Trip Generation and Parking Demand of Boarding Houses

Analysis Report

Trip Generation and Parking Demand of Boarding Houses

Analysis Report

Client: Transport for NSW

Version: V03

Date: 15 September 2022

TTPP Reference: 21529

Quality Record

Version	Date	Prepared by	Reviewed by	Approved by	Signature
V01	02/05/2022	Sokan Chhoun	Kelly Yoon	Ken Hollyoak	DRAFT
V02	07/09/2022	Sokan Chhoun	Oasika Faiz	Ken Hollyoak	DRAFT
V03	15/09/2022	Sokan Chhoun	Oasika Faiz	Ken Hollyoak	

Table of Contents

Tables

Figures

APPENDICES

A. SUMMARY TABLE OF KEY STATISTICS AND RATIOS
B. DETAILED MULTIPLE REGRESSION ANALYSIS RESULTS

1 Introduction

1.1 Study Outline

The Transport Planning Partnership (TTPP) has been commissioned by Transport for NSW (TfNSW) to undertake a trip generation and parking demand analysis of boarding houses across Sydney and Regional NSW.

Trip generation and parking rates for various land use types are presented in the *Guide to Traffic Generating Developments* (the Guide), first released by Roads and Traffic Authority (RTA), NSW (later Roads and Maritime Services) in 1991. It drew on the results of a number of trip generation and parking demand surveys covering a wide range of business and other land use types. That document, still used extensively by Councils, consultants and developers, was revised in 2002. The 2002 revision retained much of the data and recommendations from the 1993 edition, which in turn contained data from surveys conducted as early as 1978.

With the changing characteristics of different land use types and travel behaviour over time, it has been deemed necessary to undertake new studies of various planning uses. There has been a number of recent studies to update the Guide's trip generation and parking generation for different land uses, with the first one being completed in 2009. The findings will be populated within a revised Guide that will be issued in the future. Road and Maritime Services (RMS) issued a technical direction TD13/04a which summarises the traffic generation data from some of these studies of the new uses, supplementing the Guide and replacing relevant information.

Even though boarding houses do not have any specific trip rate and parking data included in the Guide, they have been growing in popularity since the passage of the Boarding House Act in 2012. This study has therefore been undertaken specifically to collect information on the traffic generation and parking demand characteristics for boarding houses. New surveys have been conducted to collect data relating to vehicle and person trips, as well as site observations to determine travel behaviour of residents and visitors. The results from these surveys are then compared with similar data available from the other Australian road and planning agencies and various overseas organisations to assess the relevance and applicability of that data for use in the local context.

1.2 Boarding Houses

A boarding house is a residential building with individual units, which may have shared amenities, such as communal kitchens, bathrooms, and laundry rooms.

Boarding houses are intended to support the delivery of affordable rental housing. They were once considered to be "halfway houses" offering cheap rent and short-term stays. As a result, boarding houses still have a stigma attached to them, but in reality, they are modern homes attracting a very different clientele such as employees and students.

The "new generation" boarding house contains self-contained units and looks like a brand new strata apartment block, complete with intercom, security cameras, balconies and an underground car park. The bedroom, living area, and sometimes a small bathroom or basic kitchen facility are all in the one room measuring anywhere between 12 square metres and 25 square metres. This type of accommodation is targeted towards young professionals, students, and the elderly who may have a difficult time finding affordable housing options in traditional apartment units. Notwithstanding this, it is noted that rooms in new generation boarding homes could be twice the size of those of older style boarding houses.

Until recently, boarding houses were referenced in *State Environmental Planning Policy (Affordable Rental Housing 2009)* (ARHSEPP). They were only permitted in Zone R2 Low Density Residential if they are considered accessible and within proximity to public transport options. The 2009 policy included enticements such as bonus floor space and boarding rooms as small as 12 square metres – almost one third of the minimum size for studio apartments. Consequently, commercial developers were developing very large blocks of boarding houses. A recent amendment to the AHSEPP however, limited the size of boarding houses in Zone R2 Low Density Residential areas to a maximum of 12 boarding rooms.

In 2021, the *State Environmental Planning Policy (Housing) 2021* (Housing SEPP) consolidated five former housing-related policies and some of the planning provisions for boarding houses were updated. In particular, the definition of boarding houses has been refined and there is a new clarification for co-living and 'build to rent'.

Boarding houses are a type of affordable housing which must now be managed by registered community housing providers. Co-living housing provides a compact, ready to occupy form of accommodation for a range of people including young professionals and key workers.

Boarding houses and co-living housing will be similar in terms of their built form and operation. Boarding houses receive a larger density bonus to encourage the delivery of this affordable product.

Consequently, many of the blocks that were examined in this study would now be classified as co-living.

1.3   Approach

The approach to this study and the tasks involved are described below:

- Undertake detailed site assessments of boarding houses, contacting the tenant managers and occupiers to obtain comprehensive information including site area, car parking, boarding rooms, number of tenants and mode of travel to/from the site.

- Arrange traffic surveys from Monday to Friday at all sites. The surveys were undertaken during March 2022 outside of any school or public holidays.

- Conduct intersection movement counts at the site access points and frontage road to determine the surrounding network peak hour periods.

- Undertake multiple linear regression analyses of a number of key variables as functions of the number of boarding rooms, gross floor areas (GFA), and number of car parking spaces. Undertake linear regression analyses of the various trip statistics as functions of single key variables.

- Compare these relationships with similar trip generation and parking demand information for boarding houses currently available from other sources, as a means of assessing the relevance of this data for use in the NSW context.

- Prepare an analysis report, which contains the analysis covering all of the calculations and comparisons (this document).

- Prepare a data report, which contains the raw data from the surveys and other supporting data such as site plans.

1.4   Report Structure

The remainder of this analysis report is set out as follows:

- Section 2 contains a description of the survey methodology and the selected sites;

- Section 3 summarises the survey results;

- Section 4 presents the linear and multiple regression analyses results.

- Section 5 compares the NSW survey results with other countries' databases such as the Trip Rate Information Computer System (TRICS, United Kingdom), New Zealand Trips and Parking Database Bureau (TDB, New Zealand) and the Institute of Transportation Engineers Trip Manual (ITE, United States); and

- Section 6 presents the summary of this investigation.

2   Survey Methodology

2.1   Selected Sites

A total of 11 boarding houses were identified for the surveys. A list of the selected sites is provided in Table 2.1 with the details of each site also described in this Section.

Table 2.1: Survey Sites List

Site ID	Site Address	Site Location (Metropolitan or Regional)
BH01	88 Joseph Street, Lidcombe	Metropolitan
BH02	80 Parramatta Road, Camperdown	Metropolitan
BH03	2506 Bundaleer Street, Belrose	Metropolitan
BH04	42 Chapel Street, St Marys	Metropolitan
BH05	1274 Botany Road, Botany	Metropolitan
BH06	111 Woodville Road, Granville	Metropolitan
BH07	391-393 Kingsway, Caringbah	Metropolitan
BH08	20 Moore Street, Campbelltown	Metropolitan
BH09	6 Gwynne Street, Gwynneville	Regional
BH10	4 Landy Drive, Mount Warrigal	Regional
BH11	748 Pacific Highway, Marks Point	Regional

The selected sites include eight boarding houses in metropolitan Sydney and three boarding houses in regional NSW. The identified sites conform with the TfNSW's requirements by providing a diverse range of sites with the following attributes:

- most with on-site parking provision;

- reasonable geographic spread;

- a range of sizes;

- a range of accessibility to public transport;

- mostly built since 2012;

- ease in isolating the site from other nearby developments for survey purposes and collecting the required trip information, i.e., no shared driveway with other developments; and

- availability of relevant information on the development (site area, number of units, pedestrian access points, vehicle entrance and exits, etc).

Specific site locations are also geographically presented in Figure 2.1 and Figure 2.2.

Figure 2.1: Metropolitan Sydney Site Locations
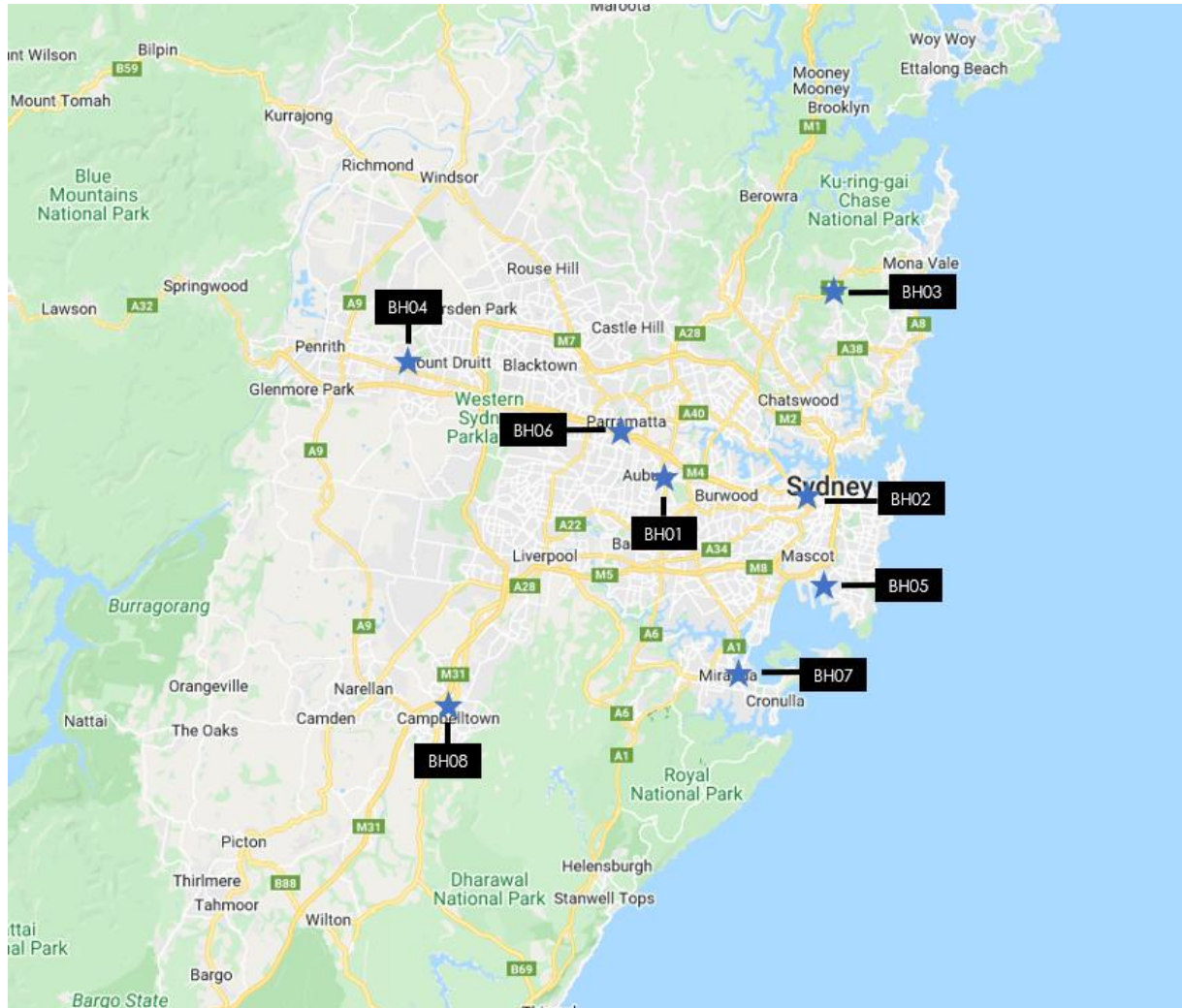
Basemap Source: Nearmap, accessed online on 17/05/2022

Figure 2.2: Regional NSW Site Locations

Basemap Source: Nearmap, accessed online on 17/05/2022

The details of the selected sites are summarised in Table 2.2.

Table 2.2: Details of Selected Sites

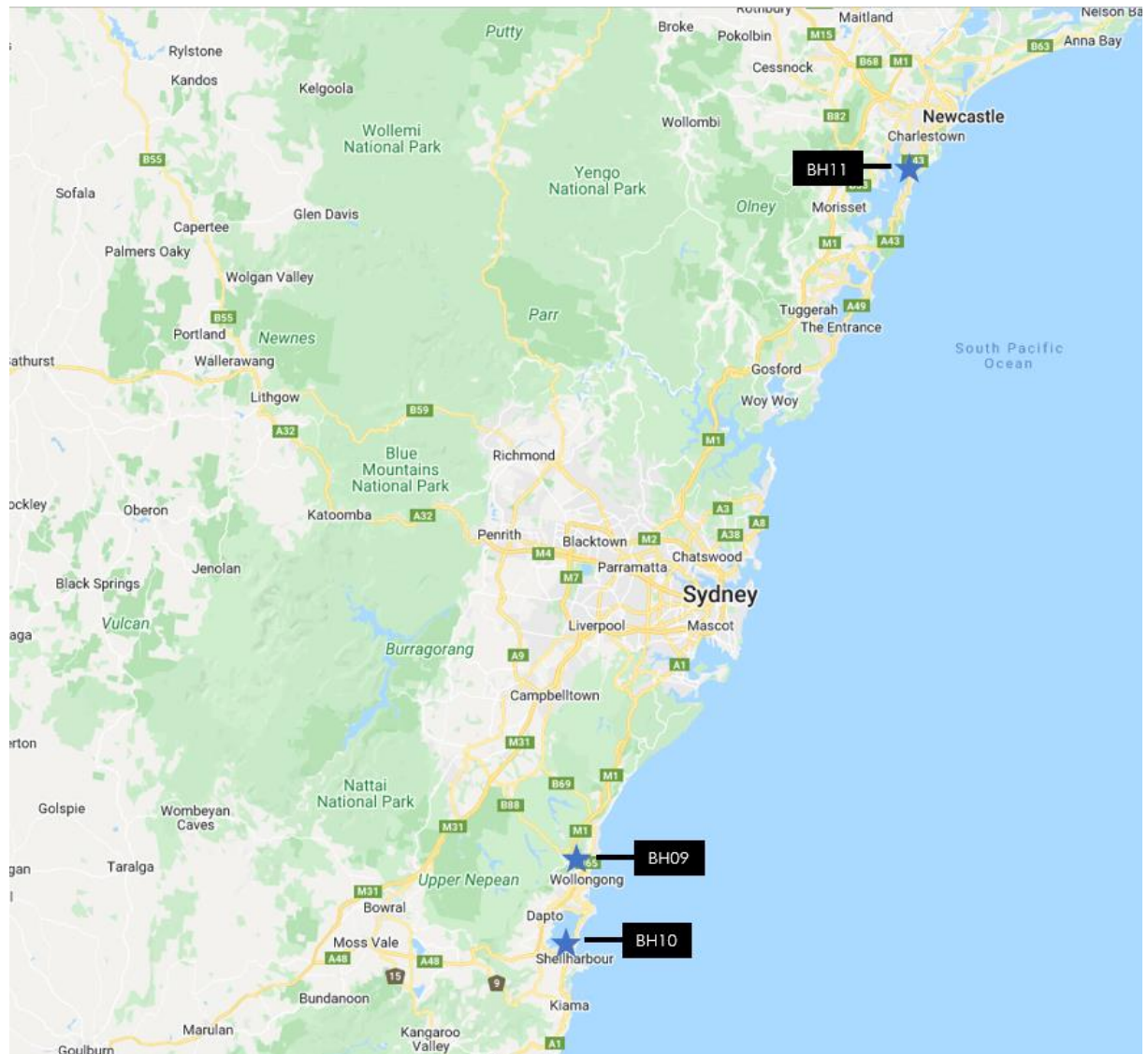| Site ID	Sydney Metropolitan Area								Regional Area		
	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11
Address	88 Joseph Street, Lidcombe	80 Parramatta Road, Camperdown	2506 Bundaleer Street, Belrose	42 Chapel Street, St Marys	1274 Botany Road, Botany	111 Woodville Road, Granville	391-393 Kingsway, Caringbah	20 Moore Street, Campbelltown	6 Gwynne Street, Gwynneville	4 Landy Drive, Mount Warrigal	748 Pacific Highway, Marks Point
Region	Greater Sydney	Greater Sydney	Greater Sydney	Greater Sydney	Greater Sydney	Greater Sydney	Greater Sydney	Greater Sydney	Regional	Regional	Regional
Council	Cumberland	City of Sydney	Northern Beaches	Penrith City	Bayside	Cumberland	Sutherland Shire	Campbelltown	Wollongong	Shellharbour	Lake Macquarie
Survey Information											
Duration of survey	Mon, 21/03/2022 to Fri, 25/03/2022	Wed 16/03/2022	Mon, 21/03/2022 to Fri, 25/03/2022	Wed 16/03/2022	Wed 16/03/2022	Tue 29/03/2022	Thur 17/03/2022	Thur 17/03/2022	Mon, 21/03/2022 to Fri, 25/03/2022	Tue 22/03/2022	Tue 22/03/2022
Date of survey, Weather											
- Monday	7:00 - 20:00 (13hrs), Sunny	-	7:00 - 20:00 (13hrs), Sunny	-	-	7:00 - 20:00 (13hrs), Sunny	-	-	7:00 - 20:00 (13hrs), Sunny	-	-
- Tuesday	7:00 - 20:00 (13hrs), Sunny	-	7:00 - 20:00 (13hrs), Sunny	-	-	-	-	-	7:00 - 20:00 (13hrs), Sunny	7:00 - 20:00 (13hrs), Sunny	7:00 - 20:00 (13hrs), Sunny
- Wednesday	7:00 - 20:00 (13hrs), Sunny	7:00 - 20:00 (13hrs), Cloudy	7:00 - 20:00 (13hrs), Sunny	7:00 - 20:00 (13hrs), Rainy	7:00 - 20:00 (13hrs), Sunny	-	-	-	7:00 - 20:00 (13hrs), Sunny	-	-
- Thursday	7:00 - 20:00 (13hrs), Rainy	-	7:00 - 20:00 (13hrs), Rainy / Cloudy	-	-	-	7:00 - 20:00 (13hrs), Sunny	7:00 - 20:00 (13hrs), Sunny	7:00 - 20:00 (13hrs), Cloudy / Rainy	-	-
- Friday	7:00 - 20:00 (13hrs), Sunny / Rainy	-	7:00 - 20:00 (13hrs), Cloudy	-	-	-	-	-	7:00 - 20:00 (13hrs), Cloudy / Rainy	-	-
Area Characteristics											
Surrounding land use (e.g., commercial, retail, high/low density residential, open space, e	Low-Density Residential	School, Low and Medium-Density Residential, Mixed-use Development,	School, Low Residential, and Open Space	Low Residential, Retail and Business, Shopping Centre	Low and Medium-Density Residential, Retail and Business, Industrial	Low-Density Residential, Retail and Business, TAFE	Low and Medium-Density Residential, Retail and Business, Hospital	Low and Medium-Density Residential, Park Reserve, Retail and Business	Low-Density Residential, Park Reserve	Low-Density Residential, Park Reserve, Hospital, Education Centre	Low-Density Residential, Park Reserve
Nearby on-street parking regime (e.g., resident scheme; time restrictions; hourly cost etc)	Joseph St: No Parking Victoria St East: Unrestricted Parking	Parramatta Rd: No Parking Sparkes St & Larkin St: Time restriction with resident scheme	Bundaleer St: Unrestricted Parking Linden Ave: Unrestricted Parking	Chapel St: Unrestricted parking Gidley St: Unrestricted and Restricted Parking	Botany Rd: Unrestricted parking Tenterden Rd: Unrestricted parking	Woodville Rd: No Parking Clarke Street: Restricted parking, resident scheme	Kingsway: No Parking Taren Point Rd: No Parking and Unrestricted Parking	Moore St: No Parking Warby St: Unrestricted Parking	Gwynne Street: Unrestricted Parking Murphy Avenue: Unrestricted Parking	Landy Drive: Unrestricted Parking Andrew Crescent: Unrestricted Parking	Pacific Highway: Unrestricted Parking Emily Street: Unrestricted Parking
Site Details											
Year built	2017	2014	2017	2020	2020	2020	2021	2019	2015	2020	2016
Site area (m²)	608	622	16,411	625	929	1,182	1,277	961	1,012	557	925
GFA (m²)	-	2,006	2,000	634	-	-	1,065	528	491	276	-
Type of Boarding House	Non-social	Non-social	Non-social	Non-social	Non-social	Non-social	Non-social	Non-social	Non-social	Non-social	Non-social
Number of Rooms	10	57	35	16	14	23	65	17	23	8	8
Other Land Uses	None	Ground floor retail	None	None	None	None	None	None	None	None	None
On-site parking											
Car Parking (incl. accessible spaces)	2	9	27	3	7	12	33	4	6	4	8
- Accessible Parking	0	0	1	0	1	1	2	1	0	1	0
Bicycle Parking	0	10	9	3	3	5	14	4	25	6	0
Motorcycle Parking	0	5	5	3	3	5	14	0	0	2	0
Access											
Number of Vehicle Access	1 - Joseph Street	1 - Sparkes Street	1 - Linden Avenue	1 - Chapel Street	1 - Botany Road	1 - Clark Street	1 - Kingsway	1 - Moore Street	1 - Murphys Avenue	1 - Landy Drive	1 - Emily Street
Number of Pedestrian Access	2 - Joseph Street	4 - Two accesses via Parramatta Road and two accesses via Sparkes Street	2 - Linden Avenue	1 - Chapel Street	1 - Botany Road	2 - Woodville Road and Clarke Street	3 - Kingsway	2 - Moore Street	2 - Murphys Avenue and Gwynne Street	1 - Landy Drive	3 - Two accesses on Emily Street and one access on Pacific Highway
Public Transport	Train: 700m to Lidcombe train station Bus: 350m to James Street bus stop	Bus: along the site frontage on Parramatta Road	Bus: 550m walking distance to Forest Way bus stop	Train: 700m to St Marys train station Bus: 290m to Queen Street bus stop	Bus: 100m walking distance to Botany Road bus stop	Train: 1.1km to Merrylands train station Bus: 50m to Woodville Road bus stop	Train: 550m to Caringbah train station Bus: 170m to Taren Point Road bus stop	Train: 1km to Campbelltown train station Bus: 110m to Moore Street bus stop	Train: 1.6km to North Wollongong train station Bus: 70m to Murphys Avenue bus stop	Bus: opposite the site frontage	Bus: opposite the site frontage
Closest Car Share Location	5-minute walk (Kerrs Road)	1-minute walk (Larkin Street)	None Nearby	None nearby	4-minute walk (Rochester Street)	None	5-minute walk (Willarong Road)	None nearby	None nearby	None nearby	None nearby

2.2   Survey Process

Site surveys were undertaken from Monday to Friday during March 2022 outside of any school or public holidays. The surveys recorded the number of vehicles and pedestrians entering and exiting the site at the boarding houses' access points. The number of boarding rooms, GFA and car parking spaces within the perimeter of the site was also recorded.

Surveyors were assigned within the site vicinity to interview the boarding houses' residents and visitors in relation to travel methods to/from the sites. The following were asked on site:

- Is the person entering the site, a resident, visitor to meet with a resident or a visitor for business purposes?

- What is the primary mode of travel?

- Does the resident or visitor own a car?

- If arrived by car, where did they park?

2.3   Data Recorded

The following information was recorded by the surveyors at each site:

- the number of vehicles parked on the site at the commencement of the survey;

- the number of vehicles and the number of occupants in each vehicle entering and leaving the site;

- the number of pedestrians entering and leaving the site;

- the trip purpose of visitors/residents (interview survey);

- the travel mode of visitors/residents (interview survey); and

- the parking location of visitors/residents who travelled by car (interview survey).

Hourly traffic volumes on the principal frontage access road were collected to determine background peak hours using intersection movement counts at the site access locations.

TTPP approached the local government authorities of each surveyed site to provide, where possible, the following information to assist with the statistical analysis of this study:

- site area and GFA;

- the number of boarding rooms;

- the number of car parking spaces;

- the number of motorcycle parking spaces; and

- the number bicycle parking spaces.

The survey data & key statistics /ratios for all survey sites are also presented in Appendix A.

3   Survey Analysis

3.1   Key Statistics

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

Vehicle-based:

- adjacent road network peak hour;

- site peak hour;

- vehicle trip generation during the site peak hour;

- vehicle trip generation during the adjacent road network peak hour;

- daily site vehicle trip generation;

- average vehicle occupancy of cars which entered the site;

- peak on-site parking accumulation; and

- parking location (based on interviews and on-site observations)

Person-based:

- person trip generation during the site peak hour;

- person trip generation during the adjacent road network peak hour;

- daily person trips;

- purpose of travel (based on interviews and on-site observations); and

- travel mode split (based on interviews and on-site observations).

The vehicle-based trips analysis comprises vehicle trips generated by on-site parking as well as vehicle trips estimated for on-street parking activity, which are based on the interview survey results. On-site vehicle trips and estimated on-street vehicle trips are analysed separately, then together, which the results are summarised in Table 3.1 and Appendix A.

Amongst the pedestrians entering/exiting the sites, some of them walked from their vehicles or to access their vehicles which were parked on-street nearby. The number of on-street parking interview responses is moderately high across all surveyed sites, which is shown is Section 3.6.4. This indicates that the driveway counts may not provide a true representation of the vehicle trip generation rate of the sites.

In the absence of on-street parking survey, interview results were filtered to obtain the proportion of on-street parking responses and estimate the number of on-street parking trips by applying this proportion to the pedestrian volumes

It is noted that while the data has been filtered for only people driving to/from the site and parked on-street to the best accuracy, the data shown here for on-street estimate is solely based on the sample results from the interview surveys. This may not provide a true representation of what was happening on-site during the survey days, which could impact the reliability of the results. Therefore, the on-street vehicle trips estimation and the associated rates can be used where reasonable. The reliability of the interview survey data is further discussed in Section 3.6.6.

3.2   Key Variables

The trip and parking generation rates could be derived from the following key variables:

- the number of rooms;
- the GFA; and/or
- the number of parking spaces.

The key variables (number of boarding rooms, GFA and parking spaces) of each site were obtained directly from the relevant local government authorities.

3.3   Trip Rates

Table 3.1 presents a summary of the survey data collected across all the boarding houses.

The trip generation rates are summarised using the surveyed trips and the following parameters:

- the number of boarding rooms;
- the GFA, and
- the number of on-site car parking spaces.

As mentioned previously, vehicle trips analysis is separated into three components, namely:

- Vehicle trips (on-site only)
- Vehicle trips (on-street estimate)
- Vehicle trips (on-site + on-street estimate)

Person-based trips are the same for all sites as the surveys counted all vehicles and pedestrians entering the site. Therefore, the results for person-based trips are summarised in one-section.

Table 3.1: Survey Results Summary

Site ID	Sydney Metropolitan Area								Regional Area		
	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11
Address	88 Joseph Street, Lidcombe	80 Parramatta Road, Camperdown	2506 Bundaleer Street, Belrose	42 Chapel Street, St Marys	1274 Botany Road, Botany	111 Woodville Road, Granville	391-393 Kingsway, Caringbah	20 Moore Street, Campbelltown	6 Gwynne Street, Gwynneville	4 Landy Drive, Mount Warrigal	748 Pacific Highway, Marks Point
Person-based Trips											
Daily Person Trips	31	165	103	19	53	93	165	40	68	24	35
Average Person Trips per Hour	2	13	8	1	4	7	13	3	5	2	3
Site Peak Person Trips											
- AM Peak	10	24	9	2	3	21	15	5	11	10	4
- PM Peak	5	21	18	10	12	16	23	7	10	3	9
Peak Network Hour Person Trips											
- AM Peak	0	16	9	1	1	3	8	1	7	0	1
- PM Peak	4	18	3	0	6	2	13	7	8	1	1
Mode Split (%)											
- Car	38%	13%	82%	50%	40%	76%	8%	43%	90%	10%	100%
- Public Transport	23%	33%	1%	50%	0%	9%	0%	7%	1%	10%	0%
- Walk/Cycle	37%	54%	13%	0%	60%	9%	92%	50%	9%	80%	0%
- Taxi/Ride Share	2%	0%	5%	0%	0%	6%	0%	0%	1%	0%	0%
Vehicle-based Trips (on-site only)											
Daily Vehicle Trips	2	15	56	4	13	31	52	18	14	8	14
Site Peak Hour Vehicle Trips											
- AM Peak	2	4	7	0	1	2	6	4	2	4	2
- PM Peak	0	4	11	2	2	3	7	4	1	3	2
Network Peak Hour Vehicle Trips											
- AM Peak	0	1	7	0	0	2	2	1	2	0	1
- PM Peak	0	1	2	0	1	0	7	4	1	1	1
Peak Parking Accumulation	3	7	11	0**	5	9	0**	5	5	3	6
- % Parking Capacity	150%*	78%	41%	0%	71%	75%	0%	125%*	83%	75%	75%
Average Vehicle Occupancy	1.00	1.87	1.09	2.50	1.38	1.06	1.00	1.17	1.14	1.00	1.00
Vehicle-based Trips (on-street estimate)											
Daily Vehicle Trips	6	8	35	0	7	45	0	1	49	0	21
Site Peak Hour Vehicle Trips											
- AM Peak	2	1	2	0	0	14	0	0	8	0	2
- PM Peak	1	2	6	0	2	9	0	0	9	0	7
Network Peak Hour Vehicle Trips											
- AM Peak	0	1	2	0	0	1	0	0	5	0	0
- PM Peak	1	1	1	0	1	2	0	0	6	0	0
Vehicle-based Trips (on-site + on-street estimate)											
Daily Vehicle Trips	8	23	91	4	20	76	52	19	63	8	35
Site Peak Hour Vehicle Trips											
- AM Peak	4	5	9	0	1	16	6	4	10	4	4
- PM Peak	1	6	17	2	4	12	7	4	10	3	9
Network Peak Hour Vehicle Trips											
- AM Peak	0	2	9	0	0	3	2	1	7	0	1
- PM Peak	1	2	3	0	2	2	7	4	8	1	1

*NOTES: * Peak parking accumulation exceeds 100% for BH01 and BH08, which is caused by car parking on the access driveway for a period of time. However, the number of cars parked exceeded the parking capacity by only one car.*
*** Peak parking accumulation is zero due to the inability to access the car parking premises to count the vehicle occupancy at the start of the survey. Peak parking accumulation for these sites is therefore not reliable and has been excluded from the analyses.*

Table 3.2: Trip Rates per Boarding Room

Trips per Boarding Room	Sydney Metropolitan Area								Regional Area		
	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11
Address	88 Joseph Street, Lidcombe	80 Parramatta Road, Camperdown	2506 Bundaleer Street, Belrose	42 Chapel Street, St Marys	1274 Botany Road, Botany	111 Woodville Road, Granville	391-393 Kingsway, Caringbah	20 Moore Street, Campbelltown	6 Gwynne Street, Gwynneville	4 Landy Drive, Mount Warrigal	748 Pacific Highway, Marks Point
No. of Rooms	10	57	35	16	14	23	65	17	23	8	8
Person-based Trips											
Daily Person Trips	3.10	2.89	2.94	1.19	3.79	4.04	2.54	2.35	2.96	3.00	4.38
Average Person Trips per Hour	0.20	0.23	0.23	0.06	0.29	0.30	0.20	0.18	0.22	0.25	0.38
Site Peak Hour Person Trips											
- AM Peak	1.00	0.42	0.26	0.13	0.21	0.91	0.23	0.29	0.48	1.25	0.50
- PM Peak	0.50	0.37	0.51	0.63	0.86	0.70	0.35	0.41	0.43	0.38	1.13
Network Peak Hour Person Trips											
- AM Peak	0.00	0.28	0.26	0.06	0.07	0.13	0.12	0.06	0.30	0.00	0.13
- PM Peak	0.40	0.32	0.09	0.00	0.43	0.09	0.20	0.41	0.35	0.13	0.13
Vehicle-based Trips (on-site only)											
Daily Vehicle Trips	0.20	0.26	1.60	0.25	0.93	1.35	0.80	1.06	0.61	1.00	1.75
Site Peak Hour Vehicle Trips											
- AM Peak	0.20	0.07	0.20	0.00	0.07	0.09	0.09	0.24	0.09	0.50	0.25
- PM Peak	0.00	0.07	0.31	0.13	0.14	0.13	0.11	0.24	0.04	0.38	0.25
Network Peak Hour Vehicle Trips											
- AM Peak	0.00	0.02	0.20	0.00	0.00	0.09	0.03	0.06	0.09	0.00	0.13
- PM Peak	0.00	0.02	0.06	0.00	0.07	0.00	0.11	0.24	0.04	0.13	0.13
Vehicle-based Trips (on-street estimate)											
Daily Vehicle Trips	0.60	0.14	1.00	0.00	0.50	1.96	0.00	0.06	2.13	0.00	2.63
Site Peak Hour Vehicle Trips											
- AM Peak	0.20	0.02	0.06	0.00	0.00	0.61	0.00	0.00	0.35	0.00	0.25
- PM Peak	0.10	0.04	0.17	0.00	0.14	0.39	0.00	0.00	0.39	0.00	0.88
Network Peak Hour Vehicle Trips											
- AM Peak	0.00	0.02	0.06	0.00	0.00	0.04	0.00	0.00	0.22	0.00	0.00
- PM Peak	0.10	0.02	0.03	0.00	0.07	0.09	0.00	0.00	0.26	0.00	0.00
Vehicle-based Trips (on-site + on-street estimate)											
Daily Vehicle Trips	0.80	0.40	2.60	0.25	1.43	3.30	0.80	1.12	2.74	1.00	4.38
Site Peak Hour Vehicle Trips											
- AM Peak	0.40	0.09	0.26	0.00	0.07	0.70	0.09	0.24	0.43	0.50	0.50
- PM Peak	0.10	0.11	0.49	0.13	0.29	0.52	0.11	0.24	0.43	0.38	1.13
Network Peak Hour Vehicle Trips											
- AM Peak	0.00	0.04	0.26	0.00	0.00	0.13	0.03	0.06	0.30	0.00	0.13
- PM Peak	0.10	0.04	0.09	0.00	0.14	0.09	0.11	0.24	0.35	0.13	0.13

Table 3.3: Summary of Trip Rates per Boarding Room

Trips per Boarding Room	Sydney Metropolitan Area BH01 to BH08			Regional Area BH09 to BH11			All Surveyed Sites BH01 to BH11		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Person-based Trips									
Daily Person Trips	1.19	4.04	2.86	2.96	4.38	3.44	1.19	4.38	3.02
Average Person Trips per Hour	0.06	0.30	0.21	0.22	0.38	0.28	0.06	0.38	0.23
Site Peak Hour Person Trips									
- AM Peak	0.13	1.00	0.43	0.48	1.25	0.74	0.13	1.25	0.52
- PM Peak	0.35	0.86	0.54	0.38	1.13	0.64	0.35	1.13	0.57
Network Peak Hour Person Trips									
- AM Peak	0.00	0.28	0.12	0.00	0.30	0.14	0.00	0.30	0.13
- PM Peak	0.00	0.43	0.24	0.13	0.35	0.20	0.00	0.43	0.23
Vehicle-based Trips (on-site only)									
Daily Vehicle Trips	0.20	1.60	0.81	0.61	1.75	1.12	0.20	1.75	0.89
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	0.24	0.12	0.09	0.50	0.28	0.00	0.50	0.16
- PM Peak	0.00	0.31	0.14	0.04	0.38	0.22	0.00	0.38	0.16
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.20	0.05	0.00	0.13	0.07	0.00	0.20	0.06
- PM Peak	0.00	0.24	0.06	0.04	0.13	0.10	0.00	0.24	0.07
Vehicle-based Trips (on-street estimate)									
Daily Vehicle Trips	0.00	1.96	0.53	0.00	2.63	1.59	0.00	2.63	0.82
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	0.61	0.11	0.00	0.35	0.20	0.00	0.61	0.13
- PM Peak	0.00	0.39	0.11	0.00	0.88	0.42	0.00	0.88	0.19
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.06	0.01	0.00	0.22	0.07	0.00	0.22	0.03
- PM Peak	0.00	0.10	0.04	0.00	0.26	0.09	0.00	0.26	0.05
Vehicle-based Trips (on-site + on-street estimate)									
Daily Vehicle Trips	0.25	3.30	1.34	1.00	4.38	2.70	0.25	4.38	1.71
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	0.70	0.23	0.43	0.50	0.48	0.00	0.70	0.30
- PM Peak	0.10	0.52	0.25	0.38	1.13	0.64	0.10	1.13	0.35
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.26	0.06	0.00	0.30	0.14	0.00	0.30	0.09
- PM Peak	0.00	0.24	0.10	0.13	0.35	0.20	0.00	0.35	0.13

Table 3.4: Trip Rates per 100m² GFA

Trips per 100m² GFA	Sydney Metropolitan Area								Regional Area		
	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11
Address	88 Joseph Street, Lidcombe	80 Parramatta Road, Camperdown	2506 Bundaleer Street, Belrose	42 Chapel Street, St Marys	1274 Botany Road, Botany	111 Woodville Road, Granville	391-393 Kingsway, Caringbah	20 Moore Street, Campbelltown	6 Gwynne Street, Gwynneville	4 Landy Drive, Mount Warrigal	748 Pacific Highway, Marks Point
GFA (m²)	-	2006	2000	634	-	-	1065	528	491	276	-
Person-based Trips											
Daily Person Trips	-	8.23	5.15	3.00	-	-	15.49	7.58	13.85	8.70	-
Average Person Trips per Hour	-	0.65	0.40	0.16	-	-	1.22	0.57	1.02	0.72	-
Site Peak Hour Person Trips											
- AM Peak	-	1.20	0.45	0.32	-	-	1.41	0.95	2.24	3.62	-
- PM Peak	-	1.05	0.90	1.58	-	-	2.16	1.33	2.04	1.09	-
Network Peak Hour Person Trips											
- AM Peak	-	0.80	0.45	0.16	-	-	0.75	0.19	1.43	0.00	-
- PM Peak	-	0.90	0.15	0.00	-	-	1.22	1.33	1.63	0.36	-
Vehicle-based Trips (on-site only)											
Daily Vehicle Trips	-	0.75	2.80	0.63	-	-	4.88	3.41	2.85	2.90	-
Site Peak Hour Vehicle Trips											
- AM Peak	-	0.20	0.35	0.00	-	-	0.56	0.76	0.41	1.45	-
- PM Peak	-	0.20	0.55	0.32	-	-	0.66	0.76	0.20	1.09	-
Network Peak Hour Vehicle Trips											
- AM Peak	-	0.05	0.35	0.00	-	-	0.19	0.19	0.41	0.00	-
- PM Peak	-	0.05	0.10	0.00	-	-	0.66	0.76	0.20	0.36	-
Vehicle-based Trips (on-street estimate)											
Daily Vehicle Trips	-	0.40	1.75	0.00	-	-	0.00	0.19	9.98	0.00	-
Site Peak Hour Vehicle Trips											
- AM Peak	-	0.05	0.10	0.00	-	-	0.00	0.00	1.63	0.00	-
- PM Peak	-	0.10	0.30	0.00	-	-	0.00	0.00	1.83	0.00	-
Network Peak Hour Vehicle Trips											
- AM Peak	-	0.05	0.10	0.00	-	-	0.00	0.00	1.02	0.00	-
- PM Peak	-	0.05	0.05	0.00	-	-	0.00	0.00	1.22	0.00	-
Vehicle-based Trips (on-site + on-street estimate)											
Daily Vehicle Trips	-	1.15	4.55	0.63	-	-	4.88	3.60	12.83	2.90	-
Site Peak Hour Vehicle Trips											
- AM Peak	-	0.25	0.45	0.00	-	-	0.56	0.76	2.04	1.45	-
- PM Peak	-	0.30	0.85	0.32	-	-	0.66	0.76	2.04	1.09	-
Network Peak Hour Vehicle Trips											
- AM Peak	-	0.10	0.45	0.00	-	-	0.19	0.19	1.43	0.00	-
- PM Peak	-	0.10	0.15	0.00	-	-	0.66	0.76	1.63	0.36	-

Table 3.5: Summary of Trip Rates per 100m² GFA

Trips per 100m² GFA	Sydney Metropolitan Area BH01 to BH08			Regional Area BH09 to BH11			All Surveyed Sites BH01 to BH11		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Person-based Trips									
Daily Person Trips	3.00	15.49	7.89	8.70	13.85	11.27	3.00	15.49	8.86
Average Person Trips per Hour	0.16	1.22	0.60	0.72	1.02	0.87	0.16	1.22	0.68
Site Peak Hour Person Trips									
- AM Peak	0.32	1.41	0.86	2.24	3.62	2.93	0.32	3.62	1.45
- PM Peak	0.90	2.16	1.40	1.09	2.04	1.56	0.90	2.16	1.45
Network Peak Hour Person Trips									
- AM Peak	0.16	0.80	0.47	0.00	1.43	0.71	0.00	1.43	0.54
- PM Peak	0.00	1.33	0.72	0.36	1.63	1.00	0.00	1.63	0.80
Vehicle-based Trips (on-site only)									
Daily Vehicle Trips	0.63	4.88	2.49	2.85	2.90	2.87	0.63	4.88	2.60
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	0.76	0.37	0.41	1.45	0.93	0.00	1.45	0.53
- PM Peak	0.20	0.76	0.50	0.20	1.09	0.65	0.20	1.09	0.54
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.35	0.16	0.00	0.41	0.20	0.00	0.41	0.17
- PM Peak	0.00	0.76	0.31	0.20	0.36	0.28	0.00	0.76	0.30
Vehicle-based Trips (on-street estimate)									
Daily Vehicle Trips	0.00	1.75	0.47	0.00	9.98	4.99	0.00	9.98	1.76
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	0.10	0.03	0.00	1.63	0.81	0.00	1.63	0.25
- PM Peak	0.00	0.30	0.08	0.00	1.83	0.92	0.00	1.83	0.32
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.10	0.03	0.00	1.02	0.51	0.00	1.02	0.17
- PM Peak	0.00	0.05	0.02	0.00	1.22	0.61	0.00	1.22	0.19
Vehicle-based Trips (on-site + on-street estimate)									
Daily Vehicle Trips	0.63	4.88	2.96	2.90	12.83	7.86	0.63	12.83	4.36
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	0.76	0.40	1.45	2.04	1.74	0.00	2.04	0.79
- PM Peak	0.30	0.85	0.58	1.09	2.04	1.56	0.30	2.04	0.86
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.45	0.19	0.00	1.43	0.71	0.00	1.43	0.34
- PM Peak	0.00	0.76	0.33	0.36	1.63	1.00	0.00	1.63	0.52

Table 3.6: Vehicle Trip Rates per On-Site Car Parking Space

Trips per On-site Car Parking Space	Sydney Metropolitan Area								Regional Area		
	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11
Address	88 Joseph Street, Lidcombe	80 Parramatta Road, Camperdown	2506 Bundaleer Street, Belrose	42 Chapel Street, St Marys	1274 Botany Road, Botany	111 Woodville Road, Granville	391-393 Kingsway, Caringbah	20 Moore Street, Campbelltown	6 Gwynne Street, Gwynneville	4 Landy Drive, Mount Warrigal	748 Pacific Highway, Marks Point
No. of On-site Car Parking Space	2	9	27	3	7	12	33	4	6	4	8
Person-based Trips											
Daily Person Trips	15.50	18.33	3.81	6.33	7.57	7.75	5.00	10.00	11.33	6.00	4.38
Average Person Trips per Hour	1.00	1.44	0.30	0.33	0.57	0.58	0.39	0.75	0.83	0.50	0.38
Site Peak Hour Person Trips											
- AM Peak	5.00	2.67	0.33	0.67	0.43	1.75	0.45	1.25	1.83	2.50	0.50
- PM Peak	2.50	2.33	0.67	3.33	1.71	1.33	0.70	1.75	1.67	0.75	1.13
Network Peak Hour Person Trips											
- AM Peak	0.00	1.78	0.33	0.33	0.14	0.25	0.24	0.25	1.17	0.00	0.13
- PM Peak	2.00	2.00	0.11	0.00	0.86	0.17	0.39	1.75	1.33	0.25	0.13
Vehicle-based Trips (on-site only)											
Daily Vehicle Trips	1.00	1.67	2.07	1.33	1.86	2.58	1.58	4.50	2.33	2.00	1.75
Site Peak Hour Vehicle Trips											
- AM Peak	1.00	0.44	0.26	0.00	0.14	0.17	0.18	1.00	0.33	1.00	0.25
- PM Peak	0.00	0.44	0.41	0.67	0.29	0.25	0.21	1.00	0.17	0.75	0.25
Network Peak Hour Vehicle Trips											
- AM Peak	0.00	0.11	0.26	0.00	0.00	0.17	0.06	0.25	0.33	0.00	0.13
- PM Peak	0.00	0.11	0.07	0.00	0.14	0.00	0.21	1.00	0.17	0.25	0.13
Vehicle-based Trips (on-street estimate)											
Daily Vehicle Trips	3.00	0.89	1.30	0.00	1.00	3.75	0.00	0.25	8.17	0.00	2.63
Site Peak Hour Vehicle Trips											
- AM Peak	1.00	0.11	0.07	0.00	0.00	1.17	0.00	0.00	1.33	0.00	0.25
- PM Peak	0.50	0.22	0.22	0.00	0.29	0.75	0.00	0.00	1.50	0.00	0.88
Network Peak Hour Vehicle Trips											
- AM Peak	0.00	0.11	0.07	0.00	0.00	0.08	0.00	0.00	0.83	0.00	0.00
- PM Peak	0.50	0.11	0.04	0.00	0.14	0.17	0.00	0.00	1.00	0.00	0.00
Vehicle-based Trips (on-site + on-street estimate)											
Daily Vehicle Trips	4.00	2.56	3.37	1.33	2.86	6.33	1.58	4.75	10.50	2.00	4.38
Site Peak Hour Vehicle Trips											
- AM Peak	2.00	0.56	0.33	0.00	0.14	1.33	0.18	1.00	1.67	1.00	0.50
- PM Peak	0.50	0.67	0.63	0.67	0.57	1.00	0.21	1.00	1.67	0.75	1.13
Network Peak Hour Vehicle Trips											
- AM Peak	0.00	0.22	0.33	0.00	0.00	0.25	0.06	0.25	1.17	0.00	0.13
- PM Peak	0.50	0.22	0.11	0.00	0.29	0.17	0.21	1.00	1.33	0.25	0.13

Table 3.7: Summary of Trip Rates per On-Site Car Parking Space

Trips per On-site Car Parking Space	Sydney Metropolitan Area BH01 to BH08			Regional Area BH09 to BH11			All Surveyed Sites BH01 to BH11		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Person-based Trips									
Daily Person Trips	3.81	18.33	9.29	4.38	11.33	7.24	3.81	18.33	8.73
Average Person Trips per Hour	0.30	1.44	0.67	0.38	0.83	0.57	0.30	1.44	0.64
Site Peak Hour Person Trips									
- AM Peak	0.33	5.00	1.57	0.50	2.50	1.61	0.33	5.00	1.58
- PM Peak	0.67	3.33	1.79	0.75	1.67	1.18	0.67	3.33	1.62
Network Peak Hour Person Trips									
- AM Peak	0.00	1.78	0.42	0.00	1.17	0.43	0.00	1.78	0.42
- PM Peak	0.00	2.00	0.91	0.13	1.33	0.57	0.00	2.00	0.82
Vehicle-based Trips (on-site only)									
Daily Vehicle Trips	1.00	4.50	2.07	1.75	2.33	2.03	1.00	4.50	2.06
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	1.00	0.40	0.25	1.00	0.53	0.00	1.00	0.43
- PM Peak	0.00	1.00	0.41	0.17	0.75	0.39	0.00	1.00	0.40
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.26	0.11	0.00	0.33	0.15	0.00	0.33	0.12
- PM Peak	0.00	1.00	0.19	0.13	0.25	0.18	0.00	1.00	0.19
Vehicle-based Trips (on-street estimate)									
Daily Vehicle Trips	0.00	3.75	1.27	0.00	8.17	3.60	0.00	8.17	1.91
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	1.17	0.29	0.00	1.33	0.53	0.00	1.33	0.36
- PM Peak	0.00	0.75	0.25	0.00	1.50	0.79	0.00	1.50	0.40
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.11	0.03	0.00	0.83	0.28	0.00	0.83	0.10
- PM Peak	0.00	0.50	0.12	0.00	1.00	0.33	0.00	1.00	0.18
Vehicle-based Trips (on-site + on-street estimate)									
Daily Vehicle Trips	1.33	6.33	3.35	2.00	10.50	5.63	1.33	10.50	3.97
Site Peak Hour Vehicle Trips									
- AM Peak	0.00	2.00	0.69	0.50	1.67	1.06	0.00	2.00	0.79
- PM Peak	0.21	1.00	0.66	0.75	1.67	1.18	0.21	1.67	0.80
Network Peak Hour Vehicle Trips									
- AM Peak	0.00	0.33	0.14	0.00	1.17	0.43	0.00	1.17	0.22
- PM Peak	0.00	1.00	0.31	0.13	1.33	0.57	0.00	1.33	0.38

3.4   Vehicle Trip Directional Split

The surveyed vehicle directional splits across all boarding houses for the AM peak and PM peak are presented in Figure 3.1 and Figure 3.2 respectively. For accuracy of the analysis, only vehicle trips recorded from the driveway counts are analysed.

For the majority of the sites, there were more outbound trips than inbound trips during the AM peak hour, whereas more inbound trips were observed in the PM peak. It is noted that BH04 during the AM hours and BH01 during the PM hours did not generate any vehicle trips, therefore, directional split is not able to be established.

Figure 3.1: AM Site Peak Hour Directional Split of Vehicle Trips
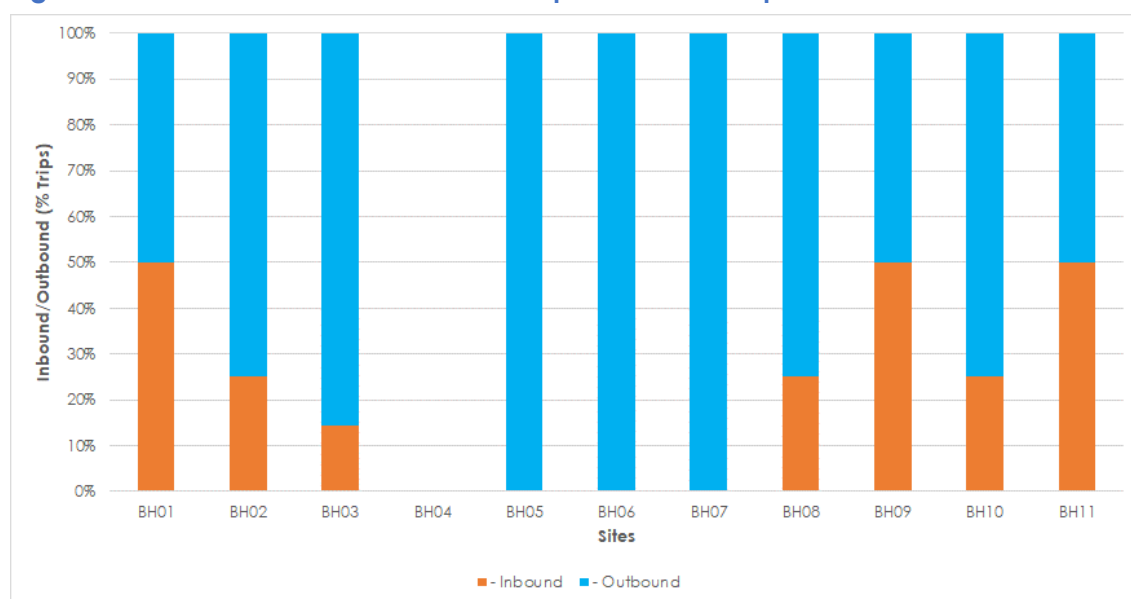
Figure 3.2: PM Site Peak Hour Directional Split of Vehicle Trips
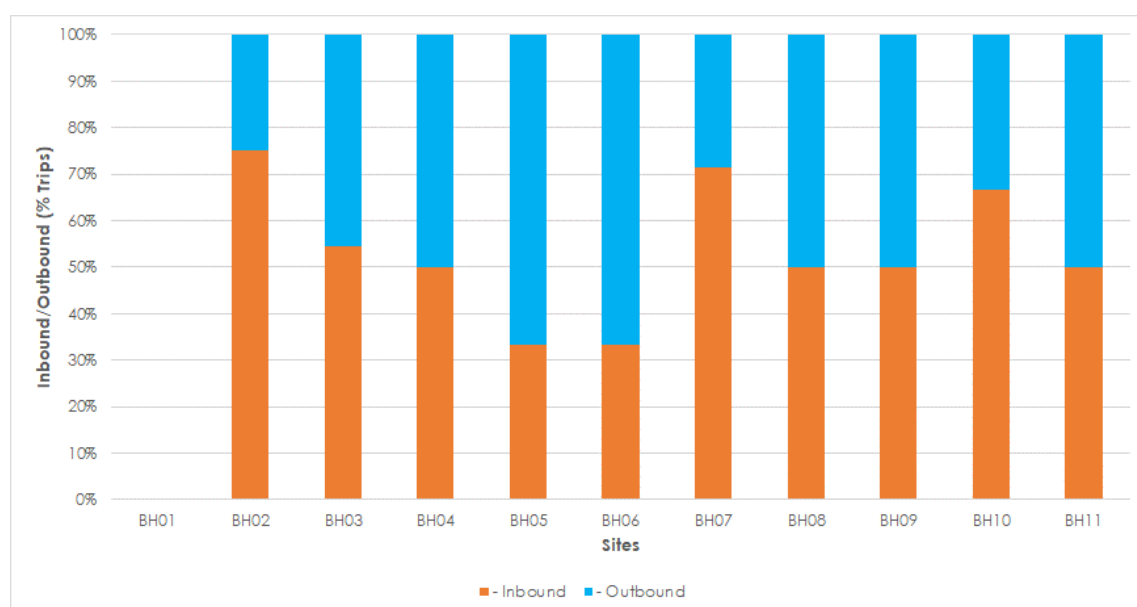
3.5   Daily Traffic Variation

The variations in daily traffic across the five days (Monday to Friday) for the three 5-day survey sites are shown in Figure 3.3, Figure 3.4 and Figure 3.5, in terms of daily person trips and daily vehicle trips for both on-site and on-street estimate.

It is noted that BH01 traffic survey on Monday was only carried out for half a day as the traffic camera was compromised in the AM, therefore BH01 Monday traffic survey results have been excluded from this analysis.

Figure 3.3: Daily Trip Generation by Day of the Week – BH01
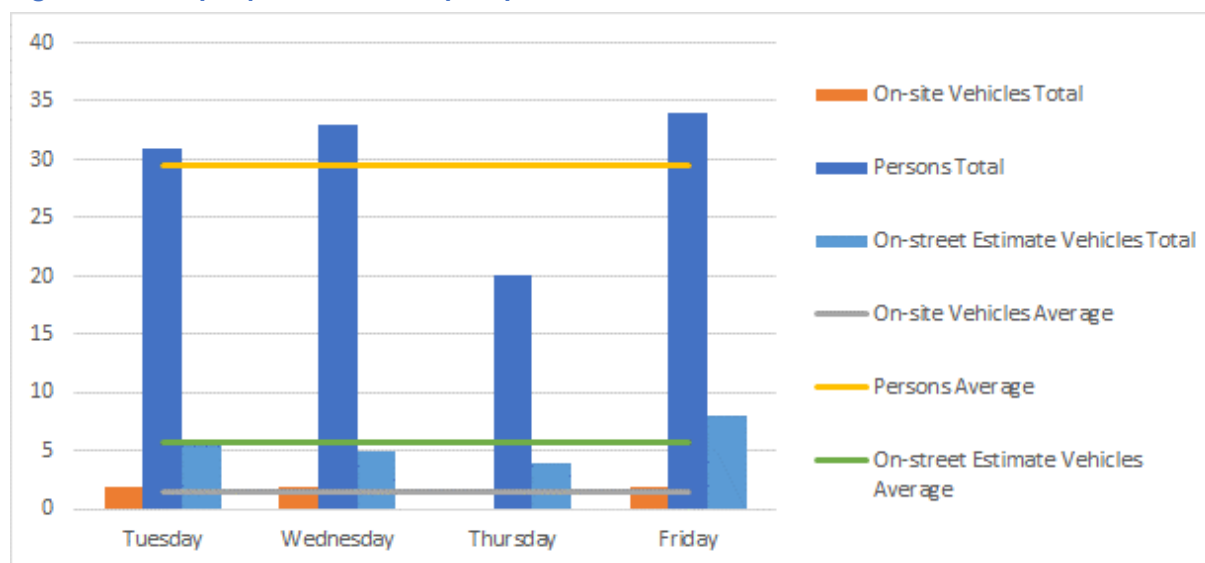
Figure 3.4: Daily Trip Generation by Day of the Week – BH03
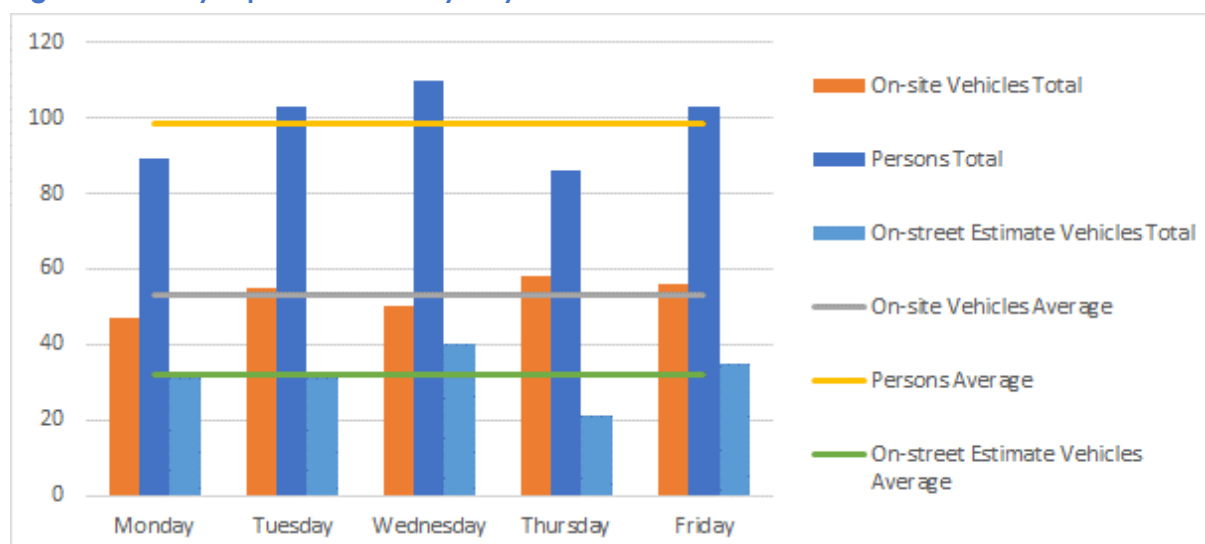
Figure 3.5: Daily Trip Generation by Day of the Week – BH09
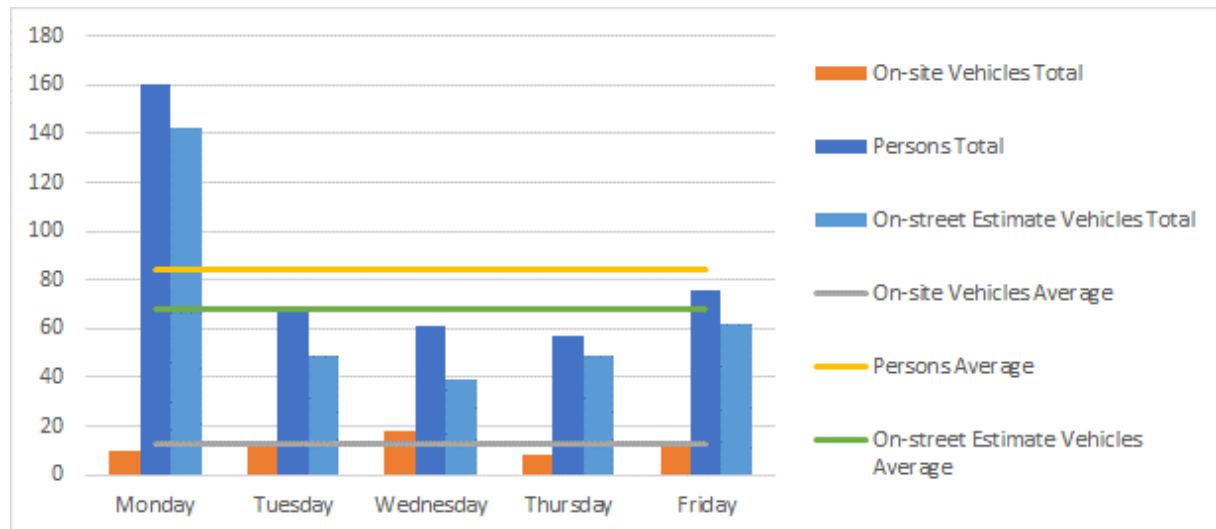
The peak weekday for person trip generation, varied significantly across the three sites, with BH01 seeing the highest daily number of person-trips on Friday, BH03 on Wednesday, and BH01 on Monday.

Daily vehicle trips for people parking on-site were quite consistent across the five days for BH03 and BH09. BH01 was not as consistent with no vehicle trips entering or exiting to/from the site on Thursday. It is also noted that BH01 only provides 2 on-site car parking spaces, hence there would be times when there is no vehicle trip generation for on-site vehicles.

3.6   Sample Interview Survey Results

Surveyors were assigned on-site to conduct interview surveys to obtain the travel patterns of residents and visitors. The purpose of the site interview surveys was to establish the following travel behaviours:

- purpose of travel (i.e. resident, visitor, others);

- mode of travel;

- car ownership; and

- parking location (i.e. on-site or on-street).

The number of interview surveys conducted at each site is summarised in Table 3.8.

Table 3.8: Number of Interview Samples per Site

Site ID	Address	Number of Interview Samples					
		Monday	Tuesday	Wednesday	Thursday	Friday	Total
BH01	88 Joseph Street, Lidcombe	22	12	16	25	12	**87**
BH02	80 Parramatta Road, Camperdown	-	-	52	-	-	**52**
BH03	2506 Bundaleer Street, Belrose	24	27	46	19	11	**127**
BH04	42 Chapel Street, St Marys	-	-	8	-	-	**8**
BH05	1274 Botany Road, Botany	-	-	10	-	-	**10**
BH06	111 Woodville Road, Granville	-	34	-	-	-	**34**
BH07	391-393 Kingsway, Caringbah	-	-	-	39	-	**39**
BH08	20 Moore Street, Campbelltown	-	-	-	14	-	**14**
BH09	6 Gwynne Street, Gwynneville	51	24	23	25	20	**143**
BH10	4 Landy Drive, Mount Warrigal	-	10	-	-	-	**10**
BH11	748 Pacific Highway, Marks Point	-	8	-	-	-	**8**
Total		**97**	**115**	**155**	**122**	**43**	**532**

The following sections summarise the results obtained from the interview surveys. The results are presented for the total data collected throughout the survey period.

The number of interview responses has been compared to the number of pedestrians entering/exiting each site during the survey periods to see the response rate and the numbers of pedestrians being interviewed. It is noted that some pedestrians were stopped for an interview, but they refused to provide any responses or were not able to communicate. These interviews have been filtered out, to determine to the best accuracy, the response rate from all pedestrians. The interview response rate for each site is summarised in Table 3.9.

Table 3.9: Response Rate for Interview Surveys

Site ID		Address	Number of Interview Responses	Number of Pedestrians	Interview Response Rate
Metropolitan	BH01 (4-day)*	88 Joseph Street, Lidcombe	65	112	58%
	BH02	80 Parramatta Road, Camperdown	52	150	35%
	BH03 (5-day)	2506 Bundaleer Street, Belrose	127	210	60%
	BH04	42 Chapel Street, St Marys	8	9	89%
	BH05	1274 Botany Road, Botany	10	35	29%
	BH06	111 Woodville Road, Granville	34	60	57%
	BH07	391-393 Kingsway, Caringbah	39	110	35%
	BH08	20 Moore Street, Campbelltown	14	19	74%
Regional	BH09 (5-day)	6 Gwynne Street, Gwynneville	143	344	42%
	BH10	4 Landy Drive, Mount Warrigal	10	16	63%
	BH11	748 Pacific Highway, Marks Point	8	21	38%

*NOTE: * BH01 data is only analysed for 4 days period even though it is a 5-day survey site. This is due to the traffic survey cameras being compromised during Monday morning. For the accuracy of the analysis and alignment with the pedestrian/on-site vehicle counts, only 4 days of interview responses are analysed.*

Averaged across all sites, the interview response rate is about 53%, with an average of 55% for Metropolitan Sydney and 47% for Regional NSW. This interview response rate is considered moderate however, it can be worked with as a sample size. Not all pedestrians were able to be stopped for an interview due to the occasional simultaneous arrival/departures of pedestrians and the limited number of traffic surveyors on site. In addition, not all pedestrians, who were stopped for an interview, agreed to participate and provide valid responses to the interview questions.

3.6.1   Purpose of Travel

Interviewees were asked for their purpose of travel into or out of the site i.e. resident who lived on-site, a visitor to the site, undertaking a delivery or other. The results of the response are presented in Figure 3.6.

Figure 3.6: Interview Survey – Purpose of Travel
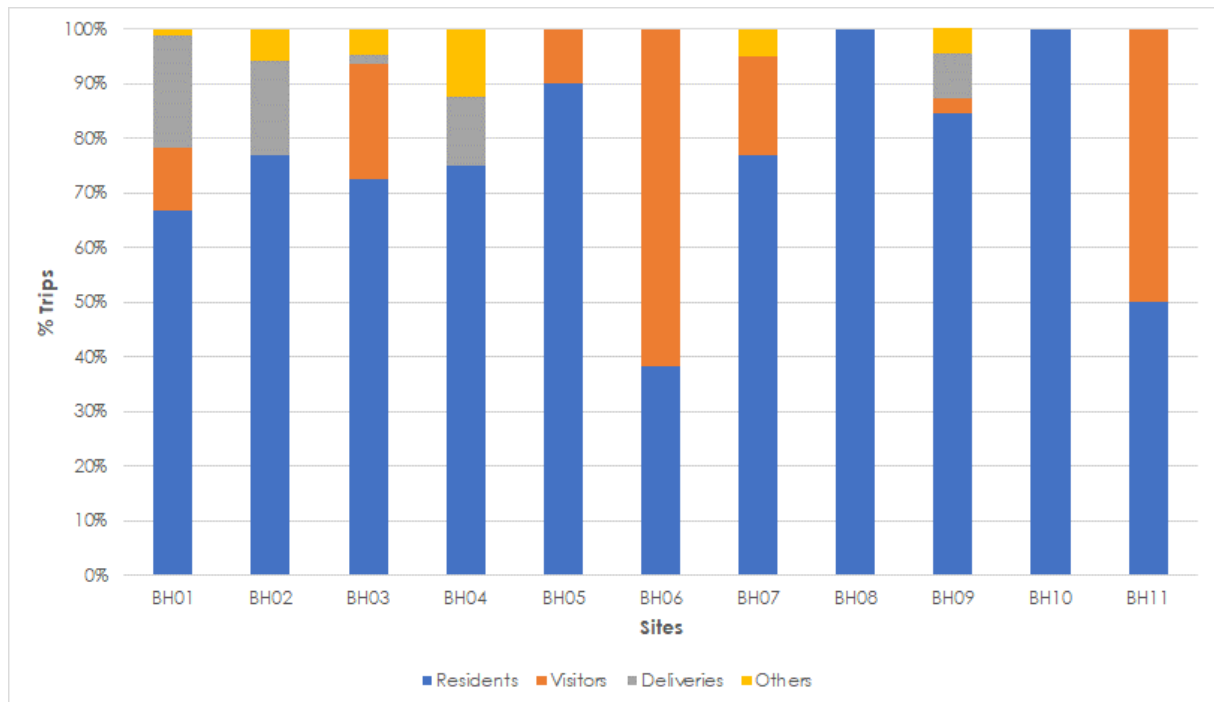
The majority of respondents (i.e. 67% - 100%) were residents and up to 21% of the respondents were either visiting a resident of the site, making a delivery (food or post) or other related reasons (such as house inspections, building maintenance work etc.)

Respondents of BH06 site were primarily visitors (i.e. 62%) with 38% being residents.
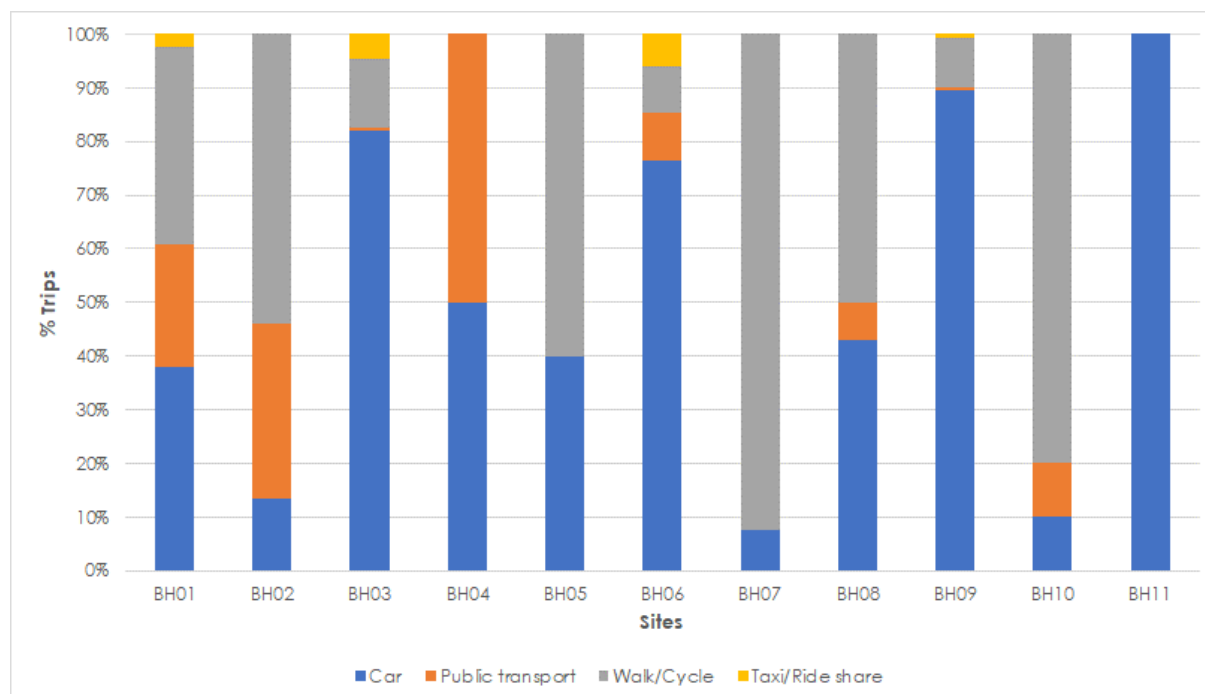
Respondents of BH11 site were an even split between residents and visitors.

Averaged across all sites, the purpose of travel can be summarised as:

- Resident – 73%

- Visitor – 16%

- Delivery – 5%

- Others – 4%

3.6.2 Mode of Travel

Figure 3.7: Interview Survey – Mode of Travel

Overall, the majority of respondents choose to either walk/cycle or drive via private vehicle to/from most sites. Walking and cycling are the main modes of travel for respondents at BH02 (54%), BH05 (60%), BH07 (92%), BH08 (50%) and BH10 (80%).

The majority of respondents at BH01 (38%), BH03 (82%), BH06 (76%), BH09 (90%) and BH11 (100%) drove a private car as the primary mode of travel.

Respondents utilising public transport services varied between 10% and 33% across most sites.

Taxi and ride share services were the least used form of travel with up to 6% of respondents travelling to/from the site.

Averaged across all sites. The mode of travel can be summarised as:

- Car – 50%

- Public transport – 12%

- Walk/Cycle – 37%

- Taxi/Ride Share – 1%

3.6.3   Car Ownership

Figure 3.8: Interview Survey – Car Ownership (Residents Only)
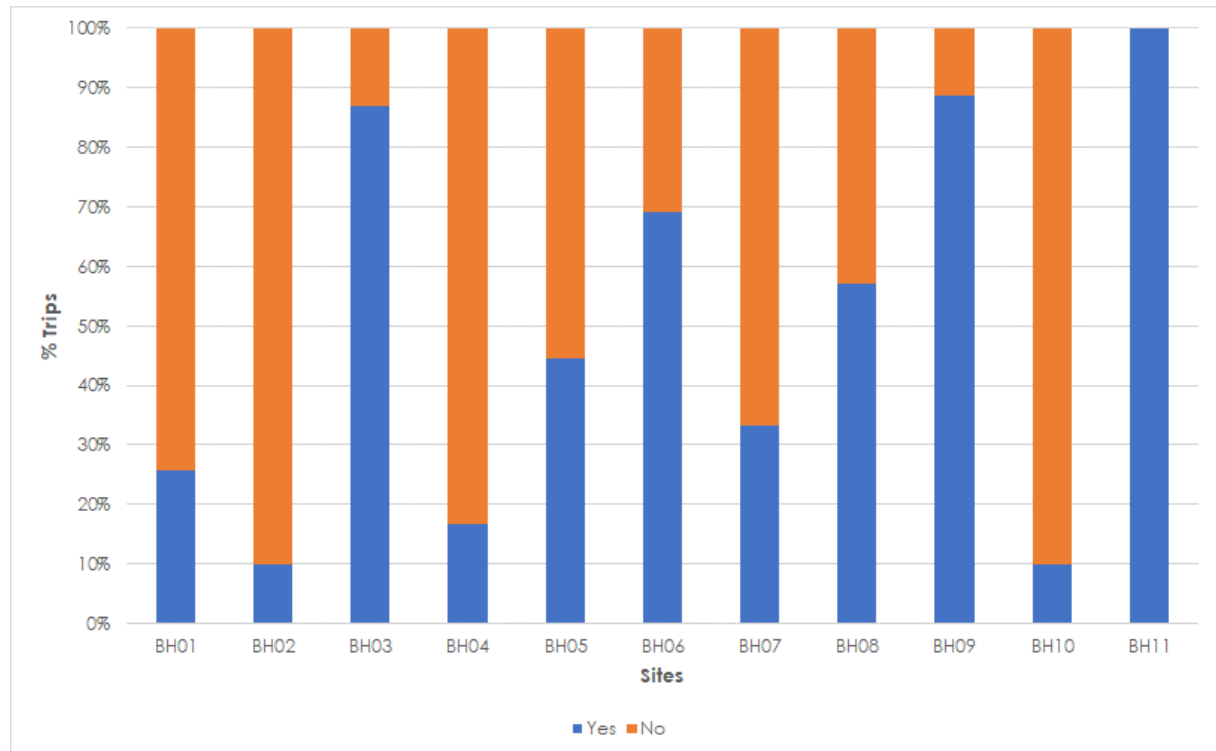
Figure 3.8 shows that the car ownership of residents differs across all sites.

The majority of residents across the BH01 (74%), BH02 (90%), BH04 (83%), BH05 (56%), BH07 (67%) and BH10 (90%) sites do not own a private car while the other residents either own a private car or did not respond.
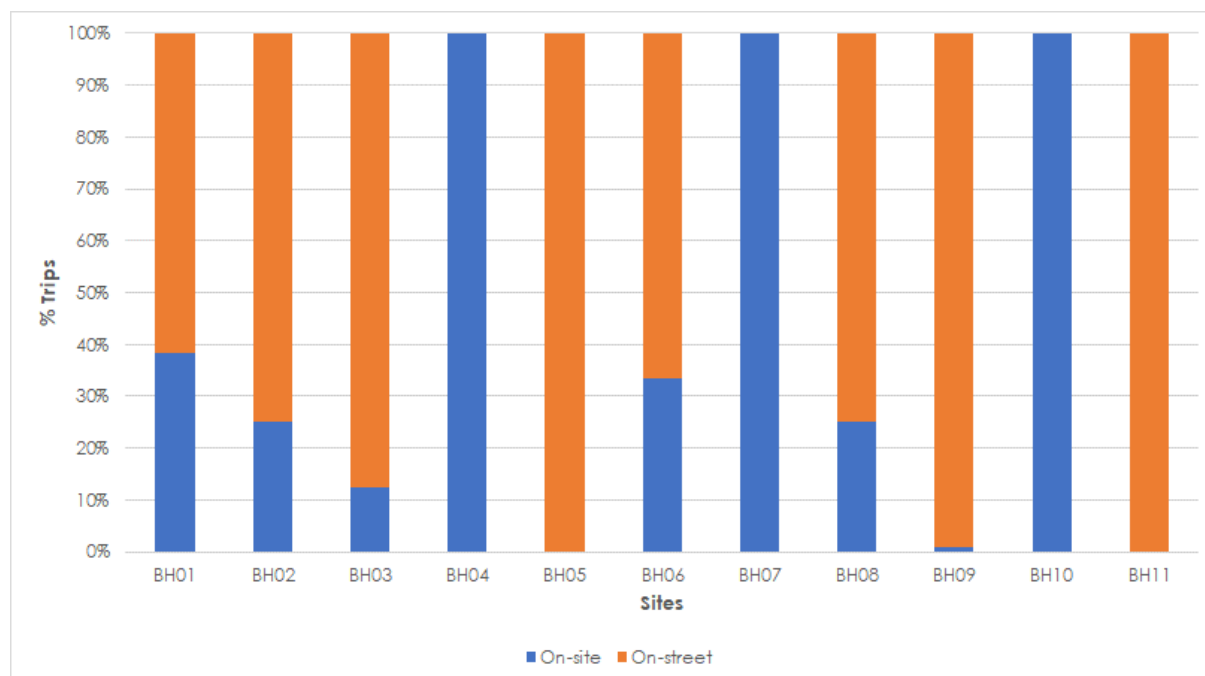
In contrast, the majority of residents across BH03 (87%), BH06 (69%), BH08 (57%) and BH09 (89%) own a private car.

All residents of BH11 responded that they do own a private car.

Averaged across all sites, 51% of residents owned a car.

3.6.4 Parking Location

**Figure 3.9: Interview Survey – Parking Location (Residents Only)**

Overall, the majority of the residents (i.e. 67% - 100%) across all sites, excluding BH04 and BH07 and BH10, parked their private vehicles on a nearby street while up to 38% of residents parked within the site.

Residents of BH04 and BH07 and BH10 parked their private vehicles within the site. It is noted that the majority of these residents do not own a car.

Average across all sites, the location of the residents' parked cars was 40% on-site and 60% on-street.

Figure 3.10: Interview Survey – Parking Location (Visitors/Others, Excluding Residents)
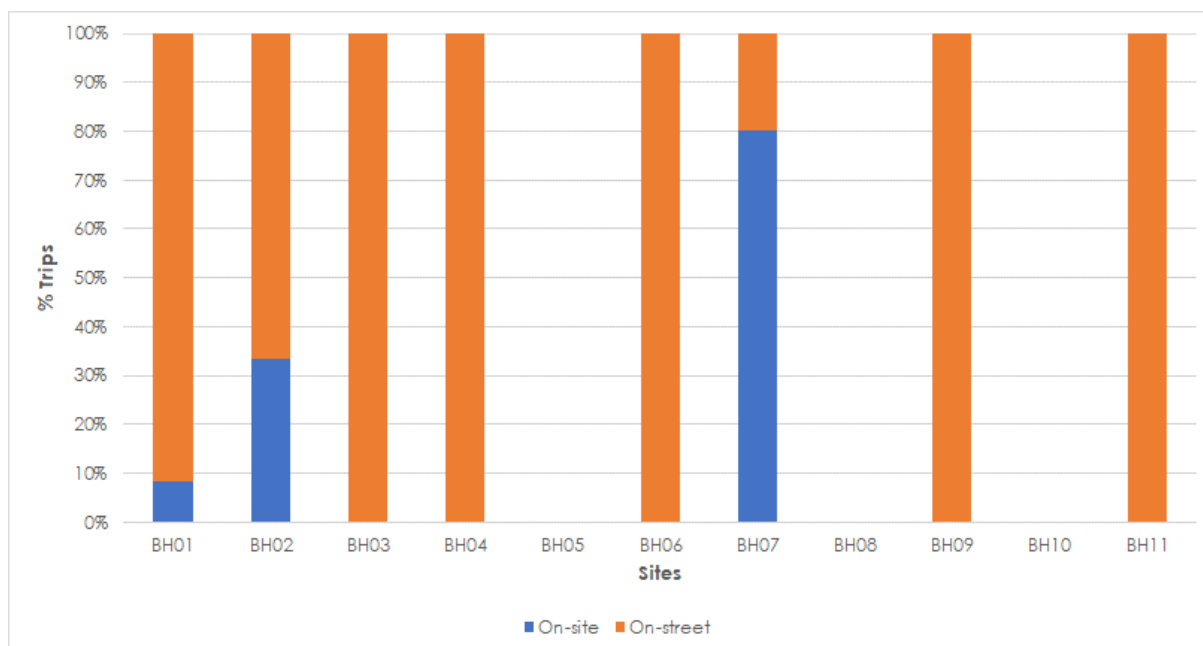
The majority of visitors (i.e. 60% - 100%) parked on a local street near the site. Some visitors of BH01 (i.e. 8%) and BH02 (i.e. 33%) parked within the site.

The majority of visitors (i.e. 80%) of BH07 parked within the site since on-street parking along the frontage of the site is restricted by No Parking restrictions.

The interview respondents at BH05 and BH08 were all residents, so no data was collected for visitor parking locations at these sites.

Average across all sites, the location of the non-residents' parked cars was 14% on-site and 86% on-street.

3.6.5   On-street Parking Estimation

Analysis in Section 3.6.4 shows that the average percentage of on-street parking is generally higher than that of on-site parking, with an average of 66% and 81% being on-street-parking for residents and visitors/others respectively. This indicates the high demand for on-street parking and shows that the driveway count of vehicle trips may not provide a true representation of vehicle trips generated from the site.

An estimation approach has been undertaken to estimate the number of on-street parking for each site during the survey periods using the following methodology:

- Calculate the interview response rate for each site.
- Filter through the interview surveys and count the number of people who drove to/from the sites and parked on-street.

- Calculate the percentage of on-street parking against the number of interview responses.

- Estimate the number of on-street parking related vehicle trips, by applying the percentage of interview responses parking on-street to the number of total pedestrians walking in and out of the site (assuming that all on-street vehicle trips have a vehicle occupancy of 1).

The following assumptions/conditions are made to facilitate the analysis of the interview surveys.

- All delivery/services vehicles (where the parking locations are not specified) are parked on-street.

- Interviews with no responses and incomplete interviews with insufficient information are excluded from the analysis.

- People who responded as car owners but did not drive to/from the sites during the survey periods are excluded from the count of on-street vehicle trips.

The percentage of on-street parking for each site has been calculated and summarised in Table 3.10.

Table 3.10: Percentage of On-Street Parking Response

Site ID		Address	Number of Interview Responses	Number of On-street Parking Responses	Percentage of On-street Parking
Metropolitan	BH01 (4-day)*	88 Joseph Street, Lidcombe	65	23	35%
	BH02	80 Parramatta Road, Camperdown	52	8	15%
	BH03 (5-day)	2506 Bundaleer Street, Belrose	127	76	60%
	BH04	42 Chapel Street, St Marys	8	1	13%
	BH05	1274 Botany Road, Botany	10	4	40%
	BH06	111 Woodville Road, Granville	34	25	74%
	BH07	391-393 Kingsway, Caringbah	39	1	3%
	BH08	20 Moore Street, Campbelltown	14	4	29%
Regional	BH09 (5-day)	6 Gwynne Street, Gwynneville	143	127	89%
	BH10	4 Landy Drive, Mount Warrigal	10	0	0%**
	BH11	748 Pacific Highway, Marks Point	8	8	100%***

*NOTE: * BH01 data is only analysed for 4 days period even though it is a 5-day survey site. This is due to the traffic survey cameras being compromised during Monday morning. For the accuracy of the analysis and alignment with the pedestrian/on-site vehicle counts, only 4 days of interview responses are analysed.*

3.6.6   Reliability of the Sample Interview Survey Results

The sample size of interview surveys is impacted by the number of pedestrians willing to stop and answer questions. The willingness of the pedestrians was affected by the following key factors:

- Available time – some pedestrians do not have the time to stop and answer questions. This has been noticeably observed amongst those catching public transport and are rushing to reach their mode of transport by a certain time.

- Unwillingness to do multiple interviews – many residents are entering/exiting the site multiple times a day (at least twice) however, are unwilling to be interviewed multiple times a day. At the sites where five days of survey data was collected, many residents were unwilling to be interviewed multiple times.

The above is important to note in understanding that the sample interview surveys do not provide a complete accurate representation of mode share patterns and the percentage of pedestrians parking on-street parking.

Significantly, interview surveys tend to lean towards vehicle drivers and away from public transport users who have less time to participate in the interviews. This is likely to sway calculations of car mode share and on-street parking activity to be higher than in reality.

The interview survey data should be used to determine the general patterns in travel behaviours of boarding house sites, however, the reliability of calculating trip rates and mode shares using this information should be questioned. For this reason, this report provides rates with and without the estimates of on-street parking activity for deliberation by the user.

3.7   Parking Demand and Provision

The parking demand and parking supply rates have been calculated in relation to the number of rooms and the GFA.

Table 3.11 provides a summary of the parking accumulation and parking provision rates of each boarding house site.

Table 3.11: Parking Provision Summary

Rates per Parking Space	Sydney Metropolitan Area								Regional Area		
	BH01	**BH02**	**BH03**	**BH04**	**BH05**	**BH06**	**BH07**	**BH08**	**BH09**	**BH10**	**BH11**
Address	88 Joseph Street, Lidcombe	80 Parramatta Road, Camperdown	2506 Bundaleer Street, Belrose	42 Chapel Street, St Marys	1274 Botany Road, Botany	111 Woodville Road, Granville	391-393 Kingsway, Caringbah	20 Moore Street, Campbelltown	6 Gwynne Street, Gwynneville	4 Landy Drive, Mount Warrigal	748 Pacific Highway, Marks Point
No. of Car Parking Spaces On-site	2	9	27	3	7	12	33	4	6	4	8
Number of Rooms	10	57	35	16	14	23	65	17	23	8	8
GFA (m²)	-	2006	2000	634	-	-	1065	528	491	276	-
Peak Parking Accumulation	3	7	11	0	5	9	0	5	5	3	6
- % Parking Capacity	150%*	78%	41%	0%**	71%	75%	0%**	125%*	83%	75%	75%
Parking Provision Rate											
- per room	0.20	0.16	0.77	0.19	0.50	0.52	0.51	0.24	0.26	0.50	1.00
- per 100m² GFA	-	0.45	1.35	0.47	-	-	3.10	0.76	1.22	1.45	-
Peak Parking Demand Rate											
- per room	0.30	0.12	0.31	0.00	0.36	0.39	0.00	0.29	0.22	0.38	0.75
- per 100m² GFA	-	0.35	0.55	0.00	-	-	0.00	0.95	1.02	1.09	-

*NOTE: * Peak parking accumulation exceeds 100% for BH01 and BH08, which is caused by car parking on the access driveway for a period of time. However, the number of car parking exceeded the parking capacity by only one car.*

*** Peak parking accumulation is zero due to the inability to access the car parking premises to count the vehicle occupancy at the start of the survey, therefore, peak parking accumulation for these sites is not reliable and has been excluded from the analysis.*

Table 3.12: Parking Rates Summary

Rates per On-Site Parking Space	Sydney Metropolitan Area BH01 to BH08			Regional Area BH09 to BH11			All Surveyed Site BH01 to BH11		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
On-Site Parking Provision Rate									
- per room	0.16	0.77	0.39	0.26	1.00	0.59	0.16	1.00	0.44
- per 100m² GFA	0.45	3.10	1.23	1.22	1.45	1.34	0.45	3.10	1.26
Peak Parking Demand Rate									
- per room	0.00	0.39	0.22	0.22	0.75	0.45	0.00	0.75	0.28
- per 100m² GFA	0.00	0.95	0.37	1.02	1.09	1.05	0.00	1.09	0.56

The parking analysis results presented in Table 3.11 and Table 3.12 indicate the following across all sites:

- the parking provision rate ranges from 0.16 to 1.0 spaces per room;
- the parking provision rate ranges from 0.45 to 3.1 spaces per 100m² GFA;
- peak parking accumulation reaches a maximum of 0.75 spaces per room; and
- peak parking accumulation reaches a maximum of 1.09 spaces per 100 m² GFA.

4 Regression Analysis

4.1 Linear Regression Analysis

The data has been analysed to determine the most consistent measure of trip generation and parking demand, using a simple linear regression approach.

The coefficient of determination (R^2) has been used to provide a measure of the usefulness of the regression equation. It measures the proportion of the dependent variable (trip behaviour) against independent variables (such as number of rooms and GFA). The closer the value of R^2 to 1.0, the better the model. In this study, an R^2 value above 0.8 represents an acceptable level of correlation.

As stated in Section 3.2, the following parameters have been used as key independent variables for this regression analysis:

- number of boarding rooms;
- GFA; and
- number of parking spaces.

The trip behaviour is plotted against the following units:

- daily total trips;
- site peak hour trips;
- network peak hour trips;
- parking supply; and
- parking accumulation.

The regression analysis includes the estimated on-street parking demand and trip generation data.

4.1.1 Number of Rooms

4.1.1.1 Trips per Room

Table 4.1 presents the summary of correlation coefficients of person and vehicle trips in relation to the number of boarding rooms. Vehicle trips in this analysis includes vehicle trips generated by on-site parking spaces and vehicle trips estimated for people parking on-street and walking into the sites.

Table 4.1: Summary of Correlation Coefficient (R^2) for Trips per Room

	R^2 - Person Trips	R^2 - Vehicle Trips
Daily Trips	$R^2 = 0.93$	$R^2 = 0.14$
Site Peak Hour Trips		
- AM Peak	$R^2 = 0.42$	$R^2 = 0.05$
- PM Peak	$R^2 = 0.82$	$R^2 = 0.09$
Network Peak Hour Trips		
- AM Peak	$R^2 = 0.73$	$R^2 = 0.10$
- PM Peak	$R^2 = 0.66$	$R^2 = 0.25$

Figure 4.1: Daily Person Trips per Room

2
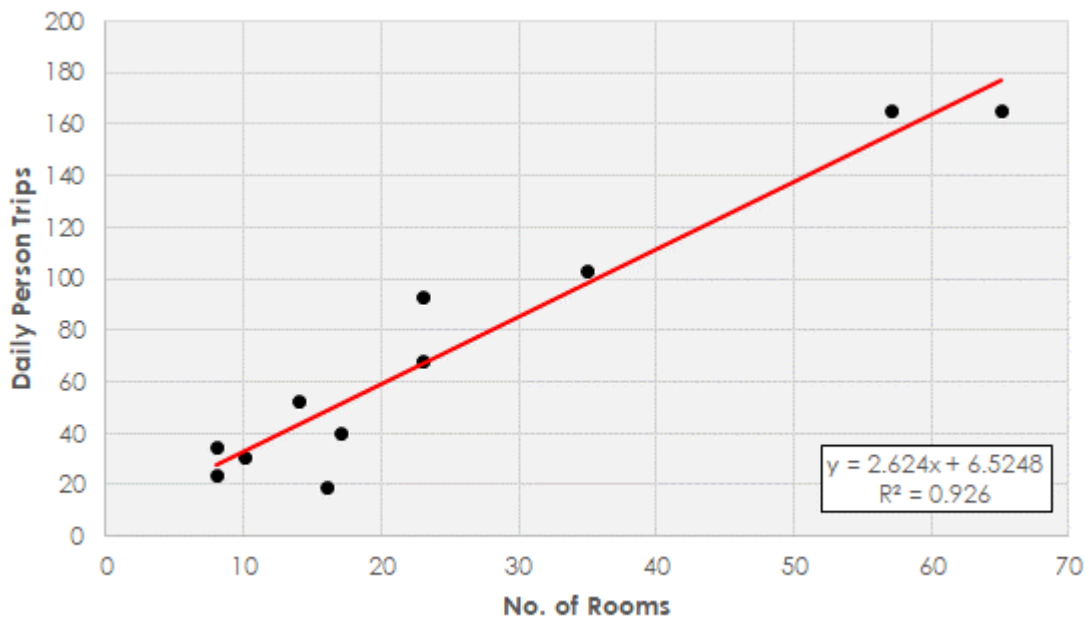
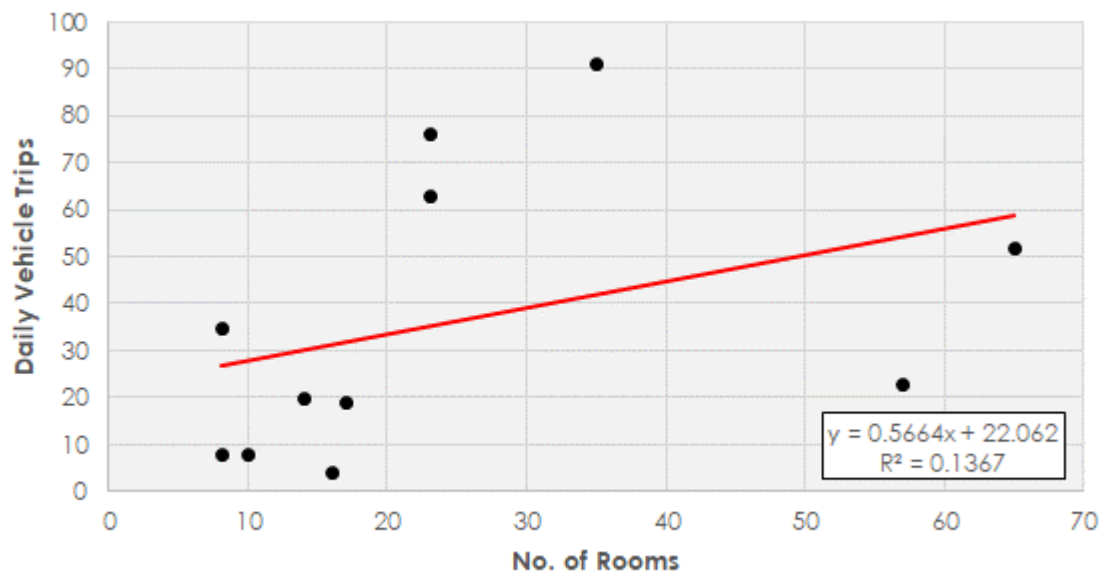**Figure 4.2: Daily Vehicle Trips per Room**

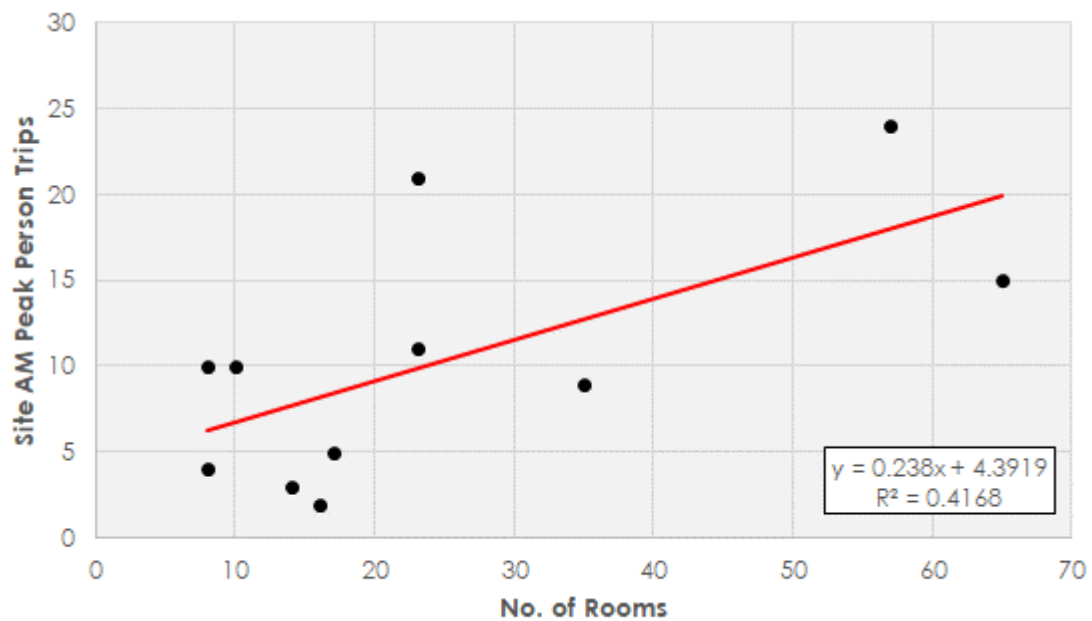**Figure 4.3: AM Site Peak Hour Person Trips per Room**

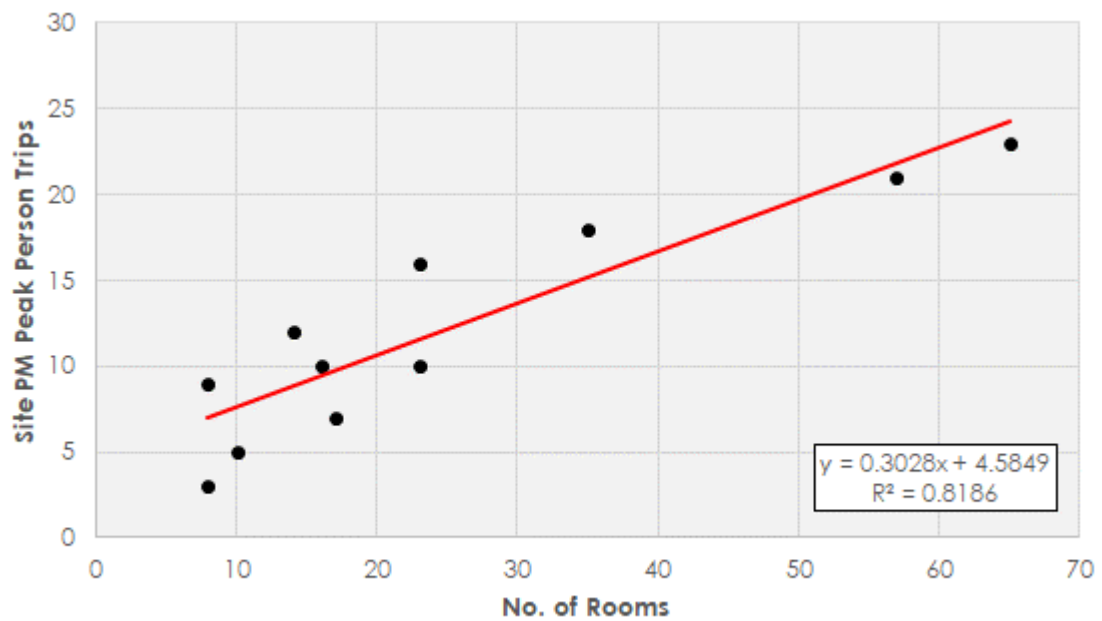**Figure 4.4: PM Site Peak Hour Person Trips per Room**

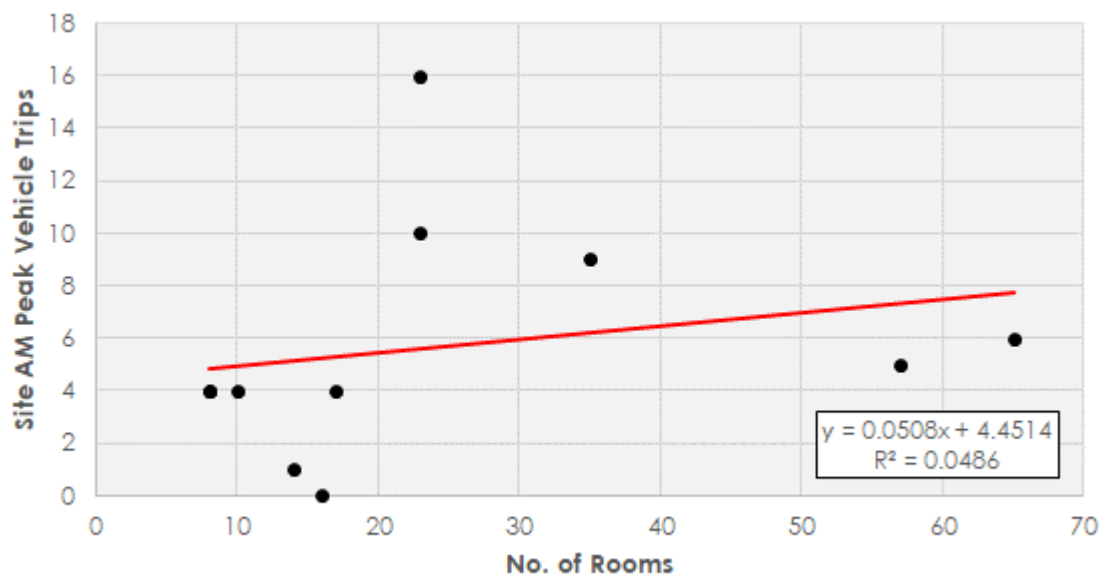**Figure 4.5: AM Site Peak Hour Vehicle Trips per Room**

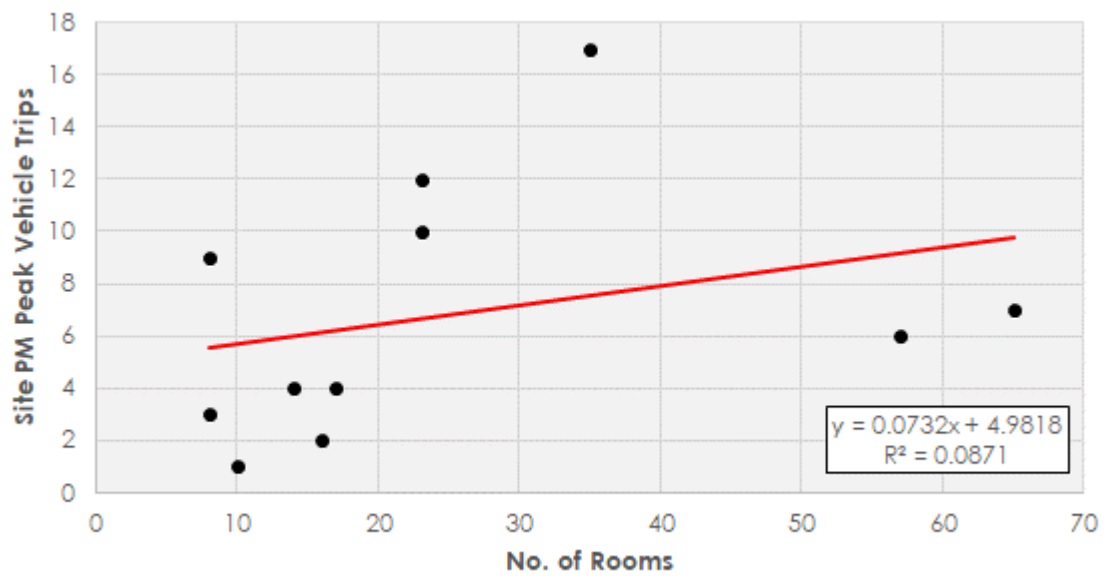**Figure 4.6: PM Site Peak Hour Vehicle Trips per Room**

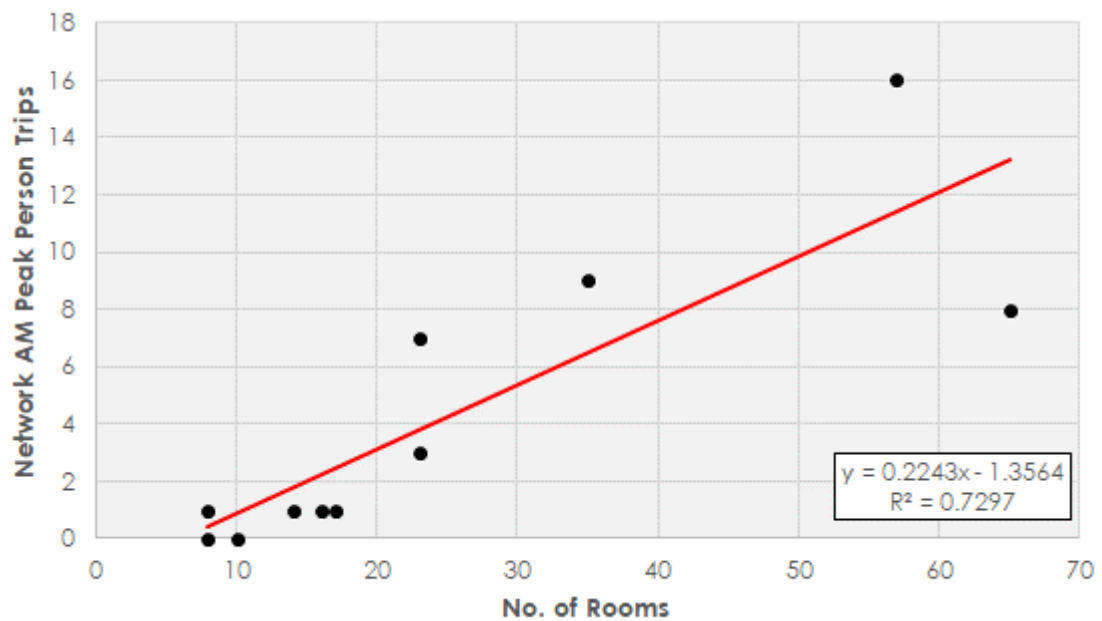**Figure 4.7: AM Network Peak Hour Person Trips per Room**

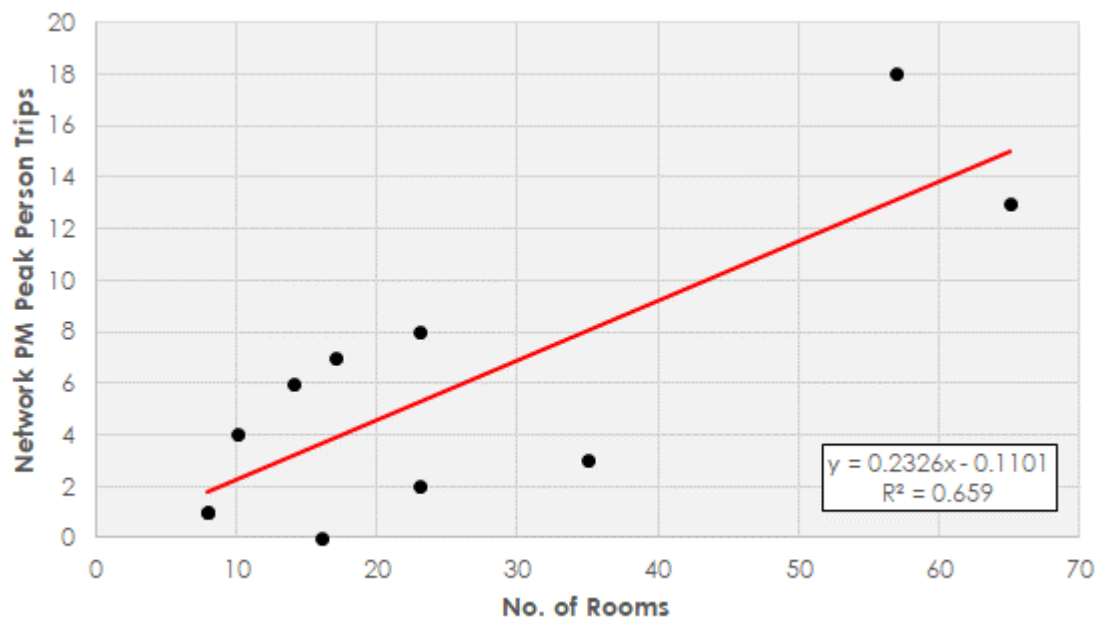**Figure 4.8: PM Network Peak Hour Person Trips per Room**

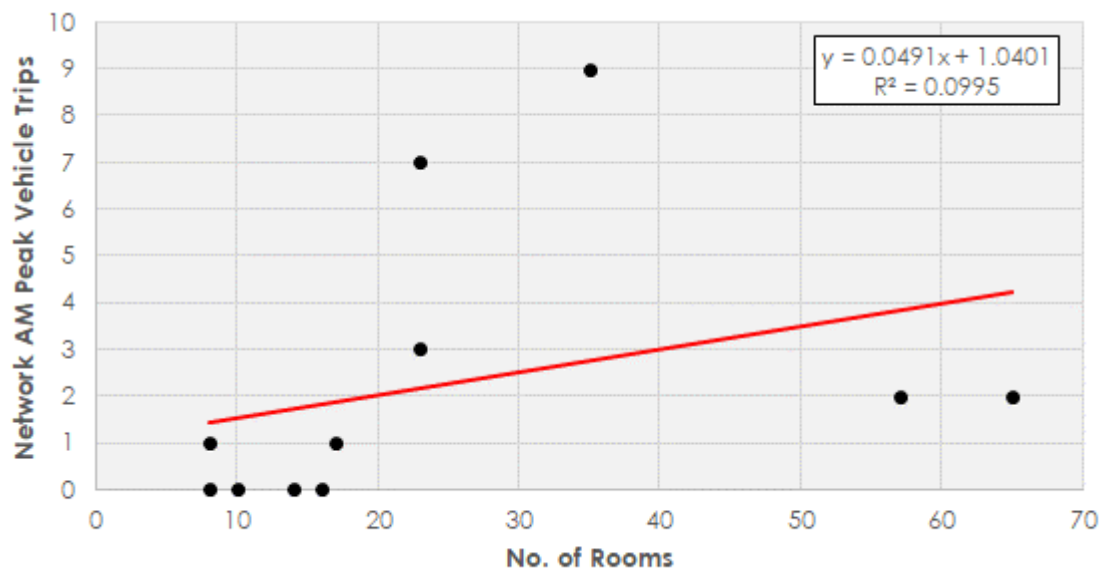**Figure 4.9: AM Network Peak Hour Vehicle Trips per Room**
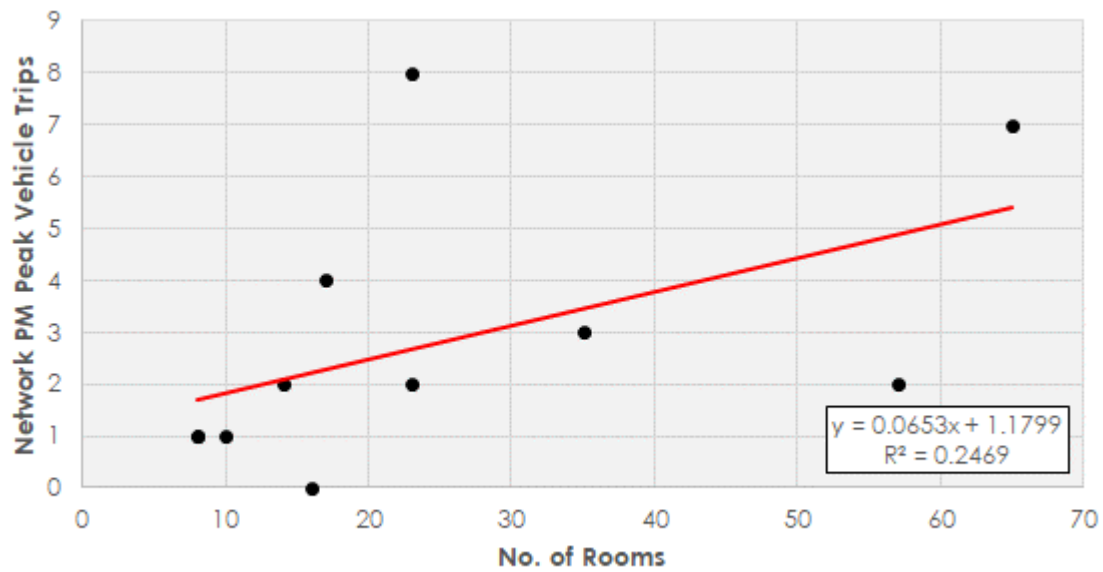
Figure 4.10: PM Network Peak Hour Vehicle Trips per Room

4.1.1.2   Car Parking Supply per Room

Table 4.2: Summary of Correlation Coefficient (R²) for Parking Supply/Demand per Room

	Correlation Coefficient (R^2)
Parking Supply	$R^2 = 0.54$
Peak Parking Demand	$R^2 = 0.33$

Figure 4.11: Car Parking Supply Spaces per Room
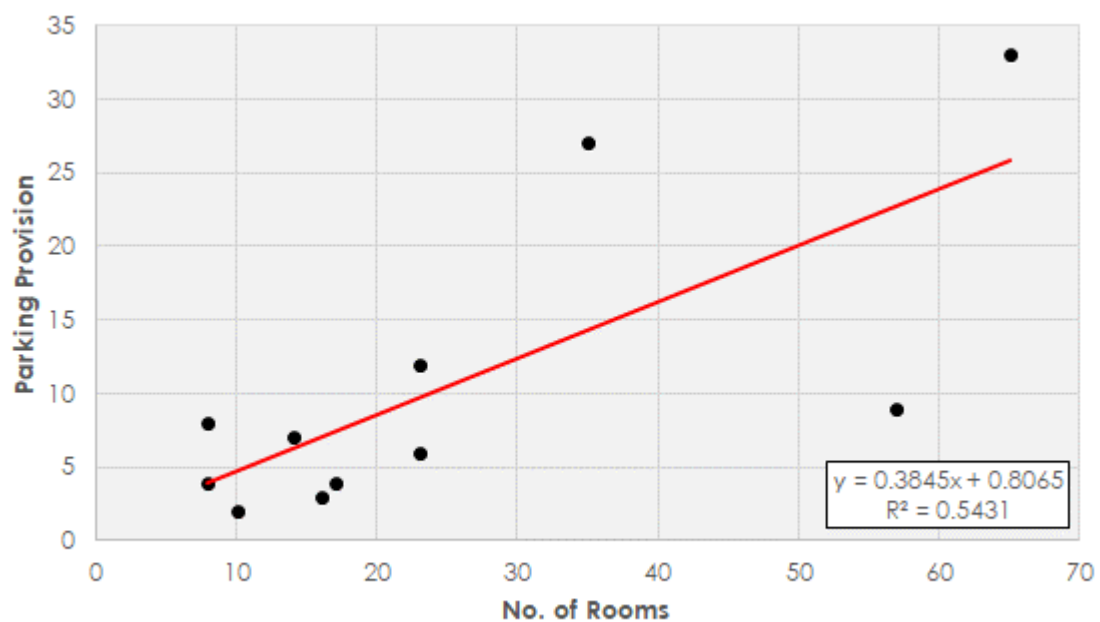
Figure 4.12: Peak Car Parking Accumulation per Room

Peak Parking Demand vs No. of Rooms scatter plot

$y = 0.0955x + 3.9299$
$R^2 = 0.3293$
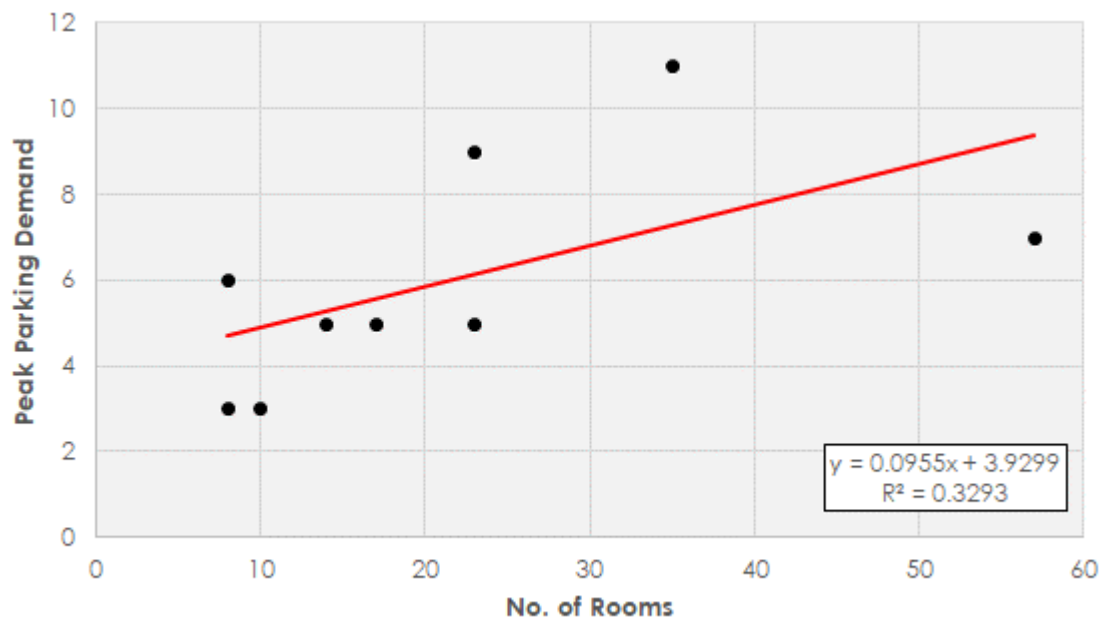
4.1.2   Gross Floor Area

4.1.2.1   Trips per GFA

Table 4.3 presents the summary of correlation coefficients of person and vehicle trips in relation to the GFA of the boarding houses.

Table 4.3: Summary of Correlation Coefficient (R^2) for Trips per GFA

	R^2 - Person Trips	R^2 - Vehicle Trips
Daily Trips	$R^2 = 0.55$	$R^2 = 0.24$
Site Peak Hour Trips		
- AM Peak	$R^2 = 0.34$	$R^2 = 0.10$
- PM Peak	$R^2 = 0.64$	$R^2 = 0.37$
Network Peak Hour Trips		
- AM Peak	$R^2 = 0.71$	$R^2 = 0.21$
- PM Peak	$R^2 = 0.23$	$R^2 = 0.01$

Figure 4.13: Daily Person Trips per GFA
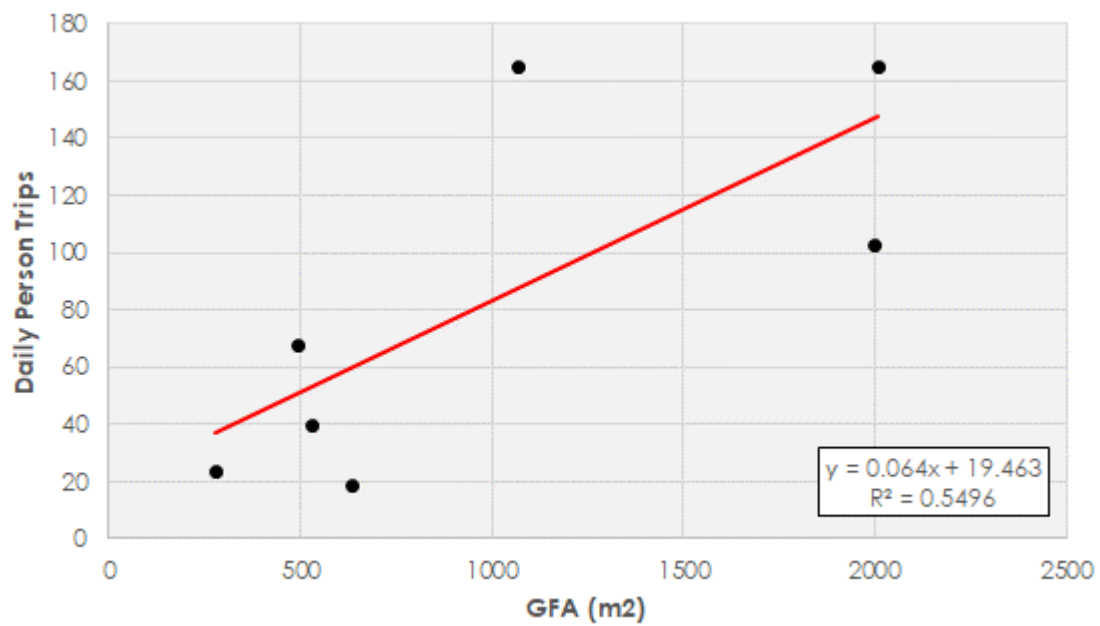
Figure 4.14: Daily Vehicle Trips per GFA
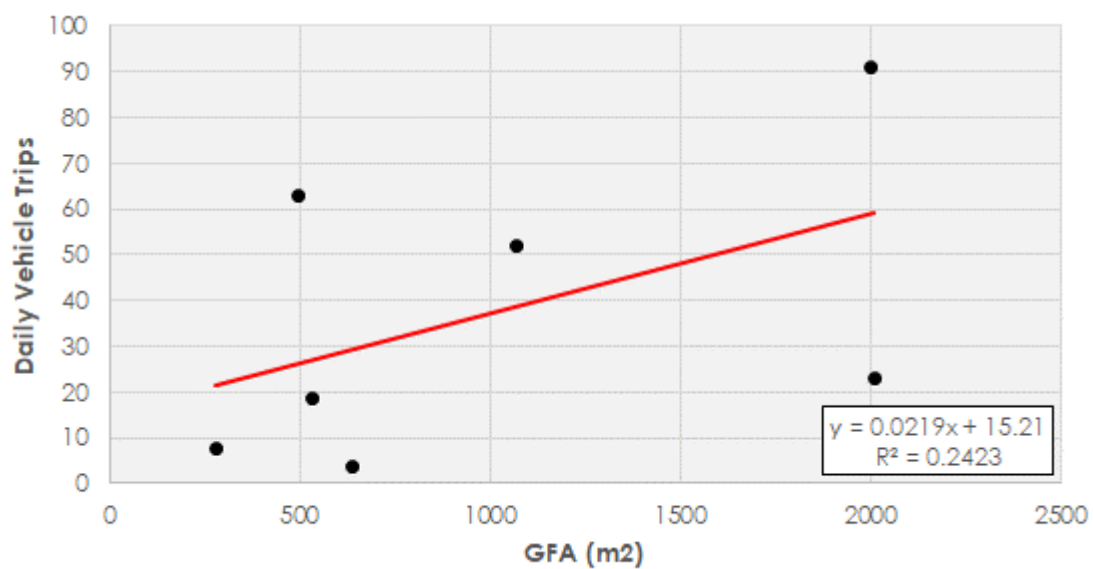
Figure 4.15: AM Site Peak Hour Person Trips per GFA

$y = 0.0058x + 5.0946$
$R^2 = 0.3416$
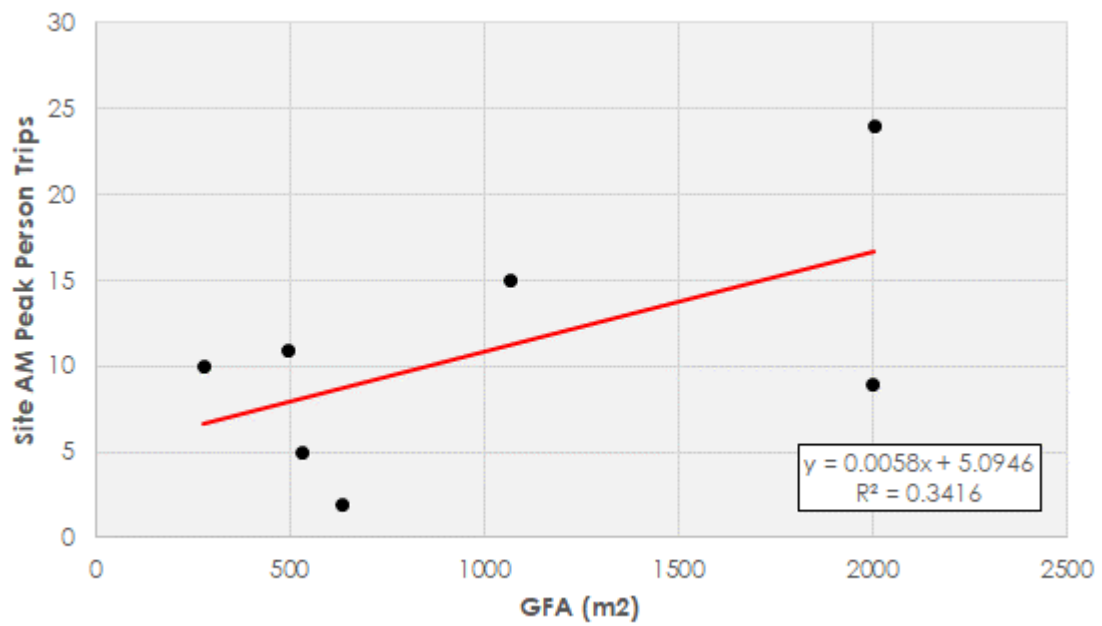
Figure 4.16: PM Site Peak Hour Person Trips per GFA

$y = 0.0084x + 4.7801$
$R^2 = 0.6438$
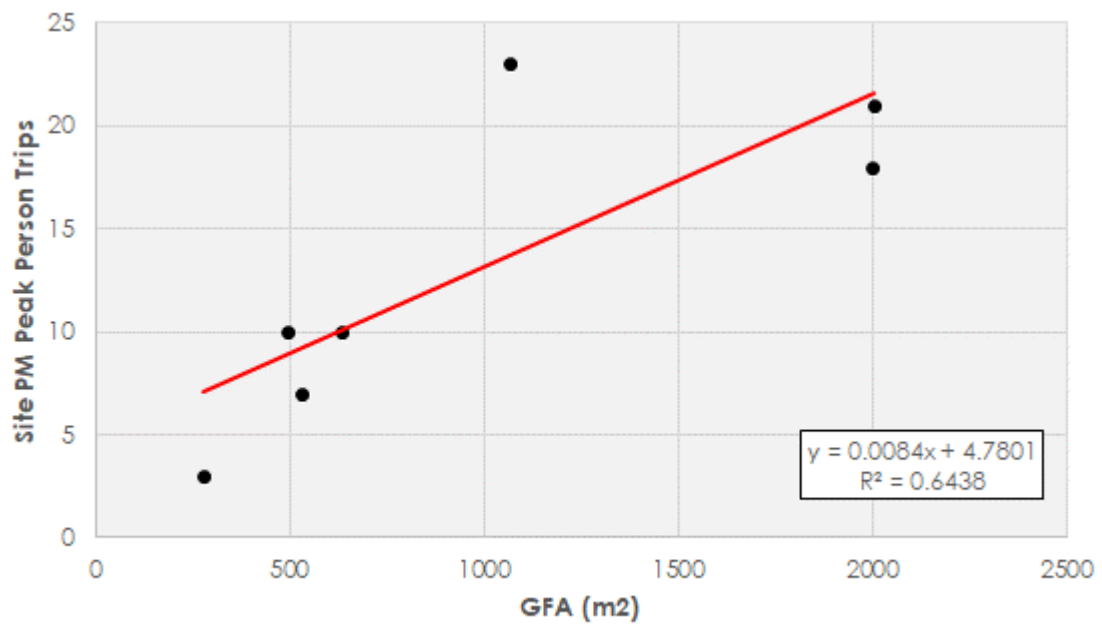
Figure 4.17: AM Site Peak Hour Vehicle Trips per GFA
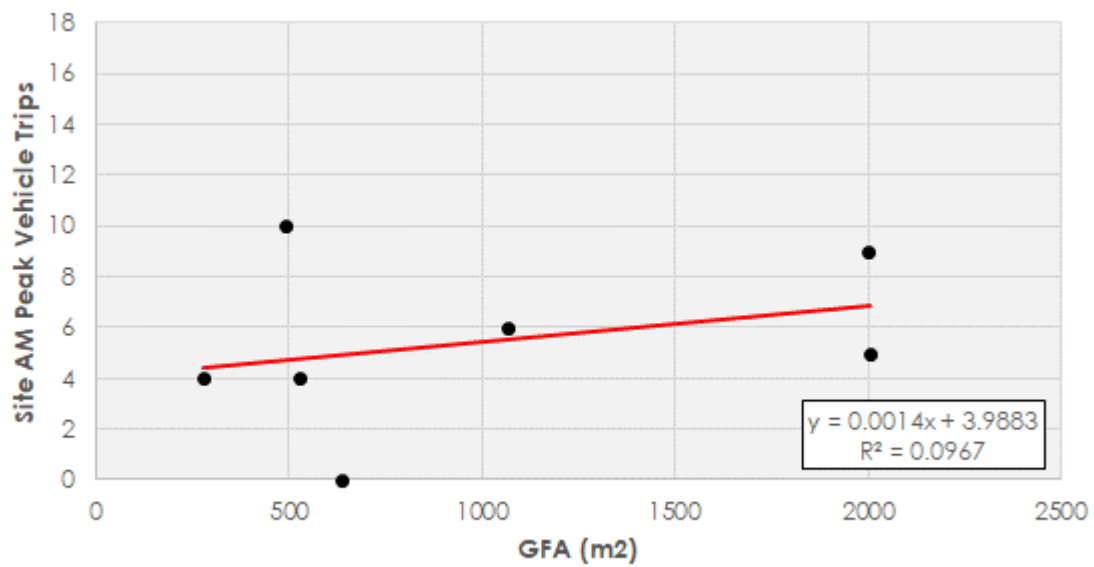
Figure 4.18: PM Site Peak Hour Vehicle Trips per GFA
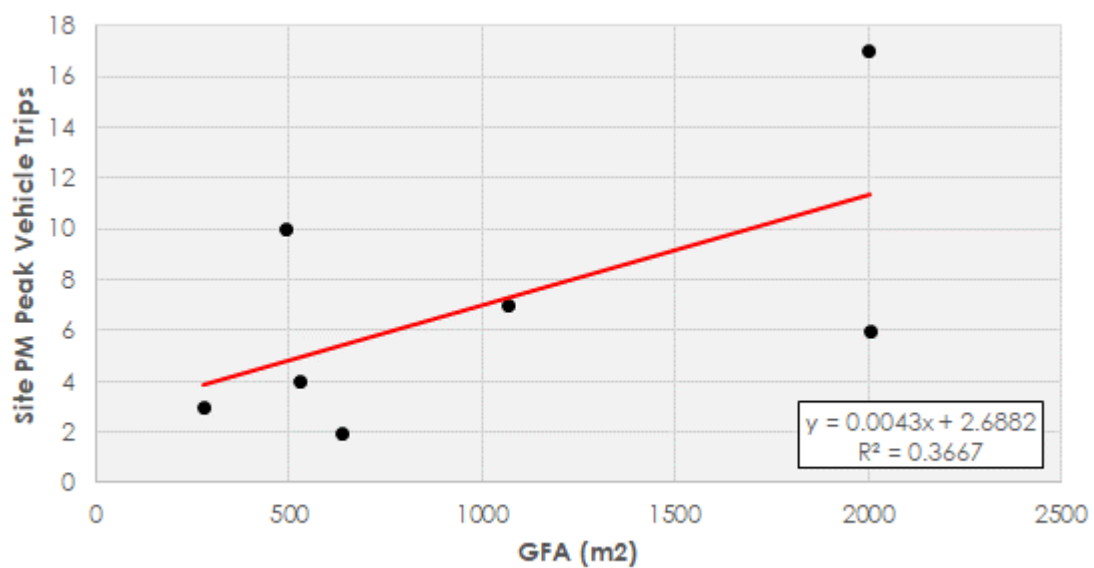
Figure 4.19: AM Network Peak Hour Person Trips per GFA
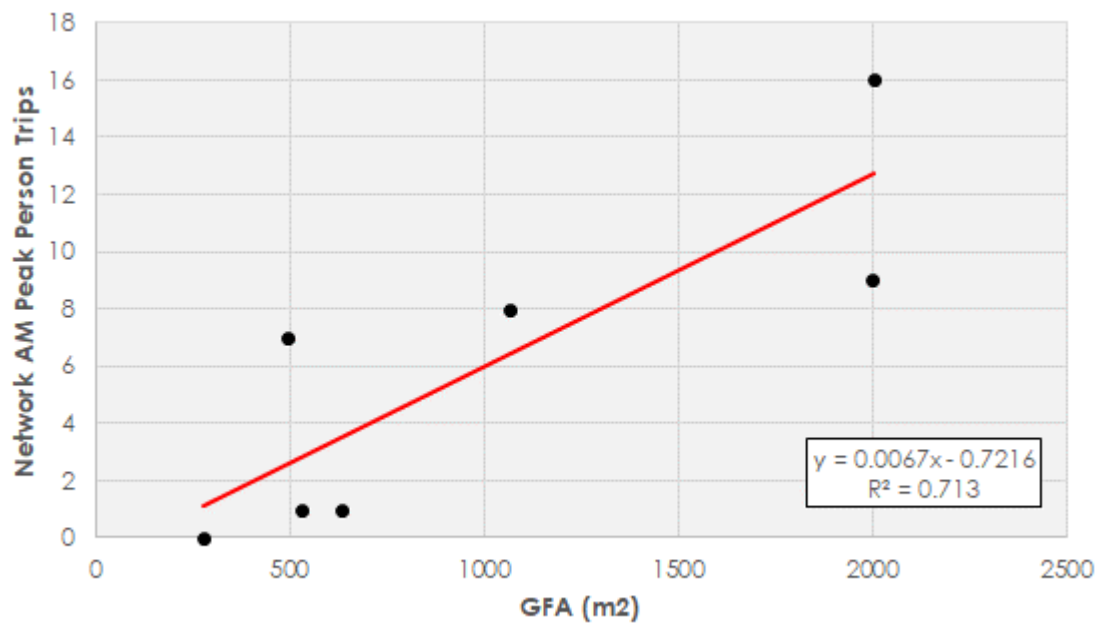
Figure 4.20: PM Network Peak Hour Person Trips per GFA
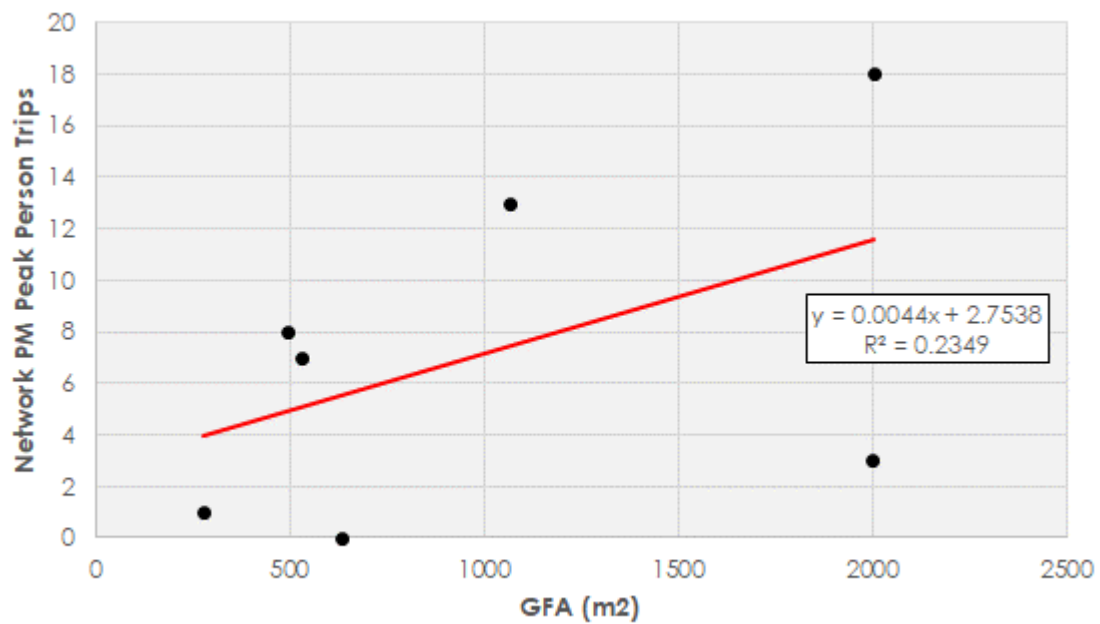
Figure 4.21: AM Network Peak Hour Vehicle Trips per GFA
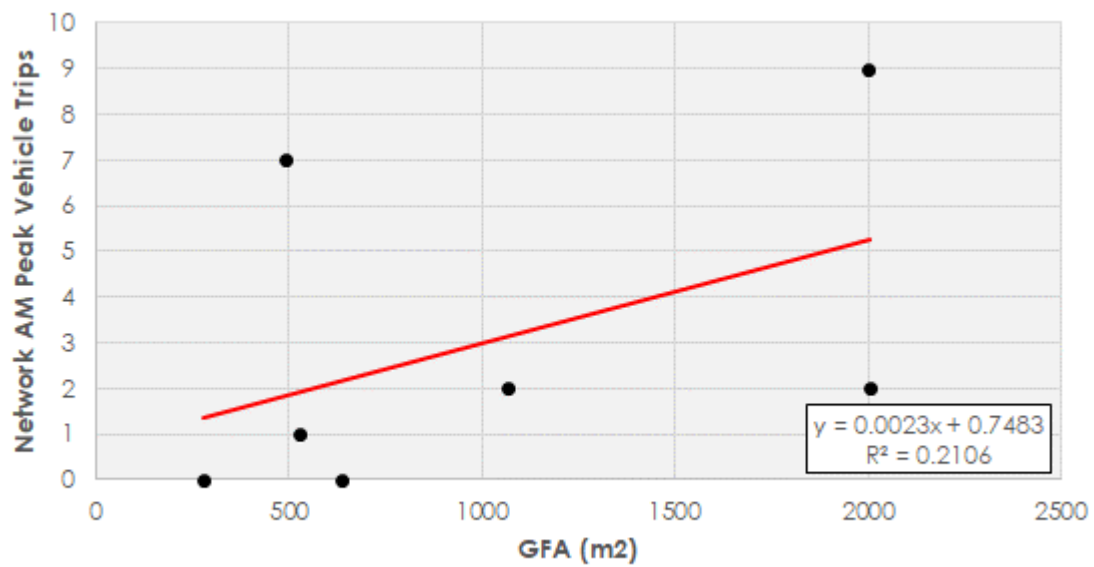
Figure 4.22: PM Network Peak Hour Vehicle Trips per GFA
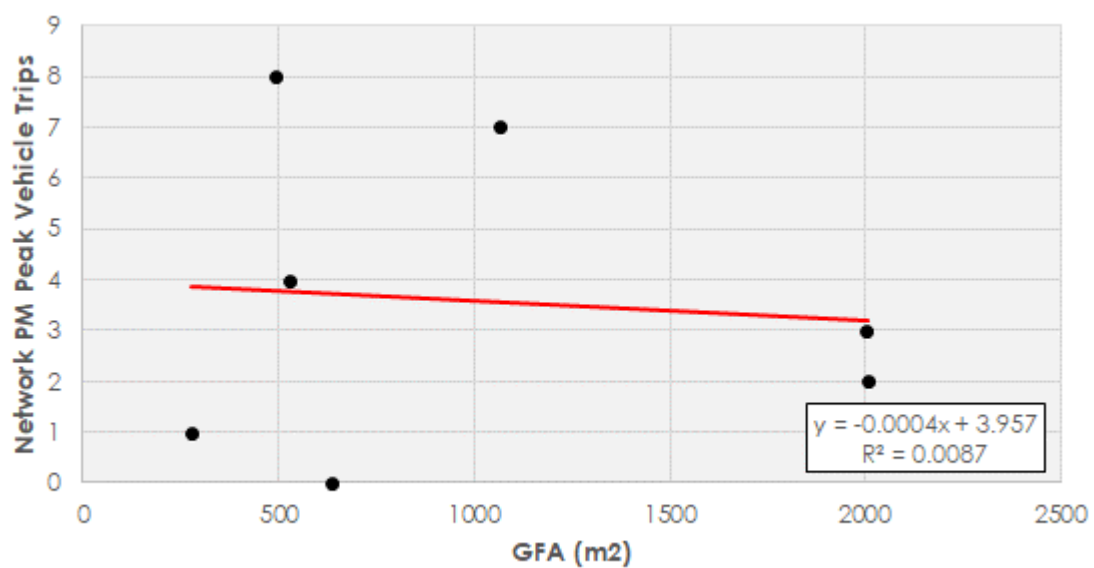
4.1.2.2 Parking Supply per GFA

Table 4.4: Summary of Correlation Coefficient (R²) for Parking Supply/Demand per GFA

	Correlation Coefficient (R²)
Parking Supply	R² = 0.30
Peak Parking Demand	R² = 0.75

Figure 4.23: Parking Supply Spaces per GFA
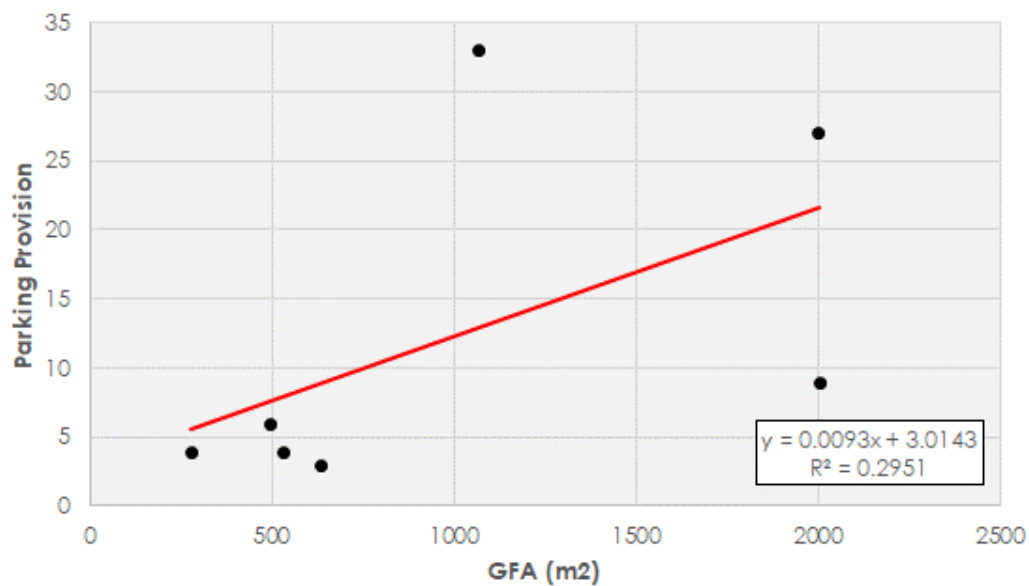
Figure 4.24: Peak Parking Accumulation per GFA
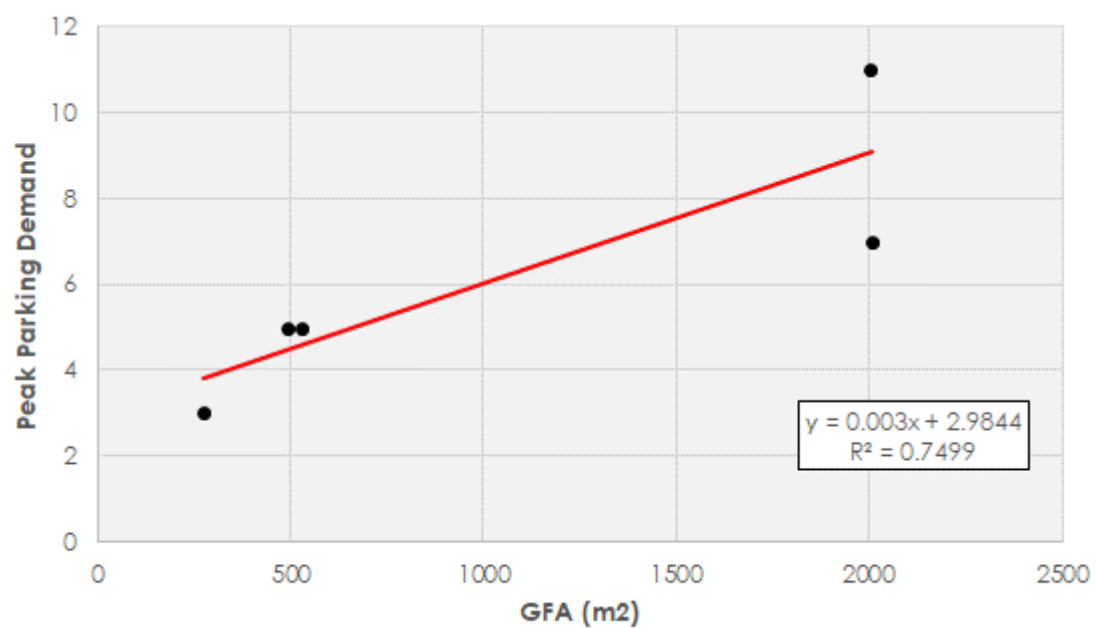
4.1.3 Number of Parking Spaces

4.1.3.1 Trips per Parking Space

Table 4.5 presents the summary of correlation coefficients of person and vehicle trips in relation to the number of car parking spaces.

Table 4.5: Summary of Correlation Coefficient (R²) for Trips per On-Site Parking Space

	R^2 - Person Trips	R^2 - Vehicle Trips
Daily Trips	$R^2 = 0.53$	$R^2 = 0.46$
Site Peak Hour Trips		
- AM Peak	$R^2 = 0.09$	$R^2 = 0.12$
- PM Peak	$R^2 = 0.62$	$R^2 = 0.37$
Network Peak Hour Trips		
- AM Peak	$R^2 = 0.25$	$R^2 = 0.25$
- PM Peak	$R^2 = 0.10$	$R^2 = 0.22$

Figure 4.25: Daily Person Trips per Parking Space
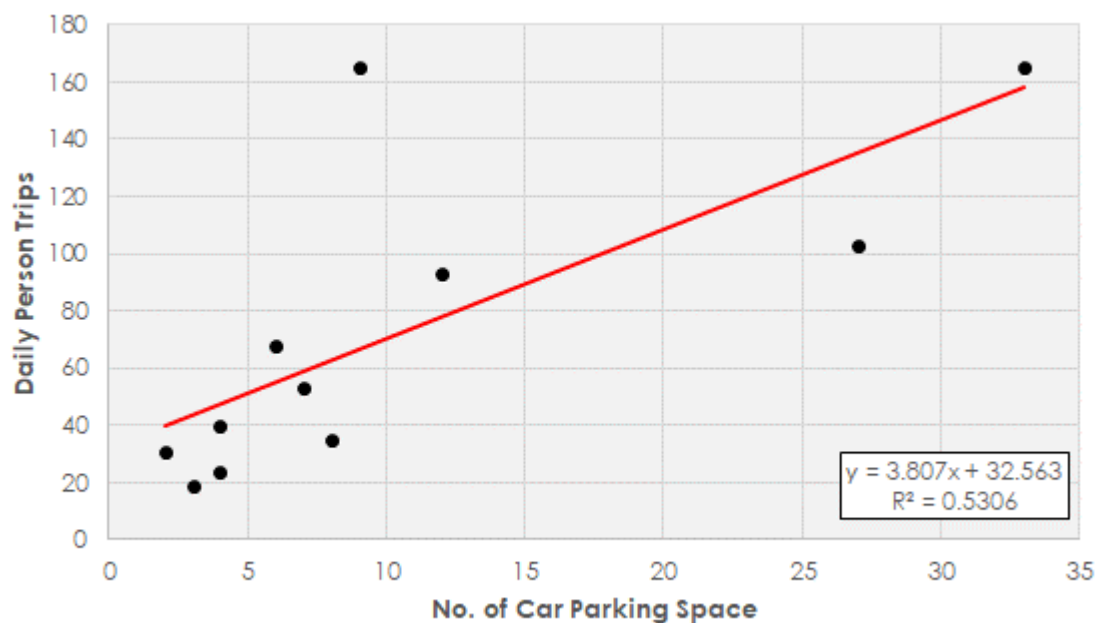
Figure 4.26: Daily Vehicle Trips per Parking Space

Daily Vehicle Trips vs. No. of Car Parking Space
$$y = 1.9857x + 15.513$$
$$R^2 = 0.4576$$
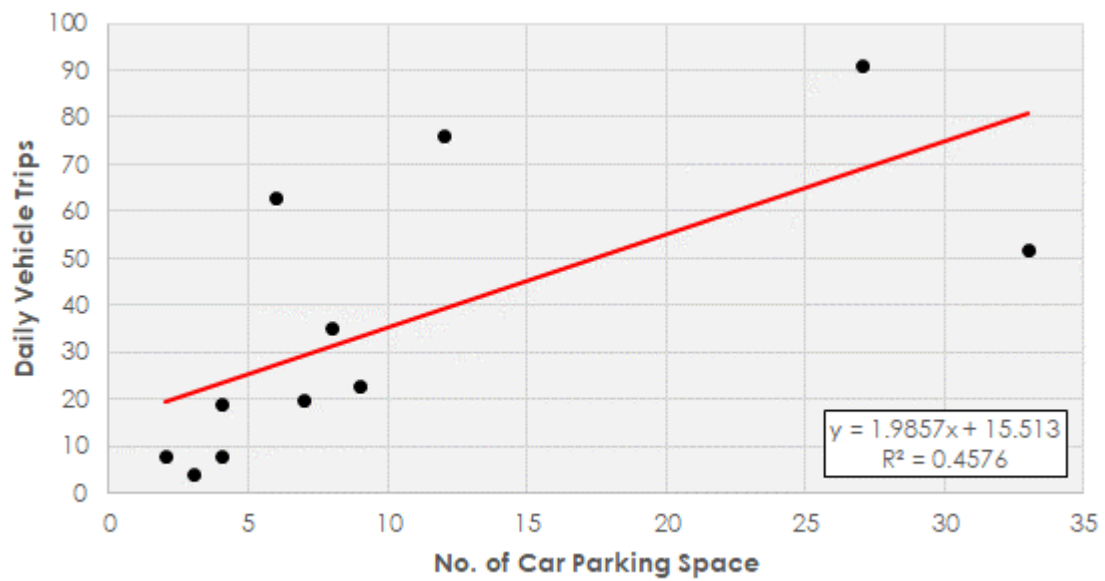
Figure 4.27: AM Site Peak Hour Person Trips per Parking Space

Site AM Peak Person Trips vs. No. of Car Parking Space
$$y = 0.2118x + 8.1491$$
$$R^2 = 0.0899$$
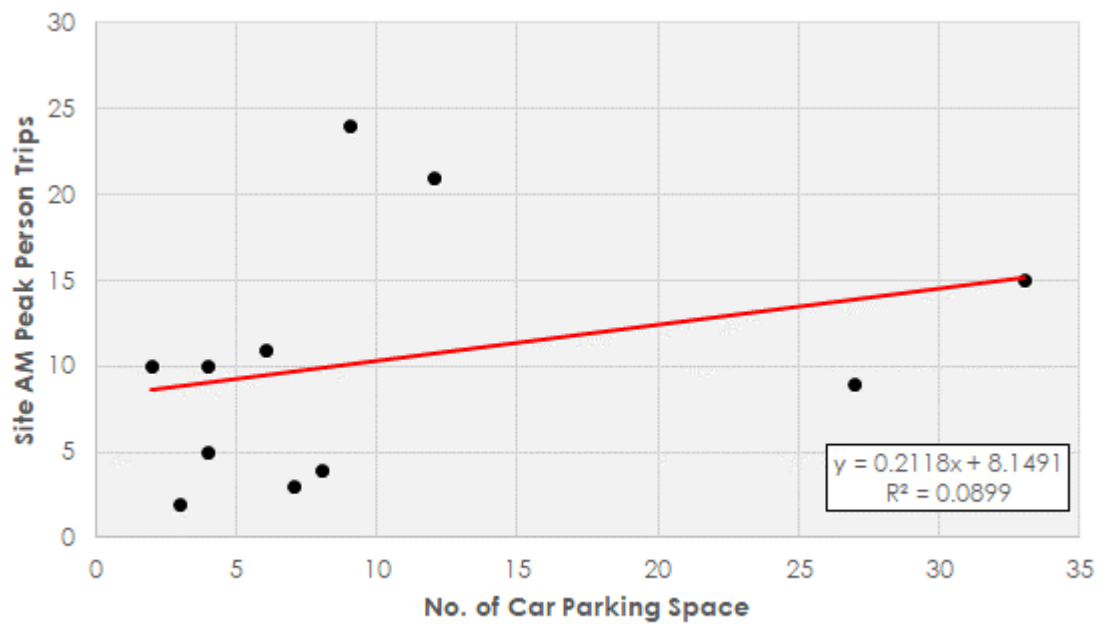
Figure 4.28: PM Site Peak Hour Person Trips per Parking Space

y = 0.5036x + 6.9169
R² = 0.6165
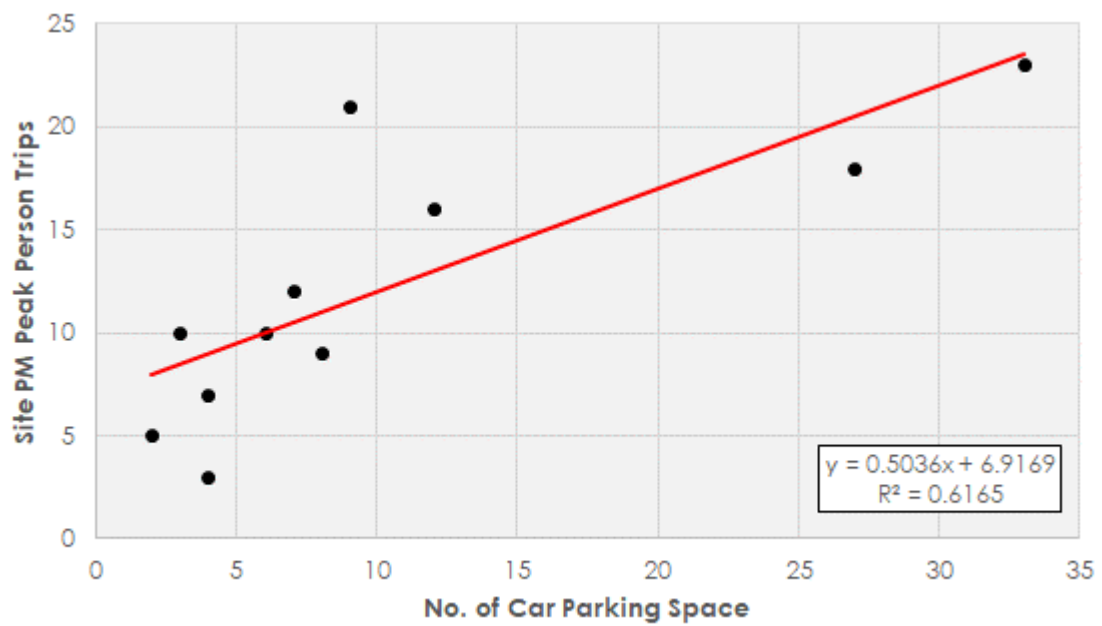
Figure 4.29: AM Site Peak Hour Vehicle Trips per Parking Space

y = 0.153x + 4.1272
R² = 0.1199
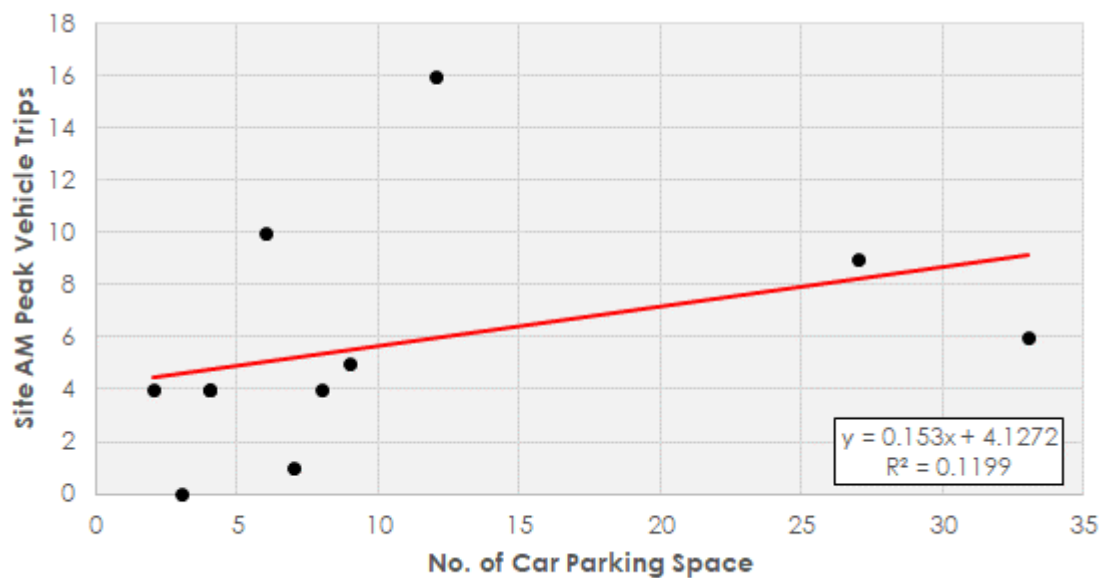
Figure 4.30: PM Site Peak Hour Vehicle Trips per Parking Space
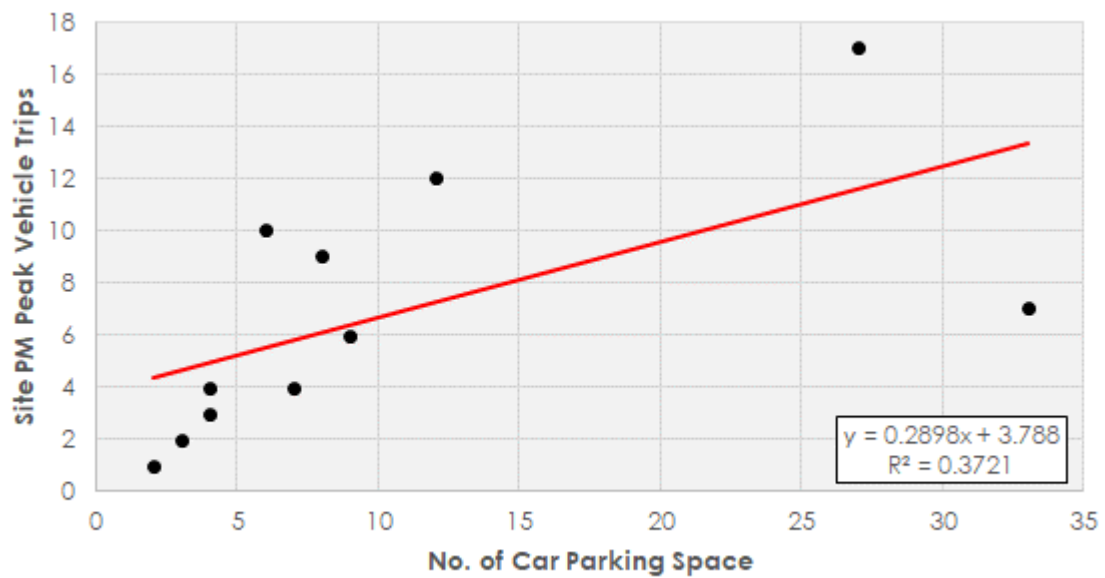
Figure 4.31: AM Network Peak Hour Person Trips per Parking Space
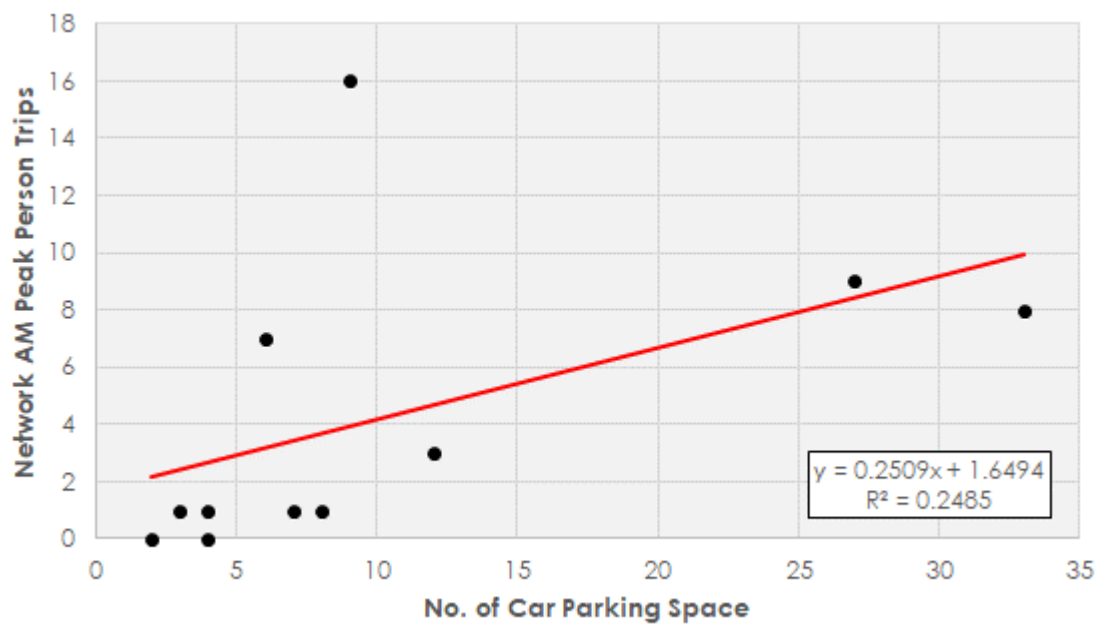
Figure 4.32: PM Network Peak Hour Person Trips per Parking Space

Scatter plot with x-axis "No. of Car Parking Space" (0 to 35) and y-axis "Network PM Peak Person Trips" (0 to 20).

$y = 0.1695x + 3.9555$
$R^2 = 0.0952$
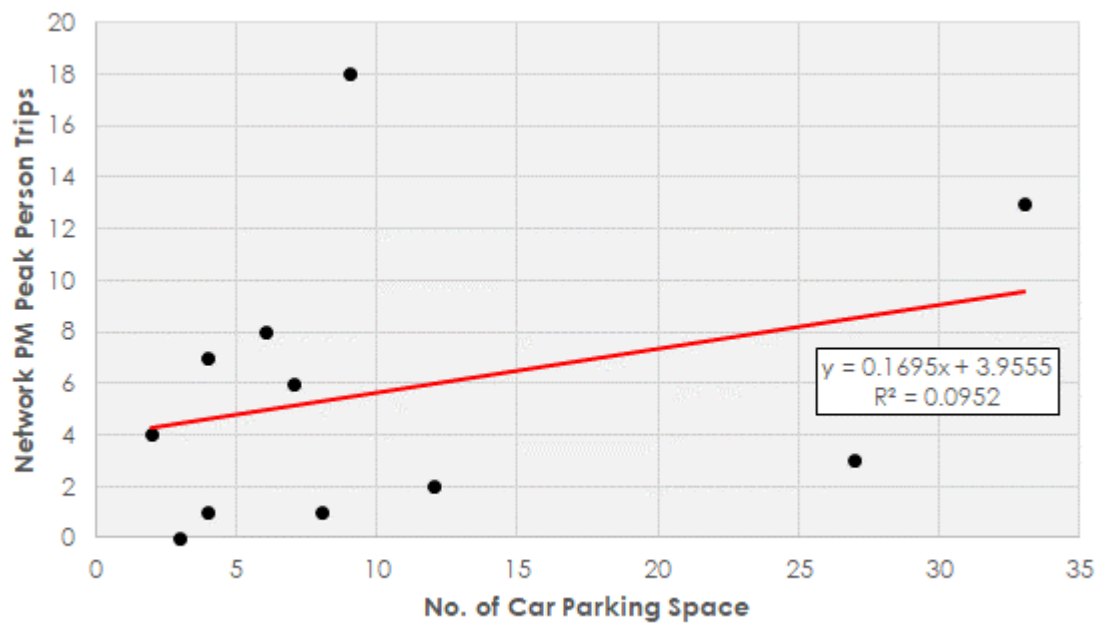
Figure 4.33: AM Network Peak Hour Vehicle Trips per Parking Space

Scatter plot with x-axis "No. of Car Parking Space" (0 to 35) and y-axis "Network AM Peak Vehicle Trips" (0 to 10).

$y = 0.1504x + 0.7002$
$R^2 = 0.254$
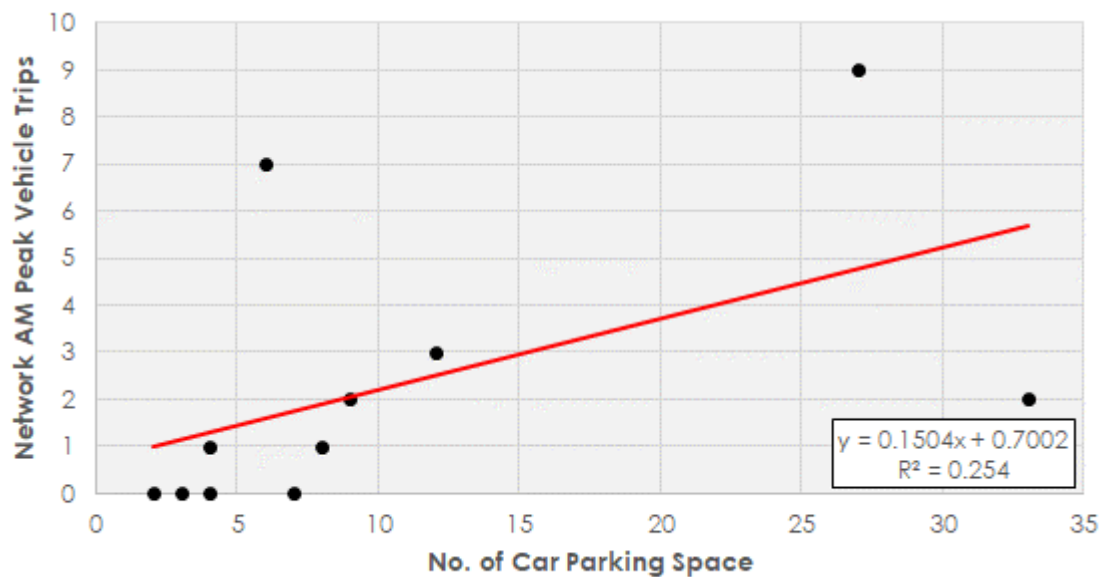
Figure 4.34: PM Network Peak Hour Vehicle Trips per Parking Space

Scatter plot with regression line. X-axis: No. of Car Parking Space (0 to 35). Y-axis: Network PM Peak Vehicle Trips (0 to 9).

$y = 0.1178x + 1.5865$
$R^2 = 0.2188$
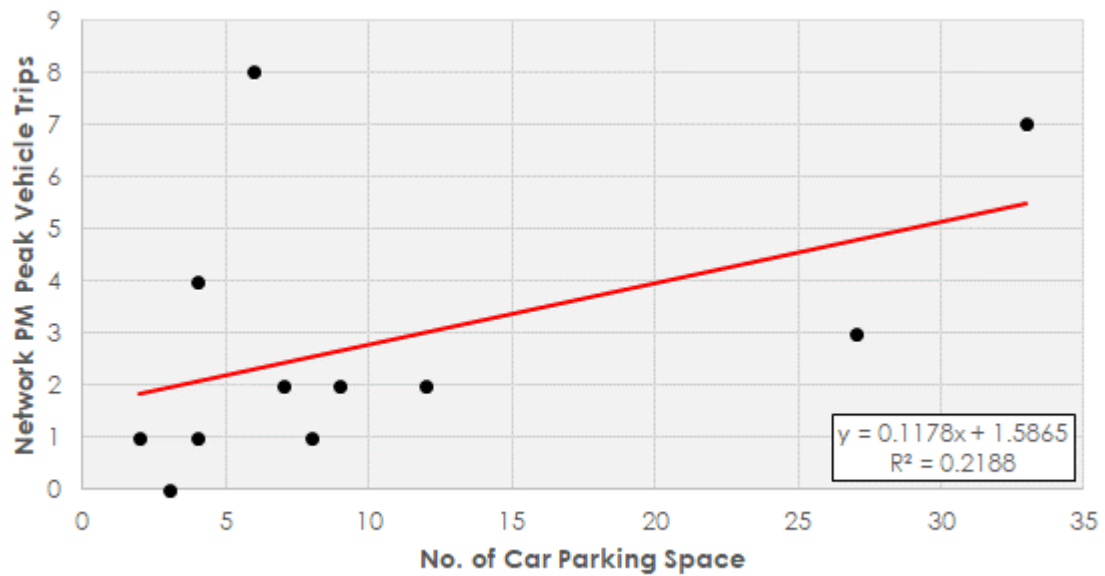
Figure 4.35: Peak Parking Accumulation per Parking Space

Scatter plot with regression line. X-axis: No. of Car Parking Space (0 to 30). Y-axis: Peak Parking Demand (0 to 14).

$y = 0.3254x + 3.1434$
$R^2 = 0.8426$
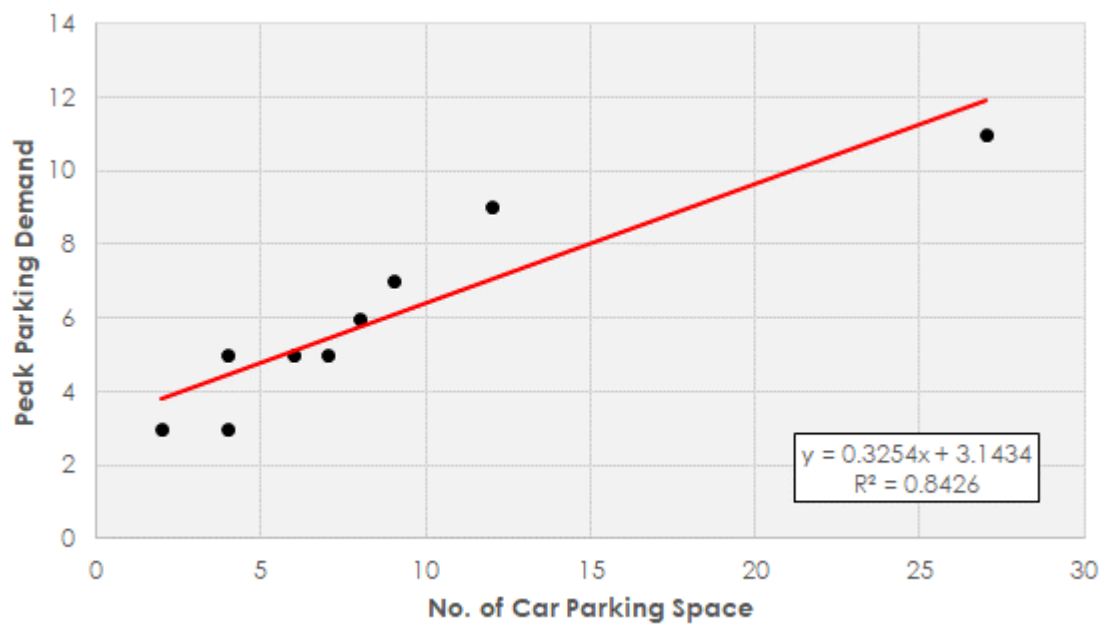
4.2 Multiple Regression Analysis

Multiple linear regression methods refer to measuring travel patterns as a function of several independent variables. These procedures have been used in a number of trip generation and parking studies and are considered to be more appropriate for particular land use types such as shopping centres, service stations, marinas and business parks according to RTA Guide to Traffic Generating Developments 2002.

As stated previously, the coefficient of determination (R^2) has been used to provide a measure of the usefulness of the regression equation. The closer the value of R^2 to 1.0, the better the model. In this study, an R^2 value above 0.8 represents an acceptable level of correlation.

A number of equation models have been assessed to determine the correlation of the following variables against the number of rooms and the on-site car parking provision:

- daily total vehicle trips;
- site peak hour vehicle trips; and
- network peak hour vehicle trips.

4.2.1 Daily Vehicle Trips

Daily Vehicle Trips: $DVT = 19.97 – 0.43A + 2.60B$ $R^2 = 0.49$

Where A is the number of boarding rooms, and B is the number of car parking spaces.

4.2.2 Site Peak Hour Vehicle Trips

AM Site Peak Hour: $SPVT = 4.31 - 0.02A + 0.18B$ $R^2 = 0.12$

PM Site Peak Hour: $SPVT = 4.65 – 0.08A + 0.41B$ $R^2 = 0.42$

4.2.3 Network Peak Hour Vehicle Trips

AM Network Peak Hour: $NPVT = 0.90 – 0.02A + 0.18B$ $R^2 = 0.26$

PM Network Peak Hour: $NPVT = -1.13 + 0.04A + 0.06B$ $R^2 = 0.27$

Based on the above analyses, there is no relationship, which has an acceptable level of correlation (i.e. R^2 value above 0.8).

5 Comparison of Findings with Other Databases

Results obtained from the assessment presented in this report have been compared to the existing guidelines and standards. Findings of this examination are presented below.

5.1 Australian Documents

5.1.1 National Document

The Austroads, "Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments" is published to provide guidance on identifying and assessing the potential impacts of land developments on the adjacent road network. The Austroads Guide includes the following:

- the importance of traffic impact assessment for various land use developments;

- an overview of key elements to consider in a traffic impact assessment;

- identifying appropriate levels of assessment based on the scale of the land use development; and

- assessing other impacts in relation to traffic and transport (i.e. road safety, infrastructure and pavement and environmental effects).

However, it does not include any specific information for boarding house developments.

5.1.2 State Environmental Planning Policy (Housing) 2021 – NSW

Chapter 2 of the NSW Government's State Environmental Planning Policy (SEPP) Housing 2021 stipulates a car parking rate for boarding houses if a relevant planning instrument does not specify a requirement for a lower number of parking spaces. The SEPP Housing 2021 is the latest environmental planning instrument that applies to boarding house developments and supersedes the following:

- State Environmental Planning Policy (Affordable Rental Housing) 2009

- State Environmental Planning Policy No. 70 – Affordable Housing (Revised Schemes)

The SEPP Housing 2021 provides the following car parking rates for boarding house developments:

- For development on land within an accessible area: 0.2 parking spaces for each boarding room.

- Otherwise: 0.5 parking spaces for each boarding room.

The same parking requirement is provided for co-living.

- for development on land in an accessible area — 0.2 parking spaces for each private room, or

- Otherwise — 0.5 parking spaces for each private room,

It is noted that an accessible area means land within:

- 800m walking distance of a public entrance to

  ‣ a railway station, or

  ‣ a wharf from which a Sydney Ferries ferry service operates, or

- 400m walking distance of

  o a public entrance to a light rail station, or

  o for a light rail station with no entrance (i.e. directly to the platform of the light rail station)

- 400m walking distance of a bus stop used by a regular bus service that has at least one bus per hour servicing the bus stop between

  o 6am and 9pm each day from Monday to Friday

  o 8am and 6pm on each Saturday and Sunday

Previous iterations of the SEPP Housing such as the 2018 edition required the following parking rates

- 0.2 spaces per boarding room if provided by a social housing provider and in an accessible location

- 0.4 spaces per boarding room if provided by a social housing provider but not in an accessible location

- 0.5 spaces per room per boarding room if not provided by a social housing provider

5.1.3 Transport Impact Assessment Guidelines 2016 – Western Australia

The Department of Planning, Lands and Heritage (DPLH) *Transport Impact Assessment Guidelines 2016* refer to the following methods in assessing the traffic generation of a site:

- surveying a comparable development in a similar location;

- using existing traffic data for a comparable development(s); and

- using typical rates for similar developments.

DPLH recognises the use of the RTA's Guide and ITE Trip Generation Manual as sources for trip generation rates however it recommends that sensitivity tests be undertaken when using these guides since the data may not be particularly relevant to Western Australia.

5.2　International Documents

5.2.1　New Zealand Trips and Parking Database Bureau

The New Zealand Trips and Parking Database Bureau (NZTPDB) was formed in 2002 and was expanded in 2008 to include both New Zealand and Australian members when it adopted its present name, the Trips Database Bureau (TDB). It became an Incorporated Society in 2004.

The main purpose of the Bureau is to maintain and share a database of parking and trip surveys, for assistance in the wider assessment and planning of transportation matters.

Members include local and regional councils, institutional organisations, consultancies and individual practitioners with an involvement in traffic and land use planning.

The TDB uses the TRICS platform for the New Zealand Trips Database. TDB was examined for Boarding House data or any similar land use but it does not include rates for boarding house developments.

5.2.2　Trip Rate Information Computer System – United Kingdom

The Trip Rate Information Computer System (TRICS) is the national standard system of trip generation and analysis in the United Kingdom and Ireland. TRICS contains a database from 7,150 transport surveys across 100 land use categories.

The database does not include any boarding house developments as they are not common in the United Kingdom.

5.2.3　Institute of Transportation Engineers Trip Manual – USA

The Institute of Transportation Engineers (ITE) publishes a "Trip Generation Manual" which consists of trip generation rates, plots and equations of more than 4,800 sites and 162 land uses. The 11th edition contains a use called Congregate Care facility. This is a facility which is a licensed boarding home or a licensed private establishment which has entered into a congregate care contract with the department of social and health services. This is often a residential facility containing separate dwelling units, which facility provides housekeeping assistance, personal care assistance and meal preparation assistance to its residents or a residential facility for the elderly (i.e., 50+) which has a central lobby, common dining area, hobby/recreational rooms with at least one meal per day in the common dining area.

Whilst not being an exact comparator, It is of note that the average trip per dwelling is 0.19 (AM peak), 0.23 (PM peak) and 2.21 per day.

5.3 Comparison of Trip Generation and Parking Supply

A limited amount of comparison material for trip generation and parking rates is available but this is summarised in Table 5.1.

Since the number of boarding rooms and car spaces are the consistent independent variable amongst all external databases, only the number of rooms and car spaces dependent rates obtained from the survey result analysis are presented for comparison.

It is noted that the correlation coefficients obtained from regression analysis are considered low to draw a solid conclusion. Therefore, results obtained from the regression analysis are not included.

There is no boarding house data to compare the trip generation so no comparisons can be drawn. However, it is of note that traffic generation rate is similar to that included in the TfNSW TD13/04a document for private apartments which gives average trip generation rates per apartment of 0.19 (AM peak) and 0.15 (PM peak).

In terms of parking occupancy, again there is no comparative data that can be used. However, the table below compares the parking to the requirements of current and recent SEPP housing documents.

Table 5.1: Comparison of Parking Occupancy Rates

Reference	Parking Rates
SEPP (Housing 2018)	• 0.2 spaces per boarding room if provided by a social housing provider and in an accessible location • 0.4 spaces per boarding room if provided by a social housing provider but not in an accessible location • 0.5 spaces per room per boarding room if not provided by a social housing provider
SEPP (Housing) 2021	• 0.2 spaces per boarding room if within an accessible area • 0.5 spaces per boarding room but not in an accessible location • 0.2 spaces per private room in co-living if within an accessible area • 0.5 spaces per private room in co-living but not in an accessible location
Average surveyed rate (current study)	• 0.28 spaces per boarding room

It is noted that the parking rate of 0.28 spaces per room is somewhat lower than the 0.5 spaces per boarding room required of the free market boarding houses on the 2018 SEPP which would have been in place for the most recent boarding houses.

6 Summary

The main conclusions of the study are that the average trip rate of boarding houses was found to be 0.30 trips per boarding room in the AM site peak hours and 0.35 trips per boarding room in the PM site peak hours. This rate also incorporates the on-street parking estimate based on the interview surveys and pedestrian counts.

Table 6.1: Trip Rates

Reference	Trip Rates		
	AM Site Peak Hour	**PM Site Peak Hour**	**Daily**
Average surveyed rate (current study)	• 0.30 per boarding room • 0.79 per on-site car space	• 0.35 per boarding room • 0.80 per on-site car space	• 1.71 per boarding room • 3.97 per on-site car space

The average peak on-site parking demand rate was found to be 0.28 spaces per room.

Table 6.2: Peak Parking Occupancy Rates

Reference	Parking Rates
Average surveyed rate (current study)	• 0.28 spaces per boarding room

Appendix A

Summary Table of Key Statistics and Ratios

Appendix A - Summary Table of Key Statistics and Ratios

Site ID:	Sydney Metropolitan Area								Regional Area		
	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11
Address	88 Joseph Street, Lidcombe	80 Parramatta Road, Camperdown	2506 Bundaleer Street, Belrose	42 Chapel Street, St Marys	1274 Botany Road, Botany	111 Woodville Road, Granville	391-393 Kingsway, Caringbah	20 Moore Street, Campbelltown	6 Gwynne Street, Gwynneville	4 Landy Drive, Mount Warrigal	748 Pacific Highway, Marks Point
Site Details											
Site area (m²)	608	622	16,411	625	929	1,182	1,277	961	1,012	557	925
GFA (m²)	-	2,006	2,000	634	-	-	1,065	528	491	276	-
Number of Rooms	10	57	35	16	14	23	65	17	23	8	8
Other Land Uses	None	Ground floor retail	None	None	None	None	None	None	None	None	None
Adjacent road AM peak hour	07:15 to 08:15	09:00 to 10:00	08:15 to 09:15	07:45 to 08:45	08:15 to 09:15	09:00 to 10:00	08:15 to 09:15	08:15 to 09:15	08:15 to 09:15	08:15 to 09:15	11:45 to 12:45
Adjacent road PM peak hour	17:30 to 18:30	18:00 to 19:00	14:15 to 15:15	14:00 to 15:00	16:15 to 17:15	14:15 to 15:15	17:00 to 18:00	16:15 to 17:15	17:00 to 18:00	14:45 to 15:45	14:15 to 15:15
On-site parking:											
Car Parking (incl. accessible spaces)	2	9	27	3	7	12	33	4	6	4	8
- Accessible Parking	0	0	1	0	1	1	2	1	0	1	0
Bicycle Parking	0	10	9	3	3	5	14	4	25	6	0
Motorcycle Parking	0	5	5	3	3	5	14	0	0	2	0
Person Trips:											
Peak 1-hour person-trips	10	24	18	10	12	21	23	7	11	10	9
Time of peak 1-hour person-trips	10:15 to 11:15	11:30 to 12:30	18:15 to 19:15	12:45 to 13:45	15:45 to 16:45	11:45 to 12:45	18:45 to 19:45	14:30 to 15:30	11:15 to 12:15	10:45 to 11:45	13:15 to 14:15
Peak person-trips per room	1.00	0.42	0.51	0.63	0.86	0.91	0.35	0.41	0.48	1.25	1.13
Peak person-trips per 100m2 GFA	-	1.20	0.90	1.58	-	-	2.16	1.33	2.24	3.62	-
Peak person-trips per car space	5.00	2.67	0.67	3.33	1.71	1.75	0.70	1.75	1.83	2.50	1.13
Total daily person-trips	31	165	103	19	53	93	165	40	68	24	35
Total daily person-trips per room	3.10	2.89	2.94	1.19	3.79	4.04	2.54	2.35	2.96	3.00	4.38
Total daily person-trips per 100m2 GFA	-	8.23	5.15	3.00	-	-	15.49	7.58	13.85	8.70	-
Total daily person-trips per car space	15.50	18.33	3.81	6.33	7.57	7.75	5.00	10.00	11.33	6.00	4.38
Person-trips during adjacent road AM peak	0	16	9	1	1	3	8	1	7	0	1
Person-trips during adjacent road PM peak	4	18	3	0	6	2	13	7	8	1	1
Vehicle Trips (on-site only)											
Peak 1-hour vehicle-trips	2	4	11	2	2	3	7	4	2	4	2
Peak vehicle-trips per room	0.20	0.07	0.31	0.13	0.14	0.13	0.11	0.24	0.09	0.50	0.25
Peak vehicle-trips per 100m2 GFA	-	0.20	0.55	0.32	-	-	0.66	0.76	0.41	1.45	-
Peak vehicle-trips per car space	1.00	0.44	0.41	0.67	0.29	0.25	0.21	1.00	0.33	1.00	0.25
Total daily vehicle-trips	2	15	56	4	13	31	52	18	14	8	14
Total daily vehicle-trips per room	0.20	0.26	1.60	0.25	0.93	1.35	0.80	1.06	0.61	1.00	1.75
Total daily vehicle-trips per 100m2 GFA	-	0.75	2.80	0.63	-	-	4.88	3.41	2.85	2.90	-
Total daily vehicle-trips per car space	1.00	1.67	2.07	1.33	1.86	2.58	1.58	4.50	2.33	2.00	1.75
Vehicle-trips during adjacent road AM peak	0	1	7	0	0	2	2	1	2	0	1
Vehicle-trips during adjacent road PM peak	0	1	2	0	1	0	7	4	1	1	1
Average vehicle occupancy	1.00	1.87	1.09	2.50	1.38	1.06	1.00	1.17	1.14	1.00	1.00
Peak parking accumulation	3	7	11	0	5	9	0	5	5	3	6
- % of vehicle parking capacity	150%	78%	41%	0%	71%	75%	0%	125%	83%	75%	75%
Vehicle Trips (on-street estimate)											
Peak 1-hour vehicle-trips	2	2	6	0	2	14	0	0	9	0	7
Peak vehicle-trips per room	0.20	0.04	0.17	0.00	0.14	0.61	0.00	0.00	0.39	0.00	0.88
Peak vehicle-trips per 100m2 GFA	-	0.10	0.30	0.00	-	-	0.00	0.00	1.83	0.00	-
Peak vehicle-trips per car space	1.00	0.22	0.22	0.00	0.29	1.17	0.00	0.00	1.50	0.00	0.88
Total daily vehicle-trips	6	8	35	0	7	45	0	1	49	0	21
Total daily vehicle-trips per room	0.60	0.14	1.00	0.00	0.50	1.96	0.00	0.06	2.13	0.00	2.63
Total daily vehicle-trips per 100m2 GFA	-	0.40	1.75	0.00	-	-	0.00	0.19	9.98	0.00	-
Total daily vehicle-trips per car space	3.00	0.89	1.30	0.00	1.00	3.75	0.00	0.25	8.17	0.00	2.63
Vehicle-trips during adjacent road AM peak	0	1	2	0	0	1	0	0	5	0	0
Vehicle-trips during adjacent road PM peak	1	1	1	0	1	2	0	0	6	0	0
Vehicle Trips (on-site + on-street estimate)											
Peak 1-hour vehicle-trips	4	6	17	2	4	16	7	4	10	4	9
Time of peak 1-hour vehicle-trips	09:45 to 10:45	17:15 to 18:15	18:30 to 19:30	12:30 to 13:30	15:30 to 16:30	11:45 to 12:45	17:00 to 18:00	16:15 to 17:15	11:15 to 12:15	10:45 to 11:45	13:15 to 14:15
Peak vehicle-trips per room	0.40	0.11	0.49	0.13	0.29	0.70	0.11	0.24	0.43	0.50	1.13
Peak vehicle-trips per 100m2 GFA	-	0.30	0.85	0.32	-	-	0.66	0.76	2.04	1.45	-
Peak vehicle-trips per car space	2.00	0.67	0.63	0.67	0.57	1.33	0.21	1.00	1.67	1.00	1.13
Total daily vehicle-trips	8	23	91	4	20	76	52	19	63	8	35
Total daily vehicle-trips per room	0.80	0.40	2.60	0.25	1.43	3.30	0.80	1.12	2.74	1.00	4.38
Total daily vehicle-trips per 100m2 GFA	-	1.15	4.55	0.63	-	-	4.88	3.60	12.83	2.90	-
Total daily vehicle-trips per car space	4.00	2.56	3.37	1.33	2.86	6.33	1.58	4.75	10.50	2.00	4.38
Vehicle-trips during adjacent road AM peak	0	2	9	0	0	3	2	1	7	0	1
Vehicle-trips during adjacent road PM peak	1	2	3	0	2	2	7	4	8	1	1
% of total trips by travel mode:											
- %Car	38%	13%	82%	50%	40%	76%	8%	43%	90%	10%	100%
- %Public Transport	23%	33%	1%	50%	0%	9%	0%	7%	1%	10%	0%
- %Walk/Cycle	37%	54%	13%	0%	60%	9%	92%	50%	9%	80%	0%
- %Taxi/Ride Share	2%	0%	5%	0%	0%	6%	0%	0%	1%	0%	0%

Appendix B

Detailed Multiple Regression Analysis Results

A. DAILY VEHICLE TRIPS
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.702747231
R Square	0.49385367
Adjusted R Square	0.367317088
Standard Error	23.7510334
Observations	11

ANOVA

	df	SS	MS	F	Significance F
Regression	2	4403.289116	2201.644558	3.902852921	0.065630297
Residual	8	4512.892702	564.1115878		
Total	10	8916.181818			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	19.96896034	12.06209489	1.655513451	0.136414157	-7.846280352	47.78420103	-7.846280352	47.78420103
A	-0.431580302	0.569963305	-0.757207171	0.470637319	-1.745918042	0.882757437	-1.745918042	0.882757437
B	2.595283476	1.092389934	2.375784868	0.04483971	0.076227771	5.114339181	0.076227771	5.114339181

B. SITE AM PEAK VEHICLE TRIPS
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.350019739
R Square	0.122513818
Adjusted R Square	-0.096857728
Standard Error	4.709189843
Observations	11

ANOVA

	df	SS	MS	F	Significance F
Regression	2	24.77006638	12.38503319	0.558476338	0.592872281
Residual	8	177.4117518	22.17646898		
Total	10	202.1818182			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	4.30804398	2.391588347	1.801331732	0.109330237	-1.206968639	9.823056599	-1.206968639	9.823056599
A	-0.017515183	0.113008363	-0.154990146	0.880668166	-0.278112936	0.24308257	-0.278112936	0.24308257
B	0.177788754	0.216591484	0.820848308	0.435508294	-0.321672105	0.677249612	-0.321672105	0.677249612

C. SITE PM PEAK VEHICLE TRIPS
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.651303751
R Square	0.424196577
Adjusted R Square	0.280245721
Standard Error	4.100741061
Observations	11

ANOVA

	df	SS	MS	F	Significance F
Regression	2	99.10774564	49.55387282	2.946815246	0.109925126
Residual	8	134.528618	16.81607725		
Total	10	233.6363636			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	4.652670235	2.082584237	2.234085014	0.055939329	-0.149777628	9.455118099	-0.149777628	9.455118099
A	-0.083754097	0.098407168	-0.85109752	0.419459528	-0.310681432	0.143173239	-0.310681432	0.143173239
B	0.408145722	0.188606878	2.164002324	0.062399031	-0.026782518	0.843073962	-0.026782518	0.843073962

D. NETWORK AM PEAK VEHICLE TRIPS
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.510685244
R Square	0.260799419
Adjusted R Square	0.075999273
Standard Error	2.918493909
Observations	11

ANOVA

	df	SS	MS	F	Significance F
Regression	2	24.04096461	12.0204823	1.411251157	0.298572083
Residual	8	68.14085358	8.517606697		
Total	10	92.18181818			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.897065882	1.482173422	0.605236789	0.56179334	-2.520832158	4.314963923	-2.520832158	4.314963923
A	-0.019066131	0.070036297	-0.272232141	0.79233776	-0.180570122	0.14243786	-0.180570122	0.14243786
B	0.177343717	0.134231354	1.321179533	0.222976989	-0.13219434	0.486881774	-0.13219434	0.486881774

E. NETWORK PM PEAK VEHICLE TRIPS
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.519120289
R Square	0.269485874
Adjusted R Square	0.086857343
Standard Error	2.44817
Observations	11

ANOVA

	df	SS	MS	F	Significance F
Regression	2	17.68807284	8.844036422	1.475595693	0.28478327
Residual	8	47.94829079	5.993536349		
Total	10	65.63636364			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.134692384	1.2433168	0.912633356	0.388110507	-1.732401298	4.001786065	-1.732401298	4.001786065
A	0.04375851	0.058749741	0.744828991	0.477682832	-0.091718636	0.179235657	-0.091718636	0.179235657
B	0.056008999	0.112599575	0.4974175	0.632276323	-0.203646086	0.315664084	-0.203646086	0.315664084