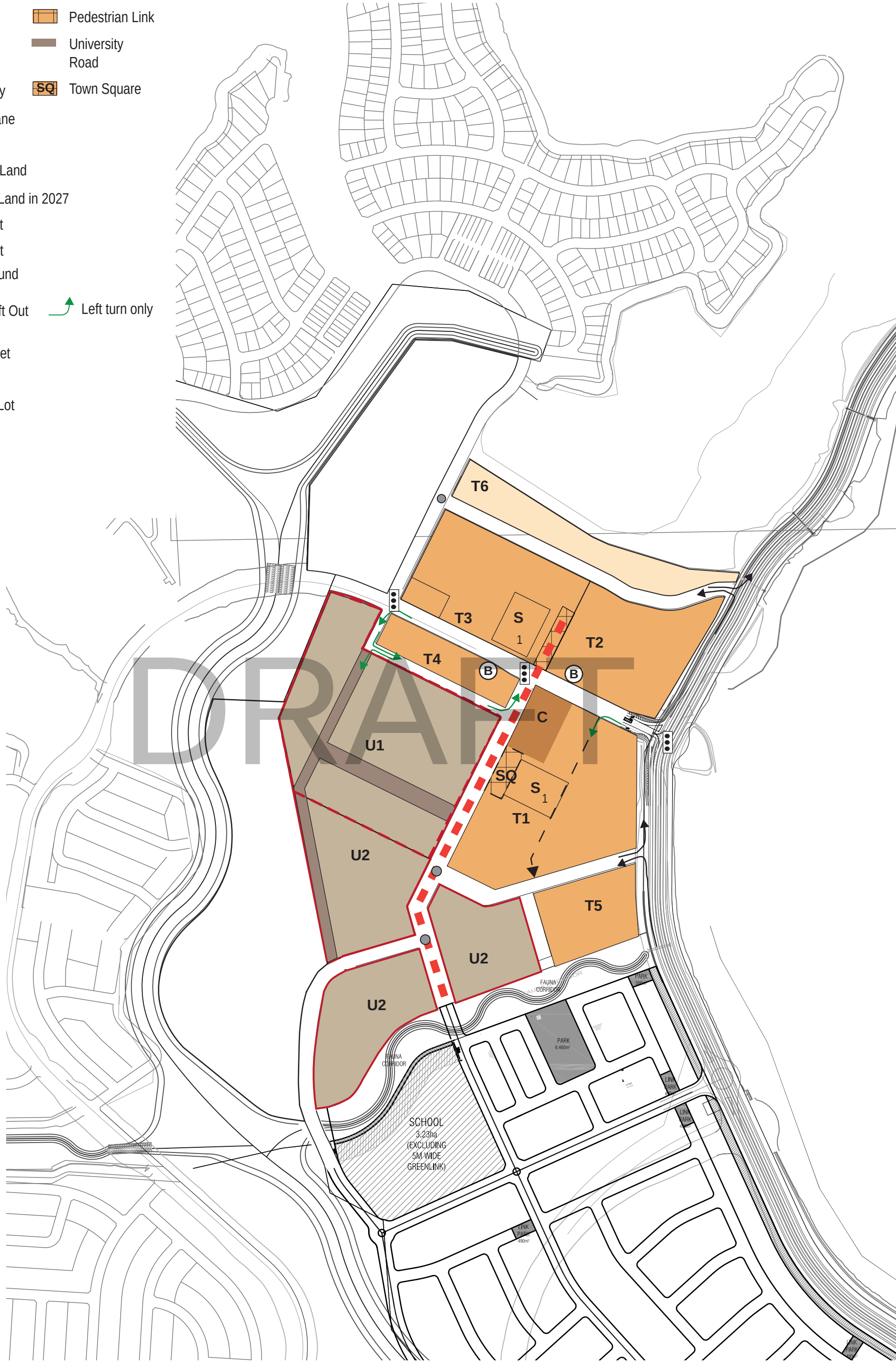
LEGEND

- Mixed use
- University
- Housing
- C Community
- Pedestrian Link
- University Road
- SQ Town Square
- Access Lane
- Initial University Land
- University Land in 2027
- Main Street
- Traffic Light
- Round-around
- Left In - Left Out
- Left turn only
- S Supermarket
- T1-6 Town Lot
- U1-2 University Lot
- B Bus Stop



15068- COBAKI TOWN MASTERPLAN

Land Use DRAFT

Prepared for: LEDA HOLDINGS

SK-01
Revision: D by KW
Status: commercial in confidence
Issued on 03 September 2015

SCALE: 1:5000 @ A3

Level 7, 75 Miller Street
North Sydney NSW 2060
Tel (02) 8920 8388
Web www.gmu.com.au

GMU

APPENDIX B

EMME MODELLING OUTPUTS

Cobaki Development Assessment
M1 4 lanes South of Stewart Road

Attachment	Description
Attachment A	AM Peak, PM Peak and Daily Link Volume Plots-2031 Base
Attachment B	AM Peak, PM Peak and Daily Link Volume Plots-2031 Revised Base
Attachment C	AM Peak, PM Peak and Daily Link Volume Plots-2031 Option
Attachment D	AM Peak, PM Peak and Daily Link Volume Plots-2031 Revised Option
Attachment E	AM Peak Difference Plots
Attachment F	PM Peak Difference Plots
Attachment G	Daily Difference Plots
Attachment H	Select Link Analyses @ SCU
Attachment I	Select Link Analyses @ Cobaki

ATTACHMENT A

AM PEAK, PM PEAK AND DAILY LINK VOLUME PLOTS – 2031 BASE

Cobaki Development Assessment
2031 Cross Border Model
Base (5,500 Cobaki + CBTS Base Network + Boyd St 2 Lanes Each Way)
AM Peak (2 Hrs.) Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Base (5,500 Cobaki + CBTS Base Network + Boyd St 2 Lanes Each Way)
PM Peak (2 Hrs.) Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Base (5,500 Cobaki + CBTS Base Network + Boyd St 2 Lanes Each Way)
Daily Total Vehicles

ATTACHMENT B

AM PEAK, PM PEAK AND DAILY LINK VOLUME PLOTS – 2031 REVISED BASE

Cobaki Development Assessment
2031 Cross Border Model
Revised Base (5,500 Cobaki + CBTS Base Network + North Facing Ramps at Boyd St)
AM Peak (2 Hrs.) Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Revised Base (5,500 Cobaki + CBTS Base Network + North Facing Ramps at Boyd St)
PM Peak (2 Hrs.) Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Revised Base (5,500 Cobaki + CBTS Base Network + North Facing Ramps at Boyd St)
Daily Total Vehicles

ATTACHMENT C

AM PEAK, PM PEAK AND DAILY LINK VOLUME PLOTS – 2031 OPTION

Cobaki Development Assessment
2031 Cross Border Model
Option (Base + 10,500 SCU + SCU 40% Internalisation & 25% PT)
AM Peak (2 Hrs.) Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Option (Base + 10,500 SCU + SCU 40% Internalisation & 25% PT)
PM Peak (2 Hrs.) Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Option (Base + 10,500 SCU + SCU 40% Internalisation & 25% PT)
Daily Total Vehicles

ATTACHMENT D

AM PEAK, PM PEAK AND DAILY LINK VOLUME PLOTS – 2031 REVISED OPTION

Cobaki Development Assessment
2031 Cross Border Model
Revised Option (Revised Base + 10,500 SCU + SCU 40% Internalisation & 25% PT)
AM Peak (2 Hrs.) Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Revised Option (Revised Base + 10,500 SCU + SCU 40% Internalisation & 25% PT)
PM Peak (2 Hrs.) Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Revised Option (Revised Base + 10,500 SCU + SCU 40% Internalisation & 25% PT)
Daily Total Vehicles

ATTACHMENT E

AM DIFFERENCE PLOTS

Cobaki Development Assessment

AM Peak Total Volume Difference Plot (Option - Base)

Higher in Base

Higher in Option

100 200 300 400 500

AM Peak Total Volume (2 Hrs.)

Cobaki Development Assessment

AM Peak Total Volume Difference Plot (Revised Option - Revised Base)

Higher in Revised Base

Higher in Revised Option

100 200 300 400 500

AM Peak Total Volume (2 Hrs.)

ATTACHMENT F

PM DIFFERENCE PLOTS

Cobaki Development Assessment

PM Peak Total Volume Difference Plot (Option - Base)

Higher in Base

Higher in Option

100 200 300 400 500

PM Peak Total Volume (2 Hrs.)

Cobaki Development Assessment

PM Peak Total Volume Difference Plot (Revised Option - Revised Base)

Higher in Revised Base

Higher in Revised Option

100 200 300 400 500

PM Peak Total Volume (2 Hrs.)

ATTACHMENT G

DAILY DIFFERENCE PLOTS

Cobaki Development Assessment

Daily Total Volume Difference Plot (Option - Base)

Higher in Base

Higher in Option

500 1000 1500 2000 2500

Daily Total Volume (24 Hrs.)

Cobaki Development Assessment

Daily Total Volume Difference Plot (Revised Option - Revised Base)

Higher in Revised Base

Higher in Revised Option

500 1000 1500 2000 2500

Daily Total Volume (24 Hrs.)

ATTACHMENT H

SELECT LINK ANALYSIS @ SCU

Cobaki Development Assessment
2031 Cross Border Model
Option Select Link Analysis @ SCU (Zone 743)
Daily Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Revised Option Select Link Analysis @ SCU (Zone 743)
Daily Total Vehicles

ATTACHMENT I

SELECT LINK ANALYSIS @ COBAKI

Cobaki Development Assessment
2031 Cross Border Model
Base Select Link Analysis @ Cobaki (Zone 660)
Daily Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Revised Base Select Link Analysis @ Cobaki (Zone 660)
Daily Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Option Select Link Analysis @ Cobaki (Zone 660)
Daily Total Vehicles

Cobaki Development Assessment
2031 Cross Border Model
Revised Option Select Link Analysis @ Cobaki (Zone 660)
Daily Total Vehicles

APPENDIX C

PARAMICS MODEL VALIDATION REPORT

Issue History

File Name	Prepared by	Reviewed by	Issued by	Date	Issued to
P2105.001T Cobaki Master Plan Paramics Model Validation and Calibration Report	P. Bollavaram	A. Bitzios	P. Bollavaram		LEDA Holdings

P2105.001T Cobaki Master Plan Paramics Model Validation and Validation Report

1. INTRODUCTION

Bitzios Consulting was commissioned by LEDA Holdings Pty Ltd to provide traffic advice for the proposed Cobaki development which includes residential, commercial and educational facilities. The study area also includes Kennedy Drive between M1 Motorway/exit Ramp interchange and Piggabeen Road/Kennedy Drive intersection. The proposed development is located to the west of the Gold Coast Airport and adjacent to the M1 Motorway. Figure 1.1 shows the extents of the modelled area.

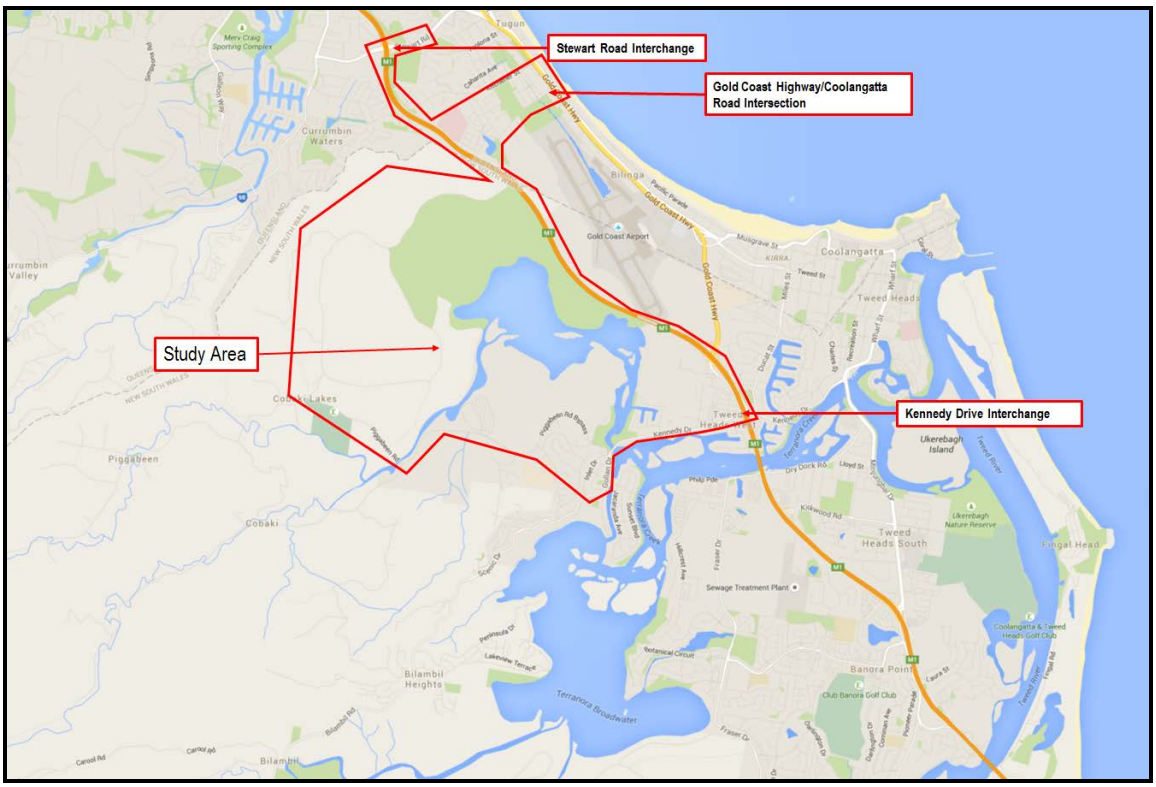


Figure 1: Paramics Modelled Area

2. PARAMICS BASE MODEL DEVELOPMENT

2.1 BASE MODEL NETWORK

The modelled traffic network was coded as per the existing conditions in terms of number of lanes, posted speed limits and traffic signal phasing/operation. Figure 2.1 shows the full extents of the model network.

Figure 2: Modelled Traffic Network and Zoning System

2.2 SIMULATION TIME

Paramics models were developed for the AM (7.00-9.00am) PM peak period (4.00-6.00pm). To ensure that the peak periods had sufficient levels of traffic in the network when the peak period started, a 30 minute “warm-up” and “cool-down" period was included at the start and end of the peak periods.

2.3 LINK TYPES

The model road network was based on the road network in the year 2015 which includes the intersection configurations, number of lanes, intersection priorities, posted speeds and all other operational attributes.

Typically, the major road corridors (i.e. M1 Motorway and interchanges) were coded as “major links” while the other parts of the network (residential streets and lower hierarchy roads) were coded as “minor links”. This has no influence in the traffic assignment but does affect turning priorities and specific traffic behaviours.

2.4 TRAFFIC SIGNALS

The base model contains a total of 4 signalised intersections located within the study area. All signal operation parameters (i.e. cycle times, phase times) were added to the model in accordance with the data collected during the site visit. During the model calibration phase, minimal adjustments to the phase lengths were made as required to ensure that the observed conditions were reflected accurately in the model. Typically, this consisted of adjusting green times by a few seconds (while keeping the cycle time consistent).

2.5 TRAFFIC DEMAND AND ASSIGNMENT

2.5.1 Intersection Turn Count Data

Intersection survey data at critical interchanges was collected by Traffic Data & Control at the following locations. Figure 3 below shows the location of the sites where count data was collected.

Figure 3: Intersection Count Locations

2.5.2 Manipulation of Traffic Count Data

The data obtained from the intersection counts was used to establish the model calibration/validation turn counts for the study area. Due to the nature of the estimation process and zone placement, the volumes are required to be "balanced" to ensure that adjacent intersections have consistent upstream and downstream volumes. In reality, cars would turn into individual driveways or intermediate side streets, however this fine level of detail is not accommodated in the model.

2.6 DEVELOPMENT OF PATTERN MATRIX

The pattern matrix represents the starting conditions of the model such that the model does not start with zero vehicles and has an appropriate number of trips corresponding to the location and time periods being modelled.

2.7 TRAFFIC ASSIGNMENT METHOD

Considering the size, route choice availability and operational characteristics of the traffic network, the assignment method used was “dynamic assignment” with perturbation. A range of assignment options were tested ranging from no feedback to 15 minute feedback, 10 minute feedback and 5 minute feedback. The optimum feedback period determined was “10 minutes” and the perturbation algorithm selected was “percentage”.

Time steps have also been increased from the default value of 2 to 4. Increasing the time steps increases the frequency of simulation iterations per second. This affects lane changing, merging, and weaving behaviour which for this model was considered to give a more realistic representation of the observed traffic operations in congested conditions.

3. BASE MODEL CALIBRATION AND VALIDATION

3.1 Model Validation Parameters

The 2015 peak base models ware run with the preliminary estimated demands based on the existing turn movements within the study area. A total of 10 intersection turn movements were validated for both the peak periods.

3.2 Model Calibration

3.2.1 GEH Statistic

Balanced intersection count data (and OD data) was used to refine the existing OD demands matrix based on zone-to-zone movements within the study area. The modelled turn data was then validated against the observed (count) data and the GEH statistic was calculated to check how closely the two datasets "matched". The GEH statistic is an equation used in traffic engineering, traffic forecasting and traffic modelling to compare two sets of traffic volumes and is the industry standard performance measure for model validation. The GEH statistic measures the degree of divergence of the modelled value from the observed value and implicitly accounts for the size of the volume, acknowledging that greater confidence is required for higher volume movements.

A GEH value less than 5 indicates there is very little variation between the modelled results and the observed counts whilst a GEH value of between 5 and 10 indicates that for the purposes of modelling, the variation is acceptable and that the model is validated. The equation used to calculate the GEH values is as follows:

$$GEH = \sqrt{\frac{(M-O)^2}{0 \cdot 5 * (M+O)}}$$

Where:

- M is the modelled or simulated flow: and
- O is the observed flow from the traffic counts.

3.2.2 Model Calibration Criteria

The model calibration criteria used to ensure the model was adequately calibrated were as follows:

- the average GEH value is < 5;
- a minimum of 85% of all turn volumes have a GEH value < 5; and
- no turn movements have a GEH value > 10.

The calibration comparisons were carried out for the peak period. This is generally viewed as good practice in simulation modelling guidelines and in accordance with industry guidelines (i.e. *RMS Paramics Micro-simulation Modelling Manual*). A summary of the calibration results is shown in Table 3.1.

Table 3.1: Base Year (2015) Model Calibration Statistics- AM Peak

Intersection	Direction	Movement	Count Data	Modelled	GEH
Steart Road/ SBD Off Ramp	WB	Left	103	125	2.1
		Through	1390	1378	0.3
	SB	Left	1241	1235	0.2
		Right	601	647	1.8
	EB	Through	451	520	3.1
		Right	402	440	1.9
Stewart Road/ NBD Offramp	NB	Left	387	439	2.6
		Right	115	147	2.8
	WB	Through	905	936	1.0
		Right	1086	1079	0.2
	EB	Left	839	986	4.9
		Through	768	819	1.8
Gold Coast Highway/ Kitchener Street	NB	Left	66	111	4.8
		Through	1739	1791	1.2
	SB	Through	1837	1885	1.1
		Right	495	447	2.2
	EB	Left	264	276	0.7
Coolangatta Road/ Boyd Street	NB	Left	329	288	2.3
		Through	48	16	5.7
	SB	Through	144	205	4.6
		Right	435	391	2.2
	EB	Left	188	227	2.7
		Right	202	192	0.7
Boyd Street/Irene Street	WB	Through	771	642	4.9
		Right	26	34	1.5
	SB	Left	85	60	2.9

Intersection	Direction	Movement	Count Data	Modelled	GEH
	EB	Left	0	1	1.4
		Through	404	360	2.3
Gold Coast Highway/ Coolangatta Road	NB	Left	203	209	0.4
		Through	1762	1835	1.7
	WB	Left	47	66	2.5
		Through	9	5	1.5
		Right	36	29	1.2
	SB	Left	19	14	1.2
		Through	1792	1830	0.9
		Right	26	32	1.1
	EB	Left	7	42	7.1
		Through	17	9	2.2
		Right	101	124	2.2
Kennedy Drive/ SBD Offramp	WB	LINK	1375	1399	0.6
	SB	LINK	850	810	1.4
Kennedy Drive/ NBD Offramp	NB	LINK	836	778	2.0
	EB	LINK	2087	1890	4.4
Kennedy Drive/ Piggabeen Road	NB	Left	40	50	1.5
		Through	1208	1203	0.1
	SB	Through	408	429	1.0
		Right	167	204	2.7
	EB	Left	399	426	1.3
		Right	16	12	1.1
Piggabeen Road/Cobaki Road	WB	Through	22	39	3.1
		Right	40	39	0.2
	SB	Left	91	99	0.8

Intersection	Direction	Movement	Count Data	Modelled	GEH
	EB	Left	2	4	1.2
		Through	69	62	0.9
				Average	2.0
				Turns with GEH<5%	96.3

Table 3.2: Base Year (2014) Model Calibration Statistics- PM Peak

Intersection	Direction	Movement	Count Data	Modelled	GEH
Steart Road/ SBD Off Ramp	WB	Left	85	80	0.6
		Through	1622	1628	0.1
	SB	Left	1062	1067	0.2
		Right	564	564	0.0
	EB	Through	483	434	2.3
		Right	426	439	0.6
Stewart Road/ NBD Offramp	NB	Left	350	346	0.2
		Right	96	97	0.1
	WB	Through	935	916	0.6
		Right	1251	1267	0.5
	EB	Left	684	643	1.6
		Through	813	784	1.0
Gold Coast Highway/ Kitchener Street	NB	Left	130	108	2.0
		Through	1987	2081	2.1
	SB	Through	1695	1708	0.3
		Right	532	481	2.3
	EB	Left	429	437	0.4
Coolangatta Road/ Boyd Street	NB	Left	267	266	0.1
		Through	79	21	8.2

Intersection	Direction	Movement	Count Data	Modelled	GEH
	SB	Through	133	146	1.1
		Right	323	291	1.8
	EB	Left	396	393	0.2
		Right	311	299	0.7
Boyd Street/Irene Street	WB	Through	378	441	3.1
		Right	76	113	3.8
	SB	Left	49	63	1.9
	EB	Left	0	2	2.0
		Through	678	630	1.9
Gold Coast Highway/ Coolangatta Road	NB	Left	111	94	1.7
		Through	2091	2150	1.3
		Right	9	1	3.6
	WB	Left	69	44	3.3
		Through	12	3	3.3
		Right	17	12	1.3
	SB	Left	39	16	4.4
		Through	1624	1629	0.1
		Right	32	57	3.7
	EB	Left	9	32	5.1
		Through	16	10	1.7
		Right	114	126	1.1
Kennedy Drive/ SBD Offramp	WB	LINK	2478	2428	1.0
	SB	LINK	1327	1315	0.3
Kennedy Drive/ NBD Offramp	NB	LINK	1061	946	3.6
	EB	LINK	1377	1241	3.8
Kennedy Drive/ Piggabeen	NB	Left	77	42	4.5

Intersection	Direction	Movement	Count Data	Modelled	GEH
Road		Through	749	731	0.7
	SB	Through	1483	1528	1.2
		Right	521	578	2.4
	EB	Left	273	268	0.3
		Right	33	23	1.9
Piggabeen Road/Cobaki Road	WB	Through	67	61	0.8
		Right	94	106	1.2
	SB	Left	73	62	1.3
		Right	1	1	0.0
	EB	Left	0	5	3.2
		Through	35	40	0.8
				Average	1.7
				Turns with GEH<5	96.4

As shown in Tables 3.1 and 3.2, all modelled periods comply with the calibration criteria and are in accordance with the guidelines contained in the *RMS Paramics Micro-simulation Modelling Manual*.

3.3 BACK OF QUEUE

A site visit was undertaken during the AM and PM peak periods within the study area. Visual observations of the Paramics model provided a comparison between the observed and modelled queues in both the morning and afternoon peak periods. Both the morning and afternoon queues appeared to replicate the back of queue data observed at critical intersections/interchanges within the study area.

3.4 MODEL VALIDATION AND CONCLUSION

The Paramics micro-simulation models for the AM and PM peak period has been calibrated to meet the requirements normally used in the development of traffic simulation models. The models appropriately reflect the traffic conditions observed during the site visits and is therefore deemed suitable for the purpose of testing alternative network configuration options and for assessing the impacts of future traffic demands associated with future development in the study area.

APPENDIX D

SCU TRAVEL MODE SHARE SURVEY SUMMARY REPORT

BITZIOS consulting

SOUTHERN CROSS UNIVERSITY
GOLD COAST CAMPUS

Travel Mode Survey
Summary Report

4th November 2013

Ref: P1265B.002

BITZIOS CONSULTING
ABN: 46 029 951 547

PO BOX 5102
Q SUPER CENTRE
\MERMAID WATERS QLD 4218

Gold Coast
Suite 26, 58 Riverwalk Avenue
Robina QLD 4226
P: (07) 5562 5377

Brisbane
Level 2, 428 Upper Edward Street
Spring Hill QLD 4000
P: (07) 3831 4442

Sydney
Studio 203, 3 Gladstone Street
Newtown NSW 2042
P: (02) 9557 6202

W: www.bitziosconsulting.com.au

E: admin@bitziosconsulting.com.au

Issue History	Prepared by	Reviewed by	Issued by	Date	Issued to
P1265B.001 Gold Coast Campus Travel Mode Summary Report	L.Johnston	A.Bitzios	A.Bitzios	10/07/2013	kirsty.howton@scu.edu.au
P1265B.002 Gold Coast Campus Travel Mode Summary Report	L.Johnston	I.Pais	I.Pais	04/11/2013	ben.roche@scu.edu.au

CONTENTS

Page

INTRODUCTION 1

Background 1
Study Purpose 1
Location 1
Gold Coast Transport Trends 2
Links to Other Strategies 2

SURVEY METHODOLOGY 3

Overview 3
Field Survey 3
On-line Survey 4

FIELD SURVEY RESULTS 5

Overview 5
Travel Mode Share 5
Traffic Volumes 5
Parking 5
Car-pool / Passenger Set-down 6
Walk 6
Cycle 6
Shuttle Bus 6

ON-LINE SURVEY RESULTS 7

Overview 7
Demographic Profile 7
Travel Mode Share 7
Travel Mode Behaviours 7
Travel Mode Perceptions 8
Overall Transport Access Satisfaction 9

KEY FINDINGS 10

Overview of Survey Findings 10
Future Actions 10
Concluding Remarks 10

INTRODUCTION

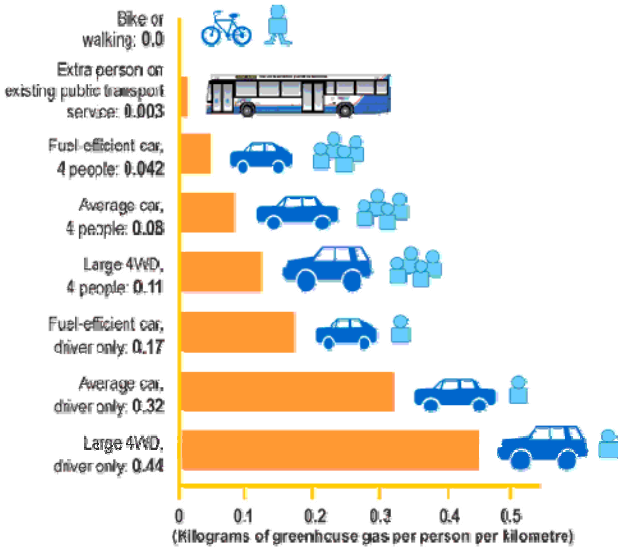
Background

Southern Cross University was established in 1994 as the sole university education facility in the Northern Rivers of NSW. In a short span of time Southern Cross University now encompasses three campuses, with approximately 15,500 students enrolled at the Lismore and Coffs Harbour (NSW) and Gold Coast (Qld) campuses.

The university has recently (2010) expanded its operations over the state border and into South East Queensland with the opening of the newly consolidated Gold Coast campus. The campus is located adjacent to Gold Coast International Airport and currently consists of two buildings, with a third currently in planning.

The campus was attended by approximately 300 students and around 50 staff in 2012 and it is envisaged that from 2013, attendance will increase to over 1500 students. The exact number of attendees is unknown due to the availability of distance and face to face modes of delivery for some courses. At the end of the construction phase in 2016, approximately 5,000 students are expected to attend the Gold Coast campus.

Universities are major employers for many regional communities across the country. They are similar to hospitals and other major business areas, whereby they generate a high demand for vehicular traffic. There are growing pressures for these high employment generators to think sustainably in developing strategies to reduce the occurrence of single occupant vehicle access. Southern Cross University (SCU) has high level support for delivering sustainable transport outcomes for managing the future growth of the Lismore Campus as demonstrated through the environmental sustainability goals identified in the SCU Strategic Plan.



Greenhouse gas emissions from different forms of transport

source: NSW State Transit (2013)

Study Purpose

The travel mode survey aims to provide SCU with an understanding of the current and future requirements to provide adequate transport access for students and staff.

This summary report provides an overview of the travel survey data obtained and highlight some of the key trends and possible transport strategies that may be deployed by the university.

A detailed travel survey data report has also been provided separate to this summary report. The data report contains a complete analysis of the travel survey data obtained.

Location

The Gold Coast campus is situated at Southern Cross Drive in Bilinga, Queensland. It is located in the local government area of the Gold Coast City Council and is surrounded by the suburbs of Coolangatta, Tweed Heads West and Tugun.

The campus forms part of the Gold Coast Airport precinct and lies to the immediate north of the NSW/Qld state border. The campus currently consists of two multi-storey buildings and a parking area fronting the site. At present there are no dedicated student accommodation facilities which service the Gold Coast campus however significant interest has been shown for the establishment of such facilities in Bilinga and surrounding suburbs.

The campus is accessed via a sole entry point provided by Southern Cross Drive on its western extent. Access to the Gold Coast Airport precinct is gained from the Gold Coast Highway via Terminal Drive. The Gold Coast Highway is a state-controlled road which provides a north-south link between the eastern suburbs of the Gold Coast across the border into NSW. A "park and ride" arrangement services the campus where students and staff are encouraged to park their vehicles off-campus at the nearby Border Park Raceway and catch a shuttle bus to the campus.

Figure 1: Site Location

Gold Coast Transport Trends

The Australian Bureau of Statistics highlights that there is a very strong car mode share in the Gold Coast area. The 2011 Census data highlights that 90% of journey to work trips occur by a private motor vehicle. Interestingly, the next highest mode share at 3% was walking trips. The average vehicle occupancy rate across the local government area is approximately 1.08 people per car.

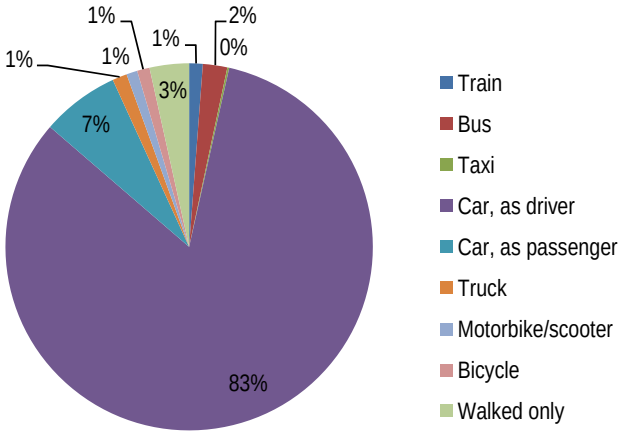


Figure 2: Gold Coast Travel Mode Share (ABS 2011)

The data from the 2011 Census for the areas adjacent to the university shows that 9% of journey to work trips involved people walking. A total of 77% travelled to work as a car driver, whilst 7% travelled to work as a passenger, resulting in an average vehicle occupancy rate of 1.09 people per car. This shows a slightly lower dependency on car travel in and around the university precinct as compared to the broader Gold Coast area.

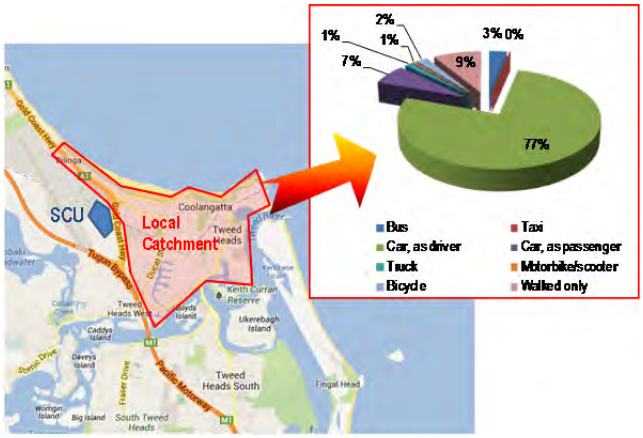


Figure 3: University Surrounds Travel Mode Share (ABS 2011)

Both of the Gold Coast wide and University area travel mode share information highlights a very low use of public transport only comprising of approximately 3% in both cases.

Cycling across the Gold Coast area was as low as 1%-2% for journey to work trips.

Links to Other Strategies

There have been many studies, strategies and resources tool kits completed over the past 10 years relevant to the Gold Coast area which have aimed to reduce the dependency on car travel.

Gold Coast City Council has recently updated their transport strategy which identifies the need to provide light rail down to the Gold Coast Airport/ SCU Campus.

In the interim, expanded bus services are required to improve access from the southern parts of the Gold Coast.

The transport strategy also includes the provision of a linear cycleway along the entire coastline.

The Gold Coast Transport Strategy has set transport mode share targets as shown in Figure 4 below. Figure 4 highlights a significant mode shift away from car use.

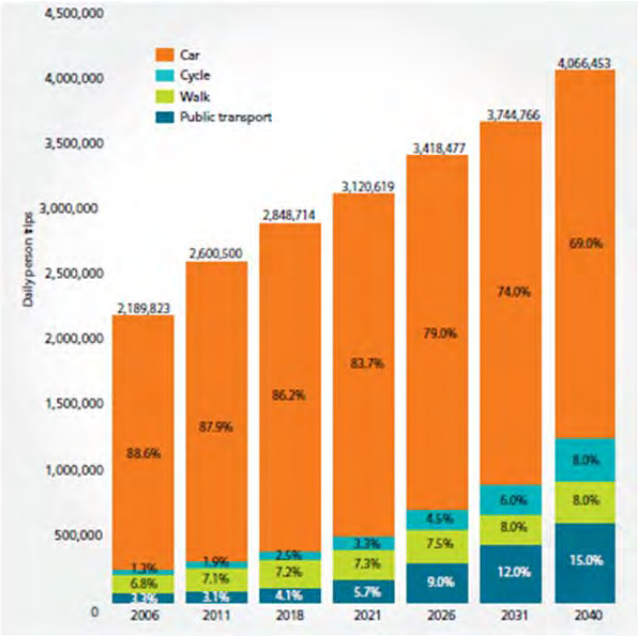


Figure 4: Gold Coast Transport Mode Share Targets

Southern Cross University is working towards achieving the objectives within the Gold Coast Transport Strategy by encouraging access through public transport and an increase in local student accommodation to promote walking and cycling.

The completion of this travel mode survey is the first step in understanding the current transport mode choice and where opportunities may exist to instigate a behavioural change.

SURVEY METHODOLOGY

Overview

The SCU Travel Mode Survey involved two separate types of surveys being conducted including:

- a field survey; and
- an on-line questionnaire for students and staff.

Field Survey

The following data was obtained from the field survey:

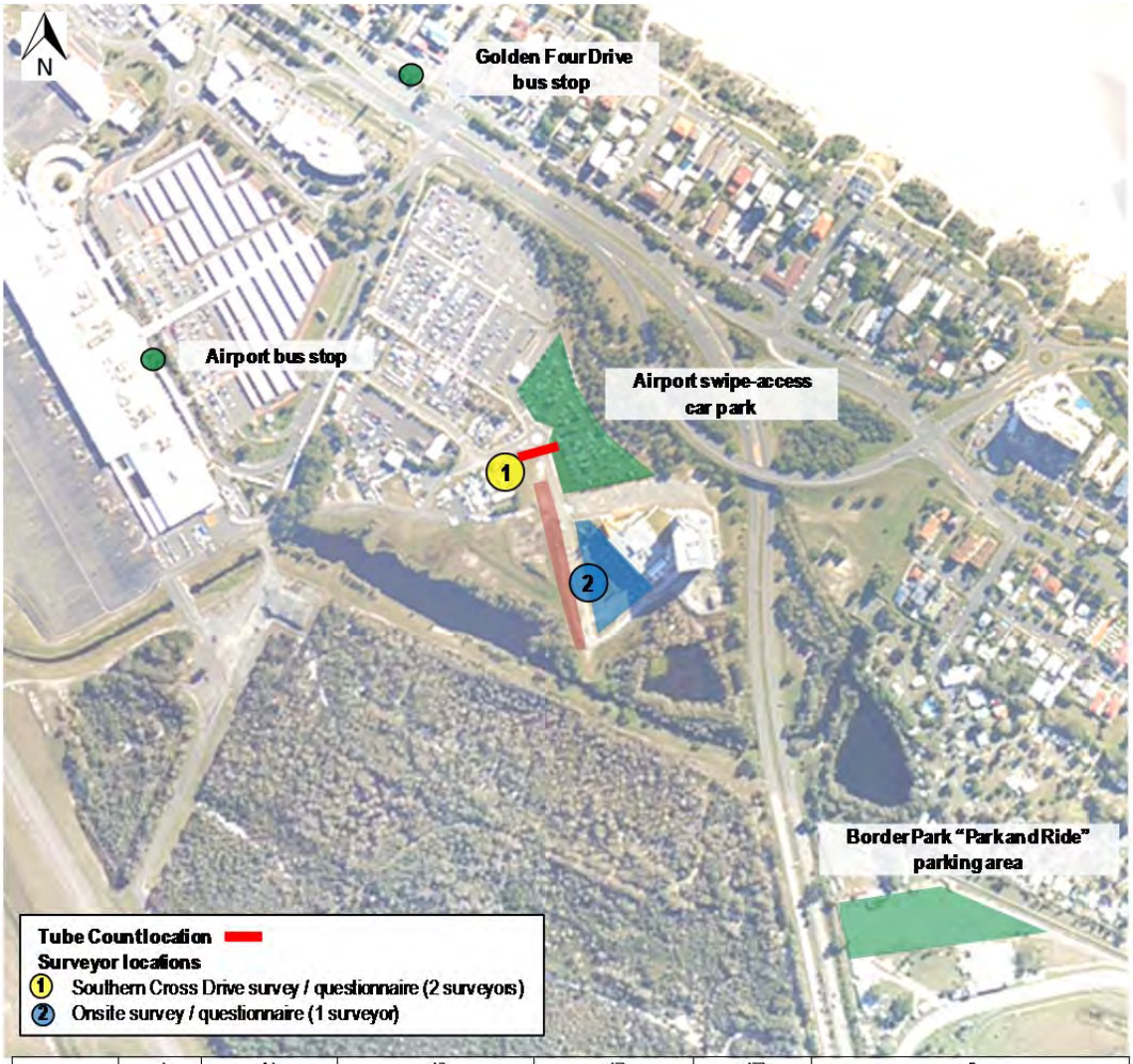
- vehicle and bike parking occupancy;
- vehicle occupancy;
- shuttle bus occupancy and frequency;
- set-down and pick-up counts;
- pedestrian and cyclist volumes; and
- 7-day traffic volume count at Southern Cross Drive.

The traffic count survey was conducted using tube counts placed on Southern Cross Drive to the immediate south of the Arthur Butler Parade/Southern Cross Drive roundabout. The traffic count survey was conducted Tuesday 30th April to Tuesday 7th May, 2013.

The remaining field survey components were conducted on Wednesday 1st May 2013, commencing at 7:00am and finishing at 7:00pm. The specific survey locations and details were as follows:

- Southern Cross Drive vehicle occupancy and pedestrian/cyclist volumes;
- Entry questionnaire; and
- On-campus parking occupancy and questionnaire.

The locations of the surveys for the Gold Coast campus as well as the field questionnaire are shown in Figure 5.



Time	a) Sex	b) Are you a?	c)i) What Mode of Transport did you use?	c)ii) As a CAR occupant, were you a?	c)iii)	d) Where did you come from?
15 Minute Increments (HH:MM)	1 - Male 2 - Female	1 - Undergraduate 2- Postgraduate 3 - Staff 4 - Visitor	1 - Car 2 - Bus 3 - Bike 4 - Walk 5 - Border Park Shuttle Bus 6 - Other	1 - Driver 2 - Passenger (if car parked on site) 3 - Dropped Off	If Other in was listed in c)i),	1 - Airport Carpark 2 - Golden Four Dr (and surrounds) 3 - Airport Bus Stop 4 - Golden Four Dr Bus Stop 5 - Not Applicable (Border Park/Dropped Off) 6 - Other

Figure 5: Field Survey Locations

On-line Survey

The on-line questionnaire commenced at 9:00am on Thursday 2nd May 2013 and closed at 5:00pm on Wednesday 8th May 2013. The on-line survey was completed in conjunction with the field surveys, requiring respondents to answer questions in relation to travel modes and associated behaviours. This included questions related specifically to their travel behaviour on the days the field surveys were conducted.

The on-line survey was designed to include a range of questions that captured information required to gain an understanding of travel choices and travel behaviours for both the student and staff demographic.

The survey included various sets of questions as summarised by the following:

- travel behaviour on the field survey day;
  - attendance
  - travel mode/s utilised
  - arrival/departure times from residence/campus
  - comparison to usual travel behaviours
- arrival to campus by car
  - number of occupants in car
  - parking area utilised
  - type of parking utilised
  - set-down / pick-up location utilised
  - access roads utilised
- perceptions of private/public transport modes;
  - travel times
  - cost
  - benefits / downfalls of travel modes from residence
- other modes of transport;
  - benefits / downfalls of alternate modes
  - benefits / downfalls of potential improvements
  - considerations of other modes
- travel mode scenarios;
  - potential parking improvements
  - potential "park and ride" initiatives
  - potential public transport initiatives
- demographics; and
  - age
  - gender
  - degree / position type
  - faculty / school
  - accommodation / residence type
  - income
  - illness or disability
- transport access needs
  - rating of satisfaction
  - inter-campus travel
  - potential improvements; and
  - travel mode influences.

The on-line survey was developed specifically to better understand existing and emerging transport access issues at the SCU campuses. The development phase of the on-line survey involved collaboration with key staff at SCU and resulted in a final product which addressed the desired requirements.

The on-line survey was published using the Qualtrics on-line data collection platform and was issued to students and staff by SCU via the university email. At the completion of the survey, all data obtained was compiled in a database and organised for analysis. The personal details of each respondent remained anonymous throughout the survey and were not included in the database.

FIELD SURVEY RESULTS

Overview

The data provided below is a summary of the key outputs obtained from the field survey conducted during the end of April / Early May 2013.

Travel Mode Share

Figure 6 shows the travel mode share obtained from the field survey data.

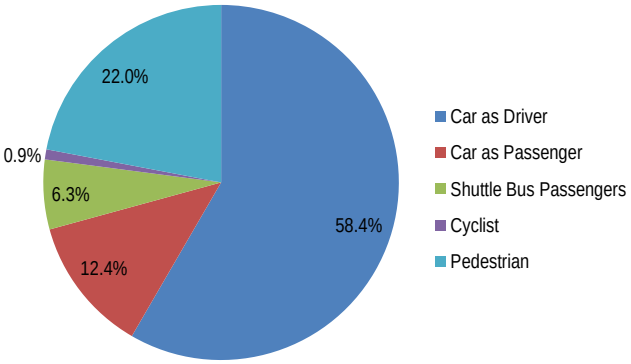


Figure 6: Travel Mode Share – Field Survey Data

Figure 6 suggests that the car usage is slightly higher than that recorded in the local area from the ABS Census data. The percentage of pedestrians accessing the university can be further dissected to show that approximately 89% of the pedestrian counted trips relate to parked vehicles nearby (Airport parking and Golden Four Drive) and walk to the campus. The Car as Driver and Car as Passenger proportions relate to car parked in the formal and informal parking areas fronting the university. *The resultant car mode share is subsequently in the order of 90% of the total mode share, with 6% driving to Border Park to catch the shuttle bus.*

The average car occupancy obtained from the survey data was 1.2 persons per car which is slightly higher than the local car occupancy data obtained from the ABS data.

Traffic Volumes

Figure 7 shows the two-way traffic volume data obtained for Southern Cross Drive upon entering the university.

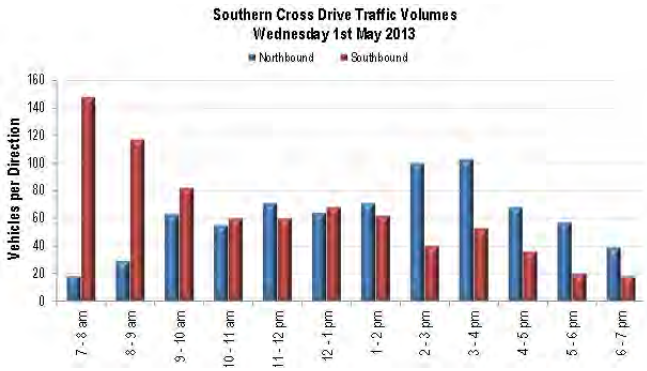


Figure 7: Traffic Volume Data

Figure 7 suggests that a large proportion of entering trips occur in the morning between 7am and 9am and exiting trips occur in the afternoon between 2pm and 4pm.

Parking

The parking survey area was separated into two precincts with parking types provided to enable more detailed analysis if required (refer Figure 8).

Figure 8: Parking Survey Area

The parking occupancy survey results are shown in Figure 9.

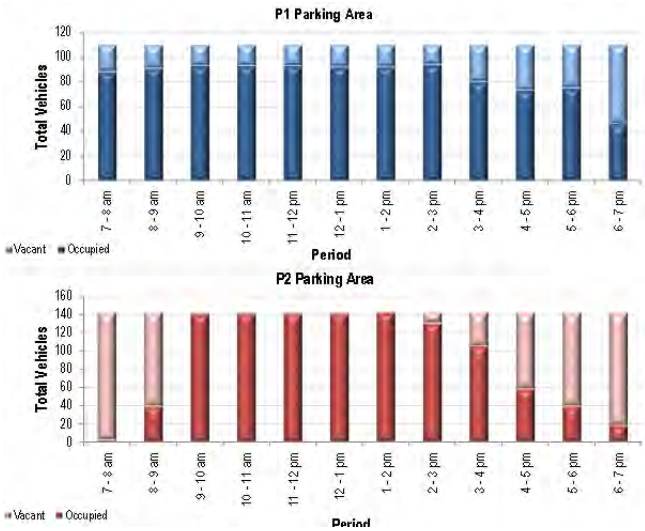


Figure 9: Parking Occupancy Summary

The parking occupancy profiles indicate that the on-campus permit parking (P1) saturates even before the commencement of morning classes, with the remaining informal parking (P2) reaching capacity in the 9am to 10am period.

The vacant parking areas in P1 related to disabled and patient parking which remained vacant for most of the day. The informal dirt parking area was seen to be heavily utilised.

Car-pool / Passenger Set-down

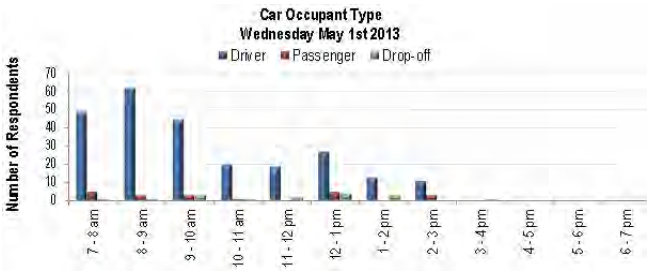


Figure 10: Car Occupant Type

Figure 10 shows that a very low proportion of staff/student is dropped off at university. There is an opportunity to improve this method of mode share to university.

Walk

Figure 11 shows the pedestrian volumes entering the campus from Southern Cross Drive.

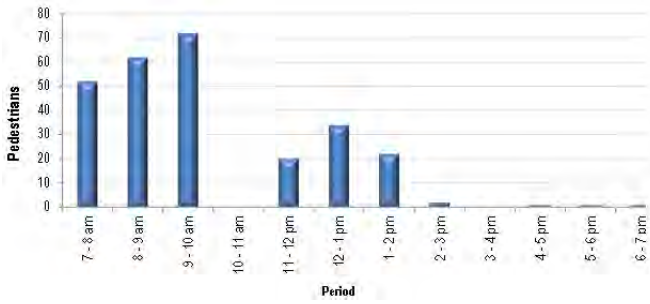


Figure 11: Pedestrian Access Volumes

A significant proportion of pedestrians arrived at the campus in the morning, in the period between 7am and 10am. The questionnaire revealed that a large component of the pedestrian volume is attributed to the students / staff parked at the Airport and Golden Four Drive. Low volumes of pedestrians were noted to be walking from nearby bus stops (8%) and from the surrounding residential areas (4%). While adequate pedestrian facilities connect surrounding areas to the campus, the indirectness of the pathways and a lack of student accommodation in the area have been identified as a contributing factor to the low volumes.

Cycle

Figure 12 shows the cyclist entering the campus by Southern Cross Drive.

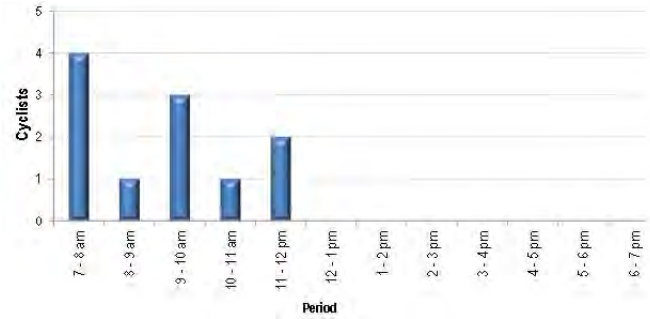


Figure 12: Cyclist Access Volumes

The low proportion of cyclist access to the campus was observed to occur during the morning (7am to 12pm) period only. Improvements should be made where possible to encourage access by cycle and increase its mode share for the university.

The implementation of a coastal cycleway may assist with this mode share. This combined with the level grades and pathway connections in the surrounding area provide a good foundation for which cycle access can be improved upon.

Shuttle Bus

The passenger volumes alighting and boarding the Border Park shuttle bus at the frontage to the campus are shown in Figure 13.

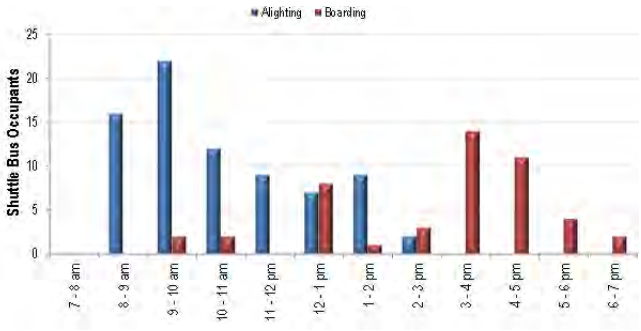


Figure 13: Shuttle Bus Passenger Volumes

Increased use of the shuttle bus in the period between 8am and 11am coincides with the on-campus (P1) and informal (P2) parking areas reaching capacity.

ON-LINE SURVEY RESULTS

Overview

The survey data obtained provides a sample of findings from the student / staff current access arrangement with a 10-15% response rate obtained from the on-line survey.

Whilst the on-line survey provides an opportunity to understand the current transport access data, it also provides an understanding into the current transport access barriers and perceptions. This provides important information that can be used to develop targeted infrastructure and communication strategies to improve the transport mode share for non-car based modes of travel.

The below provides a summary of the key results from the on-line survey for the Gold Coast Campus.

Demographic Profile

Of the 10-15% of students that responded to the on-line survey approximately 82% were female. Further efforts to encourage male students / staff to respond to the survey should be targeted during future on-line surveys.

80% of the respondents were from the student demographic, whilst the remaining 20% were staff. The typical age of students spread from 15-35 years old, whilst the age of staff typically spread from 30-60 years old.

While the residency of students and staff was observed to be distributed across both the Gold Coast and Tweed Shire areas, Tweed Heads was identified as a significant local residential supplier for both student and staff accommodation (10%). A further 12% of students (approximately 9% of the total) were noted to reside in Banora Point. The data showed other residential areas surrounding the campus (Bilinga, Coolangatta and Tweed Heads West) made up 10% of the overall residencies. The remaining students and staff were spread across a number of broader areas with 20% of students/staff coming from the Tweed Valley and Tweed Coast. The eastern and western suburbs of the Gold Coast north of Burleigh accounted for 17% of residencies in each respective area.

No dedicated student accommodation is presently provided for the Gold Coast campus, as reflected by the results of the survey. A significant proportion (50%) of students and staff live in their own home with their family.

Travel Mode Share

The demographics of residency provided by students and staff give an initial insight into why access to the campus by car is so favourable. It furthermore reinforces the travel mode behaviours exhibited by students and staff.

The travel mode share returned by the on-line survey is shown in Figure 14. It shows that a significantly large proportion (85%) of students and staff access the campus by car, which reflects the results obtained using the field survey. Following this was access by walking, which contributed a low proportion of 4%. Very low numbers stated that they gained access to the campus by cycle (3%), bus (2%) or shuttle bus (1%).

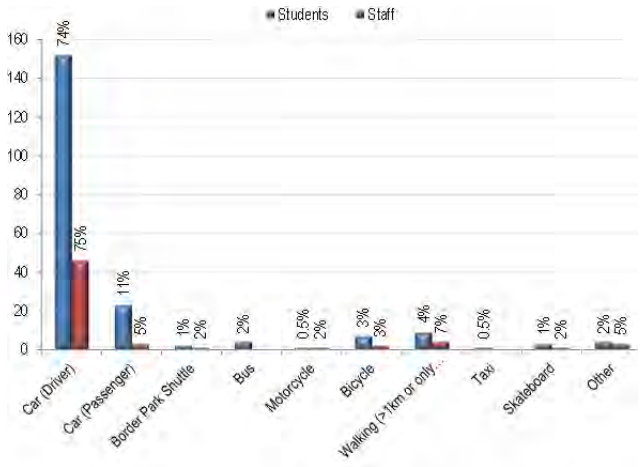


Figure 14: Travel Mode Share

Travel Mode Behaviours

Figure 15 shows the main reasons why respondents opted for car travel. Many stated that it was either their only option or that they preferred the independence of using their car.

Figure 15: Reasons for Travel by Car

For those respondents that chose not to travel by car, the main reason for choosing an alternative mode of transport is shown in Figure 16.

Figure 16 shows that the main reason for mode choice was that they lived nearby. This highlights the main potential of trying to provide a greater opportunity for local student accommodation. The other key factor related to either not owning a car or having a driver's license.

Consideration should subsequently be given to promoting student accommodation within

Coolangatta or Tweed Heads town centres, with a high frequency shuttle service.

The impact of bus services operating in Queensland and bus services operating in NSW with no overlapping services over the border is an issue that could be rectified through a dedicated University/Airport shuttle bus service connecting the precinct with Coolangatta, Tweed Heads and any other identified student accommodation or high density residential area.

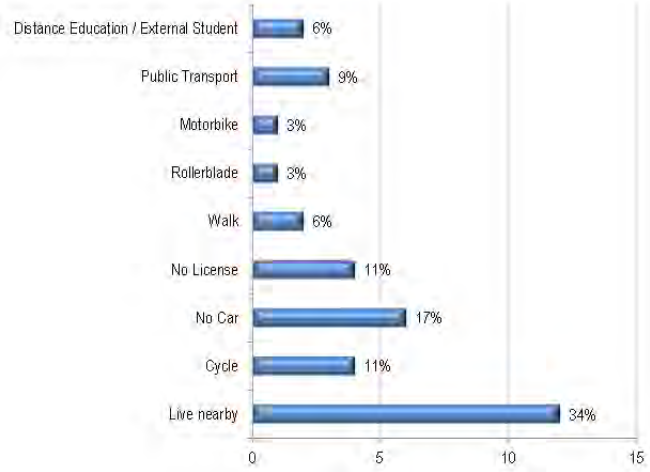


Figure 16: Reasons for No Travel by Car

The main reason why respondents chose not to use public transport is shown in Figure 17. The data suggests that the main reason for lack of public transport use is its lack of directness and availability near their place of residence.

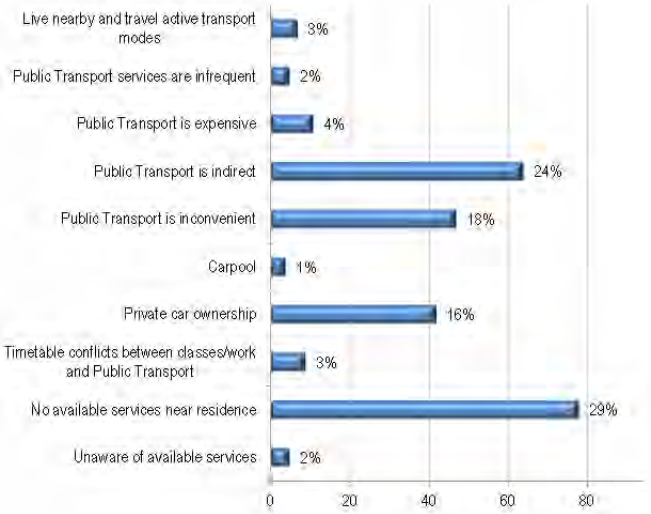


Figure 17: Reasons for No Travel by Public Transport

The chosen location of parking is shown in Figure 18. It should be noted that 42% of parkers searched for a space on-campus first. As 36% found a space on-campus, this results in approximately 6% of respondents having to subsequently circulate elsewhere to find a place to park.

Interestingly, 7% of respondents parked in surrounding streets, whilst a further 8% parked in other locations not specified, which may be interpreted as being the 'dirt' area adjacent to the campus.

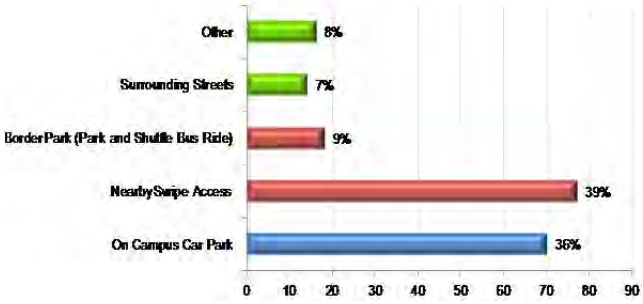


Figure 18: Parking Locations

Travel Mode Perceptions

Figure 19 shows the transport modes that students and staff would consider using. The data suggests that there are opportunities to encourage the use of car-pooling. Student and staff access via shuttle buses may be considered, but use of route service buses do not appear to have much attraction.

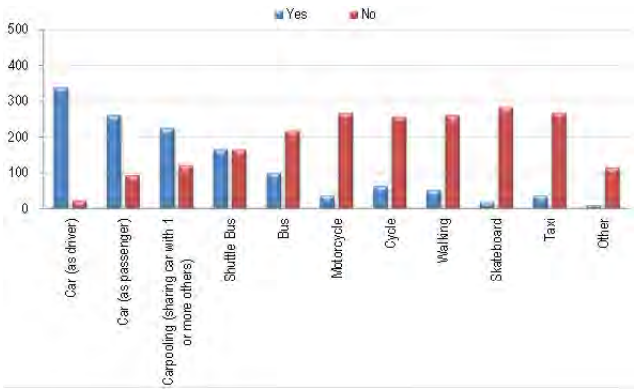


Figure 19 : Considered Travel Modes

16% of respondents felt that public transport would be more expensive than driving, whilst only 3% thought public transport would be quicker. These two perceptions require a major shift in thinking in order to achieve an improved non-car based mode share.

The majority of respondents felt that public transport was safe and clean, however was indirect and infrequent. The lack of parking was a strong perception noticed from the respondents.

Improved lighting around the campus was the only measure that showed some positive interest to improve active transport.

The lack of local residential accommodation is likely to be a factor in this level of response. In future surveys a question relating to the suitable provision of closely located student accommodation should be asked. Some respondents did request improved end of trip facilities.

A number of bus improvements were supported such as:

- Discounted tickets;
- Better timed services;
- More frequent services; and
- More shuttles at peak times.

Whilst a lack of parking was re-iterated as a necessary improvement measure, there were some respondents that requested improvements to car-pooling. Allocated parking areas and improved communications to arrange car-pooling were key suggestions to improve car occupancy rates.

Overall Transport Access Satisfaction

Staff and Students were asked to rank their overall satisfaction of transport access provisions to university. Figure 20 shows that the respondents are generally satisfied with transport access arrangements, however there is a significant proportion that is substantially dissatisfied.

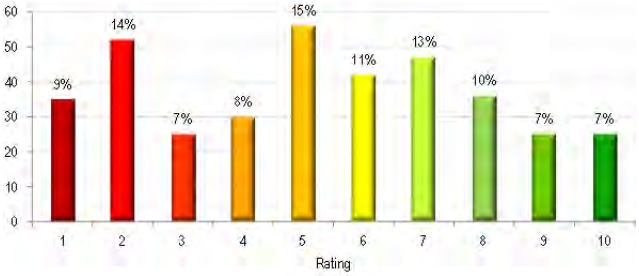


Figure 20: Overall Satisfaction

In addition, 10%-14% stated that overall it was easy to find parking on, or nearby campus. The remainder were either neutral or not satisfied with parking arrangements.

KEY FINDINGS

Overview of Survey Findings

The completion of the field surveys and student/staff questionnaire revealed a number of key trends such as:

- There is currently a very high car mode share in the Gold Coast area;
- The car mode share is consistent in and around the precinct;
- The average car occupancy of 1.2 people per car is slightly higher than the Gold Coast average;
- There is parking shortfall for students with approximately 50-60 cars parking off-site (excluding the dirt area);
- The staff permit parking area also appears to be deficient with it filling quite rapidly in the morning;
- There appears to be an oversupply of parking for specific users (i.e disabled parking / reserved parking / visitor permit parking);
- There is a very low use of public transport use, mainly due to the location of the services, frequency of services and poor travel times;
- There is a high proportion of students and staff that reside outside of the campus area, making car travel their most attractive choice;
- Improvements are required to street-lighting in and around the campus;
- There is a need to provide a substantial increase in localised student accommodation with good transport access to Coolangatta and Tweed Heads centres;
- There is a perception that public transport is more expensive than car travel;
- The overlapping of services over the NSW/QLD border is an issue;
- There is a demand for car-pooling should a number of improvements be made;
- Public transport would be given consideration if the route services were more direct;
- Respondents that would consider using public transport if service frequencies were increased and bus discounts given; and
- The general perception is that transport access to the university is below average.

Future Actions

A number of actions should be considered to address the issues identified with the aim to reduce the demand for single occupant car use, such as:

- Review bus services around the university considering the provision of a dedicated university loop service providing more direct connections between the university, Airport, Coolangatta, Tweed Heads, Border Park and other student residential clusters (refer Figure 21);

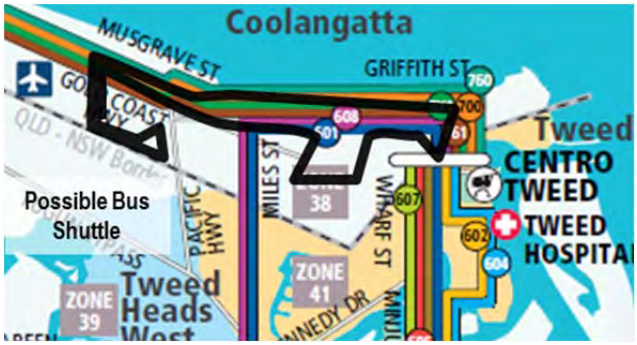


Figure 21: Possible Bus Shuttle Extension

- Incentivise car-pooling through the provision of a dedicated parking area and improved student introduction methods;
- Introduce a communication strategy for educating students and staff on the 'real' cost of travelling by car compared to other transport modes, as well as the additional environmental and health benefits of using active transport modes. Release of such information during o-week and as part of information packs to potential students and staff should be considered;
- Develop a plan to encourage more local accommodation, including consideration of an accommodation strategy located within Coolangatta / Tweed Heads.

Concluding Remarks

This travel mode survey has been conducted to better understand staff and student travel choices. A number of sub-actions will be developed from this process for considered implementation.

Additional travel mode surveys are likely to occur in the future to gauge the success of any actions implemented. Southern Cross University is committed to the continual improvement of transport access in a sustainable manner.

APPENDIX E

SCU TRAVEL MODEL SHARE DATA REPORT

SCU TRAVEL MODE SURVEY
GOLD COAST CAMPUS DATA REPORT

FOR

SOUTHERN CROSS
UNIVERSITY

BITZIOS consulting

Gold Coast
Suite 26, 58 Riverwalk Avenue
Robina QLD 4226
P: (07) 5562 5377
W: www.bitziosconsulting.com.au

Brisbane
Level 2, 428 Upper Edward Street
Spring Hill QLD 4000
P: (07) 3831 4442
E: admin@bitziosconsulting.com.au

Sydney
Studio 203, 3 Gladstone Street
Newtown NSW 2042
P: (02) 9557 6202

Project No: P1265 Version No: 001 Issue date: 3rd July 2013

DOCUMENT CONTROL SHEET

Issue History

Report File Name	Prepared by	Reviewed by	Issued by	Date	Issued to
P1265.001R SCU Gold Coast Campus Data Report	L.Johnston	A.Bitzios	A.Bitzios	03/07/2013	Kirsty Howton Southern Cross University

CONTENTS

Page

1. INTRODUCTION 4

1.1 BACKGROUND 4
1.2 SITE LOCATION 4
1.3 PURPOSE 5

2. SURVEY DETAILS 6

2.1 OVERVIEW 6
2.2 FIELD SURVEY 6
2.2.1 Site Details 6
2.2.2 Assumptions 7
2.2.3 Data Requirements 7
2.2.4 Methodology 7
2.3 ON-LINE SURVEY 9
2.3.1 Details 9
2.3.2 Data Requirements 9
2.3.3 Methodology 10

3. FIELD SURVEY RESULTS 11

3.1 OVERVIEW 11
3.1.1 Mode Summary 11
3.1.2 Mode Share Summary 12
3.2 TRAFFIC VOLUMES 13
3.2.1 Daily Volumes 13
3.2.2 Hourly Volumes 13
3.3 PARKING OCCUPANCY 14
3.4 VEHICLE OCCUPANCY 17
3.5 PEDESTRIAN VOLUMES 18
3.6 CYCLIST VOLUMES 18
3.7 BORDER PARK SHUTTLE BUS UTILISATION 19
3.8 QUESTIONNAIRE RESPONSES 19

4. ONLINE SURVEY RESULTS 24

4.1 DEMOGRAPHICS 24
4.2 TRAVEL TO CAMPUS ON FIELD SURVEY DAY 30
4.3 TRAVEL MODE BEHAVIOUR 38
4.4 TRAVEL MODE PERCEPTIONS 42

Tables

Table 3.1: Parking Summary
Table 3.2: Traffic Summary
Table 3.3: Pedestrian Summary
Table 3.4: Cyclist Summary
Table 3.5: Bus Summary

Figures

Figure 1.1: Southern Cross University Gold Coast Campus

Figure 2.1: Gold Coast Campus Site
Figure 2.2: Gold Coast Campus Locations
Figure 2.3: Questionnaire Sample Form

Figure 3.1: Southern Cross Drive Daily Traffic Volumes
Figure 3.2: Southern Cross Drive Hourly Traffic Volumes
Figure 3.3: Parking Occupancy – Precinct One (Hourly)
Figure 3.4: Parking Occupancy – Precinct Two (Hourly)
Figure 3.5: Permit Parking Hourly Occupancy
Figure 3.6: Disabled Parking Hourly Occupancy

Figure 3.7: Patient Parking Hourly Occupancy
Figure 3.8: Bike Parking Hourly Occupancy
Figure 3.9: Southern Cross Drive Vehicle Occupancy
Figure 3.10: Southern Cross Drive Vehicle Occupant Comparison
Figure 3.11: Southern Cross Drive Pedestrian Volumes
Figure 3.12: Southern Cross Drive Cyclist Volumes
Figure 3.13: Border Park Shuttle Bus Utilisation
Figure 3.14: Access by Gender
Figure 3.15: Undergraduate Access'
Figure 3.16: Staff Access
Figure 3.17: Postgraduate Access
Figure 3.18: Visitor Access
Figure 3.19: Access by Travel Mode
Figure 3.20: Car Occupant Type
Figure 3.21: Multi-mode Access
Figure 3.22: Park and Walk Origin
Figure 3.23: Bus and Walk Origin

Figure 4.1: Degree / Position Type of Respondents
Figure 4.2: Gender of Respondents
Figure 4.3: Age Group of Respondents
Figure 4.4: Age Group of Student Respondents
Figure 4.5: Age Group of Staff Respondents
Figure 4.6: Disability of Respondents
Figure 4.7: Resident Type of Respondents
Figure 4.8: Faculty / School of Respondents
Figure 4.9: Gross Weekly Personal Income of Respondents
Figure 4.10: Gross Weekly Personal Income of Student Respondents
Figure 4.11: Gross Weekly Personal Income of Staff Respondents
Figure 4.12: Gold Coast Campus Respondents – Campus Attended
Figure 4.13: Travel Mode
Figure 4.14: Usual Mode of Travel
Figure 4.15: Days Travelled Via Described Journey
Figure 4.16: Car Used On Last Leg
Figure 4.17: Parking Precinct Used
Figure 4.18: Access On-campus Parking Initially
Figure 4.19: Access Nearby Swipe-access Parking Initially
Figure 4.20: Access to Campus from Suburb by Respondents
Figure 4.21: Access to Campus from Suburb by Student Respondents
Figure 4.22: Access to Campus from Suburb by Staff Respondents
Figure 4.23: Journey Times to SCU
Figure 4.24: Journey Times from SCU
Figure 4.25: Days Travelled to SCU
Figure 4.26: Days Attended SCU from Home
Figure 4.27: Have Travelled to SCU by Car
Figure 4.28: Reasons for Travel by Car
Figure 4.29: Reasons for No Travel by Car
Figure 4.30: Have travelled to SCU by Public Transport
Figure 4.31: Reasons for Travel by Public Transport
Figure 4.32: Reasons for No Travel by Public Transport
Figure 4.33: Travel Time Comparison
Figure 4.34 Travel Time Comparison
Figure 4.35: Considered Travel Modes
Figure 4.36: Travel Perceptions from Residence to SCU
Figure 4.37: Benefits of Improvements to Active Transport
Figure 4.38: Benefits of Improvements to Public Transport
Figure 4.39: Benefits of Improvements to Car Travel
Figure 4.40: Car-pool Incentives
Figure 4.41: Car-pool Barriers
Figure 4.42: Satisfaction of Transport Needs
Figure 4.43: Difficulty of Finding Parking On-campus
Figure 4.44: Difficulty of Finding Parking Near-campus

1. INTRODUCTION

1.1 BACKGROUND

Universities are major employers for many regional communities across the country. They are similar to hospitals and other major business areas, whereby they generate a high demand for vehicular traffic. There are growing pressures for these high employment generators to think sustainably in developing strategies to reduce the occurrence of single occupant vehicle access. Southern Cross University (SCU) has high level support for delivering sustainable transport outcomes as demonstrated through environmental sustainability goals identified in the SCU Strategic Plan.

Southern Cross University was established in 1994 as the sole university education facility in the Northern Rivers of NSW. In a short span of time Southern Cross University now encompasses three campuses, with approximately 15,500 students enrolled at the Lismore and Coffs Harbour (NSW) and Gold Coast (Qld) campuses.

The university has recently (2010) expanded its operations over the state border and into South East Queensland with the opening of the newly consolidated Gold Coast campus. The campus is located adjacent to Gold Coast International Airport and currently consists of two buildings, with a third due for completion sometime in 2014.

The campus was attended by approximately 300 students and around 50 staff in 2012 and it is envisaged that from 2013, attendance will increase to over 1500 students. The exact number of attendees is unknown due to the availability of distance and face to face modes of delivery for some courses. At the end of the construction phase in 2016, approximately 5,000 students are expected to attend the Gold Coast campus.

1.2 SITE LOCATION

The Gold Coast campus is situated at Southern Cross Drive in Bilinga, Queensland. It is located in the local government area of the Gold Coast City Council and is surrounded by the suburbs of Coolangatta, Tweed Heads West and Tugun. The campus forms part of the Gold Coast Airport precinct and lies to the immediate north of the NSW/Qld state border. The campus currently consists of two multi-story buildings and a parking area fronting the site. At present there are no dedicated student accommodation facilities which service the Gold Coast campus however significant interest has been shown for the establishment of such facilities in Bilinga and surrounding suburbs.

The campus can be accessed via a sole entry point provided by Southern Cross Drive on its western extent. Access to the Gold Coast Airport precinct is gained from the Gold Coast Highway via Terminal Drive. The Gold Coast Highway is a state-controlled road which provides a north-south link between the eastern suburbs of the Gold Coast across the border into NSW. A “park and ride” arrangement services the campus where students and staff are encouraged to park their vehicles off-campus at the nearby Border Park Raceway and catch a shuttle bus to the campus.

Figure 1.1: Southern Cross University Gold Coast Campus

1.3 PURPOSE

Southern Cross University has commissioned the project team lead by Bitzios Consulting (assisted by Traffic Data and Control and Newton Denny Chappelle) to deliver a travel mode survey to provide a sustainable response to existing and emerging transport issues. The travel mode survey is aimed to provide SCU with an understanding of the current and future requirements to provide adequate transport infrastructure, management and services levels for staff and student access at each campus.

The scope of the project included:

- documenting the existing transport infrastructure used for access to the university by all available modes of transport;
- understanding where each campus sits within the local transport systems;
- highlighting existing deficiencies and areas of concern for traffic access, parking provision, public transport services/facilities and walking and cycling infrastructure;

The survey outputs have been provided as follows:

- Gold Coast Campus Data Report (this report);
- Lismore Campus Data Report; and
- SCU Travel Mode Share Survey Summary Report.

2. SURVEY DETAILS

2.1 OVERVIEW

The SCU Travel Mode Survey has been developed to involve two individual components for capturing the required data;

- field survey (Lismore and Gold Coast campuses only)
- on-line survey (University-wide)

2.2 FIELD SURVEY

2.2.1 Site Details

Southern Cross University Gold Coast Campus is located on Southern Cross Drive, Bilinga as shown in Figure 2.1.

Figure 2.1: Gold Coast Campus Site

The Gold Coast campus is accessed via a single access point along Southern Cross Drive. Parking is provided on-campus through the use of a parking area which fronts campus buildings as well as an informal provision on the western side of Southern Cross Drive. Additional parking provisions have been allocated to the campus at the Airport swipe-access car park which is located to the immediate north of the campus.

The site can be accessed by public transport (bus) via two nearby bus stops, with one located at the Airport on Terminal Drive fronting the Domestic Arrivals and the other on Golden Four Drive to east of the Gold Coast Highway. A “park and ride” arrangement which services the campus utilises the parking provisions

available at the Border Park Raceway located on Binya Avenue, Coolangatta. The shuttle bus travels approximately 2.8 km from Border Park to the campus and completes the trip in around five minutes.

2.2.2 Assumptions

All trips generated to and from the campus will use the single access point along Southern Cross Drive. As it provides local access to the campus, it is unlikely that the road is used to access any other developments.

2.2.3 Data Requirements

To establish an understanding of the travel mode share and behaviours at the Gold Coast campus, it was determined the following data was required for analysis:

- vehicle and bike parking occupancy (hourly intervals);
- vehicle occupancy (number of people per vehicle)
- shuttle bus occupancy (utilisation and frequency)
- set-down and pick-up counts (passenger volumes)
- pedestrian and cyclist volumes; and
- 7-day traffic volume count at one site (Southern Cross Drive).

2.2.4 Methodology

A site visit was conducted on Wednesday 27th March 2013 to identify points of access and collect a parking inventory of the site using aerial maps. Using the site details and above assumptions, two separate sites were selected as survey locations with the parking provisions divided into two precincts.

The Gold Coast Campus field survey was conducted on Wednesday 1st May 2013, commencing at 7:00am and finishing at 7:00pm. The data required from the field survey was collected by a team of surveyors assigned to select point or area on the campus. The survey components were conducted at the following locations:

- Southern Cross Drive survey – vehicle occupancy and pedestrian/cyclist volumes (one surveyor);
- Southern Cross Drive survey – questionnaire (one surveyor); and
- On-campus survey – parking occupancy and questionnaire (one surveyor).

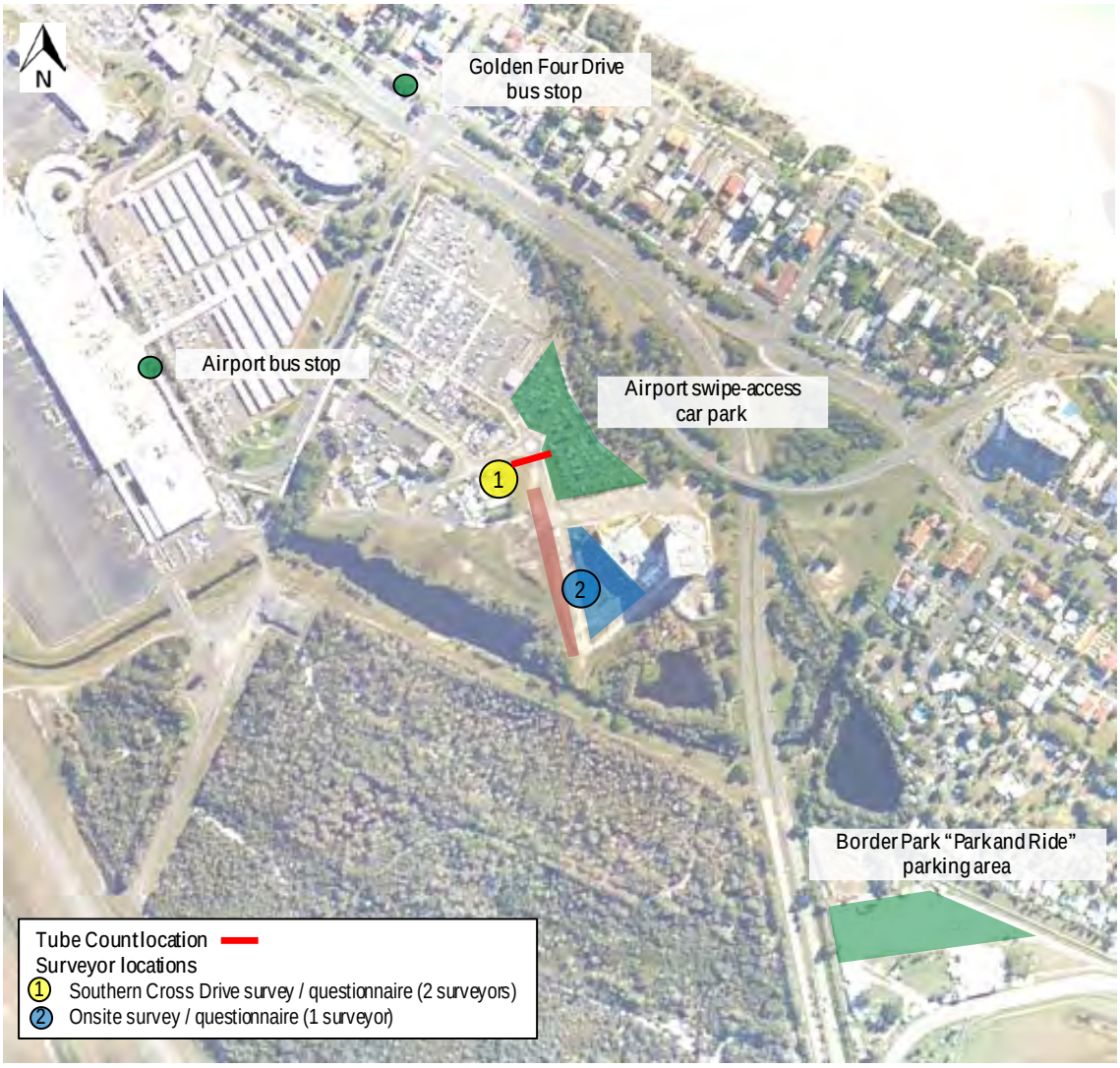


Figure 2.2: Gold Coast Campus Survey Locations

The traffic count survey was conducted using tube counts placed on Southern Cross Drive to the immediate south of the Arthur Butler Parade/Southern Cross Drive roundabout. The traffic count survey was conducted from 12:00am Tuesday 30th April to 12:00am Tuesday 7th May, 2013.

A questionnaire was conducted for pedestrians accessing the campus throughout the duration of the field survey. The questionnaire was conducted by two surveyors each of the survey locations, using the sample form shown in Figure 3.3 below.

	a)	b)	c)i)	c)ii)	c)iii)	d)
Time	Sex	Are you a?	What Mode of Transport did you use?	As a CAR occupant, were you a?		Where did you come from?
15 Minute Increments (HH:MM)	1 - Male 2 - Female	1 - Undergraduate 2- Postgraduate 3 - Staff 4 - Visitor	1 - Car 2 - Bus 3 - Bike 4 - Walk 5 - Border Park Shuttle Bus 6 - Other	1 - Driver 2 - Passenger (if car parked on site) 3 - Dropped Off	If Other in was listed in c)i),	1 - Airport Carpark 2 - Golden Four Dr (and surrounds) 3 - Airport Bus Stop 4 - Golden Four Dr Bus Stop 5 - Not Applicable (Border Park/Dropped Off) 6 - Other
7:15	2	1	1	1		1
	1	3	4			3

Figure 2.3: Questionnaire Sample Form

The questionnaire was conducted to collect data on trips made to the campus where walking or cycling was used as a mode of transport in the final leg of the journey.

2.3 ON-LINE SURVEY

2.3.1 Details

The on-line travel mode and behaviour survey was conducted as a University-wide survey and was issued to all students and staff. The survey commenced use at 9:00am on Thursday 2nd May 2013 and was closed at 5:00pm on Wednesday 8th May 2013. The on-line survey was completed in conjunction with the field surveys, requiring respondents to answer questions in relation to travel modes and associated behaviours. This included questions related specifically to their travel behaviour on the days the field surveys were conducted.

2.3.2 Data Requirements

The on-line survey was developed to include a broad range of questions that would capture the data required to gain an understanding of travel modes and behaviours in relation to student and staff demographics.

The survey included various sets of questions as summarised by the following:

- travel behaviour on field survey day;
  - attendance
  - travel mode/s utilised
  - arrival/departure times from residence/campus
  - comparison to usual travel behaviours
- arrival to campus by car
  - occupants in car
  - parking area utilised
  - type of parking utilised
  - set-down / pick-up location utilised
  - access roads utilised
- perceptions of private/public transport modes;
  - travel times
  - cost
  - benefits / downfalls of travel modes from residence
- other modes of transport;
  - benefits / downfalls of alternate modes
  - benefits / downfalls of potential improvements
  - considerations of other modes
- travel mode scenarios;
  - potential parking improvements
  - potential “park and ride” initiatives
  - potential public transport initiatives
- demographics; and
  - age
  - gender
  - degree / position type
  - faculty / school
  - accommodation / residence type
  - income
  - illness or disability
- transport access needs
  - rating of satisfaction

- inter-campus travel
- potential improvements; and
- travel mode influences.

2.3.3 Methodology

The on-line survey was developed specifically to better understand existing and emerging transport access issues at the SCU campuses. The development phase of the on-line survey involved collaboration with key staff at SCU and resulted in a final product which addressed the desired requirements.

The on-line survey was published using the Qualtrics on-line data collection platform and was issued to students and staff by SCU via the university email. At the completion of the survey, all data obtained was compiled in a database and organised for analysis. The personal details of each respondent remained anonymous throughout the survey and were not included in the database.

3. FIELD SURVEY RESULTS

3.1 OVERVIEW

3.1.1 Mode Summary

A summary of the results obtained for each travel mode surveyed at Gold Coast campus has been provided in Tables 3.1 to 3.5 below.

Table 3.1: Parking Summary

Parking Type	Hourly Utilisation			Supply
	Minimum	Median	Maximum	
Total Car Parks	25%	81%	93%	252
Permit	49%	99%	100%	91
Patient	0%	0%	27%	11
Reserved	0%	0%	0%	1
Disabled	0%	29%	29%	7
Informal	1%	83%	100%	142
Bike	0%	28%	44%	18

Table 3.2: Traffic Summary

Access	Two-Way Hourly Volume		
	Minimum	Median	Maximum
Southern Cross Drive	57	133	166

Table 3.3: Pedestrian Summary

Access	Entering Hourly Volume (One-Way)		
	Minimum	Median	Maximum
Southern Cross Drive	0	11	72

Table 3.4: Cyclist Summary

Access	Entering Hourly Volume (One-Way)		
	Minimum	Median	Maximum
Southern Cross Drive	0	0	4

Table 3.5: Shuttle Bus Summary

Access	Entering Hourly Passenger Volumes (One-Way)		
	Minimum	Median	Maximum
Border Park Shuttle	0	11	24

3.1.2 Mode Share Summary

The mode share of trips to the Gold Coast campus observed from the results of the field survey is as follows:

- Car as Driver = 708 (58.4%);
- Car as Passenger = 150 (12.4%);
- Shuttle Bus Passengers = 77 (6.3%);
- Cyclist = 11 (0.9%); and
- Pedestrian = 267 (22%).

The average car occupancy for the Gold Coast campus obtained from the survey was approximately 1.2 occupants per vehicle.

3.2 TRAFFIC VOLUMES

3.2.1 Daily Volumes

The distribution of daily traffic volumes across Southern Cross Drive for the Gold Coast campus is shown in Figure 3.1 below.

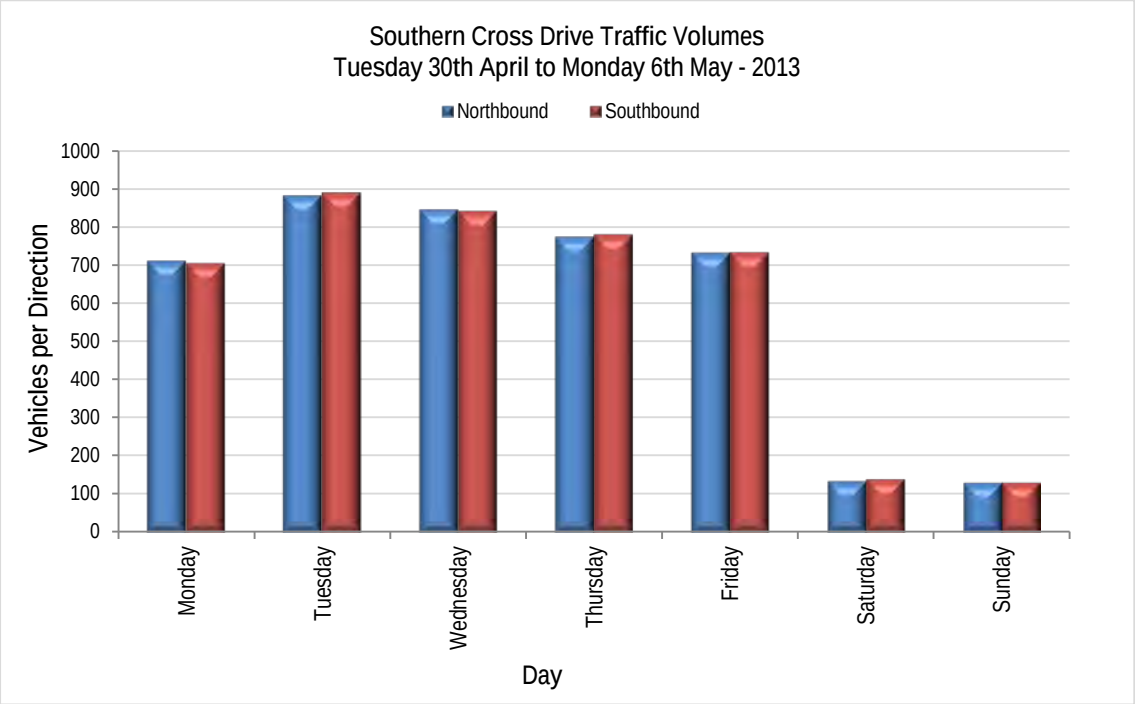


Figure 3.1: Southern Cross Drive Daily Traffic Volumes

3.2.2 Hourly Volumes

The hourly traffic volumes for Southern Cross Drive were recorded as shown in Figure 3.2.

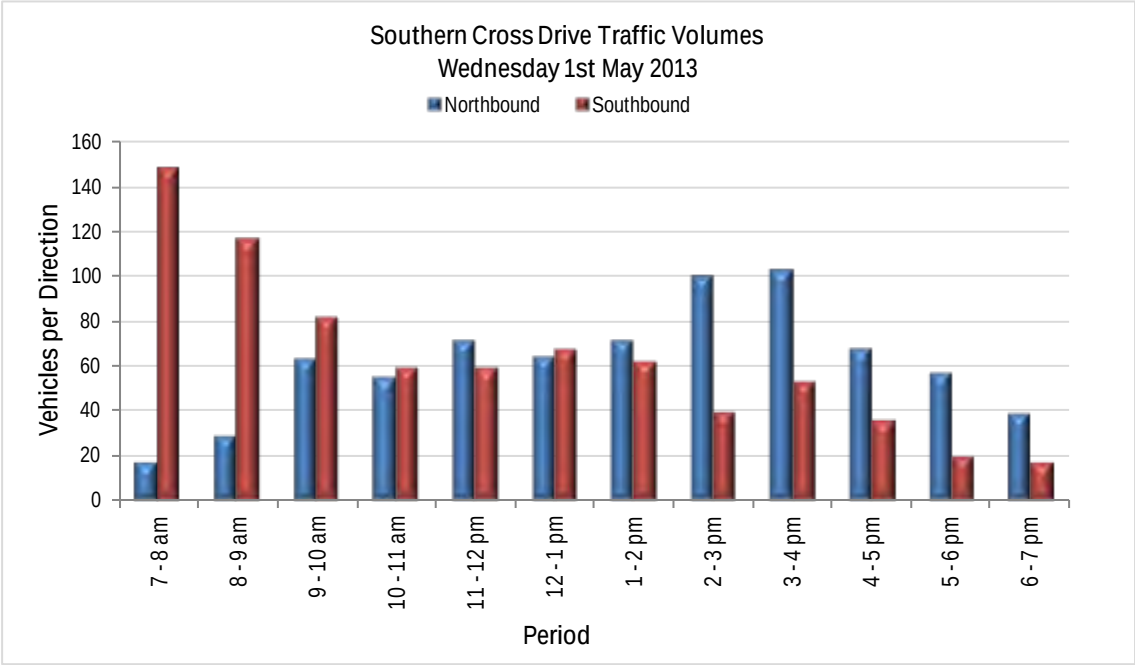


Figure 3.2: Southern Cross Drive Hourly Traffic Volumes

3.3 PARKING OCCUPANCY

The hourly occupancy for both of the parking areas on the Gold Coast campus was recorded as shown in Figures 3.3 and 3.4 respectively.

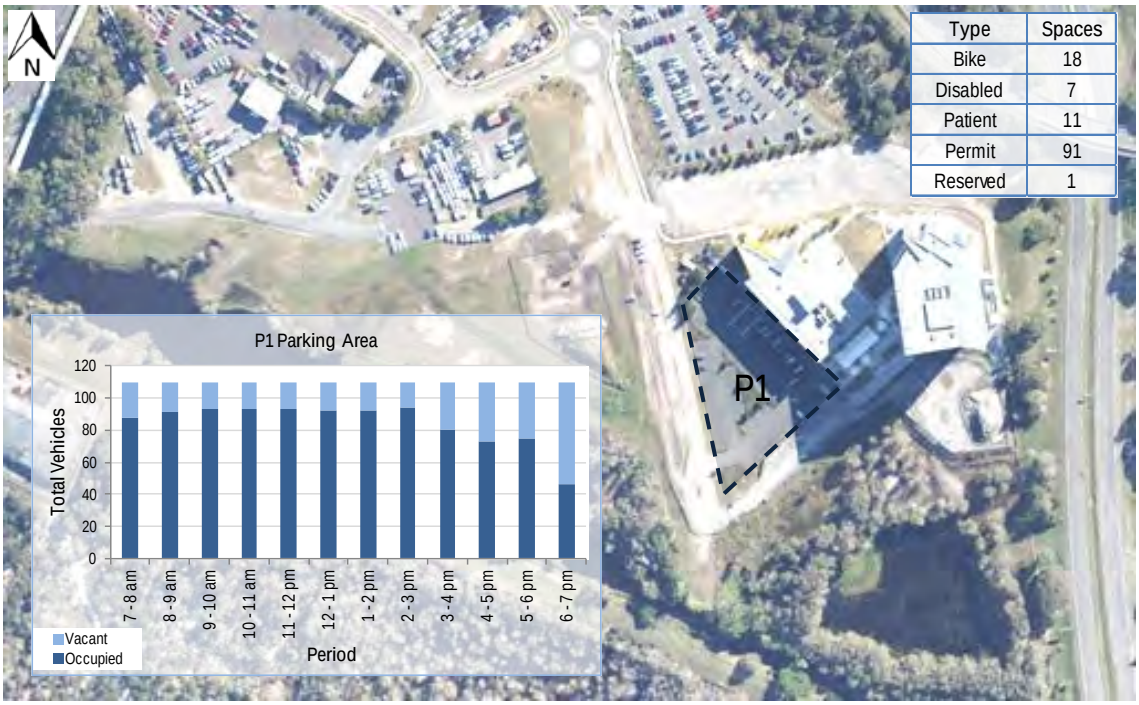


Figure 3.3: Parking Occupancy – Precinct One (Hourly)

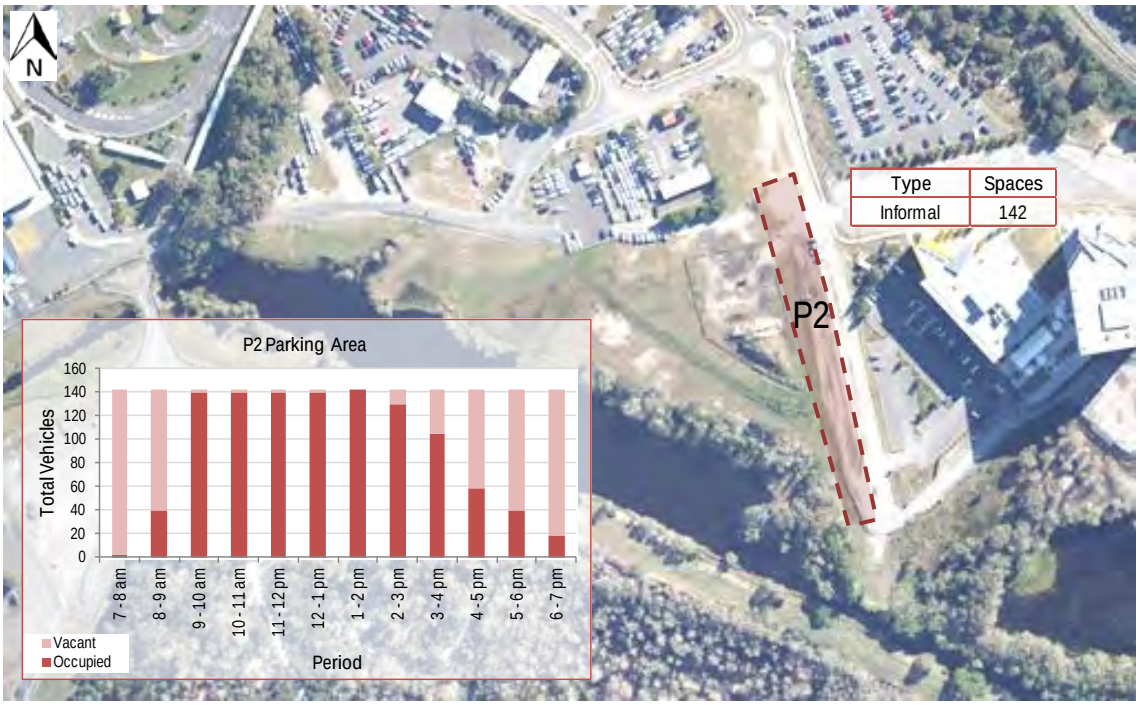


Figure 3.4: Parking Occupancy – Precinct Two (Hourly)

The hourly occupancy for the parking types on the Gold Coast campus was recorded as shown in Figures 3.5 and 3.8 respectively.

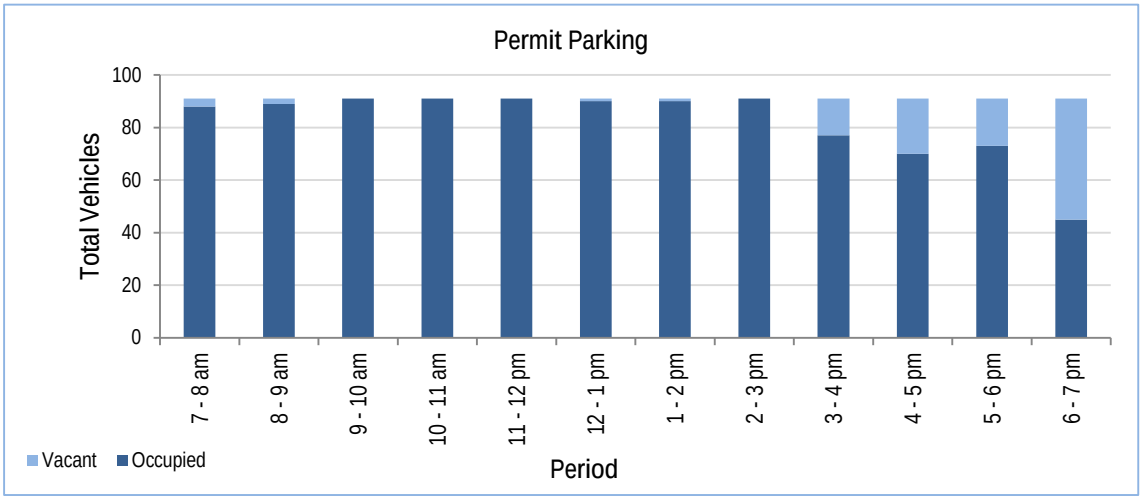


Figure 3.5: Permit Parking Hourly Occupancy

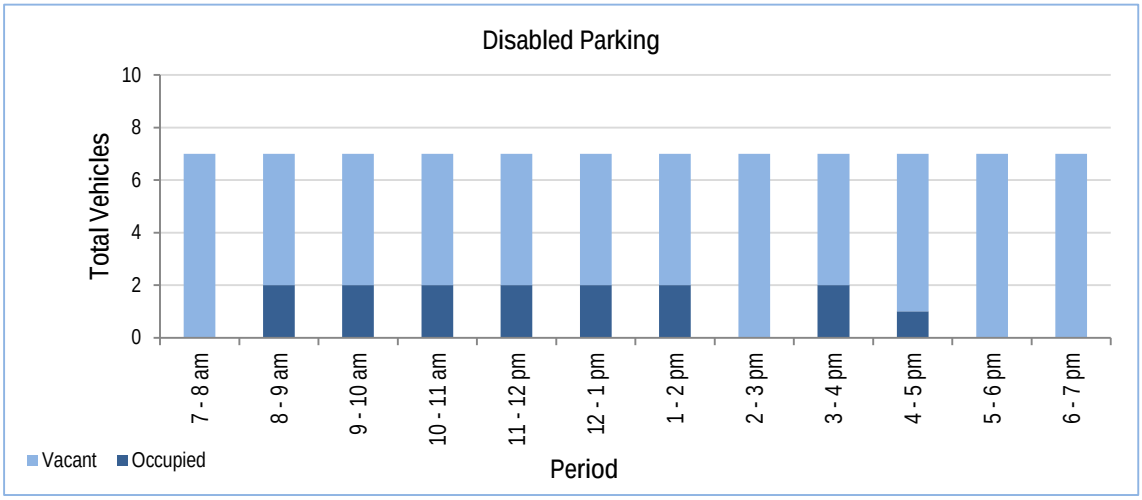


Figure 3.6: Disabled Parking Hourly Occupancy

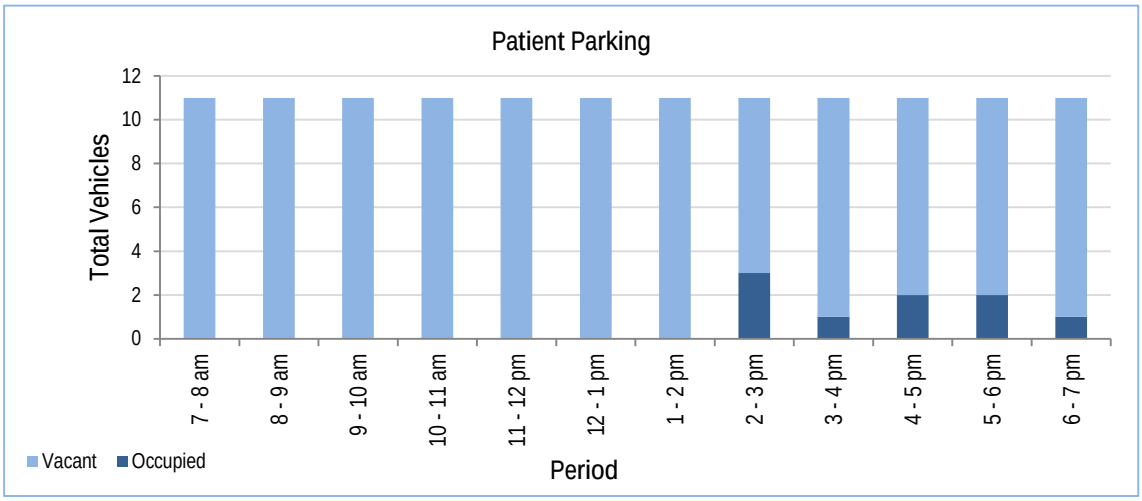


Figure 3.7: Patient Parking Hourly Occupancy

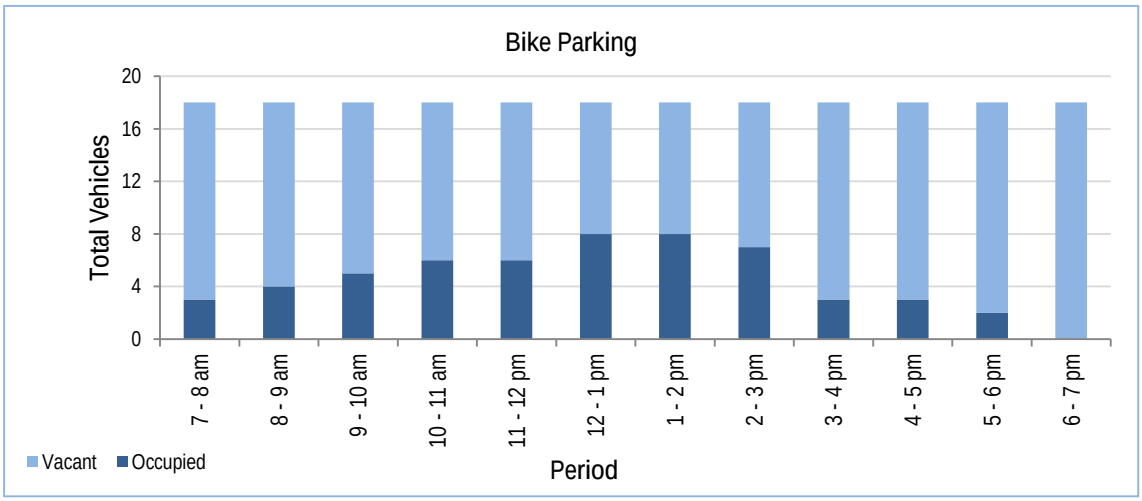


Figure 3.8: Bike Parking Hourly Occupancy

3.4 VEHICLE OCCUPANCY

The total number of vehicles by number of occupants for Southern Cross Drive is shown in Figure 3.9.

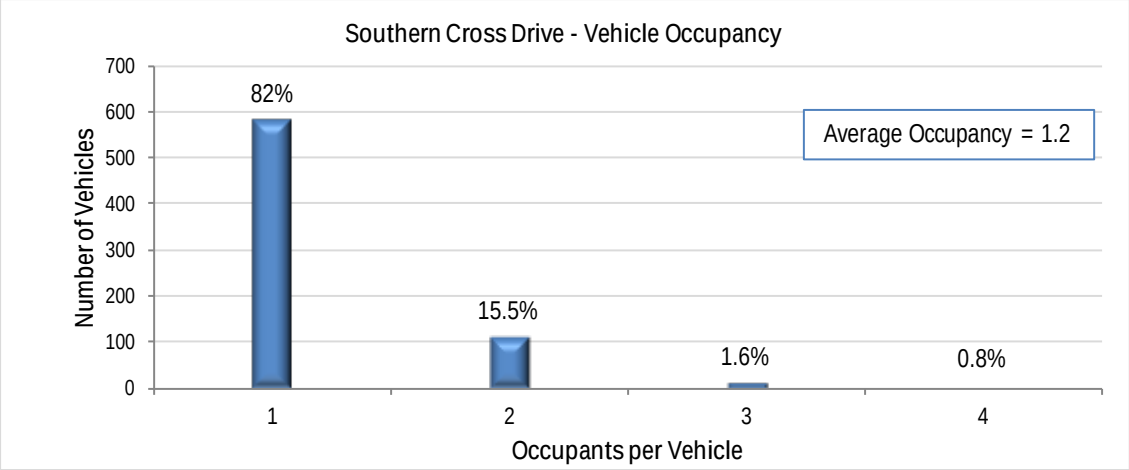


Figure 3.9: Southern Cross Drive Vehicle Occupancy

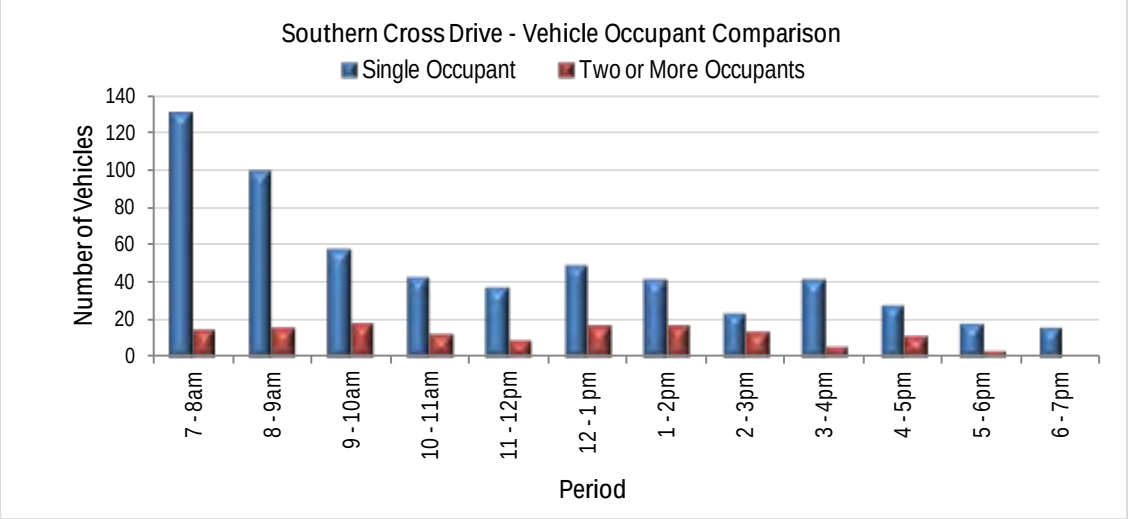


Figure 3.10: Southern Cross Drive Vehicle Occupant Comparison

3.5 PEDESTRIAN VOLUMES

The hourly pedestrian volumes for Southern Cross Drive were recorded as shown in Figure 3.11 below.

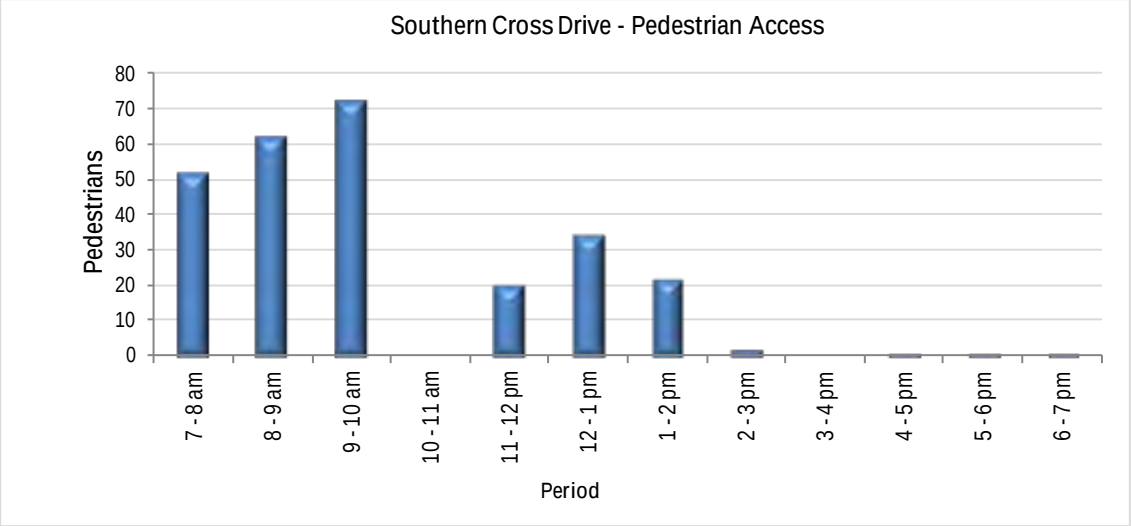


Figure 3.11: Southern Cross Drive Pedestrian Volumes

3.6 CYCLIST VOLUMES

The hourly cyclist volumes for Southern Cross Drive were recorded as shown in Figure 3.12.

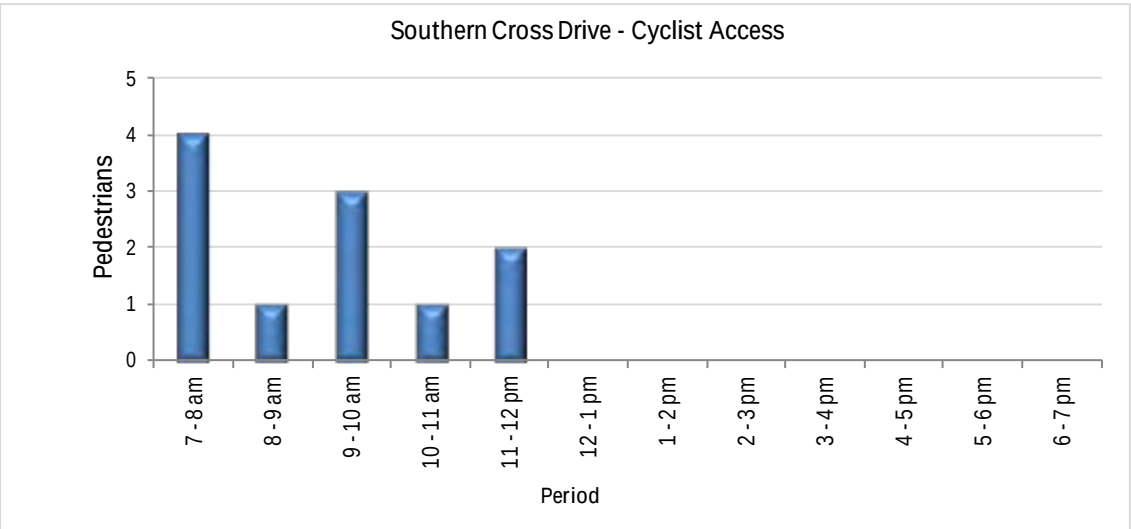


Figure 3.12: Southern Cross Drive – Cyclist Volumes

3.7 BORDER PARK SHUTTLE BUS UTILISATION

The Border Park "park and ride" shuttle bus was observed to operate at an average of one service every 30 minutes. The hourly utilisation of passengers on the shuttle bus service is shown in Figure 3.13 below.

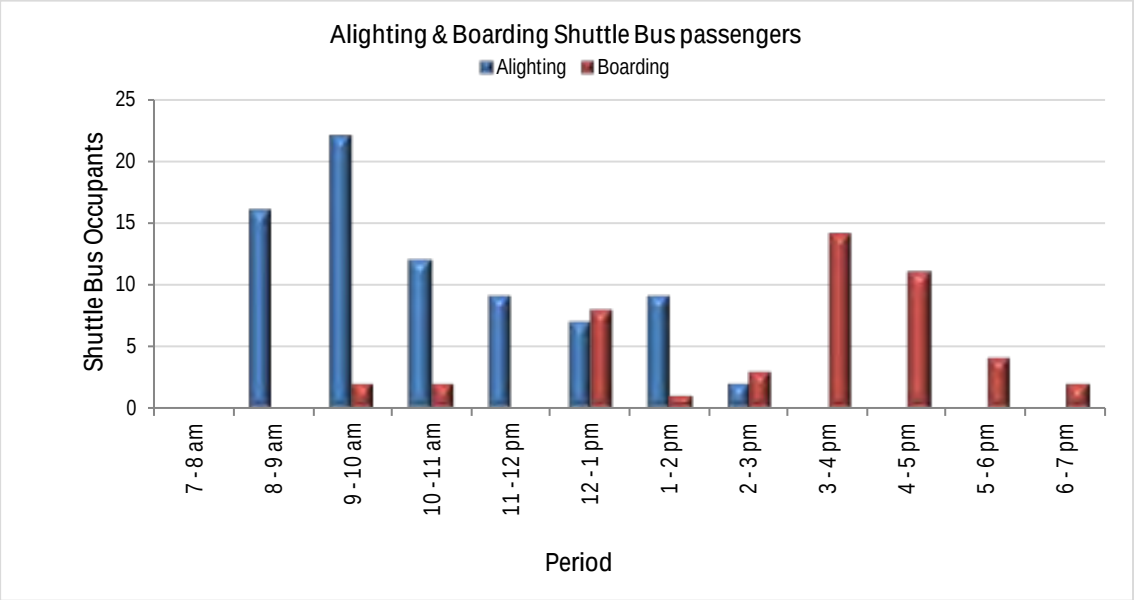


Figure 3.13: Border Park Shuttle Bus Utilisation

3.8 QUESTIONNAIRE RESPONSES

A total of 372 respondents were surveyed for the questionnaire component of the Gold Coast campus field survey. It should be noted that of the responses, no cyclists were surveyed for the questionnaire and therefore are not included in the results. Furthermore, incomplete responses were obtained from the questionnaire however were excluded from the results.

The hourly access by gender is shown for the respondents in Figure 3.14.

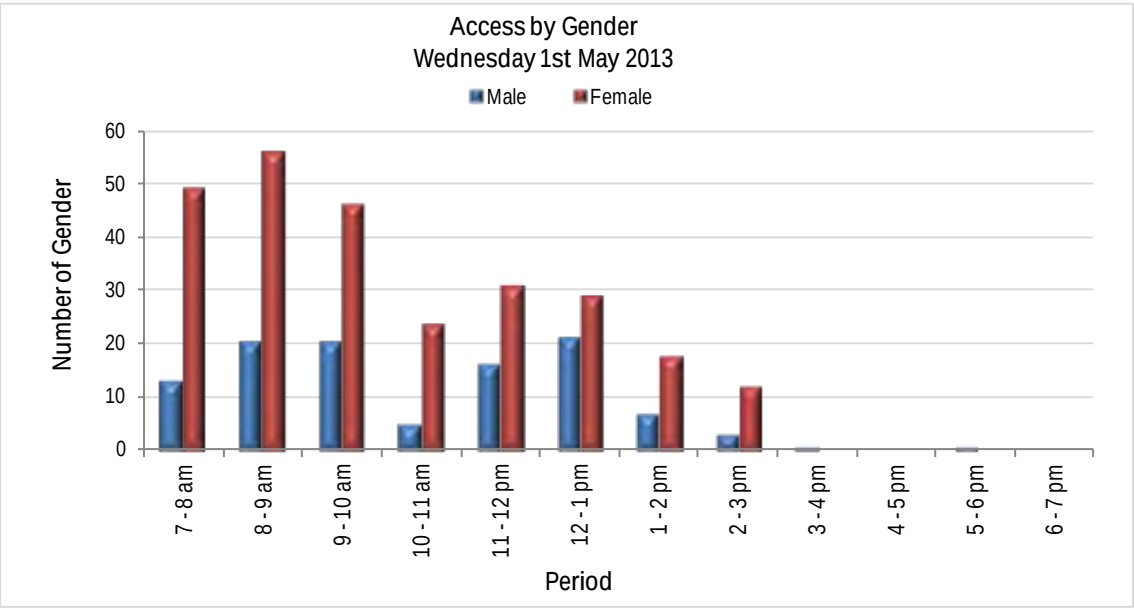


Figure 3.14: Access by Gender

The hourly access by undergraduate students is shown for the respondents in Figure 3.15.

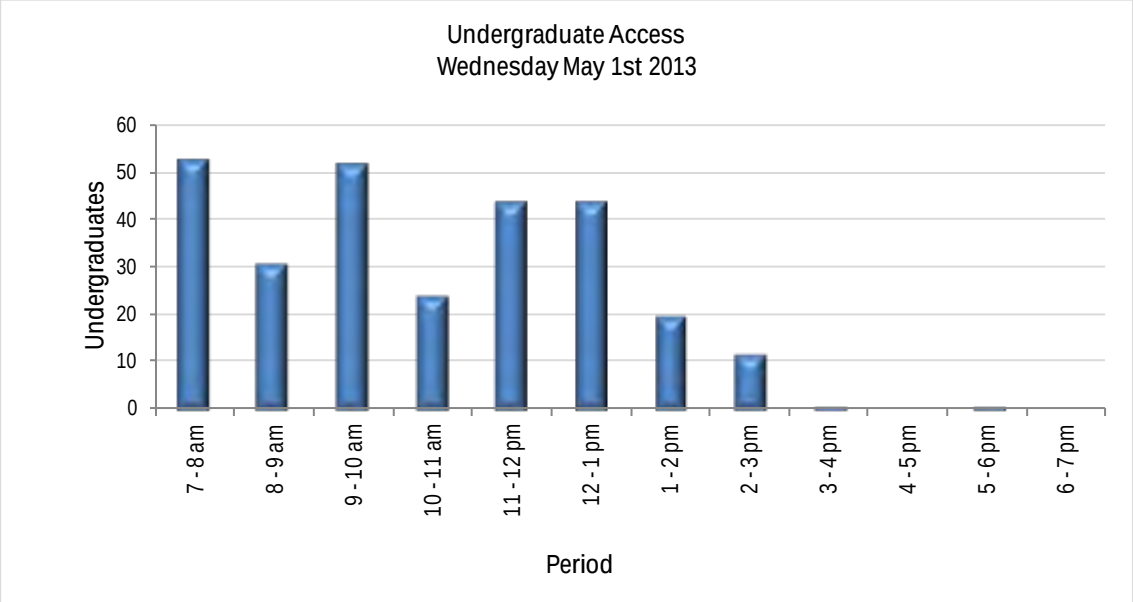


Figure 3.15: Undergraduate Access

The hourly access by staff is shown for the respondents in Figure 3.16.

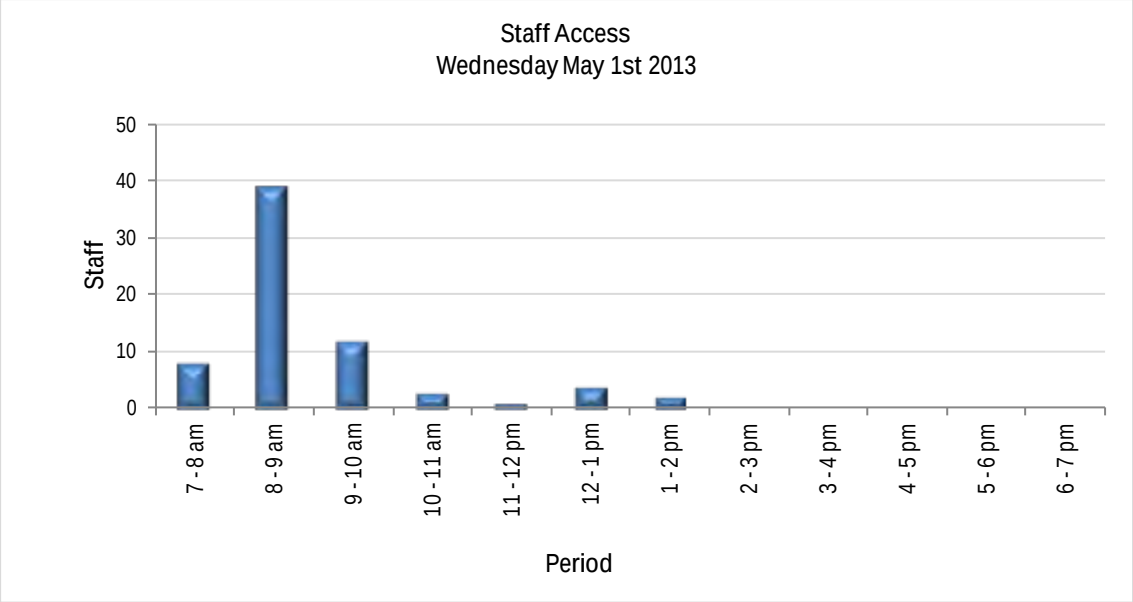


Figure 3.16: Staff Access

The hourly access by postgraduate students is shown for the respondents in Figure 3.17.

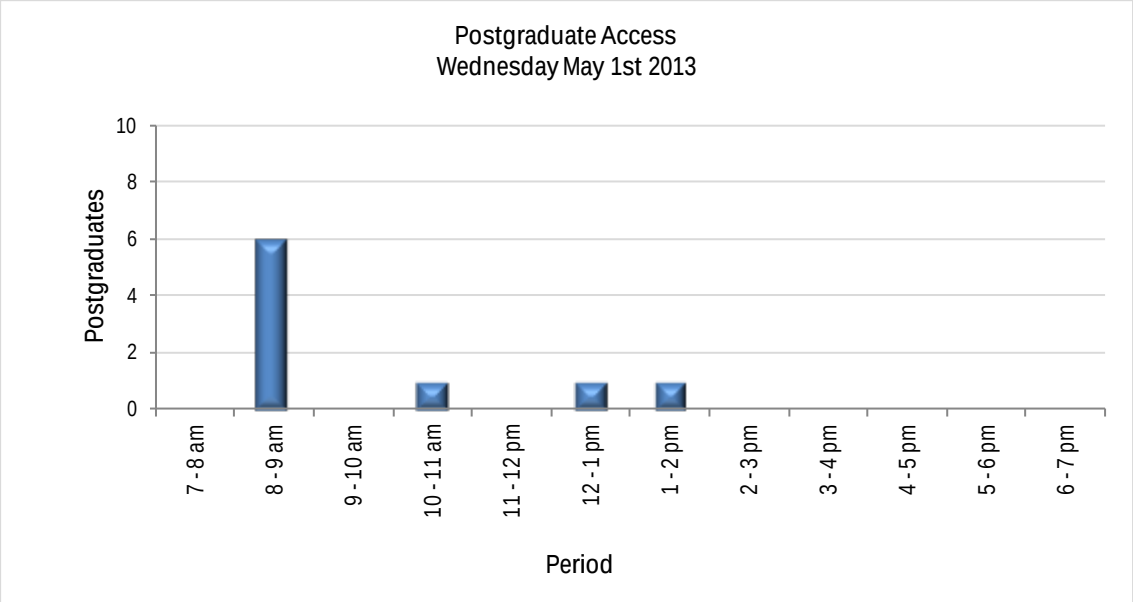


Figure 3.17: Postgraduate Access

The hourly access by visitors is shown for the respondents in Figure 3.18.

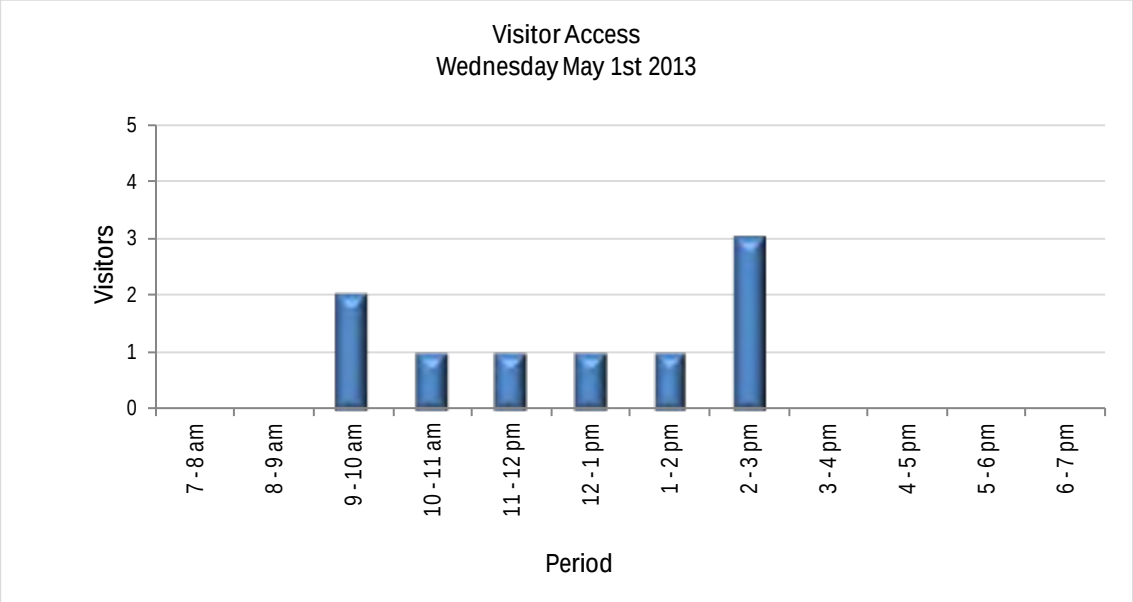


Figure 3.18: Visitor Access

The hourly access by travel mode for the respondents is shown in Figure 3.19.

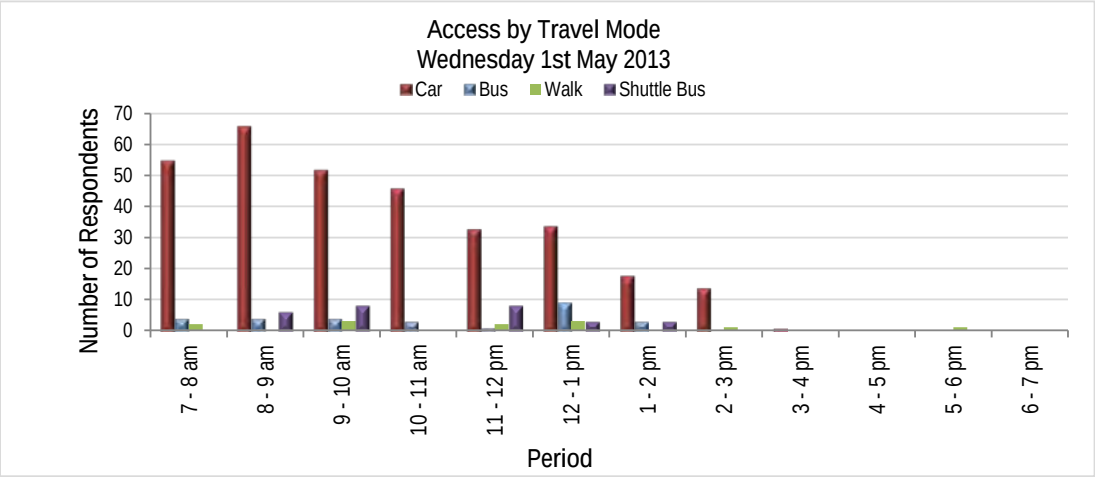


Figure 3.19: Access by Travel Mode

The hourly access by type of car occupant for the respondents is shown in Figure 3.20.

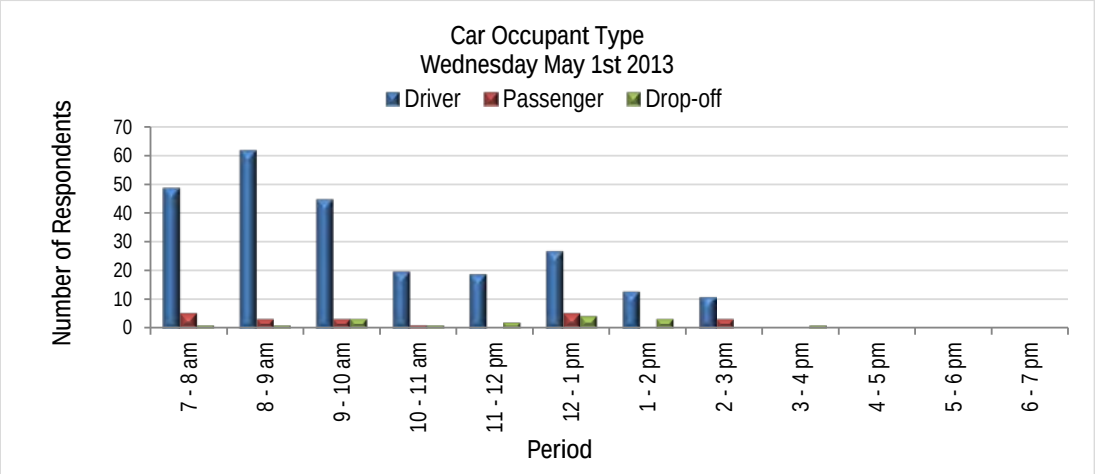


Figure 3.20: Car Occupant Type

The hourly access by multi-mode trips for the respondents is shown in Figure 3.21.

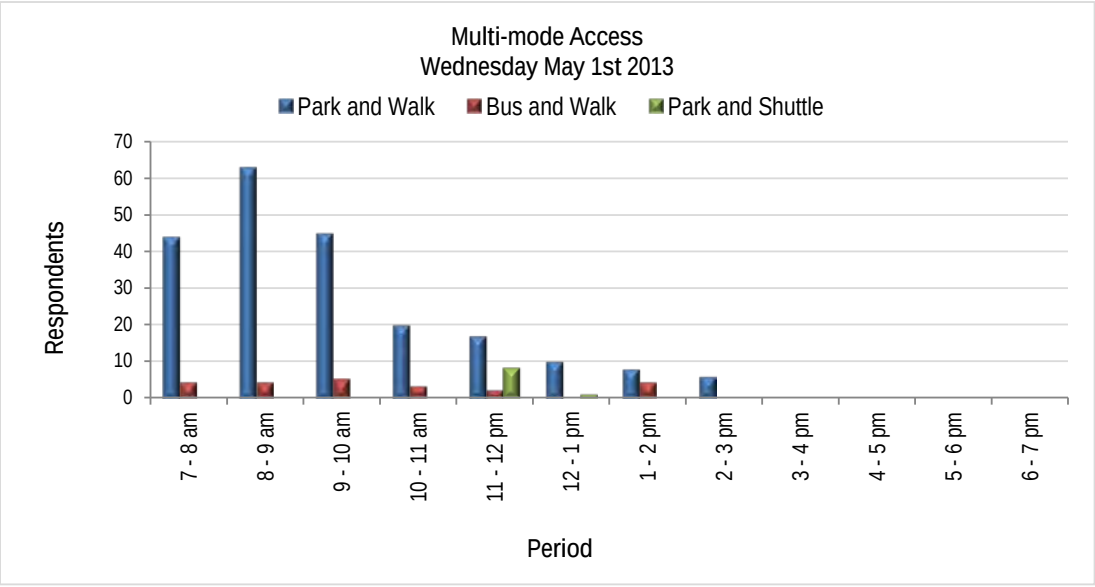


Figure 3.17: Multi-mode Access

The hourly access park and walk origin for the respondents is shown in Figure 3.18.

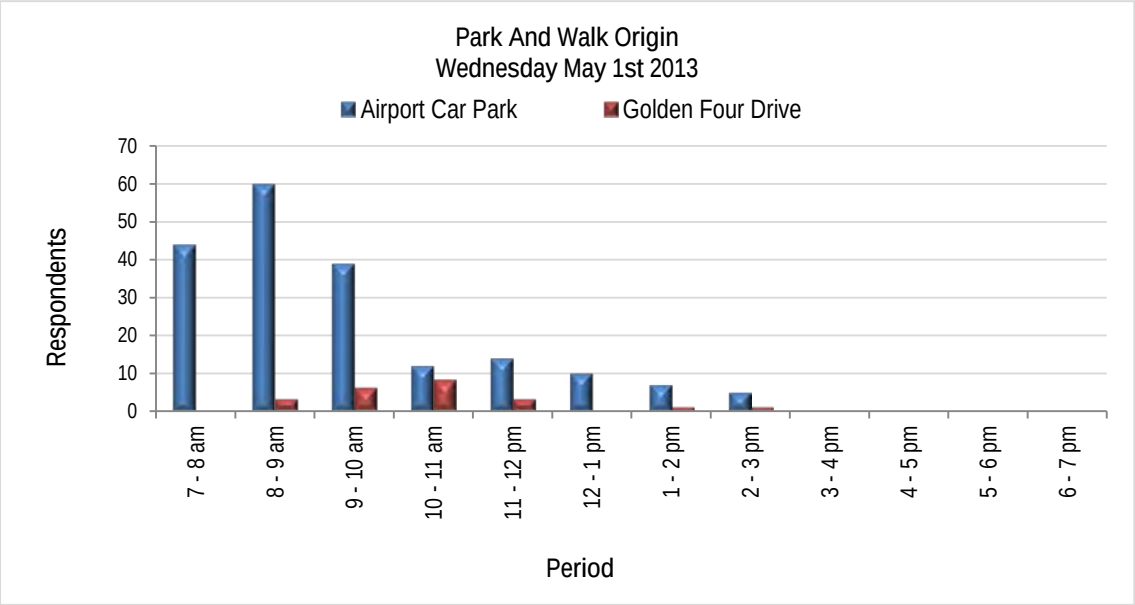


Figure 3.18: Park and Walk Origin

The hourly access by bus and walk origin for the respondents is shown in Figure 3.19.

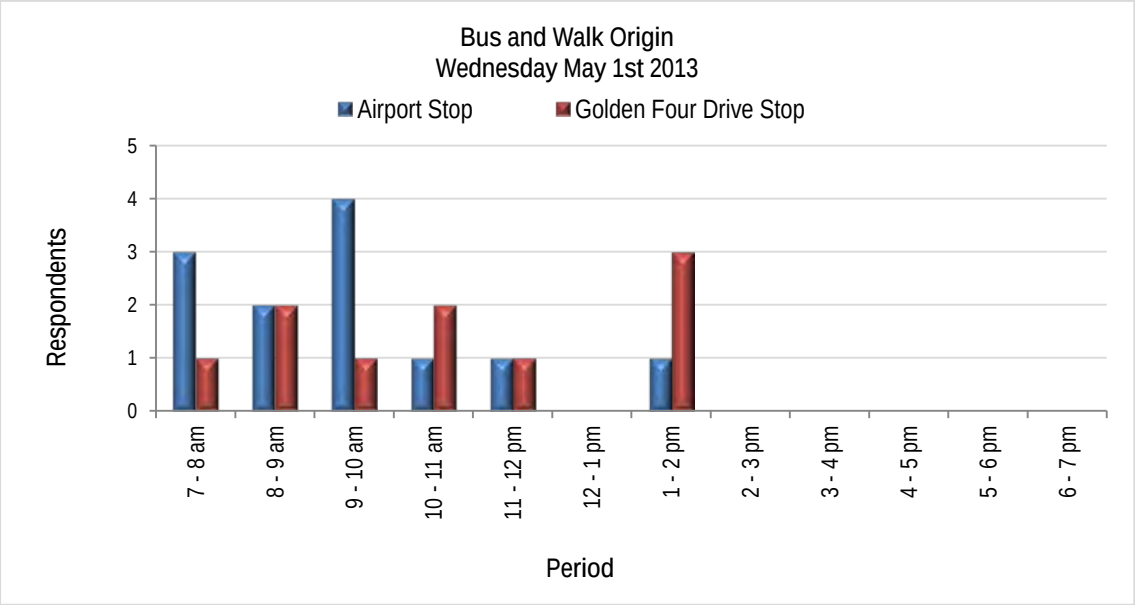


Figure 3.19: Bus and Walk Origin

4. ONLINE SURVEY RESULTS

4.1 DEMOGRAPHICS

Question: *Which category best describes you?*

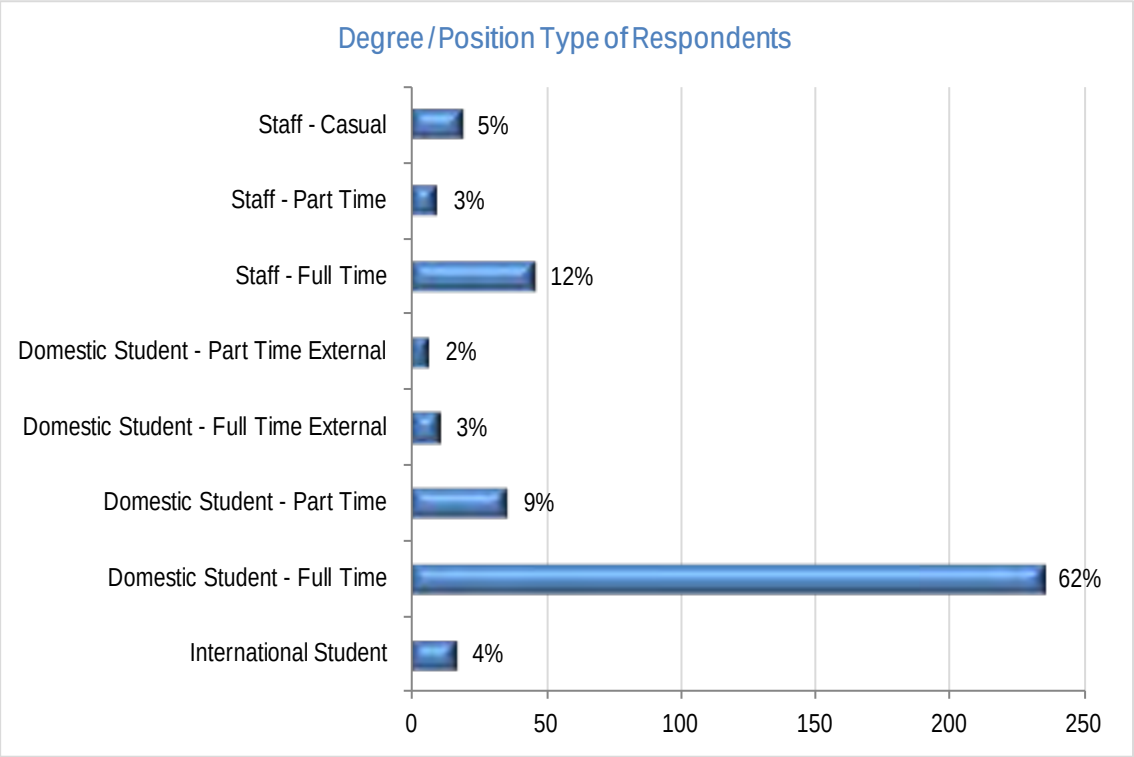


Figure 4.1: Degree / Position Type of Respondents

Question: *What is your gender?*

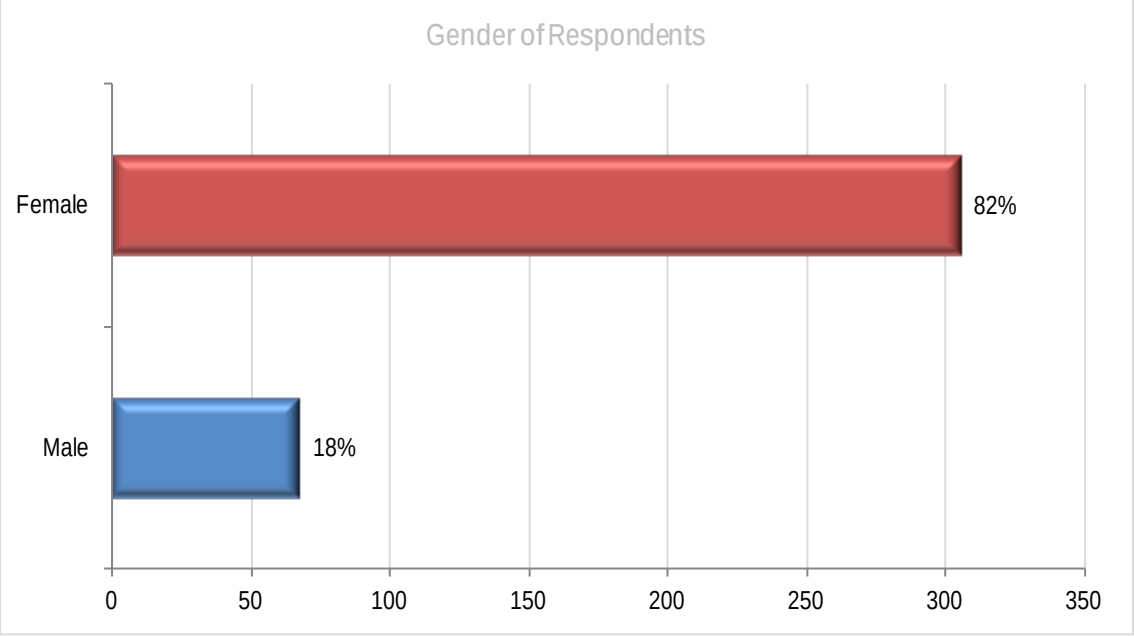


Figure 4.2: Gender of Respondents

Question: *What is your age group?*

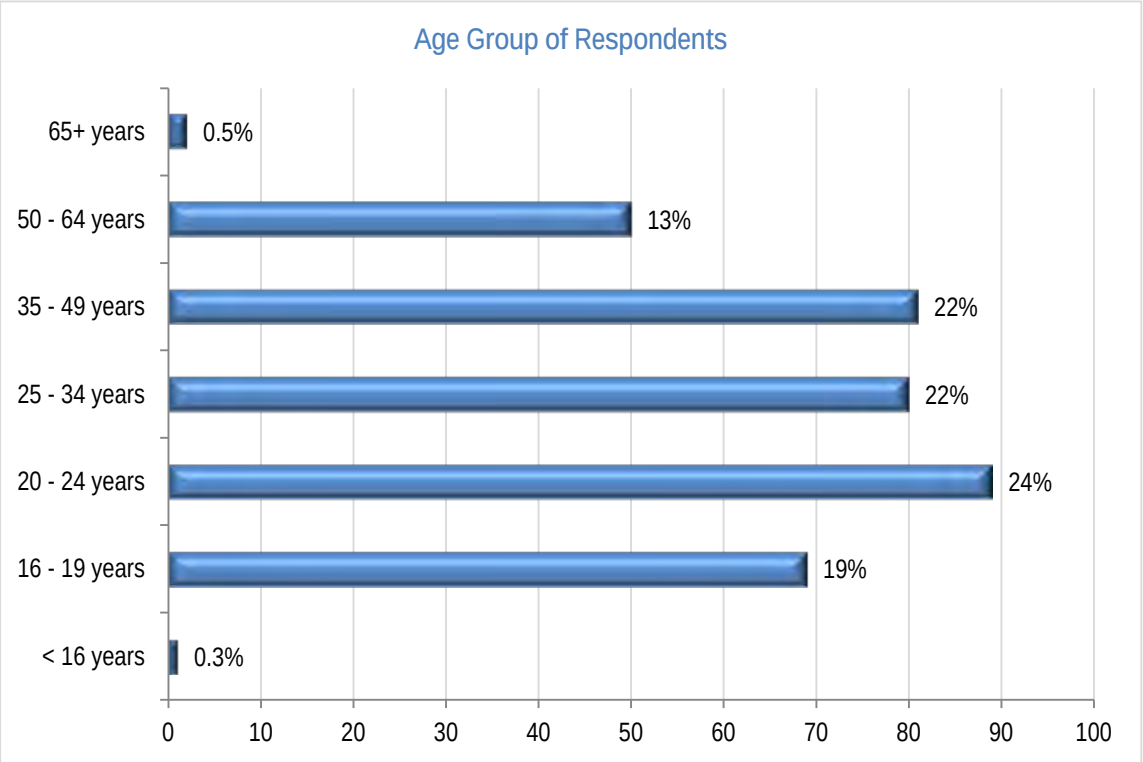


Figure 4.3: Age Group of Respondents

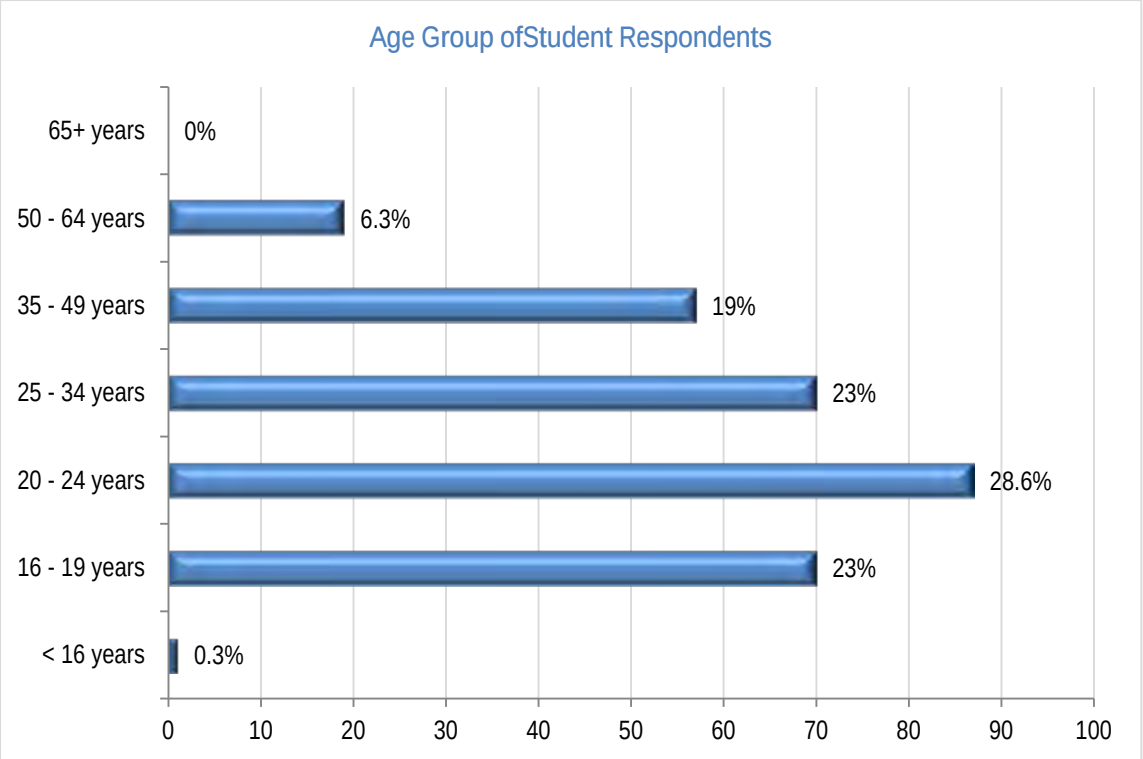


Figure 4.4: Age Group of Student Respondents

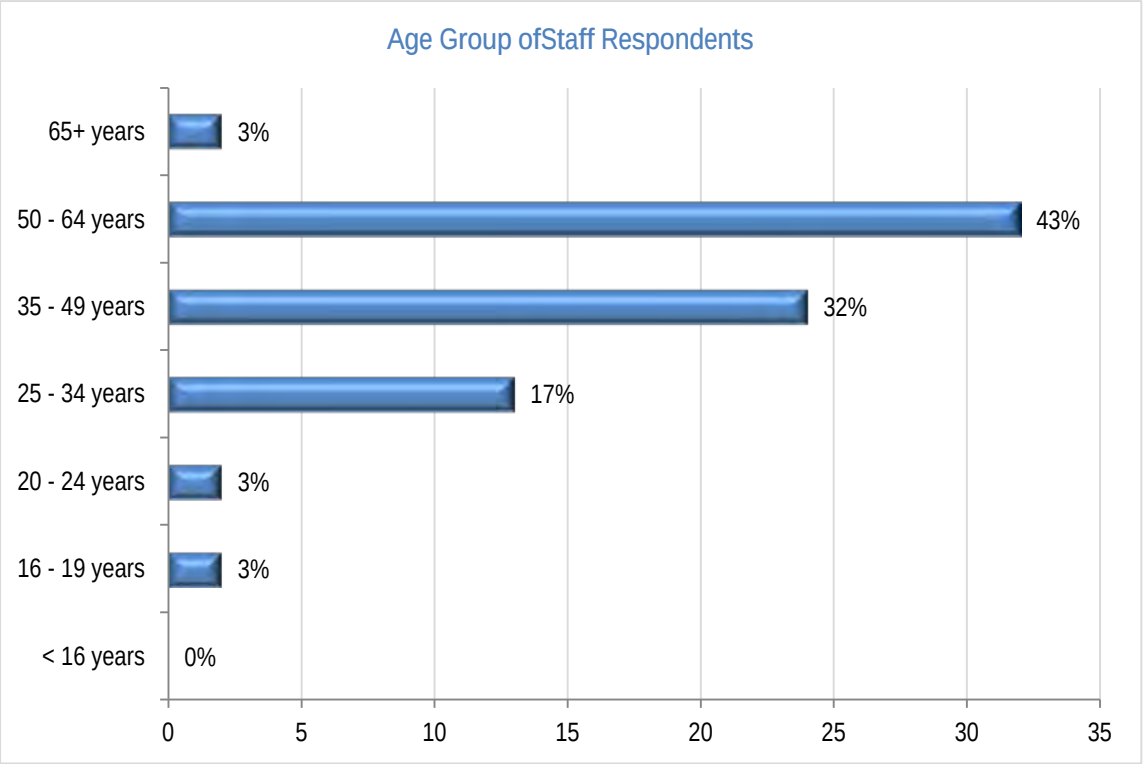


Figure 4.5: Age Group of Staff Respondents

Question: *Do you have any long term illness or disability, which hinders or prevents you from travelling unaided?*

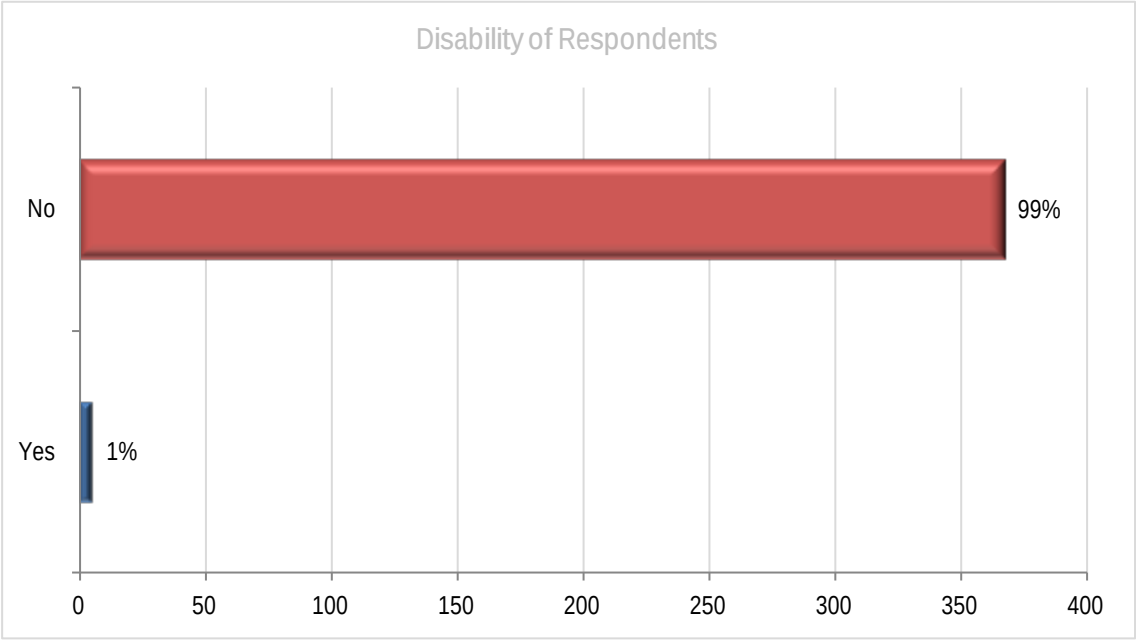


Figure 4.6: Disability of Respondents

Question: *What kind of accommodation do you live in currently?*

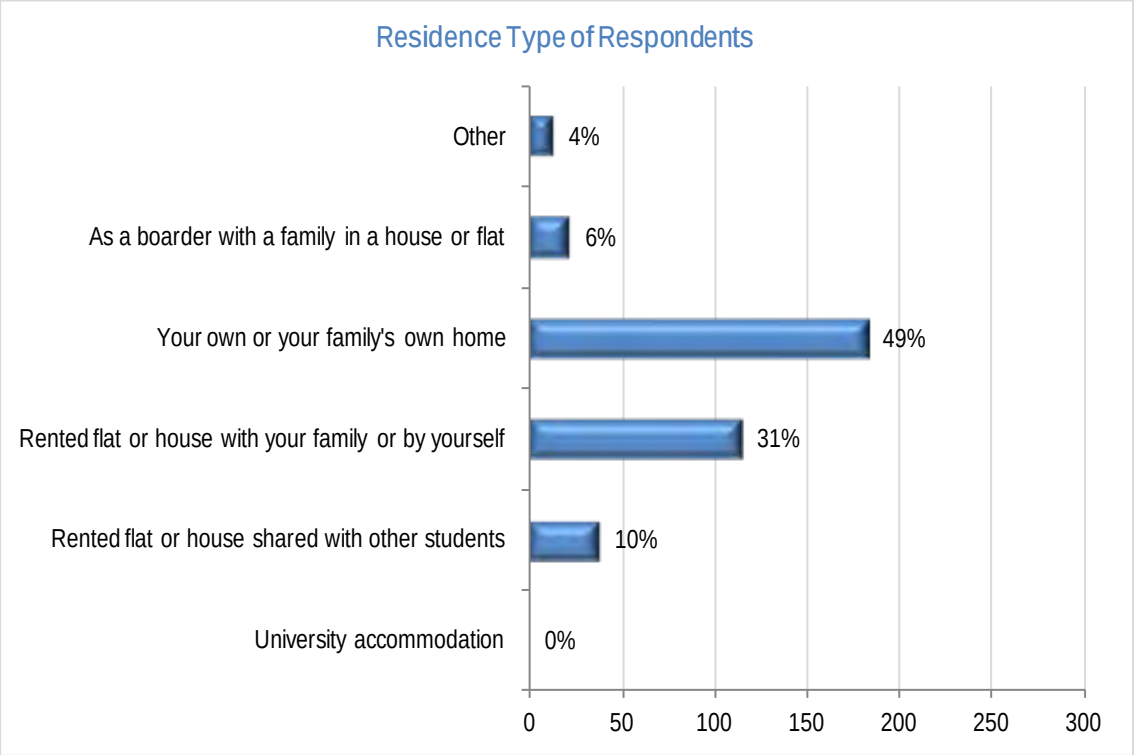


Figure 4.7: Resident Type of Respondents

Question: *Which school, college or work unit are you enrolled or employed with?*

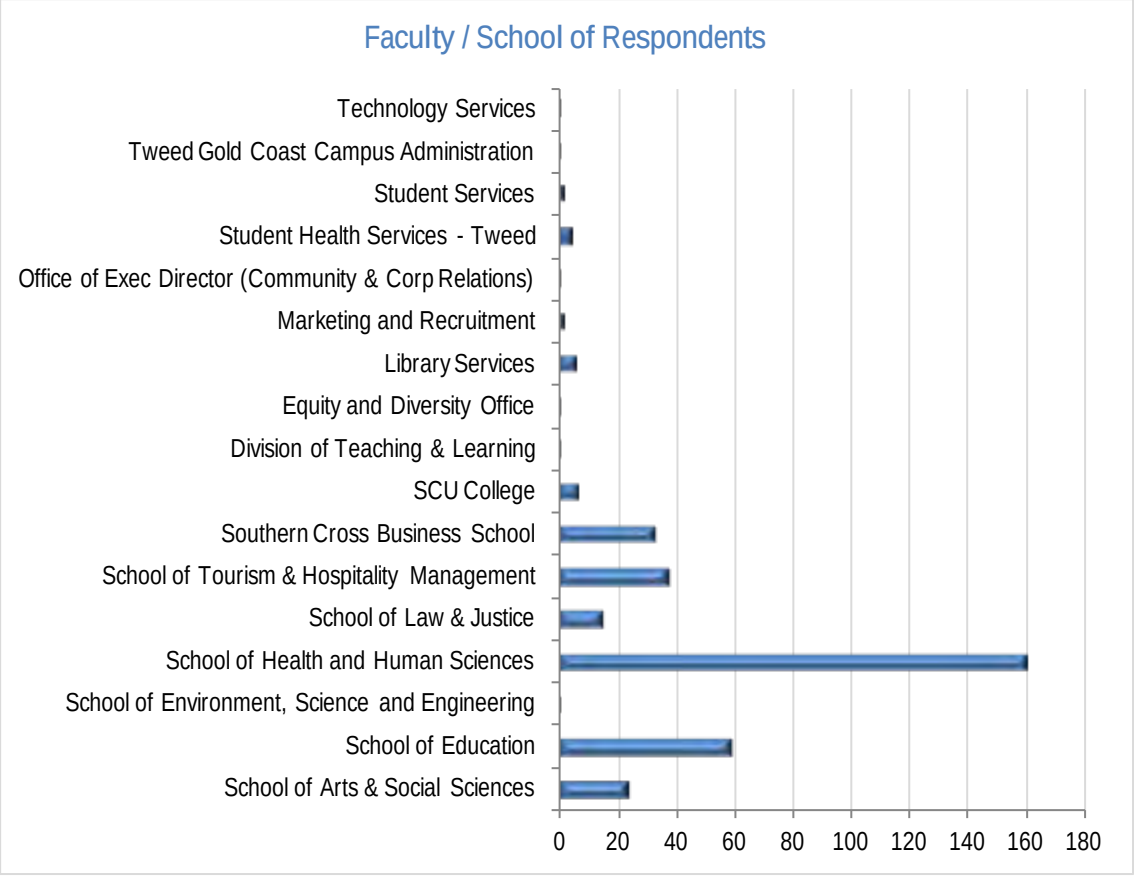


Figure 4.8: Faculty / School of Respondents

Question: What is your estimated weekly gross personal income (this includes all Government allowances and superannuation?

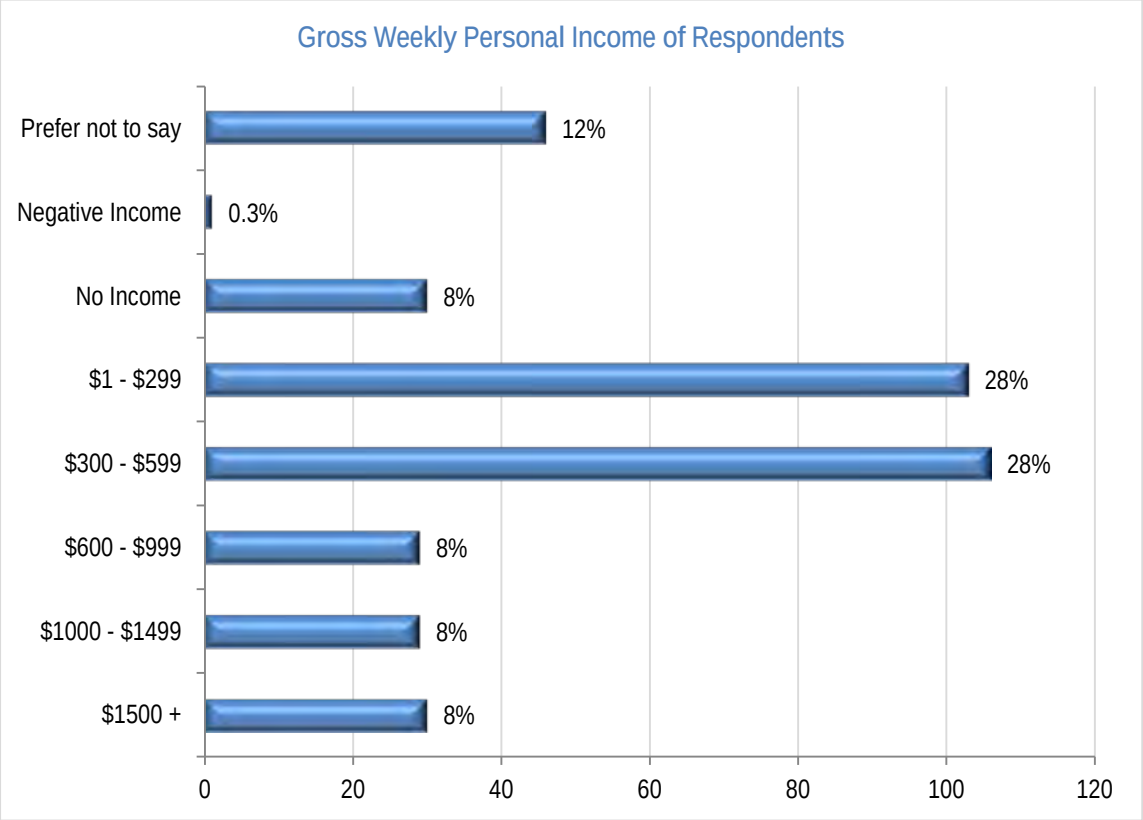


Figure 4.9: Gross Weekly Personal Income of Respondents

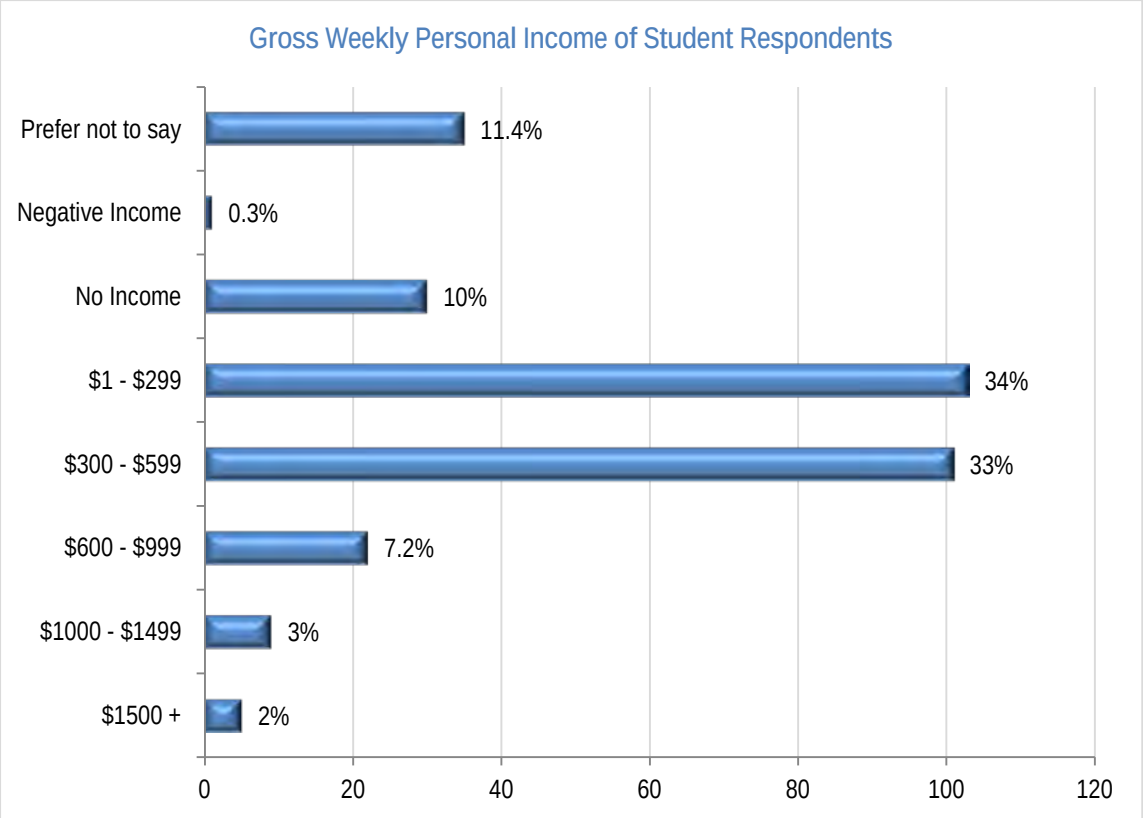


Figure 4.10: Gross Weekly Personal Income of Student Respondents

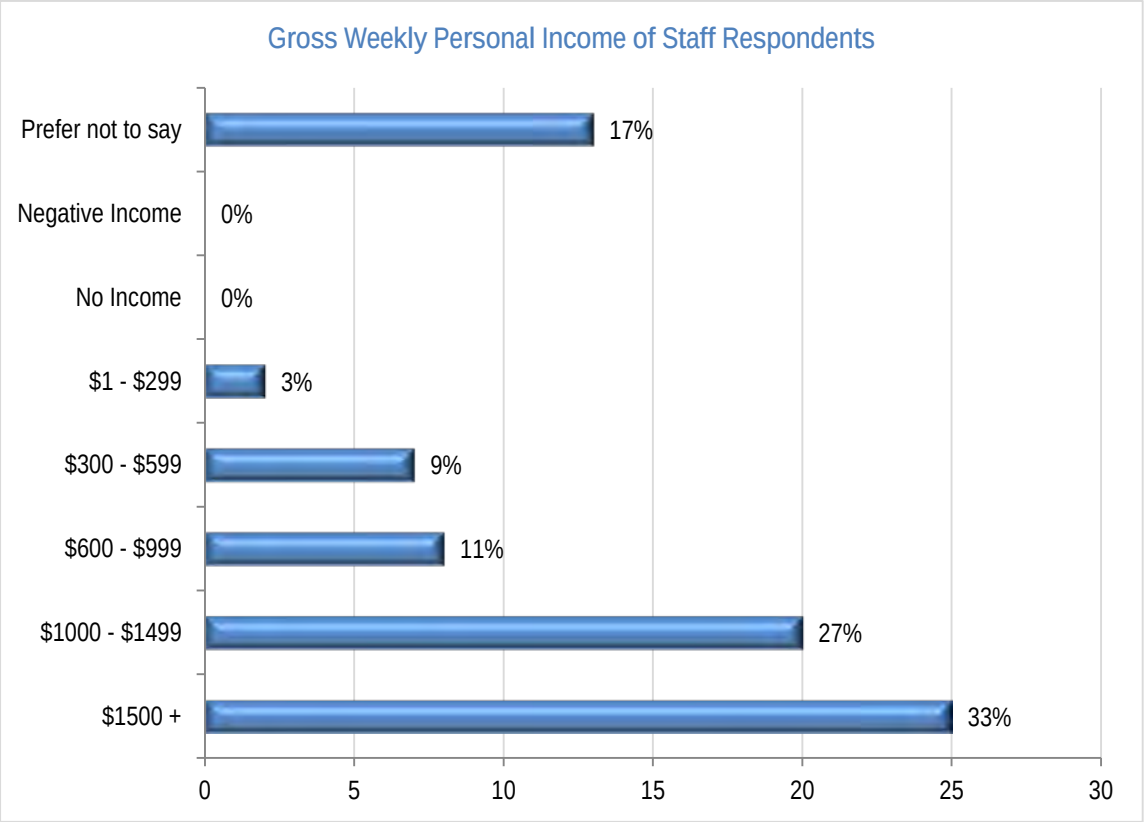


Figure 4.11: Gross Weekly Personal Income of Staff Respondents

4.2 TRAVEL TO CAMPUS ON FIELD SURVEY DAY

Question: *On Wednesday 1st May 2013 which campus did you travel to?*

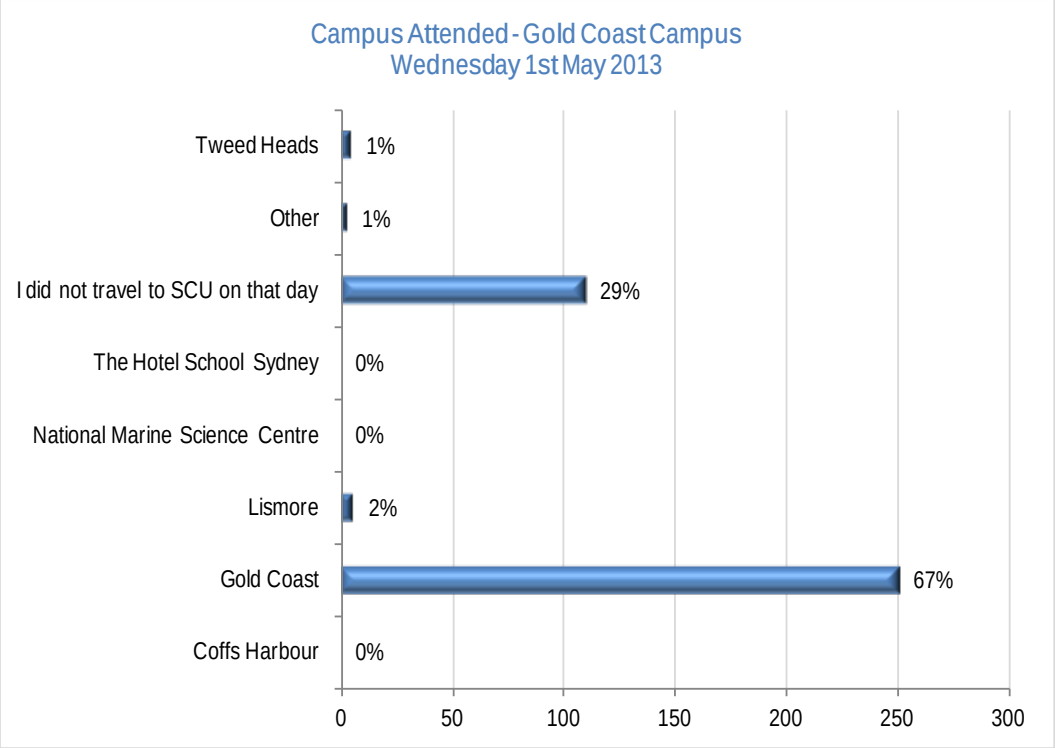


Figure 4.12: Gold Coast Campus Respondents – Campus Attended

Question: *How did you travel to SCU on Wednesday 1st May 2013?*

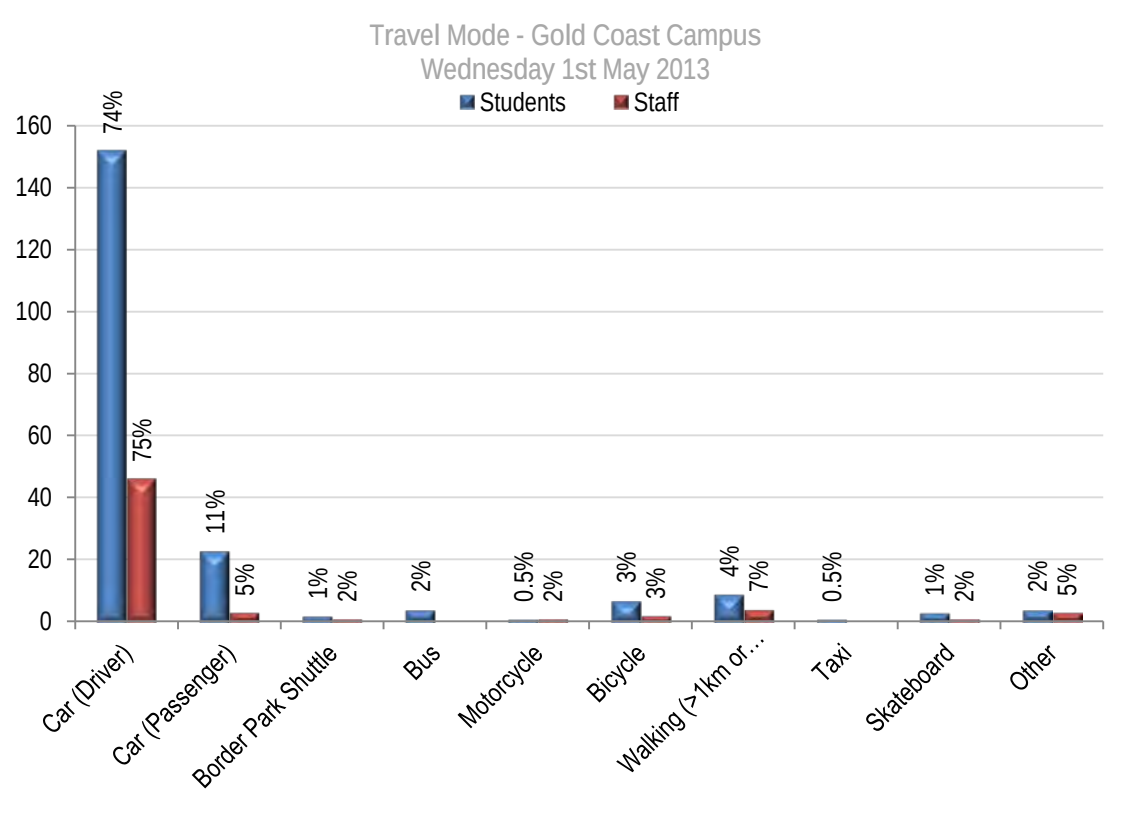


Figure 4.13: Travel Mode

Question: *Was your journey on Wednesday 1st May 2013 the usual way you travel to University?*

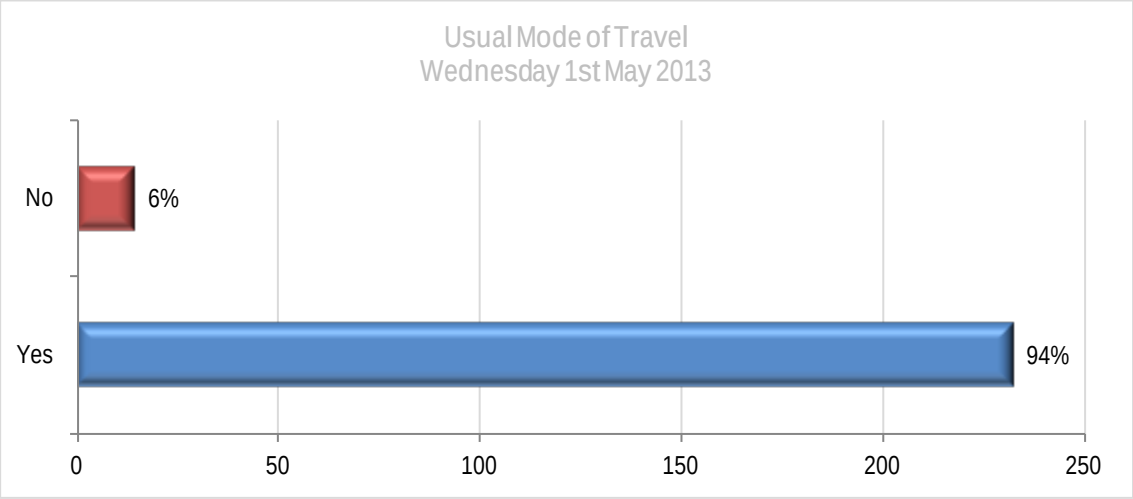


Figure 4.14: Usual Mode of Travel

Question: *I travel via the legs I described for Wednesday 1st May 2013:*

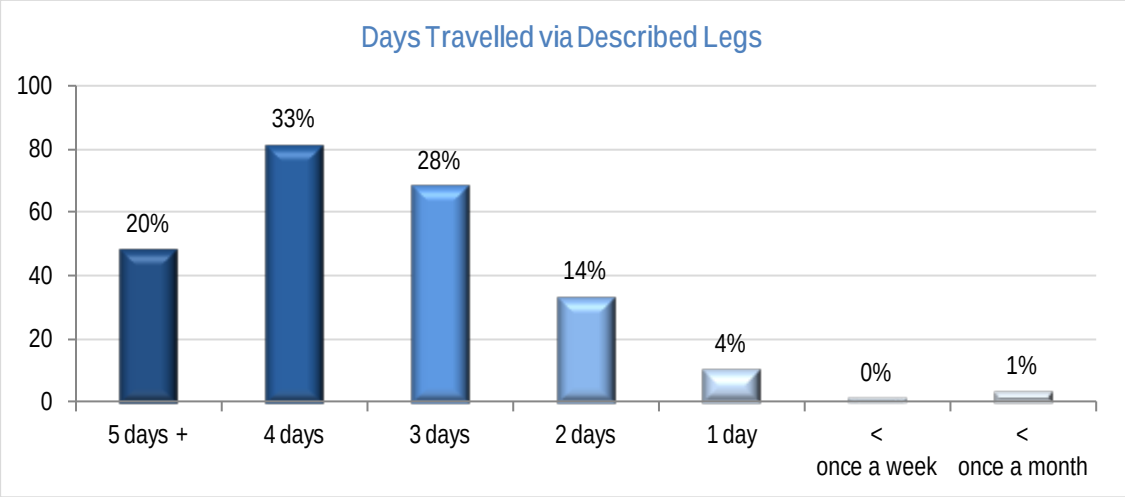


Figure 4.15: Gold Coast Campus – Travel by Described Legs

Question: *Did you use a car for the last leg of your journey to Gold Coast Campus on Wednesday 1st May 2013?*

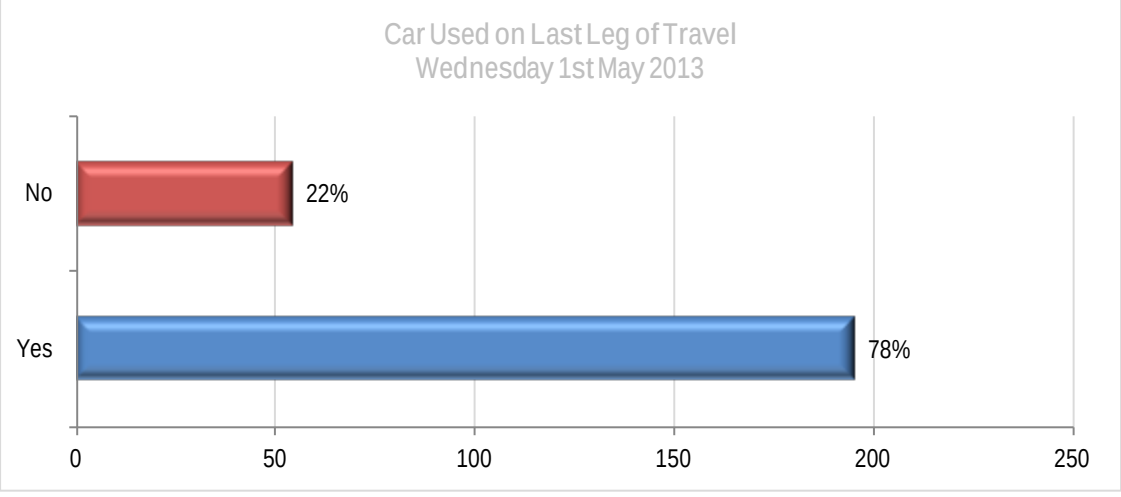


Figure 4.16: Car Used On Last Leg

Question: *What parking area did you use?*

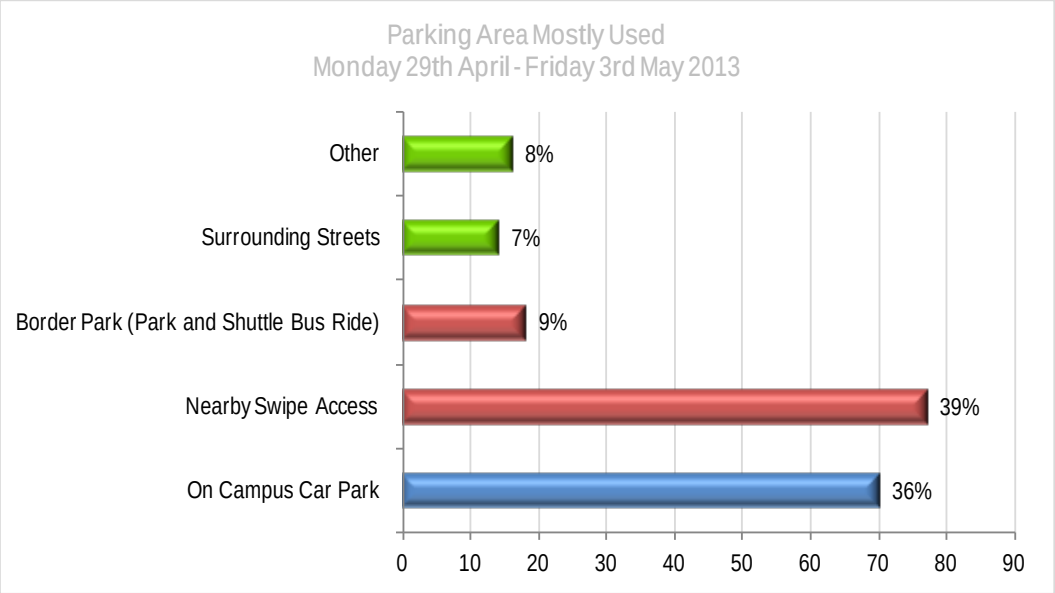


Figure 4.17: Parking Precinct Used

Question: *Did you try to access on-campus car parking before parking?*

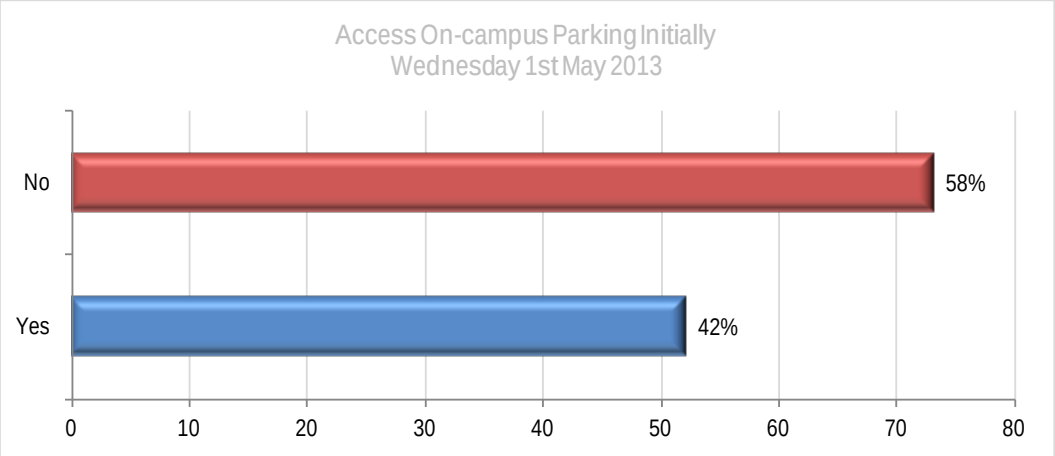


Figure 4.18: Access On-campus Parking Initially

Question: *Where did you travel from on Wednesday 1st May?*

Figure 4.20: Access to Campus from Suburb by Respondents

Figure 4.21: Access to Campus from Suburb by Student Respondent

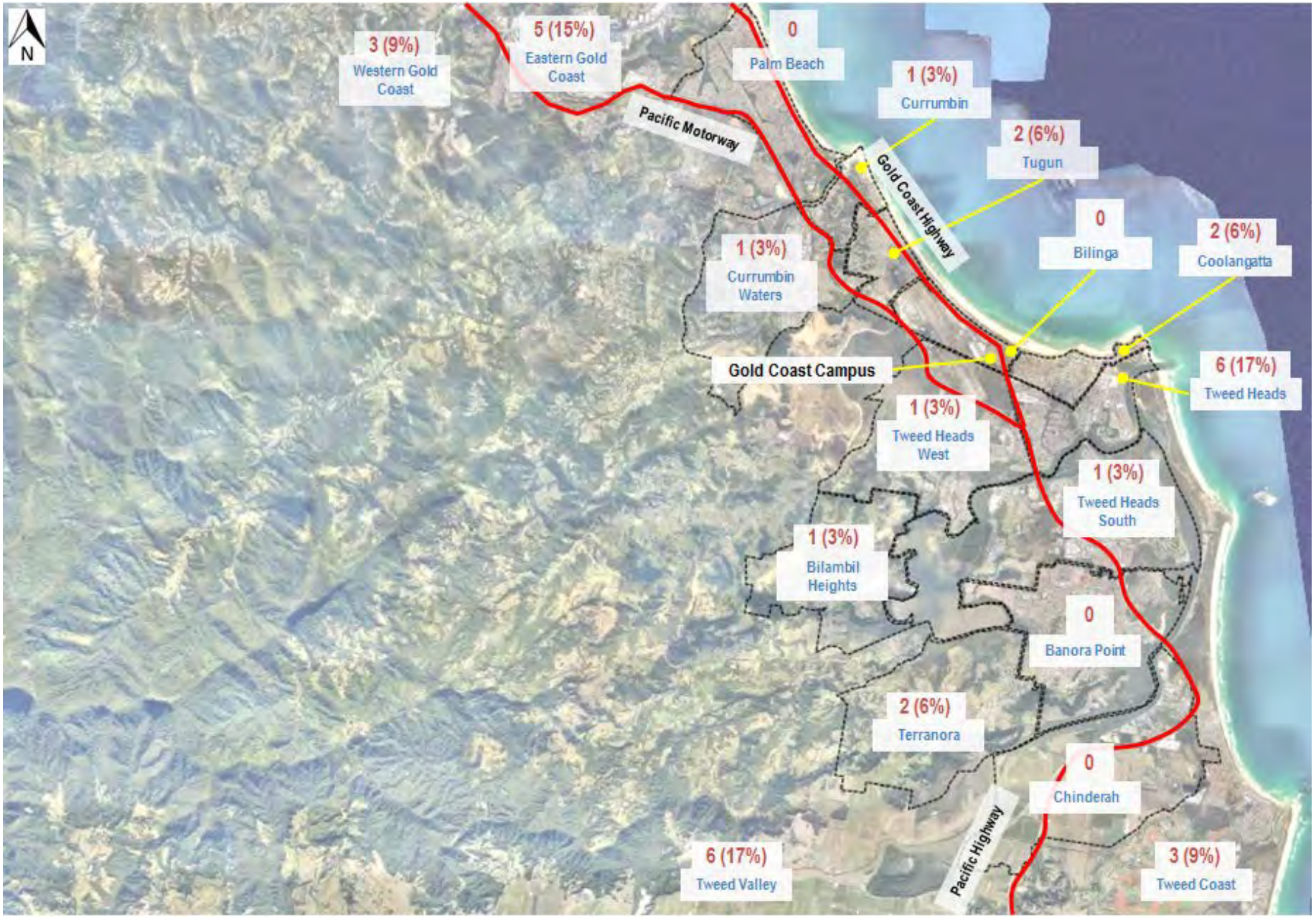


Figure 4.22: Access to Campus from Suburb by Staff Respondent

Question: *What time (to the nearest half hour) did you start your journey on Wednesday 1st May 2013? (from your residence)*

Question: *What time (to the nearest half hour) did you arrive at SCU on Wednesday 1st May 2013?*

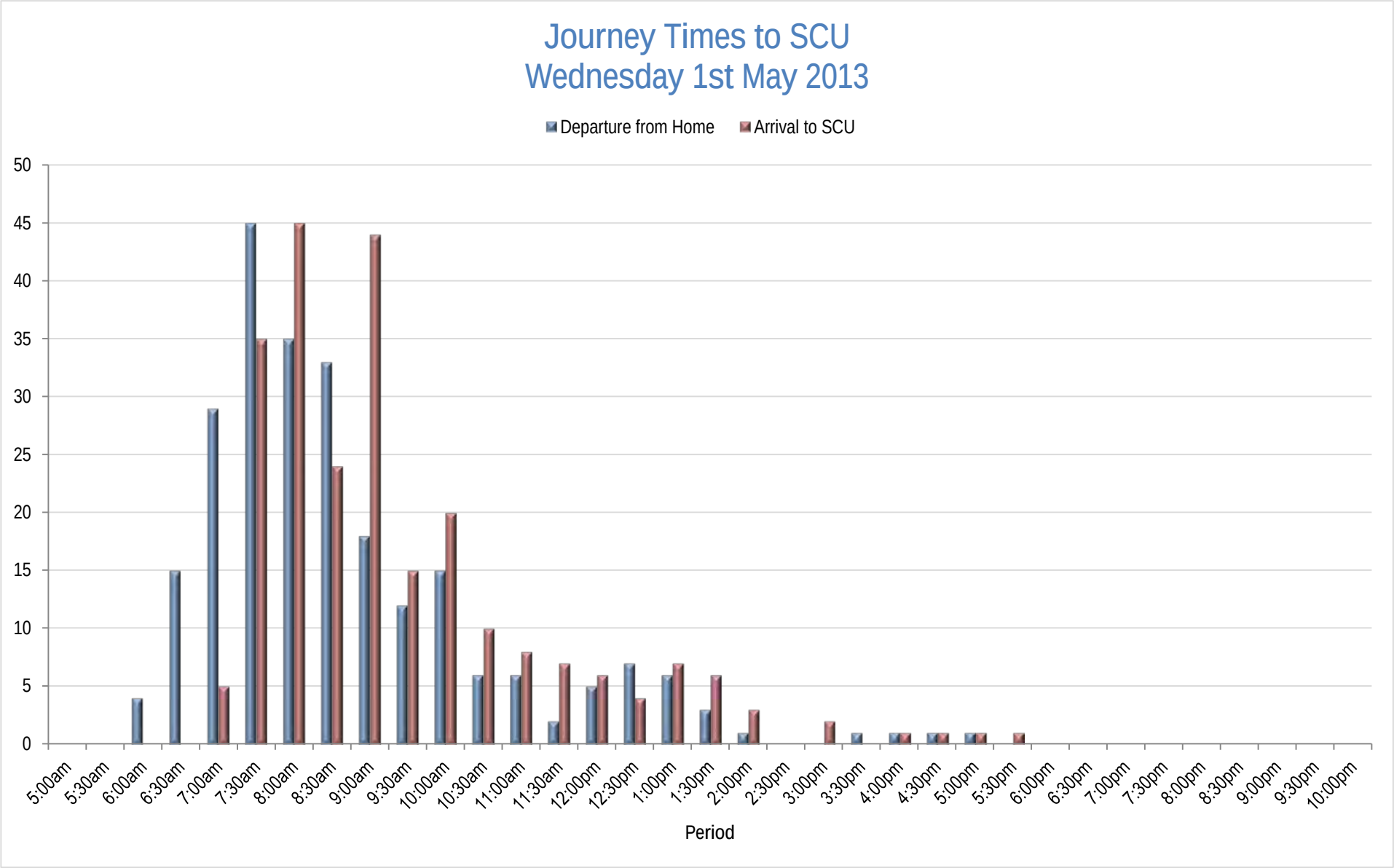


Figure 4.23: Journey Times to SCU

Question: *At what time (to the nearest half hour) did you leave SCU to return home on Wednesday 1st May 2013?*

Question: *At what time (to the nearest half hour) did you arrive home on Wednesday 1st May 2013?*

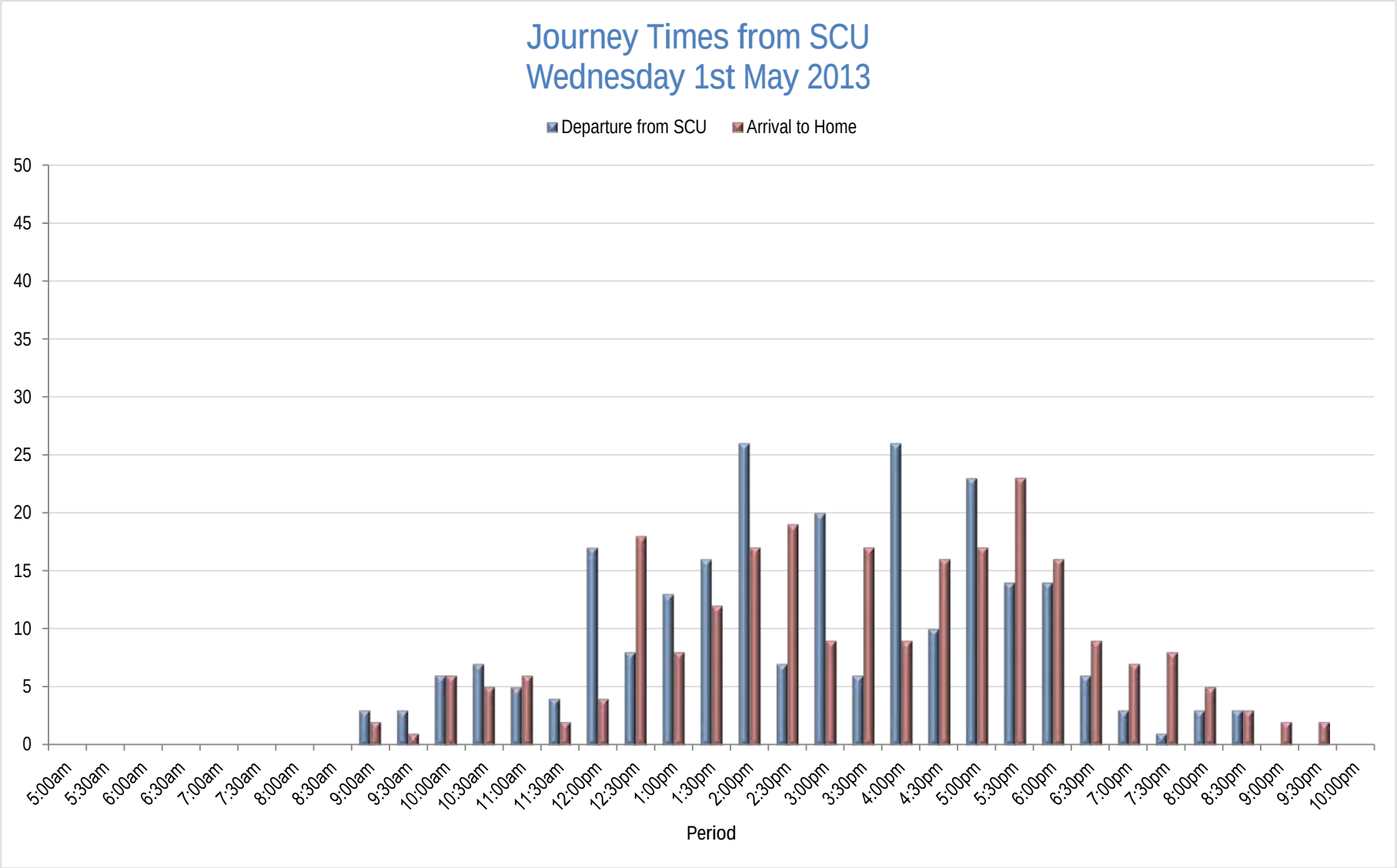


Figure 4.24: Journey Times from SCU

4.3 TRAVEL MODE BEHAVIOUR

Question: *On average, during study session, how frequently do you travel to SCU?*

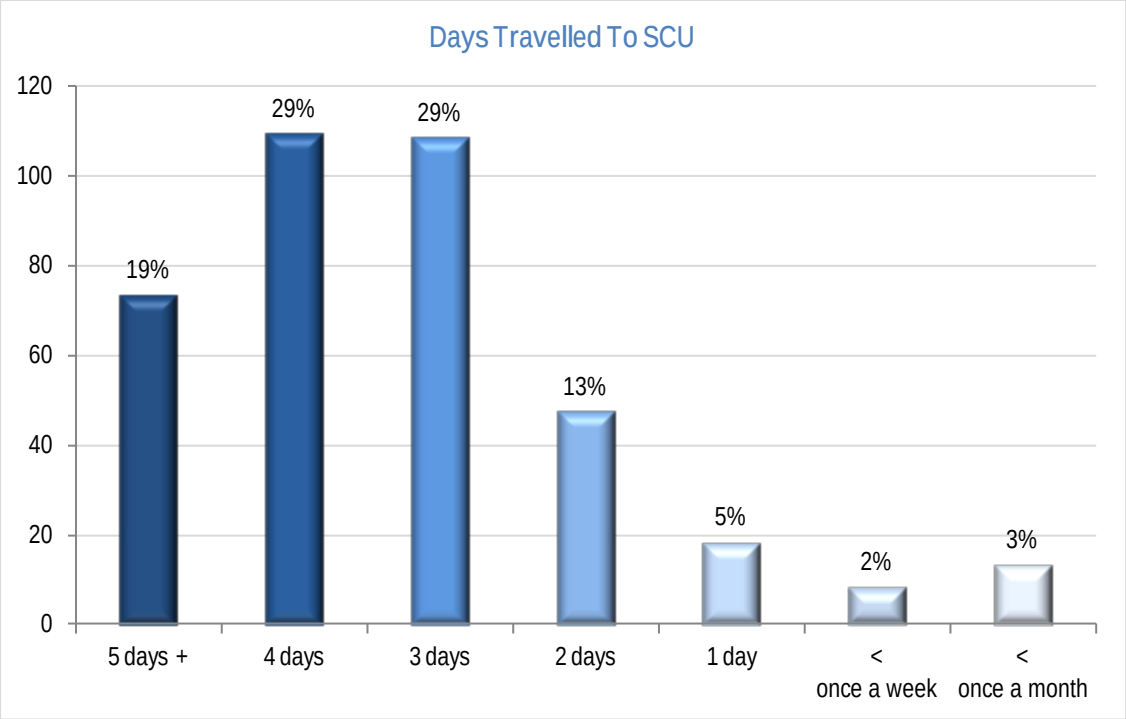


Figure 4.25: Days Travelled to SCU

Question: *On average, during study session, how frequently do you attend classes (as students) or work (as staff) from home?*

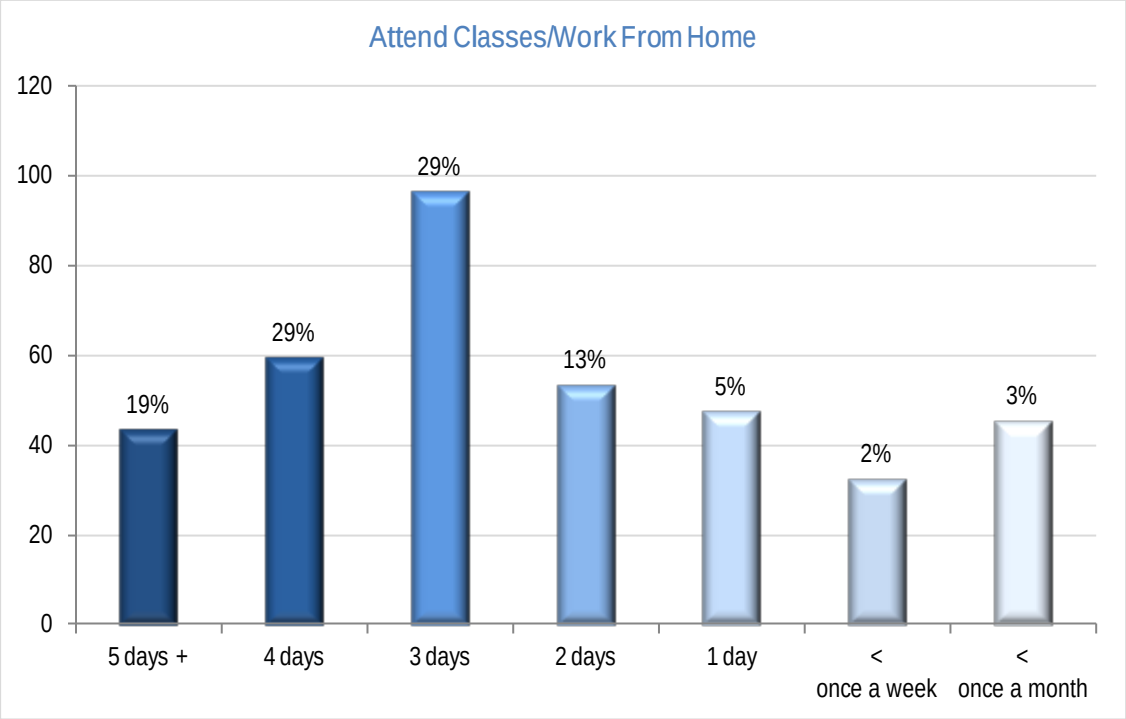


Figure 4.26: Days Attended SCU from Home

Question: *Have you travelled to SCU by car?*

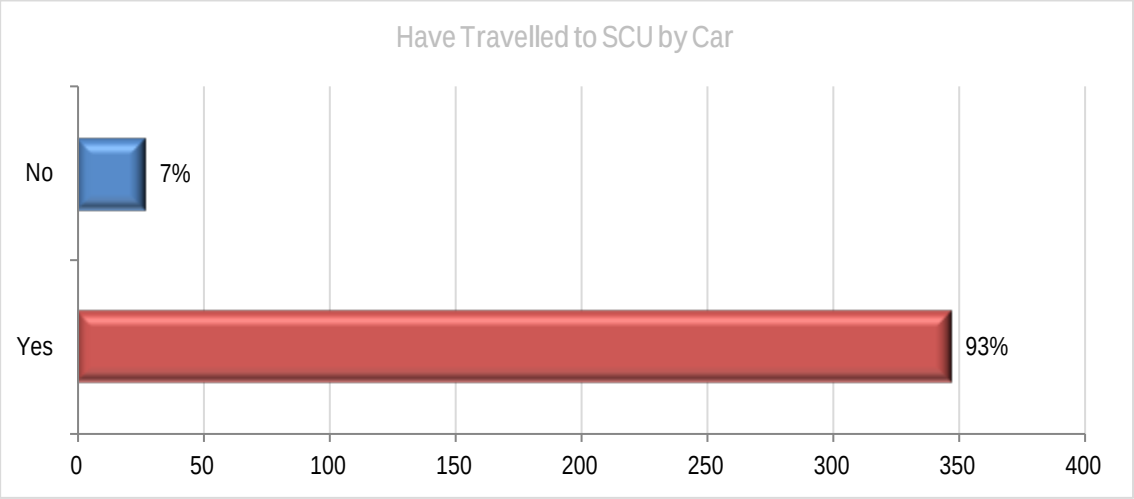


Figure 4.27: Have Travelled to SCU by Car

Question: *What are your reasons for travelling to SCU by car?*

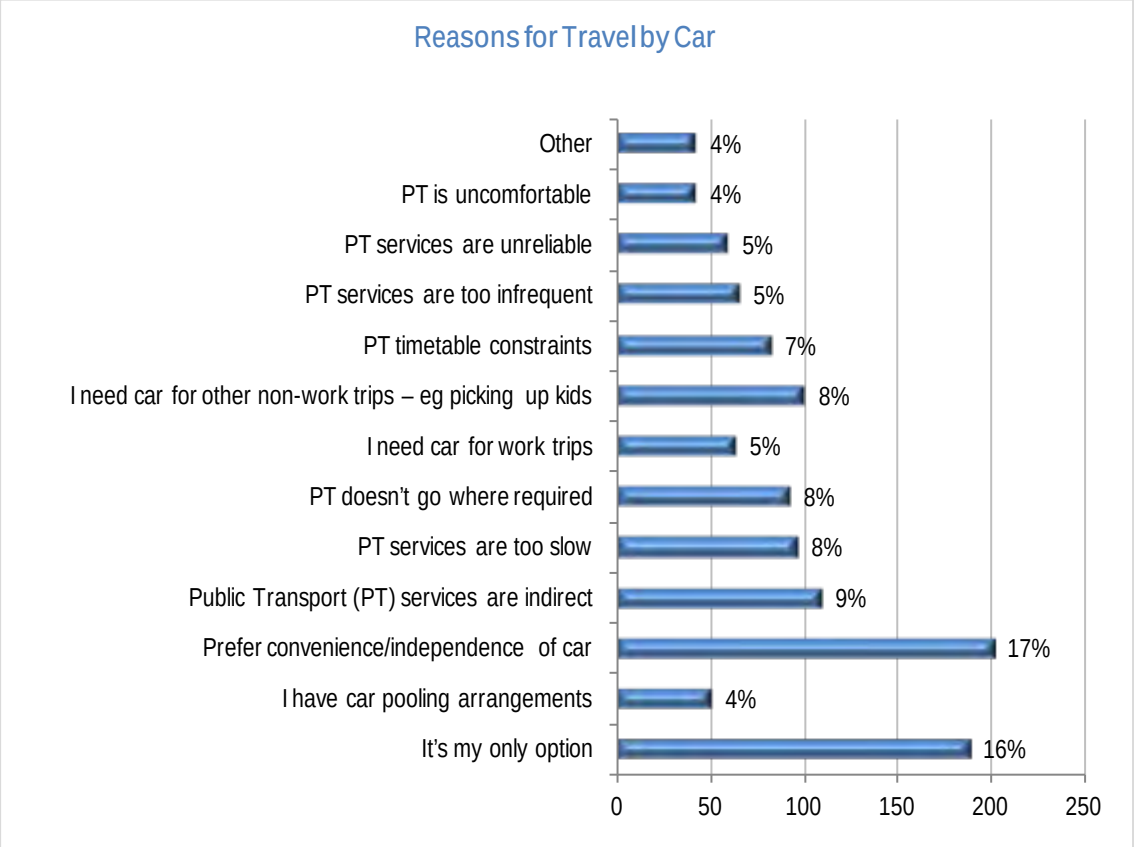


Figure 4.28: Reasons for Travel by Car

Question: *Have you travelled to SCU by car? (If answered No)*

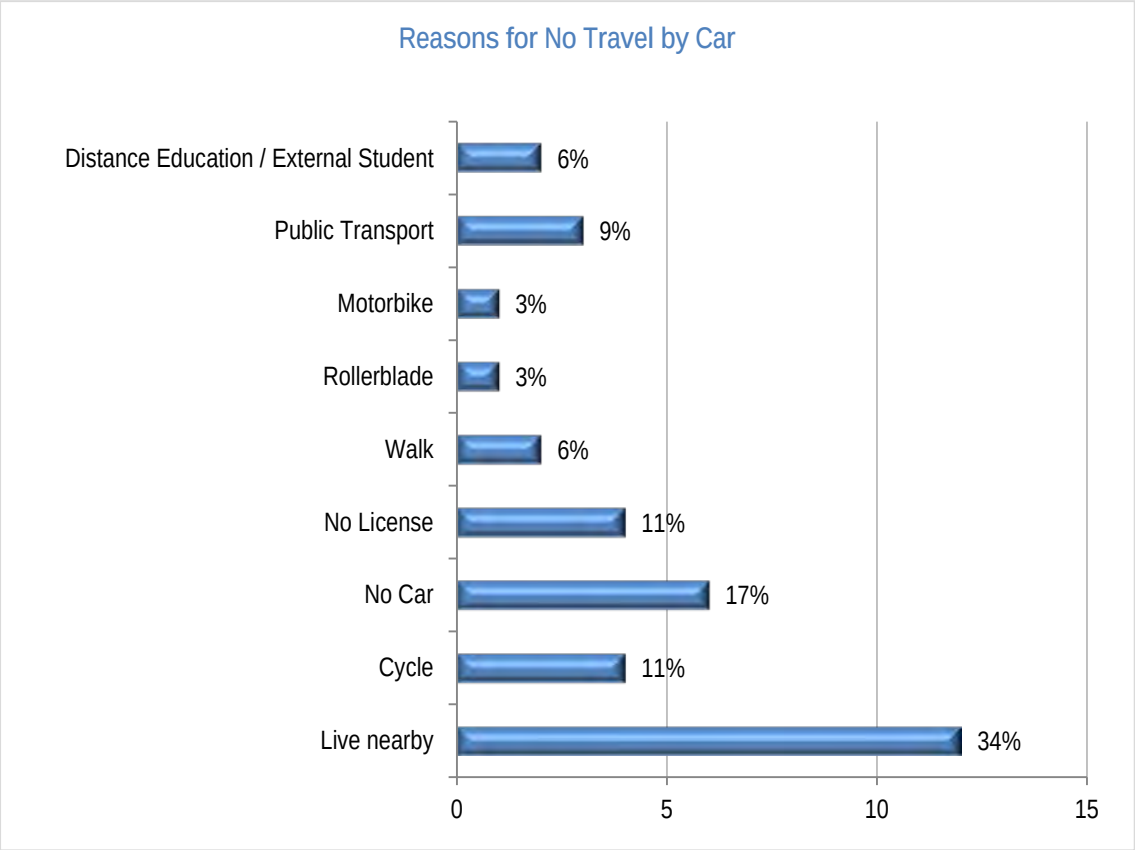


Figure 4.29: Reasons for No Travel by Car

Question: *Have you travelled to SCU by public transport?*

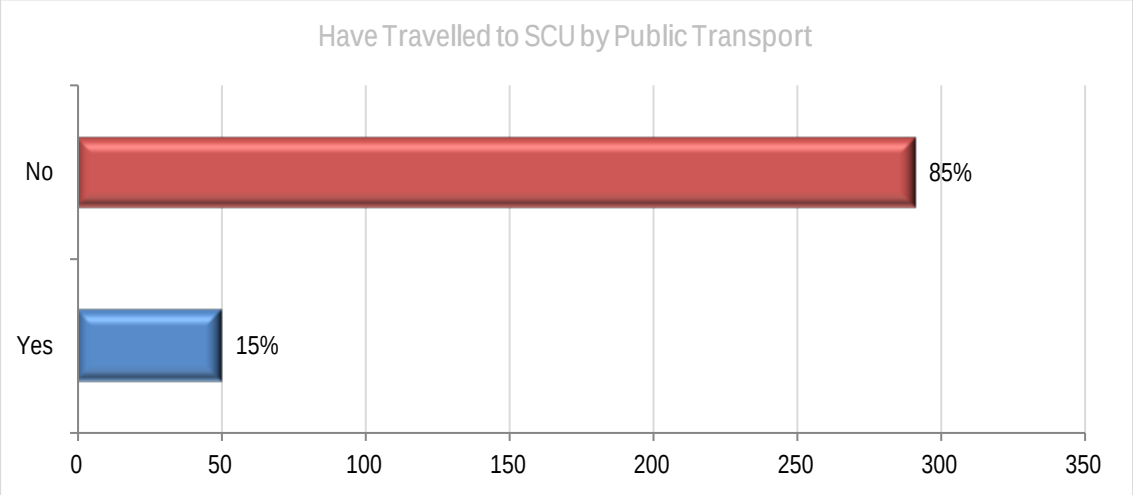


Figure 4.30: Have Travelled to SCU by Public Transport

Question: *What are your reasons for travelling to SCU by public transport?*

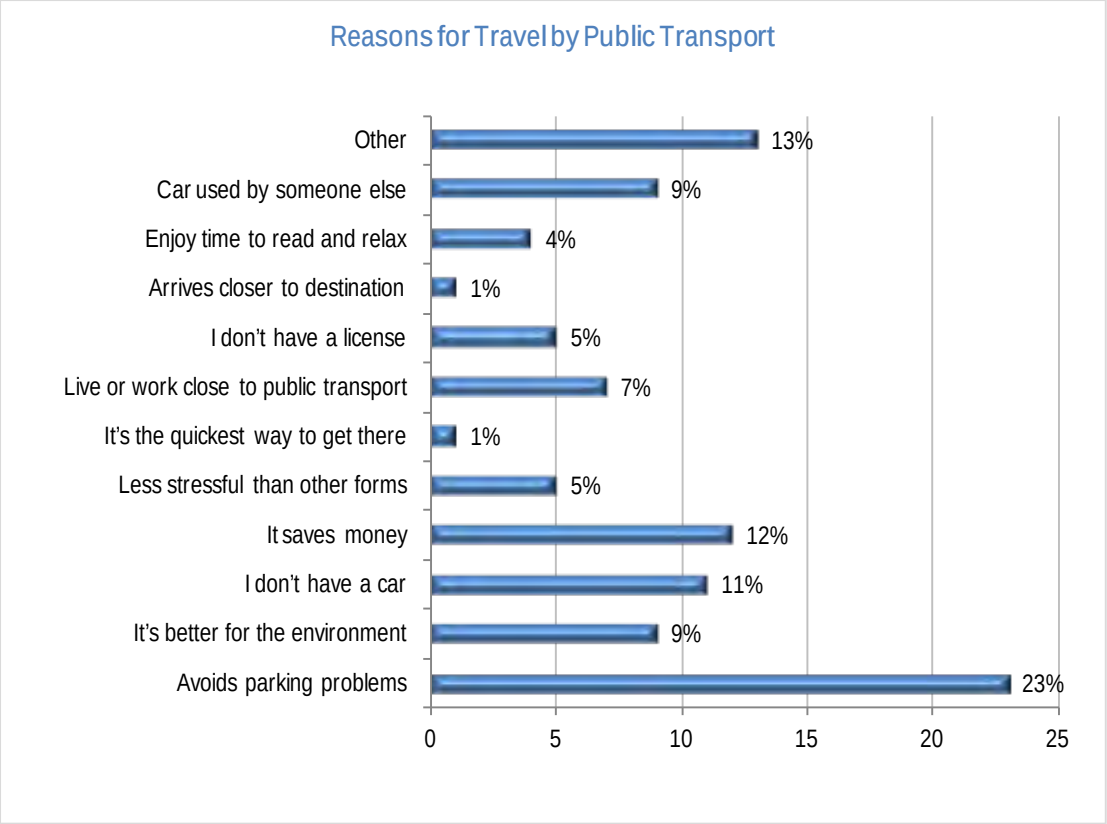


Figure 4.31: Reasons for Travel by Public Transport

Question: *Have you travelled to SCU by public transport? (If answered No)*

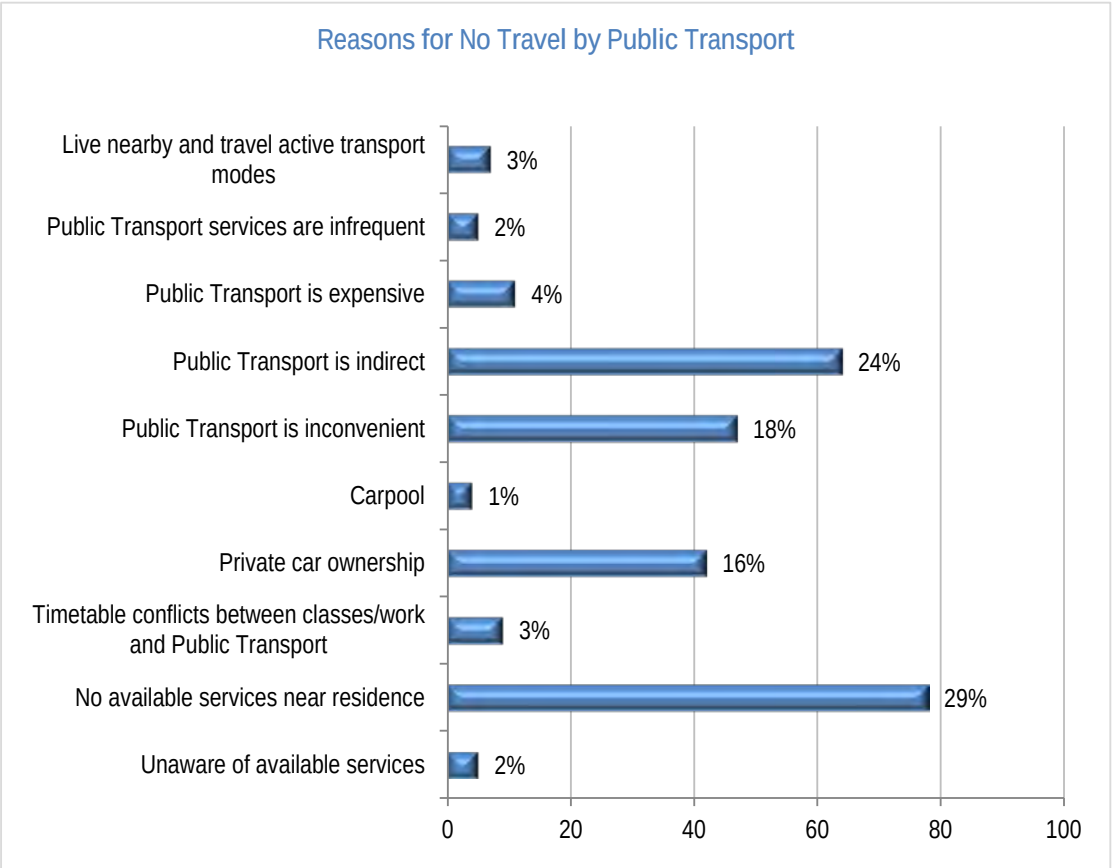


Figure 4.32: Reasons for No Travel by Public Transport

4.4 TRAVEL MODE PERCEPTIONS

Question: *Compared to using a car from your home, do you think it would be cheaper, about the same or more expensive to travel to SCU by Public Transport?*

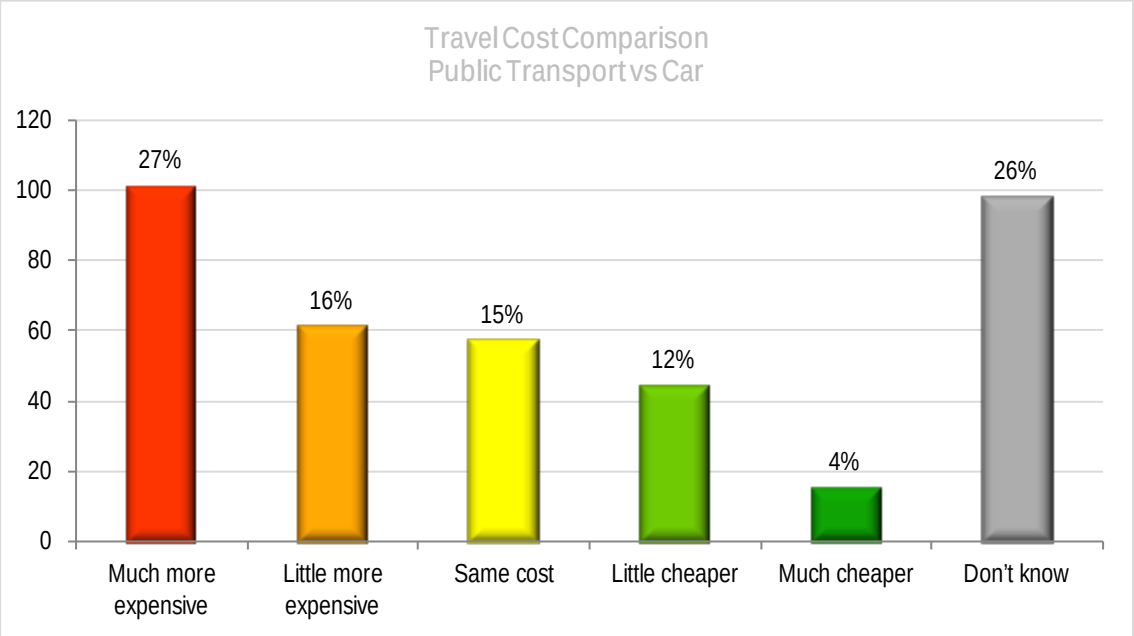


Figure 4.33: Travel Cost Comparison

Question: *In terms of travel time to SCU, do you think it is faster, about the same or slower to use public transport or a car?*

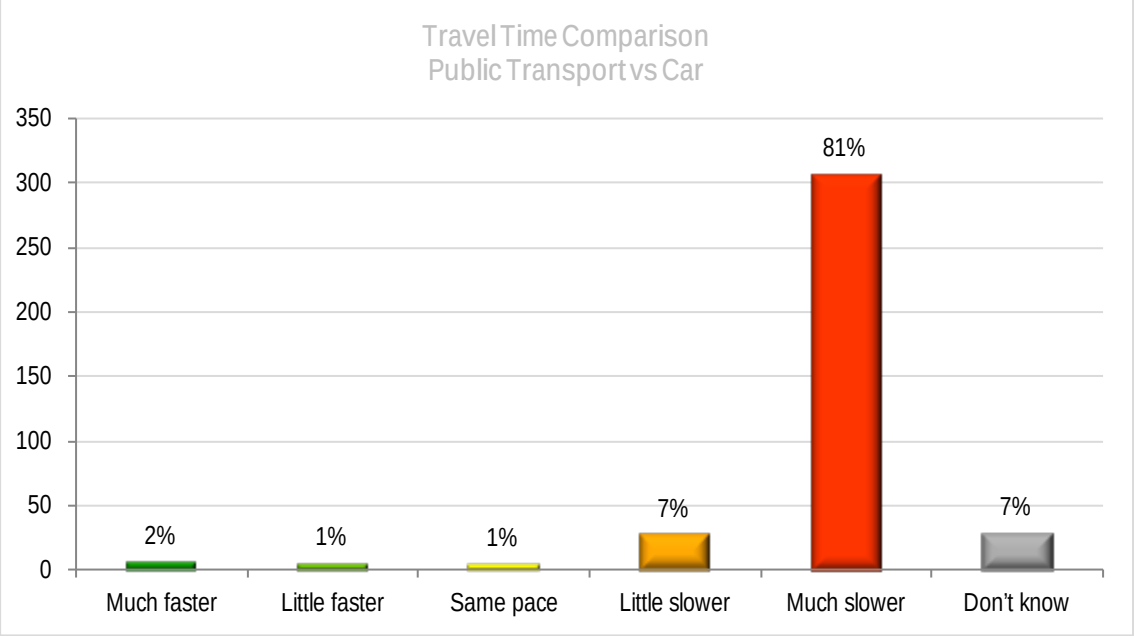


Figure 4.34: Travel Time Comparison

Question: *Based on current conditions, I consider the following modes as ways I could get to SCU:*

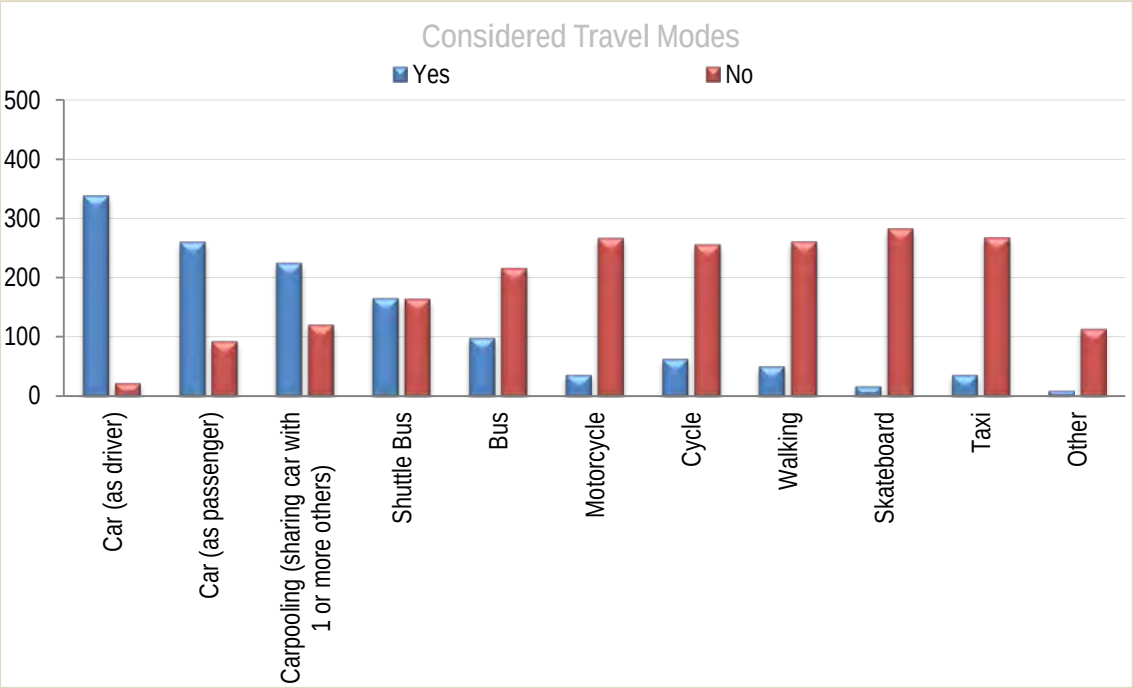


Figure 4.35: Considered Travel Modes

Question: *Using the scale below, please indicate the extent to which you agree with the following statements relating to the travel from your home to SCU:*

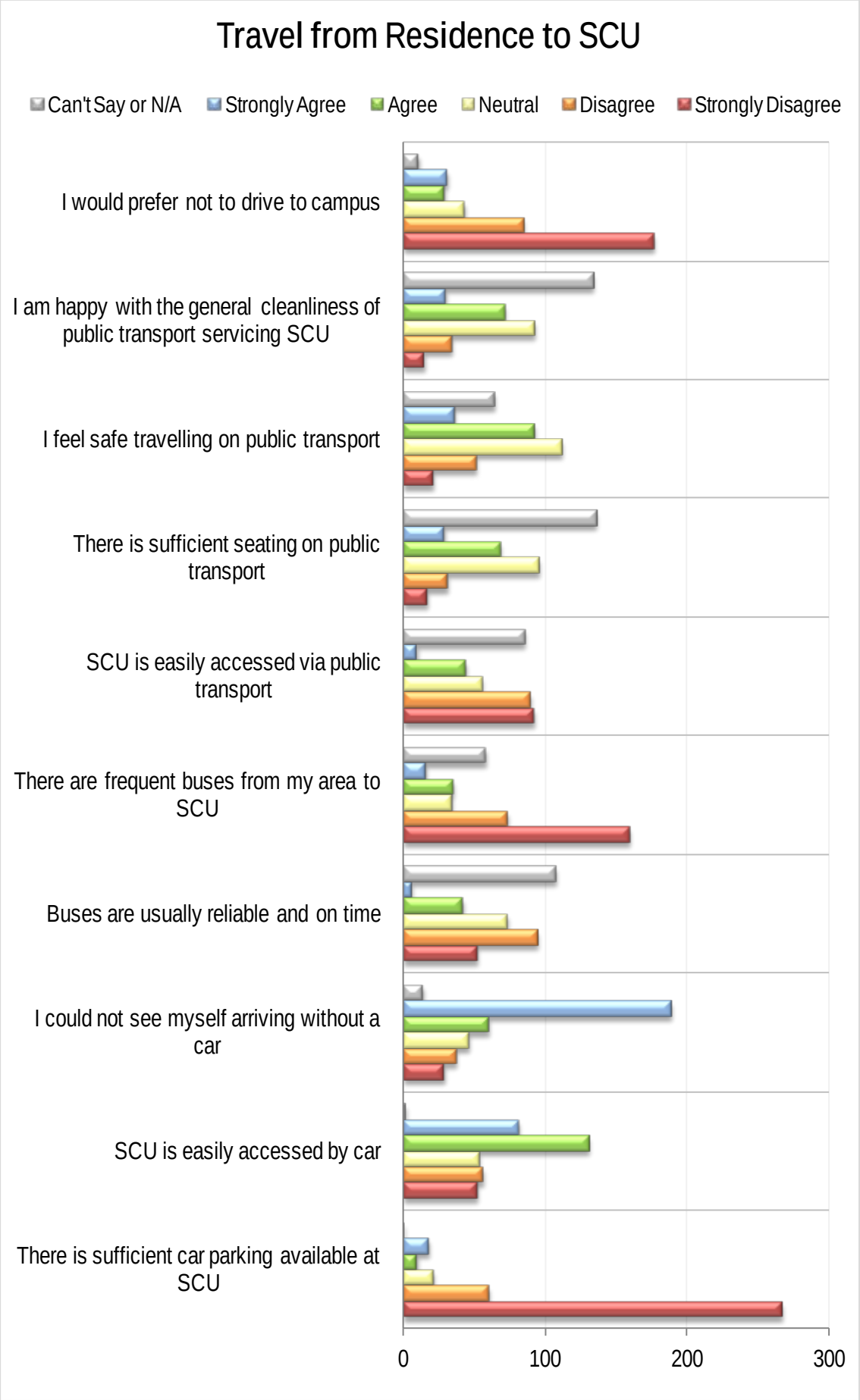


Figure 4.36: Travel Perceptions from Residence to SCU

Question: *Would these help you if you are in a position to walk, cycle or skateboard?*

Figure 4.37: Benefits of Improvements to Active Transport

Question: *Would these help you use public transport?*

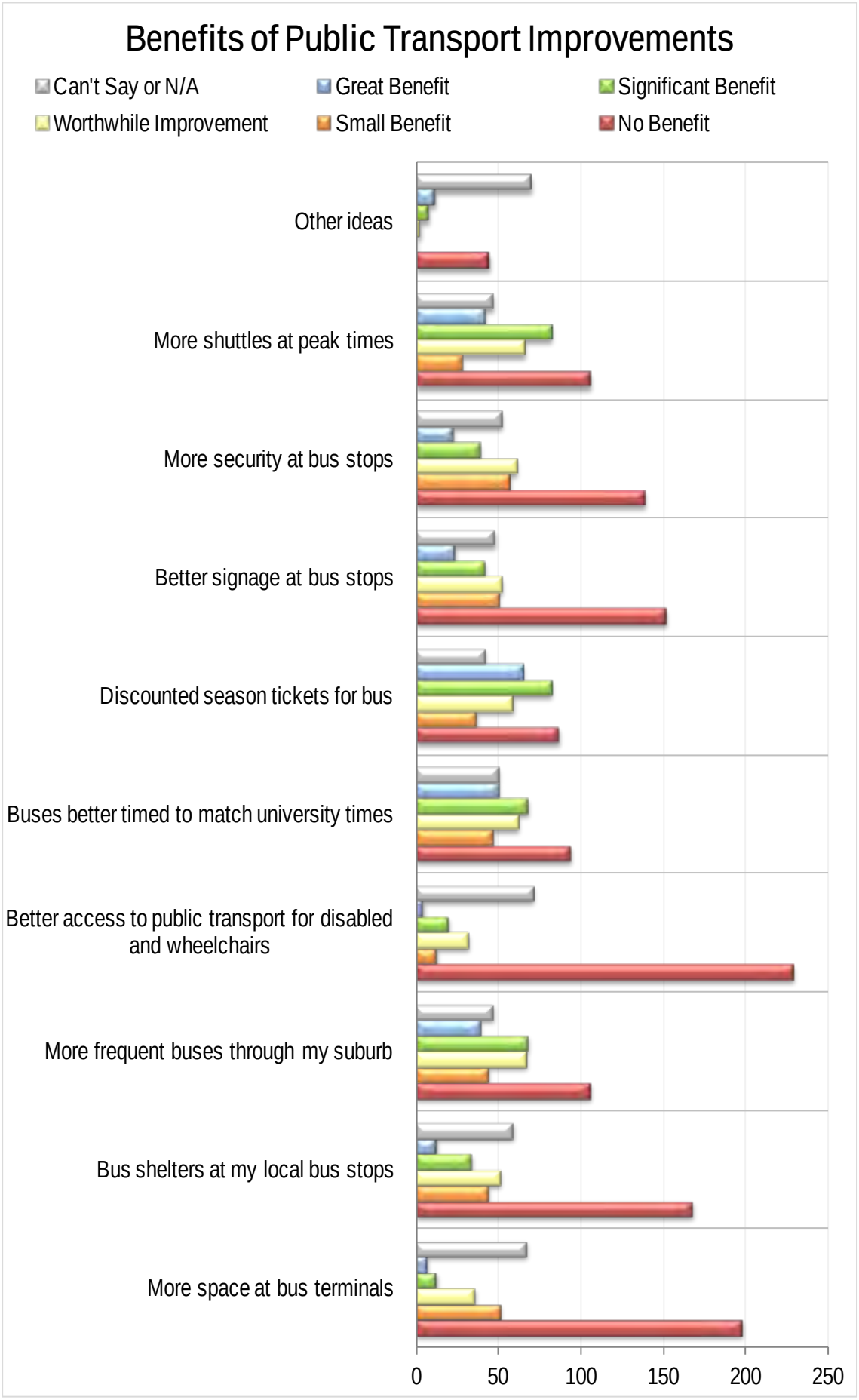


Figure 4.38: Benefits of Improvements to Public Transport

Question: *Would these help you if you were travelling by car?*

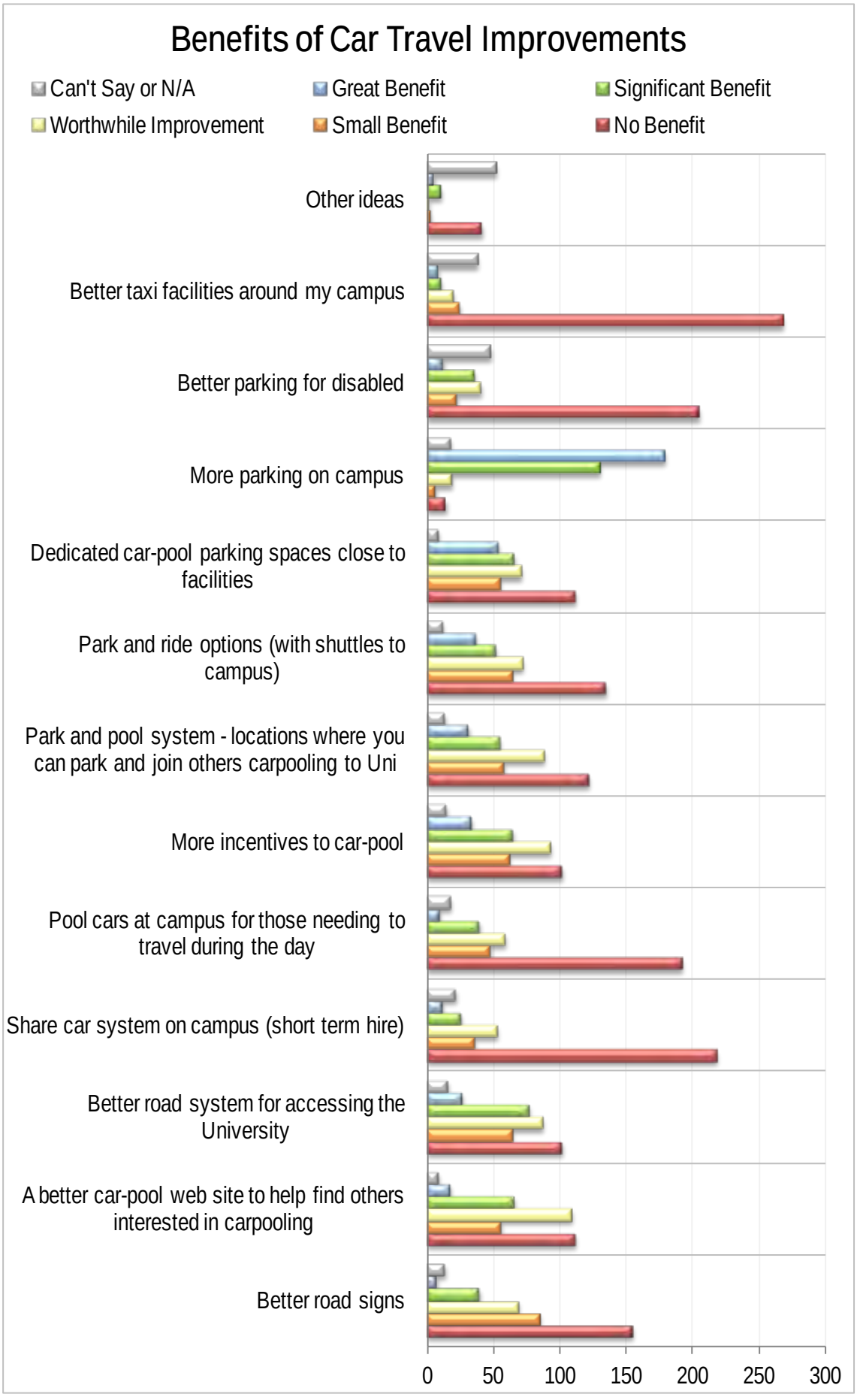


Figure 4.39: Benefits of Improvements to Car Travel

Question: *What incentives would you need to take up car-pooling at least once a week to travel to work/study?*

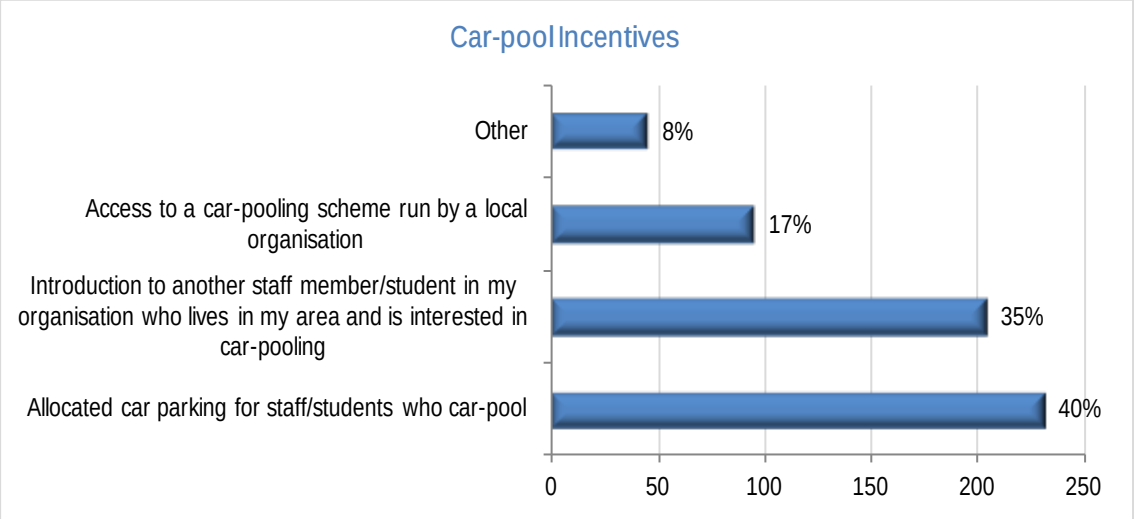


Figure 4.40: Car-pool Incentives

Question: *What do you consider a barrier to car-pooling?*

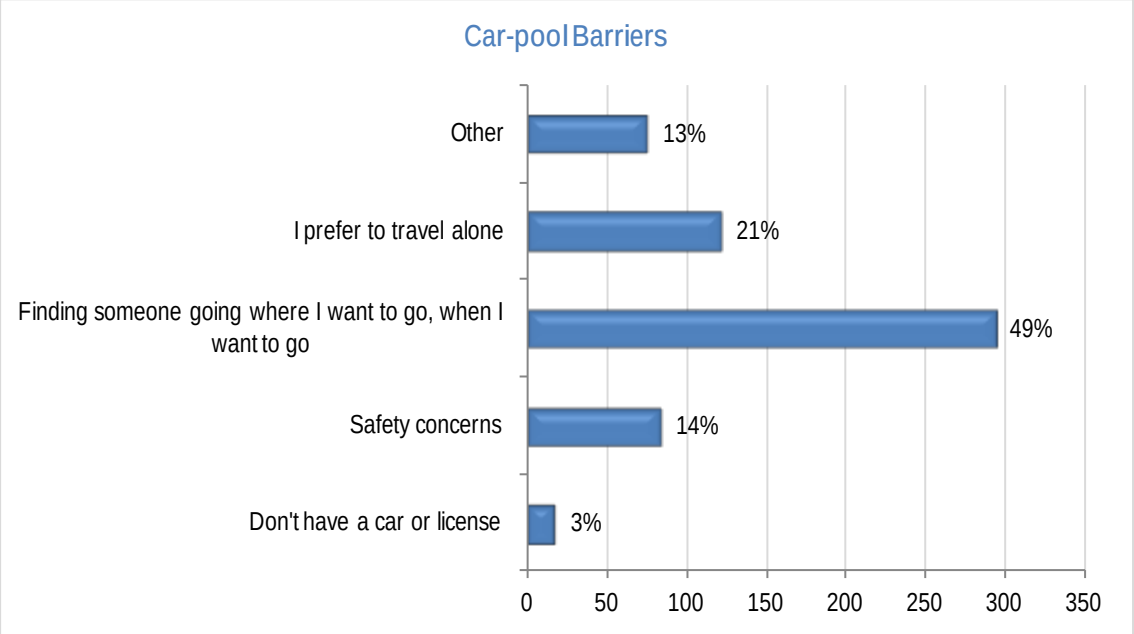


Figure 4.41: Car-pool Barriers

Question: *Please rate how well your transport needs are being met (where 1 is the lowest and 10 is the highest)?*

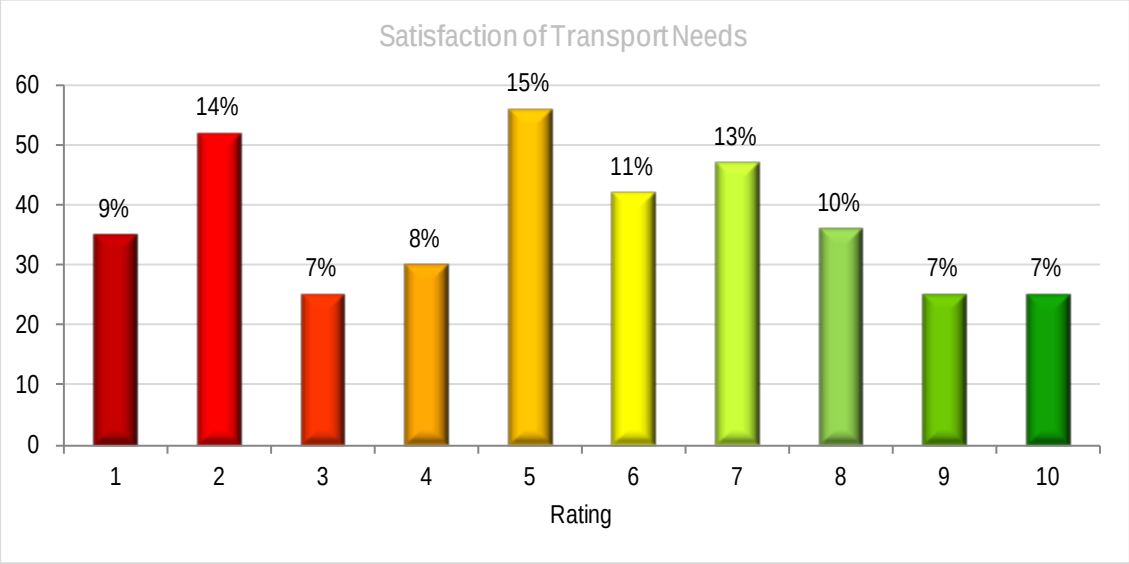


Figure 4.42: Satisfaction of Transport Needs

Question: *How easy or difficult is it to find parking on campus?*

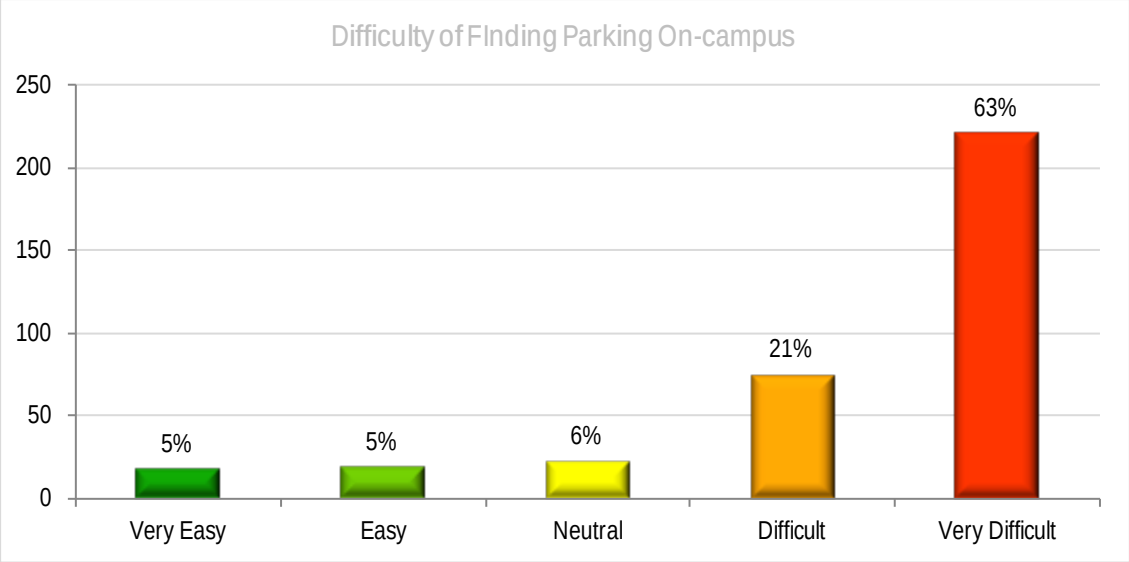


Figure 4.43: Difficulty of Finding Parking On-campus

Question: *How easy or difficult is it to find parking near your campus?*

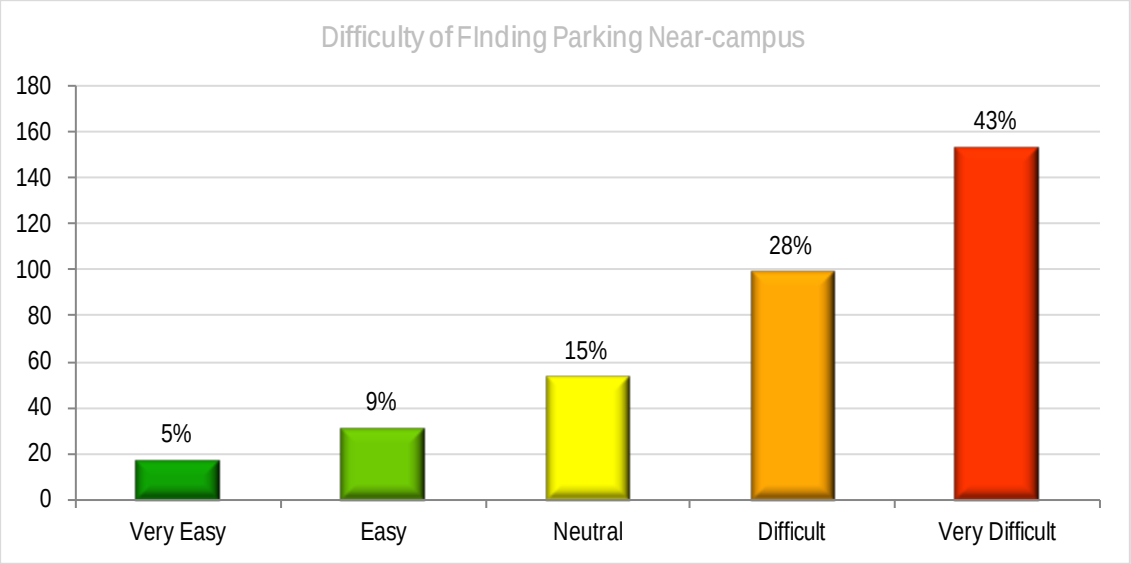


Figure 4.44: Difficulty of Finding Parking Near-campus

APPENDIX F

UPDATED TOWN CENTRE NETWORK AND CROSS-SECTIONS

ROAD TYPE 01
TOWN STREET
14.5M

ROAD TYPE 02
TOWN COLLECTOR
18.6M

ROAD TYPE 03
TOWN SERVICE ROAD | TOWN COLLECTOR
19.0M

ROAD TYPE 04
MAIN STREET
22.60M

ROAD TYPE 05
SANDY LANE
26.00M

UNIVERSITY SITE 1 (U1)
6.00HA

UNIVERSITY SITE 2 (U2)
6.00HA

STRM WATER 1
0.28HA

CASUAL OPEN SPACE
PLAYGROUND NON COMPLIANT AREA
0.73HA

CASUAL OPEN SPACE
PLAYGROUND COMPLIANT AREA
0.43HA

STRUCTURED OPEN SPACE
3 X SOCCER | RUGBY | LEAGUE
1 X AFL | CRICKET
CLUB HOUSE | CAR PARKING
AREA:7.18HA

STRM WATER

T6

T3

T4

T4

T2

7,345m2

4,306m2

11,645m2

STRM WTR
2,800m2

U1
47,498m2

U1
12,502m2

T1

T1

ENV

U2
21,093m2

T5

U2
38,907m2

71,848m2

FAUNA CORRIDOR

FAUNA CORRIDOR

STRM WATER

PRECINCT 6
BALANCE

PRECINCT 7

PROJECT TITLE: COBAKI	
DRAWING TITLE: STRUCTURED OPEN SPACE AREA 1 | UNIVERSITY MASTER BLOCKS	
BASES: SEDGMAN | MICHEL GROUP SERVICES	

NO	DATE	REVISION	BY

SCALE: 1:1000	DATE: SEPTEMBER 2015
DESIGN: JB | BS	CHECKED: BS
DRAWN: JB	DRAWING NO: COBAKI_LSP_08_2015_V9

LEDA

NORTH

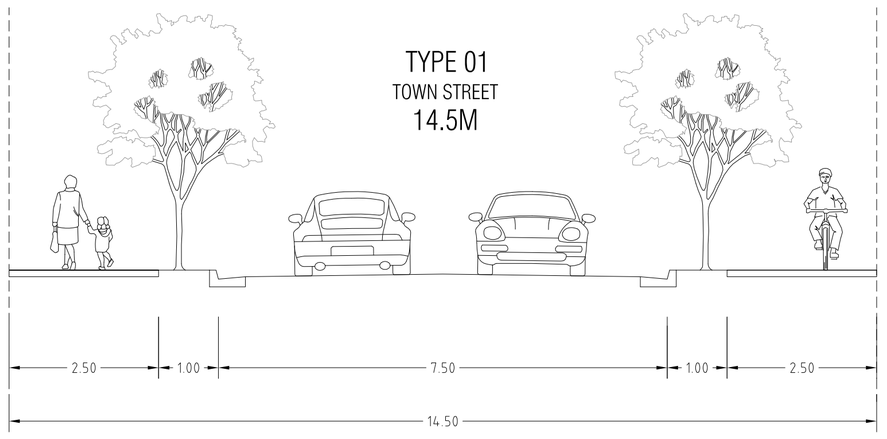
Level 2247 Gold Coast Highway
Nobby Beach
PO Box 206 QLD 4218

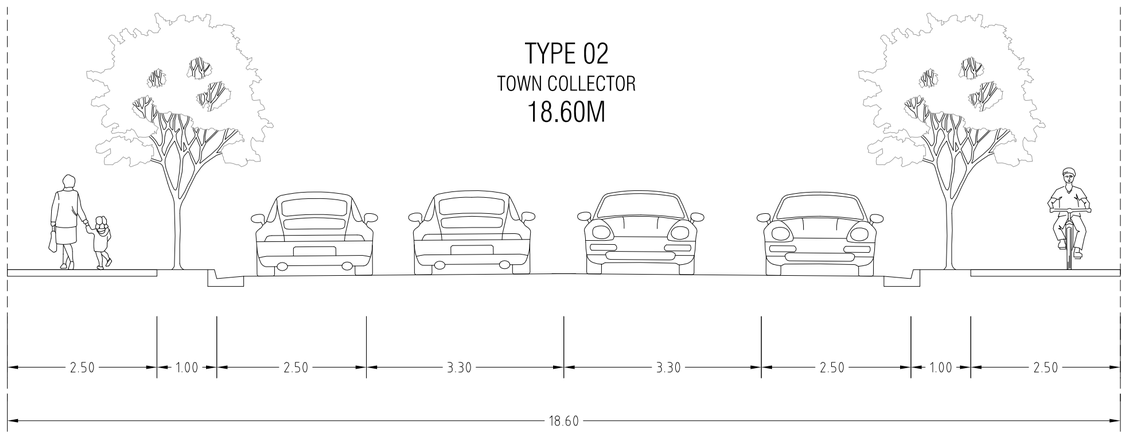
Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au

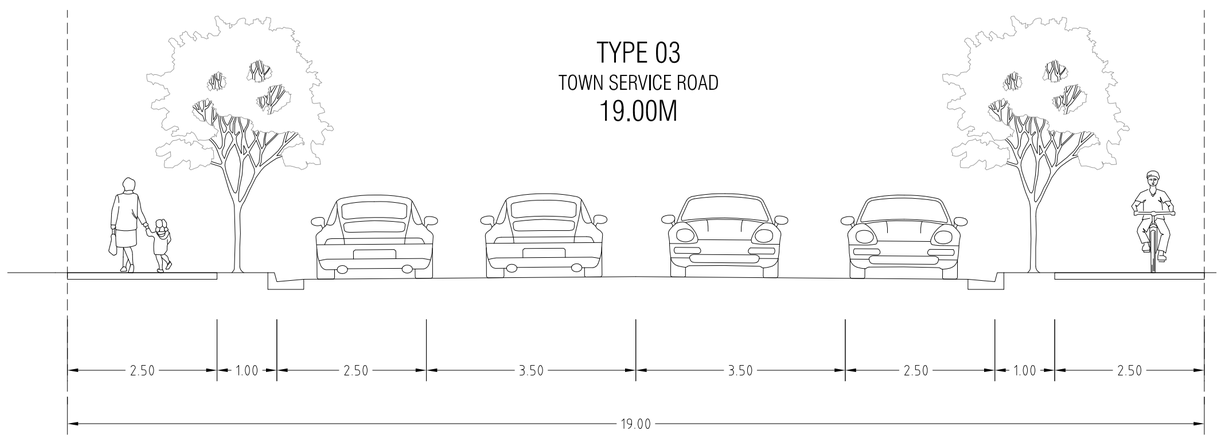
PLANIT CONSULTING

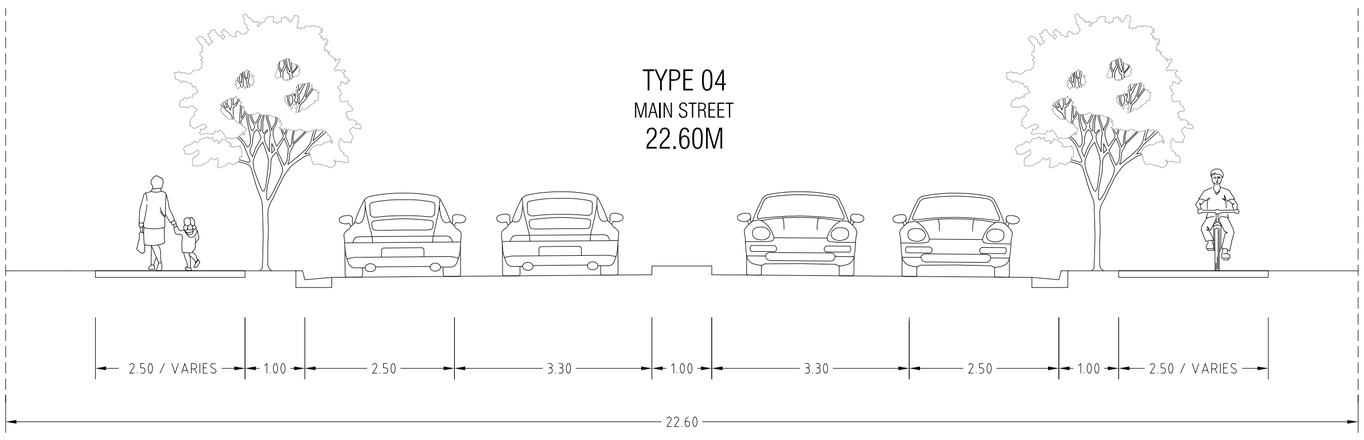
TYPICAL ROAD SECTIONS 1 | TOWN CENTER

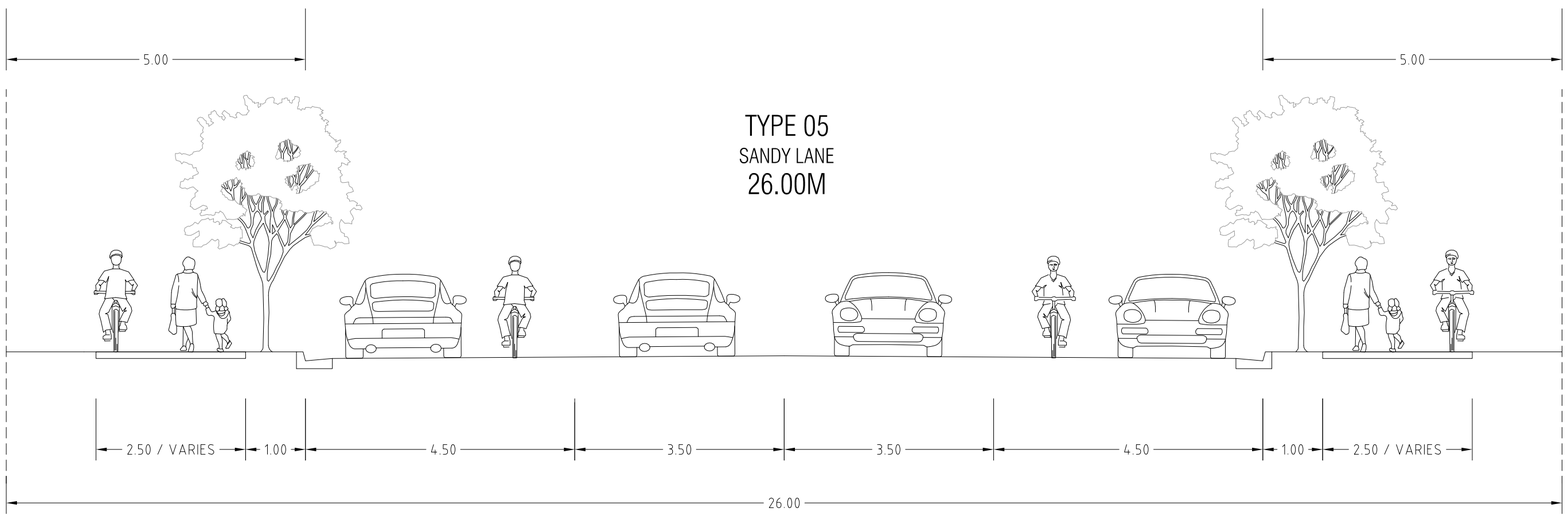
BASED ON BITZIOS TYPICAL CROSS SECTIONS SEPTEMBER 2015











PROJECT TITLE
COBAKI

DRAWING TITLE
TYPICAL ROAD SECTIONS 1 | TOWN CENTER

BASES: SEDGMAN | MICHEL GROUP SERVICES | BITZIOS

NO	DATE	REVISION	BY

SCALE: REFER DIMS	DATE: SEPTEMBER 2015
DESIGN: JB | BS	CHECKED: BS
DRAWN: JB	DRAWING NO: COBAKI_LSP_08_2015_V3

LEDA

NORTH

Level 2247 Gold Coast Highway
Nobby Beach
PO Box 206 QLD 4218

Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au

PLANIT CONSULTING

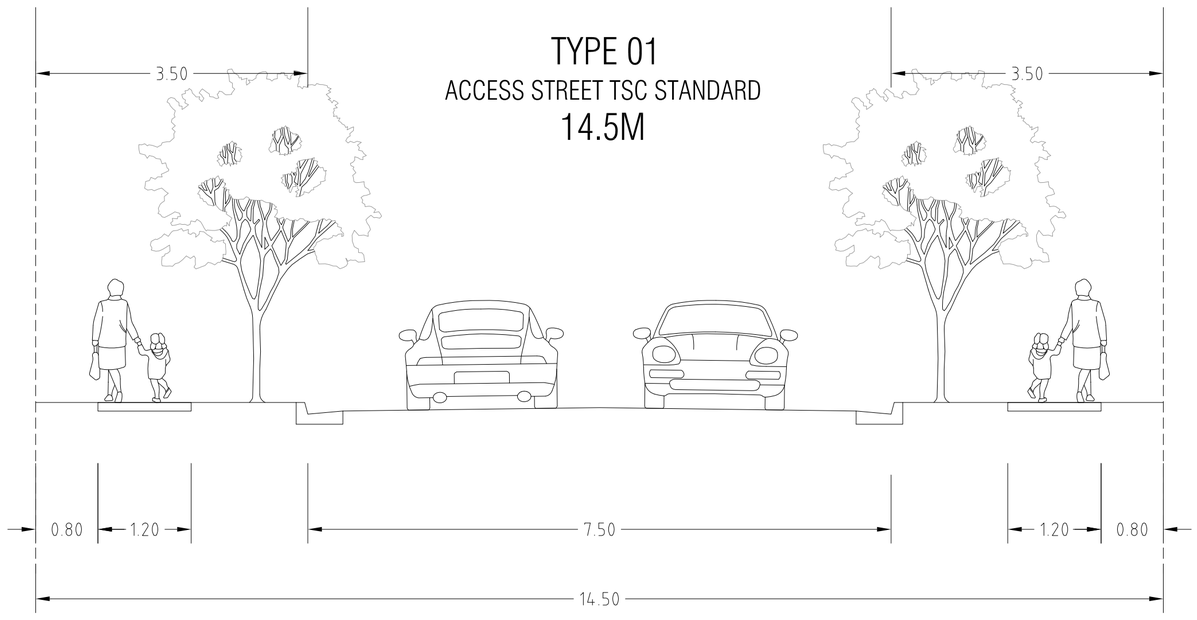
TYPICAL ROAD SECTIONS 2 | PRECINCTS

BASED ON TSC STANDARDS

TYPE 01

ACCESS STREET TSC STANDARD

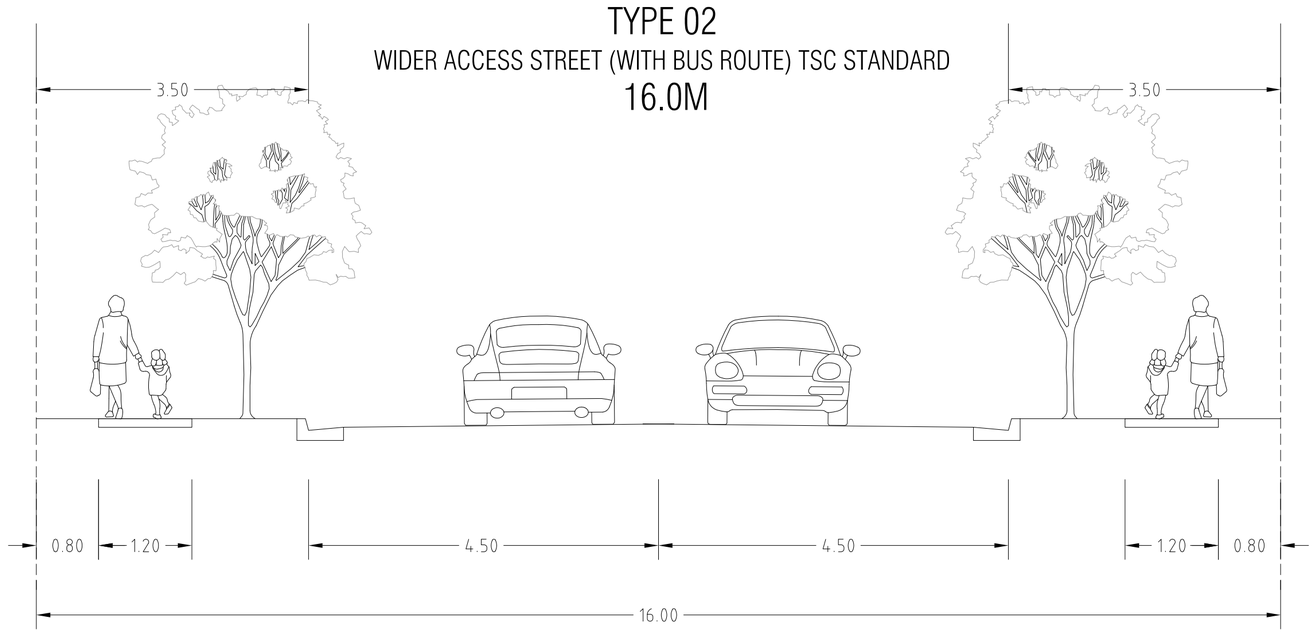
14.5M



TYPE 02

WIDER ACCESS STREET (WITH BUS ROUTE) TSC STANDARD

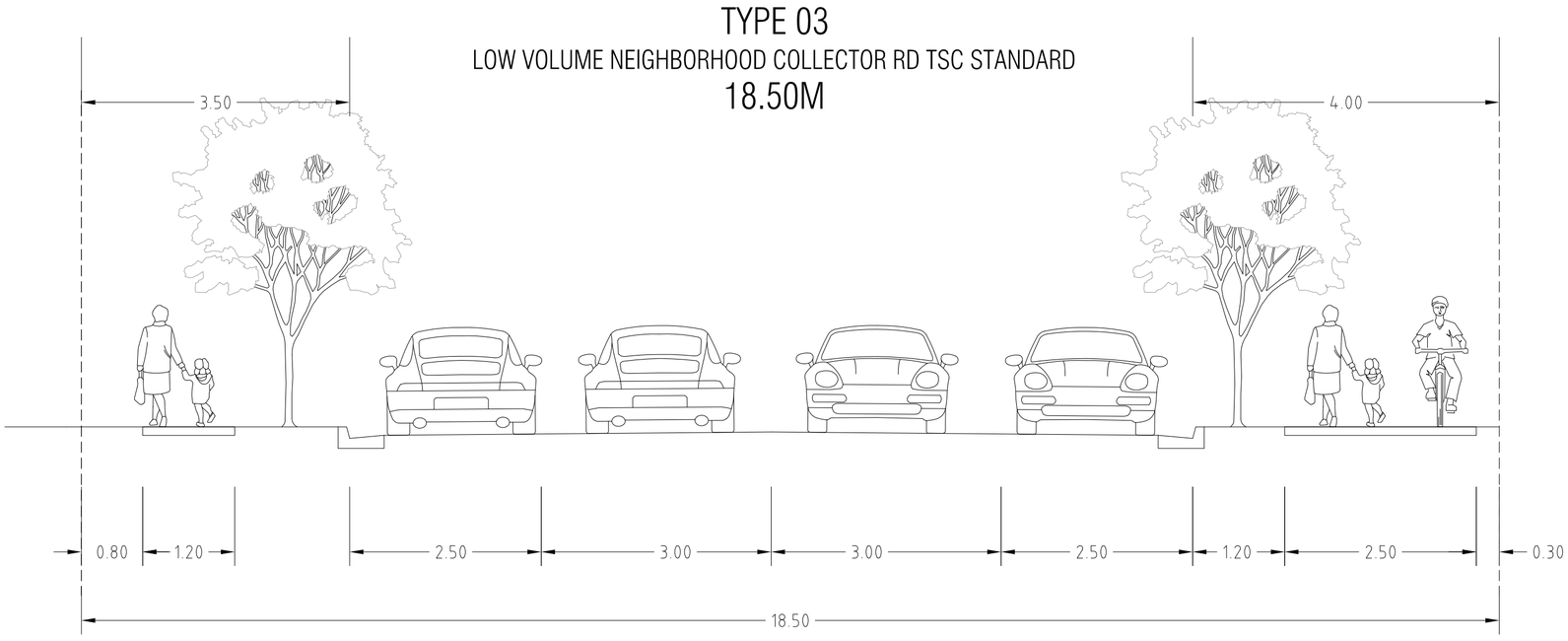
16.0M



TYPE 03

LOW VOLUME NEIGHBORHOOD COLLECTOR RD TSC STANDARD

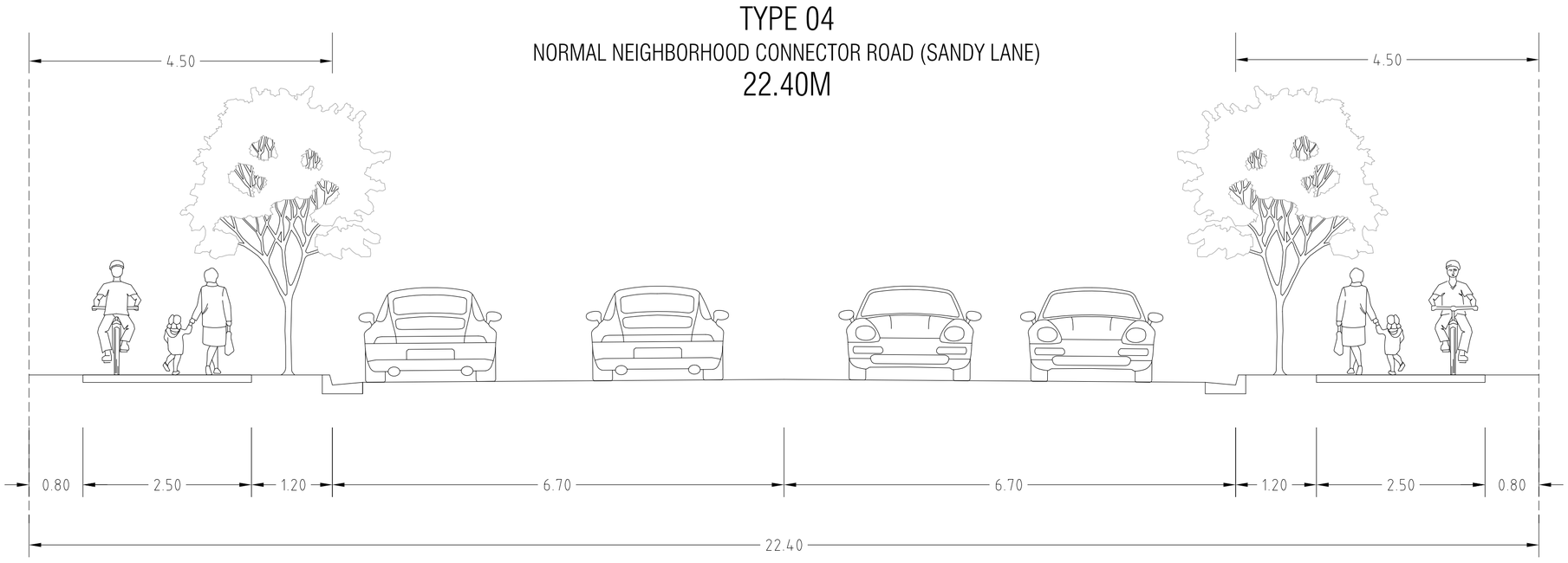
18.50M



TYPE 04

NORMAL NEIGHBORHOOD CONNECTOR ROAD (SANDY LANE)

22.40M



PROJECT TITLE: COBAKI

DRAWING TITLE: TYPICAL ROAD SECTIONS 1 | TOWN CENTER

BASES: SEDGMAN | MICHEL GROUP SERVICES | BITZIOS

NO	DATE	REVISION	BY

SCALE: REFER DIMS	DATE: SEPTEMBER 2015
DESIGN: JB | BS	CHECKED: BS
DRAWN: JB	DRAWING NO: COBAKI_LSP_08_2015_V3

LEDA

NORTH

Level 2247 Gold Coast Highway
Nobby Beach
PO Box 206 QLD 4218

Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au

PLANIT CONSULTING