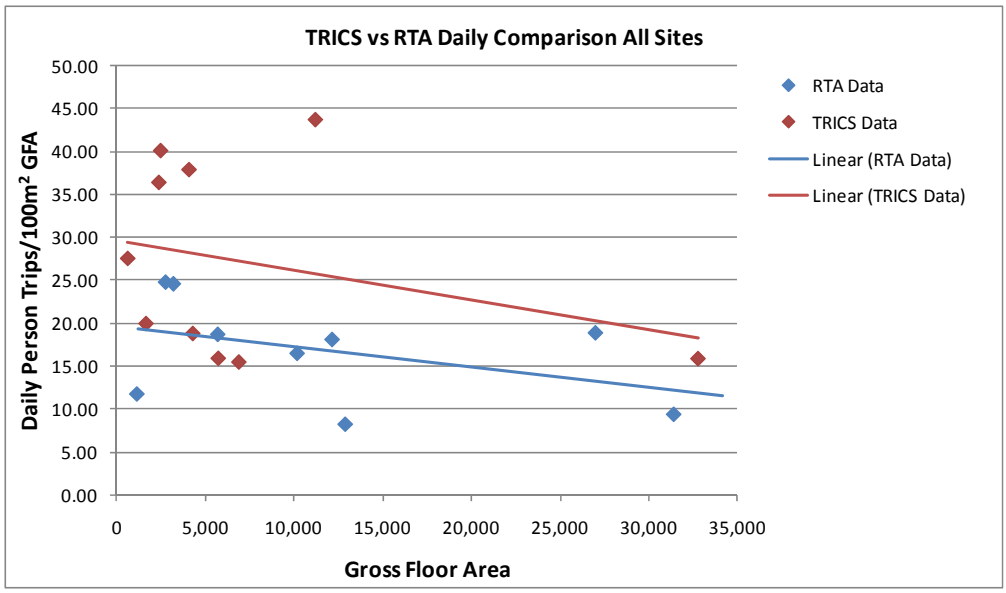


Figure 8.6: TRICS Data v Sydney Data (AM Peak Hour Person Trips & Gross Floor Area)

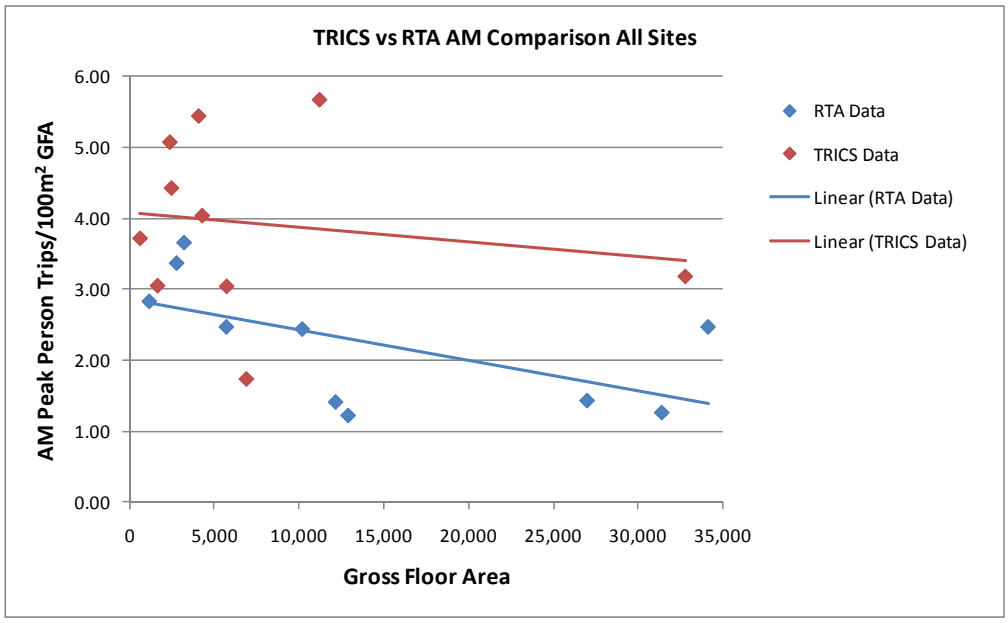
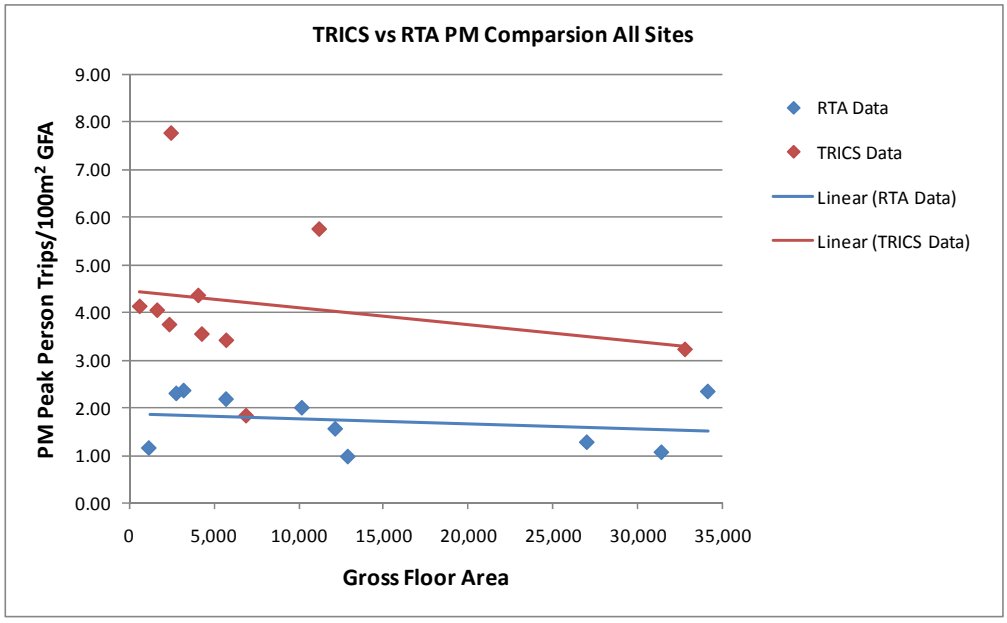


Figure 8.7: TRICS Data v Sydney Data (PM Peak Hour Person Trips & Gross Floor Area)



Figures 8.5 to 8.7 indicate that, on the whole, the person trips/100m² GFA for the TRICS sites were higher than those determined as part of this study. There was also a common trend which indicated that as the gross floor area increased the person trips/100m² GFA decreased.

Vehicle Trips

GTA Consultants also compared the trip generation rates of the UK TRICS sites which had a similar car driver mode share with the sites within this study to determine if the rates were similar, details of which are contained in Tables 8.5 and 8.6.

Table 8.5: TRICS Trip Generation Rates (High Vehicle Mode Share Sites)

Site Ref No	Site Location	Car Driver Mode Share	Vehicle Trip Generation Rate	
			AM	PM
LE-02-A-02	Loughborough	86%	1.49/100 m² GFA	1.59/100m² GFA
TW-02-A-01	Radio Studios, Gateshead	75%	2.79/100m² GFA	3.10/100m² GFA
WY-02-a-01	Bradford	66%	3.38/100 m² GFA	2.50/100m² GFA

Table 8.6: RTA Study Sites Trip Generation Rates (High Vehicle Mode Share Sites)

Site Ref No	Site Location	Car Driver Mode Share	Vehicle Trip Generation Rate	
			AM	PM
OB8	Norwest Business Park	97%	2.75/100m² GFA	1.17/100m² GFA
OB5	Macquarie Park	84%	2.07/100 m² GFA	1.84/100m² GFA
OB4	Hurstville	78%	2.86/100 m² GFA	1.84/100m² GFA
OB7	Liverpool	74%	2.49/100m² GFA	1.70/100m² GFA

Note: Red and blue shading indicate sites with a comparable car driver mode share.

There were no evident consistencies when comparing these two sets of data in Table 8.5 and 8.6.

Details of the TRICS site by site trip and parking generation data provided to GTA Consultants is provided in Appendix F.

8.5 Conclusions

- The stand alone person trips and person trips per 100m2 GFA for the TRICS sites were significantly higher than the RTA study sites and this key difference, although difficult to define, could be attributed to higher per employee densities in the United Kingdom or alternatively associated with a higher overall population meaning there are likely to be more visitors to the UK sites.
- The vehicle trips per 100m2 GFA of those sites with a high driver mode share for both the TRICS and RTA study sites showed very little correlation when the AM and PM trip rates were compared.
- It is important to recognise that the average car driver mode share of the 10 TRICS sites were considerably lower than the average car driver mode share of the 10 RTA Sydney study sites being 48% and 63% respectively which indicates that there is far less reliance on private car travel in the UK than in Sydney. Mode share also has a significant influence on vehicle trips.
- The above assessment indicates that for this land use type and based on the information provided from the TRICS for the 10 UK sites that these trip rates could not be usefully applied in the NSW context.

Appendix A

Consolidated Trip Summary Table

All Sites Trip and Parking Generation Analysis Summary Table 2010

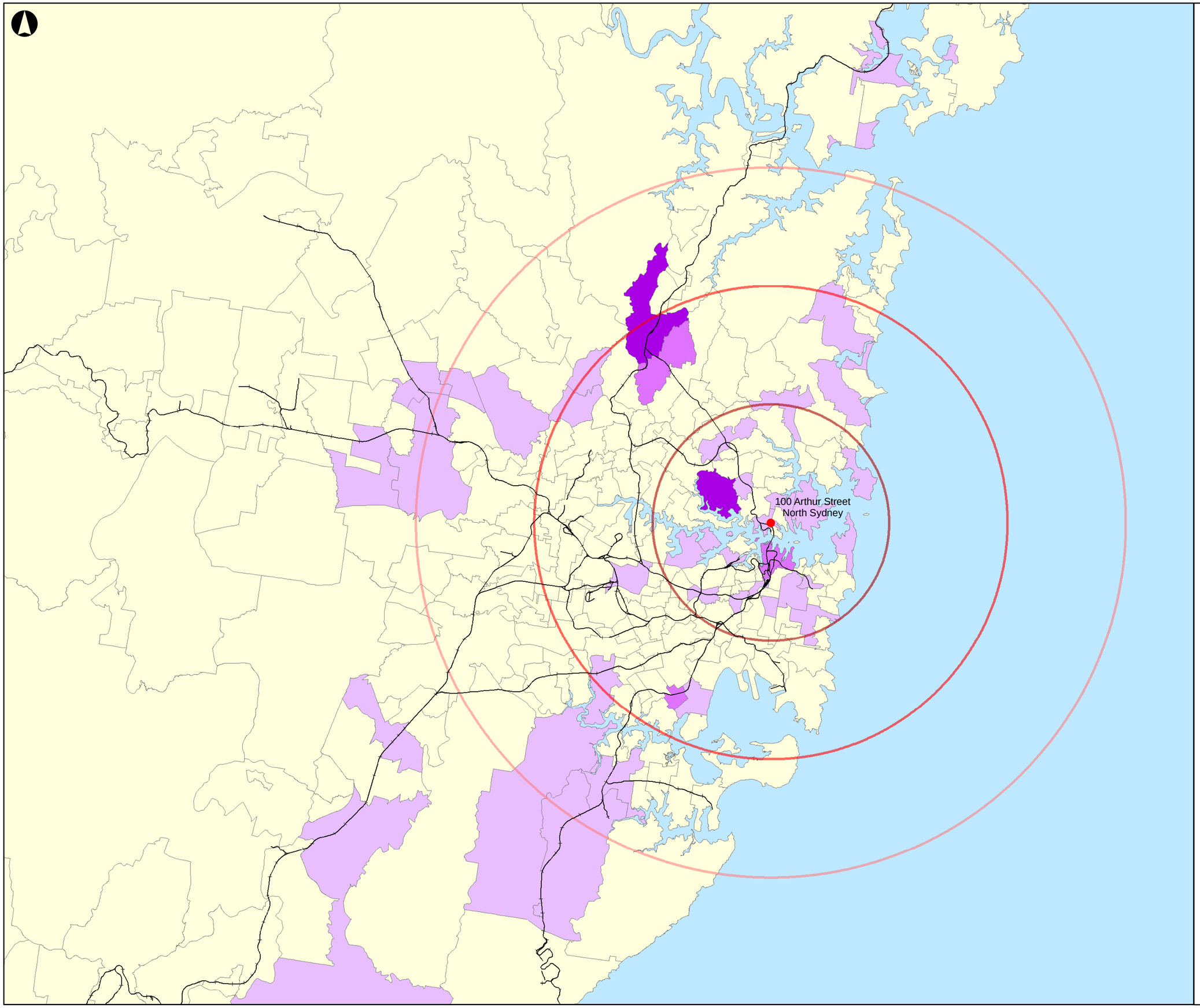
Site	OB1	OB2	OB3	OB4	OB5	OB6	OB7	OB8	OB9	OB10	Average
Location	**North Sydney**	**Chatswood**	**Sydney Olympic Park**	**Hurstville**	**Macquarie Park**	**Parramatta**	**Liverpool**	**Norwest**	**Newcastle**	**Wollongong**	
Site Characteristics											
Address	Innovation Place, 100 Arthur St, North Sydney, NSW 2060	CSR, 9 Help Street, Chatswood, NSW, 2067	CBA, 2-4 Dawn Fraser Avenue, Sydney Olympic Park, NSW, 2127	33 McMahon Street, Hurstville NSW 2220	16 Giffnock Avenue, Macquarie Park NSW 2113	Sydney Water, 1 Smith St, Parramatta NSW 2150	13-15 Moore St, Liverpool NSW 2170	Argus Technologies, 10-12 Lexington Drive, Bella Vista NSW 2153	NIB Head Office, 22 Honeysuckle Drive, Newcastle NSW 2300	77 Market St, Wollongong NSW 2500	
Office Type	Multiple Tenants / Private Sector	Single Tenant / Public Sector	Single Tenant / Private Sector	Multiple Tenants / Private Sector	Multiple Tenants / Private Sector	Multiple Tenants / Private Sector	Multiple Tenants / Private Sector	Single Tenant/ Private Sector	Multiple Tenants / Private Sector	Single Tenant / Private Sector	
Year Constructed	2008	1990	2008	2003	2008	2009	2003	2004	2009	2009	
Primary Industry	Construction	Construction/Building	Banking/Finance	-	Energy	Service Provider / Water	Finance / Employment	Electrical Goods	Insurance / Engineering	Insurance	
Survey Date	8/12/2009	2/12/2009	25/11/2009	9/12/2009	10/02/2010	10/02/2010	3/12/2009	1/12/2009	4/02/2010	2/02/2010	
Survey Duration	7am-6:30am	7am-6:30am	7am-6:30am	7am-6:30am	7am-6:30am	7am-6:30am	7am-6:30am	7am-6:30am	7am-6:30am	7am-6:30am	
Accessibility Score	0.9	0.9	0.4	0.9	0.9	0.9	0.9	0.6	0.9	0.9	
Car Driver Mode Share	13%	42%	60%	78%	84%	32%	74%	97%	72%	78%	63%
Public Transport Mode Share	64%	43%	32%	2%	8%	52%	16%	3%	6%	3%	23%
GFA (m^2)	31,400	10,214	34,131	3,254	5,748	27,000	2,817	1,200	12,182	12,921	14,087
Number of storeys	20	8	4	5	5	17	4	4	6	8	8
No. of employees on day of survey	1,129	347	2,053	85	240	1,225	88	32	490	300	599
Total No. Of Employees	1,136	397	2,400	95	240	1,400	99	34	490	380	667
Employee Density per m2 GFA	28	26	14	34	24	19	28	35	25	34	27
Road Network AM Peak Period	7:45am - 8:45am	10:00am-11:00am	8:15am-9:15am	8:45am-9:45am	7:45am - 8:45am	8:00am-9:00am	10:30am-11:30am	8:15am-9:15pm	8:00am-9:00am	8:15am-9:15am	
Road Network PM Peak Period	5:00pm-6:00pm	3:45pm-4:45pm	5:15pm-6:15pm	3:30pm-4:30pm	4:30pm-5:30pm	5:15pm-6:15pm	3:15pm-4:15pm	4:00pm-5:00pm	5:00pm-6:00pm	4:45pm-5:45pm	
Person-based Trips	**OB1**	**OB2**	**OB3**	**OB4**	**OB5**	**OB6**	**OB7**	**OB8**	**OB9**	**OB10**	**Average**
Site AM Peak Hour	**397**	**249**	**842**	**119**	**142**	**387**	**95**	**34**	**172**	**158**	260
Trips per $100m^2$	1.26	2.44	2.47	3.66	2.47	1.43	3.37	2.83	1.41	1.22	2.26
Trips per employee	0.35	0.63	0.35	1.25	0.59	0.28	0.96	1.00	0.35	0.42	0.62
Site PM Peak Hour	**338**	**205**	**801**	**77**	**126**	**349**	**65**	**14**	**191**	**128**	229
Trips per $100m^2$	1.08	2.01	2.35	2.37	2.19	1.29	2.31	1.17	1.57	0.99	1.73
Trips per employee	0.30	0.52	0.33	0.81	0.53	0.25	0.66	0.41	0.39	0.34	0.45
Road Network AM Peak	**391**	**111**	Refer Note 1	**104**	**142**	**266**	**58**	**31**	**172**	**158**	159
Trips per $100m^2$	1.25	1.09	Refer Note 1	3.20	2.47	0.99	2.06	2.58	1.41	1.22	1.81
Road Network PM Peak	**338**	**90**	Refer Note 1	**67**	**86**	**298**	**48**	**10**	**190**	**128**	139
Trips per $100m^2$	1.08	0.88	Refer Note 1	2.06	1.50	1.10	1.70	0.83	1.56	0.99	1.30
Total Daily Trips	**2,975**	**1,691**	Refer Note 1	**802**	**1,079**	**5,114**	**700**	**142**	**2,213**	**1,074**	1754
Trips per $100m^2$	9.47	16.56	Refer Note 1	24.65	18.77	18.94	24.85	11.83	18.17	8.31	16.84
Peak Hour 1-hour person arrivals	362	218	842	82	128	500	55	32	166	141	252.60
Time	8:00am-9:00am	8:15am-9:15am	8:00am-9:00am	8:00am-9:00am	7:45am-8:45am	7:45am-8:45am	8:00am-9:00am	7:45am-8:45am	8:00am-9:00am	8:15am-9:15am	
Peak Hour 1-hour person two way trips	510	249	842	119	145	783	95	34	191	187	315.50
Time	12:15pm-1:15pm	8:15am-9:15am	8:00am-9:00am	10:00am-11:00am	12:00pm-1:00pm	12:30pm-1:30pm	9:45am-10:45am	8:00am-9:00am	4:45pm-5:45pm	12:00pm-1:00pm	
Average two-way trips/hour	259	147	Refer Note 1	70	94	445	61	12	192	93	152.56
Vehicle-based Trips	**OB1**	**OB2**	**OB3**	**OB4**	**OB5**	**OB6**	**OB7**	**OB8**	**OB9**	**OB10**	**Average**
Site AM Peak Hour	**52**	**105**	**505**	**93**	**119**	**185**	**70**	**33**	**126**	**123**	141
Trips per $100m^2$	0.17	1.03	1.48	2.86	2.07	0.69	2.49	2.75	1.03	0.95	1.55
Site PM Peak Hour	**44**	**86**	**481**	**60**	**106**	**166**	**48**	**14**	**139**	**100**	124
Trips per $100m^2$	0.14	0.84	1.41	1.84	1.84	0.61	1.70	1.17	1.14	0.77	1.15
Road Network AM Peak	**51**	**47**	Refer Note 1	**65**	**119**	**185**	**57**	**30**	**126**	**123**	89
Trips per $100m^2$	0.16	0.46	Refer Note 1	2.00	2.07	0.69	2.02	2.50	1.03	0.95	1.32
Road Network PM Peak	**44**	**36**	Refer Note 1	**60**	**72**	**75**	**46**	**10**	**137**	**100**	64
Trips per $100m^2$	0.14	0.35	Refer Note 1	1.84	1.25	0.28	1.63	0.83	1.12	0.77	0.91
Total Daily Car Trips	**387**	**710**	Refer Note 1	**623**	**906**	**1636**	**518**	**138**	**1615**	**838**	819
Trips per $100m^2$	1.23	6.95	Refer Note 1	19.15	15.76	6.06	18.39	11.50	13.26	6.49	10.98
Peak Hour 1-hour vehicle arrivals	47	92	505	64	108	160	41	31	120	110	127.65
Time	8:00am-9:00am	8:15am-9:15am	8:00am-9:00am	8:00am-9:00am	7:45am-8:45am	7:45am-8:45am	8:00am-9:00am	7:45am-8:45am	8:00am-9:00am	8:15am-9:15am	
Peak Hour 1-hour vehicle two way trips	66	105	505	93	122	251	70	33	138	146	152.79
Time	12:15pm-1:15pm	8:15am-9:15am	8:00am-9:00am	10:00am-11:00am	12:00pm-1:00pm	12:30pm-1:30pm	9:45am-10:45am	8:00am-9:00am	4:45pm-5:45pm	12:00pm-1:00pm	
Average two-way trips/hour	34	62	Refer Note 1	54	79	142	45	12	139	73	71.0
Car Park In and Out	**OB1**	**OB2**	**OB3**	**OB4**	**OB5**	**OB6**	**OB7**	**OB8**	**OB9**	**OB10**	**Average**
Site AM Peak Hour	**44**	**42**	**158**	**27**	**78**	**63**	**9**	**18**	**89**	**45**	**57**
Trips per $100m^2$	0.14	0.41	0.46	4.86	0.47	0.29	2.24	0.75	0.15	0.69	1.05
Site PM Peak Hour	**33**	**50**	**127**	**17**	**63**	**58**	**8**	**6**	**80**	**50**	**49**
Trips per $100m^2$	0.11	0.49	0.37	0.52	1.10	0.21	0.28	0.50	0.66	0.39	0.46
Total Daily Car Trips	**178**	**231**	**797**	**129**	**450**	**471**	**52**	**75**	**466**	**203**	**305**
Trips per $100m^2$	0.57	2.26	2.34	3.96	7.83	1.74	1.85	6.25	3.83	1.57	3.22
Time of Peak Parking Accumulation	1:15pm-1:30pm & 2:30pm-2:45pm	2:30pm-3:00pm	11:00am	9:45am-10:00am	11:00am-11:30am	11:00am-11:15am	9:15am-9:45am & 10:15am-10:45am	12:00pm-12:15pm	12:15pm-12:30pm	2:30pm-2:45pm	
Parking	**OB1**	**OB2**	**OB3**	**OB4**	**OB5**	**OB6**	**OB7**	**OB8**	**OB9**	**OB10**	**Average**
Total Parking Demand	148	166	1440	74	202	448	74	33	358	296	323.90
Total Parking Demand (Spaces per $100m^{2)}$	0.47	1.63	4.22	2.27	3.51	1.66	2.63	2.75	2.94	2.29	2.44
Total Parking Demand (1 space/m2 GFA)	213	61	24	44	28	60	38	36	34	44	41
On-site Parking per employee	0.13	0.42	0.60	0.78	0.84	0.32	0.75	0.97	0.73	0.78	41
No of on-site parking spaces	136	150	902	66	269	402	28	83	220	133	238.90
Peak On-site Parking Demand	93	115	407	44	165	170	14	25	168	89	129.00
On-site Parking per $100m^2$	0.30	1.13	1.19	1.35	2.87	0.63	0.50	2.08	1.38	0.69	1.21
On-site Parking per employee	0.08	0.29	0.17	0.46	0.69	0.12	0.14	0.74	0.34	0.23	0.33
Average Car Occupancy	1.06	1.05	Not recorded	1.13	1.09	1.15	1.22	1.08	1.10	1.10	1.11
No of cycle parking spaces	0	8	150	0	0	150	0	0	20	0	
Cycle Parking Demand	n/a	0%	Not recorded	n/a	n/a	11%	n/a	n/a	0.05%	n/a	
Cycle Parking Rate (Spaces/Employee)	n/a	2%	6%	n/a	n/a	11%	n/a	n/a	4%	n/a	6%
No of Loading Bays	1	6	n/a	0	3	6	0	1	0	0	
Questionnaire	**OB1**	**OB2**	**OB3**	**OB4**	**OB5**	**OB6**	**OB7**	**OB8**	**OB9**	**OB10**	**Average**
No. of responses to questionnaire survey	52	93	1,460	45	91	63	40	31	331	91	
% of responses v total staff on day of survey	5%	27%	71%	53%	38%	5%	45%	97%	68%	30%	43%
Principle Mode of Travel											
Car Driver	13%	42%	60%	78%	84%	32%	74%	97%	72%	78%	
Car Passenger	4%	4%	3%	13%	3%	5%	8%	0%	11%	8%	
Train	52%	37%	23%	2%	3%	44%	13%	0%	5%	3%	
Bus	12%	6%	9%	0%	5%	8%	3%	3%	1%	0%	
Cycle	0%	0%	2%	0%	0%	6%	0%	0%	4%	5%	
Walking	4%	10%	1%	7%	0%	5%	3%	0%	5%	0%	
On & Off Site Parking Proportions											
% vehicles parked on-site	15%	36%	Info not available	10%	95%	38%	12%	97%	24%	41%	
% vehicles parked off -site (on-street)	31%	23%	Info not available	53%	0%	12%	30%	3%	45%	43%	
% vehicles parked off-site (parking station)	54%	41%	Info not available	37%	5%	50%	58%	0%	31%	16%	

Notes:

1. These values could not be determined as only AM and PM peak hour trip data was provided by CBA for site OB3 - Sydney Olympic Park

Appendix B

Employee Postcode Figures



Legend

- Railway
- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1
- 2
- 3

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres

0 4,000 8,000 16,000

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Client

Road and Traffic Authority

Job Title

Trip and Parking Demand Surveys - Office Blocks

Drawing Title

Figure
OB1 Respondent Origin Postcodes

Scale at A3

1:300,000

Drawing Status

Preliminary

Job No	Drawing No	Issue
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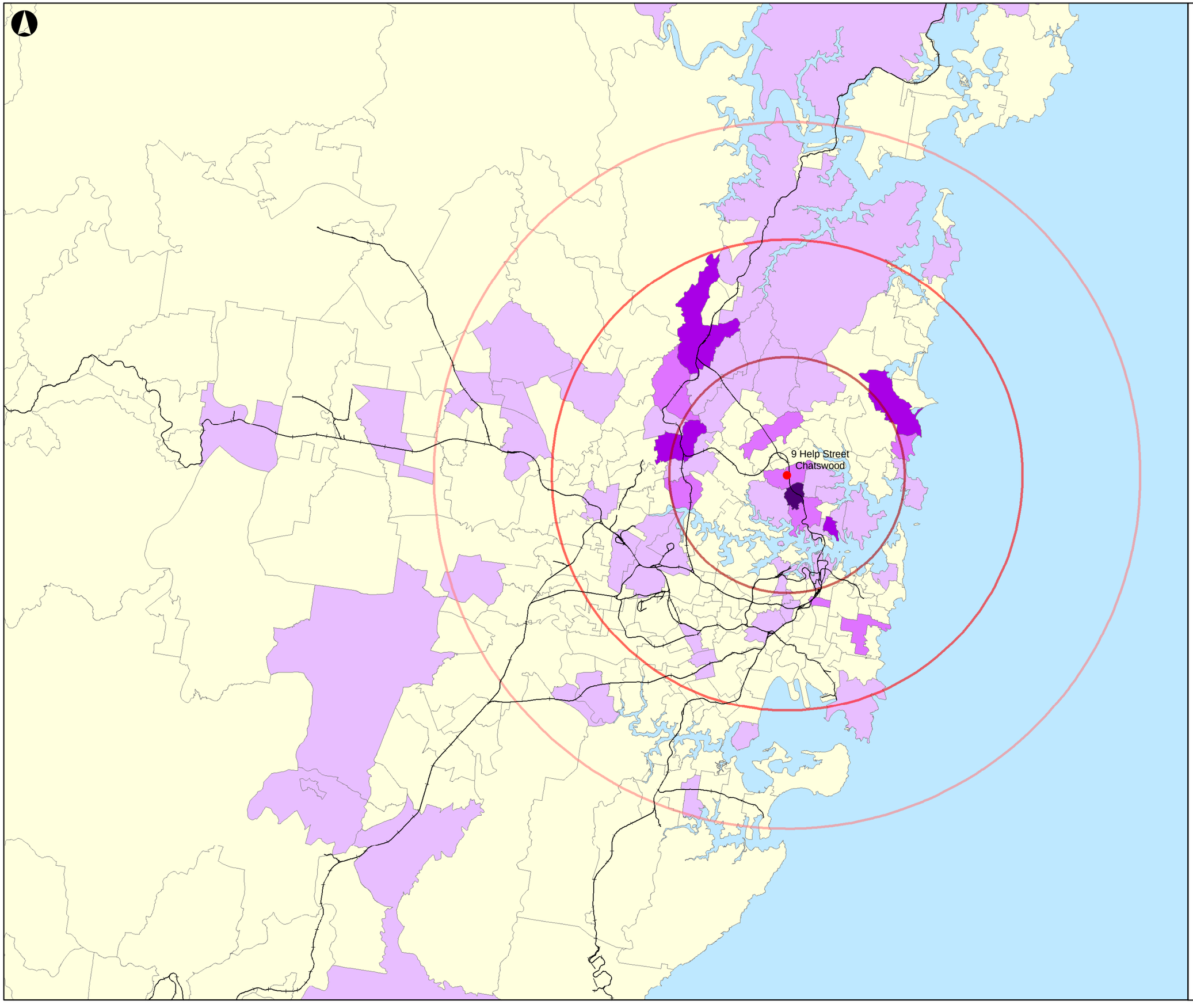

Legend

- Railway
- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1
- 2
- 3
- 4

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres
0 4,000 8,000 16,000

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Client

Road and Traffic Authority

Job Title

Trip and Parking Demand Surveys - Office Blocks

Drawing Title

Figure
OB2 Respondent Origin Postcodes

Scale at A3

1:300,000

Drawing Status

Preliminary

Job No	Drawing No	Issue
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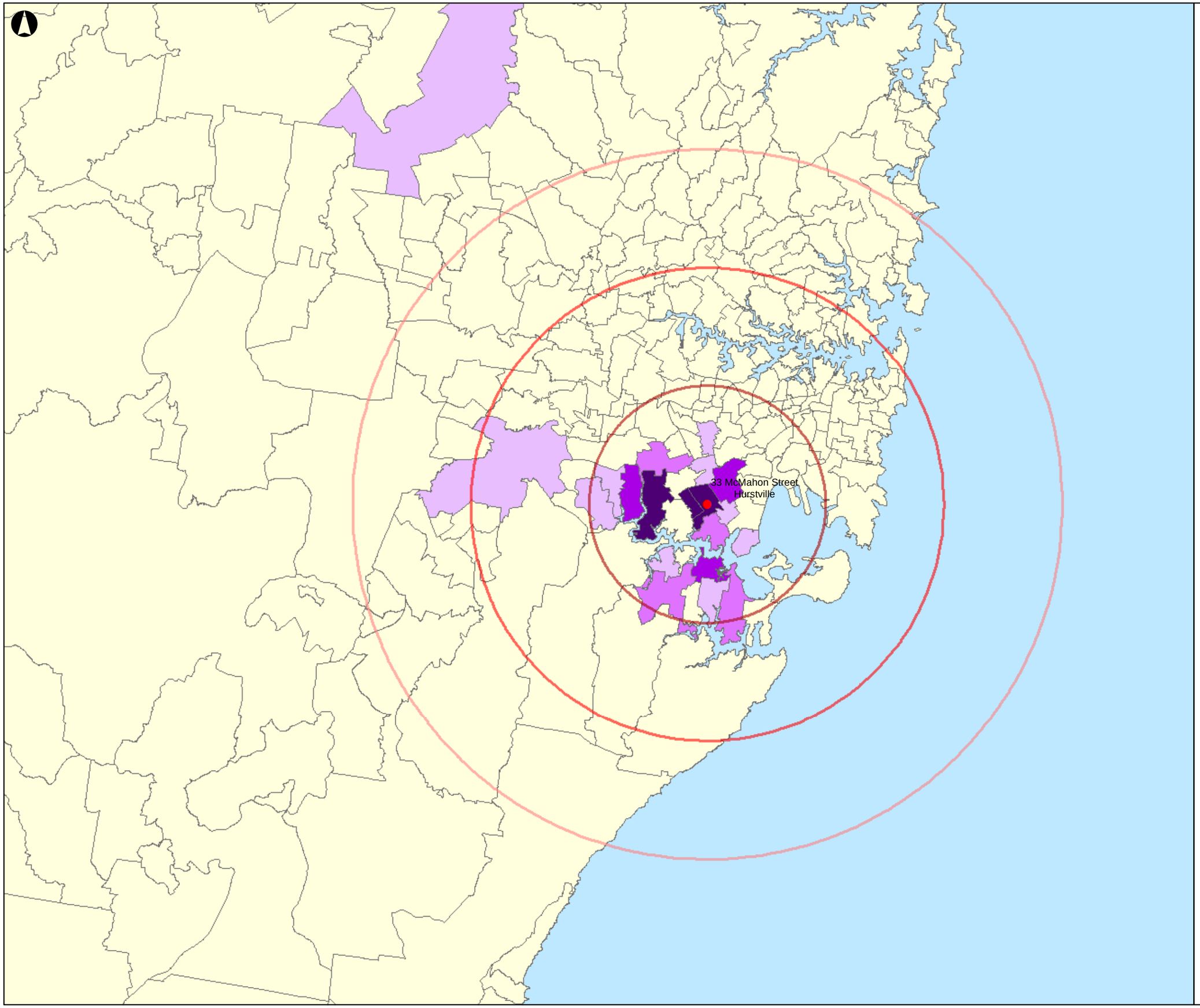

Legend

- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1
- 2
- 3
- 4 - 6

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres
0 4,000 8,000 16,000

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Client

Road and Traffic Authority

Job Title

Trip and Parking Demand Surveys - Office Blocks

Drawing Title

Figure
OB4 Respondent Origin Postcodes

Scale at A3

1:300,000

Drawing Status

Preliminary

Job No	Drawing No	Issue
IS10510	001	P1

16 Giffnock Avenue
Macquarie Park

Legend

- Railway
- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1
- 2
- 3
- 4

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres

0 4,000 8,000 16,000

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Client

Road and Traffic Authority

Job Title

Trip and Parking Demand Surveys - Office Blocks

Drawing Title

Figure
OB5 Respondent Origin Postcodes

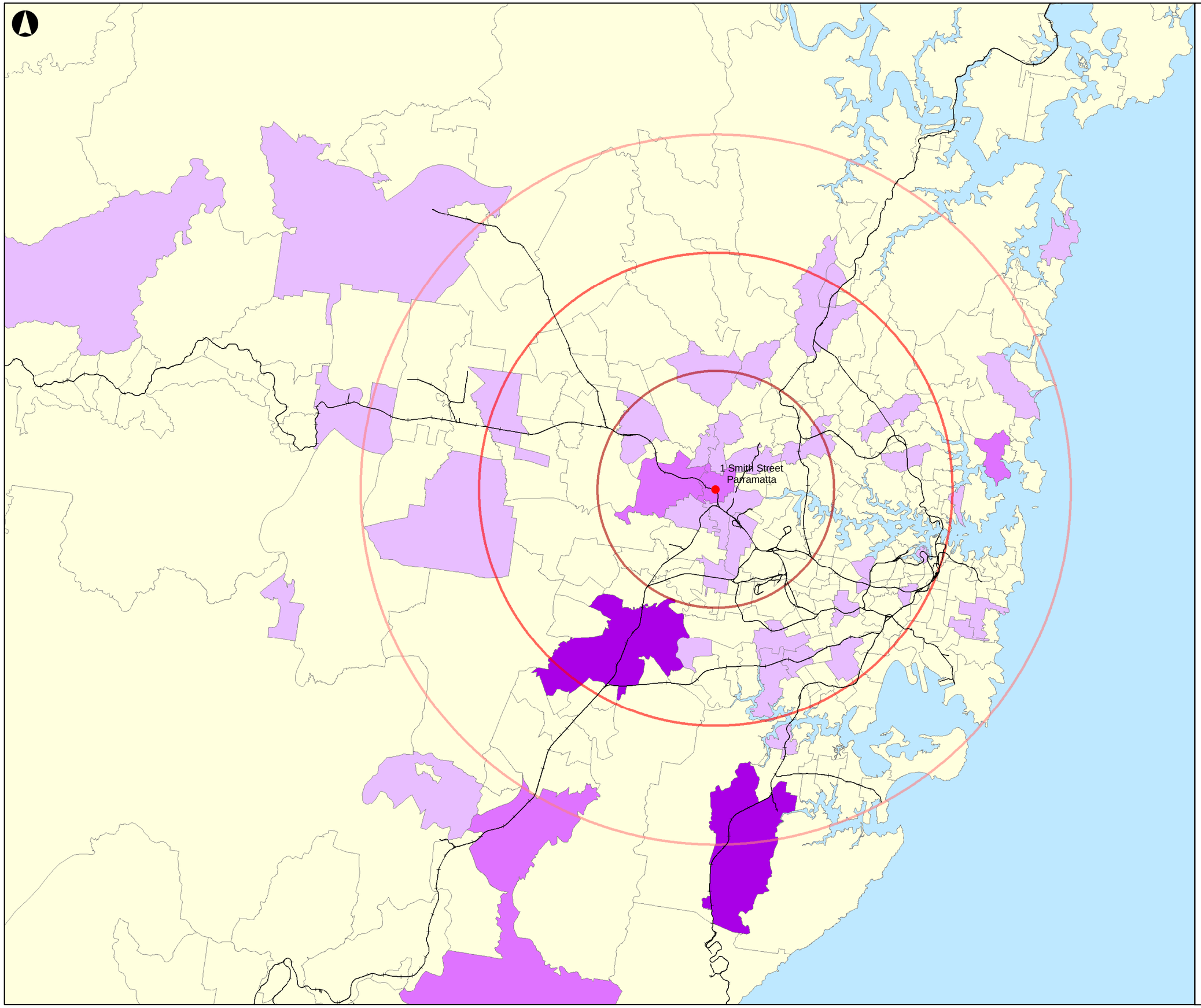
Scale at A3

1:300,000

Drawing Status

Preliminary

Job No	Drawing No	Issue
IS10510	001	P1



Legend

- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1
- 2
- 3

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres
0 4,000 8,000 16,000

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Client

Road and Traffic Authority

Job Title

Trip and Parking Demand Surveys - Office Blocks

Drawing Title

Figure
OB6 Respondent Origin Postcodes

Scale at A3

1:300,000

Drawing Status

Preliminary

Job No	Drawing No	Issue
IS10510	001	P1

13-15 Moore Street
Liverpool

Legend

- Railway
- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1
- 2
- 9

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres
0 4,000 8,000 16,000

GTAconsultants
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Client
Road and Traffic Authority

Job Title
Trip and Parking Demand Surveys - Office Blocks

Drawing Title
Figure
OB7 Respondent Origin Postcodes

Scale at A3
1:300,000

Drawing Status
Preliminary

Job No	Drawing No	Issue
IS10510	001	P1

10-12 Lexington Drive
Bella Vista

Legend

- Railway
- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1
- 2
- 3

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres
0 4,000 8,000 16,000

GTAconsultants
www.gta.com.au

Client
Road and Traffic Authority

Job Title
Trip and Parking Demand Surveys - Office Blocks

Drawing Title
Figure
OB8 Respondent Origin Postcodes

Scale at A3
1:300,000

Drawing Status
Preliminary

Job No	Drawing No	Issue
IS10510	001	P1

22 Honeysuckle Drive
Newcastle

Legend

- Railway
- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1 - 4
- 5 - 8
- 9 - 12
- 13 - 16

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres
0 4,000 8,000 16,000

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Client
Road and Traffic Authority

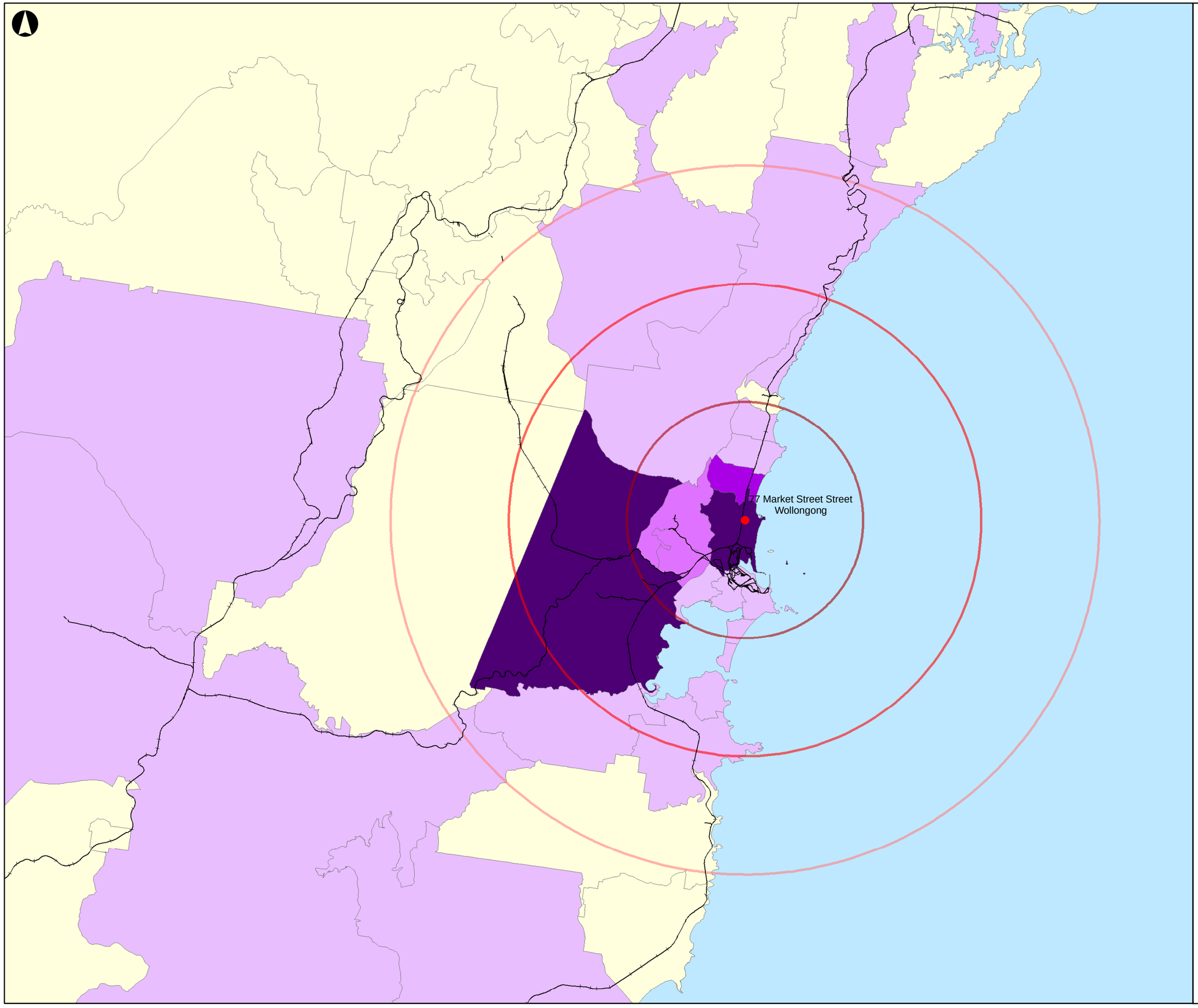
Job Title
Trip and Parking Demand Surveys - Office Blocks

Drawing Title
Figure
OB9 Respondent Origin Postcodes

Scale at A3
1:300,000

Drawing Status
Preliminary

Job No	Drawing No	Issue
IS10510	001	P1



Legend

- Railway
- Site Address and Suburb
- Inner Ring (0-10 km)
- Middle Ring (10-20 km)
- Outer Ring (20-30 km)

Number of Respondents

- 1 - 4
- 5 - 8
- 9
- 13 - 14

Issue	Date	By	Chkd	Appd
P1	07-04-10	BL	KM	AS

Metres
0 4,000 8,000 16,000

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Client

Road and Traffic Authority

Job Title

Trip and Parking Demand Surveys - Office Blocks

Drawing Title

Figure
OB10 Respondent Origin Postcodes

Scale at A3

1:300,000

Drawing Status

Preliminary

Job No	Drawing No	Issue
IS10510	001	P1

Appendix C

RTA Trip Generation Rates

Table 3.7
Summary table of land use traffic generation Rates

Land Use	Traffic generation rates	
	Daily Vehicle Trips	Peak Hour Vehicle Trips
Residential		
Dwelling houses	9.0 / dwelling	0.85 per dwelling
hMedium density residential flat building	*Up to 2 bedrooms*	
	4-5 / dwelling	0.4-0.5 / dwelling
	3 bedrooms or more	
	5-6.5 / dwelling	0.5-0.65 / dwelling
High density residential flat building	*metropolitan regional centres*	
	-	0.24 / unit
	metropolitan sub-regional centre	
	-	0.29 / unit
Housing for aged and disabled persons	1-2 / dwelling	0.1-0.2 / dwelling
Casual accommodation		
Motels	3 / unit	0.4 / unit
Hotels - traditional Hotels - tourist	See section 3.4.2 See Section 3.4.3	-
Office and commercial		
Commercial premises	10 / 100m^2 GFA	2 / 100m^2 GFA
Retail		
Shopping centres	see section 3.6.1	-
Service stations and convenience stores	see section 3.6.2	-
Motor showrooms	-	0.7 / 100m^2 Site Area
Car tyre retail	10 / 100m^2 Site Area	1 /100m^2 Site Area
Road side stalls	-	-
Drive-in liquor	-	-
Markets	18 / stall	4 / stall
Bulky goods retail	see section 3.6.8	-
Video stores	see section 3.6.9	-

Land Use	Parking Requirements
Casual Accommodation	
Motels	1 space for each unit + 1 space per 2 employees *If restaurant included then add the greater of:* 15 spaces per 100m^2 GFA of restaurant / function room, or 1 space per 3 seats
Hotels –traditional -tourist	Comparisons should be drawn with regard to similar developments
Office and Commerical	
Commercial premises	Unrestrained situation: 1 space per 40m^2 GFA Restrained situation: refer to council parking code
Retail	
Shopping centres	GLFA (m^2) — spaces per 100m^2 GLFA 0-10,000 — 6.1 10,000-20,000 — 5.6 20,000-30,000 — 4.3 over 30,000 — 4.1
Service stations and convenience stores	Requirements are additive: 6 spaces per work bay 5 spaces per 100m^2 GFA of convenience store *(if restaurant present, then greater of:* 15 spaces per 100m^2 GFA, or 1 space per 3 seats)
Motor showrooms	0.75 spaces per 100m^2 site area + 6 spaces per work bay (for vehicle servicing facilities)
Car tyre retail outlets	whichever is the greater of: 3 spaces per 100m^2 GFA, or 3 spaces per work bay
Roadside stalls	4 spaces
Drive-in liquor stores	not applicable
Markets	2.5 spaces per stall (customers only)
Bulky goods retail stores	Comparisons should be drawn with similar developments
Video stores	6.1 spaces per 100m^2 GFA

Appendix D

RTA Study Sites Summaries – NZTDB Format

SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day: Wednesday	Date: 02/12/09	Time Start: 7:00am	Time Finish: 6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name		**Results & Comments** Trip Generation Study			
SITE DATA	Land Use Description		Commercial Office Blocks			
	Territorial Local Authority		North Sydney Council			
	Street Address & Suburb		100 Arthur Street North Sydney			
	Survey Site General Location	OuterRur ☐	InnerRur ☐	OuterSub ☐	Inner Sub ☐	Town Ctr ☑
	Pedestrian Activity	Nil ☐	Low ☐	Moderate ☑	High ☐	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☐	Moderate ☐	High ☑	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☑	Local ☐
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)		-			
	Gross Floor Area (GFA m2)		31,400m^2			
	Employees (during survey)		1,129			
	Other Size (please specify value and units eg seats, rooms, beds, pupils)		-			

B.				
PARKING	Parking Spaces Provided On-site (Inc Staff)	Total 136		
	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 1:15pm	Total (Inc Staff) 99	Staff (number) -
	Peak Parking Demand During Survey	0.30 total/100m^{2}GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 8:00am	End 9:00am	Comments
			IN	47 trips	IN + OUT 52	
			OUT	5 trips		
		PM Peak (veh/hr)	TIME	Start 5:00pm	End 6:00pm	
			IN	2 trips	IN + OUT 44	
			OUT	42 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	1,058		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	0.16 / 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	0.14 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	3.37 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	7	13
Car Passengers	2	4
Goods Drivers	0	0
Goods Passengers	0	0
Pedestrians	2	4
Cyclists	0	0
Bus Passengers	6	12
Train Passengers	28	52
Other	7	13
Total	52	100%

Survey undertaken by (org): GTA Consultants	Surveyor Contact (ph): +61 2 8448 1803
Survey undertaken by (surveyor): Austraffic	email: katherine.mccray@gta.com.au

SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day	Date	Time Start	Time Finish
	Wednesday	02/12/09	7:00am	6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name	Results & Comments: Trip Generation Study			
SITE DATA	Land Use Description	Commercial Office Blocks			
	Territorial Local Authority	Willoughby City Council			
	Street Address & Suburb	9 Help Street, Chatswood			
	Survey Site General Location	OuterRur ☐	InnerRur ☐	OuterSub ☐	Inner Sub ☐	Town Ctr ☑
	Pedestrian Activity	Nil ☐	Low ☐	Moderate ☑	High ☐	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☐	Moderate ☐	High ☑	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☐	Local ☑
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)	1,369m^2				
	Gross Floor Area (GFA m2)	10,214m^2				
	Employees (during survey)	342				
	Other Size (please specify value and units eg seats, rooms, beds, pupils)	-				

B.				
PARKING	Parking Spaces Provided On-site (Inc Staff)	Total 142		
	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 2:30pm	Total (Inc Staff) 115	Staff (number) -
	Peak Parking Demand During Survey	1.13 total/100m^{2}GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 8:15am	End 09:15am	Comments
			IN	92 trips	IN + OUT 105	
			OUT	13 trips		
		PM Peak (veh/hr)	TIME	Start 5:00pm	End 6:00pm	
			IN	4 trips	IN + OUT 86	
			OUT	82 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	922 trips		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	1.03/ 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	0.84 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	9.03 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	39	42
Car Passengers	4	4
Goods Drivers	0	0
Goods Passengers	0	0
Pedestrians	9	10
Cyclists	0	0
Bus Passengers	6	6
Train Passengers	34	37
Taxi	1	1
Total	93	100%

Survey undertaken by (org): GTA Consultants	Surveyor Contact (ph): +61 2 8448 1803
Survey undertaken by (surveyor): Austraffic	email: katherine.mccray@gta.com.au

SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day	Date	Time Start	Time Finish
	Wednesday	25/11/09	7:00am	6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name	Results & Comments: Trip Generation Study			
SITE DATA	Land Use Description	Commercial Office Blocks			
	Territorial Local Authority	Sydney Olympic Park Authority			
	Street Address & Suburb	2-4 Dawn Fraser Avenue			
	Survey Site General Location: OuterRur ☐	InnerRur ☐	OuterSub ☐	Inner Sub ☑	Town Ctr ☐
	Pedestrian Activity: Nil ☐	Low ☐	Moderate ☑	High ☐	V High ☐
	Public Transport Opportunities: Nil ☐	Low ☐	Moderate ☑	High ☐	V High ☐
	Highest Classification of Frontage Road/s	Major Arterial ☐	Minor Arterial ☐	Collector ☑	Local ☐
		Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)	4,560 m^2			
	Gross Floor Area (GFA m2)	34,131m^2			
	Employees (during survey)	2053			
	Other Size (please specify value and units eg seats, rooms, beds, pupils)	-			

B.				
PARKING	Parking Spaces Provided On-site (Inc Staff)	Total 798		
	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 11:00am	Total (Inc Staff) 407	Staff (number) -
	Peak Parking Demand During Survey	1.19 total/100m^2GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 8:00am	End 9:00am	Comments
			IN	NOT SURVEYED	IN + OUT 505	
			OUT			
		PM Peak (veh/hr)	TIME	Start 5:00pm	End 6:00pm	
			IN	NOT SURVEYED	IN + OUT 481	
			OUT			
		Daily (veh/day)	TIME	Start	End	
			TOTALIN+OUT	NOT SURVEYED		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	1.48 / 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	1.41 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	- / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	-	60
Car Passengers	-	3
Goods Drivers	-	0
Goods Passengers	-	0
Pedestrians	-	1
Cyclists	-	2
Bus Passengers	-	9
Train Passengers	-	23
Other	-	1
Total	-	100%

Survey undertaken by (org): GTA Consultants	Surveyor Contact (ph): +61 2 8448 1803
Survey undertaken by (surveyor): Austraffic	email: katherine.mccray@gta.com.au

SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day: Wednesday	Date: 09/12/09	Time Start: 7:00am	Time Finish: 6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name		**Results & Comments** Trip Generation Study			
SITE DATA	Land Use Description		Commercial Office Blocks			
	Territorial Local Authority		Hurstville City Council			
	Street Address & Suburb		33 McMahon Street, Hurstville			
	Survey Site General Location	OuterRur ☐	InnerRur ☐	OuterSub ☐	Inner Sub ☐	Town Ctr ☑
	Pedestrian Activity	Nil ☐	Low ☐	Moderate ☐	High ☑	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☐	Moderate ☐	High ☑	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☑	Local ☐
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)		737 m^2			
	Gross Floor Area (GFA m2)		3,254m^2			
	Employees (during survey)		85			
	Other Size (please specify value and units eg seats, rooms, beds, pupils)		-			

B.					
PARKING	Parking Spaces Provided On-site (Inc Staff)	Total 66			
	Other Parking Spaces Available On-street Off-site	Total -			
	Staff Parking Spaces Provided On-site	Total			☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total			
	Peak Parking Demand	Time 9:45am	Total (Inc Staff) 44	Staff (number) -	
	Peak Parking Demand During Survey	1.35 total/100m^2GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA	

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 9:45am	End 10:45am	Comments
			IN	74 trips	IN + OUT 93	
			OUT	19 trips		
		PM Peak (veh/hr)	TIME	Start 3:30pm	End 4:30pm	
			IN	30 trips	IN + OUT 60	
			OUT	30 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	692		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	2.86 / 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	1.84 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	21.27 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	35	78
Car Passengers	6	13
Goods Drivers	0	0
Goods Passengers	0	0
Pedestrians	3	7
Cyclists	0	0
Bus Passengers	0	0
Train Passengers	1	2
Other	0	0
Total	45	100%

Survey undertaken by (org): GTA Consultants	Surveyor Contact (ph): +61 2 8448 1803
Survey undertaken by (surveyor): Austraffic	email: katherine.mccray@gta.com.au

SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day	Date	Time Start	Time Finish
	Thursday	10/12/09	7:00am	6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name	**Results & Comments** Trip Generation Study			
SITE DATA	Land Use Description	Commercial Office Blocks			
	Territorial Local Authority	City of Ryde Council			
	Street Address & Suburb	16 Giffnoock Avenue, Macquarie Park			
	Survey Site General Location	OuterRur ☐	InnerRur ☐	OuterSub ☐	Inner Sub ☐	Town Ctr ☑
	Pedestrian Activity	Nil ☐	Low ☐	Moderate ☑	High ☐	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☐	Moderate ☐	High ☑	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☐	Local ☑
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)	11,000 m^2			
	Gross Floor Area (GFA m2)	5,748m^2			
	Employees (during survey)	240			
	Other Size (please specify value and units eg seats, rooms, beds, pupils)	-			

B.	Parking Spaces Provided On-site (Inc Staff)	Total 269		
PARKING	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 10:45am	Total (Inc Staff) 166	Staff (number) -
	Peak Parking Demand During Survey	2.88 total/100m^2GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 7:45am	End 8:45am	Comments
			IN	107 trips	IN + OUT 119	
			OUT	12 trips		
		PM Peak (veh/hr)	TIME	Start 3:30pm	End 4:30pm	
			IN	22 trips	IN + OUT 106	
			OUT	84 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	988 trips		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	2.07 / 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	1.84 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	17.19 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	76	84
Car Passengers	3	3
Goods Drivers	0	0
Goods Passengers	0	0
Pedestrians	0	0
Cyclists	0	0
Bus Passengers	5	5
Train Passengers	3	3
Other	4	4
Total	91	100%

Survey undertaken by (org): GTA Consultants	Surveyor Contact (ph): +61 2 8448 1803
Survey undertaken by (surveyor): Austraffic	email: katherine.mccray@gta.com.au

SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day	Date	Time Start	Time Finish
	Wednesday	10/02/10	7:00am	6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name	Results & Comments: Trip Generation Study			
SITE DATA	Land Use Description	Commercial Office Blocks			
	Territorial Local Authority	Parramatta City Council			
	Street Address & Suburb	1 Smith Street, Parramatta			
	Survey Site General Location	OuterRur ☐	InnerRur ☐	OuterSub ☐	Inner Sub ☐	Town Ctr ☑
	Pedestrian Activity	Nil ☐	Low ☐	Moderate ☐	High ☑	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☐	Moderate ☐	High ☑	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☑	Local ☐
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)	-				
	Gross Floor Area (GFA m2)	27,000m^2				
	Employees (during survey)	1,225				
	Other Size (please specify value and units eg seats, rooms, beds, pupils)	-				

B.				
PARKING	Parking Spaces Provided On-site (Inc Staff)	Total 252		
	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 11:00am	Total (Inc Staff) 186	Staff (number) -
	Peak Parking Demand During Survey	0.69 total/100m^{2}GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 8:00am	End 9:00am	Comments
			IN	158 trips	IN + OUT 185	
			OUT	27 trips		
		PM Peak (veh/hr)	TIME	Start 4:15pm	End 5:15pm	
			IN	17 trips	IN + OUT 166	
			OUT	149 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	2,189		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	0.69 / 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	0.61 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	8.11 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	20	32
Car Passengers	3	5
Goods Drivers	0	0
Goods Passengers	0	0
Pedestrians	3	5
Cyclists	4	6
Bus Passengers	5	8
Train Passengers	27	44
Other	0	0
Total	62	100%

Survey undertaken by (org): GTA Consultants	Surveyor Contact (ph): +61 2 8448 1803
Survey undertaken by (surveyor): Austraffic	email: katherine.mccray@gta.com.au

SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day	Date	Time Start	Time Finish
	Thursday	03/12/09	7:00am	6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name	**Results & Comments** Trip Generation Study			
SITE DATA	Land Use Description	Commercial Office Blocks			
	Territorial Local Authority	Liverpool City Council			
	Street Address & Suburb	13-15 Moore Street Liverpool			
	Survey Site General Location	OuterRur ☐	InnerRur ☐	OuterSub ☐	Inner Sub ☐	Town Ctr ☑
	Pedestrian Activity	Nil ☐	Low ☐	Moderate ☑	High ☐	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☐	Moderate ☐	High ☑	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☑	Local ☐
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)	-			
	Gross Floor Area (GFA m2)	2,817m^2			
	Employees (during survey)	88			
	Other Size (please specify value and units eg seats, rooms, beds, pupils)	-			

B.	Parking Spaces Provided On-site (Inc Staff)	Total 28		
PARKING	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 9:15am	Total (Inc Staff) 14	Staff (number) -
	Peak Parking Demand During Survey	0.50 total/100m^{2}GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 9:45am	End 10:45am	Comments
			IN	37 trips	IN + OUT 70	
			OUT	33 trips		
		PM Peak (veh/hr)	TIME	Start 3:30pm	End 4:30pm	
			IN	23 trips	IN + OUT 48	
			OUT	25 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	626 trips		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	2.48 / 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	1.70 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	22.22 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	29	74
Car Passengers	3	8
Goods Drivers	0	0
Goods Passengers	0	0
Pedestrians	1	3
Cyclists	0	0
Bus Passengers	1	3
Train Passengers	5	13
Taxi	0	0
Total	39	100%

Survey undertaken by (org): GTA Consultants	Surveyor Contact (ph): +61 2 8448 1803
Survey undertaken by (surveyor): Austraffic	email: katherine.mccray@gta.com.au

SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day: Tuesday	Date: 01/12/09	Time Start: 7:00am	Time Finish: 6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name		**Results & Comments** Trip Generation Study			
SITE DATA	Land Use Description		Commercial Office Blocks			
	Territorial Local Authority		The Hills Council			
	Street Address & Suburb		10-12 Lexington Drive, Norwest			
	Survey Site General Location	OuterRur ☐	InnerRur ☐	OuterSub ☐	Inner Sub ☑	Town Ctr ☐
	Pedestrian Activity	Nil ☐	Low ☑	Moderate ☐	High ☐	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☑	Moderate ☐	High ☐	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☑	Local ☐
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)		10,000m^2			
	Gross Floor Area (GFA m2)		4,500m^2			
	Employees (during survey)		32			
	Other Size (please specify value and units eg seats, rooms, beds, pupils)		-			

B.	Parking Spaces Provided On-site (Inc Staff)	Total 83		
PARKING	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 12:00pm	Total (Inc Staff) 25	Staff (number) -
	Peak Parking Demand During Survey	0.56 total/100m^{2}GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 8:00am	End 09:00am	Comments
			IN	30 trips	IN + OUT 33	
			OUT	3 trips		
		PM Peak (veh/hr)	TIME	Start 4:45pm	End 5:45pm	
			IN	0 trips	IN + OUT 14	
			OUT	14 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	140 trips		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	0.73/ 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	0.21 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	3.11 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	30	97
Car Passengers		
Goods Drivers		
Goods Passengers		
Pedestrians		
Cyclists		
Bus Passengers	1	
Total	31	100%

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SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day: Thursday	Date: 04/02/10	Time Start: 7:00am	Time Finish: 6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name		**Results & Comments** Trip Generation Study			
SITE DATA	Land Use Description		Commercial Office Blocks			
	Territorial Local Authority		Newcastle City Council			
	Street Address & Suburb		22 Honeysuckle Drive, Newcastle			
	Survey Site General Location	OuterRur ☐	InnerRur ☑	OuterSub ☐	Inner Sub ☐	Town Ctr ☐
	Pedestrian Activity	Nil ☐	Low ☑	Moderate ☐	High ☑	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☑	Moderate ☐	High ☑	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☑	Local ☐
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)		-			
	Gross Floor Area (GFA m2)		12,812m^2			
	Employees (during survey)		490			
	Other Size (please specify value and units eg seats, rooms, beds, pupils)		-			

B.				
PARKING	Parking Spaces Provided On-site (Inc Staff)	Total 200		
	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 12.15pm	Total (Inc Staff) 168	Staff (number) -
	Peak Parking Demand During Survey	1.31total/100m^{2}GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 8:00am	End 9:00am	Comments
			IN	122 trips	IN + OUT 126	
			OUT	4 trips		
		PM Peak (veh/hr)	TIME	Start 4:45pm	End 5:45pm	
			IN	14 trips	IN + OUT 139	
			OUT	125 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	1,777		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	1.41 / 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	1.57 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	14.59 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	234	72
Car Passengers	36	11
Goods Drivers	0	0
Goods Passengers	0	0
Pedestrians	17	5
Cyclists	14	4
Bus Passengers	4	1
Train Passengers	17	5
Other	0	0
Total	324	100%

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SITE SURVEY SUMMARY SHEET

Office Ref Only

Survey Period Date & Time	Day: Thursday	Date: 02/02/10	Time Start: 7:00am	Time Finish: 6:30pm
	☐ Extended Data Collection (Several Days)	Date Start		Date End

A.	Activity Name		**Results & Comments** Trip Generation Study			
SITE DATA	Land Use Description		Commercial Office Blocks			
	Territorial Local Authority		Wollongong City Council			
	Street Address & Suburb		77 Market Street, Wollongong			
	Survey Site General Location	OuterRur ☐	InnerRur ☑	OuterSub ☐	Inner Sub ☐	Town Ctr ☐
	Pedestrian Activity	Nil ☐	Low ☐	Moderate ☑	High ☑	V High ☐
	Public Transport Opportunities	Nil ☐	Low ☐	Moderate ☑	High ☑	V High ☐
	Highest Classification of Frontage Road/s		Major Arterial ☐	Minor Arterial ☐	Collector ☑	Local ☐
			Traffic aadt =		SH/TLA/Other Rd (state)	
	Occupied Site Area (Ha or m2)		-			
	Gross Floor Area (GFA m2)		12,921m^2			
	Employees (during survey)		300			
	Other Size (please specify value and units eg seats, rooms, beds, pupils)		-			

B.				
PARKING	Parking Spaces Provided On-site (Inc Staff)	Total 133		
	Other Parking Spaces Available On-street Off-site	Total -		
	Staff Parking Spaces Provided On-site	Total		☐ Not Relevant ☑ Not Surveyed ☐ Estimated
	Staff Parking Spaces On-street and Off-site	Total		
	Peak Parking Demand	Time 2.30pm	Total (Inc Staff) 89	Staff (number) -
	Peak Parking Demand During Survey	0.69total/100m^{2}GFA	NA total/other unit (state unit)	NA staff / 100m^2 GFA

C.						
TRIP GENERATION	SITE SURVEYED ARRIVAL/DEPARTURE FLOW	AM Peak (veh/hr)	TIME	Start 8:15am	End 9:15am	Comments
			IN	110 trips	IN + OUT 123	
			OUT	13 trips		
		PM Peak (veh/hr)	TIME	Start 4:45pm	End 5:45pm	
			IN	8 trips	IN + OUT 100	
			OUT	92 trips		
		Daily (veh/day)	TIME	Start 7:00am	End 6:30pm	
			TOTALIN+OUT	965		
	Peak Trip Rate per 100m2 or other unit (state)		AM Hr	0.95 / 100m2 GFA / hr		/ other unit (state) / hr
			PM Hr	0.77 / 100m2 GFA / hr		/ other unit (state) / hr
			DAILY	7.47 / 100m2 GFA / hr		/ other unit (state) / hr

GENERAL COMMENTS AND NOTES

eg. Site location characteristics, parking durations, weather and other special aspects (school holidays, public holidays)

A sample of staff and visitors were interviewed to determine the modal split

Modal Split	Number	%
Car Drivers	71	78
Car Passengers	7	8
Goods Drivers	0	0
Goods Passengers	0	0
Pedestrians	0	0
Cyclists	5	5
Bus Passengers	0	0
Train Passengers	3	3
Other	5	5
Total	0	100%

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Appendix E

NZTDB Trip Generation Data

NZTDB Site Specific Trip Generation Data

Site No.	Territorial Local Authority	Suburb or Locality	Activity Name	Land Use Group	Land Use Activity (Primary)	Land Use Activity (Description)	Location Environment	Frontage Road Hierarchy and Daily Traffic Volume				Population Details			Pedestrian Activity	Public Transport Accessibility	Date of Survey	Time of Survey	Day of Survey	GFA (m^2)	Site Area (m^2)	Employees	Other Size (please specify value)
								Major Arterial (vpd)	Minor Arterial (vpd)	Collector Road (vpd)	Local Road (vpd)	within 1 km	within 5 km	Total Population of Urban Area									
3	Auckland	CBD	Central Park Offices	Commercial	Office	Park							137000	1300000			12/08/1993	0800-0900, 1630-1800	Thursday	49110			
17	Auckland	Oranga	Central Park Offices	Commercial	Office	Park	Town Centre	Daily volume unknown				7000	136678	1300000						491100		unkown	
33	North Shore	Hauraki	Kircaldy Architects	Commercial	Office	Suburban	Town Centre		Daily volume unknown			6354	75552	1300000			18/05/1993	0800-1700	Tuesday	120		2	
34	Waitakere	Henderson North	Social Welfare/CYPS	Commercial	Office	CBD	Inner Suburban			Daily volume unknown				1300000			13/05/1993	0900-1700	Thursday	4032		180	
69	Auckland	Oranga	Greenlane Office Park (south)	Commercial	Office	Park	Inner Suburban	Daily volume unknown				7839	139788	1300000			5/11/1993	0800-1800	Friday	8384		267	
87	Auckland	Greenlane	Greenlane Office Park	Commercial	Office	Park	Inner Suburban	Daily volume unknown						1300000			27/01/1994	0800-1730	Thursday	6855		256	
151	Auckland	Greenlane	Greenlane Office Park, 300-308 Great South Road	Commercial	Office	Park								1300000			15/07/1994	0800-0900, 1615-1715	Friday	7850			
152	Auckland	Greenlane	Greenlane Office Park, 300-308 Great South Road	Commercial	Office	Park								1300000			16/07/1994	1000-1400	Saturday	7850			
577	Christchurch	Middleton	8 Craft Place	Commercial	Office		Suburban	<1000						333000	Moderate	Moderate	14/09/2007	14:20-16:50	Friday	530	1290	10-20	
585	Christchurch	Middleton	3 Craft Place	Commercial	Office		Suburban							333000	Moderate	Moderate	27/09/2007	14:00-17:30	Thursday	900	1350		
589	Christchurch	Middleton	9 Craft Place	Commercial	Office		Suburban							333000	Moderate	Moderate	27/09/2007	14:00-17:30	Thursday	520	3962		
591	Christchurch	Middleton	8 Craft Place	Commercial	Office		Suburban							333000	Moderate	Moderate	27/09/2007	14:00-17:30	Thursday	400	999		
662	Auckland	Newmarket	OnGas House	Commercial	Office		Inner Suburban		3,540			6000	181000	1300000	Moderate	High	3/03/2009	06:30-18:00	Tuesday	4,886			

Other Unit (please specify unit eg: seats, rooms, beds, pumps)	Comments	Parking Spaces Provided On-site	Other Parking Spaces Available On-street and Off-site	MAX ON-SITE PARKING DEMAND	MAX OFF-SITE PARKING DEMAND	(at time)	PEAK TOTAL PARKING DEMAND RATES					SURVEYED ARRIVAL/DEPARTURE FLOW												GFA (IN+OUT)		
										Other		AM Peak (vph)				PM Peak (vph)				Daily (vpd)						
							GFA (spaces/ 100m2 GFA)	SITE AREA (spaces/ 100m2 SA)	EMPLOYEES (spaces/emp)	(spaces/other unit)	Other Unit (if applicable)	IN	OUT	IN + OUT	at time	IN	OUT	IN + OUT	at time	IN	OUT	IN + OUT	at time	AM	PM	DAILY
							0.00	0.00	0.00	0.00		460	103	563		187	519	706				0		1.15	1.44	
							0.00	0.00	0.00	0.00		814	255	1069		256	738	994				0		0.22	0.20	
		4		4		0800	3.33	0.00	2.00	0.00		3	1	4		1	3	4		12	12	24	0800-1700	3.33	3.33	20.00
		127		129		0915	3.20	0.00	0.72	0.00				0		72	72	144		655	600	1255	0900-1700		3.57	31.13
		247		204		0915	2.43	0.00	0.76	0.00		159	32	191		22	82	104		557	492	1049	0800-1800	2.28	1.24	12.51
		206		147		1430	2.14	0.00	0.57	0.00		121	27	148		29	81	110		535	474	1009	0800-1730	2.16	1.60	14.72
							0.00	0.00	0.00	0.00		131	25	156	0800-0900	44	112	156	1615-1715			0		1.99	1.99	
							0.00	0.00	0.00	0.00		8	10	18	1130-1230			0				0		0.23		
		14	up to 30	14		15:12	2.64	1.09		0.00						5	2	7	14:20-15:20						1.32	
			21														8	8	16:00-17:00						0.89	
			32														5	5	16:00-17:00						0.96	
			12													3	3	6	16:00-17:00						1.50	
	4,538m2 GLFA			125		9:30	2.56	0.00	0.00	0.00		50	3	53	08:15-09:15	3	65	68	16:30-17:30					1.08	1.39	

TRIP GENERATION RATES										TRAVEL MODE (trips)								TRAVEL MODE (percentage)								NOTES AND COMMENTS
SITE AREA (IN+OUT)			EMPLOYEES			OTHER UNIT (IN+OUT)																				
AM	PM	DAILY	AM	PM	DAILY	AM	PM	DAILY	OTHER UNIT	Car Driver	Car Passenger	Goods Driver	Goods Passenger	Pedestrian	Cyclist	Bus Passenger	Total	Car Driver	Car Passenger	Goods Driver	Goods Passenger	Pedestrian	Cyclist	Bus Passenger	Total	
			2.00	2.00	12.00																					Average of three days
				0.80	6.97																					"Benefit Day"
			0.72	0.39	3.93																					
			0.58	0.43	3.94									112 over 9.5 hour survey								112 over 9.5 hour survey				
	0.54									10							10	100.0							100.0	
	0.59																									
	0.13																									
	0.60																									
																										Driveway surveyed 06:30-09:30 & 15:00-18:00 / Parking count survey hourly 06:30-18:00

Appendix F

UK TRICS Trip Generation Data

UK TRICS Site Specific Trip & Parking Generation Data

WR-02-A-01 COUNCIL OFFICES, WREXHAM — Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport
AM peak hour	08:00 - 09:00	2500	2.28	57.0	74	0.8				
PM peak hour	16:30 - 17:30	2500	4.00	100.0	74	1.4				
Daily	07:00 - 19:00	2500	20.64	516.0	74	7.0	59.20%	1.10%	19.90%	19.80%

TW-02-A-02 UNION OFFICES, NEWCASTLE — Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport
AM peak hour	08:30 - 9:30	1675	0.896	15.0	12	1.3				
PM peak hour	16:00 - 17:00	1675	1.195	20.0	12	1.7				
Daily	07:00 - 19:00	1675	5.853	98.0	12	8.2	33.80%	0.00%	39.40%	26.80%

SC-02-A-10 GOVERNMENT OFFICE,GUILDFORD — Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport
AM peak hour	08:00 - 09:00	4312	0.58	25.0	38	0.7				
PM peak hour	16:30 - 17:30	4312	0.51	22.0	38	0.6				
Daily	07:00 - 19:00	4312	2.687	115.9	38	3.0	16.50%	1.47%	62.70%	19.30%

LE-02-A-02 COUNCIL OFF., LOUGHBOROUGH — Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport
AM peak hour	10:00 - 11:00	6913	1.49	103.0	137	0.8				
PM peak hour	16:00 - 17:00	6913	1.592	110.1	137	0.8				
Daily	07:00 - 18:00	6913	13.28	918.0	137	6.7	99.10%	0.90%		

LC-02-A-06 TOWN HALL, BLACKBURN — Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport
AM peak hour	09:00 - 10:00	11225	1.988	223.2	130	1.7				
PM peak hour	16:00 - 17:00	11225	2.014	226.1	130	1.7				
Daily	07:00 - 19:00	11225	15.282	1715.4	130	13.2	40.20%	0.24%	50.80%	8.70%

WY-02-A-01 CALL CENTRE, BRADFORD — Edge of Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport
AM peak hour	07:30 - 8:30	2400	3.375	81.0	220	0.4				
PM peak hour	17:00 - 18:00	2400	2.5	60.0	220	0.3				
Daily	07:00 - 19:00	2400	24.167	580.0	220	2.6	76.40%	0.00%	19.20%	4.44%

TW-02-A-01 RADIO STUDIOS, GATESHEAD — Edge of Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport
AM peak hour	09:00 - 10:00	645	2.79	18.0	12	1.5				
PM peak hour	17:00 - 18:00	645	3.101	20.0	12	1.7				
Daily	07:00 - 19:00	645	20.616	133.0	12	11.1	86.20%	0.00%	13.80%	0.00%

TV-02-A-01 INLAND REVENUE, MIDDLESBRGH — Edge of Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport
AM peak hour	07:30 - 8:30	4100	2.463	101.0	80	1.3				
PM peak hour	16:00 - 17:00	4100	1.976	81.0	80	1.0				
Daily	07:00 - 19:00	4100	17.121	702.0	80	8.8	52.00%	0.40%	39.40%	8.20%

KC-02-A-05 COUNTY HALL, MAIDSTONE — Edge of Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport	Taxis
AM peak hour	08:30 - 9:30	32793	1.168	383.0	369	1.0					
PM peak hour	16:30 - 17:30	32793	1.19	390.2	369	1.1					
Daily	07:00 - 19:00	32793	5.799	1901.7	369	5.2	42.18%	0.46%	41.10%	16.30%	0.00%

CA-02-A-03 OFFICE, PETERBOROUGH — Edge of Town Centre

Period	Time	GFA	Trips/100m2	Trips	Parking spaces	Trips/parking space	Vehicles	Cyclists	Pedestrians	Public Transport	Taxis
AM peak hour	07:30 - 08:30	5750	1.235	71.0	97	0.7					
PM peak hour	17:00 - 18:00	5750	1.391	80.0	97	0.8					
Daily	07:00 - 19:00	5750	6.437	370.1	97	3.8	46.70%	1.35%	46.10%	5.80%	0.96%

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