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Office of the Vice-Chancellor

The Secretary
Legislative Council Select Committee – GHT
Legislative Council
Parliament House, HOBART 7000
Via email: ght@parliament.tas.gov.au

Greater Hobart Traffic Congestion

The Tasmanian Legislative Council Select Committee on Greater Hobart Traffic Congestion recently invited written submissions from interested organisations. The University of Tasmania welcomes the opportunity to present the attached submission.

With facilities located both at Sandy Bay and within the Hobart CBD, the University is one of Hobart's largest employers and is a significant contributor to the economic and social wellbeing of the state.

This consultation is timely and aligns with two recent reports commissioned by the University. The first is the *Traffic Impact Assessment for Central Hobart*, which informed the decision to move the University into the Hobart CBD. The other is the soon to be released *University of Tasmania Travel Behaviour Survey Update Report 2019*, which informs the University's transport and facilities planning and performance indicators that underpin the University's sustainable transport strategies. The *Traffic Impact Assessment for Central Hobart* is attached to our submission for your reference.

A key finding of the *Traffic Impact Assessment for Central Hobart* of particular relevance to the scope of the Select Committee is that the University's move into the Hobart CBD would reduce traffic congestion by removing the total number of trips made across the city by staff, students and visitors.

We are committed to sustainable transport solutions which reduce the traffic load across the Greater Hobart region and, while recognising the needs of our staff, students and broader community, are actively working on how we can support further reductions on reliance on private motor vehicles that contribute to that traffic load.

The University is of the opinion that any improvements to traffic management across Greater Hobart will materially contribute to the liveability and sustainability of the region and we thank you for the opportunity to provide comment.

Yours sincerely

Professor Rufus Black
Vice-Chancellor

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Greater Hobart Traffic Congestion

Submission from the University of Tasmania

Background

Through its major campuses across the city, the University of Tasmania contributes significantly to Hobart's travelling population, and as one of Hobart's largest employers is a significant contributor to the economic and social wellbeing of the state, particularly in the context of a global education market.

Given the significant demand for transport and therefore the impact of traffic on our students, staff and visitors, the University commends the State Government for recognising the importance of more effectively planning for and managing the impact of traffic within the Greater Hobart area.

The University recognises that the causes of traffic congestion and its solutions are complex and cannot be dealt with through a single submission, nor can it be remedied quickly. On that basis we are pleased to provide the following submission in line with the Terms of Reference provided.

Terms of Reference

1. **The scope of Greater Hobart's traffic congestion and its impact on the community and economy**

Central to our place-based mission is our ability to work in partnership with the community, industry and government to solve the complex problems underlying these issues and to create a prosperous, inclusive and sustainable future for Tasmania.

The foundations of the University's decision to relocate its campus to the Hobart CBD are the positive contributions that we make as a place-based University to both Hobart and Tasmania more broadly. The move will see the University engage more effectively with our community, driving increases in educational attainment levels and strengthening links to industry which in turn will drive economic growth across the Greater Hobart region.

The University is of the opinion that any improvements to traffic management across Greater Hobart will materially contribute to the liveability and sustainability of the region.

The current traffic challenges faced across Greater Hobart impact several factors that detract from the overall liveability of the region. These include:

- Increased air and noise pollution impairs Hobart's reputation as the capital of Australia's green and sustainable state
- Increased greenhouse gas and particulate emissions. Action to remedy congestion should reduce greenhouse gas emissions and lessen particulates, creating related health benefits (eg. reduced levels of asthma).

- Increased stress levels as the community deals with longer commuting times and reduced time with family and friends
- Increased risk of traffic related accidents for vehicle traffic and other commuters (cyclists and pedestrians etc) due to the higher attention levels required when driving in traffic congestion and the driver fatigue that it can cause
- Reduction in productive economic activity in both workplace productivity and reduced trading within the region due to time and effort to commute to places of business
- Increased fuel cost from spending greater periods in stop/start or slow-moving traffic

Recognising and addressing the challenges presented by traffic congestion across Greater Hobart will have a significant impact in improving social connectivity and access to employment (both paid and voluntary), training and education, services and recreational activities which all contribute to a thriving city and its surrounds.

2. Causes of congestion, including physical and topographical barriers

In simple terms, the causes of traffic congestion are either:

- System inefficiencies such as the nature of the road network (convergence of major arterial roads with limited capacity city streets), mixing of varying types of traffic (passenger vehicles, heavy vehicles, buses, cyclists and pedestrians), poorly co-ordinated traffic lights, ineffective street markings and variable driving skills
- Demand pressure where even in efficient systems the overall demand during peak times is greater than the optimal capacity of the road network

We acknowledge that Hobart experiences both causes of traffic congestion at differing points in the system (notwithstanding Greater Hobart's topography which, while contributing strongly to our sense of place, with its CBD sitting between the Derwent Estuary and kunanyi, also presents some inherent challenges). These causes have been accentuated by a number of factors including but not limited to:

- Challenges in creating integrated, long-term planning across local, state and federal governments to identify and address the causes of traffic congestion across the region. We have the potential to address this through the existing regional planning framework (*Southern Tasmanian Regional Land Use Strategy*), which was devised to coordinate planning actions across various tiers of government
- Population growth in outer areas (e.g. Sorell, Brighton, Kingston) without commensurate regional investment in infrastructure to support the increased traffic load. To counter this a settlement strategy could assist with managing the market-based pressures for growth in the outer suburban locales, which can be more difficult and expensive to serve with transport infrastructure (e.g. duplicating bridges can be expensive)

- Limited take up of public transport options across the Greater Hobart area due to limitations in the services provided (routes and frequency) and deep community expectations regarding the ability to be able to easily drive to their destinations
- One-way streets through the Hobart CBD limiting the choice of alternative routes by commuters when traffic is impacted by accidents (and other events) or overall traffic load
- Development of high access arterial roads to the south, north and east that enable faster travel to bottlenecks in the system rather than seeking to regulate the flow of traffic along those routes
- Ineffective co-ordination of solutions for users of alternative transport options that impact traffic (e.g. reliance on co-ordination of pedestrian lights between Hobart CBD and waterfront)
- Major carparks located within the core Hobart CBD (Centrepoint, Trafalgar Square, Argyle St, Vodafone and Melville St carparks) with some limited to one-way access and exit causing peak loads and blockages on adjacent streets.
- It is worth noting also, that inner-city parking in Hobart remains comparatively inexpensive, so there is less incentive for people to use other modes of transport.

3. Strategic planning processes between Commonwealth, State and Local governments

The University strongly supports an ongoing and integrated long-term planning approach to traffic management involving all relevant regional local governments, the state government and federal government. We recognise the complexity of this approach and are committed to working with and supporting these bodies in developing long-term solutions that benefit the Greater Hobart area, especially during the long-term redevelopment of our operations in Hobart.

4. Future initiatives to address traffic congestion in the Greater Hobart area

Of particular relevance to the scope of the Select Committee, the *Traffic Impact Assessment for Central Hobart* commissioned by the University identified that the University's move into the Hobart CBD would reduce traffic congestion by removing the total number of trips made across the city by staff, students and visitors.

In addition, there are several potential initiatives that may help alleviate the traffic congestion within the Greater Hobart area which include:

- Improved traffic and city planning
  - Implementing an integrated approach to planning, developing and implementing traffic management strategies across the Greater Hobart area by local, state and federal government. This was identified as a key success factor by the *Traffic Impact Assessment for Central Hobart*
  - Developing park-and-ride facilities in suburban locations, providing more choices for people with limited access to rapid transport options. These should be developed in an integrated way with residential and commercial developments (e.g. transit-orientated development).

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  - Working with major employers on workplace strategies that may allow staff to travel to and from work outside of peak periods and therefore reduce the total peak traffic load
  - Encouraging appropriate residential accommodation density (potentially mixed use), within the Hobart CBD and along public transport and active transport corridors to both reduce the total travel requirements and facilitate the use of alternate forms of transport by Greater Hobart residents

- Improved road access and management
  - Investigating the opportunity to move away from one-way streets in the Hobart CBD (as has occurred in other cities around the world such as Vancouver, Minneapolis, Louisville and Oklahoma City)
  - Implementing transit lane provisions on main arterial roads for all buses, cars with three or more passengers, and electric vehicles where the driver is not the sole occupant
  - Supporting car and ride-sharing opportunities through sponsored online systems, and dedicated parking in urban areas

- Application of technology to enable greater transparency and individual transport planning
  - Providing real-time traffic reporting allowing the community to easily access information to inform decisions about when they choose to travel
  - In the medium- to longer-term, investigate the feasibility of congestion charging systems such as those already in place in Singapore, London and Stockholm
  - Improving real-time information about bus services and any other public transport services into the future (e.g. minutes until the next bus arrives at key bus stops/hubs or a mobile phone app that provides this information). This allows customers to turn up and go, avoiding the frustration of waiting when services are running late
  - Developing a transport accessibility app for smart phone and web-based trip planning tool with info and links on bike routes, bike use etiquette/safety, bus services, alternative travel options etc
  - Providing wi-fi internet connection on key bus services and any other public transport services into the future

- Increasing community use of the existing public transport network
  - Increasing the frequency of bus services in high-use corridors in periods of high demand and facilitating the reliability and efficiency of these services in peak traffic periods through appropriate infrastructure and road network adjustments (e.g. transit lane provisions)
  - Developing Park and Ride (car-bus) and Ride and Ride (bike-bus) facilities
  - Considering incentives for public transport use, including rewards schemes and the potential re-structure of bus fares including tertiary student concessions, and differential fares for peak and non-peak periods
  - Providing bike access on existing bus services and any other public transport services into the future
  - Improving linkages between inter and intra-regional bus services - that is, have services such as Redline and Tassielink with a terminus co-located with the Metro Tasmania bus interchange and provide well integrated information about these services

- Improving way-finding to public transport access points
- Considering economically viable and appealing new linkages between the Hobart CBD and the northern suburbs (e.g. dedicated bus transit-way with similar or better performance results)

- Alternative transport options
  - Improving pedestrian access and connection from the Hobart CBD and waterfront to increase pedestrian safety and amenity and minimise traffic impact on Macquarie St and Davey St
  - Improving pedestrian, bicycle and other active transport linkages within Hobart's various activity centres (e.g. Battery Point shared pathway, bike lanes) as well as connections to surrounding communities
  - Considering linking the Hobart northern, eastern and western shore key activity zones by supporting a bicycle friendly ferry service that links to the Hobart waterfront
  - Considering supporting a bike and /or electric scooter share scheme in the Hobart CBD to encourage alternative methods for short trips

5. Any other matters incidental thereto

The University is committed to continuing to work with the state government and local government to identify appropriate strategies (in addition to those identified above) to reduce traffic congestion across Greater Hobart. As the sole university for Tasmania, we have a unique ability to work in partnership with government and community to help inform the best possible outcomes for Tasmania and Tasmanians.

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Attachment

i) Traffic Impact Assessment for Central Hobart 2018

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Attachment 1

Preliminary Traffic Impact Assessment for Central Hobart

The University of Tasmania
Southern Infrastructure Transformation Program

Preliminary Traffic Impact Assessment for Central Hobart

May 2018

prepared for

The University of Tasmania
Southern Infrastructure Transformation Program

by

GHD Pty Ltd and *RED Sustainability Consultants*

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Table of Contents

List of Figures

List of Tables

Executive Summary

The University of Tasmania (UTAS) would like to explore the possible implications for the Hobart inner city road network if the University were to relocate its services out of the Sandy Bay campus to the Hobart Central Business District (CBD). This report presents a first pass assessment of the possible implications.

Methodology

A spreadsheet model was developed to reflect traffic generation and distribution for a baseline (current) situation and various University facility development and travel behavior scenarios. The modelled scenarios provide an indication of potential changes in travel activity and parking demand between the scenarios.

The focus of the assessment was on travel during the AM peak period, nominally between 8am and 9am on a weekday. Travel patterns in the PM peak tend to be more complex, due to an increased occurrence of non-home-based trips and trip chaining. However indicative results were provided for the PM also.

Seven scenarios were developed and tested. A summary of these are outlined below.

Scenario	Scenario Summary
SCENARIO 1 (Base Case)	Existing situation
SCENARIO 2	Relocation of Sandy Bay campus to Hobart CBD – adopt 2017 Sandy Bay mode share profile for students and staff
SCENARIO 3	Relocation of Sandy Bay campus to Hobart CBD – adopt 2017 Hobart CBD mode share profile for students and staff
SCENARIO 4	Scenario 3 with a medium term residential origin shift away from Sandy Bay
SCENARIO 5	Relocation of Sandy Bay campus to Hobart CBD – adjusted mode share for international students only – no change in residential origin
SCENARIO 6	Relocation to Sandy Bay campus to Hobart CBD - medium term residential origin shift away from Sandy Bay and adjusted mode share (2017 Hobart CBD mode share profile for adopted for domestic students and staff, and Scenario 5 adjusted mode share for international students)
SCENARIO 7	Relocation of Sandy Bay campus to Hobart CBD - medium term residential origin shift away from Sandy Bay with targeted mode share interventions in highest car use corridors (shift from car trips to bus trips)

Findings

An important feature of the change in student on-campus population in Hobart has been the growth in international student enrolments and the increasing share of international students on-campus in Hobart. The significance of this is relevant to travel behaviour as the majority of the international student cohort tend to live nearer to their main place of study than domestic (especially Tasmanian) students.

Residential location plays an important role in travel mode choice. The residential location of many international students in the vicinity of Hobart campuses enables active modes, particularly walking. Domestic students live in a greater diversity of locations throughout southern Tasmania and have much higher levels of car use, as do staff.

The modelling reveals a likely reduction in trips made by car to the University with a relocation to the Hobart CBD and associated changes in mode share and/or residential location. The impact of this on the road network is varied. Roads that connect between the Hobart CBD and existing Sandy Bay campus will generally see a significant reduction in traffic activity. There are relatively minor increases in traffic on roads such as Macquarie Street and Sandy Bay Road northbound, although given existing volumes on these roads are already approaching capacity at peak times, the potential implications of this could be significant. These impacts will need to be modelled in more detail.

The following is a summary of the key findings from the analysis:

- With a shift to the Hobart CBD from Sandy Bay as the main campus destination, where the Hobart CBD mode profile is adopted there is an associated overall reduction in car driver trips and an increase in bus and active travel modes. The largest reductions in car driver vehicle trips are observed for the Northern (Brooker), Central, Sandy Bay/Taroona, and Southern (Southern Outlet) travel regions.
- Shifting the residential origin of many students away from Sandy Bay into the Central travel region marginally increases bus trips and active mode trips, with the vast majority of active mode trips to the University generated in the central residential zone.
- The most significant car driver trip reductions and increase in bus trips are observed when applying specific car use reduction targets for the highest traffic volume corridors (Eastern, Northern, and Southern).
- The existing total parking demand is some 1,645 spaces across all southern campuses, with almost 70% associated with staff travel. Whilst this number is generally reduced with the shift to the CBD and associated changes in mode share, only with targeted car use reduction strategies would a significant reduction in car parking demand be experienced.

Recommendations and Opportunities

Travel demand and mode share profiles will be impacted by a range of factors into the future. However, it will be the way the University develops its facilities in the context of a changing urban-regional environment that will be most important in managing changes in travel demand and urban traffic.

Given the largest gains in reducing car driver trip demand and traffic will be made with targeted car use to bus use mode shift interventions, collaborative responses with agencies responsible for delivering public transport service enhancements will be particularly crucial.

The following outlines specific recommendations for UTAS:

- *Better integrate strategic University transport planning with master-planning and facilities design*
- *Plan for university population diversity and change*
- *Grow the number of students living in central Hobart*
- *Work with external agencies to grow public transport mode share*
- *Work with external agencies to develop sustainable parking responses*
- *Enhance active mode accessibility and amenity*
- *Explore road network impact and improvement opportunities*

Next Steps

Based on the results from this analysis and recommendations outlined, the following are potential next steps for the University:

- Further traffic modelling in collaboration with the Department of State Growth and the City of Hobart;
- Continue strategic decision making and master-planning/facilities design to include holistic travel demand transport planning considerations mentioned in this report and apply the principles outlined in the *UTAS Sustainable Transport Strategy 2017-2021*.
- Development of a stakeholder engagement program should the University decide to pursue a full relocation to the Hobart CBD.

1 Introduction

1.1 Background

The University of Tasmania's largest campus is set on 100 hectares in the suburb of Sandy Bay, some five minutes' drive south of the city centre (Hobart CBD). Established Hobart CBD based satellite campuses include the Conservatorium of Music, the School of Creative Arts, Institute for Marine and Antarctic Studies, the Medical Sciences Precinct, and the Domain. The University of Tasmania has commenced further expansion of facilities in the Hobart CBD, with the Academy of Creative Industries and Performing Arts construction underway next to Hobart's Theatre Royal. In February 2017 Infrastructure Australia approved the University of Tasmania's business case for a Science and Technology (STEM) Precinct in Hobart. The STEM Precinct will be built at the corner of Argyle and Melville streets, initially intended to accommodate 3000 students and 700 staff in contemporary teaching environments and cutting-edge research facilities. Together the STEM, Medical Sciences, Marine Sciences, and Arts and Cultural Precincts will deliver a significant University of Tasmania (UTAS) CBD presence (Figure 1).

UTAS is exploring options and implications for the possible relocation of all its Sandy Bay campus buildings and facilities to the Hobart CBD, completing a once in a multi-generational city consolidation program. As part of the internal decision making process, and due diligence, the University has sought to explore the vehicular traffic impact of moving completely from Sandy Bay to the Hobart CBD.

This report presents the results of a high level first pass assessment of travel behavior and vehicular traffic impact for central Hobart based on best available information at the time.

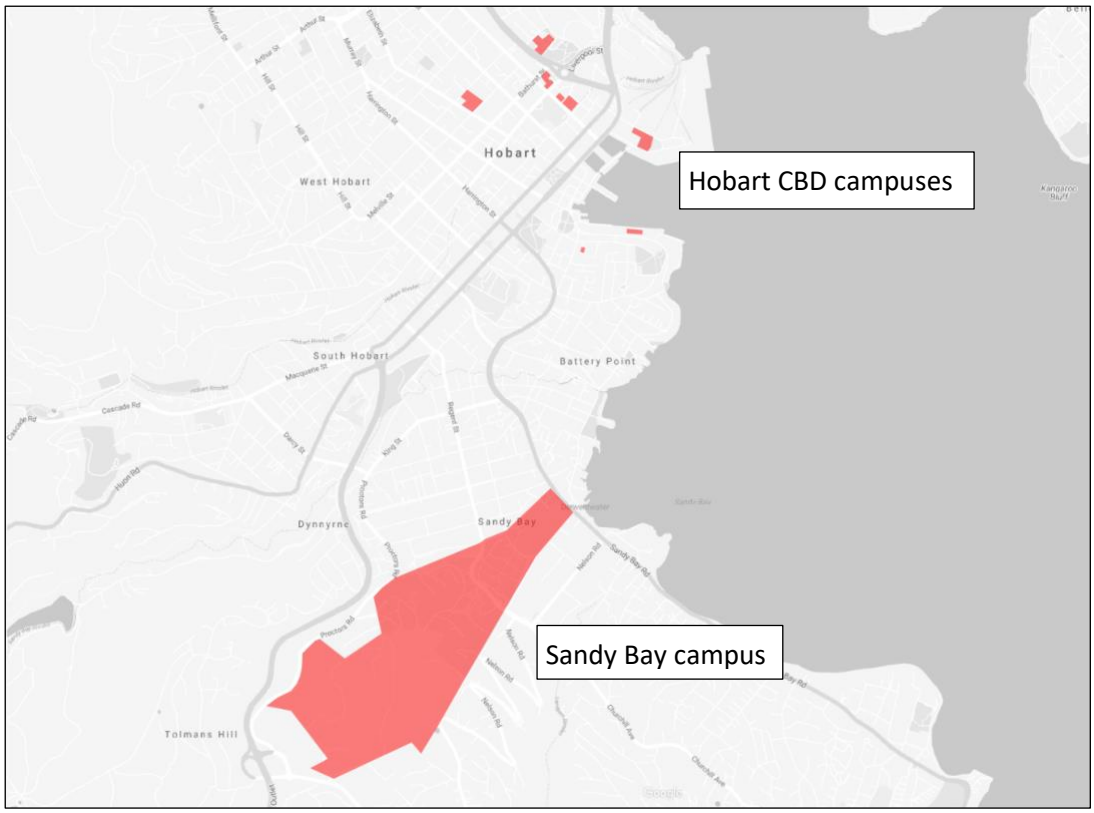

Figure 1: Map of University of Tasmania Hobart Campuses and Facilities (current and planned)

1.2 Purpose of investigation

The ultimate purpose of this study is to undertake a first pass high level traffic impact assessment for a complete relocation of UTAS facilities from Sandy Bay to the Hobart CBD. There are two core aims:

1. To quantify the potential impact associated with the scenario, 'UTAS complete relocation from Sandy Bay to the Hobart CBD', on trip generation and vehicular traffic within central Hobart to inform internal decision making; and

2. Provide recommendations to the University to address these implications

1.3 Structure of this report

The report is divided into five sections. Section 2 outlines the methodology and assumptions applied to the modelling exercise. Sections 3 and 4 present the results of the modelling. Section 5 provides recommendations, and Section 6 considers potential next steps.

2 Methodology and Assumptions

This preliminary assessment has involved the development of a spreadsheet model of student and staff travel to establish an estimate of trip generation and traffic impact in central Hobart. The following sections describe the methodology, input data, and key assumptions used in the development of the model.

2.1 Modelling Methodology

In order to determine the impacts of the possible relocation of the UTAS Sandy Bay campus buildings and facilities to the Hobart CBD, traffic modelling was undertaken. A spreadsheet model was developed in Microsoft Excel to reflect traffic generation and distribution for a baseline (current) situation and various University facility development and travel behavior scenarios. The modelled scenarios provide an indication of potential changes in travel activity and parking demand between the scenarios.

The focus of this assessment is on travel during the AM peak period, nominally between 8am and 9am on a weekday. Travel patterns in the PM peak tend to be more complex, due to an increased occurrence of non-home-based trips and trip chaining. Whilst both AM and PM data is available from the University of Tasmania Travel Behaviour Survey 2017 (UTAS TBS 2017), a preliminary assessment of PM peak conditions was based on a mirror of AM peak travel patterns.

2.2 Data In-puts and Sources

When considering the number of students and staff travelling to and from UTAS Hobart campuses and facilities we used the best available data and estimates of student and staff on-campus population, residential origins, Hobart campus destinations, and time of day students and staff arrive for study or work. Table 1 outlines the data inputs required for the modelling exercise, data available, and data sources used.

Table 1: Data In-puts and Data Sources

Data in-put required	Data available	Data Source
Student population	Number of on-campus students enrolled (not including distance/online only enrolments)	UTAS EFTSL[1] Southern Infrastructure head count estimates
Staff population	Number of staff by employment classification (professional, academic and casual staff) by location (Hobart CBD and Sandy Bay Campus)	UTAS HR[2]
Work/study destination	University work/study location (Sandy Bay campus or Hobart CBD facilities)	UTAS TBS 2017[3], UTAS EFTSL and UTAS HR
Residential origin	Residential postcodes converted to travel regions	UTAS TBS 2017
Time students arrive on campus	Estimate of peak class attendance and share of students arriving in morning peak (8-9am)	UTAS EFTSL & class timetables
Time staff arrive at work	Estimate of share of staff classification types arriving in morning peak (8-9am)	Best estimate based on work behaviour assumptions
Transport mode used for the journey to work (staff) and study (students)	Main mode used for the journey to work or study on Monday. Main mode is defined as the single transport mode used for the furthest distance in the journey (consistent with the *Greater Hobart Household Travel Survey 2010*[4])	UTAS TBS 2017
Proportion of staff working at home	Proportion of staff working at home (daily average)	UTAS TBS 2017
Hobart traffic data	Morning and evening turning movement counts at key intersections Hobart CBD for May 2016	Department of State Growth & City of Hobart
More on UTAS TBS 2017 Sample sizes: UTAS TBS 2017 samples used in this study were n=710 (domestic on-campus students), n=200 (international on-campus students), and n=411 (staff). Samples were drawn from those attending Hobart campuses (Sandy Bay and Hobart CBD) for study or work only. Staff residential origins were checked against actual head count residential origin postcodes with UTAS TBS 2017 postcode origin distribution proving very similar.		

2.3 Student and Staff Population

Current student and staff numbers used in the modelling are provided in Table 2. The baseline number of students across both the Sandy Bay and Hobart CBD campuses is 3,122 international and 9,743 domestic students. There are approximately 2215 staff across both campuses including academic, professional and casual staff.

[1] University of Tasmania Equivalent Full Time Student Load (EFTSL) 2017, Hobart
[2] University of Tasmania Human Resource data 2017, Hobart
[3] University of Tasmania Travel Behaviour Survey, 2017.
http://www.utas.edu.au/__data/assets/pdf_file/0008/1017890/TBS_2017_Report_final.pdf
[4] *Greater Hobart Household Travel Survey 2010*, Tasmanian Department of Infrastructure, Energy and Resources, Hobart
http://www.transport.tas.gov.au/road/plans_strategies/greater_hobart_household_travel_survey

Table 2: Student and Staff Populations by Campus

Staff and Students	Campus		Total on-Campus
	Sandy Bay	Hobart CBD	
International Students	2,849	273	3,122
Domestic Students	7,082	2,660	9,743
Staff	1655	560	2,215

Location of residence

The UTAS TBS provides the residential postcode and suburb data for each respondent. Postcodes and suburbs of residence for UTAS TBS 2017 student and staff respondents were classified into seven travel regions based on the indicative road corridor used from each location to access the Hobart CBD. These are shown in Table 3 and illustrated in Figure 2.

Actual residential postcodes for staff were obtained on completion of modelling. This data was cross checked with the UTAS TBS 2017 staff sample. The UTAS TBS staff sample was found to be very close to the real population residential origin distribution and so is considered to be representative of the staff population.

Table 3: Residential Origin Travel Regions

Travel Region	Indicative Road Corridor	Suburb examples within postcode origins
Central	Campbell Street / Elizabeth Street / Murray Street / Barrack Street	Hobart, West Hobart
Eastern	Tasman Highway	Geilston Bay, Montagu Bay, Bellerive, Tranmere, Clarendon Vale, Clifton Beach, Lauderdale, South Arm, Opossum Bay, Cremorne, Sorell, Dulcot, Campania, Colebrook, Nubeena, Mount Rumney, Penna, Orford, Carlton, Kellevie
Northern (Brooker Highway Corridor)	Brooker Highway	West Moonah, Goodwood, Berriedale, Brighton, Glenlusk, Risdon Vale, Grasstree Hill, Central Tasmania, Northern Tasmania
Inner North	Argyle Street / Elizabeth Street / Harrington Street / Murray Street	North Hobart, New Town
South Hobart	Strickland Avenue / Huon Road	South Hobart
Sandy Bay / Taroona	Sandy Bay Road / Churchill Avenue	Sandy Bay, Taroona
Southern (Southern Outlet)	Southern Outlet	Mt Nelson / Tolmans Hill, Kingston, Blackmans Bay, Leslie Vale, Hastings, Nicholls Rivulet, Huonville, Franklin, Kettering, Woodbridge Middleton, Police Point, Bruny Island, far south Tasmania

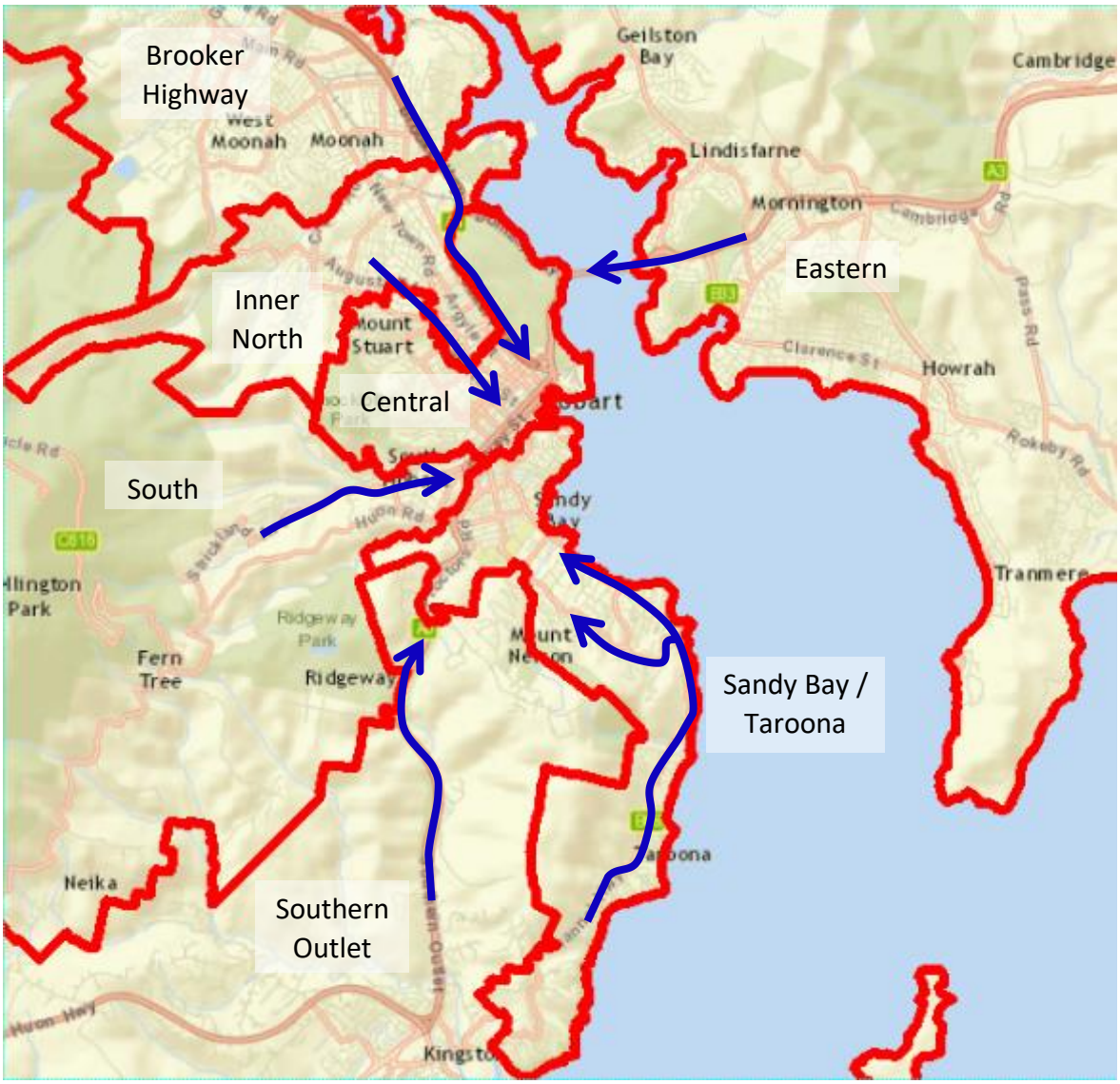

Figure 2: Indicative Road Corridors (residential origin regions)

Student on-campus population and travel behaviour

Students form the greatest share of the university population (approximately 85%) attending campuses on any given day. While UTAS student enrolments have increased significantly over the past five years (6% per annum), the majority of the increase has been students enrolling externally (online distance) meaning the on-campus student population in Hobart has remained relatively stable. It is anticipated that student on-campus population growth is likely to be very modest (about 1% per annum) based on the change in on-campus students between 2013 and 2017. Table 4 shows the growth, and composition change, in student enrolments (EFTSL) between 2013 and 2017.

Table 4: UTAS Student Enrolments (EFTSL) 2013-2017, Hobart

Hobart (Equivalent Full Time)	2013	2017	Change per annum (5 year average)
Distance/online	1,726	4,404	31.0%
Hobart International Students (on-campus)	1,744	3,122	15.8%
All on-campus	8,082	8,460	0.9%
Total enrolments	**9,808**	**12,864**	**6.2%**

Source: UTAS EFTSL

An important feature of the change in student on-campus population in Hobart has been the growth in international student enrolments and the increasing share of international students on-campus (see Table 4). The significance of this is relevant to travel behaviour as the majority of the international student cohort tend to live nearer to their main place of study than domestic (especially Tasmanian) students. The UTAS TBS 2017 found that for international students attending the Sandy Bay campus some 88% lived in either Sandy Bay or in suburbs immediately neighbouring Sandy Bay. This compared to 40% of Tasmanian students.

Residential location plays an important role in travel mode choice. The UTAS TBS 2017 found that 57% of international students travelled by active modes (walked or cycled), 23% took the bus, and 15% drove to their Sandy Bay or Hobart CBD place of study. The picture for domestic (particularly Tasmanian) students is quite different, with 39% driving and far fewer walking than the international cohort. The Tasmanian student mode profile is likely influenced by a range of factors including their greater residential dispersion across the Greater Hobart Region and southern Tasmania, variable public transport accessibility outside of inner urban areas, and journey time from outer urban areas increasing the likelihood of car use. Local students also have the option to live in the family home and share family vehicles. The residential location of many international students in the vicinity of Hobart campuses clearly enables active modes, particularly walking.

The following tables provide details of the in-put assumptions based on best available information of 2017 travel behavior - residential origins of students by travel region (Table 5), student destinations by campus (Table 6), and the main mode of transport used by students by travel region (Table 7 and Table 8). International and domestic students are differentiated because of the marked differences in residential location and main transport mode used as mentioned above.

Table 5: Student Residential Origins by Travel Region

Students	Campus Destination	Residential origins travel region							
		Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)	All Regions
International Students	Sandy Bay	14%	2%	2%	4%	12%	57%	9%	100%
	Hobart CBD	32%	3%	6%	10%	23%	23%	3%	100%
Domestic Students	Sandy Bay	14%	17%	17%	8%	8%	18%	18%	100%
	Hobart CBD	24	17%	9%	5%	15%	15%	15%	100%

Source: UTAS TBS 2017 (postcode of residence)

Table 6: Student Campus Destination - Sandy Bay and Hobart CBD 2017

Campus Destination	2017 (% of on-campus population)	Average Last 5 Years (% of on-campus population)
Hobart CBD	8.8%	9.6%
Sandy Bay	91.2%	90.4%

Source: UTAS EFTSL

Table 7: International Students - Main Mode for Journey to Study by Origin and Campus Destination, 2017

Main transport mode (% rounded)	Residential origin travel region						
	Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)
	International students – Destination Hobart CBD facilities						
Car (as driver)	0%	0%	0%	0%	14%	17%	100%
Motorcycle/scooter	0%	0%	0%	0%	0%	0%	0%
Bus	14%	100%	100%	100%	14%	6%	0%
Walk/cycle	86%	0%	0%	0%	71%	78%	0%
Car (as passenger)/other	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%
	International students – Destination Sandy Bay campus						
Car (as driver)	31%	50%	100%	25%	13%	11%	25%
Motorcycle/scooter	0%	0%	0%	0%	0%	0%	0%
Bus	46%	50%	0%	63%	38%	11%	17%
Walk/cycle	23%	0%	0%	0%	50%	75%	50%
Car (as passenger)/other	0%	0%	0%	13%	0%	3%	8%
Total	100%	100%	100%	100%	100%	100%	100%

Source: UTAS TBS 2017 (main mode to study, Monday)

Table 8: Domestic students - Main Mode for Journey to Study by Origin and Campus Destination, 2017

Main transport mode (% rounded)	Residential origin travel region						
	Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)
	Domestic students – Destination Hobart CBD facilities						
Car (as driver)	15%	71%	18%	10%	10%	15%	100%
Motorcycle/scooter	0%	0%	0%	0%	0%	0%	0%
Bus	2%	21%	73%	50%	24%	30%	0%
Walk/cycle	81%	0%	0%	40%	67%	35%	0%
Car (as passenger)/other	2%	7%	9%	0%	0%	20%	0%
Total	100%	100%	100%	100%	100%	100%	100%
	Domestic students – Destination Sandy Bay campus						
Car (as driver)	29%	50%	52%	44%	28%	14%	58%
Motorcycle/scooter	7%	1%	2%	0%	0%	1%	1%
Bus	34%	33%	41%	44%	22%	7%	19%
Walk/cycle	21%	1%	2%	4%	38%	76%	11%
Car (as passenger)/other	9%	14%	5%	7%	13%	1%	10%
Total	100%	100%	100%	100%	100%	100%	100%

Source: UTAS TBS 2017 (main mode to study, Monday)

An analysis of the current UTAS student timetable showed that student numbers on Monday to Wednesday were similar, with reduced numbers of students on Thursday and Friday. Peak volumes occurred on Monday. Approximately 13% of students at the Sandy Bay campus have a class commencing at 9am on a Monday morning.

Staff population and travel behaviour

Table 9 outlines the staff population according to staff classifications (academic, professional and casual staff) and assumptions we have made about the proportion arriving at work in the morning peak (8-9am) depending on the staff classification. Based on these assumptions, approximately 75% of staff would generally arrive between 8:00 am and 9:00 am.

Staff residential origin distribution is outlined in Table 10. The main mode of transport used by staff according to their residential origin and campus destination is provided in Table 11.

Table 9: Staff Population and Proportion Arriving in Morning Peak

Hobart CBD Head Count 2017	Number of staff on any day of the working week	Proportion arriving 8-9am (Mon)	Number arriving 8-9am (Mon)
Academic staff	220	70%	154
Professional staff	280	90%	252
Casual staff	59	20%	12
Total staff (any work day)	**560**		**418**
Sandy Bay Head Count 2017	Number of staff on any day of the working week	Proportion arriving 8-9am (Mon)	Number arriving 8-9am (Mon)
Academic Staff	651	70%	456
Professional staff	828	90%	746
Casual staff	176	20%	35
Total staff (any work day)	**1655**		**1236**
Source: Staff head counts and workplace location adapted from UTAS HR data			
Assumptions: Monday is considered a peak work day based on UTAS TBS 2017. Monday 8-9am arrival (morning peak) assumptions are based on estimates of the proportion of staff working from home (sourced from UTAS TBS 2017) and distributions of work arrival times through the work day. Proportion of casual staff arriving Monday 8-9am incorporates the consideration of a proportion of casual staff also being students and the high variation in days and hours of work. Overall, estimates are considered conservative.			

Table 10: Staff Residential Origins by Travel Region

	Campus Destination	Residential origins travel region							
		Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)	All Regions
Staff	Sandy Bay	9%	15%	12%	7%	8%	17%	31%	100%
	Hobart CBD	10%	16%	15%	10%	11%	16%	21%	100%

Table 11: Staff - Main Mode for Journey to Work by Origin and Campus Destination, 2017

Main transport mode (% rounded)	Residential origin travel region						
	Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)
	Staff – Destination Hobart CBD facilities						
Car (as driver)	20%	77%	74%	43%	33%	27%	65%
Motorcycle/scooter	10%	0%	0%	0%	0%	0%	0%
Bus	0%	15%	16%	29%	17%	13%	17%
Walk/cycle	70%	0%	5%	29%	33%	53%	9%
Car (as passenger)/other	0%	8%	5%	0%	17%	7%	9%
Total	100%	100%	100%	100%	100%	100%	100%
	Staff – Destination Sandy Bay campus						
Car (as driver)	61%	86%	92%	72%	25%	67%	83%
Motorcycle/scooter	0%	6%	0%	6%	0%	2%	0%
Bus	0%	3%	4%	0%	10%	2%	7%
Walk/cycle	35%	3%	4%	17%	55%	29%	5%
Car (as passenger)/other	4%	3%	0%	6%	10%	0%	5%
Total	100%	100%	100%	100%	100%	100%	100%

2.4 Traffic Volumes

Traffic data used in this modelling exercise was collected by GHD prior to this investigation (in May/June 2016) for the Greater Hobart Transport Modelling – Strategic Model Update project, commissioned by the Department of State Growth and the City of Hobart. The surveys included morning and evening turning movement counts at key intersections throughout the Hobart CBD and surrounds.

2.5 Scenarios

The UTAS spreadsheet model was used to test seven scenarios. Scenario names and assumptions are outlined in Table 12 below.

Table 12: Scenarios

See Appendix – Scenario assumptions for full assumption details

Scenario Name	Scenario Summary	Scenario Assumptions
SCENARIO 1 (Base Case)	Existing situation	No change
SCENARIO 2	Relocation of Sandy Bay campus to Hobart CBD – adopt UTAS TBS 2017 Sandy Bay mode share	• 100% of staff and students located within the Hobart CBD • Includes the residential origin distributions outlined in Table 5 and Table 10 Students and staff adopt UTAS TBS 2017 **mode share profile for Sandy Bay campus** outlined in Table 7, Table 8, and Table 11
SCENARIO 3	Relocation of Sandy Bay campus to Hobart CBD – adopt TBS 2017 Hobart CBD mode share	• 100 % of staff and students located within the Hobart CBD • Includes the residential origin distributions outlined in Table 5 and Table 10 Students and staff adopt UTAS TBS 2017 **mode share profile for Hobart CBD facilities** outlined in Table 7, Table 8, and Table 11
SCENARIO 4	Scenario 3 with a medium term residential origin shift	• 100 % of staff and students located within the Hobart CBD • **A modest residential shift for students and staff** relocating from Sandy Bay campus to Hobart CBD is assumed based on consolidation of university accommodation in Central and Inner North residential travel regions and modest growth in other private accommodation in the Hobart CBD and surrounds. The shift assumes the following redistributions: o *International Students: redistribute from Sandy Bay / Taroona (-9%) and South Hobart (-2%) to Central (+10%) and Inner North (+2%)* o *Domestic Students: redistribute from Sandy Bay / Taroona (-3%) to Central (+2%) and Inner North (+1%)* o *Staff: redistribute from Sandy Bay / Taroona (-2%) to Central (+1%) and Inner North (+1%)* Students and staff adopt UTAS TBS 2017 **mode share profile for Hobart CBD facilities** outlined in Table 7, Table 8, and Table 11.

Scenario Name	Scenario Summary	Scenario Assumptions
SCENARIO 5	Relocation of Sandy Bay campus to Hobart CBD – adjusted mode share for international students only – no change in residential origin	• 100 % of staff and students located within the Hobart CBD • Includes the residential origin distributions outlined in Table 5 and Table 10 • Domestic students and staff adopt UTAS TBS 2017 **mode share profile for Hobart CBD facilities** outlined in Table 8, and Table 11 • International students adopt an adjusted Hobart CBD mode share. Adjustments are due to the low international student sample size (n=43) in the UTAS TBS 2017 spread across the travel regions. The adjustments are based on expert assessment and review of domestic student values, and include: o *Reduce car (as driver) mode share for South Hobart (-4%) and Sandy Bay/Taroona (-7%)* o *Reduce pedestrian/cycle mode share for South Hobart (-5%)* o *Increase bus mode share for South Hobart (+9%) and Sandy Bay/Taroona (+6%)* *Adopt domestic Hobart CBD profile for Inner North: increase bus mode share (+40%) and reduce pedestrian/cycle mode share (-40%)*
SCENARIO 6	Relocation to Sandy Bay campus to Hobart CBD with medium term residential origin shifted and adjusted mode share	• 100% of staff and students located within the Hobart CBD • A medium term residential origin shift for students is assumed • Domestic students and staff adopt UTAS TBS 2017 **mode share profile for Hobart CBD facilities** outlined in Table 8, and Table 11 All International students adopt the adjusted Hobart CBD mode share set out in Scenario 5.
SCENARIO 7	Relocation of Sandy Bay campus to Hobart CBD with medium term residential origin shift and targeted mode share interventions	• 100% of staff and students located at the Hobart CBD campus • A medium term residential shift for students is assumed • All International students adopt an adjusted Hobart CBD mode share as set out in Scenario 5 • Domestic students and staff adopt an adjusted mode share based on a targeted approach to reducing car mode share for the Eastern, Brooker Highway Corridor and Southern Outlet location categories, by increasing the bus mode share. Currently the Hobart CBD profile for domestic students and staff has high proportions of car (as driver) mode share for these locations. The following adjustments are included: o *Redistribute from Eastern car* (as driver) *mode share (-30%) to bus mode share (+30%) for staff and domestic students* o *Redistribute from Southern Outlet car* (as driver) *mode share (-10%) to bus mode share (+10%) for staff and domestic students* o *Redistribute from Inner North car (as driver) mode share (-30%) to bus mode share (+30%) for staff*

2.6 Assumptions and Study Limitations

This is a first pass high level exploration of the traffic implications of moving all Sandy Bay campus activities to the Hobart CBD. As such the project team is limited by data availability and uncertainty around the specific characteristics of a potential move.

This assessment excludes consideration of the potential traffic generation from re-use of the existing Sandy Bay campus site. Similarly, it does not consider the potential offset of traffic generation from existing land use in the Hobart CBD that might be replaced by new UTAS facilities.

The modelling undertaken for this assessment relates to strategic trip assignment only, and does not consider implications for capacity of the network. Discussions around capacity impacts are based on a qualitative assessment only.

The analysis contained includes a range of assumptions, for example:

- Arrival and departure times of students and staff to work/study
- Road network route choice
- Student and staff traffic volumes
- Potential medium term changes to residential origins

Assumptions and estimates have been made based on best available data and the expert knowledge of project team personnel.

The UTAS TBS, UTAS EFSTL and UTAS HR data sources all have their limitations but are the best available. The UTAS TBS is not totally representative of the UTAS population being an online survey open to all staff and students[5]. Nevertheless, survey participation in 2017 was high (2700 participants), particularly for Hobart campuses. The survey is the largest independent survey of travel behaviour in Tasmania and relative to student on-campus and staff populations, sample sizes provide us with confidence levels of 95% for on-campus students, and 90% for staff. Acknowledging these limitations, the TBS remains the only up to date travel behavior data source for the University. It allows comparison of travel behavior between campuses, and regions, residential origins and other sociodemographic variables where indicators of these are otherwise unavailable.

UTAS TBS 2017 samples used in this study were n=710 (domestic on-campus students), n=200 (international on-campus students), and n=411 (staff). Samples were drawn from those attending Hobart campuses (Sandy Bay and Hobart CBD) for study or work only.

Finally, the study is unable to anticipate specific changes to the transport network (road or public transport) into the future that might impact positively or negatively on traffic associated with university activities. It does however consider scenarios for adjusting the mode share in the highest vehicle use transport corridors to reflect potential vehicle reduction targets for city wide multi-stakeholder planning.

[5] More information about the UTAS TBS can be found at http://www.utas.edu.au/__data/assets/pdf_file/0008/1017890/TBS_2017_Report_final.pdf

3 AM Results

The UTAS TBS 2017 provides us with an indication of mode share for the journey to study or work associated with residential origins of students and staff and campus destinations. This project's modelling exercise applied this data to explore the implications of moving all UTAS Sandy Bay campus facilities into the Hobart CBD for the road network and non-car modes of travel. Section 3.1 provides more insight into UTAS mode share profiles for the journey to study or work for Sandy Bay campus and Hobart CBD. Sections 3.2 – 3.5 present results from the morning peak modelling exercise. Section 3.6 outlines other potential travel demand considerations, and Section 3.7 provides an overarching summary of key findings.

3.1 Mode Share Profiles for Journey to Study/Work – Sandy Bay and Hobart CBD

The UTAS TBS (2015 and 2017) findings show that fewer students and staff attending Hobart CBD facilities travel by car for study or work than those attending the Sandy Bay campus (Figure 3). Students are more likely to walk or cycle to study at a Hobart CBD facility than the Sandy Bay campus (47% for Hobart CBD compared to 29% for Sandy Bay), and less likely to drive (24% for Hobart CBD compared to 35% for Sandy Bay), although bus usage is not dramatically different given recent improvements to through bus services to the Sandy Bay campus.

For staff, walk/cycle and bus modes used by those based at Hobart CBD facilities is double that of those based at Sandy Bay (walk/cycle is 25% for Hobart CBD compared to 16.5% for Sandy Bay, while bus use is 14% for Hobart CBD compared to only 4% at Sandy Bay). In terms of car use (specifically car driver) there is a notable reduction in the share of staff travelling to work by car to Hobart CBD facilities compared to Sandy Bay (52% for Hobart CBD compared to 73% for Sandy Bay).

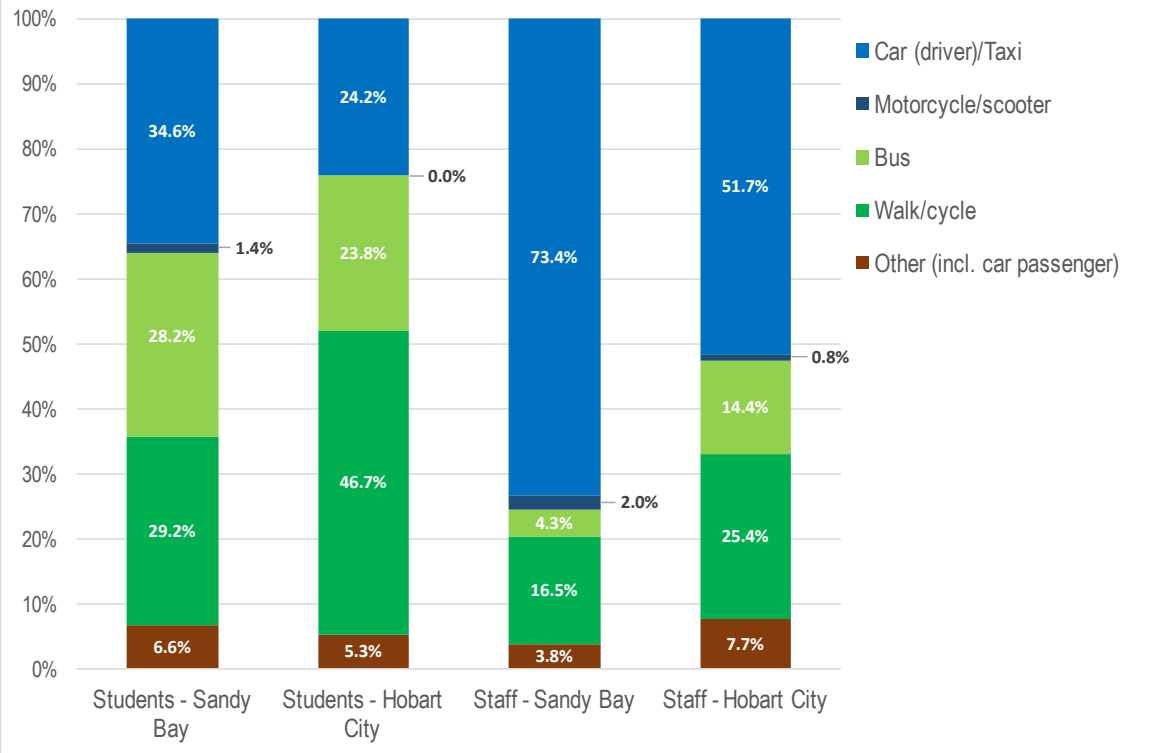

Figure 3: Mode Share Comparisons - Students and Staff at Sandy Bay and Hobart CBD, 2017

Source: UTAS TBS 2017

These indicators suggest that moving the Sandy Bay facilities to Hobart CBD would reduce the share of students and staff travelling to study or work by car. Given significant parking constraints (parking supply and costs) and more direct access to the Hobart CBD by public transport this is not unexpected. The assignment of these mode shares and other adapted scenarios through this project's modelling exercise reveals results for:

- car trip volumes from residential origin travel regions/transport corridors;
- inner-city vehicle traffic volumes on the inner Hobart road network;
- public transport trips;
- active mode trips; and
- parking demand.

3.2 AM Road Network Impact

Vehicle demand by residential origin

The number of UTAS students and staff travelling by car as driver from each residential origin travel region is shown in Table 14 for the various scenarios. Scenario 2 assumes no change in individual student / staff mode choice or residential location and confirms that with these assumptions the proposed relocation from the Sandy Bay campus to the Hobart CBD campus results in no change to the total volumes of staff and students accessing the university by each mode, just the destination campus. Comparing scenarios 3 to 6 with scenario 1 (existing base case), the following results are evident:

- From the Eastern residential origin zone there is a slight increase of 13 car driver trips due to a campus shift from Sandy Bay to Hobart CBD based on a UTAS TBS 2017 Hobart CBD mode share profile. In particular there is an increase in car driver mode share for domestic students from 50% to 71%.
- From the Northern (Brooker Highway) residential origin travel region there is a reduction of 86 car driver trips due to the campus shift from Sandy Bay to Hobart CBD based on a UTAS TBS 2017 Hobart CBD mode share profile. The mode share for international students shifts from 100% car driver to 100% bus. For domestic students the car driver mode share decreases from 52% to 18%, with an associated increase in bus mode share. For staff the car driver mode share decreases from 92% to 74%, with increases in bus mode share. Though this reduction in car driver mode share from the north is notable for staff, it is from an extremely high base and a 74% car driver share is still a significant mode share.
- From the Southern Outlet residential origin travel region there is a reduction of 72 car driver trips due to the campus shift from Sandy Bay to Hobart CBD based on a UTAS TBS 2017 Hobart CBD mode share profile. For domestic students the car driver mode share decreases from 58% to 40% and for staff from 83% to 65%, with associated increases in bus mode share. Although the car driver mode share for International students increases from 25% to 100%, only a very small proportion (10%) of trips made to the University from the Southern Outlet residential origin travel region are made by international students. Thus the net impact of the shift to a Hobart CBD mode share is a decrease.
- In scenario 3 and 5 there is a decrease of 80 car driver trips travelling from the central residential origin travel region due to the campus shift from Sandy Bay to Hobart CBD based on a UTAS TBS 2017 Hobart CBD mode share profile. The car driver mode share for international students,

domestic students and staff decreases by 31%, 14% and 41%, respectively and with it a reduction in short car driver trips through the Hobart CBD.

- Scenarios 4 and 6 include a residential shift which increases the proportion of people living in the central residential travel region, moving from the South Hobart and Sandy Bay / Taroona travel regions (+10% International, +2% Domestic and +1% Staff). An increase in people originating from the central areas in Scenarios 4, 6 and 7 means that 5 more car driver trips are made from the central travel region in Scenarios 4 and 6 than in Scenarios 3 and 5 based on the UTAS TBS 2017 Hobart CBD mode share profile.
- In scenarios 3 and 5 there is a decrease of 53 vehicles travelling from the Inner North residential origin travel region due to the campus shift from Sandy Bay to Hobart CBD based on the UTAS TBS 2017 Hobart CBD mode share profile. The car driver mode share for international students, domestic students and staff decreases by 25%, 34% and 29%, respectively.
- Scenarios 4 and 6 include a small residential shift which redistributes the proportion of people living in the Inner North residential travel region, moving from the South Hobart and Sandy Bay / Taroona travel regions (+2% International, +1% Domestic and +1% Staff). An increase in people originating from the Inner North in Scenarios 4, 6 and 7 means that 6 more car driver trips are made than in scenarios 3 and 5, but still some 47 fewer car driver trips than in the base scenario.
- In Scenario 3, the Sandy bay / Taroona residential origin travel region shows a reduction of 70 car driver trips due to the campus shift from Sandy Bay to Hobart CBD based on a UTAS TBS 2017 Hobart CBD mode share profile. A further reduction of 16 car driver trips occurs in Scenario 4 due to the moderate shift in residential origin away from Sandy Bay / Taroona (-9% International, +3% Domestic and -2% Staff). Scenario 5 results in a reduction of 84 car driver trips due to the shift from a Sandy Bay to CBD campus mode share profile and an adjusted mode shift from 17% car driver mode share to 10% car driver mode share. Scenario 6 shows the combined impact of the shift to a Hobart CBD mode profile, a residential origin shift, and the adjusted mode share for international students.
- The South Hobart residential origin travel region shows a small reduction in car driver trips primarily due to the shift from a Sandy Bay to Hobart CBD mode share profile increasing staff car driver mode share from 25% to 33% and resulting in an increase in nine car driver trips by staff. This off-sets some of the reduction in car driver trips by domestic students, however.

Scenario 7 shows the greatest reduction of all the scenarios, with 643 fewer car driver trips than in Scenario 1 (the existing base case). Scenario 7 includes the changes mentioned above, specifically students and staff adopting a Hobart CBD mode share, a shift in residential origin, and adjusted mode share for international students. In addition to these changes, Scenario 7 includes a transferal from car driver mode to bus for the Eastern, Southern Outlet and Northern (Brooker) residential origin. Targeting these three corridors for a mode shift away from 'car driver' results in a further reduction of 140 car driver trips from the Eastern, 63 from the Southern Outlet, and 68 from the Brooker Highway travel regions. If applied, such targets would need to be supported by a concerted effort and investment by state and local governments, bus service providers (and potentially other public transport service options in the future) specifically, with program support from the University.

The reductions in car driver mode for the corridors applied in this scenario equate to the following reduction targets for students and staff over time (
Table 13).

Table 13: Scenario 7 Car Driver Reduction Targets (3, 5 and 10 years)

	Total reduction %	3 Year annual reduction	5 Year annual reduction	10 Year annual reduction
Domestic Students				
Eastern (Tasman Bridge)	42%	14%	8%	4%
Northern (Brooker)	0%	0%	0%	0%
Southern (Southern Outlet)	70%	23%	14%	7%
Staff				
Eastern (Tasman Bridge)	39%	13%	8%	4%
Northern (Brooker)	68%	23%	14%	7%
Southern (Southern Outlet)	15%	5%	3%	1.5%

Table 14: Car Driver Trips by Residential Origin (8-9am)

Scenario	Central		Eastern		Brooker Highway		Inner North		South Hobart		Sandy Bay / Taroona		Southern Outlet		Total	
	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1
1	142	0	335	0	274	0	118	0	73	0	211	0	493	0	1645	0
2	142	0	335	0	274	0	118	0	73	0	211	0	493	0	1645	0
3	62	-80	348	13	188	-86	64	-53	69	-3	141	-70	421	-72	1293	-353
4	67	-75	348	13	188	-86	71	-47	68	-5	125	-86	421	-72	1286	-359
5	62	-80	348	13	188	-86	64	-53	67	-6	126	-84	421	-72	1276	-369
6	67	-75	348	13	188	-86	71	-47	66	-7	113	-98	421	-72	1273	-372
7	67	-75	208	-127	125	-149	71	-47	66	-7	113	-98	353	-140	1002	-643

Table 15: Indicative Road Network Impacts (vehicles per hour 8-9am)

Scenario	Location 1			Location 2			Location 3			Location 4			Location 5			Location 6			Location 7		
	Macquarie Street (North of Southern Outlet)			Macquarie Street (North of Sandy Bay Road)			Davey Street (North of Sandy Bay Road)			Sandy Bay Road Northbound (South of Byron Street)			Regent Street Northbound			Sandy Bay Road Southbound (South of Byron Street)			Regent Street Southbound		
	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes
1	566	0	0%	27	0	0%	1151	0	0%	20	0	0%	6	0	0%	540	0	0%	611	0	0%
2	566	0	0%	211	184	8%	0	-1151	-35%	161	141	8%	49	43	8%	0	-540	-77%	0	-611	-77%
3	490	-76	-3%	141	114	5%	0	-1151	-35%	108	87	5%	33	27	5%	0	-540	-77%	0	-611	-77%
4	488	-77	-3%	125	98	4%	0	-1151	-35%	95	75	4%	29	23	4%	0	-540	-77%	0	-611	-77%
5	488	-78	-3%	126	100	4%	0	-1151	-35%	97	76	4%	30	23	4%	0	-540	-77%	0	-611	-77%
6	486	-79	-3%	113	86	4%	0	-1151	-35%	86	66	4%	26	20	4%	0	-540	-77%	0	-611	-77%
7	419	-147	-5%	113	86	4%	0	-1151	-35%	86	66	4%	26	20	4%	0	-540	-77%	0	-611	-77%

Figure 4: Inner Hobart Road Network (AM)

Table 16: Bus Trips by Residential Origin (8-9am)

Scenario	Central		Eastern		Brooker Highway		Inner North		South Hobart		Sandy Bay / Taroona		Southern Outlet		Total	
	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1
1	67	0	84	0	103	0	66	0	63	0	63	0	101	0	546	0
2	67	0	84	0	103	0	66	0	63	0	63	0	101	0	546	0
3	13	-54	92	9	177	75	100	34	61	-2	112	49	184	84	740	194
4	18	-49	92	9	177	75	115	49	59	-3	99	36	184	84	746	200
5	13	-55	92	9	177	75	92	27	66	3	126	63	184	84	750	205
6	18	-49	92	9	177	75	105	39	63	0	111	48	184	84	750	205
7	18	-49	233	149	240	138	105	39	63	0	111	48	252	151	1021	475

Table 17: Active Travel Trips by Residential Origin (8-9am)

Scenario	Central		Eastern		Brooker Highway		Inner North		South Hobart		Sandy Bay / Taroona		Southern Outlet		Total	
	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1	Total Trips	Change from Scenario 1
1	183	0	8	0	12	0	36	0	160	0	395	0	61	0	855	0
2	183	0	8	0	12	0	36	0	160	0	395	0	61	0	855	0
3	328	145	0	-8	11	-1	72	36	167	7	386	-10	41	-20	1005	150
4	382	199	0	-8	11	-1	79	43	159	-1	338	-57	41	-20	1011	156
5	328	145	0	-8	11	-1	80	43	164	5	385	-10	41	-20	1010	155
6	382	199	0	-8	11	-1	90	53	157	-3	338	-58	41	-20	1019	164
7	382	199	0	-8	11	-1	90	53	157	-3	338	-58	41	-20	1019	164

Inner Hobart road network impact

Table 15 shows the impact of these scenarios on key parts of the inner Hobart road network. In the existing base case scenario students and staff from all the residential locations except residents from Sandy Bay / Taroona would access the Sandy Bay Campus via Sandy Bay Road or Regent Street. In Scenarios 3 to 7, due to the Sandy Bay campus relocation to the Hobart CBD, vehicles from these locations would no longer use Sandy Bay Road / Regent Street resulting in a decrease in southbound traffic on Sandy Bay Road, Regent Street and Davey Street. This alteration in traffic flow in the morning peak is illustrated in Figure 5.

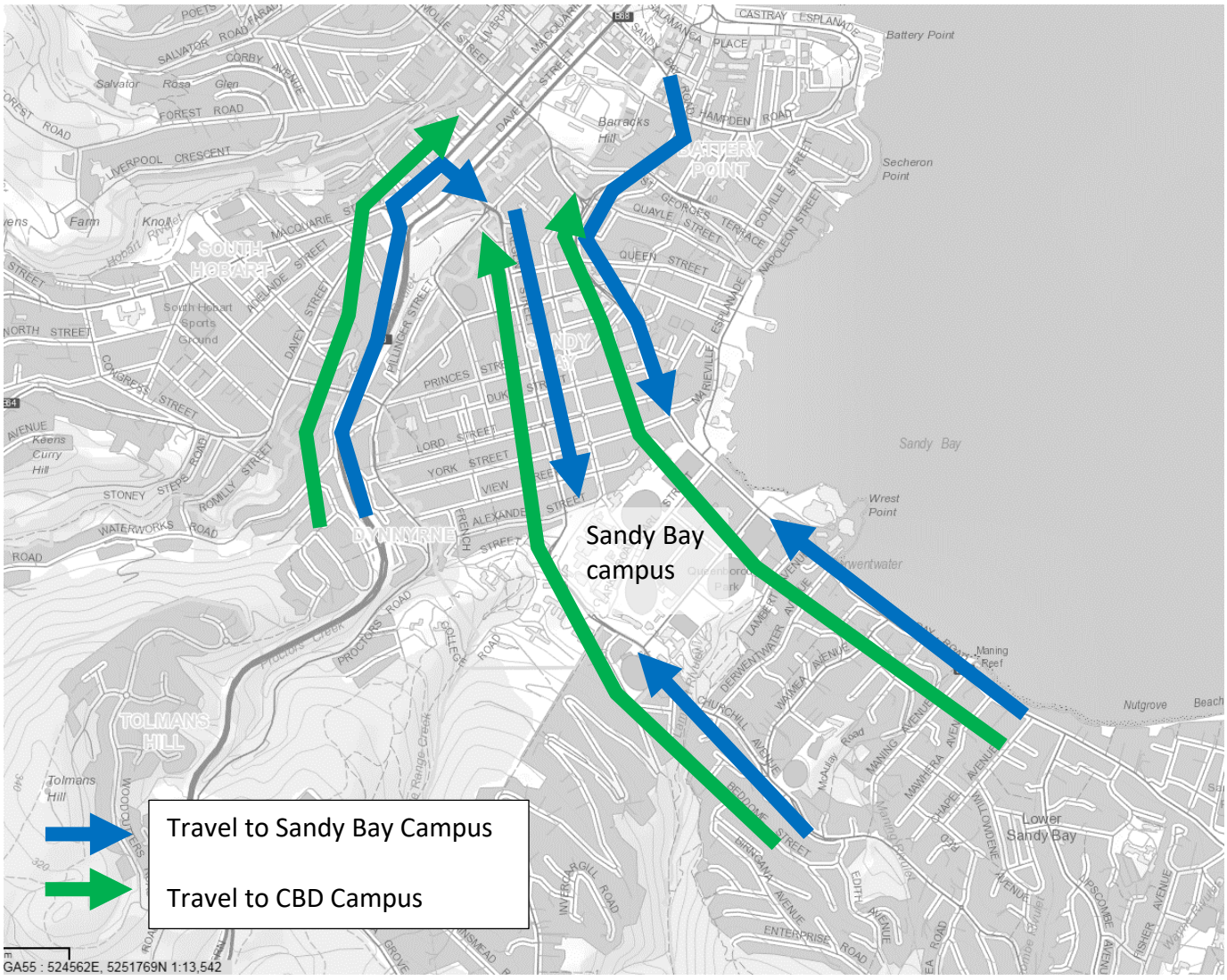

Figure 5: Access to Sandy Bay and Hobart CBD Campuses – AM peak

Base imagery obtained from www.thelist.tas.gov.au © State of Tasmania

3.3 Public Transport System Impact

Table *16* shows that in Scenarios 3-7 there would be an increase in bus trips. There would be relatively minor changes in bus trips from the South Hobart residential origin travel region, and in Scenario 3-6 there is also minimal change from the Eastern residential origin travel region. In Scenario 7, where this residential origin travel region is targeted for an increase in bus mode share, a more significant increase in bus travel is observed.

Bus travel from the Central residential zone reduces in all scenarios, primarily associated with a higher active transport mode share.

3.4 Active Mode Impact

As with travel by public transport, there is expected to be an increase in staff and students using active travel modes (walking and cycling) from certain locations, especially the Central and Inner North travel regions (Table 17). However, there would be a decrease in active travel from the Sandy Bay / Taroona residential origin travel region, and from the Southern Outlet residential origin travel region. This is a result of trips from these locations now being longer than they would have been to the Sandy Bay campus, making other modes more attractive. There is an opportunity to ensure that many of these trips are converted to bus trips.

3.5 Parking Demand

The total expected demand for parking in each scenario is shown in Table 18. The total demand is some 1,645 in both scenarios 1 and 2, with almost 70% associated with staff travel. In Scenarios 3-7 the total demand is reduced compared to the existing, although the proportions of staff and student demand remains consistent.

It is noted that not all of this demand will need to be met through University-supplied parking spaces in the CBD, and in fact it is understood that the amount of parking supplied as part of any UTAS CBD development will be significantly restricted. Therefore this data indicates the impact on other public parking supply in and around the CBD.

Students in particular would be expected to seek free, or low cost, parking options, which may result in an increase in parking demand spilling further into the inner suburbs and residential areas around the CBD. Ongoing management will be required to minimise impacts on residential amenity and access in these locations, and to facilitate an appropriate supply of parking for other uses.

Table 18: Parking demand (number of parking spaces required)

Scenario	Sandy Bay Campus			City Campus		
	Student	Staff	Total	Student	Staff	Total
1	422	913	1335	95	215	310
2	0	0	0	517	1128	1645
3	0	0	0	422	871	1293
4	0	0	0	415	872	1286
5	0	0	0	406	871	1276
6	0	0	0	401	872	1273
7	0	0	0	317	685	1002

3.6 Other Considerations

In addition to traffic movements associated with the journey to and from study/work, moving the Sandy Bay campus activities to the Hobart CBD will ultimately reduce the need for day-to-day intra-urban inter-campus movements that are more than 10 minutes walk. Based on UTAS TBS 2017 data it is estimated that there are over 1700 UTAS land based inter-campus trips made by staff and students per week in Tasmania with the majority of these being movements to and from Hobart CBD facilities and the Sandy Bay campus.[6] While some of these trips are walk/cycle or bus trips, for staff some 63-100% of Hobart urban inter-campus movements are made by car, depending on the CBD facility origin or destination, while for students some 32% of Hobart intercampus trips are made by car.

Moving from Sandy Bay to the Hobart CBD will remove vehicle traffic associated with such activity throughout the day. Where there is a need to move between University buildings/facilities within the Hobart CBD these trips will be most amenable by foot. Also of note is anecdotal evidence (and some qualitative evidence from a small study[7]) that points to the possible reduction in the need for staff (and possibly students) to drive to work (or study) due to the reduced need to use their car for other incidental local inter-campus trips.

[6] The UTAS TBS 2017 found that for every staff member there were 0.5 land-based business trips made between Monday-Friday. Of these, 40% were trips between University of Tasmania campuses or facilities (inter-campus).

[7] Two focus groups UTAS IMAS and MSP facilities were held in 2015 at which travel behaviour adaptation associated with moving work locations was discussed (researchers Lyth, A and Pharo, E).

3.7 Impact Highlights

The following is a summary of the key findings:

- There is an overall reduction in car driver trips made with a shift to the Hobart CBD from Sandy Bay for Scenarios 3-7. All these scenarios adopt a Hobart CBD mode profile. The reduction applies to all residential travel regions, except for the Eastern residential origin travel region where there is a very small increase in car driver trips.
- The largest reductions in car driver vehicle trips are observed for the Northern (Brooker), Central, Sandy Bay/Taroona, and Southern (Southern Outlet) residential travel regions .
- The most significant car driver trip reductions are observed when applying Scenario 7 car use reduction targets for the highest traffic volume corridors (Eastern, Norther, Southern). Here reductions are 127 fewer car driver trips for the Eastern corridor, 47 fewer car driver vehicle trips for the Northern corridor, and 140 fewer car driver trips for the Southern corridor.
- Road network impacts due to a shift to the Hobart CBD from Sandy Bay relate largely to the direction of traffic flow for those originating in the Sandy Bay/Taroona residential origin travel region. The greatest traffic flow reductions in the morning peak (8-9am) are observed on Davey St north of Sandy Bay Rd (1151 fewer vehicles per hour), Sandy Bay Rd southbound (540 fewer vehicles per hour), and Regent St southbound (611 fewer vehicles per hour).
- Increased traffic volumes in the morning peak (8-9am) are observed on Macquarie St north of Sandy Bay Rd (an increase of between 86-184 vehicles per hour), Sandy Bay Rd northbound (an increase of between 66-141 vehicles per hour), and Regent St northbound (an increase of between 20-43 vehicles per hour).
- With a shift to the Hobart CBD there is a notable increase in bus trips (between 194- 475 more bus trips depending on the scenario).
- Shifting the residential origin of students away from Sandy Bay into the Central residential origin travel region increases bus trips marginally compared to no change in residential origin population share. The largest increase in bus trips is associated with Scenario 7 which applies mode shift targets from car driver to bus trips for the Eastern, Northern, and Southern corridors.
- There is an increase in active mode trips of between 154-160 overall, with the vast majority of these generated in the central residential zone.

4 PM Results

4.1 PM Road Network Impact

Table 19 shows the impact of these scenarios on key parts of the inner Hobart road network. In the existing base case scenario students and staff from all the residential locations except residents from Sandy Bay / Taroona would leave the Sandy Bay Campus via Sandy Bay Road or Regent Street. In Scenarios 3 to 7, due to the Sandy Bay campus relocation to the Hobart CBD, vehicles from these locations no longer use Sandy Bay Road / Regent Street resulting in a decrease in northbound traffic on Sandy Bay Road, Regent Street and Davey Street. Compared with the morning peak, the alteration shows a key magnitude of change on the road network. This alteration in traffic flow in the evening peak is illustrated in Figure 6.

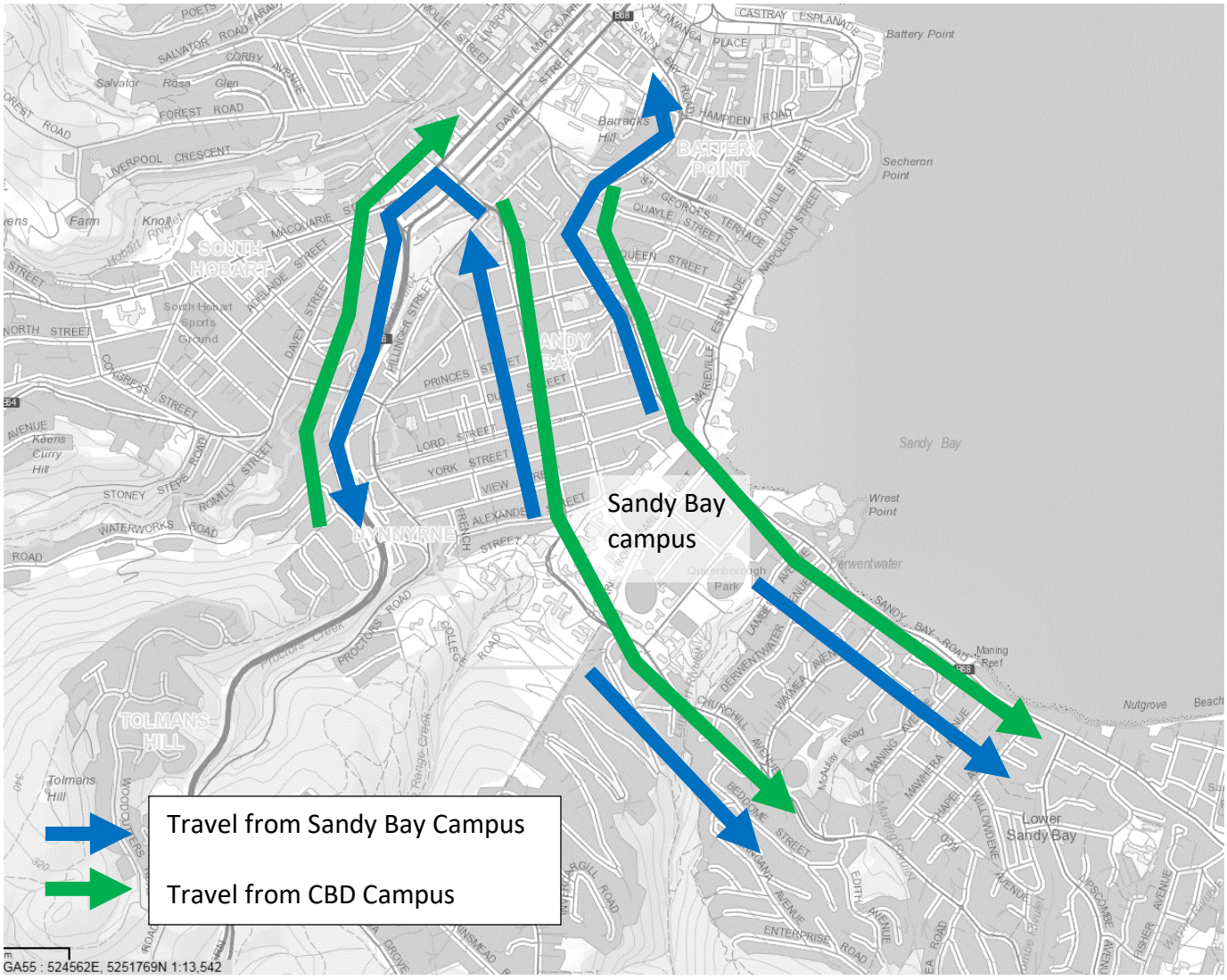

Figure 6: Access to Sandy Bay and Hobart CBD campuses – PM peak

Base imagery obtained from www.thelist.tas.gov.au © State of Tasmania

Table 19: Indicative Road Network Impacts (vehicles per hour 4-5pm)

Scenario	Location 8			Location 2			Location 3			Location 4			Location 5			Location 6			Location 7		
	Macquarie Street (North of Southern Outlet)			Macquarie Street (North of Sandy Bay Road)			Davey Street (North of Sandy Bay Road)			Sandy Bay Road Northbound (South of Byron Street)			Regent Street Northbound			Sandy Bay Road Southbound (South of Byron Street)			Regent Street Southbound		
	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes	Total UTAS Trips	Change from Scenario 1	% of Existing Volumes
1	585	0	0%	1098	0	0%	28	0	0%	840	0	0%	258	0	0%	13	0	0%	15	0	0%
2	585	0	0%	0	-1098	-52%	218	190	5%	0	-840	-72%	0	-258	-79%	102	89	8%	51	36	5%
3	507	-78	-2%	0	-1098	-52%	149	121	3%	0	-840	-72%	0	-258	-79%	70	57	5%	35	20	3%
4	505	-80	-3%	0	-1098	-52%	132	104	3%	0	-840	-72%	0	-258	-79%	62	49	4%	31	16	2%
5	504	-81	-3%	0	-1098	-52%	133	106	3%	0	-840	-72%	0	-258	-79%	63	50	4%	31	17	2%
6	503	-82	-3%	0	-1098	-52%	119	91	2%	0	-840	-72%	0	-258	-79%	56	43	4%	28	13	2%
7	433	-152	-5%	0	-1098	-52%	119	91	2%	0	-840	-72%	0	-258	-79%	56	43	4%	28	13	2%

Figure 7 : Inner Hobart Road Network (PM)

5 Recommendations and Opportunities

Travel demand and mode share profiles will be impacted by a range of factors into the future. Predicting the rate, character and growth of the university and the characteristics of Greater Hobart Region structural change, particularly land use change (housing location and density) and transport infrastructure, is fraught with uncertainty. However, it will be the way the University develops its facilities in the context of a changing urban-regional environment that will be most important in managing changes in travel demand and urban traffic.

Should the University decide to pursue a full Hobart CBD re-location, a range of opportunities and planning responses are recommended to minimise the transport and traffic risks associated with University development. Ultimately, as travel behaviour is influenced by numerous factors, systemic improvement to Hobart's transport system (including public transport, the road network, local and regional parking strategies) and attention to student accommodation is required. This means it will be crucial for the University to work collaboratively with other agencies (government and non-government) across scales as early as possible.

The following section outlines recommendations specifically for the University and those that will require collaborative effort with external agencies. Given the largest gains in reducing car driver trip demand and traffic will be made with targeted car use to bus use mode shift interventions, collaborative responses with external agencies responsible for delivering public transport service enhancements will be crucial in curtailing inner city traffic congestion and managing parking demand.

5.1 Recommendations Specifically for the University

Better integrate strategic university planning with master-planning and facilities design

Maintaining the practice of undertaking strategic transport planning to reflect the changing nature of the University and the urban and regional environment it is situated in will be essential. The University has made an excellent start in this regard having prepared two Sustainable Transport Strategies since 2012 in which there is a strong focus on reducing single occupant vehicle use and parking demand. It will be essential to better scaffold the high-level transport planning objectives and principles outlined in this strategic work into University masterplans, and the design of specific facilities and infrastructure to deliver the outcomes required.

Plan for university population diversity

The rate of on-campus student growth in the short to medium term is estimated to be 1% per annum based on the past five years. International students are expected to form an increasing share of the on-campus student population. It will continue to be important to distinguish between the context of planning for local and international student demands, as well as staff, as response strategies will require different emphases.

Grow the number of students living in central Hobart

Growing the number and proportion of students living in, and neighbouring, central Hobart will be crucial for reducing student vehicle use and parking demand. Given the present shortfall in housing rental supply in inner Hobart suburbs it is strongly recommended that the University takes a proactive role in meeting the housing needs of both domestic and international students ensuring that accommodation is in walkable distance, or at the least, has very good access to a public transport route providing a good level of service frequency. If inner Hobart residential options for students is not addressed then there is a risk that car driver trip demand will be higher into the future, should the

university on-campus population grow. The ability of the Hobart CBD to accommodate a significant increase in car driver trips is limited, with impacts expected to spill into surrounding areas and affect the wider Hobart community.

5.2 Multi-agency Collaborative Opportunities

Work with external agencies to grow public transport mode share

Growing the public transport mode share of the university population to reduce the risk of excessive car use, traffic congestion, and parking demand, would need to be a central aim of any city consolidation strategy, but it is not something the University can do on its own. There are significant community wide benefits associated with the University working constructively with government and public transport agencies to enhance public transport services, and their accessibility and attractiveness across the Greater Hobart region. Travel demand corridors with particularly high car use mode shares and growing travel demand, such as the Eastern and Southern transport corridors, may be suitable priority corridors. Initiatives could include the following. These are initiatives that with good design have been effective elsewhere in the world. A number (especially real-time bus service information, transit lanes and rewards schemes) have a good degree of local public support based on recent research[8]:

- Introducing real-time bus service information to improve ease of public transport use and enhance customer confidence in bus arrival and departure times;
- Reviewing the suitability of bus services according to demand (routes, frequency, and peak demand periods) given the university's consolidation in the Hobart CBD;
- Increasing frequency of bus services in high use corridors in periods of high demand and facilitating the reliability and efficiency of these services in peak traffic periods through appropriate infrastructure and road network adjustments (e.g. transit lane provisions);
- Promoting a regional park-n-ride network to facilitate access across the region to high frequency bus corridors; and
- Considering incentives for public transport use, including rewards schemes (these could be associated with the University), and the potential re-structure of bus fares including tertiary student concessions, and reduced fares out of peak periods.

Work with external agencies to develop sustainable parking responses

It will be important to carefully consider parking strategies as part of any move to the CBD. This requires partnering with local and state governments to roll out measures that maximise alternative transport choices and consider the impact of parking supply and mix. The availability of parking, and its relatively low cost compared to mainland centres (and CBD based university institutions), is a significant factor in the generation of traffic activity in the Hobart CBD, and acts as an incentive for private car use for both the journey to work and other local trips. Consequently, parking supply provides opportunities to consider the mix of parking, its location (within the Hobart CBD, the city fringe and regional park and ride facilities), and pricing structures to help satisfy demand where it is appropriate, but discourage excessive car use where viable alternative transport choices are available. Parking supply may also include providing a greater proportion of car spaces for carpoolers, car-share vehicles (where car-share schemes

[8] Lyth, Cleland, Sharman 2018.*Tasmanian Travel and Physical Activity Study 2017*, University of Tasmania Menzies Institute for Medical Research. See pp22-25, relative appeal of options to encourage public transport use www.menzies.utas.edu.au/tapas

emerge in the future), electric and/or small vehicles (including electric charging points). Along with improving the attraction of public transport, parking is highly relevant to the current concerns about traffic congestion and amenity in and around the Hobart CBD.

Nevertheless, dealing with parking agendas in any CBD is a challenging task, with societal demands and expectations for parking and the local political discourse that accompanies the issue. Discussion of parking needs to be packaged with the heightening of community awareness of the links between parking supply, public transport patronage, traffic congestion and amenity in central city areas. Parking strategies that aim to limit parking in central areas cannot be pursued without significant attention to private vehicle travel demand management strategies including city-wide public transport improvement and the development of supportive urban form/land use changes. Without a highly reliable, efficient and cost effective alternative to private car usage, there will be limited incentive for an individual to change their travel behavior.

Enhance active mode accessibility and amenity

With an increase in the number of people working, studying and living in the Hobart CBD there will need to be due consideration to improving: pedestrian amenity within the CBD; and safe, integrated cycle networks linking the Hobart CBD to its surrounding suburbs, and end-of –trip infrastructure. Again, it will be essential for the University to continue to work with local councils and other relevant agencies, and for the University to incorporate these elements in its own master-planning and facilities design stages. The University might also explore the value of well-designed collaborative inner city bike-share and/or car-share schemes to facilitate active modes for a range of local trips and reduce the need for inner city car ownership which in turn reduces the demand for inner city parking.

Road network opportunities

The impacts of the relocation to the Hobart CBD on the Hobart road network are varied. Roads that connect between the Hobart CBD and the existing Sandy Bay campus will see a significant reduction in traffic activity. Whether these reductions can translate into operational gains for the remaining traffic on these roads has not yet been investigated.

The potential increases in traffic on roads such as Macquarie Street and Sandy Bay Road northbound are relatively minor, although given existing volumes on these roads are already approaching capacity at peak times, the potential implications are significant. These impacts should be modelled in more detail as part of subsequent stages of this investigation.

6 Next Steps

Based on the results from this analysis and recommendations outlined, the following are potential next steps for the University:

- More detailed traffic modelling should be undertaken, using the Greater Hobart Urban Travel Demand Model, and the Hobart Mesoscopic Model, to allow a more refined understanding of the impacts of the proposed relocation on travel behavior and on the road network. This modelling should be undertaken in collaboration with the model owners, the Department of State Growth and the City of Hobart;
- Continue strategic decision making and master-planning and facilities design to include holistic travel demand transport planning considerations mentioned in this report, and apply the principles outlined in the *UTAS Sustainable Transport Strategy 2017-2021*.
- Should the decision to go ahead with a full move to the Hobart CBD occur, a stakeholder engagement program will be essential. Such a program should have an emphasis on collaborative opportunities (short, medium and long term) to reduce the share of car use and increase public transport use in all major transport corridors. Many initiatives around public transport improvement will have significant community/regional co-benefits meaning such a collaborative approach is essential to ensure these benefits.

Appendix – Scenario assumptions

SCENARIO 1: Existing situation

SCENARIO 2: Relocation of Sandy Bay campus to Hobart CBD – adopt UTAS TBS 2017 Sandy Bay mode share

- 100% of staff and students located within the Hobart CBD
- Includes the residential origin distributions outlined in Table 5 and Table 10
- Students and staff adopt UTAS TBS 2017 mode share profile for Sandy Bay campus outlined in **Error! Reference source not found.**, Table 8, and Table 11

SCENARIO 3: Relocation of Sandy Bay campus to Hobart CBD – adopt TBS 2017 Hobart CBD mode share

- 100 % of staff and students located within the Hobart CBD
- Includes the residential origin distributions outlined in Section 2.3, Table 5 and Table 10
- Students and staff adopt UTAS TBS 2017 mode share profile for Hobart CBD facilities outlined in Section 2.3, **Error! Reference source not found.**, Table 8, and Table 11

SCENARIO 4: Scenario 3 with a medium term residential origin shift

- 100 % of staff and students located within the Hobart CBD
- **A modest residential shift for students and staff** relocating from Sandy Bay campus to CBD campus is assumed based on consolidation of university accommodation in Central and Inner North residential zone categories and modest growth in other private accommodation in the CBD and surrounds. The shift assumes the following redistributions (adjusted values provided in Table A 1 in red):
  - *International Students: redistribute from Sandy Bay / Taroona (-9%) and South Hobart (-3%) to Central (+10%) and Inner North (+2%)*
  - *Domestic Students: redistribute from Sandy Bay / Taroona (-3%) to Central (+2%) and Inner North (+1%)*
  - *Staff: redistribute from Sandy Bay / Taroona (-2%) to Central (+1%) and Inner North (+1%)*
- Students and staff adopt UTAS TBS 2017 mode share profile for Hobart CBD facilities outlined in Section 2.3 **Error! Reference source not found.**, Table 8, and Table 11.

A 1: Adjusted Residential Origins (in red)

	Campus Destination (prior to move to CBD)	Residential origins travel region							
		Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)	All Regions
International Students	Sandy Bay	24%	2%	2%	6%	12%	45%	9%	100%
	Hobart CBD	32%	3%	6%	10%	23%	23%	3%	100%
Domestic Students	Sandy Bay	16%	17%	17%	9%	8%	15%	18%	100%
	Hobart CBD	24%	17%	9%	5%	15%	15%	15%	100%
Staff	Sandy Bay	10%	15%	12%	8%	8%	15%	31%	100%
	Hobart CBD	10%	16%	15%	10%	11%	16%	21%	100%

SCENARIO 5: Relocation of Sandy Bay campus to Hobart CBD – adjusted mode share for international students only – no change in residential origin

- 100 % of staff and students located within the Hobart CBD
- Includes the residential origin distributions outlined in Table 5 and Table 10
- Domestic students and staff adopt UTAS TBS 2017 mode share profile for Hobart CBD facilities outlined in Table 8, and Table 11
- International students adopt an adjusted Hobart CBD mode share. Adjustments are due to the low international student sample size (n=43) in the UTAS TBS 2017 spread across the travel regions. The adjustments are based on expert assessment and review of domestic student values, they include (adjusted values provided in Table A 2 in red):
  - *Reduce car (as driver) mode share for South Hobart (-4%) and Sandy Bay/Taroona (-7%)*
  - *Reduce pedestrian/cycle mode share for South Hobart (-5%)*
  - *Increase bus mode share for South Hobart (+9%) and Sandy Bay/Taroona (+6%)*
  - *Adopt domestic Hobart CBD profile for Inner North: increase bus mode share (+40%) and reduce pedestrian/cycle mode share (-40%)*

A 2: Adjusted International Students Hobart CBD Mode Share (in red)

Main transport mode (% rounded)	Residential origin travel region						
	Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)
Car (as driver)	0%	0%	0%	0%	10%	10%	65%
Motorcycle/scooter	0%	0%	0%	0%	0%	0%	0%
Bus	14%	100%	100%	60%	24%	12%	17%
Walk/cycle	86%	0%	0%	40%	67%	78%	9%
Car (as passenger)/other	0%	0%	0%	0%	0%	0%	9%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

SCENARIO 6: Relocation to Sandy Bay campus to Hobart CBD with medium term residential origin shifted and adjusted mode share

- 100% of staff and students located within the Hobart CBD
- A medium term residential origin shift for students is assumed as per Scenario 4, Table A 1
- Domestic students and staff adopt UTAS TBS 2017 mode share profile for Hobart CBD facilities outlined in Table 8, and Table 11
- All International students adopt the adjusted Hobart CBD mode share set out in Scenario 5, Table A 2.

SCENARIO 7: Relocation of Sandy Bay campus to Hobart CBD with medium term residential origin shift and targeted mode share improvements

- 100% of staff and students located at the Hobart CBD campus
- A residential shift for students is assumed, as per Scenario 4 Table A 1
- All International students adopt an adjusted Hobart CBD mode share as set out in Scenario 5, Table A 2
- Domestic students and staff adopt an adjusted mode share based on a targeted approach to reducing car (as driver) mode share for the Eastern, Brooker Highway Corridor and Southern Outlet location categories, by increasing the bus mode share. Currently the Hobart CBD profile for domestic students and staff has high proportions of car (as driver) mode share for these locations. The following adjustments are summarized below and outlined in red in Tables A 3 and A 4:
  - *Redistribute from Eastern car (as driver) mode share (-30%) to bus mode share (+30%) for staff and domestic students*
  - *Redistribute from Southern Outlet car (as driver) mode share (-10%) to bus mode share (+10%) for staff and domestic students*
  - *Redistribute from North (Brooker) car (as driver) mode share (-30%) to bus mode share (+30%) for staff*

A 3: Targeted Adjustments Domestic Students Mode Share (in red)

Main transport mode (% rounded)	Residential origin travel region						
	Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)
Car (as driver)	15%	41%	18%	10%	10%	15%	30%
Motorcycle/scooter	0%	0%	0%	0%	0%	0%	0%
Bus	2%	51%	73%	50%	24%	30%	60%
Walk/cycle	81%	0%	0%	40%	67%	35%	0%
Car (as passenger)/other	2%	7%	9%	0%	0%	20%	10%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

A 4: Targeted Adjustments Staff Mode Share (in red)

Main transport mode (% rounded)	Residential origin travel region						
	Central	Eastern (Tasman Bridge)	Northern (Brooker Hwy)	Inner North	South Hobart	Sandy Bay & Taroona	Southern (Southern Outlet)
Car (as driver)	20%	47%	44%	43%	33%	27%	55%
Motorcycle/scooter	10%	0%	0%	0%	0%	0%	0%
Bus	0%	45%	46%	29%	17%	13%	27%
Walk/cycle	70%	0%	5%	29%	33%	53%	9%
Car (as passenger)/other	0%	8%	5%	0%	17%	7%	9%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**