



THE UNIVERSITY OF
SYDNEY

Sustainable Transport & Mobility Plan

The University of Sydney

CIS Planning – Engineering & Sustainability

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Executive Summary

The University of Sydney (the University) provides tertiary education opportunities for students and workplaces for staff across a host of campuses around Sydney. The main campus for the University is located in Camperdown and Darlington and is attended by approximately 43,000 students (effective student load) and 6,000 staff (full time equivalent).

The main campus is located on the south-western fringe of the Sydney CBD, bounded by Parramatta Road and City Road. With close linkages to public transport, recreation, and key centres of Newtown, Broadway and Sydney CBD, the University is in a unique position of harnessing the advantages of a city campus and providing a campus integrated with its surrounding land use.

The University is committed to increasing sustainable mode share in both its students and staff, and understanding ways it can improve. The key objectives of this Sustainable Transport and Mobility Plan (STAMP) is to:

- Achieve 90 per cent of travel to main campuses by sustainable modes by 2030;
- A more connected campus with improved connectivity to the Ultimo Camperdown Health and Education super precinct as designated in the Central District Plan;
- Strong focus on innovative transport solutions and collaboration opportunities with key stakeholders within the super precinct;
- Increase walking priority on campus; and
- Improve connectivity to the city’s walking and bicycle networks and public transport networks.

The current travel mode share by sustainable transport is 91 per cent for students and 73 per cent for staff. There were however a number of opportunities developed through the analysis that has the potential to further improve sustainable transport to the University. These opportunities were developed by understanding the existing challenges and constraints on the active and public transport networks.

A prioritisation matrix was completed using each of the five objectives as well as the ease of implementation to rank the opportunities at high, medium or low priorities. High priorities were projects/ tasks which should be completed in the next two years. Medium priorities between three to five years and low priorities between six to ten years. It was noted that the majority of projects/ tasks that were external to the University would require a collaboration between various government departments. The action plan for the STAMP is as follows:

- High Priority
 - Work with City of Sydney to improve connections between the campus and Redfern Station;
 - Work with government departments to provide direct walking and bicycle paths between Waterloo Metro and the University and other key land uses;
 - Work with government departments to provide direct walking and bicycle paths between Australian Technology Park and the University;
 - Activate the education precinct (north-west of the University) with the addition of retail and food land uses to increase activation and walking flows;
 - Removal of vehicles from Manning Road, and provide a walking only thoroughfare.
 - Work with government departments to provide a ‘boulevard feel’ to City Road, with improved walking priority. There is potential to provide a wide pedestrian crossing, with greater phase time for people walking;
 - Improve wayfinding between Darlington and Camperdown Campuses;
 - Work with City of Sydney and government departments to provide bicycle link between St Johns Road and the University;
 - Provide improved wayfinding facilities to end of trip facilities around campus;
 - Work with Transport for NSW to provide a Metro West station close to the University;
 - Work with Transport for NSW to provide improved connections to Redfern Station; and
 - Move parking to the periphery of the University.
- Medium Priority
 - Provide an improved gateway and wayfinding into the University from Missenden Road, past the Charles Perkins Centre and onto the Grose Farm Lane footpath;
 - Work with City of Sydney to ensure all regional paths at a minimum are marked with bicycle logos. Where possible separated bicycle paths should be provided;

- Work with City of Sydney and Royal Prince Alfred Hospital to provide off-road bicycle access along Missenden Road and Lyons Road to Johnsons Creek shared path;
 - Develop end of trip facility strategy and implementation plans to encouraging bicycle riding within the University. This could include the addition of bicycle hubs;
 - Provide salary sacrifice for bicycles and public transport to staff; and
 - Increase on-campus parking charges for students and staff.
- Low Priority
- Widen walking access paths at the vehicle entry points from Parramatta Road;
 - Work with City of Sydney and government departments to investigate opportunity of a bicycle bridge over Parramatta Road;
 - Work with City of Sydney and government departments to provide increased footpath capacity, or provide slim line bus stops to reduce pinch point at bus stops (particularly along Parramatta Road);
 - Work with government departments to improve access routes from Macdonaldtown Station to the University and other key land uses; and
 - Work with City of Sydney to provide improved wayfinding to Glebe Point Light Rail stop to encourage the use of light rail to the University.

The University has the opportunity to harness development in the local area to improve its sustainable transport to the University. There is the potential to further improve sustainable mode share through improvements in infrastructure and policy. The University can work in collaboration with other state and local government agencies to provide a connected community.

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Introduction

Background

The University of Sydney (the University) provides tertiary education opportunities for students and workplaces for staff across a host of campuses around Sydney. The main campus for the University is located in Camperdown and Darlington and is attended by approximately 43,000 students (effective student load) and 6,000 staff (full-time equivalent).

The main campus is located on the south-western fringe of the Sydney CBD, bounded by Parramatta Road and City Road. With close linkages to public transport, recreation, and key centres of Newtown, Broadway and Sydney CBD, the University is in a unique position of harnessing the advantages of a city campus and providing a campus integrated with its surrounding land use.

Report purpose

The University is committed to the continual improvement of sustainability outcomes. The overarching policy for sustainability is the University Sustainable Policy (2015), with the 2015 Sustainable Transport and Mobility Plan (STAMP) being the current effective document for transport.

The development of the updated STAMP will inform a strategy for the University to increase the number of students and staff using sustainable transport to travel to and from the University. This document will specifically identify key strategies in relation to active and public transport.

The key objectives of this STAMP are to:

- Achieve 90 per cent of travel to main campuses by sustainable modes by 2030;
- Create a more connected campus with improved connectivity to the Ultimo Camperdown Health and Education super precinct as designated in the Central District Plan;
- Create a strong focus on innovative transport solutions and collaboration opportunities with key stakeholders within the super precinct;
- Increase walking priority on campus; and
- Improve connectivity to the city's walking and bicycle networks and public transport networks.

Sustainable benefits

The development of this STAMP will provide environmental benefits, economic and social benefits for the University staff, students and surrounding land uses.

Environmental

This STAMP will deliver environmental benefits by providing a pathway forward for the provision of new facilities, services and policy changes to increase incentives for staff and students to choose sustainable transport options (active and public) over private motoring.

Vehicle emissions have a range of impacts on the local community and contribute to global climate change. Transport emissions accounted for 18 per cent of Australia's National Greenhouse Gas Inventory in the year to June 2017 (Commonwealth of Australia, 2017). The STAMP will encourage a shift to sustainable transport that will improve urban air quality and reduce greenhouse gas emissions.

The STAMP will serve to enhance the University's environmental reputation amongst leading learning and research institutions. By creating a more accessible organisation and encouraging environmentally sustainable transport options, the University will demonstrate its commitment to sustainability and reinforce its position as a leading University.

Economic

The STAMP will increase awareness about alternative travel options and their costs, to enable more rational and informed choices based on the real costs of transport. It will highlight how current car parking charges are too low to present a real incentive to adopt alternative and more sustainable transport modes. Strategies for financial incentives that encourage the uptake of more sustainable transit modes are also discussed.

Choosing active or public transport instead of a car may offer significant financial benefits to many of the University's staff and students. Car running costs provided by the NRMA, which include costs for registration, compulsory third party insurance, fuel, tyres and general maintenance are about \$1.53/km for a medium car (NRMA, 2014). It would cost \$214 per week for a 14 km daily return trip from Ashfield to Redfern in a medium car. By comparison, the cost of a weekly Opal fare from Ashfield to Redfern Station is \$34.60/week (Transport for NSW, 2015) and the cost of running a bicycle is about \$14/week (Arundell, The Cost of Cycling, 2007). A commuter choosing a train for the trip would save about \$9,428 annually and a bicycle rider would save \$10,400 annually compared to using a car.

The economic benefits of sustainable transport are however not only for the students and staff of the University. Existing car parks and spaces could be transformed into additional educational facilities, student housing or some other use to enable public domain activation and enhancement, all of which could become more valuable to the University in the long-term.

Social

Implementation of the STAMP will provide a range of social and health benefits to the University. It will improve on-campus facilities and services that will limit vehicles to designated peripheral areas, reduce internal traffic movements and encourage uptake of active and public transport.

Better planning and design layout for car parking stations, pathways and bicycle facilities can reduce existing traffic-related conflicts amongst people driving, walking and bicycle riding. Carshare services and infrastructure can be set up to reduce single person car trips and provide opportunities for drivers to share travel costs, ease road congestion, and reduce exhaust air pollution and the associated respiratory health problems.

Healthier lifestyles can be encouraged through the adoption of sustainable transport by University staff and students. This integrates physical activity into their daily travel patterns. Active travel offers a range of health benefits and the University supports this with its long-term target for sustainable transport adoption by 2030 of 90 per cent. This responds to world-leading research into the causes of obesity, cardiovascular disease and diabetes. Staff who complete 20 minutes of physical activity each day are likely to have half as many sick days as those who do 10 minutes a day (Goodyear, et al., 2010).

Travelling to and from the University is an important consideration for potential staff and students when considering new work/study opportunities. On average, Sydney residents spend around 90 minutes a day commuting to and from work. Travel options that aim to reduce traffic congestion, better manage vehicle circulation around campus and increase sustainability can help calm the public realm and facilitate greater well-being for a healthier University experience.

Drivers and Policy

There are several state government, local government and University documents which provide a focus on sustainable transport. The drivers for these policies include sustainability, creating a liveable city and providing an integrated and efficient transport network. The following section provides a summary of the purpose and vision of these documents and the relevance they hold for the University.

State Government

Draft Future Transport Strategy 2056 (2017)

The Draft Future Transport Strategy 2056 is an update to the Long Term Transport Master Plan that sets the 40-year vision and direction for NSW. This strategy is a high-level document that sits above the Greater Sydney District and Regional NSW plans.

This strategy puts an emphasis on developing a “metropolis of three cities”, where all customers can live within 30 minutes access from their nearest centre or ‘city’. The strategy aims to improve the liveability of all key centres across the Greater Sydney metropolis. The key outcomes of this strategy that will affect the University transport network include:

- Completing the walking and bicycle networks to and through centres;
- Better plan and co-ordinate integration of active and public transport networks;
- Support the establishment of new bicycle share services;
- Provide clear wayfinding systems for transport users; and
- Explore ways to ensure most employees have options available to them, to live near work or commute using a combination of active and public transport – where this does not occur, to explore options supported by technology.

Draft Eastern City District Plan – Our Greater Sydney 2056 (2017)

The draft Eastern City District Plan (developed by the Greater Sydney Commission) provides a focus on the eastern portion of the Greater Sydney metropolis. This includes the Inner West, Eastern Suburbs, Sydney Airport, and Sydney CBD. The University is central to all of these subregions. The draft District Plan details key future projects within the Eastern District so that collaborations between governments, community and business can be better co-ordinated. These include the Camperdown–Ultimo Health and Education Precinct, Central to Eveleigh Urban Transformation Project, the Bays Precinct Transformation Project and the Parramatta Road Urban Transformation Strategy.

The plan discusses the need to maintain a liveable city, by providing the necessary infrastructure to meet the city’s needs. This infrastructure includes future transport requirements as well as improved options for walking and bicycle riding to enhance sustainable connectivity for all and meet the changing needs of people. It further details a need to provide improved access to and expansion of existing urban amenities, including through major health and education precincts, especially the now identified Camperdown-Ultimo Health and Education Precinct. Key items relevant to the University include:

- Better provisions for walking and bicycle riding through the Camperdown–Ultimo Health and Education Precinct; and
- Parking availability should reflect the level of service an area enjoys from public transport – with a preference for public and active transport utility.

A Metropolis of Three Cities Draft Greater Sydney Region Plan (2018)

Our Greater Sydney (A Metropolis of three cities) is Sydney’s draft Greater Sydney Region Plan and was prepared by the Greater Sydney Commission. This document was developed concurrently with the NSW Government’s Future Transport 2056 and Infrastructure NSW’s State Infrastructure Strategy to align use, transport and infrastructure outcomes for Greater Sydney.

The purpose of the plan is to:

- Set a 40-year vision (up to 2056) and establish a 20-year plan to manage growth and change for Greater Sydney in the context of economic, social and environmental matters;
- Inform district and local plans and the assessment of planning proposals;

- Assist infrastructure agencies to plan and deliver growth and change and to align their infrastructure plans to place-based outcomes;
- Inform the private sector of the vision for Greater Sydney and infrastructure investments required to manage growth; and
- Inform and engage the wider community so the draft Plan can best reflect the values and aspirations of all.

Our Greater Sydney (A Metropolis of Three Cities) places focus on collaboration of education institutes with industry and local government.

Key relevant items for the University include:

- The University has been placed as part of the Innovation Corridor, Harbour CBD. This corridor includes Royal Prince Alfred Hospital, The University of Notre Dame, University of Technology Sydney, TAFE NSW and the Redfern to Eveleigh Precinct.
- Importance of enhancing active transport within the Innovation Corridor to “spur an exchange of ideas”; and
- Prioritise public transport projects to support the “30 minute city”.

Local Government

Sustainable Sydney 2030 – The Vision (2017)

Sustainable Sydney 2030 (updated in 2017) provides a vision for Sydney to become a “green, global and connected city” by 2030. This vision has been developed as a high-level plan for the City of Sydney and details a strategic plan for implementation to cover the period of 2017 to 2021. It was developed to command and inform the City’s key planning priorities and aspirations.

The vision statement provides key targets to achieve a sustainable city by 2030 as well as overarching frameworks for action.

Targets relevant to the University STAMP include:

- 10 per cent of trips across the City are made by bicycle;
- 50 per cent of all trips across the City to be made by walking movements;
- 80 per cent of trips to work by both residents of the City and those travelling into the City, to be made by public transport; and
- Every resident will be within reasonable walking distance to most local services, including fresh food, childcare, health services and leisure, social, learning and cultural infrastructure.

University

Campus Improvement Plan (2014 – 2020)

In 2014, the University brought out the Campus Improvement Plan (CIP) to guide the University expansion from 2014 to 2020. It is a plan for new buildings and infrastructure to cater for students and the general community. The CIP includes the refurbishment and redevelopment of certain buildings around the campus. Of particular interest in the Campus Improvement Plan for this STAMP are the end of trip facilities provided in each building and also the student and staff population for each building.

The access strategy for the CIP, was also developed to complement future developments at the University. Key outcomes from the access strategy included limiting most general vehicle movements to the campus peripheries. It was recommended that four new waste/service depots be built to act as multi-function transfer stations at key sites. This would limit the need for heavy service vehicles to traverse the campus, and instead the use of smaller sustainable vehicles.

The access strategy also stated the need to increase the appeal of public transport through ticket subsidies for staff and students and local walking corridor improvements. It also highlights the need to reduce the dependence on car parking spaces in all future developments.

The strategy recommended that internal roads could become shared spaces to help improve bicycle and walking interactions.

Public Realm Strategy and Campus Design Guidelines (2017)

The Public Realm Strategy and Campus Design Guidelines (2017), developed by Gehl Consulting analysed the existing campus facilities and proposed improvements for both greater walking priority and enhanced public realm experiences. They developed a series of principles to inform the University's future expansion taking into account the assets of its neighbouring communities such as the Inner West, Broadway, Australian Technology Park (ATP), Carriageworks, Royal Prince Alfred Hospital, Redfern and Sydney CBD. Gehl focussed on how best to transform the Camperdown-Darlington Campus into an 'integrated campus'; promoting it more as a distinct but vibrant addition to the 'neighbourhood' within the City itself. This transformation requires ways to capitalise on the geographic position of the University campus to expand its appeal as a place, not just a learning institute. This would enable a more vibrant social dynamic and enhance the Universities perceived openness to the community.

The strategy identified numerous physical and policy barriers that it suggested were limiting the University's potential to become a more integrated campus. Key recommendations included:

- Improving active transport linkages to and from the Campus itself;
- Prioritising a change to the City Road crossing experience;
- Improving active linkages to and from Redfern Station;
- Simplifying wayfinding and navigation across campus; and
- Providing greater permeability across the Main Campus and a vastly improved walking domain.

This document also focussed on how to achieve greater usage of outdoor spaces, which it saw as an underutilised resource. It identified ways to increase activity both day and night, and on weekends. These included new provisions for mixed-use development; incorporating a variety of residential, retail, recreational and restaurant experiences.

In all, Gehl identified 66 potential project initiatives that could support the ongoing work of the University's Campus Improvement Plan (CIP).

Sustainable Access and Parking Strategy Report (2016)

Sustainable Access and Parking Strategy Report (2016) was developed by Parking and Traffic Consultants to provide the University with a detailed assessment of its existing parking provisions and the way they are used by students and staff. The report highlighted key inefficiencies with the existing parking arrangements and provided a range of physical and policy recommendations to better align with the University's sustainability targets. Some of the key recommendations in this report include:

- Allowing salary sacrificing for sustainable transport measures and not just for parking permits;
- An increase in parking fees (which remain some of the lowest in Australia);
- Potential replacement of the dominant parking permit scheme with a Pay-As-You-Go (PAYG) system; and
- Using new technologies to improve the efficiency of the parking management system (i.e. streamline revenue collection, enforcement, wayfinding, etc.).

Environmental Sustainability Policy (2015)

The University has established an Environmental Sustainability Policy to define the principles which best promote sustainability targets and inform the frameworks for meeting such objectives.

Within this policy, the key points relating to transport is the promotion of sustainable transport and mobility through:

- Providing quality infrastructure and facilities to support active transport; and
- Encouraging the adoption of active and public transport.

Achievements so far

The University has completed a number of projects and initiatives since the previous STAMP was completed in 2015. Some of the completed projects to encourage sustainable transport uptake include:

Walking

- Establishing a Meet and Move group;
- Development of a campus Flora App;
- Commissioning the Gehl Public Realm guidelines to inform the development of the University, and enhance outdoor spaces for higher walking flows or usage;
- Footbridge activation close to Science Road; and
- Improved connection to Victoria Park.

Cycling

- Establishment of Bike2work group on Yammer;
- Additional bicycle parking and end-of-trip-facilities (EFTs) in the Abercrombie Building (192 external bicycle racks, 77 secure bicycle parking and 14 showers) and Sydney Nanosciences Hub (ten external bicycle racks and six showers);
- Establishment of a permanent bicycle repair station on Eastern Avenue;
- University Membership to the City of Sydney's Cycle Advisory Committee;
- Provision of new 'cycle lanterns' at the City Road/ Butlin Avenue intersection;
- New bicycle and walking counts commissioned to understand active transport flow throughout the University;
- Development of dockless bicycle pilot program.

Public transport

- The University established a strong working relationship with the NSW State Government to enhance public transport access and provisions, including the potential for a new Sydney MetroWest station on Campus and improved access routes to the future Waterloo Metro Station, along with the established heavy rail services at Redfern Station.

Car travel and parking

- The University commissioned the Sustainable Access & Parking Strategy Report (2016) to better understand the improvements it can make to existing parking facilities and behaviours; and
- Removal of parking from Science Road.

Other

- Development of the University travel plan; and
- Establishment of working groups with government organisations including Transport for NSW.

The University of Sydney

Existing infrastructure

This section discusses the existing conditions for people walking, bicycle riding, driving and using public transport.

Walking

The external walking network surrounding the University is extensive, with wide footpaths provided on most approaches into the University. The key access points for people walking into the University are:

- Shepherd Street;
- Butlin Avenue at City Road;
- Butlin Avenue at Abercrombie Street;
- Footbridge across Parramatta Road, close to Arundel Street;
- Missenden Road (John Hopkins Drive);
- University Avenue;
- Ross Street; and
- Western Avenue.

The most highly used entrance into the University is the Shepherd Street entrance (shown in **Figure 1**), due to its close proximity to Redfern Station. During the peak one hour period over 2,500 people use this access point, walking along Abercrombie Street and Lawson Street. Footpath widths along Abercrombie Street have recently been upgraded, with an effective width of approximately 2.5 metres. Along Lawson Street, however, the effective footpath width is currently 1.8 metres, shown in **Figure 2**. This means during peak periods, Lawson Street can appear significantly more congested with foot-traffic than Abercrombie.

The intersection where Butlin Avenue meets Eastern Avenue at City Road experiences a very high volume of walking movement during the peak one hour period. 2,000 people use the overpass above this intersection, which follows the key desire line from Redfern Station. However, 1000 people in the same peak period still use the signalised crossing below this bridge. The Gehl report suggested the indirect combination of stairs allowing access to this bridge and the limited wayfinding provisions were limiting its appeal for people, compared to simply waiting their turn to cross a busy road.

The footbridge across Parramatta Road provides a more obvious and direct connection between Arundel Street in Glebe and the University. This footbridge is well utilised by those alighting bus services on Parramatta Road and those people who access either the university or other land uses to the south, from north of Parramatta Road. The footbridge has stair-only access from both sides of Parramatta Road, so there is no wheeled or disabled access provision onto it from below.

Other external University gateways do not tend to have stairs, but those along Parramatta Road (with the exception of the footbridge) are driveways dominated by vehicular access, with narrow footpaths shown in **Figure 3**.

The walking pathways at grade along Parramatta Road and City Road have no separation from the high volume of traffic and provide minimal protection from the elements due to a lack of trees and other plantings.

Permeability within the University is reasonably good, with footpaths provided on both sides of most roads, and some corridors reserved for active transport alone. In the older buildings, there is still an over-reliance on stairs alone.

The key walking thoroughfare for the University is Eastern Avenue, now mostly pedestrianised from City Road to the Great Hall shown in **Figure 4**. However, walking dominance is poor towards the western side of the Camperdown campus, relatively narrow footpaths as shown in **Figure 5**.

There are also a number of walking barriers across both the Darlington and Camperdown campuses. These include fencing, stairs and limited wayfinding away from the main thoroughfares.

Figure 6 shows the number of walking and vehicle movements within the University. These have been taken from the Gehl Public Realm Strategy Campus Guidelines in 2016. These walking and vehicles counts will be

used as the quantified basis for understanding the key walking behaviours across the University. It was noted that there are a lot more walking movements than vehicle movements across the day.

Figure 1 - Shepherd Street entrance



Figure 2 - Lawson Street footpath



Figure 3 - Access from Parramatta Road



Figure 4 - University main walkway

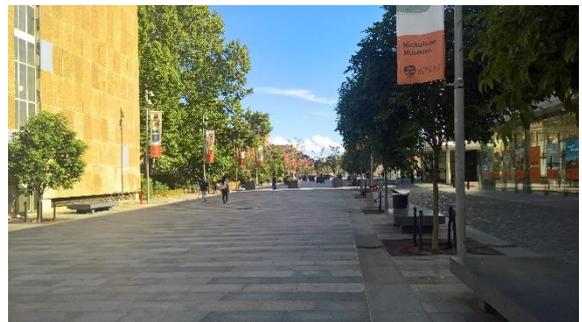
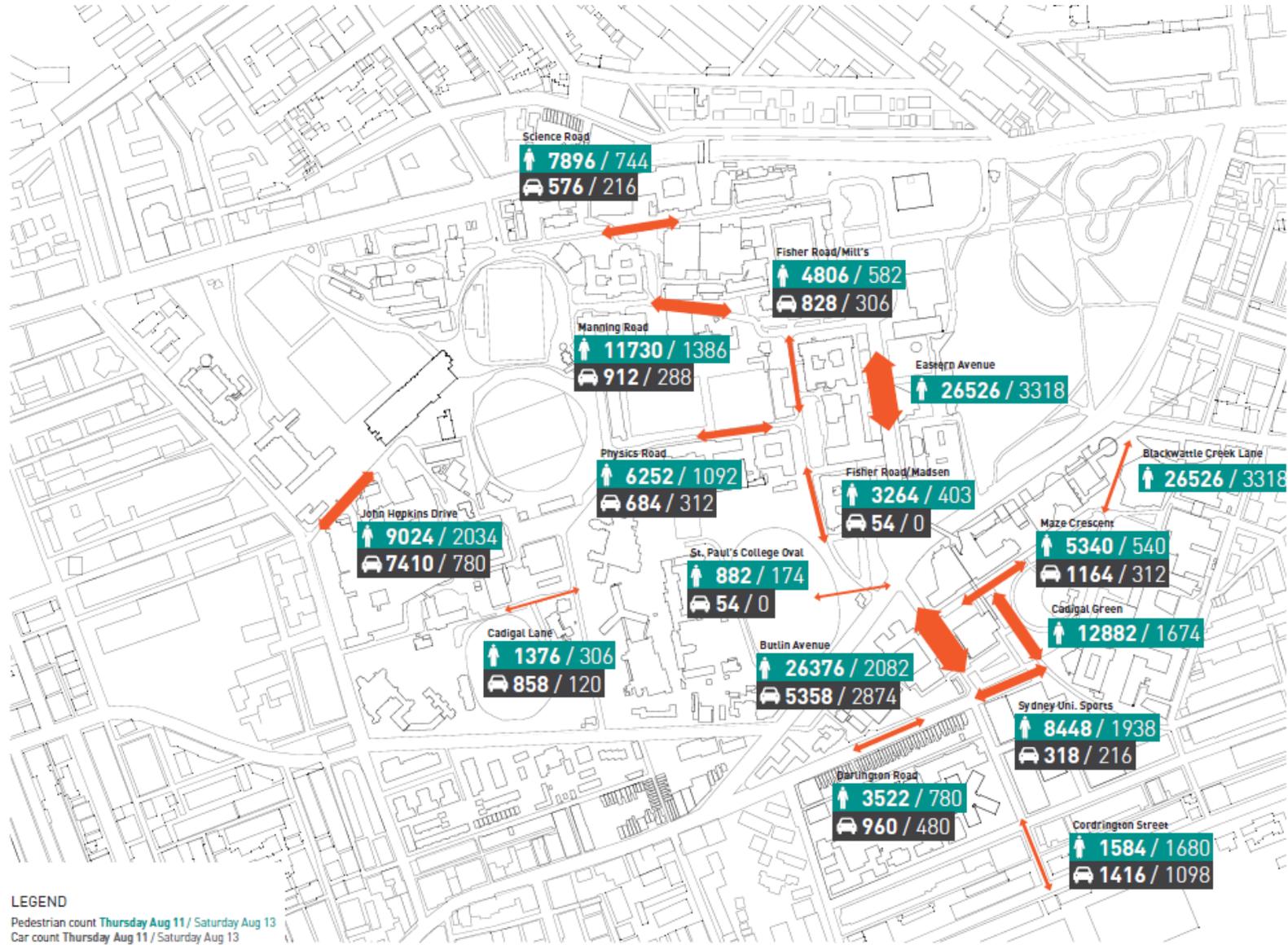


Figure 5 - Footpaths to education precinct



Figure 6- Walking counts for Thursday and Saturday in August 2016



Source: Gehl Public Realm Strategy Campus Guidelines (2016)

Bicycle Infrastructure

External bicycle infrastructure

There are a number of existing cycleways surrounding the University precinct, which have been rated by the City of Sydney as providing 'low difficulty' on-road routes.

Bicycle access into the University from the surrounding bicycle network is through signalised or pedestrian crossings, where riders should dismount among people walking. As discussed previously, the footbridge across Parramatta road has stair access only and is a constraint to the bicycle network.

An extract of the City of Sydney bicycle map from 2017 is shown in **Figure 10**.

Key bicycle routes into the University include:

- Wilson Street; (southern east-west corridor to Shepherd Street);
- Butlin Avenue/ Codrington Street; (north to Darlington, City Road and Camperdown from Eveleigh);
- Shepherd Street; (west to Darlington from Redfern or Chippindale);
- Broadway bicycle link; and (south from Ultimo to Darlington);
- St Johns Road; (northern east-west corridor allowing connections to multiple southward paths via Ross Street, Arundel Street, Derwent Road over Parramatta Road);
- Multiple shared paths through Victoria Park (west to Camperdown Campus from Central, Chippindale and the east);
- Missenden Road; (east to Main Campus from Newtown/Camperdown); and
- John Hopkins Drive; (east into Camperdown Campus from Missenden Road).

Internal bicycle infrastructure

Most of the University's internal road network has been classified as 'low difficulty' bicycle streets, despite vehicular access still being maintained on most. Active shared paths have been provided along Eastern Avenue and around the Sydney Law School; where only service vehicles are permitted.

The University provides a number of end-of-trip-facilities (ETFs) including bicycle racks, showers and lockers. Any new buildings constructed as part of the CIP initiative, should consider/satisfy the City of Sydney DCP rates for EFTs or the Green Star Ratings for buildings. These are strictly rates for tertiary education and do not make allowances for the University as a more 'integrated campus' or 'community'. In January 2018, the University had a total of:

- 159 shower facilities;
- Approximately 2,190 bicycle racks; and
- 736 lockers.

Most existing shower facilities are designated either male or female, with limited unisex facilities available, except in newer buildings. There are also limited secure caged facilities for both students and staff to use.

Examples of typical bicycle racks provided within the Main Campus are shown in **Figure 7** and **Figure 8**.

Figure 7 - Undercover bicycle racks



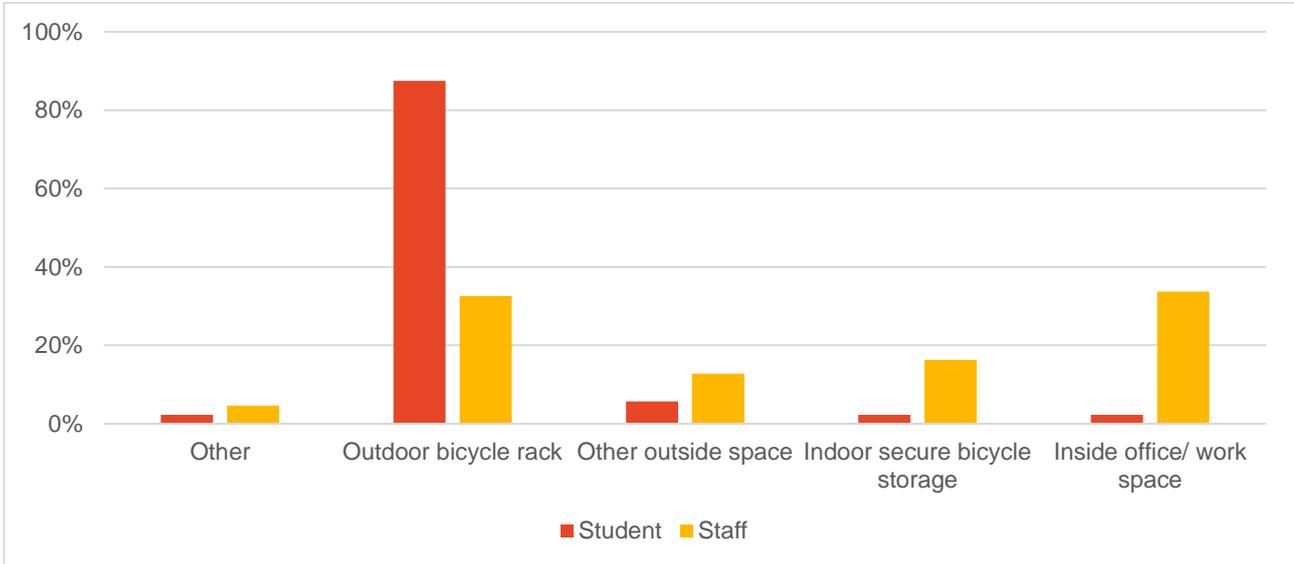
Figure 8- Outdoor bicycle racks



Available lockers have not been evenly distributed across the University in co-ordination with bicycle racks or showers. They are more prevalent towards the western side of the Camperdown campus or the southern side of the Darlington Campus. The locations of these facilities are shown in **Figure 11**, and a detailed map shown in **Appendix A**.

Figure 9 shows the distribution of how students and staff store their bicycles across the University. Students park their bicycles outside and staff are making use of indoor facilities. This may also be because most staff would spend whole days in the same building. Students are likely to travel around campus and go to different buildings. This survey data shows the requirement to take into account the needs of students and staff when deciding on locations of bicycle parking facilities.

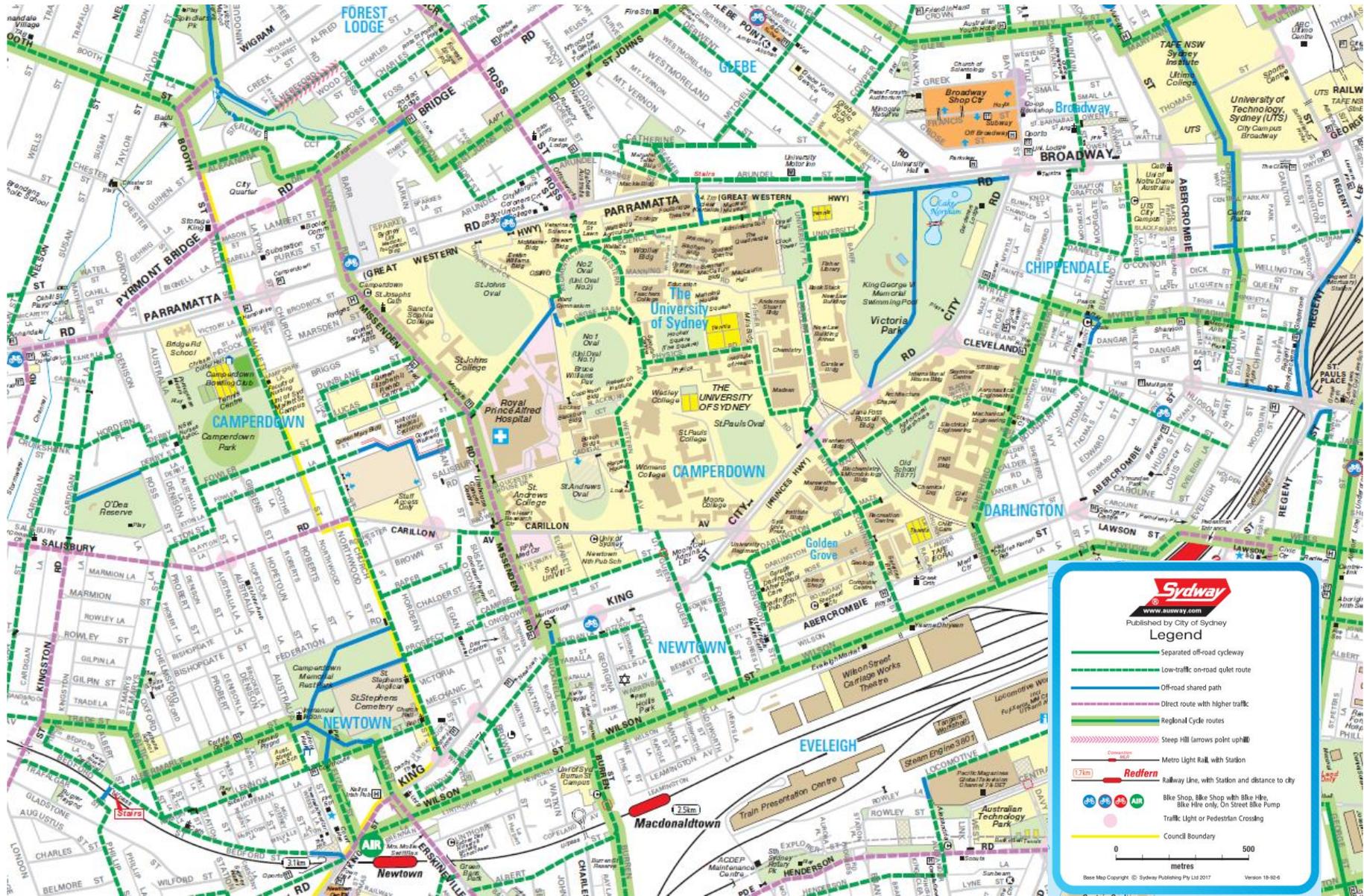
Figure 9 - Student and staff park bicycles – where do they park?



Source: 2017 University of Sydney travel survey

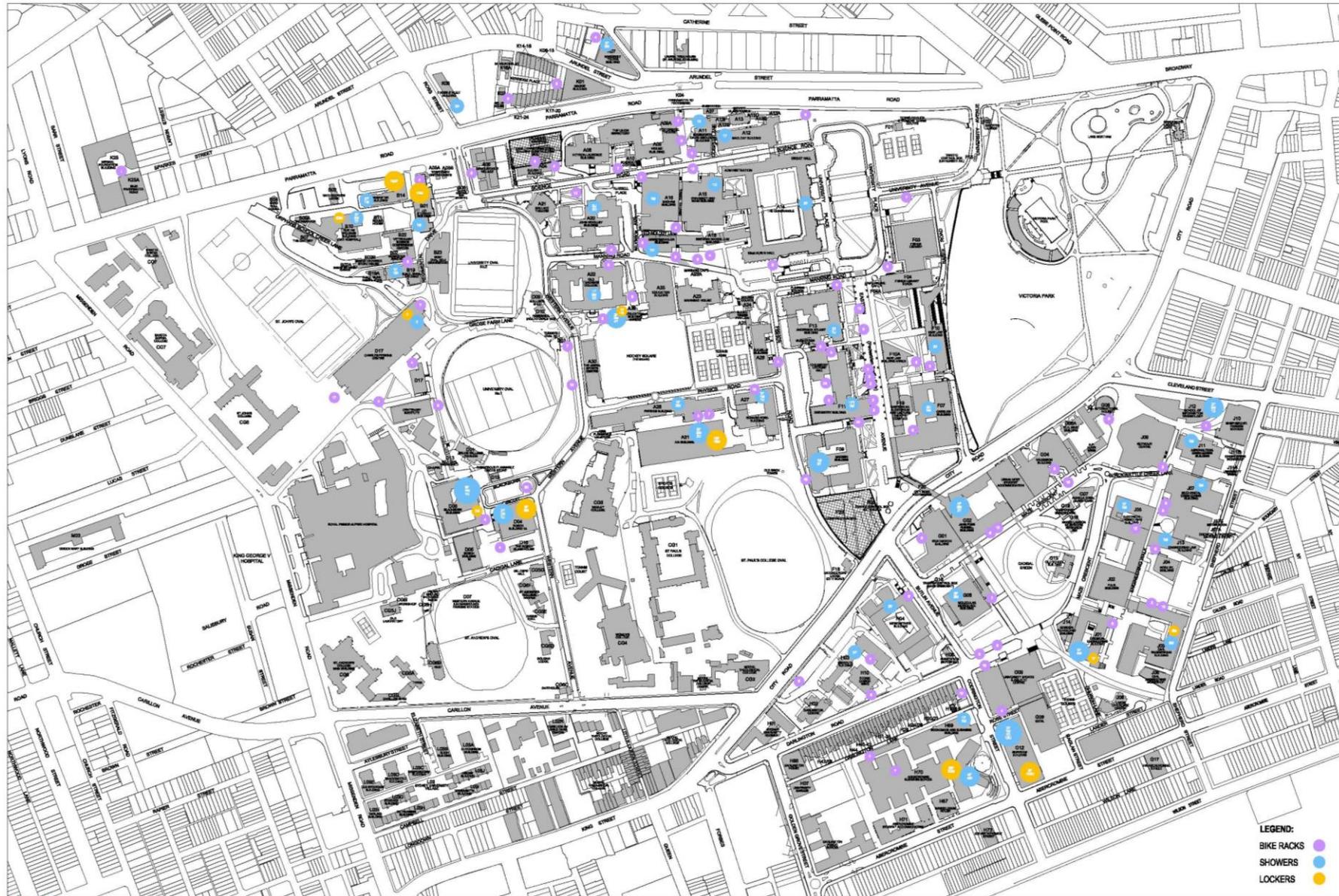
In the past year, there has been an increase of ‘dockless’ bicycle-share companies across Sydney. As part of the University’s ongoing CIP program, approximately 200 dockless bicycles (from licensed operators) have been placed across the University area as a trial. The University is currently piloting a dockless bicycle project to analyse uptake, popular destinations and to assess the adequacy of bicycle infrastructure.

Figure 10 - Existing bicycle network



City of Sydney Bicycle Map (2017)

Figure 11 - Existing bicycle rack, showers and lockers



Source: University of Sydney (2016)

Public transport

Train Services

The University benefits from being within a walkable catchment of Central, Redfern, Newtown and Macdonaldtown Stations. The majority of lines on the Sydney Trains network pass through both Redfern and Central Stations. The Inner West line is the only line that also services Newtown and Macdonaldtown Stations.

Redfern Station is the most important station serving the University, as it offers the easiest and most direct walk.

A summary of train service frequencies passing through Redfern and Central Station in the peak hour periods is shown below in **Table 1**.

Table 1 - Train timetable summary

Train Service	Route	AM Peak	PM Peak
T1 North Shore and Northern	Berowra to City via Gordon, Hornsby to City via Macquarie University	29	35
	City to Berowra via Gordon, City to Hornsby via Macquarie University	38	30
T1 Northern	Epping to City via Strathfield	13	8
	City to Epping via Strathfield	8	11
T1 Western	Emu Plains or Richmond to the City	38	28
	City to Emu Plains or Richmond	31	37
T2 Inner West & Leppington	Parramatta or Leppington to City	35	20
	City to Parramatta or Leppington	28	29
T3 Bankstown	Liverpool or Lidcombe to City via Bankstown	24	12
	City to Liverpool or Lidcombe via Bankstown	14	22
T4 Eastern Suburbs & Illawarra	Waterfall or Cronulla to Bondi Junction	33	31
	Bondi Junction to Waterfall or Cronulla	30	35
T8 Airport & South Line	Macarthur to City via Airport or Sydenham	6	0
	City to Macarthur via Airport or Sydenham	0	6

Source: Sydney Trains (Jan 2018)

The high frequency for most lines suggests there are sufficient train services across the network (during the peak periods) to deliver most Sydneysiders in reach of a train line to the University. It is noted that the T8 Airport & South line service only provides peak hour connections to Central Station, and students and staff may have to change at Central Station and connect with another service to Redfern. Students and staff going to Camperdown may walk or bicycle from Central Station, as Redfern Station is more than one kilometre away.

Light Rail

The existing light rail network provides connections from Dulwich Hill to Central Station and takes about 37mins from end to end. Most do not use it from end to end, but as a cross-regional connector. The closest light rail stop to the University is in Glebe, approximately 1.2 kilometres from the University Avenue entrance or Parramatta Road footbridge. The light rail provides services at 8 minute frequencies during the peak periods and 11 minute frequencies during off-peak.

Bus Services

The University benefits from two key arterial roads well serviced by buses. Services can be accessed along Parramatta Road, City Road and Missenden Road with the average stop spaced every 300 metres. Bus routes predominantly service the Inner West and Eastern Suburbs catchments. The key transfer points between rail and bus services within the CBD are Central Station, Town Hall and Martin Place. From these areas, students and staff can catch additional services to other parts of Sydney.

The bus service frequencies for all University services in peak periods are shown below in **Table 2**.

Table 2 - Bus timetable summary

Bus route	Interface with Campus	Route description	Service times	No. of services/weekday	No. of services for AM peak (7-9am)	No. of services for PM peak (5-7pm)
352	City Road	Marrickville Metro to Bondi Junction via Oxford St, Crown St and King St	6:25am – 12:06am	39	4	6
		Bondi Junction to Marrickville Metro via Oxford St, Crown St and King St	6:23am – 12:19am	40	5	5
370	Glebe Point Road / Broadway	Leichhardt Marketplace to Coogee	5:37am – 12:00am	68	12	7
		Coogee to Leichhardt Marketplace	5:30am – 12:10am	68	10	9
412	Missenden Rd & Parramatta Rd	Campsie to City Martin Place via Earlwood	5:23am – 22:30pm	49	8	4
		City Martin Place to Campsie via Earlwood	6:42am – 12:18am	48	6	5
413	Parramatta Road	Campsie to City Martin Place	5:42am – 23:12pm	40	5	4
		City Martin Place to Campsie	6:43am – 12:48am	38	4	6
422	City Road	Kogarah to City Martin Place	5:30am – 10:49pm	77	8	7
		City Martin Place to Kogarah	6:02am – 12:03am	79	11	9
423	City Road	Kingsgrove to City Martin Place	4:10am – 12:10am	76	12	6
		City Martin Place to Kingsgrove	4:34am – 2:02am	76	7	10
426	City Road	Dulwich Hill to City Martin Place	5:02am – 3:51am	69	12	6

Bus route	Interface with Campus	Route description	Service times	No. of services/weekday	No. of services for AM peak (7-9am)	No. of services for PM peak (5-7pm)
		City Martin Place To Dulwich Hill	6:31am – 12:13am	66	5	9
428	City Road	Canterbury to City Martin Place	4:16am – 1:13am	74	13	6
		City Martin Place to Canterbury	5:44am – 12:23am	71	6	11
431	Glebe Point Road / Broadway	Glebe Point to City Martin Place	4:50am – 3:03am	101	25	11
		City Martin Place to Glebe Point	5:23am – 3:47am	101	10	19
433	Glebe Point Road / Broadway	Balmain Gladstone Park to Central Pitt St	4:57am – 12:05am	70	19	6
		Central Pitt St to Balmain Gladstone Park	5:44am – 12:02am	65	6	13
436	Parramatta Road	Chiswick to Central Pitt St	6:04am – 11:09pm	43	9	3
		Central Pitt St to Chiswick	6:57am – 12:22am	40	5	5
438	Parramatta Road	Abbotsford to City Martin Place	4:29am – 3:20am	75	12	7
		City Martin Place to Abbotsford	5:19am – 3:20am	77	7	12
439	Parramatta Road	Mortlake to City Martin Place	8:12am – 7:12pm	23	2	4
		City Martin Place to Mortlake	8:07am – 8:54pm	22	2	1
440	Parramatta Road	Bondi Junction to Rozelle	5:00am – 12:35am	109	13	15
		Rozelle to Bondi Junction	4:16am – 11:36pm	92	15	11
461	Parramatta Road	Burwood to City Domain	4:39am – 11:05pm	67	13	6
		City Domain to Burwood	5:35am – 11:59am	63	9	10
470	Catherine St / Broadway	Lilyfield to City Martin Place	5:06am – 11:25pm	100	16	8
		City Martin Place to Lilyfield	5:42am – 12:03pm	87	7	19
480	Parramatta Road	Strathfield to central Pitt St via Homebush Rd	5:23am – 6:50pm	25	8	1
		Central Pitt St to Strathfield via Homebush Rd	7:48am – 8:48pm	24	2	6

Bus route	Interface with Campus	Route description	Service times	No. of services/weekday	No. of services for AM peak (7-9am)	No. of services for PM peak (5-7pm)
483	Parramatta Road	Strathfield to Central Pitt St via South Strathfield	6:00am – 11:10pm	32	6	4
		Central Pitt St to Strathfield via South Strathfield	6:18am – 12:19am	31	4	5
L23	City Road	PrePay Only – Kingsgrove to City Martin Place (Limited Stops)	6:35am – 8:06am	9	7	N/A
		PrePay Only – City Martin Place to Kingsgrove (Limited Stops)	4:30pm – 6:19pm	8	N/A	6
L28	City Road	PrePay Only – Canterbury to City Martin Place (Limited Stops)	6:53am – 8:23am	8	7	N/A
		PrePay Only – City Martin Place to Canterbury (Limited Stops)	4:38pm – 6:07pm	7	N/A	5
L38	Parramatta Road	PrePay Only – Abbotsford to City Martin Place (Limited Stops)	6:32am – 9:17am	16	13	N/A
		PrePay Only – Martin Place to Abbotsford (Limited Stops)	3:06pm – 7:02pm	15	N/A	7
L39	Parramatta Road	PrePay only – Mortlake to City Martin Place (Limited Stops)	6:30am – 7:44am	5	3	N/A
		PrePay Only – City Martin Place to Mortlake (Limited Stops)	4:32pm – 6:42pm	8	N/A	6
M10	Parramatta Road	PrePay Only – Maroubra Junction to Leichhardt via City	6:33am – 8:05pm	65	7	10
		PrePay Only – Leichhardt to Maroubra Junction via City	6:43am – 8:21pm	64	12	13
M30	City Road	PrePay Only – Sydenham to Taronga	6:31am – 7:52pm	66	10	10
		PrePay Only – Taronga to Sydenham	6:05am – 8:17pm	68	11	10

Source: Sydney Bus Timetables (Jan 2018)

The majority of bus routes that service the University do so with high frequency and long service hours, usually until midnight. The L series buses provide additional services only during the peak periods. Combined with train or ferry transfers to other parts of Sydney, buses help provide most students and staff with an adequate service to and from their destination.

The bus stop infrastructure surrounding the University usually consists of a bus stop flag and shelter. Examples of bus stops along City Road and Parramatta Road are shown in **Figure 12** to **Figure 14** below.

Figure 12 - City Road bus stop (towards Newtown)



Figure 13- Parramatta Road bus stop (westbound close to footbridge)

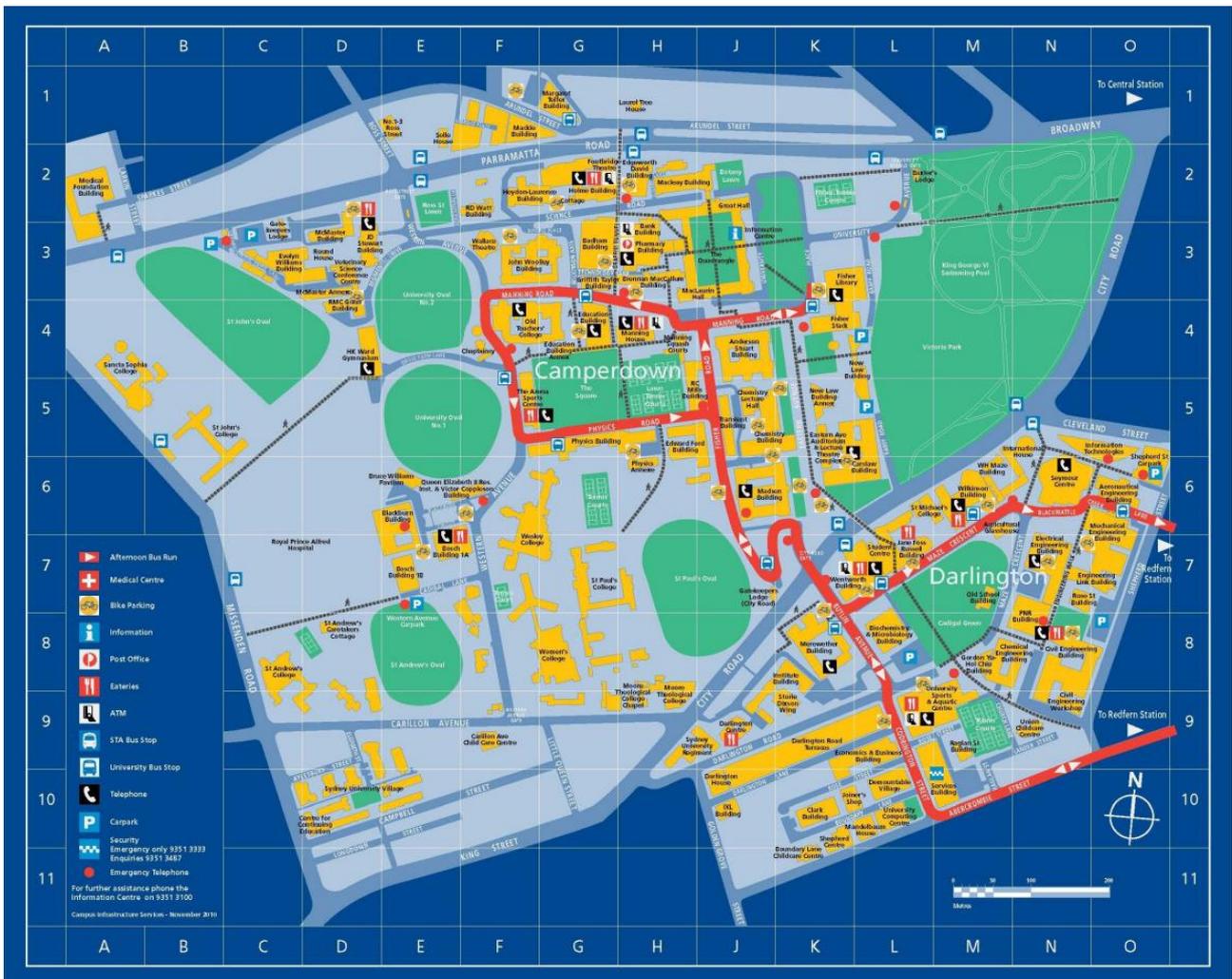


Figure 14 - Parramatta Road bus stop



In addition to the Sydney Buses network, the University also runs an internal shuttle bus service between Redfern Station and the Camperdown-Darlington campuses. This shuttle bus runs at 15–20 minute frequencies between 4:30pm – 10:15pm during the semester and from 4:30pm – 8:15pm outside semester. The route of the shuttle bus service is shown in **Figure 15**.

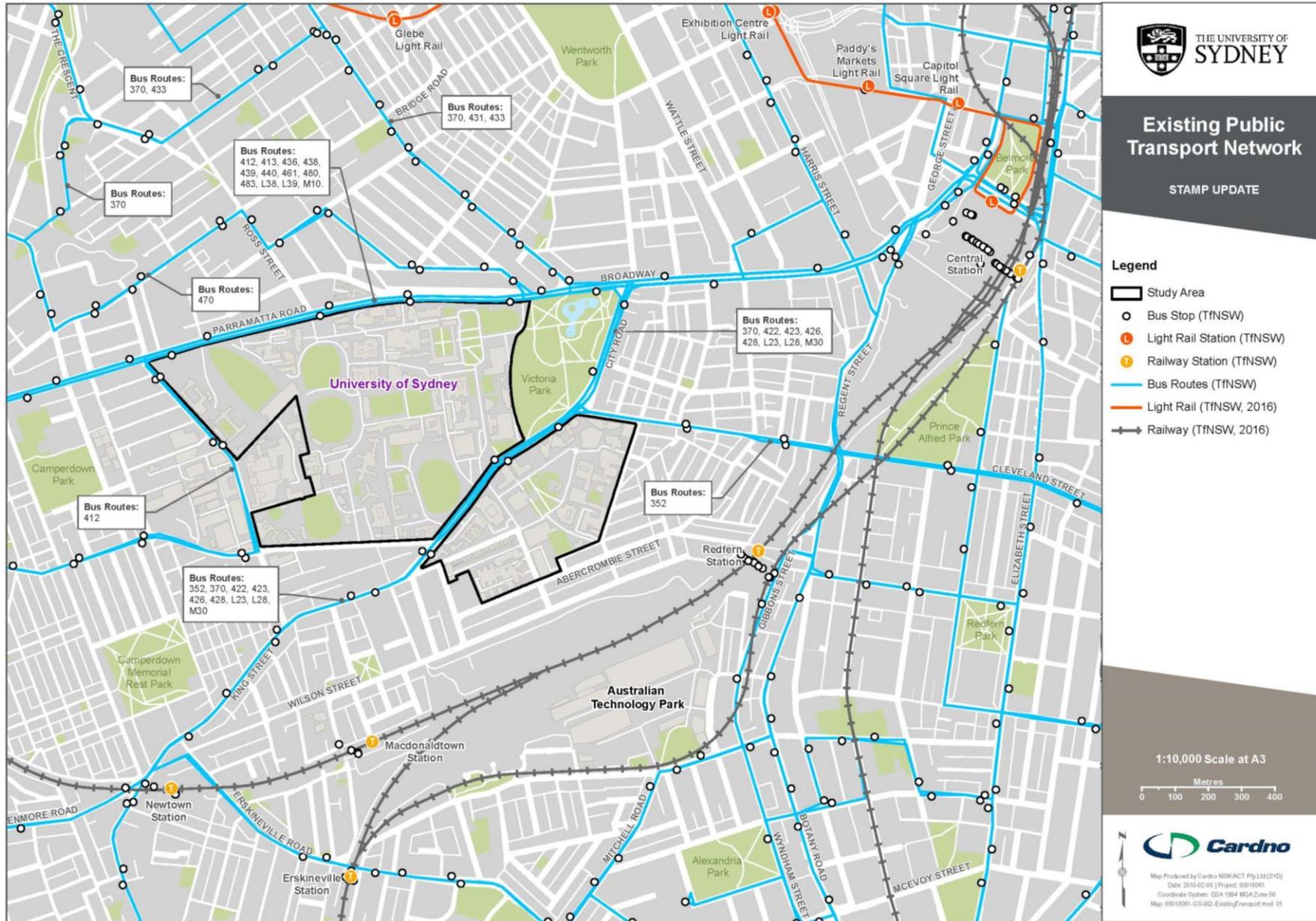
Figure 15 - Internal shuttle bus



Source: University of Sydney (2018)

A map of all key public transport corridors surrounding the Main Campus is shown in **Figure 16**.

Figure 16 - Existing public transport



Parking

Parking is available throughout the University and is provided in a large number of buildings. In 2016, there was 2,375 parking spaces available across the University and their distribution was as follows:

- General permit and ticketed parking – 1,896 parking spaces (80 percent); and
- Special permits bays – 479 parking spaces (20 per cent).

The total number of parking spaces are split evenly split between Darlington and Camperdown campuses. A map from the 2013 university parking audit is included in **Appendix B**.

The parking permits are available to staff as well as postgraduate and evening students. The existing annual pricing for car parking on campus is shown in **Table 3**.

Table 3- Parking prices on campus

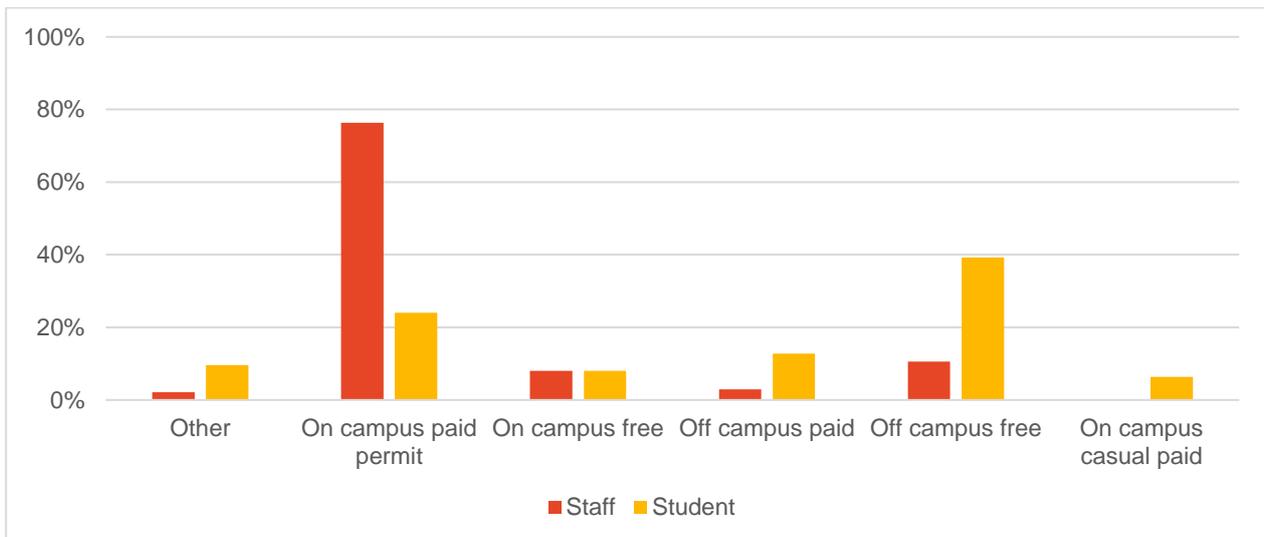
Parking permit type	Price
Camperdown or Darlington staff	\$520
Mallett St Single (staff)	\$1,030
Mallett St Tandem (staff)	\$520
Postgraduate student	\$396
Camperdown Student Evening (3pm to 6am)	\$300
Darlington Student Evening (3pm to 6am)	\$260
Conjoint off-campus staff (3 hour max)	\$136
University of Sydney Union/sport staff	\$520

Source: <https://sydney.edu.au/campus-life/getting-to-campus/parking.html> (2018)

Casual parking is also available in carparks surrounding the University, including Shepherd Street carpark and Western Avenue Carpark that is available for students and staff to use.

Of the 275 staff and 125 students that responded to the question in the 2017 travel survey on where they parked; 78 per cent of staff stated they parked on campus with a parking permit, while the majority of students who drove (39 per cent) parked off campus for free. Results of the parking location of students and staff are shown in **Figure 17**.

Figure 17- Parking locations at the University (Camperdown/ Darlington Campus)



Source: 2017 University of Sydney travel survey

Land use and key centres

The University is mostly an educational precinct with related land uses, however, the Main Campus benefits from its surrounding mix of primary and secondary schools, tertiary institutions, health facilities, research institutes, transit nodes, retail and commercial precincts, recreational land uses and a diverse mix of residential.

The significance of such diverse surrounding land uses close to the City justify an ongoing investment in active and public transport networks that will encourage ongoing sustainable transport uptake between these land uses.

Key centres of interest near the University include:

- Royal Prince Alfred Hospital and related medical precinct;
- The University of Notre Dame;
- University of Technology Sydney;
- TAFE NSW, Ultimo;
- Sydney's CBD;
- Australian Technology Park (ATP);
- Carriage Works;
- Trains stations (including Central Station, Redfern Station, Macdonaldtown Station and Newtown Station);
- King Street shopping and restaurant strip;
- Glebe and Paddy's Market light rail stops;
- Victoria Park Aquatic Centre and gym;
- University of Sydney Sports and Aquatic Centre;
- Numerous outdoor playing fields, courts and parks;
- Broadway Shopping Centre;
- Central Park Mall;
- The Enmore Theatre; and
- Glebe Point Road shops and restaurant strip.

The key land uses are shown in **Figure 18**.

Figure 18 - Key land uses



Travel patterns

Mode share

Transport mode share was assessed from the University travel surveys conducted in 2012 and 2017. In 2012 931 staff respondents to this survey and in 2017 this increased to 1146 from the Darlington and Camperdown campuses. For students, there were 1,282 respondents in 2012 on the question of mode share, and in 2017 there were 1,928.

It was noted that using these travel surveys will provide approximately 3 per cent margin of error at a 95 per cent confidence interval. (Source: Check market sample size calculator)

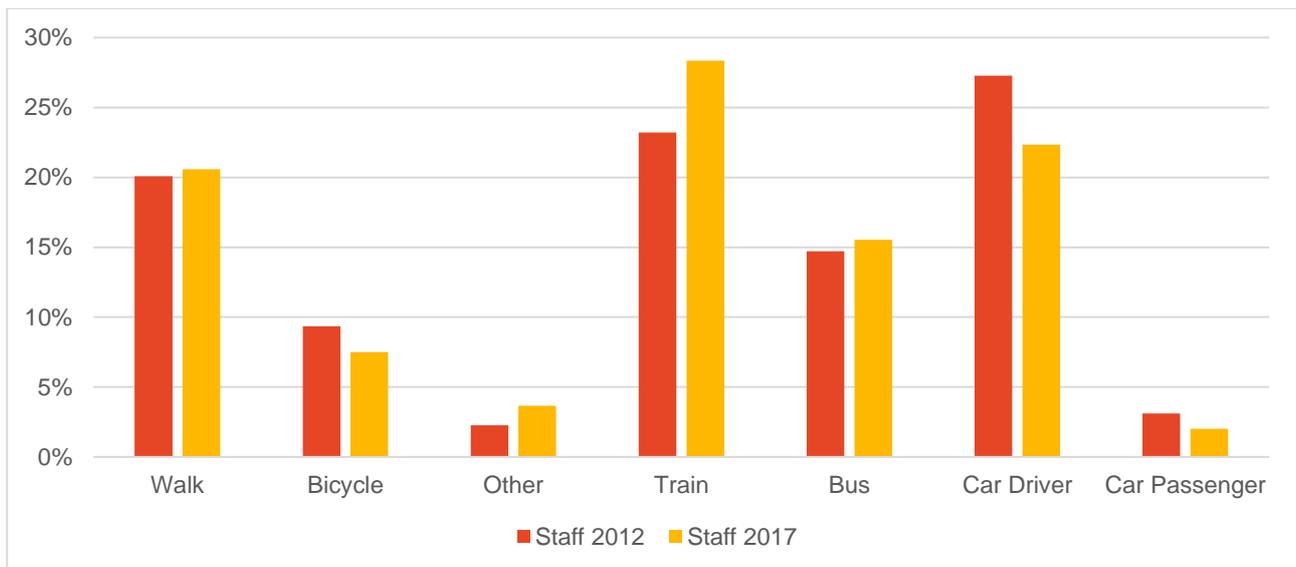
Staff

Results showed that between 2012 and 2017, staff using public transport increased from 38 per cent to 44 per cent, this includes train and bus patronage. The total number of active transport users stayed relatively stable (at around 29 per cent) but more notably, there was a slight decline in the percentage of staff bicycle riding; countered by a slight increase in those walking. In both survey years, about 20 per cent of staff were found to walk to University.

Those arriving by private vehicle reduced from 30 per cent in 2012 down to 24 per cent in 2017. The number of staff arriving as car passengers also declined. In summary, the results indicate there is a clear trend amongst staff towards public transport use.

Overall, staff travel mode share to the University via sustainable transport is currently 73 per cent. A summary of staff survey results is shown in **Figure 19**.

Figure 19 - Staff transport mode share to the University (Camperdown/ Darlington Campus)



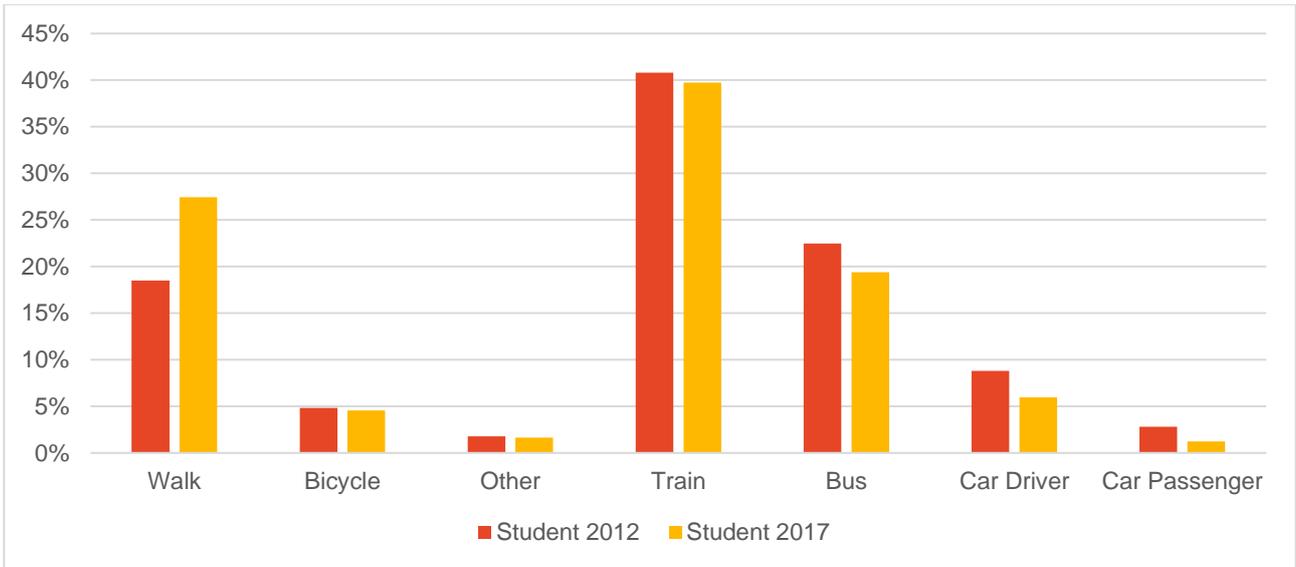
Source: 2012 and 2017 University of Sydney travel survey

Students

Mode share results for students attending the University indicate there has been a higher percentage of students (compared to staff) using public transport; 2012 (63 per cent) and 2017 (59 per cent). There was a slight decrease in the number of students travelling by train. Active transport travel has also increased, especially in walking with an increase of nine per cent to 28 per cent mode share in 2017. This increase in walking to campus and reduction in other modes can likely be attributed to the increase in student accommodation in and surrounding the University.

Overall, student mode share to the University via sustainable transport is currently 91 per cent. Results for students is displayed in **Figure 20**.

Figure 20 - Student transport mode share to the University (Camperdown/ Darlington Campus)

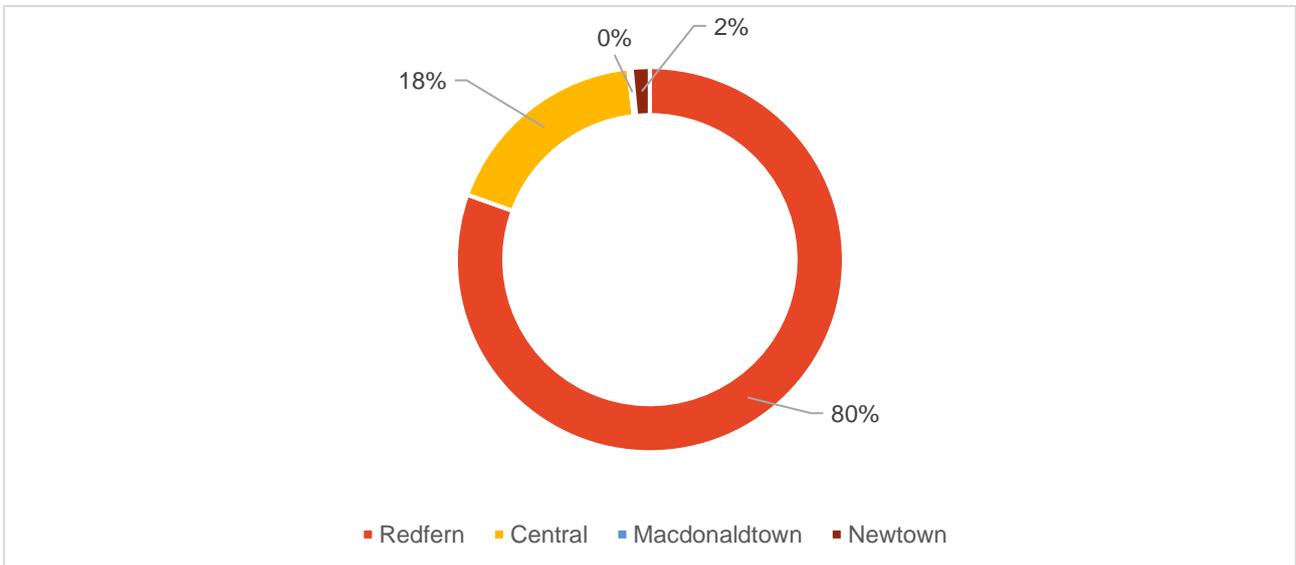


Source: 2012 and 2017 University of Sydney travel survey

Station used to access the campus

From the survey results in staff and student, the train network transports the majority of people to and from the University. From the 2017 travel surveys, the stations most widely utilised were Redfern Station (80 per cent), Central (18 per cent) and Newtown (2 per cent). Macdonaldtown had a very small amount of students and staff utilise this station. A summary of these results is shown in **Figure 21**.

Figure 21 - Train Station used to access the Camperdown/ Darlington Campus



Source: 2017 University of Sydney travel survey

Staff and students travel locations

Staff

The locations of staff and students were taken from 2018 postcode data for all campuses of the University. The data showed that the majority of staff lived in the following regions:

- Inner West;
- Lane Cove;
- Epping;
- Hornsby;

- Baulkham Hills;
- Bella Vista;
- Westmead; and
- Pendle Hill.

A high number of staff live within five to ten kilometres of the University. Bus routes to the University service the majority of these staff locations, particularly in the Inner West. The main region with a high number of staff with limited direct public transport services to the University, was in north-west Sydney, close to Baulkham Hills, Bella Vista and Lane Cove. North-west Sydney is due to have a direct metro line that is detailed in the **Future Plans Section**, which will provide a connection to the train network. **Figure 22** shows where staff residents that travel to all the University campuses.

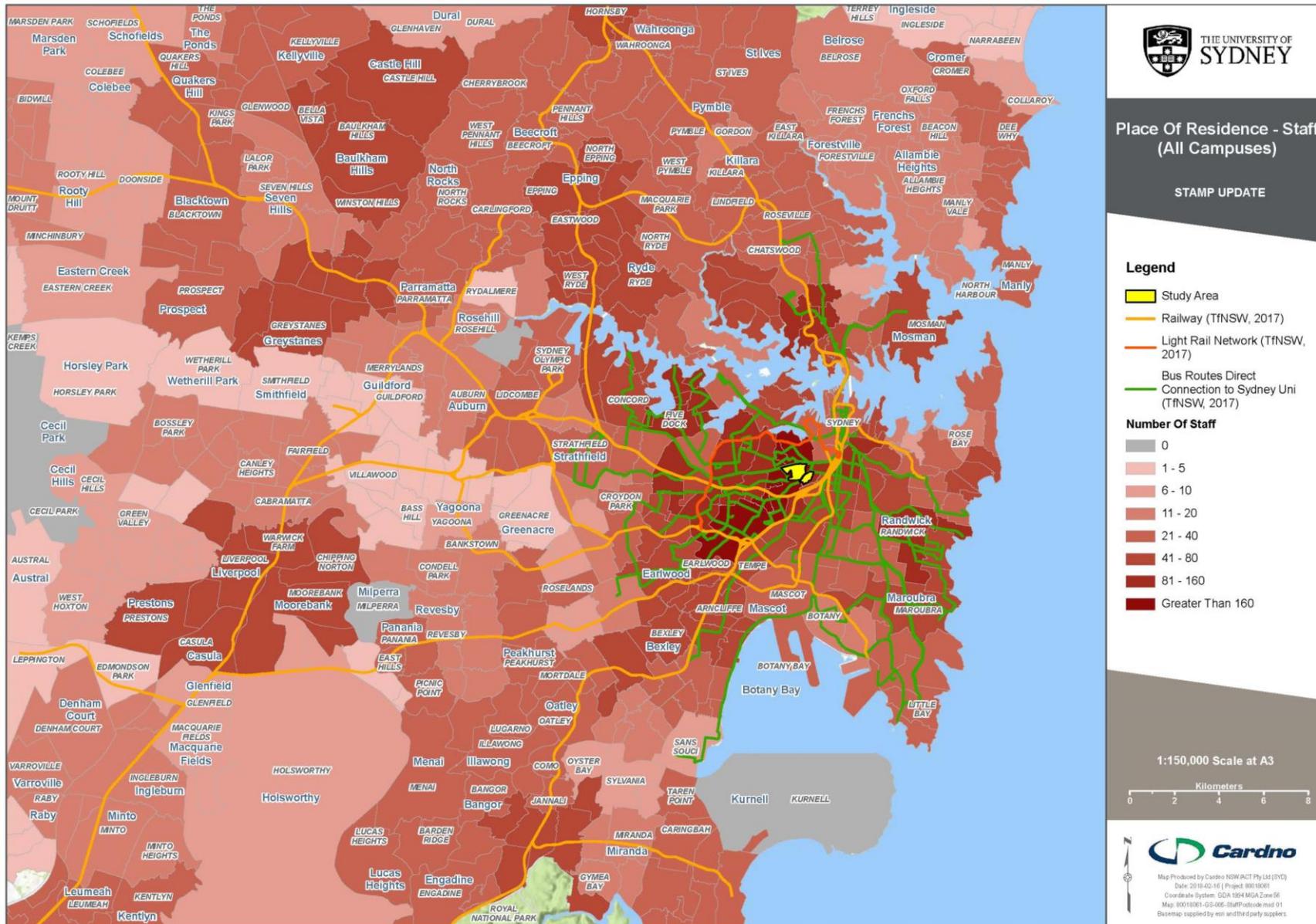
Students

For students, there are a number of locations that have a high density of students living. The largest is Chippendale and Camperdown. Other high-density locations with over 1,000 students living include:

- Newtown;
- Ultimo;
- Sydney CBD;
- Glebe; and
- Burwood.

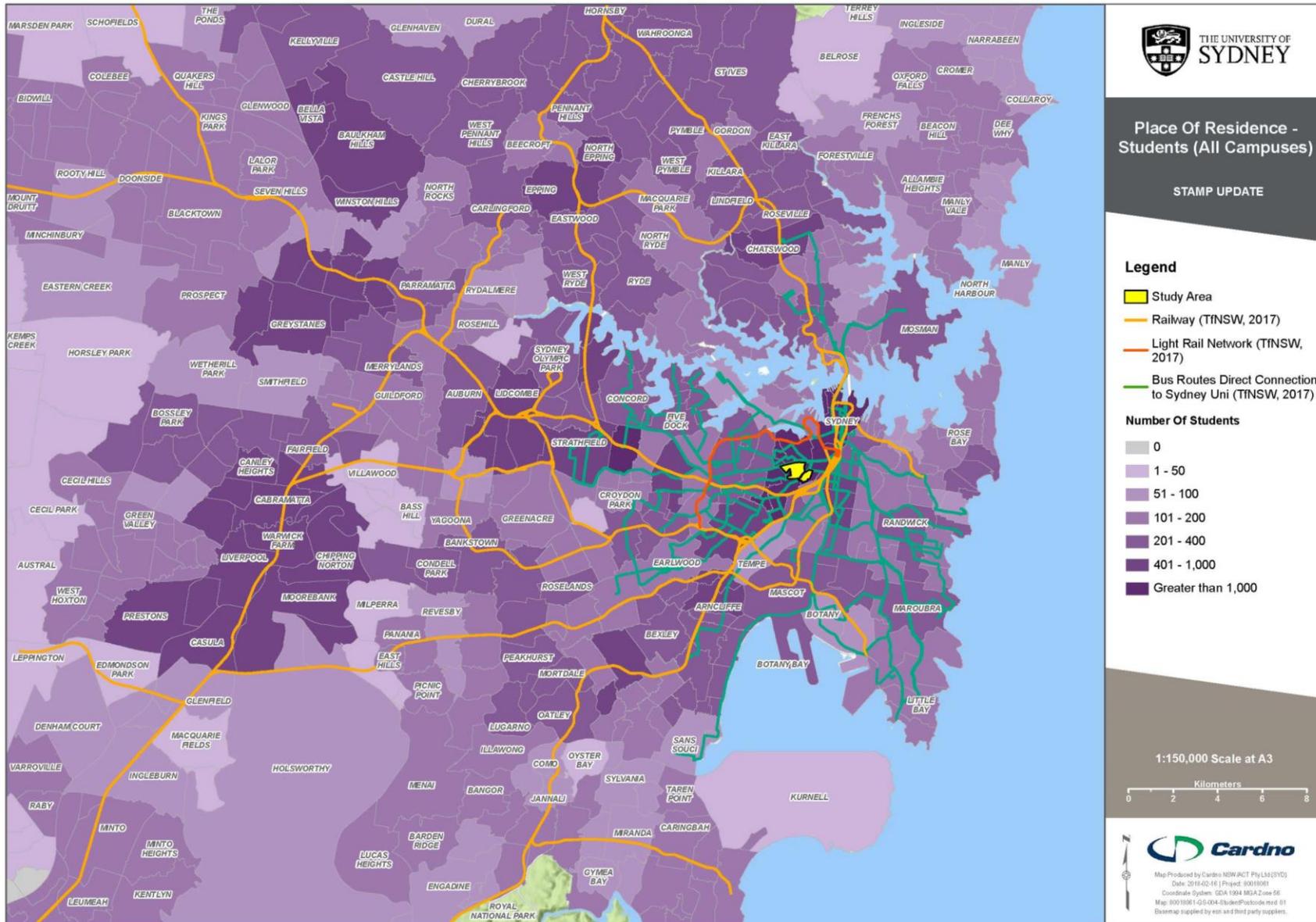
Similarly to staff, there are a high number of students living close to or on campus. A high number of students also live close to train lines that can provide access to Redfern and Central Station. A summary of student residences is given in **Figure 23**.

Figure 22 - Staff residence



Source: 2018 University of Sydney postcode data

Figure 23 - Student residence



Source: 2018 University of Sydney postcode data

Future plans

There are a number of future plans that have been developed by the state and local governments that will affect the University. These projects include the redevelopment, revitalisation of lands, and proposed major infrastructure projects that will potentially increase the flow of people to and through the University.

University of Sydney

The University has plans to significantly increase student and staff population from 2018 to 2022. There is predicted to be an increase in student and staff population by 18 per cent through to 2022. The predicted student and staff populations are shown in **Table 4**.

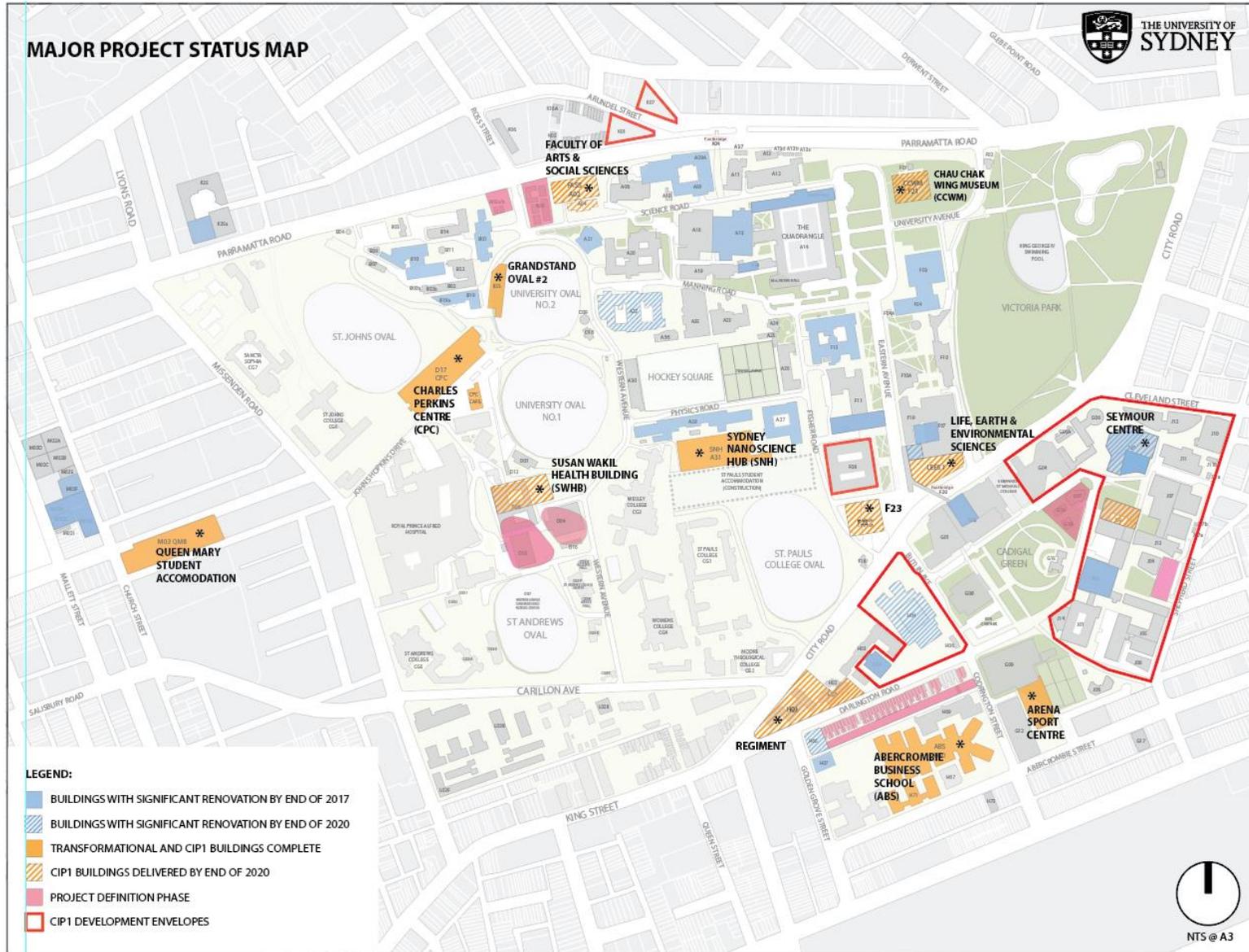
Table 4 - Project student and staff population

	2018	2019	2020	2021	2022
Effective Student Load (EFSTL)	42,939	44,256	50,195	50,880	50,811
Staff Full time Equivalent (FTE)	6,111				7,211

Source: University of Sydney (2018)

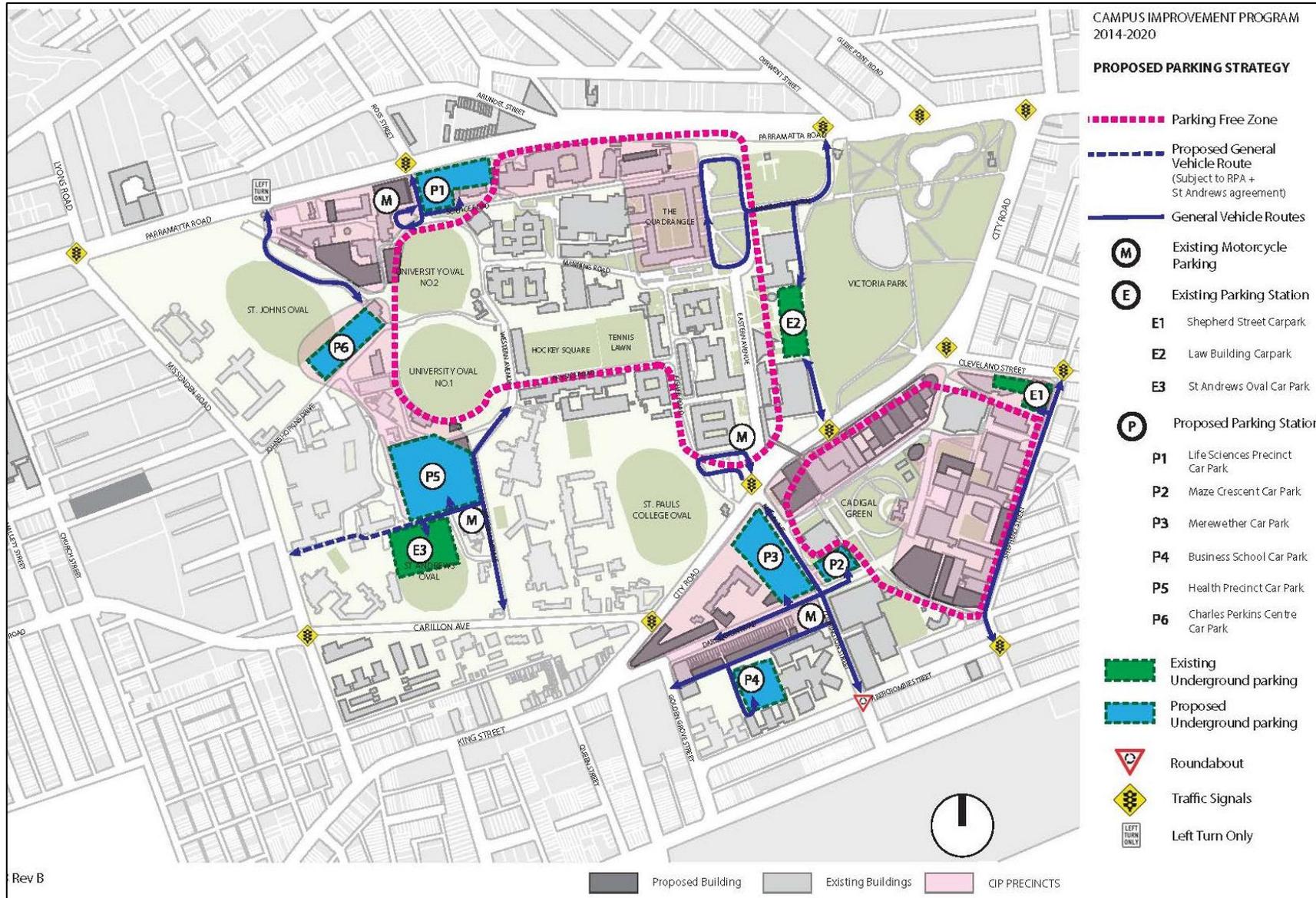
In addition to the increase in student and staff population, the CIP plans propose changes to buildings, vehicle access and parking to the University. A map showing the CIP future improvements to buildings is shown in **Figure 24**. **Figure 25** also provides a map of the proposed vehicle free zones and general vehicle routes through the University.

Figure 24 - Campus Improvement Plan building developments



Source: University of Sydney Campus Improvement Plan (2013)

Figure 25- Campus Improvement Plan Parking Strategy



Source: Campus Improvement Plan Access Strategy (Arup, 2013)

The proposed end of trip facilities in each building are shown below in **Table 5**.

Table 5 - Proposed end of trip facilities

Building Name	Bicycle Parking		Showers	Lockers	Water fountain
	External	Internal/ secure			
Sydney Nano Institute (SNI)	10	0	6	32	1
Charles Perkins Centre (CPC)	8	77	14	224	2
Abercrombie Business School (ABS)	192	206	8	58	2
Administration Building	0	74	7	66	1
LEES 1	0	27	4	102	3
FASS & RD Watt	92	33	13	118	1
Engineering Technology Precinct (ETP) Stage 1	29	30	11	33	0
Chau Chak Wing Museum (CCWM)	8	4	1	115	1
Susan Wakil Health Building (SWHB) - Health Precinct Stage 1	299	35	25	75	0
Regiment (student accommodation)	48	175	2	10	0
Total	686	661	91	833	11

Source: University of Sydney (2018)

Central to Eveleigh Urban Transformation (2016)

The Central to Eveleigh Urban Transformation Strategy aims to progressively transform the 50 hectares of government-owned land along the rail corridor south-west of the CBD over the next 30 years. UrbanGrowth has projected 16,000 new dwellings and 21,000 new jobs in Central to Eveleigh Corridor over the next 20 to 30 years.

The North Eveleigh precinct in Central to Eveleigh close to the University and RPAH precinct is forecast to have 750 new dwellings by 2036 and 3,328 jobs.

Parramatta Road Urban Renewal Strategy (2016)

Delivery of WestConnex and the associated traffic reduction along Parramatta Road presents opportunities for urban renewal along the road. UrbanGrowth is planning to transform the Parramatta Road Corridor over the next 30 years through investment in homes, jobs, transport, open spaces and public amenity. The key principles for the strategy include planning diversity in housing and employment in liveable local precincts and connecting places to better serve customers and encourage sustainable travel. The Camperdown precinct is anticipated to have an additional 700 homes, 2,300 jobs, and 1,400 residents by 2056. The state government in October 2016 released the final Strategy and Implementation Toolkit.

Bays Precinct

The Bays Precinct Program led by UrbanGrowth is the transformation of 95 hectares of land and 94 hectares of waterways in Sydney Harbour. The redevelopment over the next 20-30 years will see the precinct evolve into a bustling hub of enterprise, activity and beautiful spaces. This will deliver new employment focused on export-oriented and knowledge-intensive jobs, socially inclusive spaces, housing diversity and mass and active transit solutions. The anticipated number of new residents and workers has not been finalised, but will likely increase pressure on the transport network.

Planned major transport projects

WestConnex Stage 3

The planned route for Stage 3 of WestConnex, the M4-M5 Link, will connect Haberfield to St Peters. The most recent design proposes that the link is moved west; meaning that entry and exit ramps will not be required at Camperdown and the RPAH will be unaffected. The project, to be completed in 2023, is expected to ease traffic congestion, and result in more reliable trip times. Implementation of Stage 3 will require alignment with the existing road network to support access to the motorway. The design will need to future-proof opportunities for new public transport options, such as on-road rapid transit along Parramatta Road.

The impact on the road network around the precinct during the project implementation will be significant. Given the low level of service already experienced along the road network, congestion and travel time unreliability are expected to increase.

Burwood-Sydney CBD rapid bus route

The Burwood-Sydney CBD rapid bus route is a rapid transit corridor that will connect Burwood and the Sydney CBD, which is included in Sydney's Bus Future. Community consultation conducted by UrbanGrowth as part of the Draft Parramatta Road Urban Transformation Strategy showed that improved public transport services were the community's highest priority for the corridor, followed by safer and better bicycle routes. The rapid transit corridor would require staged implementation to successfully integrate with WestConnex.

The Burwood-Sydney CBD rapid bus route service will provide high capacity and high-frequency limited stop services connecting the inner west to the CBD, via the Broadway and Camperdown Education and Health Precinct. Public transport journeys will become faster and more reliable through the operation of higher-frequency and higher-capacity bus services, additional on-road priority, and bus stop enhancements. The Burwood-Sydney CBD rapid bus route will integrate with north-south rapid and suburban bus routes connecting major centres such as Macquarie Park, Burwood and Hurstville, and with the dense network of local bus services.

While Bus Rapid Transit is the popular short-medium term solution, the Light Rail is also being investigated for the Parramatta Road corridor in the longer term, to support the expected growth detailed in the Parramatta Road Urban Transformation Strategy.

Redfern Station Upgrade

As part of the Central to Eveleigh Urban Transportation Strategy, there are plans to provide a potential southern concourse at Redfern Station. The plan also notes potential new active transport crossing over the train lines between Australian Technology Park and Carriageworks to facilitate connections between north and south Eveleigh. The strategy states the importance of improving ties between Redfern and the University, as well as innovative industries surrounding the University.

No timings and designs have been created for the Redfern Station upgrade.

Central Station Precinct

TfNSW is working to develop a vision and plan for the Central Station precinct, focusing on connecting the transport modes with the surrounding recreational, business, residential and educational areas and revitalising public spaces. The upgrade will facilitate interchange with the new CBD and South East Light Rail and Sydney Metro services. The upgrade is undergoing initial community consultation to guide the vision for the revitalised Central Station, and construction of walking infrastructure is expected to start in 2018.

Sydney Metro

Sydney Metro West is a proposed metro line stretching from the Sydney CBD towards Parramatta. The NSW government committed to this project in 2017. The new metro line will provide additional rail capacity between Parramatta to the CBD connecting new communities along the route. Key precincts that have been identified include Parramatta, Sydney Olympic Park, The Bays Precinct and Sydney CBD. This project is currently in the planning phase. The remainder of the metro station locations have not been finalised, and the location of a metro station at or close to the University is a key objective of the University.

Sydney Metro City & Southwest is a proposed metro line along the existing Bankstown Line (which will be converted to Metro tracks) to the city and northwest (along with Sydney Metro Northwest). Sydney Metro City & Southwest is due for completion in 2024. A station is proposed to be built in Waterloo, approximately 1.5 kilometres from the University entrance. There is potential for students and staff to alight from Waterloo Station to arrive at the University.

Sydney Metro Northwest is currently under construction and will be opened in 2019. This metro line will provide services from Rouse Hill to Chatswood, and provide those travelling to and from the northwest more convenient access to the University. Sydney Metro Northwest will connect to Sydney Metro City & Southwest in 2024 from Chatswood.

Lawson Street improvements

Plans have been developed in 2015 by the City of Sydney for the improvement of walking and bicycle access along Lawson Street. The key improvement west of Redfern Station is to move the trees onto the roadway to increase the clear width of the footpath to 2.5 metres. Artist's impression for the walking improvements is shown in **Figure 26**. East of Redfern Station, a dedicated cycleway is planned to link into Wilson Street. Artist impressions of this plan is shown in **Figure 27**.

Figure 26 - Lawson Street walking improvements



Source: City of Sydney Lawson Street improvements (2015)

Figure 27 - Lawson Street bicycle improvements



Source: City of Sydney Lawson Street improvements (2015)

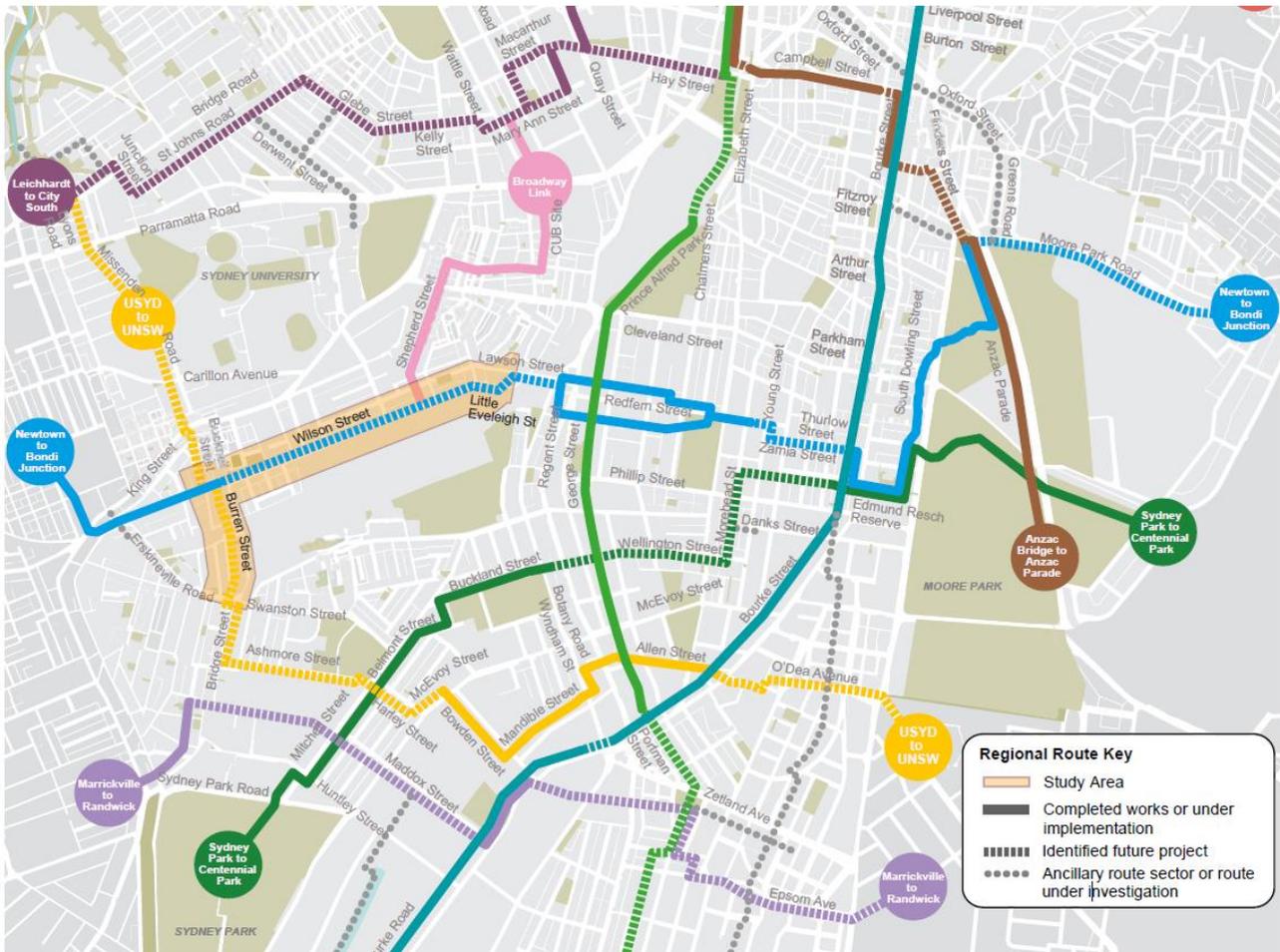
Regional bicycle route map

The City of Sydney has developed a number of plans to develop a safer regional bicycle network to connect major hubs. Key routes providing connections to the University include:

- Leichhardt to City South;
- The University of Sydney to UNSW;
- Newtown to Bondi Junction;
- Broadway Link;

Figure 28 shows the existing and proposed regional bicycle route network.

Figure 28 - Regional bicycle route network



Source: City of Sydney

Wilson Street improvements

As part of the Bondi Junction to Newtown regional network, there is a proposal to provide a two way separated cycleway along Wilson Street. Additional cycleways will be provided on Burren Street and Pine Street. An artist's impression of the Wilson Street cycleway network intersection with Burren Street is shown in Figure 29.

This bicycle link will also provide improved connections to the University between Redfern and Macdonaldtown Stations.

Figure 29 - Wilson Street cycleway proposal



Source: City of Sydney Wilson Street Cycleway (2016)

Challenges and constraints

There are a number of challenges why students and staff choose not to use sustainable transport to travel to and from the University. This section will outline existing challenges and constraints for encouraging sustainable transport. It will also outline gaps in the active and public transport networks.

Walking

There are a number of constraints for walking, that if addressed have the potential to increase the number of students and staff walking to the University, as well as taking public transport. The key points include safety, footpath congestion, limited activation after hours, and limited walking priority.

Safety

Walking safety is one of the key factors for limited used of sustainable transport. Away from the major roads of Missenden, City and Parramatta Roads, footpaths on route to the University have poor passive surveillance due to poor lighting and lack of activation after hours.

Lawson Street is a specific example where staff and students may feel unsafe. Currently, all lighting along this stretch is provided above the tree canopy. This results in dark footpaths, which is not an attractive walking route, especially at night.

Within the Camperdown and Darlington campuses, away from the Eastern Avenue walkway, there is poor activation, particularly after hours. Areas where there is poor activation include the Life Science, Health and Cultural Precincts. In particular, it is noted there is a lack of retail and food land uses in this area at street level. People must also walk through carparks and along the road which does not provide an attractive walking route throughout the University.

Narrow footpaths

There are a number of key routes to and within the University that experience congestion due to footpath widths.

The key route is along Lawson Street, which has walking volumes of approximately 2,500 during the morning peak period. The southern side (which 90 per cent of people use during peak periods) of the road has a footpath clear width of 1.8 metres and has a number of obstructions due to trees, power poles and general street furniture. Lawson Street is shown in **Figure 30**.

Within the University, Manning Road is a highly utilised walking corridor that has footpaths provided on both sides of the road. In 2016, 11,730 people used Manning Road over a 24-hour period. This road is unattractive to walk along as people are required to walk through car parks, with vehicle priority provided.

Access points from Parramatta Road for both vehicles and people have narrow pedestrian entrances. These access points do not provide an attractive gateway into the University. University Avenue entrance is shown in **Figure 31**.

Figure 30 - Lawson Street footpath



Figure 31 - University Avenue entrance



Gateways into the University

The gateways into the University are poor for walking and bicycle riders, with limited wayfinding and signage showing entrances into the University. This is especially apparent from Missenden Road entrance, along John Hopkins Drive. There is limited wayfinding, as shown in **Figure 32**.

Entrances from Victoria Park are also limited, with no gateway signs showing people walking have reached the University. This is shown in **Figure 33**.

Figure 32 - Missenden Road entrance



Figure 33 - Victoria Park entrance



Source: Google streetview, 2017

Connectivity between Darlington and Camperdown campuses

The existing connectivity between the Darlington and Camperdown campuses is either through the pedestrian overpass or at the signalised crossings.

The existing pedestrian overpass has relatively poor wayfinding when on approach from the Darlington campus. People walking are also required to walk through a building and make a number of turns to access the overpass. Overall, this pedestrian overpass does not provide direct access between both campuses.

The signalised crossings are also highly utilised by people walking, however, vehicle priority is generally provided with limited walking time provided for people walking. People walking must also walk towards one of two signals that are not necessarily on the direct desire line.

Connections to surrounding developments

There are a number of surrounding developments that have poor connectivity. The major development is the Australia Technology Park and Carriageworks that could potentially attract industries to the University. The railway line is a constraint to direct access to the University.

Connections to future developments

There are a number of key developments in close proximity to the University that could see increased walking volumes on certain footpaths. These include the Central to Eveleigh Precinct, Bays Precinct and Waterloo Metro Station.

Cycling

The existing bicycle network surrounding the University has limited off-road paths that discourage students and staff living within bicycle riding distance of the University. Although the bicycle map shown in **Figure 10** appears extensive, the majority of these routes are not dedicated facilities.

When on campus, the majority of roads are designated as bicycle friendly. There is however limited wayfinding to end of trip facilities throughout the University.

On the internal road network, shared zones have not been put in place, providing priority to vehicles. Entrance signage is shown in **Figure 34**.

Figure 34 - Vehicle entrance signage



Train

Redfern

Redfern Station currently only has an eastern concourse, which provides relatively poor connectivity to the University, Australian Technology Park and Carriageworks. The existing concourse forces people walking to access the University to use Lawson Street that as discussed before is highly congested with people during peak periods.

Macdonaldtown

Macdonaldtown Station is currently underutilised by students and staff to the University, with less than 0.5 per cent of students and staff using this station. This could be due to distance, poor wayfinding and security to the University.

Buses

Bus stop customer waiting capacity for commuters along Parramatta Road is generally poor, due to the relatively constrained footpath width. Those with accessibility needs or prams would be unable to navigate through waiting passengers during peak periods. An example of the Parramatta Road bus stop is shown in **Figure 35**.

Figure 35 - Parramatta Road bus stop



Light Rail

Glebe Point Light Rail stop is located a 1.2 kilometre walk from the University Avenue entrance, however there is minimal usage of light rail, which accounts for under 1 per cent of all students and staff. This could likely be due to relatively poor wayfinding and security in the evenings.

Parking

Parking at the University for staff is currently cheap in comparison to other Universities in Australia. Parking is the only mode that can be salary sacrificed.

Reason for driving to the University

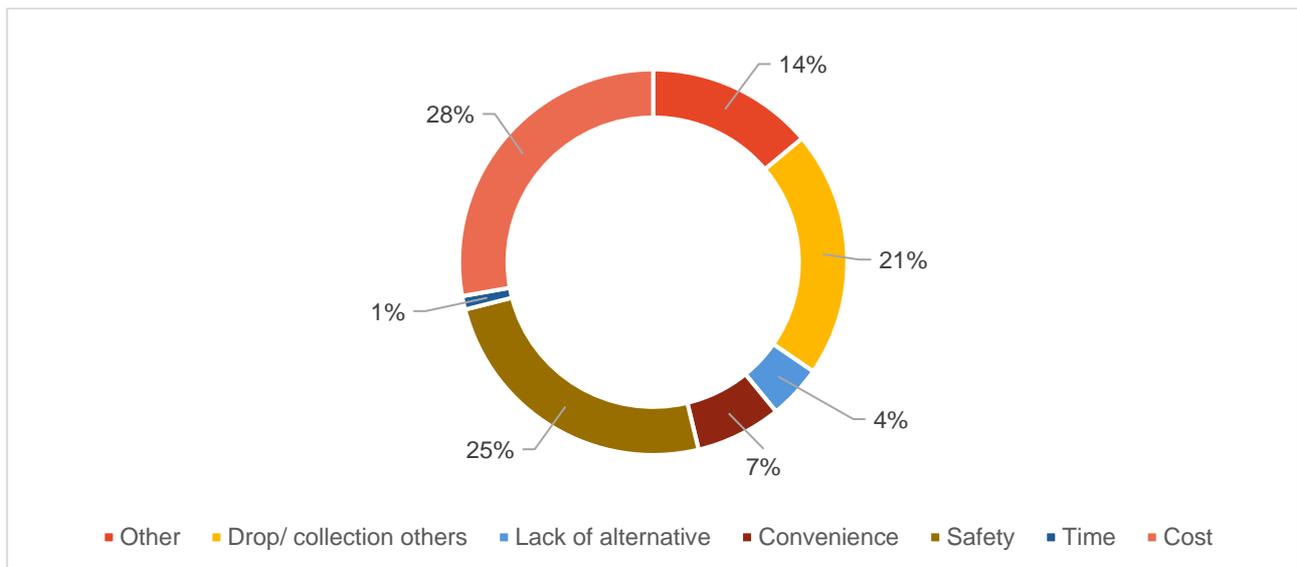
Understanding the reasons why staff and students drive to the University is important. This will help guide where the University will focus its efforts to achieve its goal of 90 per cent sustainable travel by 2030.

Staff

From the 2017 University travel survey, 266 staff responded to the question on why they choose to drive to the University (Camperdown or Darlington campuses). The highest rated reason was safety, followed by cost that accounts for 53 per cent of staff combined. Drop off and collection of others followed with 21 per cent. Only seven per cent of staff rated convenience and five per cent time as the key factor for driving.

A summary of this data is provided below in **Figure 36**.

Figure 36 - Why staff drive to the University (Camperdown/ Darlington campuses)



Source: 2017 University of Sydney travel survey

The cost of parking on campus is also deemed too low, especially due to the salary sacrificing for parking permits, and not for sustainable transport. From the **Existing Infrastructure Section**, it was clear that the majority of staff (84 per cent) that drive to the University use a parking permit to park on campus. This will be considered within opportunities.

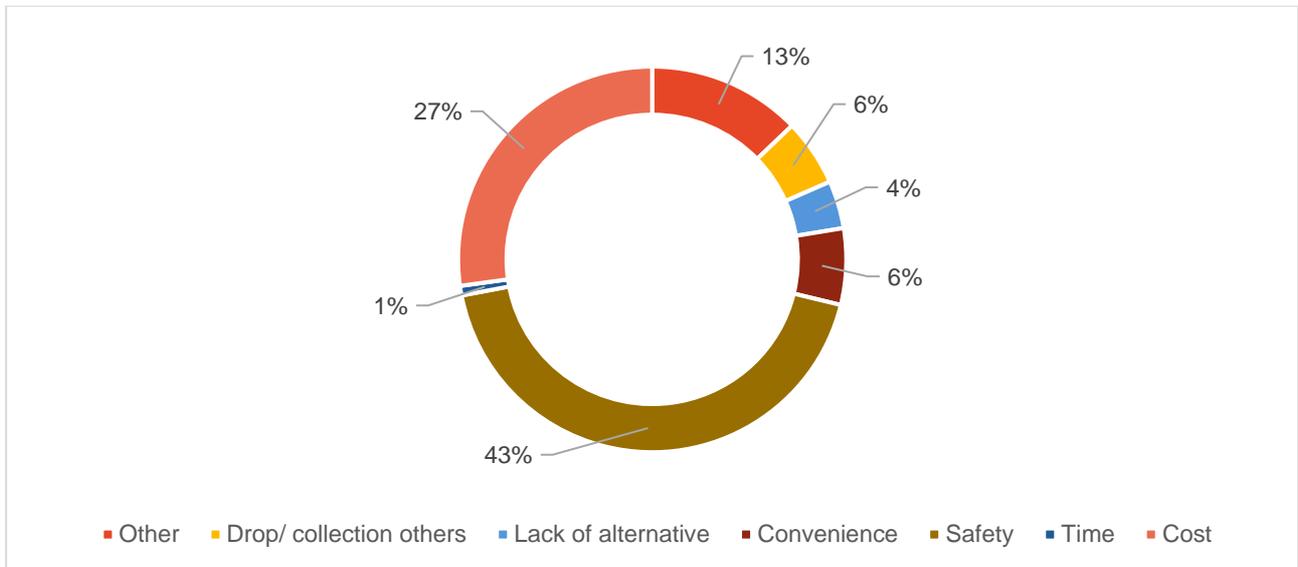
Students

From the 2017 University travel survey, 125 students responded to the question on why they choose to drive to the University (Camperdown or Darlington campuses). The surveys show that the majority of students (43 per cent) drove to campus due to safety concerns. Additionally, students also stated costs as the main factor (27 per cent).

From the **Existing Infrastructure Section**, the majority of students (52 per cent) parked their vehicles off campus, either paid or free.

A summary of the survey results are shown in **Figure 37**.

Figure 37 - Why students drive to the University (Camperdown/ Darlington campuses)



Source: 2017 University of Sydney travel survey

It is clear, as for staff that safety is a clear concern for students as well. This will be discussed in detail in the **Opportunities Section**.

Case studies

Case studies have been developed to provide the University of examples of how to provide improvements to some of the challenges and constraints discussed in the previous section. These case studies provide examples of how other Universities and cities have implemented various projects to improve the sustainability of travel to and within the precinct.

End of trip facilities

Comparing the 2012 and 2017 University travel surveys showed that bicycle riding as a percentage of mode share has fallen in recent years. In order to attract the maximum number of would-be bicycle riders, the number and location of End of Trip Facilities (ETF) need to be assessed. Examples of Universities that have provided ETF's include Adelaide University, University of Newcastle and University of Queensland that are discussed below.

Adelaide University

Adelaide University is typical of most Australian campuses. It offers showers, change rooms, lockers, undercover racks, water refill stations and bicycle maintenance facilities. ETFs are scattered around its campus, though in some buildings they are only available to male or female users and locked at night. Bicycle security remains a major concern and theft is common on campus, students are therefore not encouraged to leave bicycles locked up after hours. To help counter the trend, additional 'caged sheds' have been installed to offer peace of mind. Registration is required to gain access to all campus ETFs and caged facilities, and the university website provides a number of tips on how best to protect property from theft.

An example of the Adelaide University bicycle cage is shown in **Figure 38**.

Figure 38 - Adelaide University bicycle cage



Source:

<https://www.adelaide.edu.au/ecoversity/resources/endoftrip/>
(viewed 2018)

University of Newcastle

The University of Newcastle offers 24/7 access to all its ETFs, and pre-registration is not required as access is achieved via a standard student or staff card. Newcastle's ETFs are not found in multiple buildings, but consolidated in just two locations, to form 'bicycle hubs'.

Bicycle hubs are a way of providing cost-effective one-stop shops for the active commuter and avoid the need for expensive retrofits of existing buildings. Because they are often large stand-alone facilities, they can also more effectively promote that ETFs are available on campus and re-enforce that bicycle riding or exercise before classes is an option to staff and students. Each hub at the University of Newcastle hosts a large number of pin-operated lockers, these lockers are programmed to open automatically after midnight to ensure daily use only and regular turnover of facilities.

Longer-term lockers can be hired at other universities, but trends show numerous lockers remain idle once leased in this way. 24/7 access is supported with CCTV cameras and regular security patrols around EFT sites

on the campus, to increase users' sense of safety. In addition, multiple unisex but single-occupant shower cubicles have also been provided to increase privacy.

Examples of the University of Newcastle bicycle hubs are shown in **Figure 39** and **Figure 40**.

Figure 39 - University of Newcastle Bicycle Hub



Source: <https://www.newcastle.edu.au/current-students/campus-environment/transport-and-parking/cycling-to-campus/bicycle-hubs> (viewed 2018)

Figure 40 - Lockers inside University of Newcastle Bicycle Hub



University of Queensland

The University of Queensland has seven bicycle hub facilities and allows people to hire out lockers on a monthly basis provided they commute most days of the week by active means. Each 'Bike Box' is equipped with showers, lockers, drying rooms and ironing boards. The University of Queensland also has a number of smaller EFTs around campus within certain buildings, but they are not as comprehensive in function as the 'Bike Boxes' which are painted brightly to stand out. Any bicycle locked up in the one spot for more than two weeks is removed by the university to ensure the racks are well utilised.

Since 2011, the University of Queensland has seen an increase in 32.5 per cent in bicycle riders arriving at its St Lucia campus.

Examples of the University of Queensland bike boxes are shown in **Figure 41** and **Figure 42**.

Figure 41 - Lockers inside University of Queensland Bike Box



Source: <https://www.pf.uq.edu.au/cycling/images/BB-herston.jpg> (viewed 2018)

Figure 42 - University of Queensland Bike Box



Source: <https://www.pf.uq.edu.au/cycling/endoftrip.html> (viewed 2018)

Parklets pilot program: Making better use of bitumen

Research by Donald Appleyard (published in his book *Liveable Streets*, 1981) was among the first scientific analysis to document how traffic negatively affects upon the social cohesion of communities. The more car movements that pass through neighbourhood streets, the more perceived danger, noise and disconnect for the people who live there. The recommendation has been made through the Campus Improvement Plan and Public Realm Guidelines, to remove traffic from the majority of campus streets. The bitumen that is left behind provides an opportunity for placemaking and can become seen as something other than a corridor just for movement.

San Francisco

San Francisco has become famous in recent times for piloting a collaborative Pavement-to-Parks scheme that began with a trial back in 2010. The scheme facilitates the opportunity for one to two local parking spaces to be applied for, reclaimed and sponsored by either local community groups, non-government organisations or local businesses to create very small pop-up parks or ‘parklets’. Example parklets are shown below in **Figure 43** and **Figure 44**.

Figure 43 - San Francisco parklet



Source: *Parklet Manual SFC, 2015*

Figure 44 - San Francisco parklet



Source: *Parklet Manual SFC, 2015*

The trial of six Parklets installed across a variety of neighbourhoods received an immediate and warm reception convincing the Council to officially open its first round, appealing for proposals to issue new Parklet Permits. By 2014, there were more than 43 Parklets across the city, and the trend has been continuing ever since. The city has since published a manual to guide applicants towards a successful outcome.

The bitumen is reclaimed with a simple at-grade platform to the footpath before being transformed into anything a group may wish, so long as it follows the manual guidelines and provides an immersive place for the surrounding community, thus enhancing the public realm. The scheme has been so successful; it has now spread across North America and the world, including some University campuses.

University City District of Philadelphia

The University City District of Philadelphia conducted some analysis on the introduction of parklets around small business precincts and found that it led to a 20 per cent increase in sales, even during the campus quiet season when most students were away on the summer break. Other intangible benefits, showed that people’s views of the streets were improved and they came to see them more as their space, not just part of an intersection or something to avoid. Example parklets on the University campus are shown in **Figure 45** and **Figure 46**.

Figure 45 - University City District parklet



Source: <https://www.universitycity.org/parklets>

Figure 46 - University City District parklet



Source: *University City District Report (2015)*

The University City District has also developed a case study on the impact of sidewalk vitality and neighbourhood businesses in 2015. It found that different types of parklets bring in people at different times. For instance, ice cream shops can bring people in during the evenings, while a café can be utilised during early afternoon hours. This case study is attached in **Appendix C**.

Parklets can serve a variety of functions and be designed as permanent fixtures, or something be temporary or portable. For example, seasonal parklets are now employed in New York City, Philadelphia, and Chicago, but removed once winter sets in and few use them due to heavy snowfalls.

Were a parklet scheme initiated by the University of Sydney, it may dramatically increase the number of people choosing visit and spend time within the University. They may come to see the bitumen as less of a road and more an alternative place to relax, socialise and even study thereby fostering a far more obvious sense that the university can double as a 'community'. Parklets are one example of how to effectively place make a dormant street and activate an area with people.

Fleet car share

Sustainability of the vehicle fleet is one way in which the University can cut down its carbon footprint and lead by example to its students and staff. The use of a car share fleet could be useful for those students and staff who occasional are required to go somewhere with limited sustainable options, which would otherwise have driven to the University.

Australian National University

Australian National University (ANU) in Canberra traded in its entire vehicle fleet for a multi-purpose hybrid car share scheme back in May 2016. They engaged with GreenShareCar to provide an on-demand service rather than a long-term standing fleet.

Membership is activated through one's staff or student card, and usage of a vehicle is charged out at 'business' and 'private' rates. Business rates are simply charged back to the appropriate faculty that requires the use of the vehicle (for strictly work purposes) at no cost to the staff member. Private rates allow vehicles to be rented out to students and staff who are not on official business.

Rates start at \$11.99 per hour or \$78 per day, which can increase depending on the style of vehicle and if the daily allocation of 150km is exceeded, in which case every kilometre bears a cost. Bookings are secured through a 24/7 online app and scanning one's university ID card on a reader mounted to the car's windshield makes accessing the vehicle easy. Over the longer term, ANU's car share scheme can present a much cheaper option (for the infrequent drives to make a meeting across town on limited time, or who needs to deliver something of substantial weight), compared to the University owning a car.

ANU offers fourteen vehicles with a variety of makes to serve the user's purpose. There is designated parking provided for car share across the campus to ensure pickup and return remains straightforward. All hire rates include fuel costs, maintenance, cleaning and rental insurance - but not the \$1500 insurance excess which can increase depending on age, the type of vehicle hired and whether the person holds a foreign drivers' license. All excess charges can be reduced by 80 per cent if the user agrees to an additional upfront fee of \$1.99/hr or \$16.50 total, for the day.

ANU's car share fleet is shown in **Figure 47**.

Figure 47 - Australian National University carshare fleet



Source: <https://services.anu.edu.au/news-events/anu-carshare-%E2%80%93-the-smartest-way-to-travel>

Opportunities

Based on the analysis, this section highlights the opportunities to increase sustainable travel for staff and students from the existing mode share of:

- 73 per cent for staff; and
- 91 per cent for students.

Opportunities have been provided for each mode.

Walking

Safety

Safety around the University can be improved through a number of methods, which include improved lighting or providing increased activation through mixed land uses. Both of these methods have the potential for improving perceived safety to and through the University. It was noted that this has also been highlighted in the University Travel Plan.

Lawson Street can benefit greatly from the implementation of improved pedestrian lighting that is provided below the tree canopy. This will improve the visibility of all people walking as well as increase passive surveillance along the road.

Throughout the University, especially through the Life Science, Health and Cultural Precincts diverse land use types should be provided that includes retail and food land uses. All new buildings should include public realm activation strategies. This can also include the introduction of parklets to bring people to the University after hours. Increasing the activation of an area will improve walkers perceived safety that has the potential to increase the confidence of students and staff after hours.

Footpath congestion

Lawson Street is a key walking route, which has high walking volumes and a large number of pedestrian obstructions including trees, power poles and signage. As discussed previously, City of Sydney has identified plans to widen the Lawson Street footpaths to 2.5 metre clear width through the relocation of trees onto planted boxes on the road. The implementation of this plan has the potential to improve the attractiveness of Lawson Street and mode share of sustainable transport.

Within the University, there is the opportunity to provide a car free zone, especially along Science Road and Manning Road that carries 11,730 people per day. This will be in line with the Campus Improvement Plan Access Strategy. Currently, people walking are constrained to footpaths on either side of the road and must walk through carparks that cause potential conflicts between vehicles and people walking. The opportunity lies to pave the existing road surface, similar to the Eastern Avenue walkway, and then enhance activity along this route.

Access points from Parramatta Road with vehicle and walking access into the University are constrained for people walking by with narrow paths. There is the opportunity to widen paths that will encourage walking from Parramatta Road.

Gateways into the University

There is the opportunity for the University to provide gateway markers at all major entrances into the University. This will provide a sense of place for the University and show the general community that they have arrived at the University. Example gateway markers for Trinity University and the University of Regina are shown in **Figure 48** and **Figure 49**.

Figure 48 - Trinity University gateway



Source: <https://www.travelblog.org/Photos/4661639>

Figure 49 – University of Regina



Source: <https://www.pinterest.com.au/pin/443463894542707314/>

The University could potentially provide these gateway markers at the entrances from Victoria Park and the Missenden Road entrance, which could help to increase activity along these entrance corridors.

Connectivity between Darlington and Camperdown campuses

There is the potential to improve connectivity between the Darlington and Camperdown campuses, due to the high walking volumes. The opportunity lies to provide a large at-grade pedestrian signalised crossing across City Road, which covers the walking desire lines.

There is the potential to also create a boulevard feel along City Road with tree plantings that would improve the walking environment around the University.

Wayfinding between the two campuses should also be considered, especially to the pedestrian overpass from the Darlington campus.

Connection to surrounding and future developments

With future major developments occurring, specifically the Central to Eveleigh Precinct, Bays Precinct development and Metro Southwest the University has the opportunity to collaborate with other major industries and organisation to create sustainable links. Key links include direct connections between:

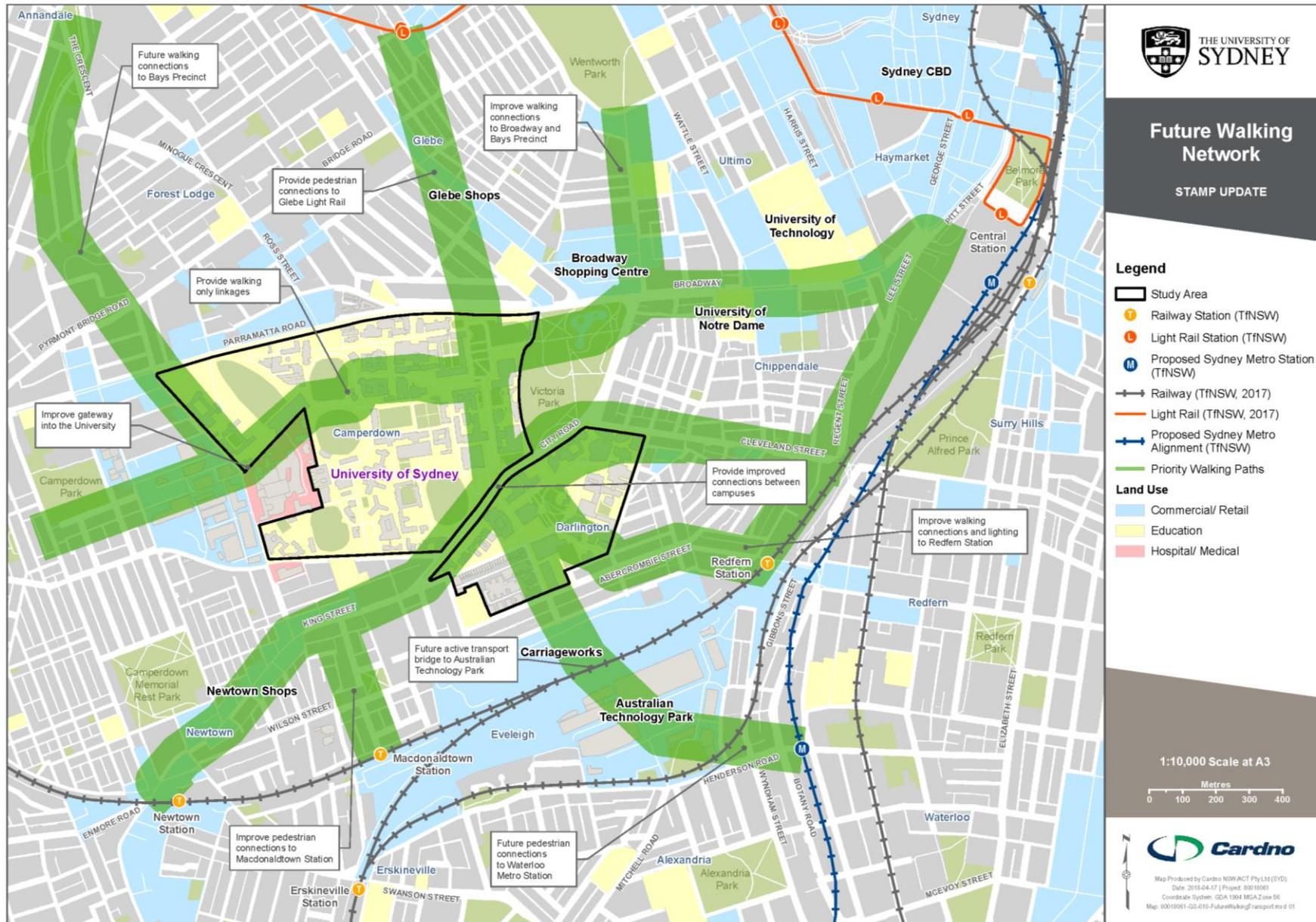
- Australian Technology Park;
- Carriageworks; and
- Waterloo Metro Station.

A key link could include a walking and bicycle bridge over the railway line to connect the two precincts.

University of Technology Sydney (UTS) is a key local example of where the collaboration between various organisations was used to achieve the sustainable outcome for the Ultimo Precinct. UTS worked closely with Council, TAFE Sydney, Powerhouse Museum, the ABC and Frasers Property to develop key walking and bicycle routes to destinations in the local neighbourhood.

A summary map showing the walking network opportunities is shown in **Figure 50**.

Figure 50 - Walking network opportunities



Cycling

Surrounding the University, there are limited off-road or separated bicycle routes. There is the opportunity to provide improved network connectivity within the Ultimo Camperdown Health and Education precinct.

Key links

There are a number of key links the University can work in collaboration with the City of Sydney to improve, bicycle riding mode share to the University. Generally, these links fall along the City of Sydney regional bicycle network.

Wilson Street

Potential improvements along Wilson Street proposed by the City of Sydney; to provide a separated cycleway would provide a key connection between Redfern, the University and Newtown. The Wilson Street cycleway could potentially connect to George Street, and further towards Bourke Street (east of Redfern). This could significantly increase the catchment of bicycle riders with access to separated cycleways.

Johnstons Creek shared path to the University

There is the opportunity for the University to work with the City of Sydney to provide an off-road bicycle path from Johnstons Creek shared path to the University. Currently bicycle riders must ride on-road between the Johnston's Creek shared path and the University, either along Booth Street (high traffic), Hereford Street (steep) or walk up stairs to Sterling Circuit. Providing an off-road connection from the termination of the existing Johnston's Creek shared path to the University would provide a direct link to the future Bays Precinct, as well as to the general bicycle network over the Iron Cove Bridge and towards Balmain.

Internal University bicycle links

With the development of parking free zones within the University, and the conversion of some internal roads to shared zones, there is the opportunity to improve flows, permeability and access for bicycle riders.

The University could facilitate links through the University that can provide a north-south connection and east-west connection. This could act as a link through the University community that could attract an increased number of people to the University, thereby increasing activity and passive surveillance.

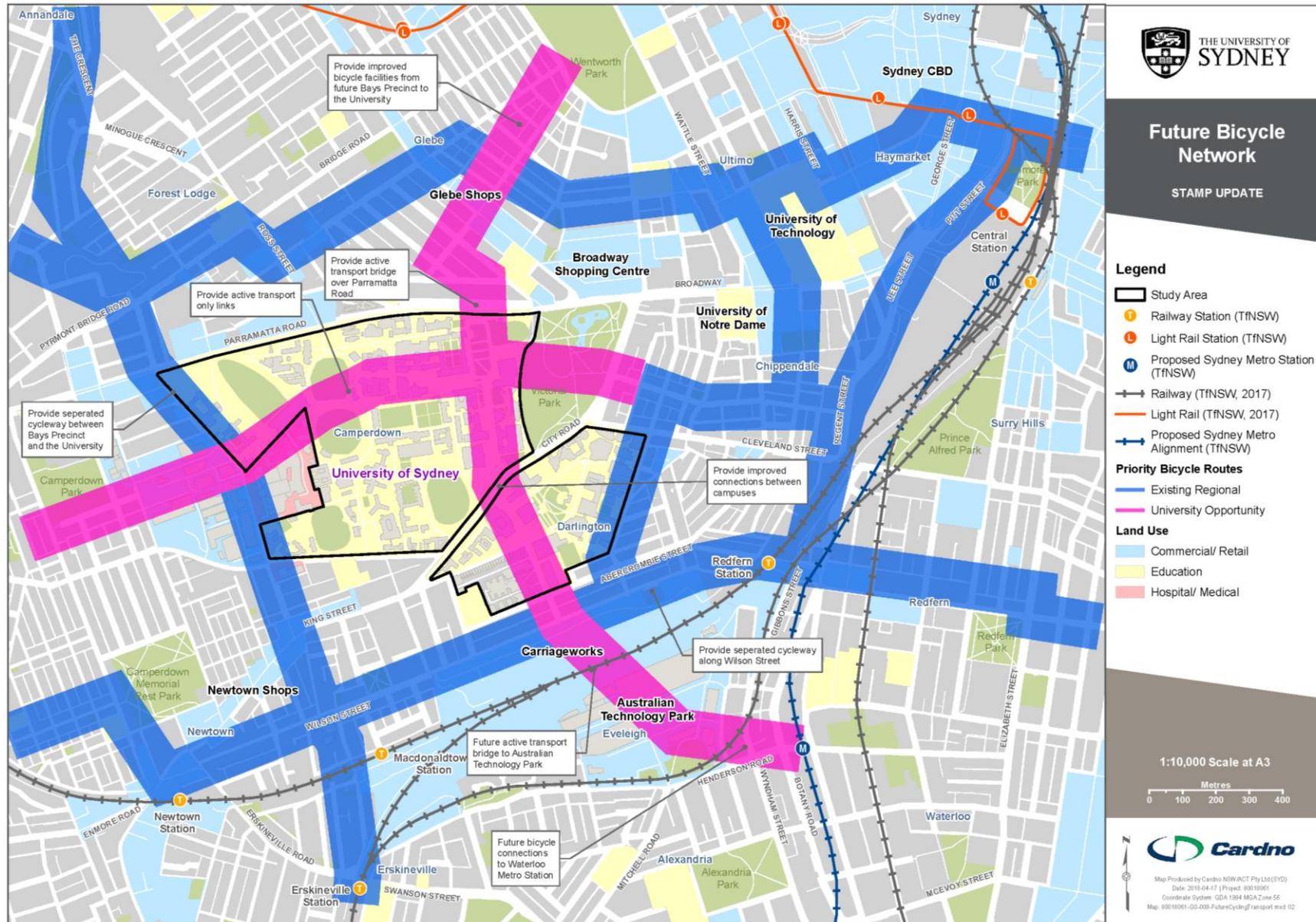
The east-west link could have an entrance from the Missenden Road gateway and continue along the potential future pedestrianised Manning Road, through to Victoria Park and towards Broadway.

The north-south route could begin at the Waterloo Metro Station and continue through the Australian Technology Park, Carriageworks and Darlington campus. A connection would need to be constructed over the railway line. This portion of the north-south link could be developed in collaboration with Transport for NSW, City of Sydney and Department of Planning. This route would then continue through the University along Butlin Avenue and Eastern Avenue towards Glebe.

Further to the north, bicycle riders could divert along Glebe Point Road or to a direct connection (potential bridge) across Parramatta Road. This link could then continue towards Wentworth Park and provide a link towards the future Bays Precinct. The University could work with City of Sydney on the development of the links across Parramatta Road.

A summary of the opportunities for the bicycle network is shown in **Figure 51**.

Figure 51- Bicycle network opportunities



End of Trip Facilities

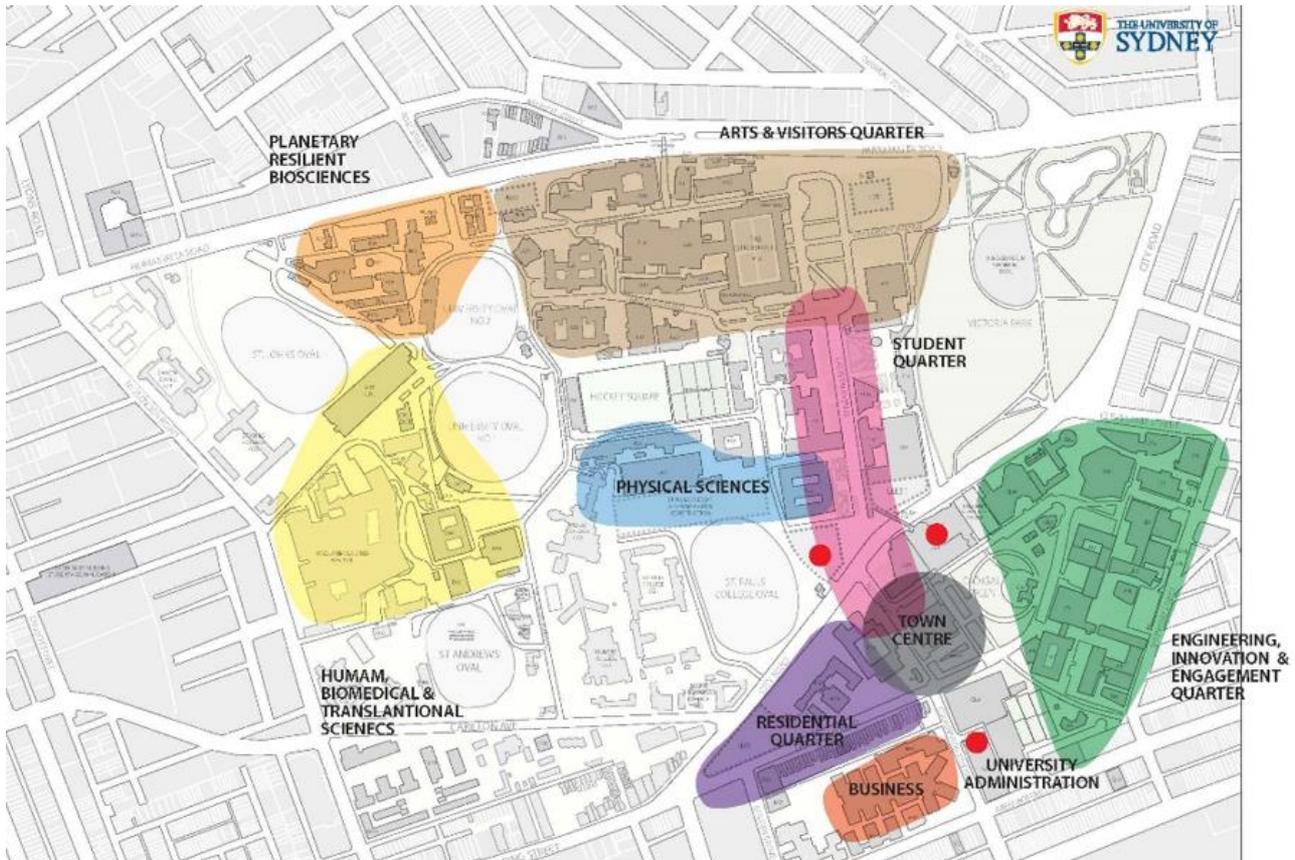
There is the opportunity to improve the end of trip facilities for both staff and students. Currently, the University has 1,839 bicycle spaces available to both students and staff across the campus.

The following section provides a comparison between the number of end of trip facilities that the University has compared to what is required.

Precincts

The University has been divided into communities, based on future precincts that are shown below in **Figure 52**.

Figure 52 - Future precincts



University of Sydney Campus Improvement Plan Presentation (2018)

For the purpose of the calculations, the precincts have been numbered as follows:

- Precinct 1 – Planetary Resilient Biosciences;
- Precinct 2 – Human, Biomedical & Translational Sciences;
- Precinct 3 – Arts & Visitors Quarter;
- Precinct 4 – Student Quarter & Physical Sciences;
- Precinct 5 – Residential Quarter, Business, Town Centre & University Administration; and
- Precinct 6 – Engineering, Innovation & Engagement Quarter.

Using the 2017 end of trip facilities (assuming that each bicycle rack can hold two bicycles), and adding in the planned bicycle facilities as part of CIP 1, the number of end of trip facilities in each precinct is shown in **Table 6**.

Table 6 - End of trip facilities planned for each precinct

Precinct	Showers	Bicycle racks	Lockers
Precinct 1 - Planetary Resilient Biosciences	10	24	280
Precinct 2 – Human, Biomedical & Translational Sciences	29	286	239
Precinct 3 – Arts & Visitors Quarter	24	314	2
Precinct 4 – Student Quarter & Physical Sciences	27	424	32
Precinct 5 – Residential Quarter, Business, Town Centre & University Administration	49	968	174
Precinct 6 – Engineering, Innovation & Engagement Quarter	20	174	9
Total	159	2,190	736

Source: Counts from the end of trip facilities survey 2017 and planned CIP 1 bicycle parking

Students

By 2020, the University estimates that there will be 50,195 students (effective student load) at the Camperdown and Darlington campuses. Using data available from 2016, it found that on a peak day approximately 26,775 students were timetabled to be at the University for classes. Based on the current increases in student population, it was assumed approximately 42,939 students (effective student load) were enrolled at the Camperdown and Darlington campuses in 2016.

Using this assumption, 62 per cent of students arrive at the University on any one day. The number of end of trip facilities should be provided assuming a peak load of 62 per cent of students that is 32,627 in 2020.

Staff

Staff projections for 2020, assuming linear growth between 2018 (6,111 staff) and 2022 (7,211 staff) projections found there will be 6,661 staff (full time equivalent).

It was assumed that 100 per cent of all staff will arrive at the University each day.

Bicycle share

The effects of the use of bicycle share scheme in Sydney has not been properly quantified. It is however unlikely that students and staff would constantly use bicycle share to travel daily to and from the University. A sensitivity analysis has been completed to understand the potential impacts of usage of bicycle share.

The following assumptions were made in the sensitivity analysis:

- The University is aiming for a ten percent mode share of bicycle mode share as per City of Sydney vision;
- The total population of staff and students on campus at its peak is 37,960;
- The percentage of students using bicycle share is based on the total potential bicycle rider population (e.g. 3,796).

The results of the sensitivity analysis is shown in **Table 7**.

Table 7 - Bicycle share sensitivity analysis

Percentage bicycle uses through bicycle share	Number of staff and students commuting to University through bicycle share
1	38
2	76
3	114
4	152
5	190
6	228
7	266
8	304
9	342
10	380

As the University currently has 200 dockless bicycles on its campus as part of its pilot program, it was assumed that the percent bicycle uptake of share bicycles is 5 percent of total bicycle rider population (i.e. 0.5 percent total transport mode share). The usage of bicycle share should be monitored and is discussed further in the **Monitoring Section**.

Requirements

The key requirements for end of trip facilities are as shown below:

- The City of Sydney has a goal of ten per cent of trips to be via bicycle riding. This will equate to ten per cent of peak students and staff on campus at any one day;
- As per City of Sydney DCP, one bicycle locker should be provided per bicycle parking spaces; and
- As per City of Sydney DCP, one shower facility should be provided per 10 bicycle spaces.

The number of end of trip facilities required (calculations are shown in **Appendix D**) for the University based on these requirements is:

- 3,596 bicycle spaces (as 200 bicycles provided through dockless bicycles);
- 3,796 lockers; and
- 380 showers.

The University currently has a shortfall of:

- 1,404 bicycle spaces;
- 3,060 lockers; and
- 221 showers.

It was noted that purpose of this STAMP is to identify the baseline requirements to meet City of Sydney DCP requirements. However, as the University should be seen as a neighbourhood, a holistic review is proposed to consider a campus-wide approach that investigates student's habits and needs. The review and monitoring of end of trip facilities are detailed in the **Monitoring Section**.

Where to provide additional bicycle parking

For the purpose of this analysis, it was assumed that students and staff are distributed evenly around the campus. For this purpose, the overall number of bicycle parking required in each precinct was 599.

The only precinct to fulfil its quota of bicycle parking was Precinct 5. The shortfall in bicycle spaces in the other precincts is shown in **Table 8**.

Table 8 - Bicycle parking shortfall

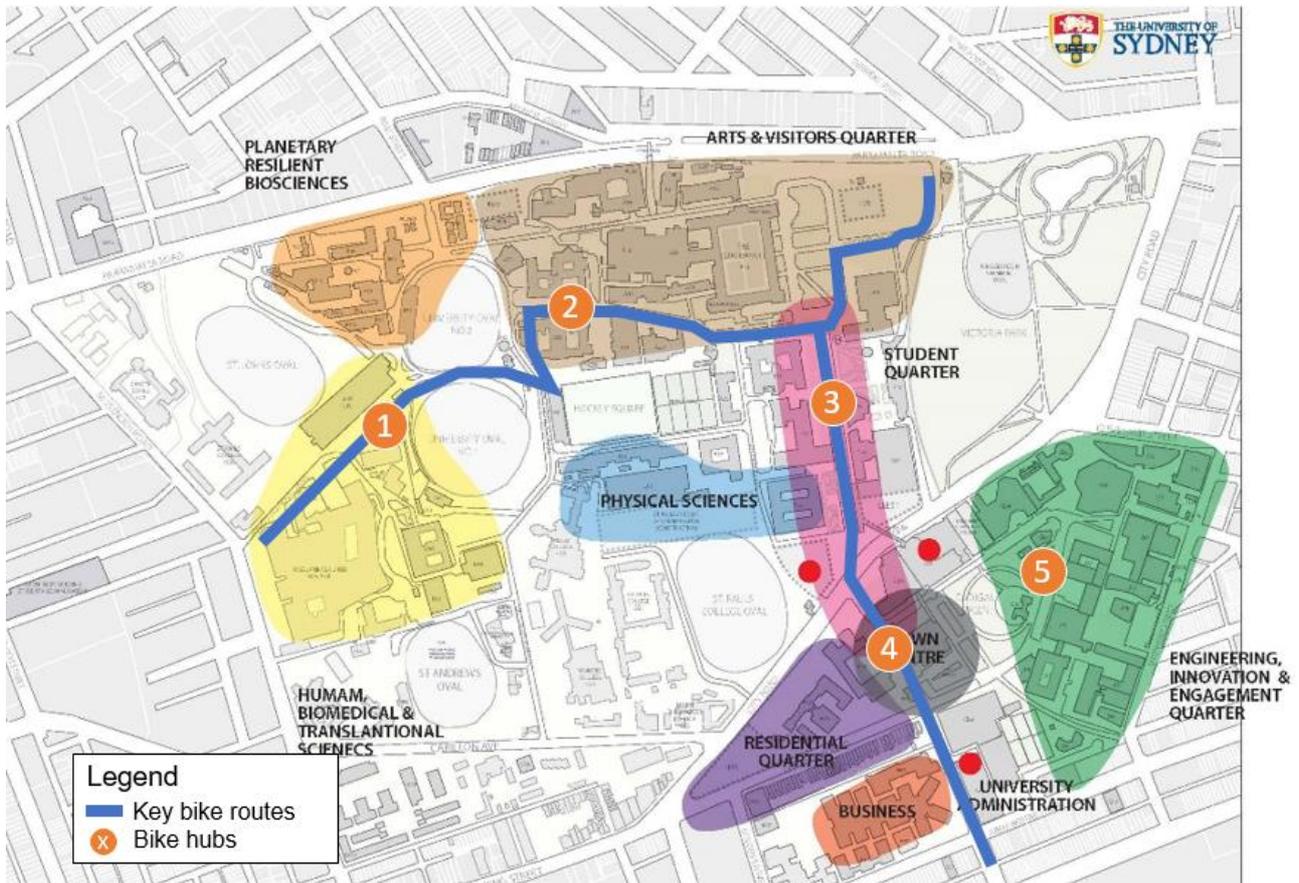
Precinct	Bicycle parking provided	Required bicycle parking	Shortfall in bicycle parking
Precinct 1 - Planetary Resilient Biosciences	24	599	575
Precinct 2 – Human, Biomedical & Translational Sciences	286	599	313
Precinct 3 – Arts & Visitors Quarter	314	599	285
Precinct 4 – Student Quarter & Physical Sciences	424	599	175
Precinct 5 – Residential Quarter, Business, Town Centre & University Administration	968	599	369 surplus
Precinct 6 – Engineering, Innovation & Engagement Quarter	174	599	425
Total	2,190	3,594	1,404

Following the assessment of the 2017 University travel survey, it found that staff that rode a bicycle to work usually parked at either an outdoor bicycle rack (46 per cent) or inside office/ secure bicycle facility (50 per cent), with the remaining parking elsewhere. Students were predominately inclined to parking in outdoor racks. Using this data, it is important that a range of facilities are provided to both students and staff at the campus.

A large number of buildings provide bicycle parking close to their entries, however, the majority of the older buildings only provide outdoor bicycle racks. There is the opportunity, instead of retrofitting old buildings, to provide central bicycle hubs that can encourage students and staff to park in a location.

Some of the shortfalls in bicycle parking can be provided in the form of bicycle hubs. The location of potential bicycle hub locations is shown in **Figure 53**.

Figure 53 - Potential bicycle hub locations



In addition to these bicycle hubs, a greater number of outdoor bicycle racks should be provided close to convenient entry points of buildings. Priority should be provided to the precincts that have limited existing facilities that include Precinct 1 and 6. Secondary priority for the end of trip facilities then provided to Precincts 2, 3 and 4.

Where to provide additional lockers and showers

The number of existing, required and shortfall in lockers and showers per precinct is shown in **Table 9**

Table 9 - Shortfall in lockers and showers

Precinct	Current showers	Required showers	Shortfall in showers	Current lockers	Required lockers	Shortfall in lockers
Precinct 1 - Planetary Resilient Biosciences	10	63	53	280	633	353
Precinct 2 – Human, Biomedical & Translational Sciences	29	63	34	239	633	394
Precinct 3 – Arts & Visitors Quarter	24	63	39	2	633	631
Precinct 4 – Student Quarter & Physical Sciences	27	63	36	32	633	601

Precinct	Current showers	Required showers	Shortfall in showers	Current lockers	Required lockers	Shortfall in lockers
Precinct 5 – Residential Quarter, Business, Town Centre & University Administration	49	63	14	174	633	459
Precinct 6 – Engineering, Innovation & Engagement Quarter	20	63	43	9	633	624
Total	159	378	219	736	3,798	3,062

All precincts within the University have a shortfall in the number of end of trip facilities provided. Lockers, in particular, have the potential to be increased for a relatively low cost. Both lockers and showers should be provided within the potential bicycle hubs. Providing all these facilities in one location has the potential to increase the attractiveness of bicycle riding to the University.

Train

Redfern

As discussed previously, Redfern Station currently only has an eastern concourse, with the majority of the platforms having stair access only. Providing a western concourse at Redfern Station has the potential to provide multiple advantages to the precinct, including improved connections toward Australian Technology Park, Carriageworks and the University. A western concourse can also improve links between these precincts. The University could discuss with Transport for NSW, and neighbouring industries to ensure any future designs of this station will taking into account these precincts.

Macdonaldtown

Macdonaldtown Station is located in close proximity to the University (1.1 kilometres to the Missenden Road entrance). There is the opportunity for the University to push for greater utilisation of this station, particularly for those using the Inner West Rail line through the development of the Central to Eveleigh Precinct. Improvements in passive surveillance and varying land uses through the development of the precinct will attract people to use this station.

With the potential development of the Central to Eveleigh Precinct, there is the potential for the University to work with Department of Planning, UrbanGrowth, Transport for NSW and developers to provide retail and restaurant land uses to enhance passive surveillance close to Macdonaldtown Station. Wayfinding signage to the University could also be provided.

The University could also continue discussing with Transport for NSW for the potential Metro West connection close to the University campus.

Buses

There is the opportunity to provide additional bus stop customer waiting capacity, particularly along Parramatta Road. The capacity of the bus stops is poor due to the limited footpath widths. This is an opportunity to work with Transport for NSW and the City of Sydney to develop solutions to increase the waiting capacity of the bus stops.

Parking

The University has the opportunity to reduce the reliance on parking, especially staff from driving to the University. These opportunities include:

- Reducing the salary sacrificing of parking, or enable public transport and bicycle purchases to be salary sacrificed; and
- Increase the cost of parking permits in line with or greater than other parking structures and timing in the local area.

The University should also complete the pedestrianisation of the University campus, by only providing parking at the peripherals of the University.

With the increasing of parking fees and moving of parking to the peripherals, the University should consider options to ensure that coach parking within the campus is adequate. This will reduce the number of coaches parked in residential areas or along Parramatta Road.

Light Rail

There is the opportunity for the University to present the light rail network as a viable option for commuting to the University. Glebe light rail stop is located approximately 1.2 kilometres from the University Avenue entrance, however, is currently underutilised. This is likely to be most viable for those commuting west of Glebe, which would reduce the need to travel to Central. The University could work in collaboration with the City of Sydney to provide wayfinding signage towards the University.

The University could also update its website to ensure students understand the potential option of using light rail to arrive at the University.

Other

The University has the opportunity to provide an integrated approach to transport management of students and staff to and through the University. This could include the appointment of a dedicated manager that will be responsible for the movement of students and staff to and through the University. This role would also include the development of strategies to achieve the goals and opportunities of this STAMP.

Wayfinding and access strategy

Providing a wayfinding strategy across the University is important to encouraging direct walking and bicycle movements. Wayfinding should be provided for key buildings, facilities and land uses in and outside the University. This includes key public transport stops, including bus stops along City Road, Parramatta Road and Missenden Road, as well as Redfern Station.

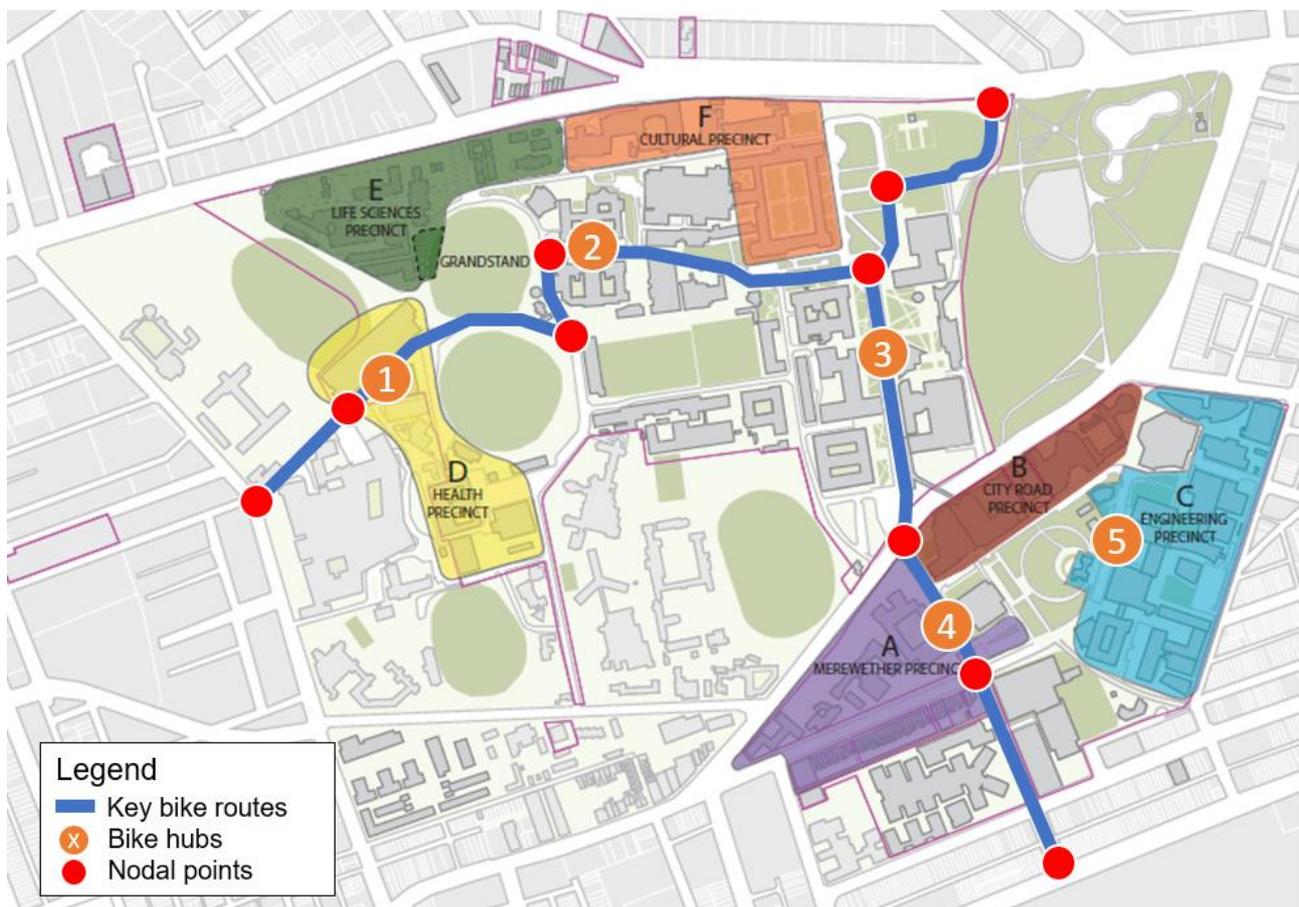
This wayfinding and access strategy is being developed to complement the existing wayfinding strategy (completed by laccess consultants) which concentrates on pedestrian and DDA accessible wayfinding. This wayfinding and access strategy will provide a strategic guidance for the bicycle network across the University and the types of signage that could be provided.

Overall, the proposed wayfinding for people walking will help bicycle riders to generally make their way around the University. This could be supplemented with bicycle specific signage to key locations.

Bicycle wayfinding signage should be provided along the two key cross-University routes.

The key decision points along the routes have been shown below in **Figure 54**. Both of these routes link to the existing regional bicycle network.

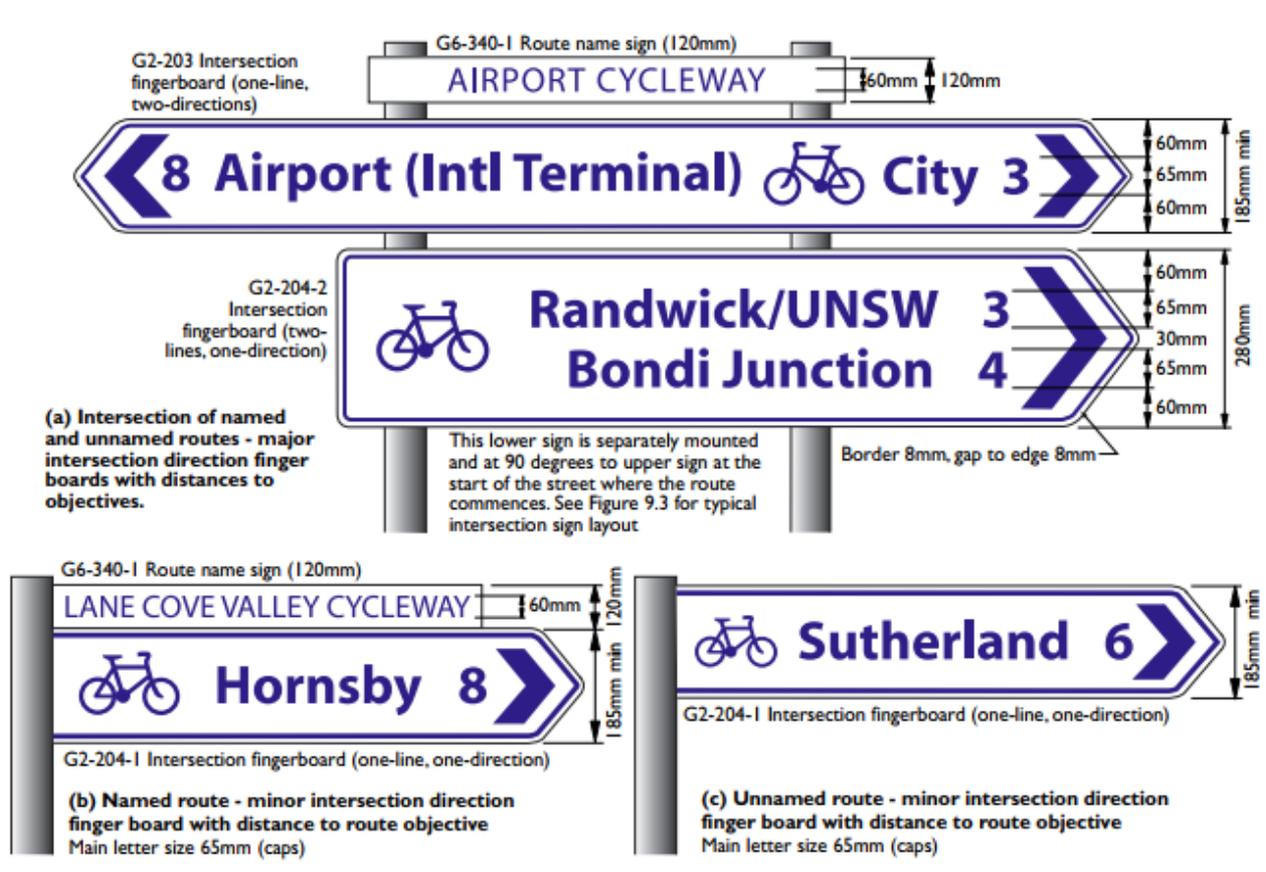
Figure 54 - Primary bicycle routes and bicycle hub locations



Basemap: University of Sydney CIP 1 Precincts

Signage should be provided at these nodal points (decision points) in line with the NSW Bicycle Guidelines developed by Roads and Maritime in 2011. Example directional signage is shown in **Figure 55**.

Figure 55 - Example bicycle directional signage



Source: NSW bicycle guidelines, Roads and Maritime (2011)

The locations of the proposed bicycle hubs and end of trip facilities should also be provided on the signage for people walking. Signage from the paths should be provided at consistent locations (i.e. always on the left side of the path). Potential wayfinding signage to be shown on pedestrian signs includes icons for:

- Location of showers within buildings; and
- Location of lockers within buildings.

Example signage includes:



Bicycle hubs should be obvious from the path and could be coloured in bright colours. This will allow people walking and bicycle riders to know the facilities have been provided, as well as hopefully encourage potential bicycle riders to ride to the University and use these facilities.

Large walking maps (information maps) of the campus located within close proximity of the bicycle hub will further support wayfinding within the campus. The maps could identify in clear detail the various faculties of interest and how they may be reached.

STAMP action plan

The proposed action plan has been prioritised based on their alignment with the strategic transport objectives.

Impact

Each action has been assessed against each of the five objectives to determine whether the action will have a high, medium or low impact on the achievement of that objective. The scoring system gives five points to a high impact action, three points to a medium impact action, and one point to a low impact action, as is shown in **Table 10** below.

Table 10 – Action plan scoring system - impact

Impact	Score	Rationale
High impact	5 points	Action will contribute significantly to the achievement of the objectives.
Medium impact	3 points	Action will contribute partially to the achievement of the objectives
Low impact	1 point	Action will make a limited or nil contribution to the achievement of the objectives.

The cost/ ease of implementation has also been completed for each of the actions. These have been scored as per **Table 11**.

Table 11 - Ease of implementation scoring

Priority	Score
Easy implementation	5 points
Moderate implementation	3 points
Difficult implementation	1 point

Results

The actions with the highest priority are those that have the highest score. The scores for high priority, medium priority, and low priority are outlined in **Table 12**.

Table 12 - Action plan scoring system - priority

Priority	Score	Rationale
High priority	Greater than 25 points	Short term (0 – 2 years)
Medium priority	22 – 25 points	Medium term (3 – 5 years)
Low priority	Less than 2 points	Long term (6 – 10 years)

A prioritisation matrix has been designed to show the assessment of the proposed actions against strategic transport objectives, the impact, and score, and the resulting prioritisation. The prioritisation matrix is shown in **Table 14**.

Table 13 - Prioritisation matrix

Mode	Opportunity	Objective 1: Achieve 90% of travel to main campuses	Objective 2: A more connected campus with improved connectivity to super precinct	Objective 3: Strong focus on innovative transport solutions and collaboration opportunities	Objective 4: Increase walking priority on campus	Objective 5: Improve connectivity to the city's walking and bicycle networks and public transport networks	Ease of Implementation	Status	Required partners	Prioritisation
Walking	Work with the City of Sydney to provide improved lighting, and increased footpath widths along Lawson Street.	High Impact	Medium Impact	High Impact	Medium Impact	High Impact	Moderate	The City of Sydney has developed plans for Lawson Street footpaths.	– City of Sydney.	High Priority (0 - 2 years)
Walking	Work with government departments to provide direct walking and bicycle paths between Waterloo Metro and the University and other key land uses.	High Impact	High Impact	High Impact	High Impact	High Impact	Easy	-	– Transport for NSW. – City of Sydney.	High Priority (0 - 2 years)
Walking	Work with government departments to provide direct walking and bicycle paths between Australian Technology Park and the University.	High Impact	High Impact	High Impact	High Impact	High Impact	Easy	Plans within the Central to Eveleigh Precinct development	– Transport for NSW. – Department of Planning. – City of Sydney.	High Priority (0 - 2 years)
Walking	Activate the education precinct (north-west of the University) with the addition of retail and food land uses to increase activation and flow of people.	High Impact	High Impact	Medium Impact	High Impact	Medium Impact	Easy	Development of CIP	-	High Priority (0 - 2 years)
Walking	Removal of vehicles to create shared and walking priority areas – with an initial focus on Science Road and Manning Road opportunities.	High Impact	High Impact	Medium Impact	High Impact	High Impact	Easy	-	-	High Priority (0 - 2 years)

Mode	Opportunity	Objective 1: Achieve 90% of travel to main campuses	Objective 2: A more connected campus with improved connectivity to super precinct	Objective 3: Strong focus on innovative transport solutions and collaboration opportunities	Objective 4: Increase walking priority on campus	Objective 5: Improve connectivity to the city's walking and bicycle networks and public transport networks	Ease of Implementation	Status	Required partners	Prioritisation
Walking	Work with government departments to provide a 'boulevard feel' to City Road, with improved walking priority. There is potential to provide a wide pedestrian crossing, with increased frequency for people.	Medium Impact	High Impact	Medium Impact	High Impact	High Impact	Moderate	Talks with Roads and Maritime	<ul style="list-style-type: none"> Roads and Maritime. City of Sydney. 	High Priority (0 - 2 years)
Walking	Improve wayfinding between Darlington and Camperdown Campuses.	High Impact	High Impact	Medium Impact	High Impact	High Impact	Easy	Development of wayfinding strategy for people walking	-	High Priority (0 - 2 years)
Cycling	Provide improved wayfinding facilities to end of trip facilities around campus.	High Impact	High Impact	High Impact	Medium Impact	High Impact	Easy	-	-	High Priority (0 - 2 years)
Cycling	Work with the City of Sydney and government departments to provide bicycle link between St Johns Road and the University.	High Impact	High Impact	High Impact	High Impact	High Impact	Easy	-	<ul style="list-style-type: none"> Roads and Maritime. City of Sydney. 	High Priority (0 - 2 years)
Train	Work with Transport for NSW to provide a Metro West station close to the University.	High Impact	High Impact	Medium Impact	High Impact	High Impact	Moderate	Talks with Transport for NSW.	<ul style="list-style-type: none"> Transport for NSW. 	High Priority (0 - 2 years)
Train	Work with Transport for NSW to provide a western concourse at Redfern Station.	High Impact	Medium Impact	High Impact	High Impact	High Impact	Moderate	-	<ul style="list-style-type: none"> Transport for NSW. Department of Planning 	High Priority (0 - 2 years)
Parking	Move parking to the peripherals of the University.	High Impact	High Impact	Medium Impact	High Impact	High Impact	Moderate	CIP access strategy completed	-	High Priority (0 - 2 years)

Mode	Opportunity	Objective 1: Achieve 90% of travel to main campuses	Objective 2: A more connected campus with improved connectivity to super precinct	Objective 3: Strong focus on innovative transport solutions and collaboration opportunities	Objective 4: Increase walking priority on campus	Objective 5: Improve connectivity to the city's walking and bicycle networks and public transport networks	Ease of Implementation	Status	Required partners	Prioritisation
Walking	Provide an improved gateway and wayfinding into the University from Missenden Road, past the Charles Perkins Centre and onto the Grose Farm Lane footpath.	Medium Impact	High Impact	Medium Impact	High Impact	Medium Impact	Moderate	-	- Royal Prince Alfred Hospital.	Medium Priority (3 - 5 years)
Cycling	Develop end of trip facility strategy and implementation plans to encouraging bicycle riding within the University. This could include the addition of bicycle hubs.	High Impact	Medium Impact	Low Impact	Medium Impact	High Impact	Easy	Additional end of trip facilities provided in CIP 1 buildings.	-	Medium Priority (3 - 5 years)
Cycling	Work with the City of Sydney to ensure all regional paths at a minimum are marked with bicycle logos. Where possible separated bicycle paths should be provided.	High Impact	High Impact	Medium Impact	Medium Impact	High Impact	Moderate	-	- City of Sydney.	Medium Priority (3 - 5 years)
Cycling	Work with the City of Sydney and Royal Prince Alfred Hospital to provide off-road bicycle access along Missenden Road and Lyons Road to Johnsons Creek shared path.	High Impact	High Impact	Medium Impact	Medium Impact	High Impact	Moderate	-	- City of Sydney. - Royal Prince Alfred Hospital. - Roads and Maritime.	Medium Priority (3 - 5 years)
Parking	Provide salary sacrifice for bicycles and public transport to staff.	High Impact	Medium Impact	Medium Impact	High Impact	Medium Impact	Easy	-	-	Medium Priority (3 - 5 years)

Mode	Opportunity	Objective 1: Achieve 90% of travel to main campuses	Objective 2: A more connected campus with improved connectivity to super precinct	Objective 3: Strong focus on innovative transport solutions and collaboration opportunities	Objective 4: Increase walking priority on campus	Objective 5: Improve connectivity to the city's walking and bicycle networks and public transport networks	Ease of Implementation	Status	Required partners	Prioritisation
Parking	Continue to implement strategies which increase space for people through reduction of surface car parking and increased charges for campus parking	High Impact	Medium Impact	Medium Impact	Medium Impact	High Impact	Easy	-	-	Medium Priority (3 - 5 years)
Walking	Widen pedestrian access paths at the vehicle entry points from Parramatta Road.	Medium Impact	Low Impact	Low Impact	High Impact	Low Impact	Moderate	-	-	Low Priority (6 - 10 years)
Cycling	Work with the City of Sydney and government departments to investigate opportunity of a bicycle bridge over Parramatta Road.	Medium Impact	Medium Impact	Medium Impact	Medium Impact	High Impact	Difficult	-	- City of Sydney	Low Priority (6 - 10 years)
Rail	Work with government departments to improve access routes from Macdonaldtown Station to the University and other key land uses.	Medium Impact	Medium Impact	High Impact	Medium Impact	High Impact	Moderate	-	- City of Sydney. - Department of Planning.	Low Priority (6 - 10 years)
Bus	Work with the City of Sydney and government departments to provide increased footpath capacity, or provide slimline bus stops to reduce pinch point at the bus stop.	Medium Impact	Low Impact	Medium Impact	Medium Impact	High Impact	Moderate	-	- City of Sydney. - Transport for NSW. - Roads and Maritime.	Low Priority (6 - 10 years)
Light Rail	Work with the City of Sydney to provide improved wayfinding to Glebe Point Light Rail stop to encourage the use of light rail to the University.	Medium Impact	High Impact	Medium Impact	High Impact	High Impact	Easy	-	- City of Sydney	Low Priority (6 - 10 years)

Enabling technology

Technology is continually evolving, and making use of these technologies can promote a change to sustainable transport. This section describes some of the technologies the University could utilise for its students and staff to help achieve its 90 per cent mode share by sustainable modes.

Real-time data apps and online navigation technologies

NSW has benefitted from improvements in travel-based technology. Opal Cards combined with real-time data travel apps have reduced wait times for customers. Opal cards have also presented students and staff with a more convenient means to access and use public transport.

Similarly, navigation apps have helped people to feel more confident about where they are going. Externally provided transport apps have helped streamline access to existing public transport for staff and students; however, navigation within the campus could be improved. As the population grows, it will be essential for the University to ensure its geographic information remains as detailed and up to date on Google Maps (as well as any other platform commonly relied upon for navigation) as possible.

Detailed information that is up to date, offers the best opportunity for staff and students to adopt enabling technologies and through it, sustainable transport. Promotion by the University of what enabling technology is available and how best to use it will prove critical in helping it reach its desired target of 90 per cent sustainable transport by 2030.

Enabling technologies should be seen as a gateway for saving people time, money and reducing emissions. This can also have a positive social impact.

Dockless bicycles

Dockless bicycles are visibly common in Sydney, with several different brands battling it out for footpath space and market share. Dockless bicycles provide a freedom for tourists and others who do not have access to a car, to reach additional amenity in a short trip not easily completed on foot. As a low-cost mobility option enabled through an app, dockless bicycles have provided increased options for distances just out of reach of walking. The University could develop a strategy for the use and parking of these bicycles.

Real-time carpark monitoring

The management of existing car spaces could be substantially improved. Slowly, surface parking is being transferred into the basements of new buildings. Most modern shopping malls have car park signalling that display real-time audits of vacant spaces from a small sensor observing each space. These have the ability to tell motorists who would not be able to readily see where those spaces are, how many vacant spaces there are, and on which floors.

Visual countdowns at key pedestrian crossings

Pedestrian crossings in major cities around the world are beginning to employ pedestrian signals which not only count down to the 'walk' signal but also count out how long people have to cross the street before traffic is once again granted right-of-way. These timed countdowns reduce panic and reduce the potential for people to rush out in front of traffic at the last moment. There are some key intersections where congested pedestrian flows could improve safety with such signalling, these are:

- The corner of City Road and Broadway;
- The corner of Broadway and Wattle Street; and
- The corner of Broadway and Harris Street.

E-Learning options

Many universities provide online courses, but the University prefers is to promote quality face-to-face learning. This does not mean enabling technologies will not have a role to play in that learning. It may simply mean they will allow new options for students who have other responsibilities, to focus the time they do have for a quality face-to-face learning experience.

The advent of podcasting and video recordings could mean there is less need for students to physically attend each lecture in a course, unless the lectures follow a highly interactive structure. Traditionally, lectures have involved large numbers of students being talked to (not with) and many of these students madly take notes barely looking up for the duration. Some students may find being present for lectures works best for them, others (who for whatever reason may struggle to attend) could listen to a podcast made of each lecture afterwards, in their own time. If any illustrations, videos or graphs were presented during the course of a lecture, these could be placed into a PowerPoint presentation by staff and placed online so it can accompany the podcast experience. Having online access to lectures would also be handy for students when reviewing for exams.

To ensure the face-to-face learning (which the University finds more valuable), smaller tutorial classes would best remain compulsory, with students needing to attend in person. Tutorial groups tend to be where the majority of academic debate and ideas are shared – it simply does not work so well for individuals, isolated online.

E-Learning also provides students who are physically obstructed from visiting the Campus, the option of studying online. In this regard, faculties could offer a range of solely e-learning courses that rely on specific technologies to support those students enrolled in them. Beyond that, the future focus for Camperdown/Darlington will be for improved face-to-face learning and research agglomeration with neighbouring stakeholders in the area.

Replacing business travel with information and communication technology

Information and Communication Technology (ICT) provides a low-cost option for staff to avoid the expense and time of business travel away from campus. ICT helps to facilitate video-conferencing & teleconferencing as readily accessible platforms for formal (but still personal) real-time communications with colleagues and stakeholders abroad.

In recent years, the University has acknowledged the clear financial, time savings and carbon footprint reduction benefits resulting from the adoption of ICT resources to avoid long-distance or interstate travel. Ongoing technology support and user training remain key to guaranteeing long-term ICT success and efficiency – which, of course, reflects on the professionalism of the University as a whole.

Telecommuting

Telecommuting makes it possible for staff to work from home (or a designated location away from their University workplace) with the support of telecommunications. It removes any need to commute back and forth each day, bypassing the physical journey in between to provide more flexibility in work-life balance for some employees. Aside from the convenience telecommuting offers the employee, it also reduces transport-related emissions at the Campus they usually attend, reduces road congestion around it and possibly even reduces the demand for parking.

Two policies; the Flexible Working Arrangements Policy and the Working From Home Policy (2014) provide a structured framework on how to achieve a formal agreement (a WFH Agreement) which is required as a pre-requisite for anyone wishing to work from home. A WFH agreement is usually achievable provided it does not disadvantage anyone's work back on Campus. WFH Agreements are not an option available to students.

Whilst there is potential for financial and environmental benefits were the University to one day encourage significant numbers of staff to telecommute, course structures are being designed to focus on quality face-to-face learning. This means the majority of academic staff would likely not apply for a work-from-home position. On the other hand, non-academic staff might find a WFH Agreement offers them clear savings on fuel, travel expenses, time and convenience.

Engagement and Communication

Communication

The University campus has good public and active transport facilities available to its staff and students, however passing on this information is vital to the efficient use of these facilities. This information could be passed onto its students and staff through orientations and induction, and through the website.

Orientation and induction

Promotion of sustainable mobility options is everything. From day one, comprehensive information needs to be circulated to all who attend the campus.

Information on all sustainable transport options, walking and bicycle routes, phone apps and other options should be provided to all students during Orientation Week and to staff during their official workplace inductions. The information given should include:

- A regional map with local points of interest around the University;
- Sustainable transit options to and from the University;
- An internal map detailing the locations for End of Trip Facilities (ETFs);
- A list of the best apps to aid public and active transport navigation;
- An explanation of the physical wayfinding systems and how it works ;
- The benefits of switching to active transport choices;
- A timetable for bus and train routes available within walking distance (1.5-2km walk);
- Details for the Camperdown-Darlington shuttle bus service to Redfern Station;
- The location and cost of car and motorcycle parking;
- Rules and Regulations for riding;
- Sustainable transport toolkits for staff and students;
- Dates for workshops which aim to improve rider safety;
- Date of Ride2UniDay; and
- Date of Walk2UniDay.

Discussions with government agencies

The University should continue to talk with government agencies including TfNSW, DPE, City of Sydney Council and Roads and Maritime to understand and provide input to key infrastructure proposals. Ongoing engagement with these departments is key to gaining an outcome that benefits the whole community. It may be beneficial to pursue these discussions as part of the Greater Sydney Commission Collaboration Area working group.

Website

Currently, the University website provides limited information on public transport routes and bicycle parking locations. There is potential to simplify the information on sustainable transport options on the website and show the locations of all facilities and public transport infrastructure.

Engagement

Events, Groups, Social Networks

The University should do everything it can to empower both staff and student clubs to embrace sustainable transport options and holds events, which can be promoted through social media and internal network forums.

The University (through Campus Infrastructure Services) hosts an annual Ride2Uni event, which aligns with the National Ride2Work event. This supports existing bicycle riders and encourages would-be bicycle riders to get out and try riding to the campus. In addition, the University collaborates with the City of Sydney to promote bicycle awareness and safety events around campus; such as Try2Wheels and the Rusty Riders courses. Such events also provide free maintenance services.

Other events the University could sponsor to better engage with staff and students and promote active transport include:

- A Walk2Uni day;
- A Car-Free day;
- Buying back parking permits (pro-rata);
- Host free walking tours for new students to familiarise them with the local area;
- Hold an annual workplace engagement programme to promote active transport and well-being; and
- Provide a known half-hour gathering point on Campus where people can come together and form larger walking groups, before heading up to Redfern Station for night services.

At most universities or commercial organisations, a bicycle user group exists to support riders and to represent the ongoing interests of the bicycle community among employees. Bicycle riders at the University established a Bike2Work group on Yammer, which is the University's social network platform of choice. This Yammer group is currently restricted to staff. However, there is no reason why a student bicycle group cannot be created to better advocate for student bicycle interests and offer a more direct engagement for students with the established university bicycle awareness campaigns.

Monitoring

Monitoring and evaluating is a vital component of providing infrastructure that is efficiently used. The University has completed a number of projects that have included auditing of existing infrastructure as well as walking counts to understand walking numbers and desire lines. The travel surveys completed in 2012 and 2017 have also provided a valuable insight into the sustainable travel trends for both students and staff.

It is important for continued monitoring to ensure the objectives of this STAMP are being met. It will also help to develop trends that will facilitate an informed decision on infrastructure requirements of the University. Monitoring actions recommended as part of this STAMP are shown below in **Table 14**.

Table 14 - Monitoring actions

Mode	Data required	Why data is required	How frequently
Walking	Walking counts	To understand changes in walking movements.	Every two years counts should be commissioned on key walkways through and around the University
Bicycles	Bicycle counts	To understand changes in bicycle rider movements.	Every two years counts should be commissioned on key bicycle routes through and around the University.
	Bicycle parking usage	To understand usage and uptake of both secure and unsecure bicycle parking.	Once a bicycle parking facility has been constructed, a survey should be completed quarterly. After two years of opening, a survey of bicycle parking should be completed every two years.
Mode share	Travel surveys	To understand the trends in mode share and general travel trends. This will also help to understand general trends due to the various project being completed.	Every two years the travel survey should be completed to understand trends in sustainable travel.
Parking	Parking utilisation	Survey of the utilisation of car parking within the University.	Every two years counts should be commissioned at each carpark to understand the utilisation of spaces and turnover.

Conclusions

This updated STAMP identifies key opportunities for improving sustainable transport to and from the University to achieve the STAMP objectives of:

- Achieve 90 per cent of travel to main campuses by sustainable modes by 2030;
- A more connected campus with improved connectivity to the Ultimo Camperdown Health and Education super precinct as designated in the Central District Plan;
- Strong focus on innovative transport solutions and collaboration opportunities with key stakeholders within the super precinct;
- Increase walking priority on campus; and
- Improve connectivity to the city’s walking and bicycle networks and public transport networks.

The current travel mode share by sustainable transport is 91 per cent for students and 73 per cent for staff. There were a number of opportunities developed through the analysis which has the potential to further improve sustainable transport to the University.

Challenges and constraints

There are a number of challenges and constraints which were identified from the initial analysis of data and a site visit. These includes:

- Walking
 - Poor passive surveillance and lighting away from the major roads of Missenden, City and Parramatta Roads;
 - Poor walking safety, especially towards Redfern Station along Lawson Street;
 - Poor activation on campus, especially away from the main walking thoroughfares of Eastern Avenue;
 - Narrow footpath widths on key walking routes, including Lawson Street and Manning Road;
 - Narrow access points for people walking riding bicycles from Parramatta Road;
 - Some gateways into the University have poor wayfinding, especially the Victoria Park and Missenden Road entrances;
 - Poor walking connectivity between the Darlington and Camperdown campuses, due to City Road;
- Cycling
 - Limited number of off-road facilities connecting to the University;
 - Limited wayfinding to and through the University to key land uses and end of trip facilities;
 - Vehicle priority is provided along most roads through the University;
- Buses
 - Bus stop customer waiting capacity is poor along Parramatta Road, which is causing a pinch point along these footpaths, particularly on the southern side of Parramatta Road;
- Light Rail
 - Poor wayfinding from Glebe Light Rail stop to and from the University;
- Train
 - Redfern Station only has an eastern concourse which provides relatively poor connectivity to the University, Australian Technology Park and Carriageworks;
 - Macdonaldtown Station is currently underutilised by students and staff to the University;
- Parking
 - University parking charges are relatively cheap for staff, and can also be salary sacrificed.

From the University Travel Survey 2017, it was found that the key reasons for staff driving to the University were due to safety and cost, which accounted for 53 per cent of staff combined. For students, the key considerations were due to safety which accounted for 43 per cent of students.

Opportunities

Based on the analysis, opportunities were developed to increase sustainable travel for staff and students. These included:

- Walking:
 - Working with City of Sydney to improve pedestrian lighting along key walking thoroughfares including Lawson Street, and the Life Sciences and Health precincts;
 - Improving activation by providing retail and food land uses in precincts including the Life Sciences and Health precincts.
 - Working with City of Sydney to widen walking paths along Lawson Street;
 - Providing a walking-only path along Manning Road and removing vehicles;
 - Widening access points for people walking from Parramatta Road;
 - Provide gateway markers at all active transport entrances to provide the University with a sense of place;
 - Work with various government departments to provide a Boulevard feel to City Roads. This could include a wide pedestrian crossing across City Road to provide greater priority to people walking; and
 - Work in collaboration with government departments to provide key direct active transport links to key developments that include Waterloo Metro, Carriageworks and Australian Technology Park.
- Cycling
 - Work with City of Sydney to ensure the Wilson Street cycleway improvements are provided;
 - Work with City of Sydney to provide an off-road facility to Johnston Creek shared path;
 - Provide internal bicycle link through the University;
 - Develop an end of trip facility strategy to improve facilities for bicycle riders to the University;
- Train
 - Work with government departments to provide a western platform at Redfern Station to improve links to Australian Technology Park, the University and Carriageworks; and
 - Work with government agencies to improve activation from as a result of the Central to Eveleigh Precinct development at Macdonaldtown Station.
- Buses
 - Work with the City of Sydney and government departments to provide additional bus stop customer waiting capacity at bus stops along Parramatta Road. This could also include the widening of the footpaths along Parramatta Road.
- Light Rail
 - Improve wayfinding to and from Glebe Point Light Rail Stop.

Action Plan

Based on these key opportunities, an action plan was developed to prioritise each opportunity. The scoring was based upon the five key objectives for this STAMP, as well as the ease of implementation. These were ranked as High (0 – 2 years), Medium (3 - 5 years) and Low (6 – 10 years).

- High Priority
 - Work with City of Sydney to provide improved lighting, and increased footpath widths along Lawson Street;
 - Work with government departments to provide direct walking and bicycle paths between Waterloo Metro and the University and other key land uses;
 - Work with government departments to provide direct walking and bicycle paths between Australian Technology Park and the University;
 - Activate the education precinct (north-west of the University) with the addition of retail and food land uses to increase activation and walking flows;
 - Removal of vehicles from Manning Road, and provide a walking-only thoroughfare.
 - Work with government departments to provide a 'boulevard feel' to City Road, with improved walking priority. There is potential to provide a wide pedestrian crossing, with greater phase time for people walking;
 - Improve wayfinding between Darlington and Camperdown Campuses;
 - Work with the City of Sydney and government departments to provide bicycle link between St Johns Road and the University;
 - Provide improved wayfinding facilities to end of trip facilities around campus;
 - Work with Transport for NSW to provide a Metro West station close to the University;
 - Work with Transport for NSW to provide a western concourse at Redfern Station; and

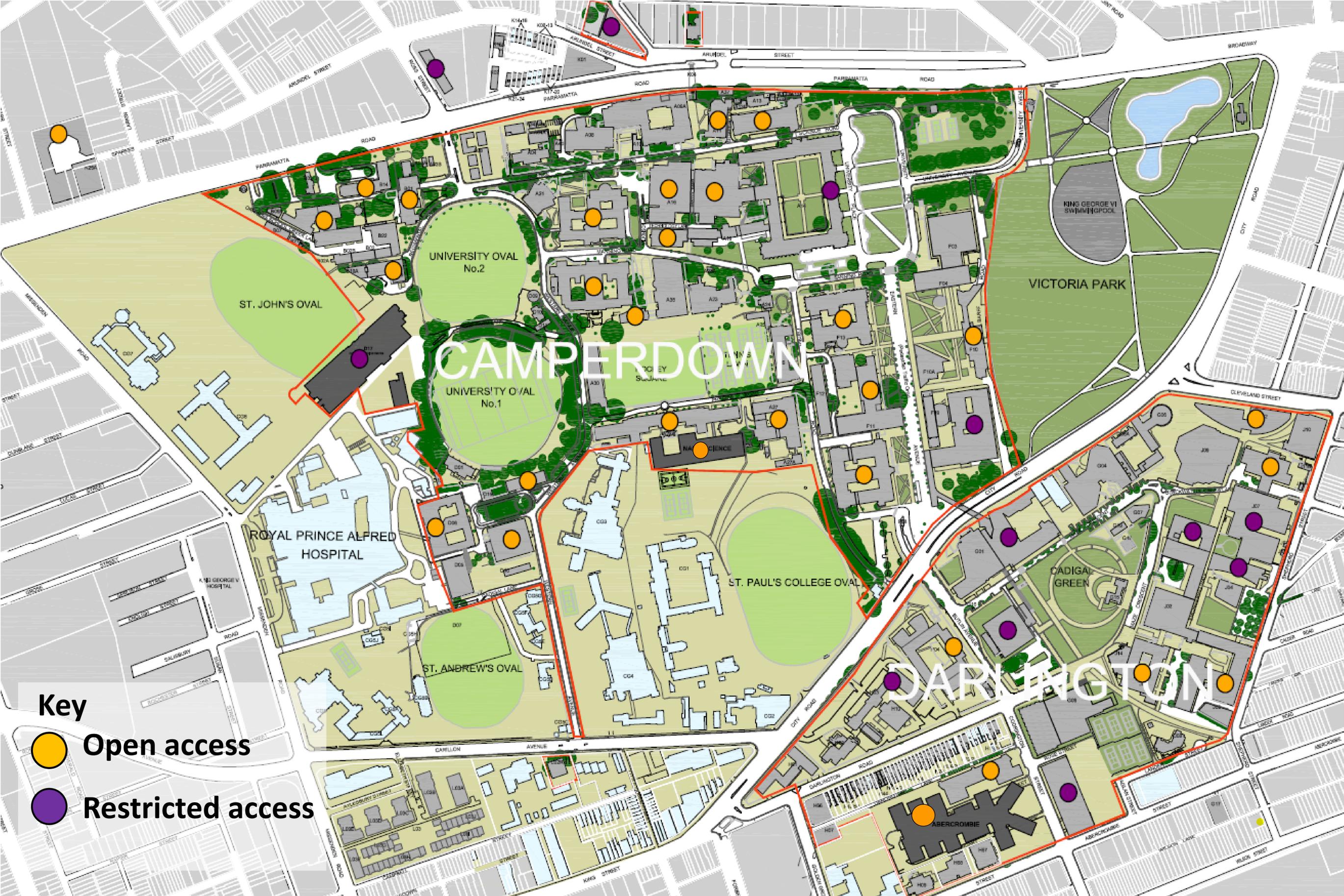
- Move parking to the peripherals of the University.
- Medium Priority
 - Provide improved gateway and wayfinding into the University from Missenden Road, past the Charles Perkins Centre and onto the Grose Farm Lane footpath;
 - Work with the City of Sydney to ensure all regional paths at a minimum are marked with bicycle logos. Where possible separated bicycle paths should be provided;
 - Work with the City of Sydney and Royal Prince Alfred Hospital to provide off-road bicycle access along Missenden Road and Lyons Road to Johnsons Creek shared path;
 - Develop end of trip facility strategy and implementation plans to encouraging bicycle riding within the University. This could include the addition of bicycle hubs;
 - Provide salary sacrifice for bicycles and public transport to staff; and
 - Increase on-campus parking charges for students and staff.
- Low Priority
 - Widen walking access paths at the vehicle entry points from Parramatta Road;
 - Work with the City of Sydney and government departments to investigate opportunity of a bicycle bridge over Parramatta Road;
 - Work with the City of Sydney and government departments to provide increased footpath capacity, or provide slimline bus stops to reduce pinch point at bus stops;
 - Work with government departments to improve access routes from Macdonaldtown Station to the University and other key land uses; and
 - Work with the City of Sydney to provide improved wayfinding to Glebe Point Light Rail stop to encourage the use of light rail to the University.

In order to ensure that the any of the opportunities are completed, it is important that the University use marketing, enabling technology and monitoring to provide an efficient use of infrastructure. This could include items complete regular surveys, update the University website and harnessing new technologies such as app developments.

The University has the opportunity to harness development in the local area to improve it's sustainable transport to the University. There is the potential to further improve sustainable mode share through improvements in infrastructure and policy. The University can work in collaboration with other state and local government agencies to provide a connected community.

Appendix A

Main Campus – Buildings with Shower Facilities



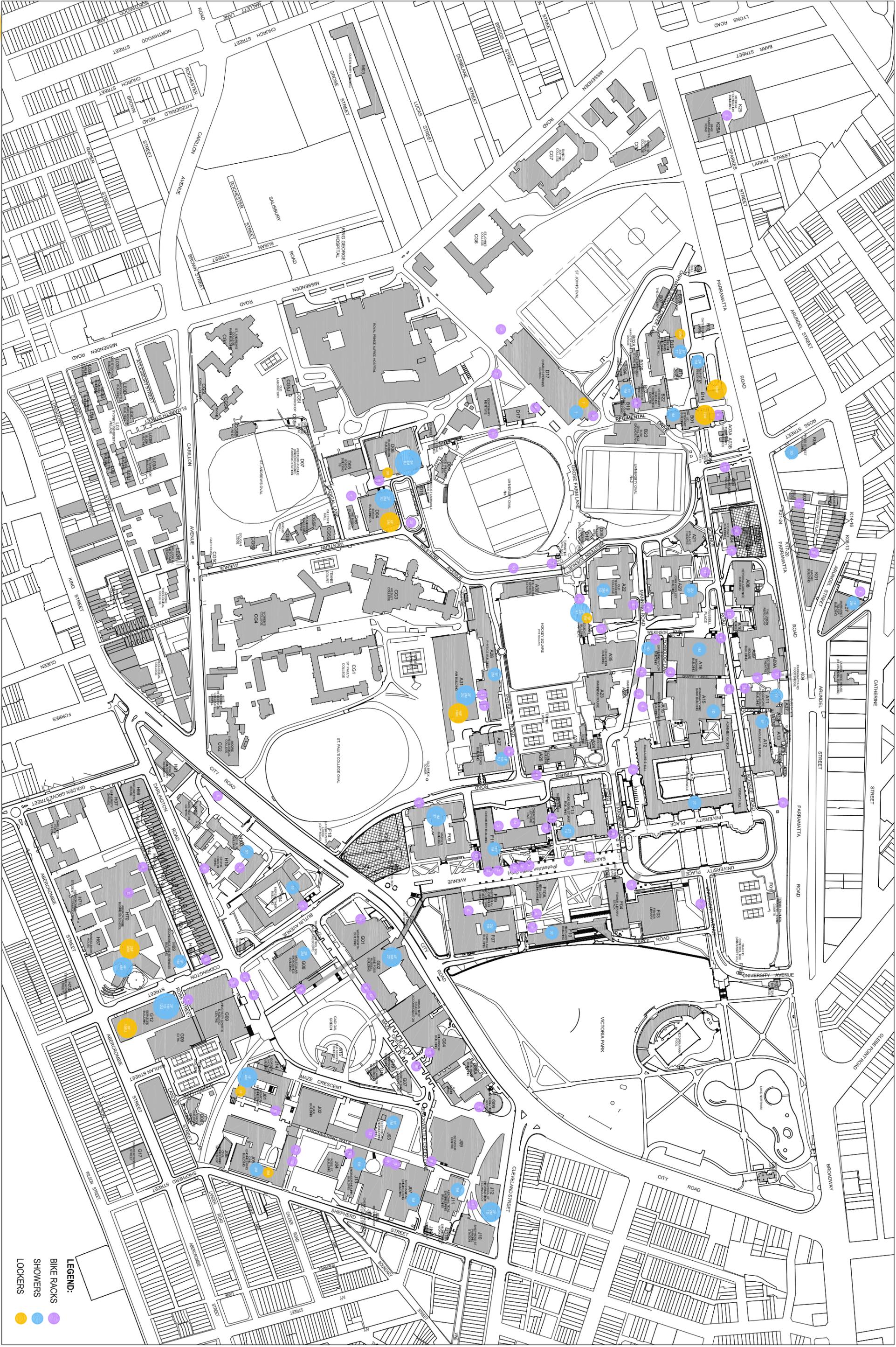
Shower Facilities

Camperdown - Darlington campuses

Bldg ID	Bldg Name	Floor ID	Room ID	Room Name / Ref	No. of showers	Accessible to All
A11	Edgeworth David	1	124	Shower	1	Yes
A14	Quad	2		L2.18	1	No
		2		N2.00	1	No
		4		L4.38	1	No
A12	Macleay	1	115	Female	1	Yes
A16	Badham	1	108	Male	1	Yes
A15	Pharmacy	3	N372	Disabled	1	Yes
A19	Griffith Taylor	2	T202	Disabled	1	Yes
A20	John Woolley	1	M116	Unisex	1	Yes
		1	M119	Unisex	1	Yes
		2	N230	Accesible	1	Yes
		2	T264	Accesible	1	Yes
A22	Old Teachers College	1	106	Disabled	1	No
		2	273	Male	1	Yes
		2	274	Female	1	Yes
		3	367B	Male	2	Yes
A27	Edward Ford	2	201C	Unisex	1	Yes
		2	202A	Female	1	Yes
		3	303A	Male	1	Yes
A31	Sydney Nanoscience Hub	3	T3003C	Male	1	Yes
		3	T3005C	Female	1	Yes
		4	T4002C	Male	1	Yes
		4	T4004C	Female	1	Yes
		3	T3004	Disabled	1	Yes
		4	T4003	Disabled	1	Yes
D02	Victor Coppelson	2	213	Female	1	Yes
D04	Bosch 1A	1	T100	Unisex	1	Yes
			T101	Female	2	Yes
			T102	Male	2	Yes
D06	Blackburn	3	335	Male	1	Yes
		4	432	Female	1	Yes
		4	433	Unisex	1	Yes
		6	633	Female	4	Yes
		6	635	Male	3	Yes
D17	Charles Perkins Hub	B1		Male Change Room	6	No
		B1		Female Change Room	6	No
		B1		Disabled Change Room	1	No
		B1		Disabled Change Room	1	No
		B1		bike parking room and corridor		No
A28	Physics	1	109	Female	1	No
		3	347	Male	1	Yes
		4	235	Male	1	Yes
A36	Education Annex	3	302	Staff	2	Yes
		3	304	Staff	2	Yes
		3	305	Male	2	Yes
		3	315	Female	2	Yes
B01	J.D. Stewart	2	M229	Male	1	Yes
B14	McMaster	B	B04	Female	2	Yes
		1	120	Male	1	Yes
B10	Evelyn Williams	2	285	Shower	1	Yes
		3	302	Male	2	Yes
		3	322	Female	1	Yes

Bldg ID	Bldg Name	Floor ID	Room ID	Room Name / Ref	No. of showers	Accessible to All
B19	RMC Gunn	1	106	Male	1	Yes
		1	131	Female	1	Yes
F07	Carslaw	1	108	Male	1	No
		1	114	Unisex	1	No
		4	427B	Unisex	1	No
F09	Madsen	2	T100		1	No
		3	204A		1	Yes
		3	301	Male	1	Yes
		3	304B		1	Yes
F10	New Law	4		Shower	1	Yes
		5		Shower	1	No
		6		Shower	1	No
F11	Chemistry	1	125	Male	1	Yes
		1	114	Female?	1	Yes
F13	Anderson Stuart	1	N109	Unisex	1	Yes
		2	S244	Shower	1	Yes
		6	N667	Shower	1	Yes
G02	JFR	1	T100A		1	Yes
		1	T100B		1	Yes
		3	T301A	Female	1	No
		3	T301B	Male	1	No
		5	T501A	Male	1	No
		5	T501B	Female	1	No
		6	T601A	Female	1	No
		7	T701A	Female	1	No
G08	Molecular Bioscience	2	246	Male	2	No
		2	238	Female	2	No
G12	Services	1	161	Disabled	1	No
		1	147	Female	1	No
		1	148	Male	1	No
		2	205A	Unisex	7	No
		2	T200	Female	1	No
		2	T203	Unisex	5	No
H03	Institute	2	N284		1	No
		3	T303		1	No
		4	T402		1	No
		4	T403		1	No
		4	N422		1	No
H04	Mereweather	2	212		1	Yes
		2	205		1	Yes
		3	308		1	Yes
		3	312		1	Yes
		4	413		1	Yes
H69	Economics	1	155	Male	1	Yes
		1	158	Female	1	Yes
H70	Abercrombie Building	B1	TB1001	Male Change Room	4	Yes
		B1	TB1002	Female Change Room	4	Yes
J01	Chemical Engineering	2	244	Male	2	Yes
		2	246	Female	1	Yes
		3	323	Male	2	Yes
J03	Electrical Engineering	3	337	Female	1	No
		9	903	Male	1	Yes
J05	Civil Engineering	2	272	Male	2	Yes
		2	274	Male	1	Yes
J07	Mechanical	1	S137	Male	2	No
		1	S143	Male	1	No
J11	Aeronautical Engineering	1	N118	Male	1	Yes

Bldg ID	Bldg Name	Floor ID	Room ID	Room Name / Ref	No. of showers	Accessible to All
J12	SIT	1	T100	Female	2	Yes
		1	T101	Male	2	Yes
		1	T102	Disabled	1	Yes
J13	Link	3	309	Male	1	No
K06	1-3 Ross St	1		Disabled	1	No
		2		Disabled	1	No
		3		Disabled	1	No
K06A	21 Ross St	1		Shower	1	No
K07	Margaret Telfer	2	T200	Female	1	No
		2	T201	Male	1	No
		4	T401	Male	1	No
K25	Medical Foundation	G	G08	Disabled	1	No
		2	210	Shower	1	Yes
		3	308	Shower	1	Yes
		4	418	Shower	1	No
		5	508	Shower	1	No
		6	608	Shower	1	No



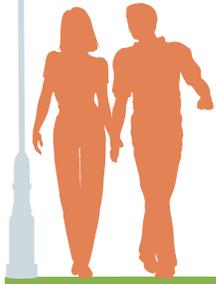
- LEGEND:**
- BIKE RACKS
 - SHOWERS
 - LOCKERS



Appendix B

Appendix C

University City District Report



University City District

The Case for Parklets: Measuring the Impact on Sidewalk Vitality and Neighborhood Businesses

OVERVIEW & BACKGROUND



University City District (UCD) works to improve economic vitality and quality of life in the University City area of Philadelphia, by investing in world-class public spaces, addressing crime and public safety, and bringing life to commercial corridors. In 2011, UCD, working with the City of Philadelphia, installed the city's first Parklets. These temporary seating platforms, placed flush with the curb, created an extension of the sidewalk by replacing one or two parking spaces with a small new park. That dry definition though belies the strikingly vibrant little hubs of activity that these new public spaces have become in our residential neighborhoods and on our commercial corridors.

The Parklets have been remarkably successful at attracting users since the day they were installed. For noted urbanist William H. Whyte, when it comes to good urban spaces, "supply creates demand. A good new public space builds a new constituency. It stimulates people into new habits." That was clearly the case at the Parklets. From early morning to late evening, many Parklets were consistently occupied by people eating, drinking, socializing, or working. Photos showed up on

social media, and crucially, businesses reported impressive sales increases after their neighboring Parklets arrived. While these reports were compelling, and successful Parklets were being reported in San Francisco and elsewhere, our evidence for their positive impact remained anecdotal. Research on Parklets in New York City and Los Angeles had documented high levels of use in central business districts, but limited data, if any, were available on Parklet performance outside of downtowns and very high density neighborhoods, including:

- Their ability to attract and retain users;
- The diversity of their users and uses;
- Their impact on the sales at adjacent businesses; and
- The micro-scale environmental factors contributing to their success or failure.

In other words, how effective were Parklets at bringing more life to our public spaces and more feet to our neighborhood businesses, and could we use that information to predict whether a Parklet would be successful elsewhere?

During the 2013 Parklet season, UCD conducted an intensive data collection and analysis effort to answer these questions. This report contains those results, and as cities, suburbs and towns strive to improve their walkability and energize their public spaces, we hope that our findings can help other communities determine if Parklets are an appropriate urban design solution for them. As a relatively new form of "tactical urbanism," Parklets are still likely to encounter some resistance, particularly as they may require a minor loss of parking. It is our hope, however, that these data can help advocates make the case for Parklets as cost-effective enhancements to the urban streetscape and quality of life, and identify the locations in their communities where Parklets are most likely to succeed.



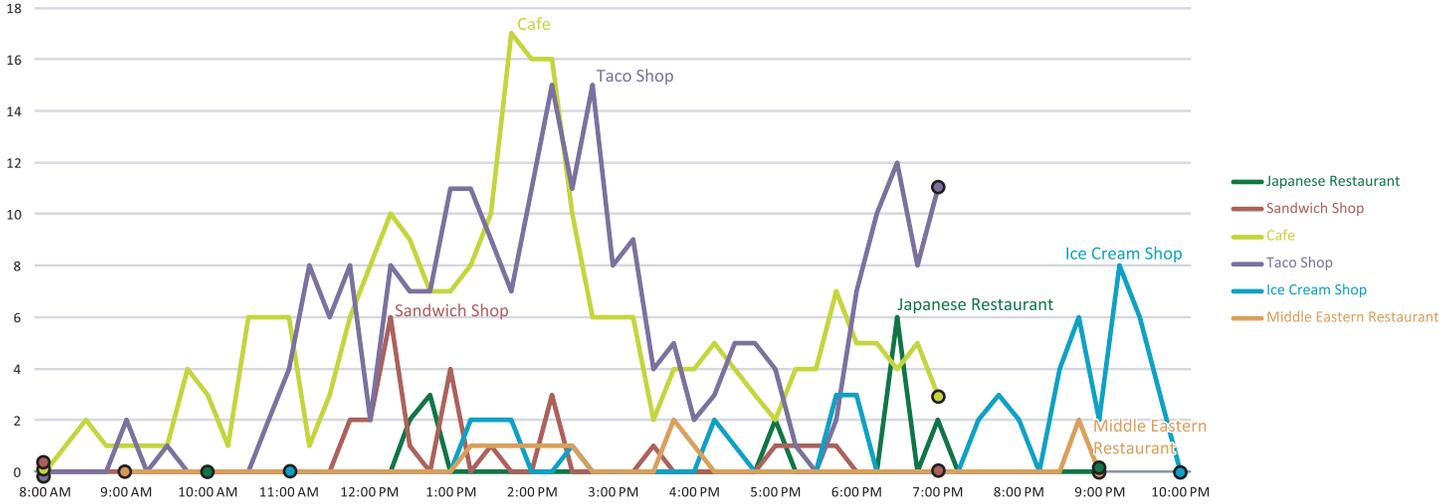
Many Parklets in University City are extremely popular, routinely filling all or nearly all of their seats at peak times

KEY FINDINGS

How Many People Use Parklets?

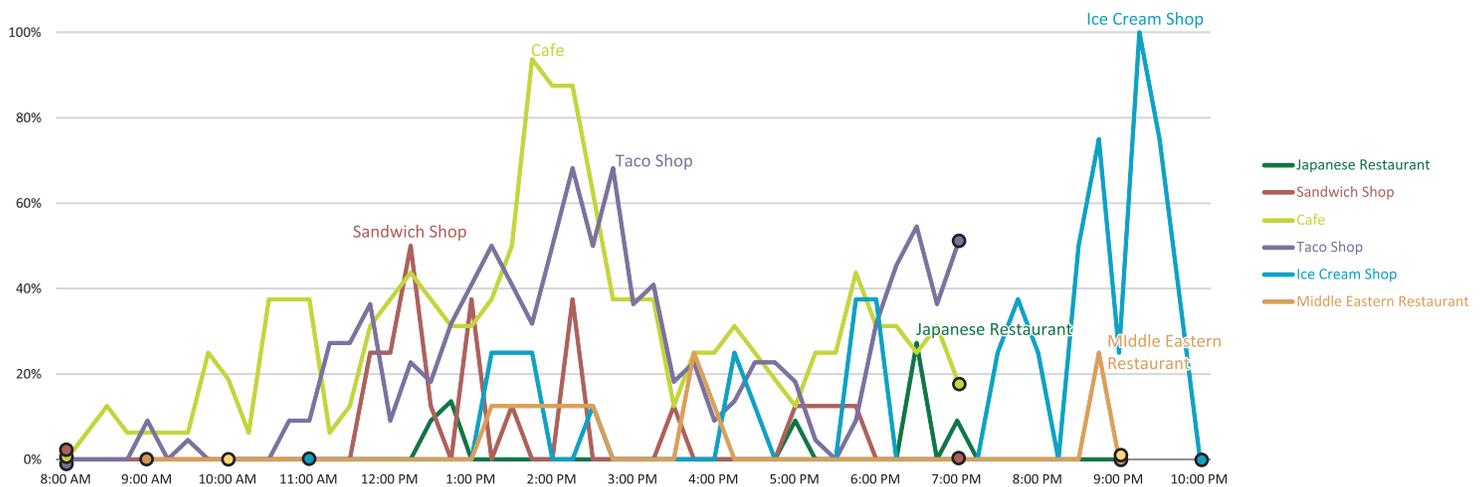
Parklets can attract an enormous number of users¹. At peak hours, busy Parklets can fill every available seat, or close to it (the number of seats ranged between 8 and 22 depending on the Parklet).

Parklet Users



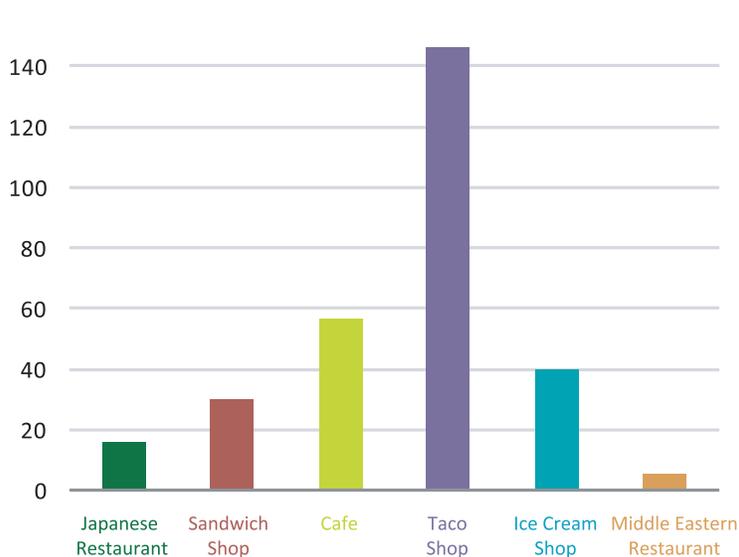
¹The Parklets are referred to here by short descriptions of their adjacent businesses. Descriptions of the Parklet sites are included at the end of the report.

Percentage of Seats Occupied



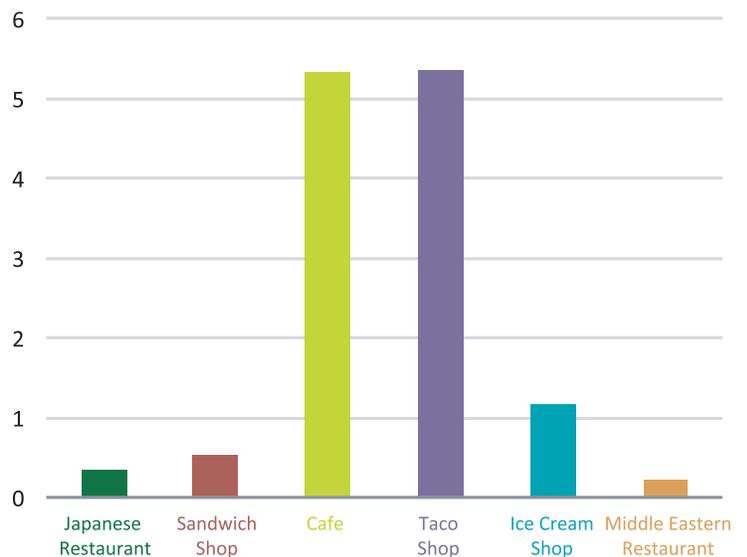
At a busy location like “Taco Shop,” that translates into well over 150 unique users over the course of a day, all in the 240 square feet that could otherwise have hosted just one or two parked cars at a time. It is important to note that Parklets can achieve high occupancy rates by retaining customers who linger, for instance over their coffee and laptops at “Café,” or by the rapid turnover of a larger number of customers stopping for a quick meal, as was the case at “Taco Shop.” Either situation can therefore help to create a successful public space.

Total Unique Daily Users



The fact that Parklets are capable of filling nearly all their seats simultaneously suggests they are particularly popular with groups and/or that strangers often share tables (and their personal space) within these small footprint spaces. By concentrating so many users in these outdoor rooms, and juxtaposing them to passing pedestrians on the adjacent sidewalks, Parklets frequently became magnets for passers-by who slowed down or stopped to chat, squeezing onto the parklet or sidewalk, and adding to the palpable buzz of activity.

Average Occupancy

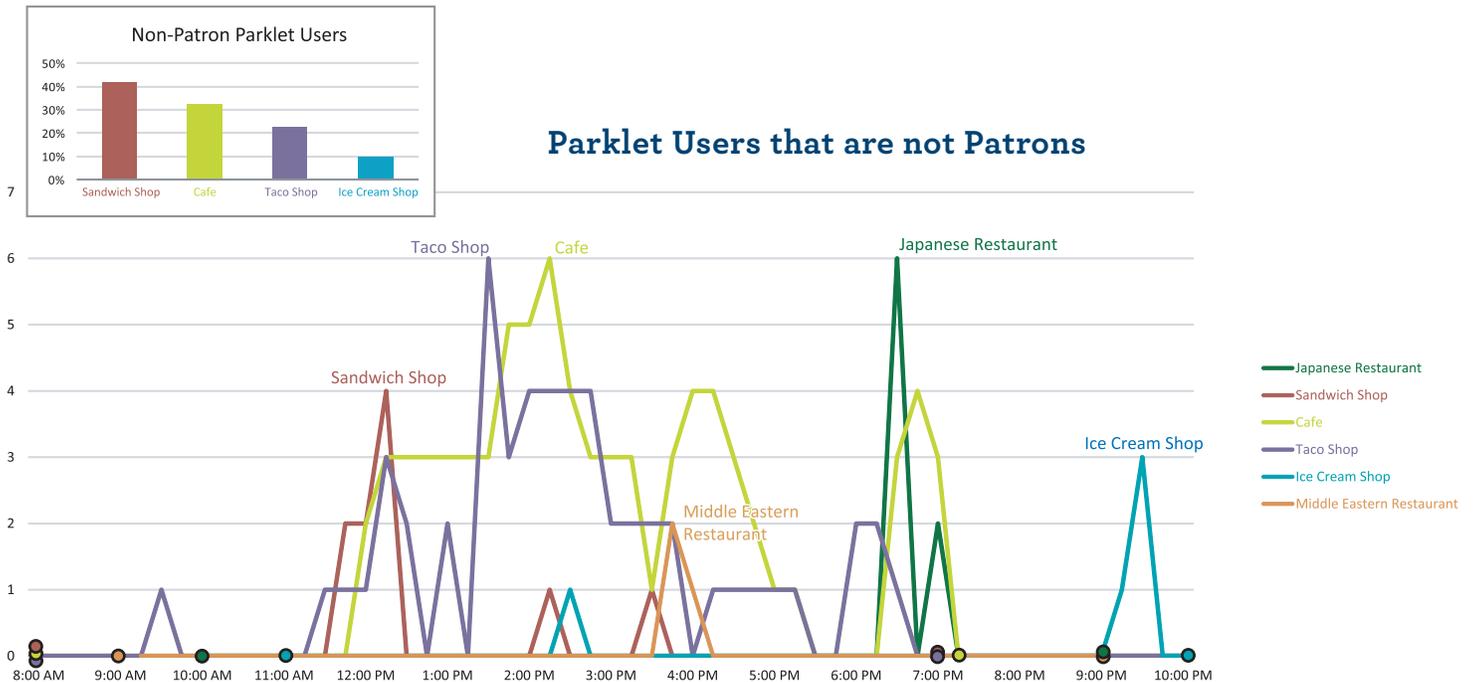


There was substantial variability in Parklet patronage. Parklet performance can be measured in multiple ways, but among the most useful is average occupancy, or the average number of users at any given time.

By that standard, two of the six Parklets, “Taco Shop” and “Cafe,” substantially outperformed the rest, with use peaking at lunch and again in the late afternoon and early evening. Occupancy trends corresponded with the nature of the product mix, so “Ice Cream Shop” performed strongly in the late evening (when potential customers in that primarily residential neighborhood were home from work), and “Sandwich Shop” attracted a modest number of users at lunchtime. Based on average occupancy and the number of total users, only “Japanese Restaurant” and “Middle Eastern Restaurant” lagged in attracting users. In the case of “Japanese Restaurant,” the inability to carry food out to the Parklet clearly hindered performance, and “Middle Eastern Restaurant” may have performed poorly for a number of reasons explored below.

Who Uses Parklets and What do They Do There?

Parklets are not just for patrons. A common concern is that Parklets may be interpreted by potential users as private space intended only for patrons of the adjacent businesses. In fact though, Parklets attracted a large number of non-patron users, with the busiest Parklets attracting the most non-patrons.



“Taco Shop” and “Cafe,” in particular, attracted a large number of non-patrons (roughly 20%-30% of all users), and in so doing, also had an unanticipated impact on sidewalk vitality beyond the Parklet footprint.

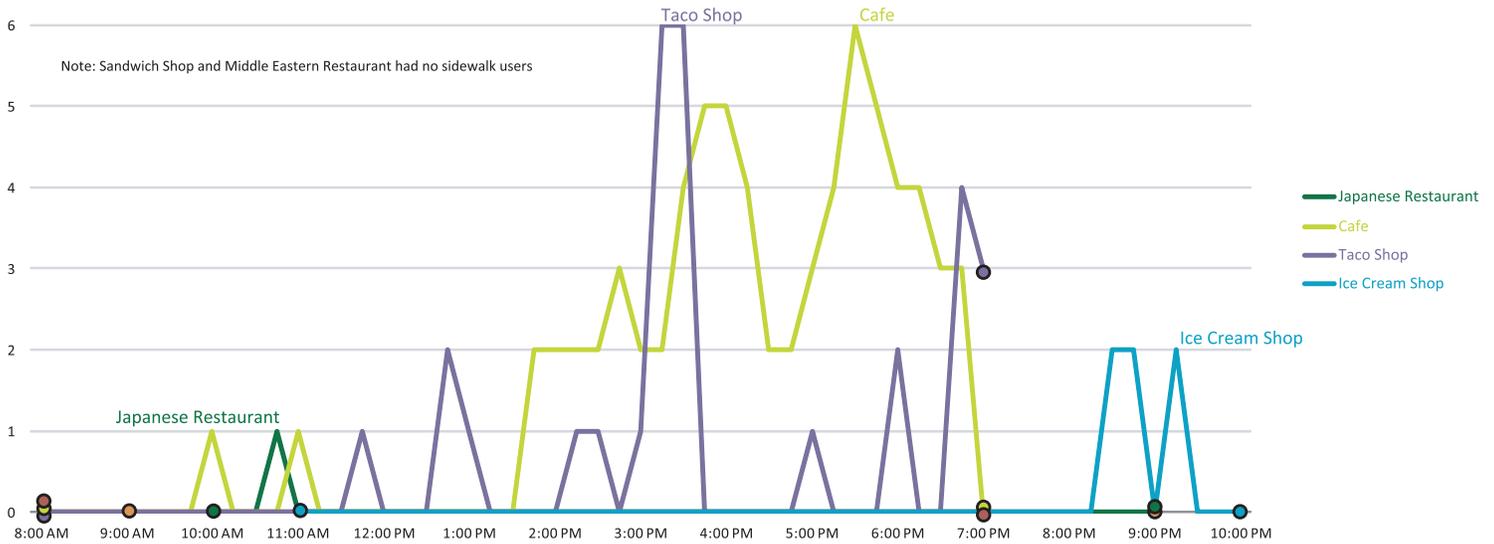
Parklets can have substantial spillover effects.

Both of the busiest Parklets attracted many “sidewalk users,” or people who lingered on the sidewalk adjacent to the Parklet, for activities such as stopping to chat with Parklet users, further enhancing the vitality of the street. As William H. Whyte put it, “What attracts people most, it would appear, is other people.” The Parklets were a strong testament to that simple but powerful observation.



Parklet activity spills over onto neighboring sidewalks as people attract people in a virtuous circle, even as many users are not necessarily patrons of the adjacent businesses

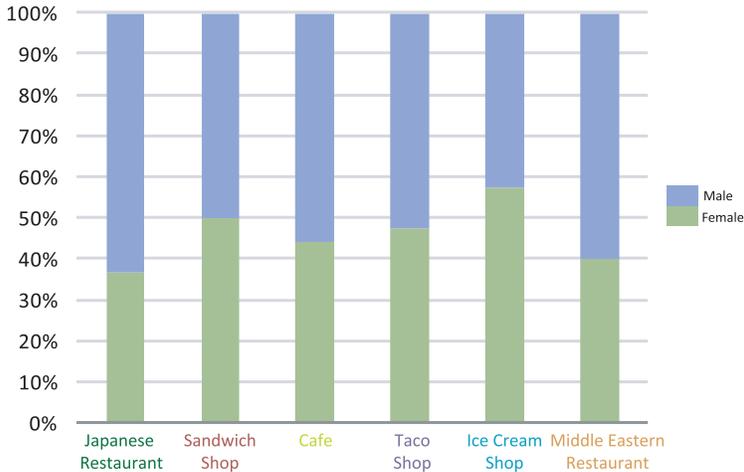
Sidewalk Users



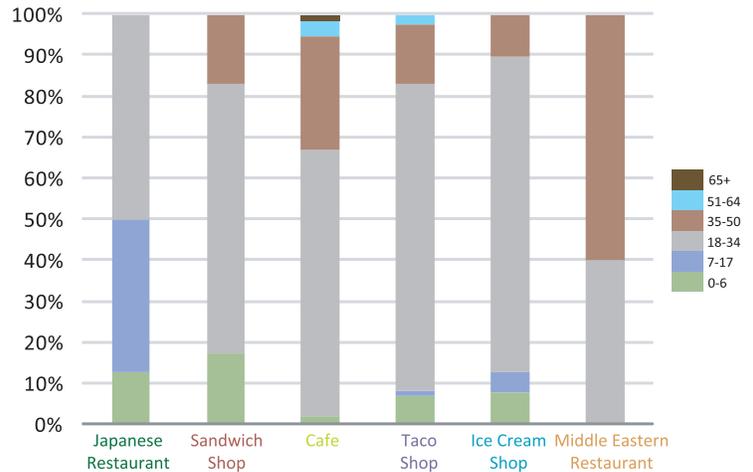
Parklets appealed evenly to males and females, a good indication of women’s comfort level in these spaces.

It has been widely observed that women tend to be more discriminating arbiters of the quality of a public space, often being more hesitant to use a space that does not feel comfortable and safe. As William H. Whyte again put it, “women are more discriminating than men as to where they will sit, more sensitive to annoyances, and women spend more time casting the various possibilities.” A strong female presence at these Parklets points to a successful space that feels at once both inviting and secure.

Gender



Age



Users were overwhelmingly young, between the ages of 18 and 34. University City residents are disproportionately young – 52% are aged 20-34 compared to 26% in Philadelphia overall – and this was reflected in the ages of Parklet users.



Parklets are particularly successful at drawing younger users, including young families, especially when associated with complimentary uses, like a popsicle shop

Nevertheless, the Parklets clearly appealed to a disproportionately young audience, and in order to serve the neighborhood as a whole, both the choice of locations, and design decisions need to be carefully considered in order to attract a mixed audience.

The Parklets were remarkably social spaces. Eating and talking to other people were by far the most common behaviors at most Parklets.

“It is such a pleasure to witness all of the folks enjoying the parklet while eating and relaxing... It’s a great place for impromptu meet-ups and eating with a neighbor. We always feel a twinge of sadness when the Parklet is tucked away for the winter.”

- Jeanne Chang, Parklet host

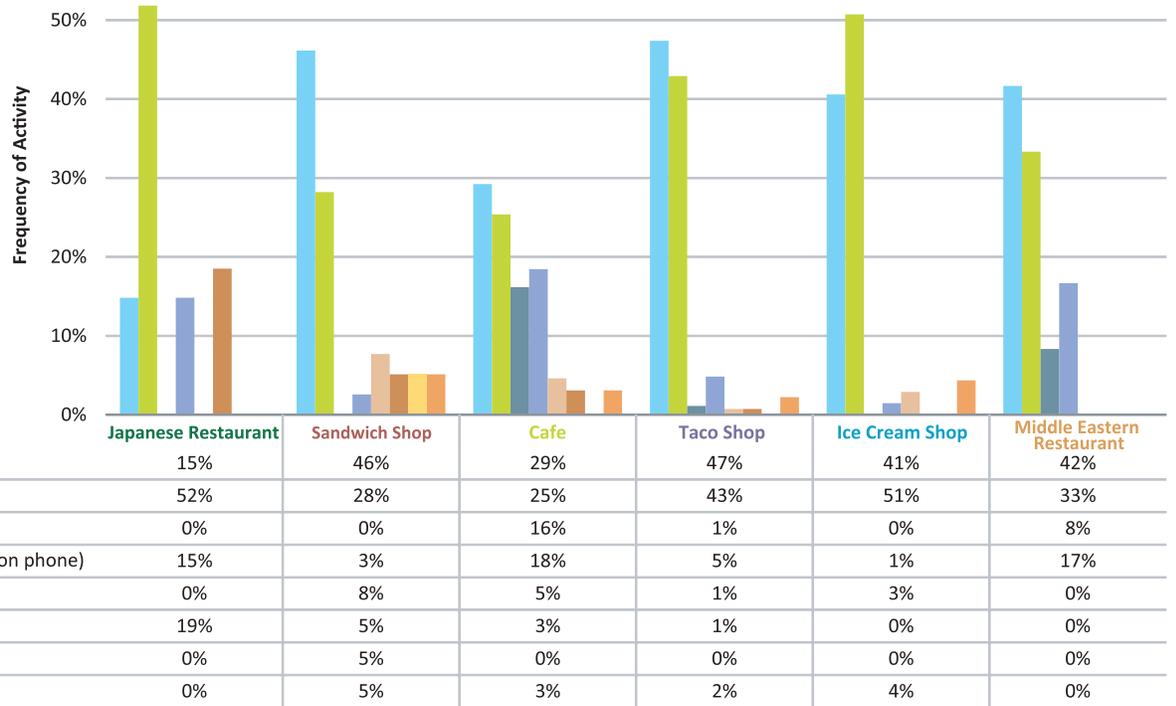


By being ADA compliant, Parklets were also able to accommodate users with limited or impaired mobility.



Parklets favor social behaviors including eating and talking to other people

Activities



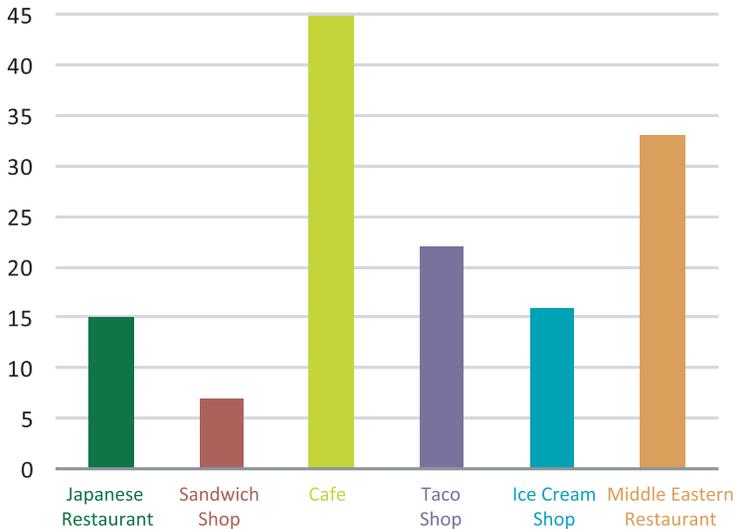
Solitary behaviors, such as reading or writing, using electronics and talking on the phone were generally rare. The primary exception to this was at “Cafe,” where a far higher percentage of users took part in those activities, as they generally did inside the cafe as well.



Parklets are largely social spaces, but also catered to solitary and quiet activities like reading or studying

The duration of parklet visits varied substantially between locations, due in part to differences in activities. At “Café,” the median duration of stay was nearly 45 minutes, twice as long as at “Taco Shop,” and more than five times longer than a visit to the Parklet outside “Sandwich Shop.”

Median Duration of Stay



Generous plantings and brightly colored furniture catch the eye of potential users and create the sense of an oasis well buffered from the street

What is the Impact of Parklets on Neighboring Businesses?

Parklet installation coincided with a substantial boost in sales. The majority of host businesses were able to provide sales data for the one to two weeks preceding and following the installation of their adjacent Parklets². Among them, the sales impact of the Parklets was substantial: following the introduction of the Parklets, sales were up by an average of 20% (the number of transactions increased by an average of 17% at the two businesses reporting that additional statistic). Several of the reporting businesses had been in operation for less than one year, so it was not possible to compare the year over year change in sales. Based on the typical increase in sales, a new Parklet is likely to pay for itself after just one to two seasons, particularly when multiple businesses benefit from its presence and can share in the cost

It is important to note that with three major universities, University City is a neighborhood with a substantial student presence – roughly 54% of residents are

college or graduate students. Because Parklet installation coincided with the end of the academic term, their positive impact on sales is almost certainly underestimated by these data. The fact that businesses with Parklets were able to weather the downturn normally associated with the end of term was, according to one Parklet host, “wildly impressive.”

What Factors Determine a Successful Site for a Parklet?

Ideally, it would be possible to use the performance of these Parklets to better understand the external factors contributing to their success, and to thereby construct a set of objective criteria by which to screen future candidate locations. To that end, we constructed a matrix of factors potentially impacting Parklet performance, and scored all of the Parklets on the site characteristics in that matrix.

“Since the Parklet first arrived... we anticipate its arrival each spring as it is such a boon to our business and neighborhood. Not only does it provide extra seating for our small space, but it provides an atmosphere of community and neighborly engagement.”

- Jeanne Chang, Parklet host

²Businesses providing sales data included: Café, Taco Shop (two adjacent businesses abutting Parklet), and Ice Cream Shop. The length of the sales comparison window depended on the data made available by the business.

Though the sample size was small, precluding tests for statistical significance, as an exploratory exercise we calculated correlation coefficients between each of these characteristics and two key performance indicators: average occupancy and unique users per hour³. We used the average value of those coefficients to group the site characteristics based on the strength of their association with Parklet success. Where an increase in the value of a site characteristic was correlated with an increase in Parklet performance, the association is shaded green. Conversely, where a decrease in the value of the characteristic is associated with improved performance, the characteristic is shaded red.

Site Characteristic	Direction of Association	Strength of Association
Customer turnover per interior seat	+	Very strongly associated
Building transparency (percentage of façade)	+	Strongly associated
Sidewalk width	-	Moderately associated
Presence of bicycle lane	+	
Presence of parallel parking (both sides of street)	+	
Population density (residents within 500 feet)	-	
Food conducive to onsite consumption	+	
Crime (robberies within 500 feet)	-	
Pedestrian volume	+	
Availability of takeout service	+	
Traffic volume	-	
Availability of shade	+	
Street width	-	Weakly associated
Presence of bicycle parking	NA	Not associated
Interior seats	NA	
Pre-existing outdoor seats	NA	

Owing to the small sample size, the following results should be treated as preliminary, and any hypotheses would need to be supported by additional data collection and statistical testing. With that caveat in mind though, the results suggest that a few key parameters may be strongly or moderately associated with Parklet success. By far the best predictor of Parklet success was a characteristic of the host business: the customer turnover per seat (measured as the number of tickets per hour per interior seat). That is, businesses with high turnover, but modest interior seating capacity were clearly associated with strong Parklet use. The other strong predictor of Parklet success was its visibility from the interior of the host business via a highly transparent façade. In the case of the more successful Parklets, a façade that included large windows fostered a sense of connection between the business and the Parklet, a perception that was aided by narrow sidewalks, another moderately strong predictor of parklet performance.

³A correlation coefficient can be thought of as the strength of the association between the value of the site characteristic, and the indicator of Parklet performance.

Several of the other strongest predictors also paint a picture of successful Parklets as being located on streets that are comfortable both to pedestrians, and to anyone sitting at a temporary platform in the street. These factors include the presence of a bicycle lane and parallel parking on both sides of the street, buffering the sidewalk and Parklet from vehicles. “Middle Eastern Restaurant” in particular may have performed poorly in part due to low customer turnover vs. interior seating capacity, poor Parklet visibility from the restaurant interior, and high traffic volumes. Also associated with Parklet success is the presence of neighboring businesses whose products are highly consumable in a Parklet setting, such as businesses with takeout service and serving informal handheld food such as sandwiches and tacos.

Some site characteristics which might intuitively have been expected to impact Parklet success were not strong predictors, at least in this small sample. For instance, the presence of pre-existing outdoor seating did not negatively impact Parklet performance; Parklet seating may have served a slightly different, and complementary, function to existing seating. At the same time, it seems very likely that the abundance of pre-existing outdoor seating at “Middle Eastern Restaurant” was another contributor to its relatively weak performance, especially as that seating was generally fairly well utilized throughout the day. Interestingly, the amount of existing indoor seating itself had no measurable impact on Parklet performance; only in the context of customer turnover did that factor take on a crucial role.



A good public space offers more than one reason to visit, including integrated bicycle racks in many Parklets

CONCLUSION

There are few more difficult challenges in building walkable neighborhoods than overcoming the clamor for parking. But as architect and urbanist Jan Gehl said, “If people rather than cars are invited into the city, pedestrian traffic and city life increase correspondingly.” Parklets, by their very nature, will almost inevitably contend with protests over lost parking, but the data presented here illustrate the enormous gains to neighborhoods and businesses that can result from the relatively painless loss of one or two parking spaces. For modest cost, well-placed Parklets can attract huge and diverse crowds, animating sidewalks and bolstering neighborhood businesses, while truly creating “places” where none existed before. Finally, the data suggest that the success of those new places need not be left to chance; rather, good decisions in siting can increase.



Supply creates demand: from the moment that Parklets were installed (and sometimes even before), they were remarkably successful at attracting users

SITE DESCRIPTIONS AND METHODS

The Parklets were all located on commercial corridors in primarily residential neighborhoods of row houses, semi-detached houses, and small apartment buildings in the University City section of West Philadelphia. “Japanese Restaurant” was located outside of a full service restaurant and adjacent to a small office space; “Sandwich Shop” was located outside of a convenience store and deli; “Cafe” was located outside a cafe serving coffee and light food; “Taco Shop” was outside a casual service restaurant serving tacos and burritos and a popsicle store, and adjacent to a casual service Korean restaurant; “Ice Cream Shop” was outside an ice cream store and adjacent to a take-out Chinese restaurant; “Middle Eastern Restaurant” was located outside a casual service Lebanese restaurant and juice bar.

User count and behavior data were collected at each Parklet on Tuesdays and Wednesdays in spring and summer 2013. Counts were conducted only on days with mild seasonal weather – days with high temperatures in the 70’s and 80’s with no precipitation. A UCD intern was stationed at the Parklet from 8:00AM (or from the opening time of the adjacent host business), and for the full duration of the business hours of the host business, except in the case of Taco Shop, where observations terminated two hours before a 9PM closing time. The intern recorded the arrival and departure time of each user, their gender and approximate age, whether or not they were a patron of the adjacent business, and the activities in which they participated (eating, talking, etc.). Site characteristics were recorded in spring 2014 and sales data were obtained directly from the host businesses. For the construction of the table of associations, the site characteristics were grouped by their strength of association with Parklet performance as follows: very strongly associated ($0.8 \leq |r|$), strongly associated ($0.35 \leq |r| < 0.8$), moderately associated ($0.15 \leq |r| < 0.35$), weakly associated ($0.1 \leq |r| < 0.15$), not associated ($|r| < 0.1$).

For more information about this report and its accompanying analysis, contact **Seth Budick**, UCD's Manager of Policy and Research at seth@universitycity.org. UCD's parklets and other public space work is run by its Planning and Economic Development department, which **Prema Katari Gupta** directs. **Nate Hommel** manages parklets for UCD. **Daniel Wolf** contributed surveying and analysis to this study. **Matt Bergheiser**, Executive Director of University City District, encourages and enables all aspects of our work, however rigorous or playful.

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All of the photos in this document are by Ryan Collerd, Ben Tran and Nate Hommel.

Appendix D

Student numbers

Number of students in 2020 – 50,195 students

Number of students in 2016 – 42,939 students

Number of students on peak day in 2016 – 26,775 students

Percentage of students at University on peak day – $26,775 / 42,939 = 62.4\%$

Estimated number of student on peak day in 2020 – 31,299 students

Staff numbers

Number of staff in 2018 – 6,111 staff

Number of staff in 2022 – 7,211 staff

Estimated number of staff in 2020 – $(7,211 - 6,111) / 2 + 6,111 = 6,661$ staff.

Assumption that 100% staff attend University each day.

Total number of staff and students

Total student and staff = 37,960

Assume 10% of students and staff cycle = 3,796 spaces required.

In accordance with City of Sydney DCP rates – one shower facility per 10 bicycle spaces

Number of shower facilities = $3,796 / 10 = 380$ showers

In accordance with City of Sydney DCP rates – 1 lockers per bike spaces

Number of lockers = 3,796 lockers

Appendix D