

**TRIP GENERATION SURVEYS
HIGH DENSITY RESIDENTIAL CAR BASED
DATA REPORT
BY BITZIOS CONSULTING**

**FOR
ROADS AND MARITIME SERVICES NSW**

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1. INTRODUCTION

1.1 BACKGROUND

Roads and Maritime Services, NSW commissioned Bitzios Consulting to undertake a trip generation and parking demand survey and analysis of Car-Based High Density Residential buildings. The *Roads and Maritime Guide to Traffic Generating Developments – 2002* (hereafter referred to as the *Guide*), contains traffic generation and parking demand information based on surveys completed in 1993. This has recently been updated in a 2013 Technical Direction of the *Guide* based on a 2012 study.

Roads and Maritime recognised that previous studies have looked at sites generally close to high frequency - high capacity public transport. In recent years there has been a trend towards higher density residential developments along corridors not necessarily well serviced by public transport. Roads and Maritime identified that new data is required focusing on residential developments that are considered “Car-Based” due to potential differences in the trip generation and parking generation compared to developments in public transport orientated centres. Key considerations in identifying the need for this study include:

- awareness that previous (2012) surveys did not adequately reflect differences in regional areas;
- recognition that previous (2012) surveys did not adequately account for accessibility to public transport;
- changing demographics with an aging population and smaller average household sizes;
- housing affordability trends and the tendency for some younger people to stay living in the family home longer;
- higher residential densities;
- increases in car ownership;
- impacts of higher fuel costs;
- changing work and leisure patterns;
- increases in the average age for obtaining a drivers licence;
- increased awareness of child safety prompting more families driving children to school;
- generational change where driving distances reduce; and
- changing School-bound travel patterns.

1.2 SCOPE

The scope of this study included:

- identifying a suitable sample of high density residential developments that are not well served by public transport within greater Sydney and NSW regional areas, with a sufficient sample size and development variety to provide confidence in the results;
- collecting relevant background data for each site (e.g. number of units, ground floor developments, on-site parking availability);
- surveying each site to collect all-mode trip generation data;
- assembling information on all-mode trip generation and parking demand data;
- tabulating and analysing the collected data to establish key statistical relationships;
- comparing the data analysis findings with those in the *Guide* and in the 2012 study; and
- presenting the results and recommendations in a Data Report and Analysis Report.

This report refers to data collected from the survey sites and should be read in conjunction with its companion Data Report. This report presents the results of the analysis of the data and provides conclusions and recommendations for consideration determining appropriate trip, traffic and parking generation rates for sites across NSW.

1.3 DEFINITION OF KEY TERMS

Roads and Maritime – Roads and Maritime Services NSW

Trip Generation – Generation of trips undertaken by individuals, including pedestrian, cyclist or persons.

Traffic Generation – Individual vehicle trips regardless of number of persons within the vehicle.

1.4 PROJECT CHALLENGES AND RESPONSES

Table 1.1 summarises challenges that occurred during the course of this project and the steps taken to address them.

Table 1.1: Addressing Project Challenges

Challenges	Steps Taken
Identifying sites that meet Roads and Maritime criteria (i.e. distance from Public Transport), particularly within the Sydney Metropolitan Area.	Analysis of public transport routes and maps, discussions with Roads and Maritime and looking for sites in alternative locations. Over 80 sites were referred to Roads and Maritime for approval.
Contacting building or strata managers in to gain permission to undertake surveys and receiving approval.	Site visits to all selected locations in conjunction with numerous phone calls and emails to various contacts connected to each site.
Ensuring a <i>typical</i> weekday and weekend was surveyed for each site.	Surveys were undertaken outside of School Holiday periods: <ul style="list-style-type: none"> ▪ Gold Coast sites – 20/04/17 to 31/06/17; and ▪ Sydney/NSW – 15/06/17 to 01/07/17.
Timing challenges impacting sub-contracted survey teams.	Due to challenges around survey timing and in contacting each site for permission an additional survey team was introduced.
Building or strata managers providing site information. Some sites required strata meetings to be held before data was provided, others preferred to only provide limited datasets.	Along with phone calls and emails to the relevant contacts, site visits and aerial imagery was utilised to source as much data on each site as possible.
The large number of survey sites increased the likelihood of data collection errors or corrupted datasets.	Where possible, additional surveys were undertaken to correct probably data errors. All other errors were noted within the Data Report and were taken into consideration throughout the data analysis.

2. SITE SELECTION

2.1 CANDIDATE SITES

A total of 84 candidate sites were selected for initial consideration, comprising of 49 within Sydney metropolitan areas and 35 in regional areas. The key criteria used to determine candidate sites included:

- newer developments;
- limited accessibility to major public transport hubs and corridors;
- provides a reasonable geographic spread;
- either owner-occupied units or commercially tenanted;
- greater than six (6) storeys in height;
- range in size (minimum 20 units); and
- no significant traffic generators (e.g. shops) within the residential block.

2.2 SELECTION BASIS

A total of 28 sites were selected from the 84 candidate sites, comprising of 8 Sydney Metropolitan, 9 Sydney Sub-Metropolitan and 11 regional sites. The final selection of sites was based on a number of key factors to ensure that the surveys would provide a meaningful representation of 'car based' residential units, including:

- being at least 1km from rail stations and 500m from bus stops or ferry terminals;
- the availability of on-site parking provision and the relevant building information needed for the dataset;
- the site's proximity to sites in 2012 surveys to allow for some data comparison; and
- ensuring an appropriate level of geographical spread across metropolitan and regional areas.

Metropolitan sites have been defined as those located within built-up areas approximately 8 km from the Sydney CBD. Sites outside this area but within the defined Sydney metropolitan area have been defined as Sub-Metropolitan while the remaining sites across NSW and the Gold Coast have been defined as Regional.

Regional sites have been selected in Wollongong, Central Coast, Newcastle, Coffs Harbour and on the Gold Coast to provide geographical spread across regional areas. A total of four (4) sites were selected on the Gold Coast, QLD to provide alternative comparison data from a regional centre that is historically car based with very limited public transport accessibility.

A total of 15 sites were manually surveyed to provide a full set of information for analysis. A further 13 sites were surveyed automatically using survey cameras. The additional 13 automatic sites augmented traffic and pedestrian movement data to increase the sample sizes for these primary data sets.

Approximate site locations are shown in Figure 2.1.

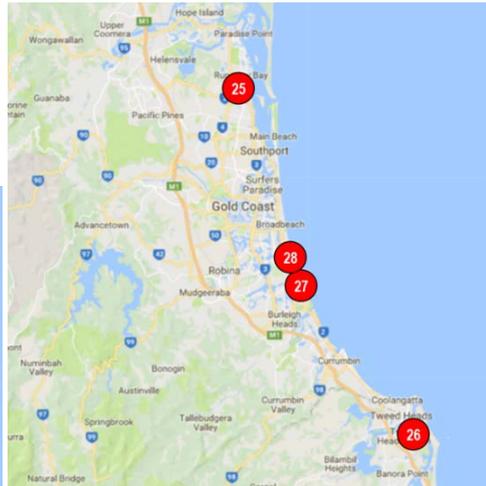
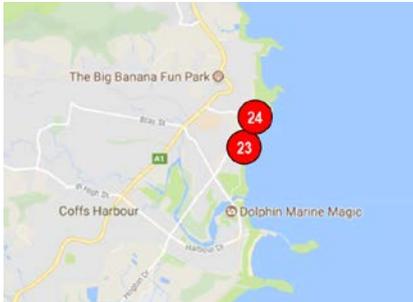
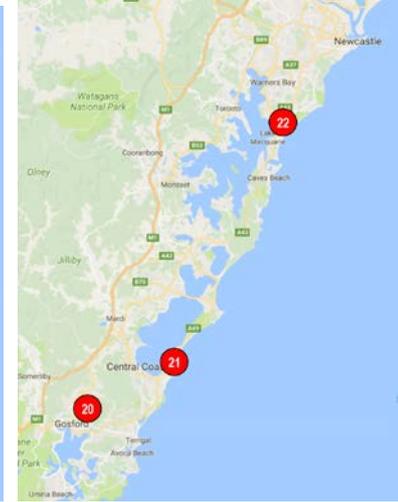
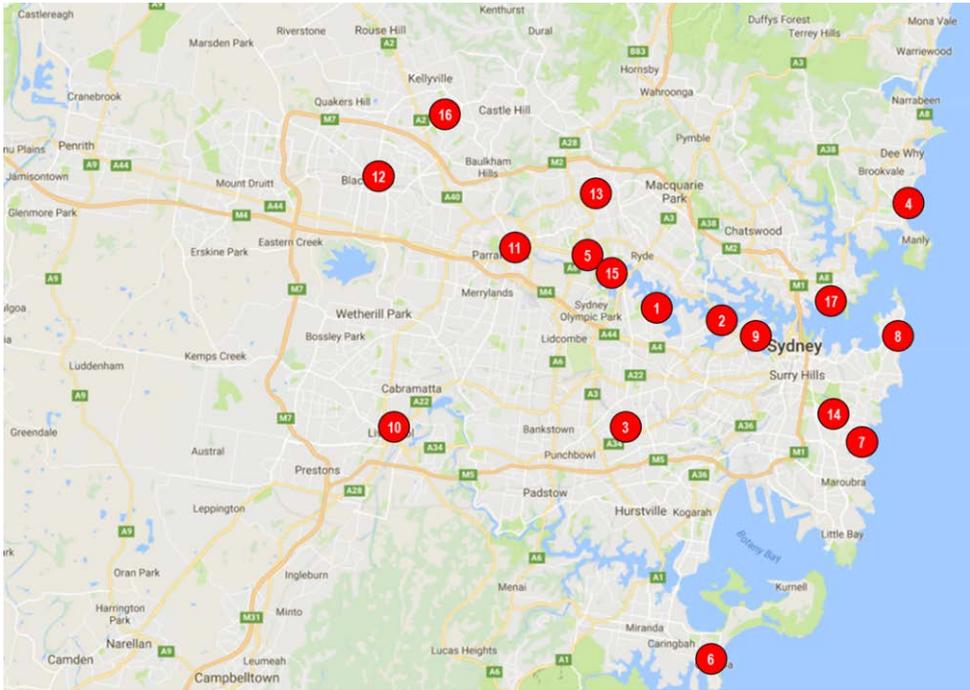


Figure 2.1: Site Locations

3. SURVEY PROCEDURE

3.1 SURVEY SCHEDULE

Surveys were completed for a single weekday and single weekend day at each of the 28 sites, resulting in a total of 56 full days of data. Weekday surveys occurred on a Tuesday or Thursday. Both Saturday or Sunday was used for weekend surveys. All surveys were undertaken between 6:00am and 7:00pm.

Surveys within Sydney and surrounds were undertaken by Austraffic with survey summaries provided in Appendix B. Gold Coast surveys were undertaken by Traffic and Data Control (TDC) with survey summaries provided in Appendix C.

The survey program comprised a mix of manual and automatic counting, parking counts and questionnaire surveys. These include:

- 15 sites were manually surveyed to obtain parking occupancy and to interview residents regarding transport mode split and travel patterns (see Section 3.2);
- one site was manually surveyed for a full weekday and weekend day on the Gold Coast (6.00am – 7.00pm);
- 14 manual surveys were undertaken in the Sydney Metropolitan and Sub-Metropolitan areas. Due to various constraints, parking surveys involved an initial count in the morning and intercept surveys spanned a 2-hour period during the morning peak period (7.00am-9.00am). Full day (6.00am – 7.00pm) traffic and pedestrian movement surveys were conducted in conjunction with the manual surveys; and
- the remaining 13 sites were surveyed using cameras only to count pedestrian and traffic movements.

Traffic counts were conducted on the nearest road (with reasonable traffic volumes) fronting each site, on a week-day and a weekend day.

The surveys were conducted as shown in Table 3.1.

Table 3.1 Survey Types and Location

Site Number	Survey Type	Location	Notes/Comments
1	Manual	Metro	Located in Breakfast Point community area.
2	Manual	Metro	Within 700m walking distance of Ferry, waterfront building.
3	Automatic/ Manual	Sub-Metro	Manual Surveys only undertaken on Weekend due to permissions from site manager. Some inconsistencies in data due to current building security upgrades.
4	Manual	Sub-Metro	Residential parking in individual parking garages. Located close to beach.
5	Manual	Metro	New building with adjacent building under construction.
6	Manual	Sub-Metro	Located in cul-de-sac with good pedestrian facilities nearby.
7	Automatic	Sub-Metro	Coastal building with high pedestrian amenity. No frontage road data collected due to equipment tampering.
8	Manual	Sub-Metro	Located in cul-de-sac with good pedestrian facilities nearby.
9	Manual	Metro	While only 4 story's, building has high density of units. High number of pedestrians noted as using multiple transport modes.
10	Manual	Sub-Metro	High availability of on-street parking in area.
11	Manual	Metro	Adjacent to riverfront.
12	Automatic	Sub-Metro	While in proximity to rail and bus station they are 1km and 500m walking distance from the site respectively. Site location given Roads and Maritime approval.
13	Manual	Sub-Metro	Site is set within Epping Park by Meriton which includes a number of community facilities.
14	Automatic	Metro	No manager response for this site. Site information found online and from site inspection.
15	Automatic	Metro	Adjacent to waterfront active transport facilities. Building site details sourced online due to lack of building manager communication.
16	Automatic	Sub-Metro	Approximately 200m walking distance from small local shops and supermarket.
17	Automatic	Metro	Small number of unrestricted parking spaces on-street.
18	Automatic	Rural	Nearby school bus stop and is within 1km of beach and town centre.
19	Automatic	Rural	Some residents noted to park on-street and adjacent intersection observed as busy during peak times.
20	Manual	Rural	Three apartment towers in gated complex.
21	Automatic	Rural	Building details sourced alternatively due to lack of manager response.
22	Automatic	Rural	Close to shops. Existing on-street parking issues noted by manager.
23	Automatic	Rural	Located adjacent to beach in Coffs Harbour.
24	Automatic	Rural	Located adjacent to beach, some units used as short term rentals (advised that at time of surveys 37 units occupied, all with vehicles)
25	Manual	Rural	Gold Coast site. Car park access restricted due to construction work.
26	Automatic	Rural	No vehicle occupancy data surveyed. Site behind shopping centre.
27	Automatic	Rural	Adjacent to Burleigh Beach with high level of on-street parking.
28	Automatic	Rural	Adjacent to Miami Beach with high level of on-street parking.

The resulting survey dates and times for each Metropolitan and Regional site are shown in Table 3.2 and Table 3.3 respectively.

Table 3.2 Survey Schedule Sydney - Metropolitan

Site No.	Building Name	Address	Year Built	Units	Frontage Road	Weekday Survey Date	Weekend Survey Date
1	Mulberry Hill 25 Market St	25 Market Street, Breakfast Point	2003	40	Tennyson Road	15/06/2017 & 27/06/2017^	17/06/2017 & 25/6/2017^
2	Brackley Gardens	84 St Georges Crescent, Drummoyne	1970	60	St George Crescent	20/06/2017 & 27/06/2017^	18/06/2017 & 25/6/2017^
3*	Shine Apartments	502-518 Canterbury Road, Campsie	2016	95	Canterbury Road	22/06/2017	24/06/2017
4	Pembroke Apartments	20 Bonner Avenue, Manly	1973	64	North Steyne Road	20/06/2017 & 27/06/2017^	18/06/2017 & 25/6/2017^
5	Royal Shores - Safari Building	48-52 Bundarra Street, Ermington	2016	329	Bundarra Street	15/06/2017	17/06/2017
6	Wyuna Apartments	13-17 Coast Ave Cronulla, New South Wales	1969	23	Ewos Parade	20/06/2017 & 27/06/2017^	18/06/2017 & 25/6/2017^
7	-	178-180 Beach Street, Coogee	1968	32	Arden Street	22/06/2017	24/06/2017
8	Vaucluse Waters Apartments	33 Kimberley St, Vaucluse	1963	60	Military Road	20/06/2017 & 27/06/2017^	18/06/2017 & 25/6/2017^
9*	Dockside Apartments	1 Buchanan Street, Balmain	1990/2000	82	Buchanan Street	20/06/2017 & 27/06/2017^	18/06/2017 & 25/6/2017^
10	Natalie Towers Apartments	24 Lachlan St, Liverpool	2014	104	Lachlan Street	15/06/2017	17/06/2017
11	The Promenade Buildings	3 Broughton Street, Parramatta	2016	277	Broughton Street	15/06/2017	17/06/2017
12	Cityview Apartments	2 Bruce Street, Blacktown	2009	32	Boyd Street	22/06/2017	24/06/2017
13*	Epping Park by Meriton (27 and 29 Seven St)	27 Seven St, Epping Park	NA	76	Mobbs Lane	15/06/2017	17/06/2017
14*	The Mile Post	96 Alison Rd, Randwick	NA	32	Alison Road	20/06/2017	18/06/2017
15*	St Tropez Apartments	8 Marine Parade, Wentworth	2012/2013	45	Hill Road south of Baywater Drive	15/06/2017	17/06/2017
16	Watermark Apartments	38 Solent Circuit, Baulkham	2015/2016	93	Solent Circuit	20/06/2017	18/06/2017
17	-	17 Raglan Street, Mosman	1969/1970	48	Raglan Street	20/06/2017 & 27/06/2017^	18/06/2017 & 25/6/2017^

* Information for this site was not provided by building management and estimated using alternative methods.

^ Video Survey Error occurred and additional survey was undertaken.

Table 3.3 Survey Schedule - Regional

Site No.	Building Name	Address	Year Built	Units	Frontage Road	Weekday Survey Date	Weekend Survey Date
18	Viridian	32-34 Church St, Wollongong NSW	2015	34	Church Street	22/06/2017	24/06/2017
19	Beaches Apartments - Towradgi Balmoral Building	1 Grand Court, Fairy Meadow, Wollongong NSW	2013	44	Grand Court, Fairy Meadow	22/06/2017 & 29/06/2017 [^]	24/06/2017 & 01/07/2017 [^]
20	The Sanctuary at Rumbalara	80 John Whiteway Drive, Gosford, Central Coast NSW	2004	188	John Whiteway Drive	22/06/2017	24/06/2017
21*	Crystal Views	65 Ocean Parade, The Entrance, Central Coast NSW	NA	30	Ocean Parade	22/06/2017	24/06/2017
22	Belmont Towers	46 Brooks Parade, Belmont, Newcastle NSW	1974	27	Macquire Street	22/06/2017	24/06/2017
23	Tradewind Apartments	77-79 Ocean Parade, Coffs Harbour NSW	1975	30	Ocean Parade	22/06/2017	24/06/2017
24	Pacific Towers Resort	121 Ocean Parade, Coffs Harbour NSW	1982	61	Ocean Parade	22/06/2017	24/06/2017
25	Marina Shores	Marina Shores, Harbourside Court, Biggera Waters QLD	2015	192	Oxley Road	20/04/2017	22/04/2017
26	Pinehurst Apartments	22 Davey St, Tweed Heads NSW	Early 1980s	71	Davey Street	27/04/2017	29/04/2017
27	Koolamara Apartments	194-198 The Esplanade, Burleigh Heads QLD	NA	24	The Esplanade	20/04/2017	22/04/2017
28*	Ceol Na Mara	90 Marine Parade, Miami QLD	NA	26	Marine Parade	01/06/2017	03/06/2017

* Information for this site was not provided by building management and estimated using alternative methods.

[^] Video Survey Error occurred and additional survey was undertaken.

3.2 DATA COLLECTION SURVEYS

The following data was collected during the surveys:

- number of entering and exiting vehicles (cars/heavy vehicles) (in 15-minute periods);
- number of vehicle occupants (in 15-minute periods);
- number of pedestrians and cyclists (in 15-minute periods);
- the time that a vehicle enters the site;
- the time that a vehicle exits the site; and
- the number of vehicles passing the site (in 15-minute blocks).

In addition to the above data, 15 selected sites were manually surveyed for parking occupancy and to ask residents four questions aimed at determining trip mode and usage of on-street parking. The questions were:

1. "Are you catching public transport or did you use public transport?"
2. If Yes to Question 1 – "What mode of public transport? - Bus (B)/Train (T)/Taxi or Uber (U)"
3. "Do you have a car that you drive at other times?"
4. "If you have a car that you use at other times, do you park in the car park here or on the street?"

3.3 SITE INFORMATION

The following additional site information was collected for each building:

- year the building was constructed;
- on-site parking availability;
- parking allocation to residents, visitors, service vehicles, disabled and other;
- number of units by 1 bedroom, 2 bedroom and 3+ bedroom sizes;
- building occupancy levels; and
- number of residents.

In addition to the above, each building's footprint area was estimated using NSW Globe Imagery data.

Local Council information and on-site observations were used where information was not available or not provided by building managers. Sites where information was sourced in this manner are noted in Table 3.2 and Table 3.3.

4. SURVEY RESULTS

The quantum of survey data collected on-site for this study is extremely large and as such this report contains a summary only of the trip generation for each sites AM and PM peak periods for weekdays and a single peak period (typically Midday) for weekend data. The complete survey records will be provided as a separate issue with summaries for individual sites provided in Appendix B and Appendix C. Preliminary data analysis summaries for all individual outlets are contained in Appendix A and include site information, trip generation derived from both traffic counts and manual survey results, parking, frontage road traffic counts and development traffic mode splits.

4.1 PRELIMINARY DATA VERIFICATION

4.1.1 Previous Roads and Maritime Services Surveys

Survey data and key derived statistics have been cross-checked against data contained in the *Guide, 2013 Technical Direction – GHD Survey based* to check for expected consistencies.

A further comparison was undertaken for those sites that are located in proximity to those selected for the previous 2012 traffic surveys. The purpose of this comparison is for expected consistencies and variations and to identify any erroneous data. The traffic generation rates derived from this study differ slightly with results from the 2012 study. This was expected due to the site parameters for each study, however the data appears consistent across the three previous studies traffic generation rates.

Table 4.1 below shows a comparison of resulting peak period traffic generation rates per unit with previous studies. The comparison sites were chosen based on their proximity to previous study sites.

Table 4.1 Site Specific Comparison of Traffic Generation with Previous Roads and Maritime Services Study

Site Number	Peak Period Traffic Generation	2012 Site Number	2012 Study - Peak Period Traffic Generation
6	23 units, 0.35 trips per unit (AM), 0.43 trips per unit (PM)	3	28 units, 0.07 trips per unit (AM), 0.11 trips per unit (PM)
9	82 units, 0.25 trips per unit (AM), 0.3 trips per unit (PM)	10	131 units, 0.18 trips per unit (AM), 0.1 trips per unit (PM)
11	277 units, 0.22 trips per unit (AM), 0.31 trips per unit (PM)	5	83 units, 0.27 trips per unit (AM), 0.12 trips per unit (PM)
15	154 units, 0.29 trips per unit (AM), 0.30 trips per unit (PM)	6	64 units, 0.28 trips per unit (AM), 0.41 trips per unit (PM)
18	34 units, 0.49 trips per unit (AM), 0.51 trips per unit (PM)	9	9 units, 0.67 trips per unit (AM), 0.22 trips per unit (PM)
22	27 units, 0.30 trips per unit (AM), 0.30 trips per unit (PM)	8	108 units, 0.39 trips per unit (AM), 0.42 trips per unit (PM)

Note: Sites selected for comparison from this study are located in similar locations in the 2012 study.

The comparison shows that in general, traffic generation is lower for buildings located close to public transport (2012 study) than those further away (this study) for Metropolitan sites in Sydney.

The relationships between AM peak and PM peak rates, and the rates in general are far more consistent in the 2017 data compared to the 2012 data.

Table 4.2 compares 2017 traffic generation surveys resulting rates with previously published Roads and Maritime Services defined traffic generation rates from a *2013 Roads and Maritime Services Technical Direction* and the *Roads and Maritime Services Guide to Traffic Generating Developments - 2002*.

Table 4.2: Comparison with Previous Roads and Maritime Services Defined Traffic Generation Rates

Weekday Trip Generation Rates	Bitzios 2017 Surveys Sydney Metropolitan Average	Bitzios 2017 Surveys Sub-Metropolitan Average	Bitzios 2017 Surveys Regional Average	Roads and Maritime Services Technical Direction – 2013 Sydney Average	Roads and Maritime Services Technical Direction - 2013 Regional Average	Roads and Maritime Services Guide – 2002 Peak Trips Metropolitan centres	Roads and Maritime Services Guide – 2002 Peak Trips Sub-Regional Centres
AM peak (1 hour) vehicle trips per unit	0.26	0.28	0.31	0.19	0.53	0.24 trips per unit	0.29 trips per unit
AM peak (1 hour) vehicle trips per car space	0.19	0.21	0.21	0.15	0.35	0.24 trips per unit	0.29 trips per unit
AM peak (1 hour) vehicle trips per bedroom	0.10	0.11	0.16	0.09	0.21	0.24 trips per unit	0.29 trips per unit
PM peak (1 hour) vehicle trips per unit	0.29	0.34	0.32	0.15	0.32	0.24 trips per unit	0.29 trips per unit
PM peak (1hour) vehicle trips per car space	0.23	0.25	0.22	0.12	0.26	0.24 trips per unit	0.29 trips per unit
PM peak (1 hour) vehicle trips per bedroom	0.10	0.13	0.16	0.07	0.15	0.24 trips per unit	0.29 trips per unit
Daily vehicle trips per unit	1.97	2.15	2.37	1.52	4.58	0.24 trips per unit	0.29 trips per unit
Daily vehicle trips per car space	1.50	1.58	1.59	1.34	3.22	0.24 trips per unit	0.29 trips per unit
Daily vehicle trips per bedroom	0.74	0.80	1.30	0.72	1.93	0.24 trips per unit	0.29 trips per unit

As shown above, traffic generation rates found in the 2017 study are more consistent with the *Guide – 2002 Edition* than those within the 2013 Technical Direction. This is likely due to the focus of the 2017 study being on developments with limited access to public transport. Furthermore, historical trip rate and travel trends would typically be expected to remain similar at sites away from public transport than those that have been provided with improved public transport options over time.

4.1.2 Other Sources

In order to provide a detailed comparison, surveyed traffic generation and volumes were compared with a number of other traffic data sources, including *Institute of Transportation Engineers (ITE) Trip Generation Rates – 8th Edition* and *QLD government datasets (provided by online database)*.

Table 4.3 summarises the recommended ITE vehicle trip generation rates for High Rise Apartments and the resulting average traffic generation rates in this assessment (Bitzios 2017) for each geographical area.

Table 4.3: Traffic Generation Comparison with ITE Rates

Period	2017 Survey Rate Sydney Metropolitan Average (per unit)	2017 Survey Rate Sub-Metropolitan Average (per unit)	2017 Survey Rate Regional Average (per unit)	ITE Rate High Rise Apartments (per unit)
Weekday	1.97	2.15	2.37	4.2
AM	0.26	0.28	0.31	0.3
PM	0.29	0.34	0.32	0.35

ITE rates recommend a significantly higher daily generation rate however peak period rates align with Sub-Metropolitan and Regional site averages.

QLD traffic data relating to high density residential apartments is available via an online database. Relevant high density residential building traffic volume data was found for surveys within Brisbane City suburbs, completed in March 2017. Each survey was one week in length. A comparison of Bitzios 2017 surveys in Sydney with QLD data surveys in Brisbane is provided Table 4.4. The sites selected for comparison are those of a similar size (i.e. number of bedrooms).

Table 4.4: Surveyed Traffic Volumes Comparison with QLD Traffic Data

	Site Number	Location	Total Bedrooms	Weekday Volume	Weekend Volume	Weekday Peak Volume	Weekend Peak Volume
2017 Site Surveys	Site 17	Mosman	103	69	84	8	12
2017 Site Surveys	Site 8	Vaucluse	120	55	110	6	17
2017 Site Surveys	Site 2	Drummoyne	127	79	86	11	14
2017 Site Surveys	Site 4	Manly	190	142	101	19	16
2017 Site Surveys	Site 26	Tweed Heads	213	301	205	34	47
QLD Data - 2017	NA	Woolloongabba	107	350	286	31	27
QLD Data - 2017	NA	Kangaroo Point	118	194	205	18	20
QLD Data - 2017	NA	Kangaroo Point	148	146	149	20	20
QLD Data - 2017	NA	Kangaroo Point	200	325	320	32	32
QLD Data - 2017	NA	Eagle Farm	263	407	353	46	33

Brisbane sites typically have much higher daily traffic volumes on both weekdays and weekends than the selected Sydney sites of similar size. However, Site 26 in Tweed Heads, NSW appears to align more with the results from Brisbane sites.

4.2 PRELIMINARY ANALYSIS AND KEY STATISTICS

The key outputs of the surveys including factors that impact the road network such as vehicle and person trip generation, development and frontage road peak periods, number of units and pedestrian trips have been summarised in this section.

4.2.1 Sydney Metropolitan

The weekday and weekend surveys conducted for sites within the Sydney Metropolitan Area have been examined to identify key findings and trends in trip generation and associated factors. Initial examination of data indicates that weekday site peaks are typically between 7.00am-9.00am and 4.00pm-6.30pm, while weekend peaks have a greater variation between 11.30am -3.00pm. Whilst the weekend surveys were conducted Saturday and Sunday, it is noted there is no typical variation or trend between Saturday or Sunday peaks. It was also noted a trend of development traffic peaks not aligning with the frontage road peak periods.

Table 4.5 Metropolitan Sites Summary – Weekday

Site Number	Number of Units	Development AM Peak	Development PM Peak	Frontage Road AM Peak	Frontage Road PM Peak	Daily Person Trips (6:00am to 7:00pm)	Daily Vehicle Trips (6:00am to 7:00pm)	Vehicle Trips (inc on-street)	AM Peak Hour Trips per Unit	PM Peak Hour Trips per Unit	AM Peak Hour Trips per Parking Space	PM Peak Hour Trips per Parking Space	Daily Pedestrian Mode Split (6:00am to 7:00pm) ^
1	40	7:15 - 8:15 AM	5:15 - 6:15 PM	7:15 - 8:15 AM	5:30 - 6:30 PM	247	127	181	0.520	0.370	0.17	0.120	48%
2	60	7:30 - 8:30 AM	3:45 - 4:45 PM	7:30 - 8:30 AM	5:45 - 6:45 PM	101	79	83	0.210	0.190	0.2	0.180	21%
5	329	7:30 - 8:30 AM	5:00 - 6:00 PM	8:00 - 9:00 AM	5:15 - 6:15 PM	367	258	321	0.090	0.120	0.16	0.210	28%
9	82	7:00 - 8:00 AM	5:30 - 6:30 PM	8:00 - 9:00 AM	5:30 - 6:30 PM	292	164	191	0.250	0.300	0.25	0.300	40%
11	277	7:15 - 8:15 AM	5:30 - 6:30 PM	7:45 - 8:45 AM	3:00 - 4:00 PM	765	590	628	0.220	0.310	0.14	0.210	30%
14*	32	6:30 - 7:30 AM	5:15 - 6:15 PM	6:45 - 7:45 AM	5:00 - 6:00 PM	102	85	Data Unavailable	0.280	0.560	0.25	0.500	0%
15*	154	7:45 - 8:45 AM	5:45 - 6:45 PM	7:30 - 8:30 AM	4:45 - 5:45 PM	451	347	Data Unavailable	0.299	0.305	NA	NA	20%
17*	49	8:30 - 9:30 AM	5:15 - 6:15 PM	11:00 AM - 12:00 PM	12:15 - 1:15 PM	72	69	Data Unavailable	0.230	0.170	0.17	0.120	0%

* No manual surveys

^ Surveyed pedestrian trips divided by daily person trips

Table 4.6 Metropolitan Sites Summary – Weekend

Site Number	Number of Units	Development Peak	Frontage Road Peak	Day Surveyed	Daily Person Trips (6:00am to 7:00pm)	Daily Vehicle Trips (6:00am to 7:00pm)	Weekend Vehicle Trips (Inc on street)	Weekend Peak Hour Trips per Unit	Weekend Peak Hour Trips per Parking Space	Daily Pedestrian Mode Split (6:00am to 7:00pm) ^
1	40	12:30 PM - 1:30 PM	11:45 AM - 12:45 PM	Saturday	290	115	115	0.425	0.139	53%
2	60	9:45 AM - 10:45 AM	11:00 AM - 12:00 PM	Sunday	248	86	86	0.233	0.233	59%
5	329	10:15 AM - 11:15 AM	2:00 PM - 3:00 PM	Saturday	430	289	333	0.109	0.190	30%
9	82	3:00 PM - 4:00 PM	11:30 AM - 12:30 PM	Sunday	318	128	145	0.232	0.226	58%
11	277	12:15 PM - 1:15 PM	12:45 PM - 1:45 PM	Saturday	971	581	620	0.245	0.159	40%
14*	32	10:00 AM - 11:00 AM	4:00 PM - 5:00 PM	Sunday	127	94	-	0.500	0.444	0%
15*	154	4:45 PM - 5:45 PM	12:30 AM - 1:30 PM	Saturday	493	405	-	0.331	NA	15%
17*	48	12:00 AM - 1:00 PM	11:45 AM - 12:45 PM	Sunday	89	84	-	0.250	0.185	0%

* No manual surveys

^ Surveyed pedestrian trips divided by daily person trips

Initial examination of the weekday data for Metropolitan sites shown in Table 4.5 indicates that:

- the average development AM peak occurs between 7:00am - 8:00am;
- the average development PM peak occurs between 5:15pm – 6:15pm;
- when compared to the frontage road peak periods, the site's peak periods typically differed by 15-30mins;
- the AM peak vehicle trips per unit have an average of 0.26, with two outlying data points of 0.5 and 0.09;
- the PM peak vehicle trips per unit have an average of 0.32, with data points ranging from 0.12 and 0.56;
- based on questionnaire response data, a high number of residents have been approximated to park on-street for larger developments; and
- weekday daily trips were marginally lower than those on the weekend for person trips, vehicles and pedestrian modes.

Initial examination of the weekend data for Metropolitan Sites shown in Table 4.6 indicates that:

- the average development weekend peak occurs at lunch time;
- when compared to the frontage road peak, the development site peaks typically differed by up to an hour however many occurred at the same time;
- there is no discernible variation when comparing Saturday and Sunday peak periods;
- the weekend peak vehicle trips per unit have an average of 0.29, with data points ranging from 0.12 and 0.50; and
- sites typically have a high number of vehicle, person and pedestrian trips on weekends.

4.2.2 Sub-Metropolitan Sites

The weekday and weekend surveys conducted for Sub-Metropolitan sites have been examined to identify key findings and trends in trip generation and associated factors. Initial examination of data indicates that weekday site peaks are typically between 8.00am-10.00am and 3.00pm-5.30pm, while weekend peaks varied greatly between 10.00am-6.00pm. Whilst the weekend surveys were conducted Saturday and Sunday, it is noted there is no typical variation or trend between Saturday or Sunday peaks. A trend was also noted where development traffic peaks do not align with the frontage road peak periods.

Table 4.7 Sub-Metro Sites Summary – Weekday

Site Number	Number of Units	Development AM Peak	Development PM Peak	Frontage Road AM Peak	Frontage Road PM Peak	Daily Person Trips (6:00am to 7:00pm)	Daily Vehicle Trips (6:00am to 7:00pm)	Vehicle Trips (inc on-street)	AM Peak Hour Trips per Unit	PM Peak Hour Trips per Unit	AM Peak Hour Trips per Parking Space	PM Peak Hour Trips per Parking Space	Daily Pedestrian Mode Split (6:00am to 7:00pm)***
3*	95	6:45 - 7:45 AM	3:45 - 4:45 PM	7:30 - 8:30 AM	5:00 - 6:00 PM	576	312	-	0.337	0.547	0.224	0.364	41%
4	64	9:30 - 10:30 AM	2:15 - 3:15 PM	8:00 - 9:00 AM	3:45 - 4:45 PM	331	142	228	0.266	0.297	0.227	0.253	56%
6	23	10:15 - 11:15 AM	5:30 - 6:30 PM	8:15 - 9:15 AM	3:45 - 4:45 PM	146	54	89	0.348	0.435	0.320	0.400	60%
7^	32	9:00 - 10:00 AM	1:30 - 2:30 PM	<i>Error in Data Collection</i>	<i>Error in Data Collection</i>	129	29	123	0.107	0.214	0.088	0.176	73%
8	60	6:30 - 7:30 AM	5:15 - 6:15 PM	8:00 - 9:00 AM	4:00 - 5:00 PM	216	55	61	0.200	0.100	0.190	0.095	75%
10	104	9:15 - 10:15 AM	4:30 - 5:30 PM	11:30 AM - 12:30 PM	3:00 - 4:00 PM	527	220	267	0.221	0.250	0.169	0.191	58%
12	32	8:00 - 9:00 AM	5:30 - 6:30 PM	8:14 - 9:15 AM	5:00 - 6:00 PM	208	59	70	0.250	0.406	0.182	0.295	71%
13	76	8:15 - 9:15 AM	4:30 - 5:30 PM	8:00 - 9:00 AM	5:15 - 6:15 PM	398	210	246	0.447	0.382	0.318	0.271	44%
16*	93	7:30 - 8:30 AM	4:15 - 5:15 PM	7:45 - 8:45 AM	5:00 - 6:00 PM	413	275	-	0.398	0.473	0.178	0.212	25%

*No manual surveys

** Errors in the frontage road data

*** Surveyed pedestrian trips divided by daily person trips

^ Weekend Manual Survey Only

Table 4.8 Sub-Metro Sites Summary – Weekend

Site Number	Number of Units	Development Peak	Frontage Road Peak	Day Surveyed	Daily Person Trips (6:00am to 7:00pm)	Daily Vehicle Trips (6:00am to 7:00pm)	Weekend Vehicle Trips (inc on-street)	Weekend Peak Hour Trips per Unit	Weekend Peak Hour Trips per Parking Space	Daily Pedestrian Mode Split (6:00am to 7:00pm)***
3^	95	5:15 - 6:15 PM	4:45 - 5:45 PM	Sunday	459	272	272	0.411	0.273	30%
4	64	3:45 - 4:45 PM	11:30 AM - 12:30 PM	Sunday	152	101	110	0.250	0.213	20%
6	23	11:15 AM - 12:15 PM	10:45 - 11:45 AM	Sunday	127	43	64	0.391	0.360	65%
7^	32	10:30 - 11:30 AM	<i>Error in Data Collection</i>	<i>Sunday</i>	162	28	150	0.219	0.206	75%
8	60	4:45 - 5:45PM	11:45 AM - 12:45 PM	Sunday	399	110	127	0.283	0.270	66%
10	104	4:30 - 5:30 PM	2:15 - 3:15 PM	Saturday	532	209	268	0.279	0.213	61%
12	32	12:45 PM - 1:45 AM	11:45 AM - 12:45 PM	Sunday	170	74	74	0.313	0.227	56%
13	76	9:30 - 10:30AM	11:00 AM - 12:00 PM	Saturday	436	225	225	0.395	0.280	45%
16*	93	10:15 - 11:15 AM	10:30 - 11:30 AM	Sunday	378	221	0	0.301	0.135	34%

* No manual surveys

** Errors in the frontage road data

*** Surveyed pedestrian trips divided by daily person trips

^ Weekend Manual Survey Only

Initial examination of the weekday data for Sub-Metropolitan Sites shown in Table 4.7 indicates that:

- the average development AM peak occurs between 8:00am - 10:00am;
- the average development PM peak occurs between 3:00pm – 5:00pm;
- when compared to the frontage road peak times, the site peak periods typically differed by up to an hour;
- the AM peak vehicle trips per unit have an average of 0.29, with data points ranging from 0.11 and 0.44;
- the PM peak vehicle trips per unit have an average of 0.34, with data points ranging from 0.10 and 0.55; and
- sites consistently have a high number of pedestrian trips, with some counts higher than the number of daily vehicle trips.

Initial examination of the weekend data for Sub-Metropolitan Sites shown in Table 4.8 indicates that:

- the development weekend peak was inconsistent varying across the day between 11:00am and 6:00pm;
- when compared to the frontage road peak times, site peak periods differed considerably;
- there is no discernible variation when comparing Saturday and Sunday peak periods, with both varying inconstantly;
- the weekend peak vehicle trips per unit have an average of 0.32, with data points ranging from 0.22 and 0.41; and
- sites typically have a higher number of vehicle trips than on a weekday and though pedestrian trips increase their proportion of total trips decreases.

4.2.3 Regional Based Sites

The weekday and weekend surveys conducted for sites within Regional Areas have been examined to identify key findings and trends in trip generation and associated factors. Initial examination of data indicates that weekday site peaks are typically between 7.00am-9.00am and 3.30pm-6.30pm, while weekend peaks have a greater variation with some occurring in the morning and some over lunch. Whilst the weekend surveys were conducted Saturday and Sunday, it is noted there is no typical variation or trend between Saturday or Sunday peaks. It was also noted a trend of development traffic peaks not aligning with the frontage road peak periods.

Table 4.9 Regional Sites Summary – Weekday

Site Number	Number of Units	Development AM Peak	Development PM Peak	Frontage Road AM Peak	Frontage Road PM Peak	Daily Person Trips (6:00am to 7:00pm)	Daily Vehicle Trips (6:00am to 7:00pm)	Vehicle Trips (inc on-street)	AM Peak Hour Trips per Unit	PM Peak Hour Trips per Unit	AM Peak Hour Trips per Parking Space	PM Peak Hour Trips per Parking Space	Daily Pedestrian Mode Split (6:00am to 7:00pm) **
18*	34	7:30 - 8:30 AM	5:00 - 6:00 PM	8:15 - 9:15 AM	4:30 - 5:30 PM	277	142	-	0.485	0.515	0.208	0.221	45%
19*	44	11:30 AM - 12:30 PM	12:00 - 1:00 PM	8:00 - 9:00 AM	4:30 - 5:30 PM	281	105	-	0.318	0.318	0.182	0.182	62%
20	188	6:30 - 7:30 AM	6:00 - 7:00 PM	8:00 - 9:00 AM	4:30 - 5:30 PM	579	545	545	0.287	0.335	0.169	0.197	Data Unavailable
21*	30	7:30 - 8:30 AM	3:00 - 4:00 PM	8:15 - 9:15 AM	1:15 - 2:15 PM	114	24	-	0.167	0.133	0.161	0.129	77%
22*	27	10:30 - 11:30 AM	1:15 - 2:15 PM	8:00 - 9:00 AM	3:30 - 4:30 PM	131	49	-	0.296	0.296	0.267	0.267	60%
23*	30	7:15 - 8:15 AM	12:00 - 1:00 PM	12:00 - 1:00 PM	12:15 - 1:15 PM	101	62	-	0.267	0.233	0.200	0.175	38%
24*	61	6:30 - 7:30 AM	6:00 - 7:00 PM	11:00 AM - 12:00 PM	2:30 - 3:30 PM	124	36	-	0.189	0.162	0.076	0.065	65%
25*	192	10:45 - 11:45 AM	4:45 - 5:45 PM	7:45 - 8:45 AM	2:45 - 3:45 PM	1179	848	-	0.448	0.547	0.387	0.473	13%
26*	71	9:15 - 10:15 AM	12:30 PM - 1:30 PM	11:00 AM - 12:00 PM	2:30 - 3:30 PM	40	301	-	0.549	0.479	0.253	0.221	Data Unavailable
27*	24	6:30 - 7:30 AM	5:00 - 6:00 PM	11:15 AM - 12:15 PM	5:00 - 6:00 PM	Data Unavailable	24	-	0.125	0.250	0.125	0.250	Data Unavailable
28*	26	7:15 - 8:15 AM	4:30 - 5:30 PM	7:30 - 8:30 AM	4:15 - 5:15 PM	Data Unavailable	43	-	0.346	0.308	0.300	0.267	Data Unavailable

* No manual surveys

** Surveyed pedestrian trips divided by daily person trips

Table 4.10 Regional Sites Summary – Weekend

Site Number	Number of Units	Development Peak	Frontage Road Peak	Day Surveyed	Daily Person Trips (6:00am to 7:00pm)	Daily Vehicle Trips (6:00am to 7:00pm)	Weekend Vehicle Trips (inc on-street)	Weekend Peak Hour Trips per Unit	Weekend Peak Hour Trips per Parking Space	Daily Pedestrian Mode Spli (6:00am to 7:00pm)**
18*	34	5:15 - 6:15 PM	11:30 AM - 12:30 PM	Sunday	233	106	-	0.471	0.208	51%
19*	44	11:15 AM - 12:15 PM	11:45 AM - 12:45 PM	Sunday	236	98	-	0.341	0.195	54%
20	188	9:30 - 10:30 AM	11:15 AM - 12:15 PM	Saturday	616	595	595	0.356	0.210	Data Unavailable
21*	30	4:00 - 5:00 PM	11:00 AM - 12:00 PM	Saturday	158	43	-	0.400	0.387	70%
22*	27	10:00 - 11:00 AM	11:45 AM - 12:45 PM	Saturday	153	49	-	0.333	0.300	65%
23*	30	8:00 - 9:00 AM	11:45 AM - 12:45 PM	Saturday	193	73	-	0.367	0.275	62%
24*	61	8:00 - 9:00 AM	10:45 - 11:45 AM	Saturday	178	52	-	0.148	0.098	63%
25*	192	4:45 - 5:45 PM	12:15 - 1:15 PM	Saturday	1163	712	-	0.521	0.450	15%
26*	71	1:00 - 2:00 PM	11:00 AM - 12:00 PM	Saturday	Data Unavailable	205	-	0.662	0.305	Data Unavailable
27*	24	8:15 - 9:15 AM	10:30 - 11:30 AM	Saturday	Data Unavailable	13	-	0.167	0.167	Data Unavailable
28*	26	6:45 - 7:45 AM	11:45 AM - 12:45 PM	Saturday	Data Unavailable	37	-	0.269	0.233	Data Unavailable

* No manual surveys

** Surveyed pedestrian trips divided by daily person trips

Initial examination of the weekday data for Regional Sites shown in Table 4.9 indicates that:

- the average development AM peak occurs between 7:00am - 8:00am;
- the average development PM peak occurs between 5:15pm – 6:15pm;
- when compared to the frontage road peak times, the site peak periods typically differed by 15-30mins however in some locations the variation was up to 1 hour;
- the AM peak vehicle trips per unit have an average of 0.32, with data points ranging from 0.13 and 0.55;
- the PM peak vehicle trips per unit have an average of 0.33, with data points ranging from 0.13 and 0.55;
- sites typically have a lower number of pedestrian trips proportionally than metropolitan sites however those site adjacent to the beach had a higher proportion of pedestrian trips; and
- it was also noted that Site 23 (Coffs Harbour) has midday peak for weekday frontage traffic and Site 19 (Wollongong) has a midday peak period for development well outside the typical morning and afternoon times.

Initial examination of the weekend data for Regional Sites shown in Table 4.10 indicates that:

- the average development weekend peak occurs between 11:00am - 12:00am however peak times varied greatly with some site peaks occurring in the morning or late afternoon;
- when compared to the frontage road peak times, the site peak periods typically differed by 15-30mins;
- there is no apparent variation when comparing Saturday and Sunday peak periods;
- the weekend peak vehicle trips per unit have an average of 0.37, with data points ranging from 0.15 and 0.66; and
- sites typically have a high number of pedestrian trips than on weekdays.

4.3 PRELIMINARY COMPARATIVE ANALYSIS

4.3.1 Metropolitan Sites

In Section 4.2.1, the summary data for each Metropolitan Site was presented, including site peak hour traffic generation per unit for individual development peak times. Figure 4.1, Figure 4.2 and Figure 4.3 compare the traffic generation across all metropolitan sites, including an average for comparison, for the AM, PM and Weekend Peak periods respectively.

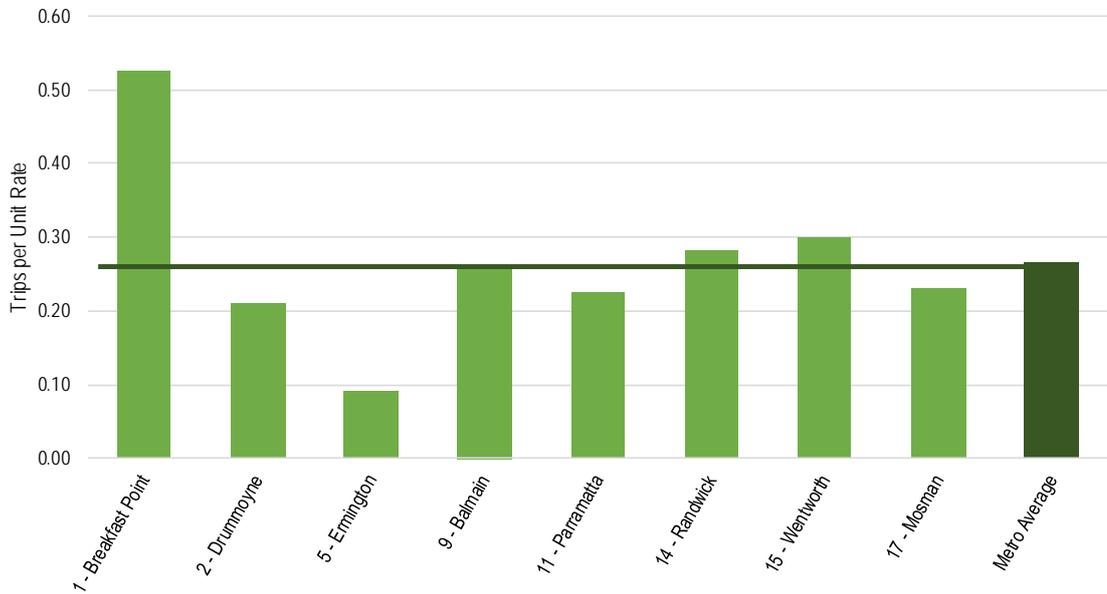


Figure 4.1 Metropolitan Sites Traffic Generation per Unit – AM Peak Period

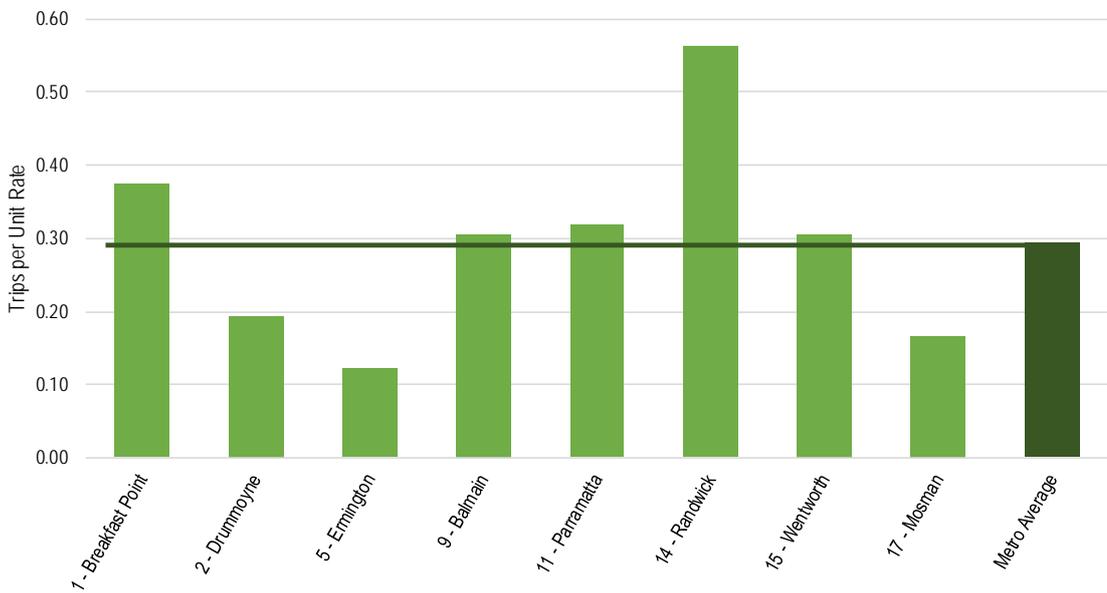


Figure 4.2 Metropolitan Sites Traffic Generation per Unit – PM Peak Period

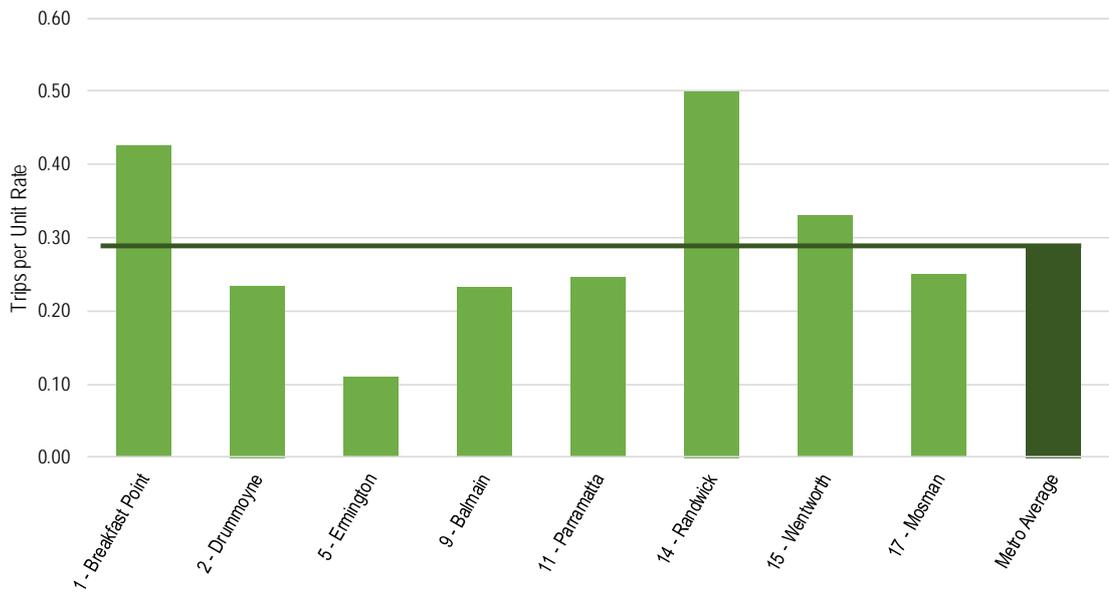


Figure 4.3 Metropolitan Sites Traffic Generation per Unit – Weekend Peak Period

Initial examination of Figure 4.1, Figure 4.2 and Figure 4.3 show that:

- metropolitan sites have similar traffic generation during AM peak period with PM peak times having slightly greater variation;
- on average the PM peak traffic generation is highest for metropolitan sites though it does not differ greatly to the AM and Weekend peak periods;
- Site 14 and Site 1 have the lowest number of units however traffic generation is high indicating the site has less use of alternative transport modes (i.e. pedestrian, cycle, bus, other); and
- Site 5 has the highest number of units and is noted to have considerable unrestricted on-street parking in close proximity.

4.3.2 Sub-Metropolitan Sites

Figure 4.4, Figure 4.5 and Figure 4.6 compare the traffic generation across all sub-metropolitan sites, including an average for comparison, for the AM, PM and Weekend Peak periods respectively.

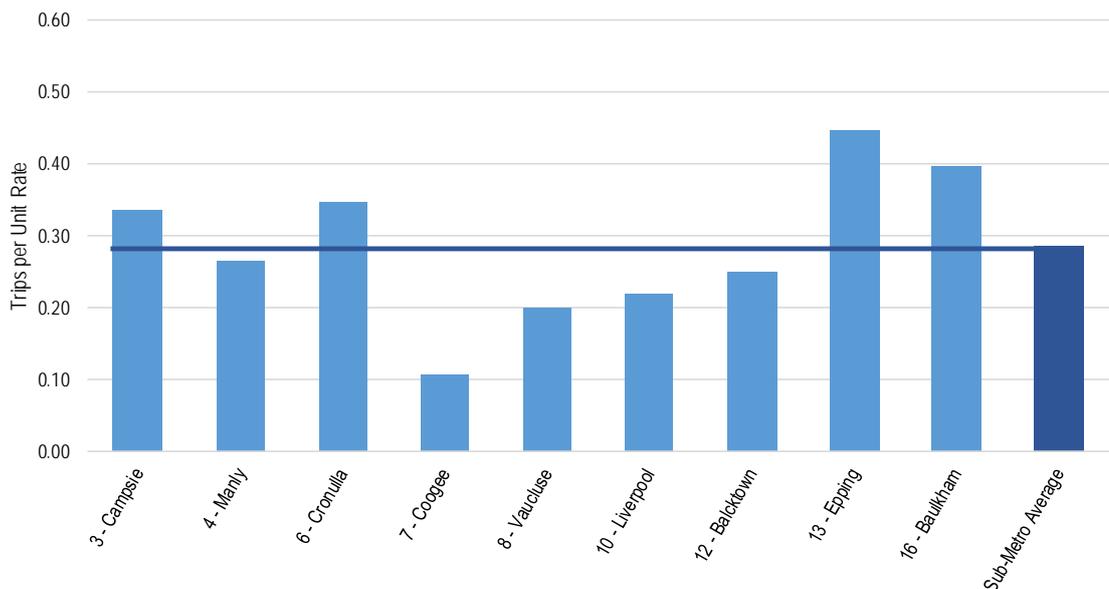


Figure 4.4 Sub-Metropolitan Sites Traffic Generation per Unit – AM Peak Period

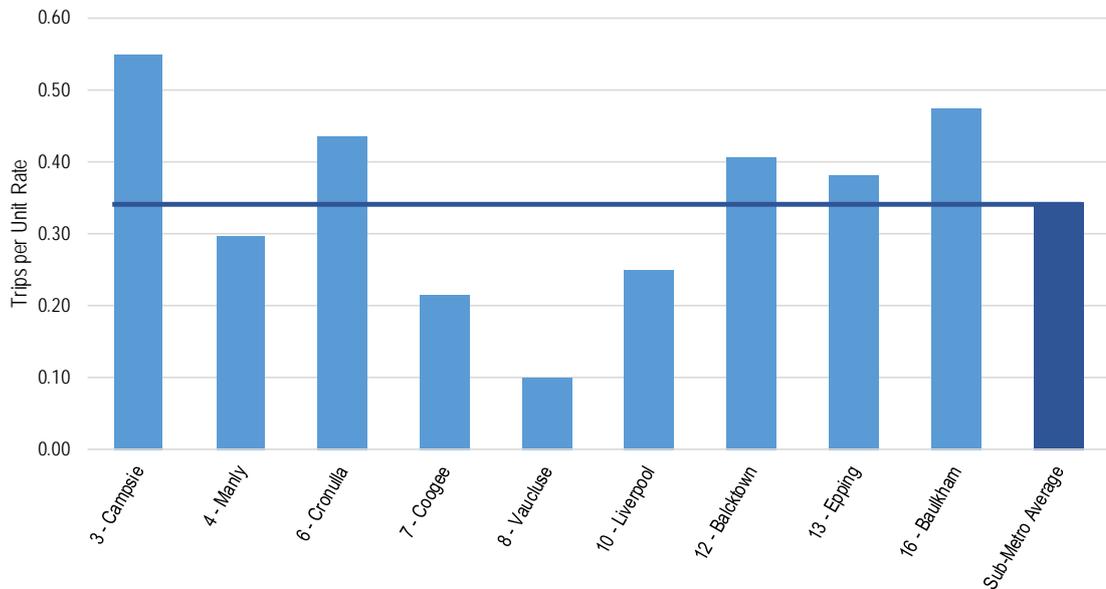


Figure 4.5 Sub-Metropolitan Sites Traffic Generation per Unit – PM Peak Period

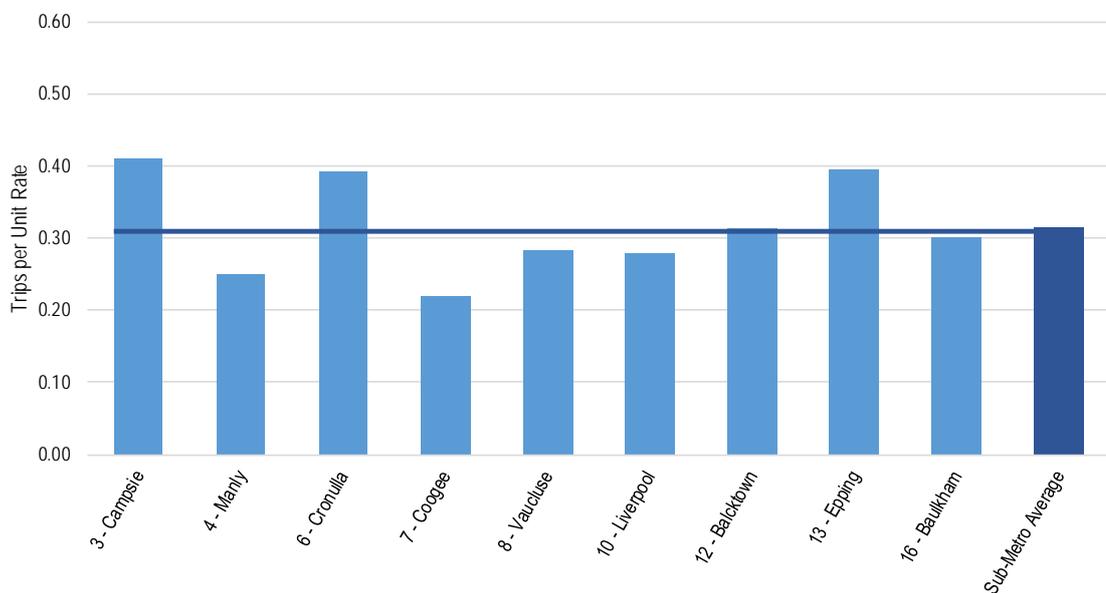


Figure 4.6 Sub-Metropolitan Sites Traffic Generation per Unit – Weekend Peak Period

Initial examination of Figure 4.4, Figure 4.5 and Figure 4.6 shows:

- the highest traffic generation occurs during PM peak periods though the PM peak has slightly greater variation than other peak times;
- Sites 3, 7 and 8 show the greatest variation to the average AM and PM peak traffic generations. Site 7 has a “PM peak” that occurs just after lunch time while Sites 3 and 8 both have earlier than average AM peak times; and
- Weekend peak traffic generation rates are relatively consistent across all sub-metropolitan sites.

4.3.3 Regional Sites

Figure 4.7, Figure 4.8 and Figure 4.9 compare the traffic generation across all regional sites, including an average for comparison, for the AM, PM and Weekend Peak periods respectively.

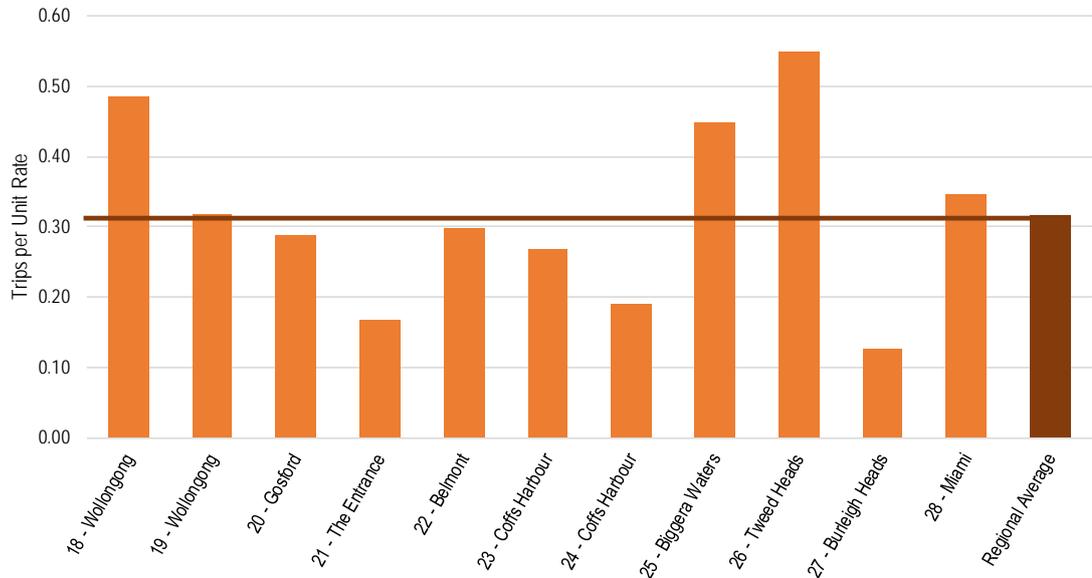


Figure 4.7 Regional Sites Traffic Generation per Unit – AM Peak Period

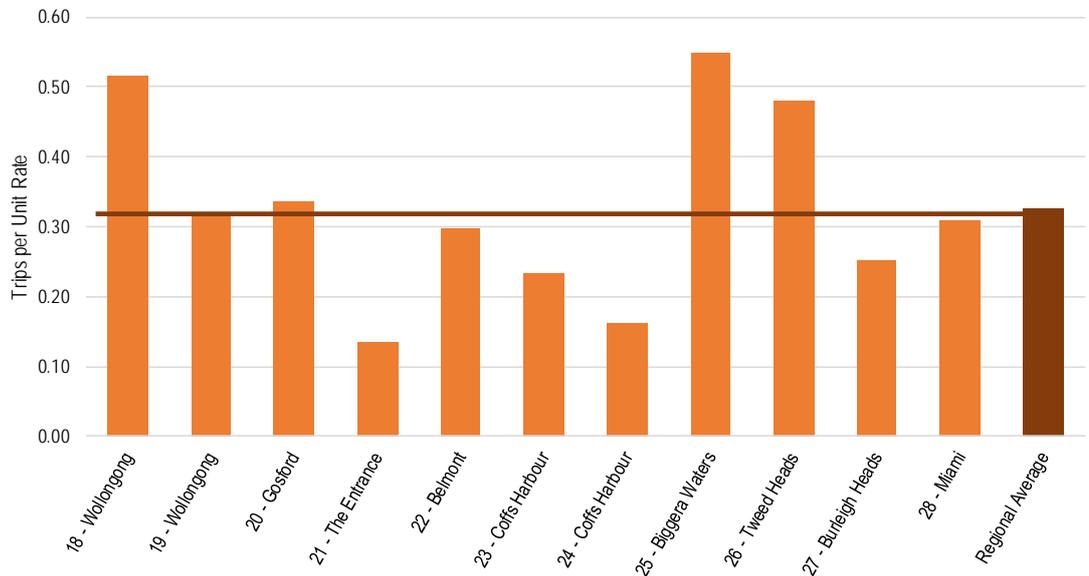


Figure 4.8 Regional Sites Traffic Generation per Unit – PM Peak Period

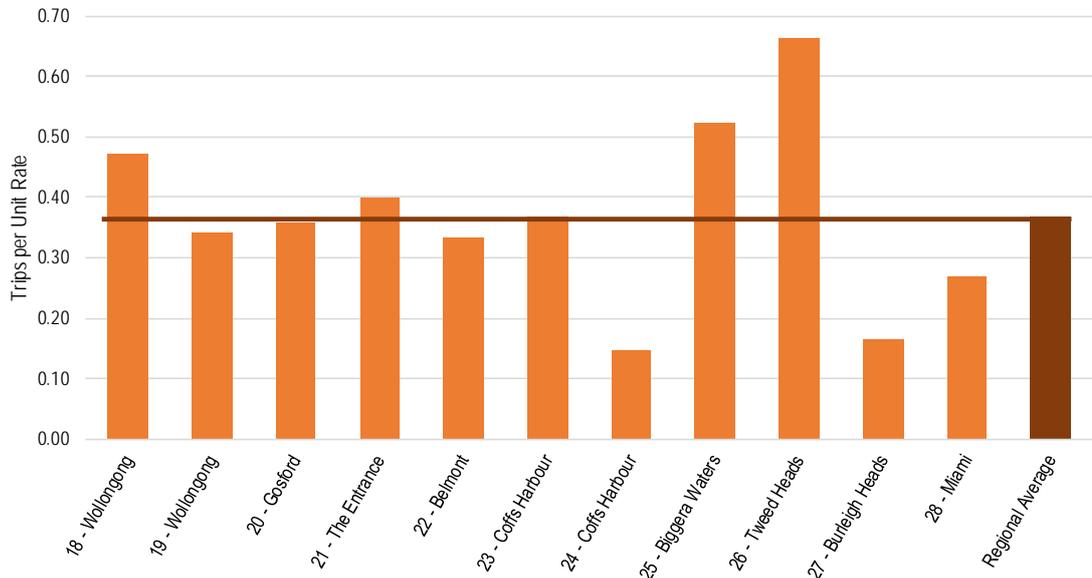


Figure 4.9 Regional Sites Traffic Generation per Unit – Weekend Peak Period

Initial examination of Figure 4.7, Figure 4.8 and Figure 4.9 shows:

- regional sites have similar AM peak period and PM peak period traffic generation rates at each site;
- traffic generation is greatest during the Weekend peak period, the weekend peak traffic generation rates also show more consistency across the regional sites than the AM/PM weekday peaks; and
- Sites 18, 25 and 26 have the highest traffic generation rates during the weekday peak periods. These sites are all located a significant distance from active transport attractors (i.e. shops, beach or park).

4.3.4 All Sites

Figure 4.10, Figure 4.11 and Figure 4.12 compare the traffic generation across all surveyed sites for the AM, PM and Weekend Peak periods respectively.

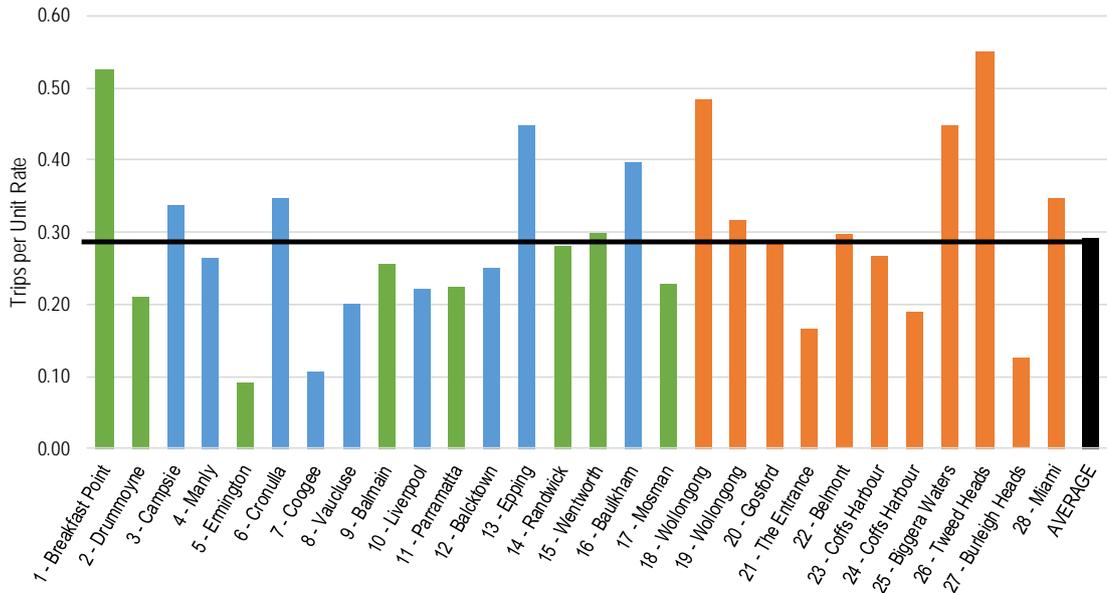


Figure 4.10 All Sites Traffic Generation per Unit – AM Peak Period

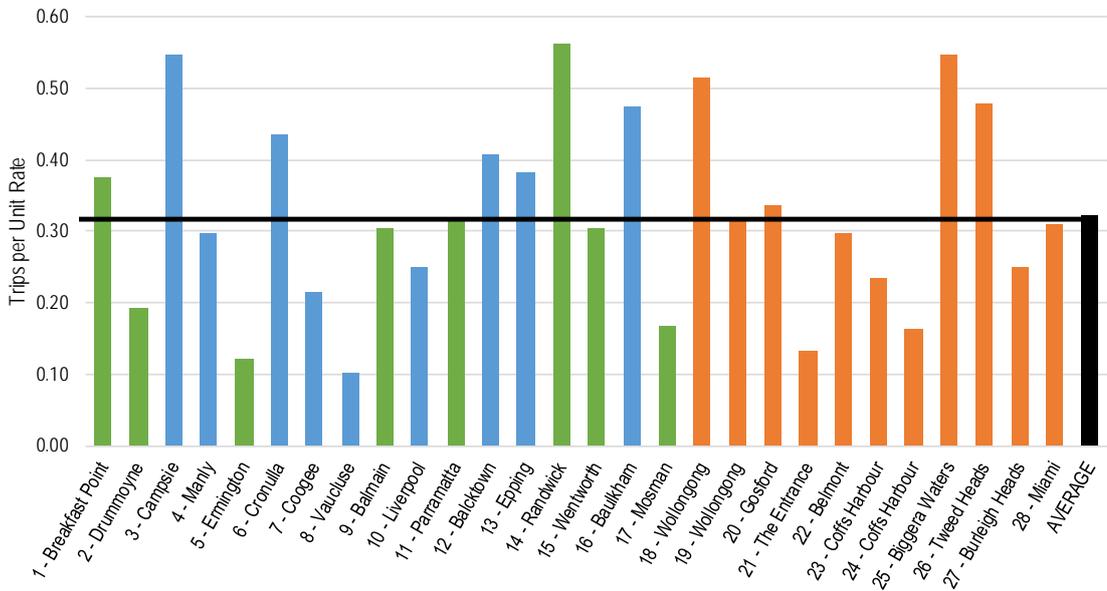


Figure 4.11 All Sites Traffic Generation per Unit – PM Peak Period

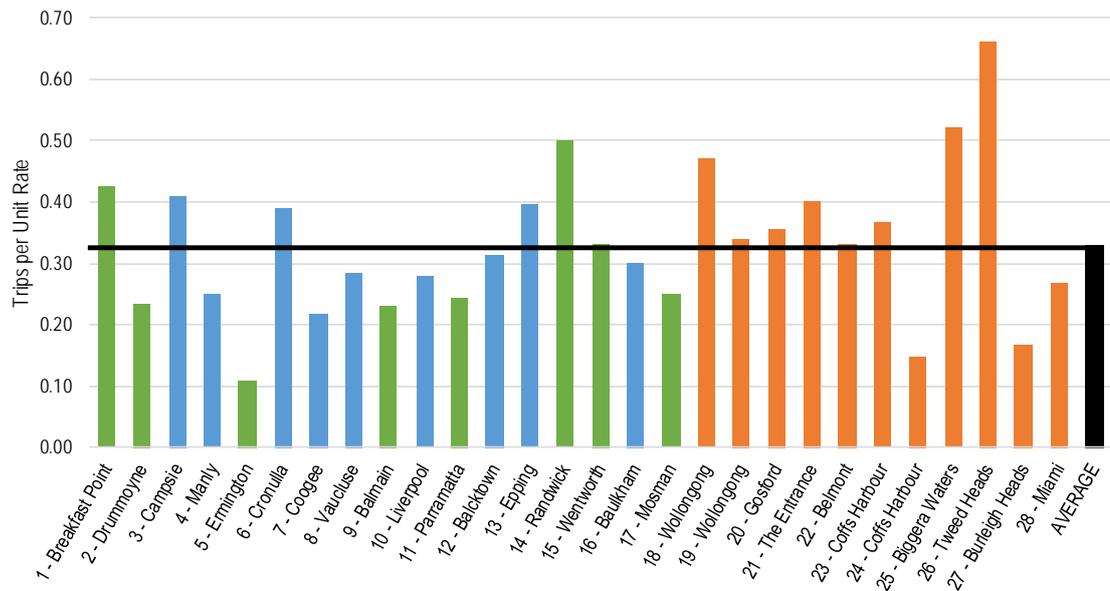


Figure 4.12 All Sites Traffic Generation per Unit – Weekend Peak Period

Initial examination of the above figures shows:

- AM peak period traffic generation rates generally increase between Metropolitan and Regional sites;
- PM peak period traffic generation shows variation from site to site however similarities are apparent between metropolitan and regional sites;
- Weekend peak period traffic generation rates remain relatively consistent across all sites with slightly lower rates occurring at metropolitan or sub-metropolitan sites; and
- average traffic generation rates per unit do not differ greatly between AM, PM and Weekend peaks when comparing all sites.

Further analysis will be conducted and reported during the analysis phase of this study.

5. CONCLUSIONS

28 sites consisting of 8 Metropolitan, 9 Sub-Metropolitan and 11 Regional were surveyed, of which 13 provided manual surveys and 15 were automated. Sites were surveyed in Sydney (17 sites), Regional NSW (8 sites) and the Gold Coast (3 sites) to capture the potential differences that might arise in trip generation, Gold Coast sites were included to provide comparison with a historically 'car based' regional city. Manual surveys at 13 sites (majority within Sydney), supplemented with automated vehicle trip surveys, included 2-hours of questionnaires to determine typical resident modal choices and an on-site parking occupancy count.

Comparisons with previous survey data found that results were reasonably consistent based on survey site location and size. Site trip generation rates showed expected minor variations due to the Car Based focus of the new survey sites.

For each site, network peaks hours, site peak hours, site peak trips, peak period trips per unit, peak period trips per parking space and pedestrian trips were tabulated. Sites have been grouped according to location for analysis into metropolitan, sub-metropolitan and regional. AM and PM weekday and Weekend peak periods were graphed for each group for comparative analysis.

The preliminary data analysis indicates that average development sites had weekday peak periods 15min-30min before or after the adjacent frontage road peak periods, though this was less common in regional sites. Average peak times were typically earlier in the AM and later in the PM for metropolitan sites when compared to Sub-Metropolitan and Regional sites (noting that these had similar average peak times).

In comparing metropolitan, sub-metropolitan and regional traffic generation rates, all areas presented a similar average traffic generation per unit rate with metropolitan and sub-metropolitan slightly lower than higher than regional sites. It was also noted that where on-street parking was available the data showed a proportion of residents walking to vehicles parking in the surrounding area.

In comparing weekend with weekday, weekend peaks typically occurred at lunchtime between 11.00am and 2.00pm and had the highest site trip generation for regional sites while the highest trip generation for metropolitan sites occurred in the weekday AM and PM peaks. Since the critical period for network peaks are weekday morning and evening, and weekend lunchtime, the site trip generation during those times will be key for analysis.

Regional and Sub-metropolitan sites presented similar average peak trips generation rates similar, while metropolitan sites showed slightly less. Weekend peak periods also show a greater variation in trip generation across all sites.

Where sites had less opportunity for public transport more vehicle trips were apparent for the metropolitan sites. Sub-metropolitan and Regional sites did not appear to follow this trend.

Parking occupancy was also recorded for manually surveyed sites. They will be used for regression analysis when determining which combination of factors, if any, will allow for predicting trip generation.

Overall, the data collected and preliminary analysis has built a platform for analysis to provide a recommendation for trip generation at car based high density residential developments, which will be contained in the Analysis Report.

APPENDIX A

SURVEY DATA SUMMARIES – ROADS AND MARITIME TEMPLATE

APPENDIX B

AUSTRAFFIC SITE SURVEYS (SITES 1-25)

APPENDIX C

TDC SITE SURVEYS (SITE 25-28)