

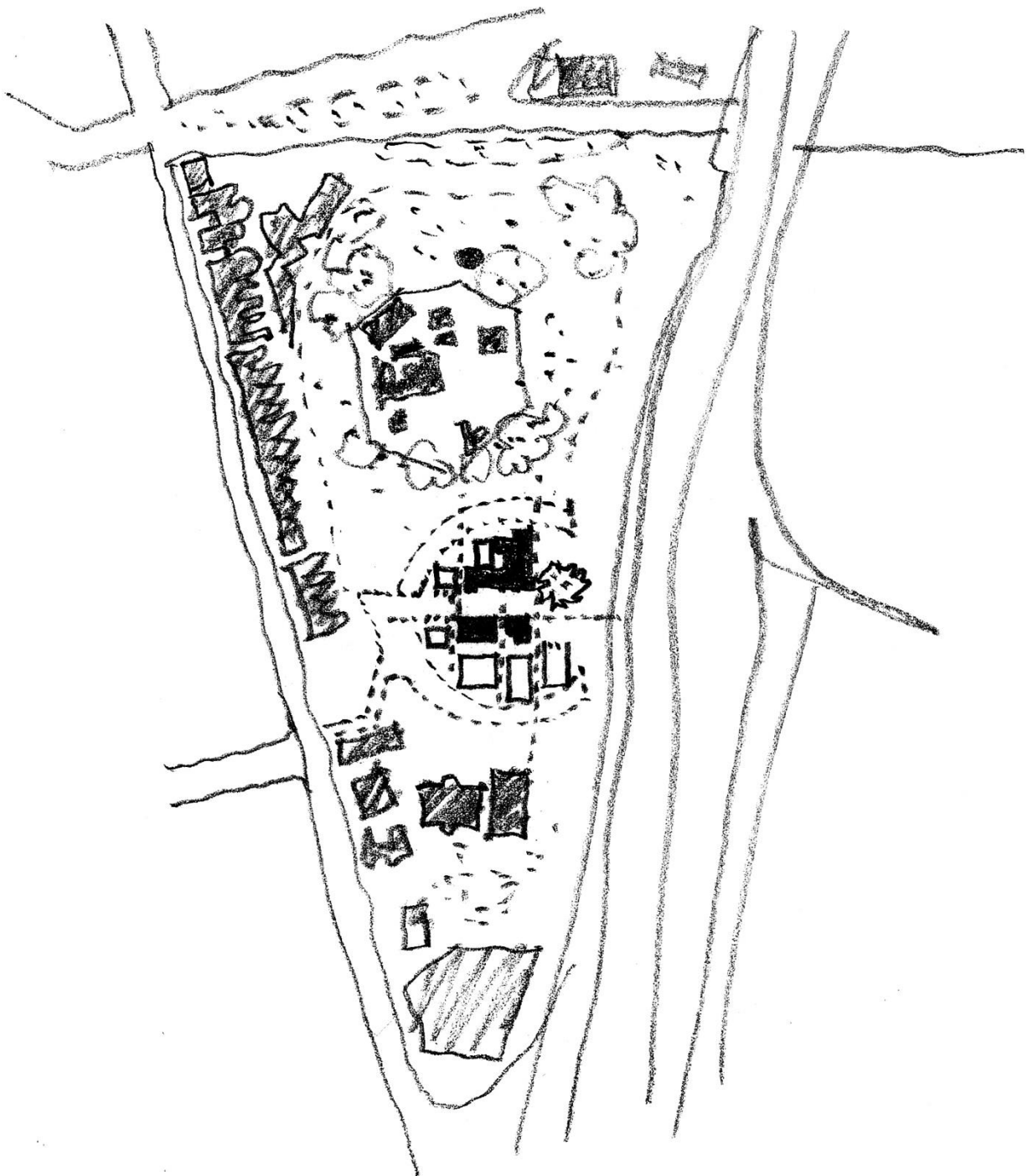
Fort Street Public School Traffic and Transport Assessment

SSD 10340

Prepared by Arup

For School Infrastructure NSW

18 February 2020



School Infrastructure NSW
Fort Street Public School
Traffic and Transport Assessment

SSD 10340

Issue | 18 March 2020

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 266969

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1 Introduction

The NSW Department of Education has commissioned Arup to develop a Traffic and Transport Assessment for the Fort Street Public School project. The site is located at Observatory Hill in Millers Point and the existing school has been in operation since 1849 making it one of the oldest government schools in Australia.

1.1 Project Description

Approval is sought for the expansion of Fort Street Public School to accommodate a total of 550 primary school students. Specifically:

Site preparation, demolition and excavation

- Site remediation.
- Demolition of the southernmost school building, the garage and storage shed west and east of the Bureau of Meteorology Building (the Met/the Met Building), and the toilet block adjoining the main school building.
- Selective removal of various elements of the main school building, as well as minor and insignificant elements of the Met Building and the Messenger's Cottage to facilitate refurbishment and future use of these buildings.
- Bulk excavation works to facilitate the new southern buildings and onsite detention.
- Tree removal.
- Installation of hydraulic and electrical services.

Land use

- Use of all buildings for the purpose of a school.

Existing buildings

- Retention, refurbishment and extension of the existing Fort Street Public School, including construction of a new roof and rooftop additions.
- Retention and refurbishment of the Met Building and internal alterations and additions.
- Retention and minor alterations and additions to the Messenger's Cottage.

Construction of New buildings

- Construction of one new building on the western part of the site for a staff room.
- Construction of two new, interconnected school buildings on the southern third of the site.
- Construction of a new communal hall and canteen building.

Landscaping

- Retention of the existing large fig tree.
- Landscaping works throughout the site, including construction of a new amphitheatre, new central plaza, and a multi-purpose forecourt.
- Landscaping of roof gardens on top of the new southern buildings and the existing Met Building.

Other works

- Works to the existing entrance road, including alterations to the Bradfield Tunnel Services Building.
- Modifications to existing pick-up / drop-off arrangements.
- Provision of signage zones.
- Installation of on-site detention.

1.2 Scope

This report is the Traffic and Transport Assessment, supporting the proposed development, suitable for the SSD lodgement.

- Generation of people and car trips
- Travel Demand Management strategy
- Vehicle access
- Any required road/intersection upgrades
- Public transport accessibility
- Car parking arrangements
- Pedestrian and bicycle access

1.3 SSDA design scope versus aspirational scope

The Fort Street Public School Master Plan caters for 26 Home Base Units for 600 students which is comprised of the current design (the subject of this SSDA) and the future Environmental Education Building, a western pedestrian bridge and upgrades to the eastern COLA.

Site infrastructure has been designed to cater for the full development of the site, including the addition of building E and the pedestrian bridge, which is beyond the remit of this SSDA.

The SSDA design documented supports 24 Home Base Units for 550 students.

1.4 Previous studies

The site has a long history of providing public school education facilities.

A Precinct Traffic Study was prepared by TTW for the Department of Education in November 2017.

Site observations were undertaken to observe existing traffic behaviour around the School site. This also involved discussions with School staff to gain an understanding of the issues they deal with on a daily basis. Counts of vehicles, cyclists, and pedestrians were undertaken at Argyle Street and the Cahill Expressway cycle bridge, with a 7-day mid-block count along Upper Fort Street. Traffic volumes were consistent throughout the week.

Key concerns noted by school staff and TTW are as follows:

- Single two-way trafficable lane along Upper Fort Street
- Lack of separation of cyclists, pedestrians, and vehicles
- Insufficient queuing space on approach to pick-up zone during afternoon peak
- Insufficient visual indicators on approach to pedestrian crossing at Kent Street

A number of short-term recommendations were provided to alleviate some aspects of these issues.

1.5 Consultation

The consultant team has attended a number of Stakeholder Working Group Meetings and special topic meetings with TfNSW and Roads and Maritime Services (RMS) in attendance to discuss traffic and transport aspects of the proposal.

The City of Sydney and the institutions located in the Observatory Hill precinct have been involved in the ongoing Stakeholder Working Group Meetings with eight meetings to date.

A meeting was held on 18 October 2019 attended by City of Sydney bicycle and traffic representatives, Bicycle NSW, Roads and Maritime Services and the consultant team to discuss a possible bicycle diversion strategy that is needed during construction of both the school and the Harbour Bridge Cycleway.

A meeting was held on 29 October 2019 with the TfNSW Sydney Coordination Office to discuss the CPTMP.

A meeting was held on 30 January 2020 with the Millers Point Community Resident Action Group to discuss the future operations of the school and how the various modes of access will be integrated into the local precinct.

2 SEARs Report

A Secretary's Environmental Assessment Requirements (SEARs) report has been submitted by the Department of Planning.

- Application Number SSD: 10340
- Proposal Name: Fort Street Public School
- Location: Upper Fort Street within City of Sydney
- Applicant: Department of Education
- Date of Issue 28 June 2019

The following details in Table 1 responds to the requirements raised in the SEARs report.

Table 1: Secretary's Environmental Assessment Requirements and response

#	SEARs Report	Arup response
	Policies: <ul style="list-style-type: none"> • Future Transport Strategy 2056 • Sydney's Cycling Future 2013 • Sydney's Walking Future 2013 • Sydney's Bus Future 2013 • City Centre Access Strategy 	The following documents have been reviewed and summarised in section 3.
Operation		
1	Provide details of the existing and proposed school operations, including staff and student numbers, school hours of operation, and operational details of any proposed before/after school care services and/or community use of school facilities.	Refer to sections 4.2 and 9.
2	Provide a detailed justification of suitability of the site to accommodate the proposal.	Refer to section 12.
3	Provide details of how the school will continue to operate during construction activities of the school, including proposed mitigation measures.	The school will be closed during construction.
4	Provide details regarding management of student safety in accessing and departing the school site in the peak periods, beyond the limits of the school grounds, and in particular how that traffic will be separated from cycle traffic associated with the cycle path.	Refer to section 10.
5	Provide detail regarding impact of construction on events including weddings that held in Observatory Hill Park. Include details of arrangements to prevent impacts on events with consideration given to the impact of construction. Provide evidence of liaison and agreement with the City of Sydney and the Observatory in relation to this issue.	Refer to the Preliminary CPTMP report.

Transport and accessibility		
1	Include a transport and accessibility impact assessment, which details, but not limited to the following:	
2	Provide details of proposed walking routes to/from the school entry gate, specifically from Kent Street and from the Argyle Street bus stop. Address proposals regarding this contained within in the Harbour Village North Public Domain Plan, including a lift from Kent Street.	Refer to section 10.7. The plan for a public lift from Kent Street is not relied upon by the proposed development.
3	Provide details of vehicular drop off points at the school, including kerb arrangements, signage, traffic movement and numbers.	Refer to section 10.1.
4	Provide details regarding continued vehicular access to the National Trust at any time, including at locations where school entry or exit gates are located, and school vehicular access will be located.	Refer to section 10.
5	Provide current daily and future peak hour vehicle traffic generation (light and heavy vehicles), current and future public transport current and future pedestrian and cycle movements existing traffic and transport facilities located within the vicinity of the proposed development.	Refer to section 9.
6	Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, school bus, pedestrian and bicycle trips.	Refer to section 9.
7	Details of school bus/coach pick up and drop off location estimated daily school / coach movements and access arrangement for students to and from bus drop off and pick up.	No school buses are proposed. The regular route buses will be utilised.
8	Access to, from and within the site from the road and active transport networks, including (but not limited to) intersection locations, design and sight distances (for example turning lanes, swept paths, sight distance requirements).	Refer to section 11.
9	Details on how the proposed development interfaces with the Sydney Harbour Bridge cycleway access proposals and how the development will impact on these.	Refer to section 10.5.
10	The adequacy of existing public transport or any future public transport infrastructure within the vicinity of the site, including the Sydney Light Rail and Sydney Metro City and Southwest metro, pedestrian and bicycle networks and associated infrastructure to meet the likely future demand of the proposed development.	Refer to section 9.
11	Measures to integrate the development with the existing/future public transport network, including the Sydney Light Rail and Sydney Metro City and Southwest metro.	Refer to section 10.7.
12	Assessment of the impact of additional traffic generated by the proposed development on the existing road network, including school bus arrangements, with consideration to the impact of trips generated (motor vehicles, pedestrians, bicycle and public transport) by the development on nearby intersections, the cumulative impacts from other approved developments	Refer to section 11.1.

	in the vicinity, and the need/associated funding for, and details of, upgrades or road improvement works, if required (Traffic modelling is to be undertaken using SIDRA network modelling for current and future years).	
13	The identification of infrastructure required to ameliorate any impacts on traffic efficiency and road safety impacts associated with the proposed development, including details on improvements required to affected intersections, additional school bus routes along bus capable roads (i.e. minimum 3.5 m wide travel lanes), additional bus stops or bus bays.	Refer to section 10.1.
14	Details of travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location-specific sustainable travel plan (Green Travel Plan and specific Workplace travel plan) and the provision of facilities to increase the non-car mode share for travel to and from the site and details of the promotion of these activities.	Refer to section 9 and the Green Travel Plan report.
15	The proposed walking and cycling access arrangements and connections to public transport services, including the Sydney Light Rail and Sydney Metro City and Southwest metro.	Refer to section 10.
16	The proposed access arrangements, for car and bus pick-up/drop-off facilities, including how peak pick up and drop off times will be managed, how vehicles will manoeuvre and how congestion flow on effects to the surrounding road network will be managed.	Refer to section 9 and 10.
17	Measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and bicycle networks, including pedestrian crossings and refuges and speed control devices and zones. Specifically provide detail of how vehicle and pedestrian traffic will be separated from the cycleway traffic in the short and long term.	Refer to section 8.4.
18	Provide detail of school entries and exits, and treatment of Upper Fort Street to prevent unsafe pedestrian conditions including conflict between pedestrians and cars.	Refer to section 10.
19	Proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance.	Refer to section 10.9.
20	Proposed number of on-site car parking spaces for teaching staff and visitors and corresponding compliance with existing parking codes and justification for the level of car parking provided on-site. If parking for staff is provided off-site, details of this and the appropriate access and safety arrangements detailed.	Refer to section 10.3.
21	An assessment of the cumulative on-street parking impacts of cars and bus pick-up/drop-off, staff parking and any other parking demands associated with the development.	Refer to section 10.3.
22	An assessment of road and pedestrian safety adjacent to the proposed development and the details of required	Refer to section 10.7.

	road safety measures and personal safety in line with CPTED.	
23	Emergency vehicle access, service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type, routes and the likely arrival and departure times).	Refer to sections 10.4 and 10.10
24	Relevant Policies and Guidelines: <ul style="list-style-type: none"> - Guide to Traffic Generating Developments (Roads and Maritime Services) - EIS Guidelines – Road and Related Facilities (DoPI) - Cycling Aspects of Austroads Guides - NSW Planning Guidelines for Walking and Cycling - Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development - Standards Australia AS2890.3 (Bicycle Parking Facilities). - City Centre Access Strategy - City of Sydney Cycling Strategy and Action Plan 2018-2030 	

3 Strategic Context

The following strategic documents have been reviewed and considered during the assessment of the proposal.

3.1 Future Transport 2056

In March 2018, Transport for New South Wales released the Future Transport Strategy 2056, which is an update of NSW's 2012 Long Term Transport Masterplan which Sydney's Cycling, Walking and Bus Future strategy documents sit under. The Strategy sets out the 40-year vision, directions and outcomes framework for customer mobility in NSW, which will guide transport investment over the long term. The document highlights the importance of integrated land use and transport planning and currently hasn't released individual modal plans.

Relevance: Sustainable modes are encouraged to access the school to help support the School's growth.

3.2 Sydney's Cycling Future

The overarching goal of Sydney's Cycling Future (released in 2013) is to make cycling a safe, convenient and enjoyable transport option for short trips. The document outlines how to support and make bicycle riding a feasible transport option for all customer types. The three approaches highlighted in the strategy include:

- Investing in separated cycleways and providing connected bicycle networks to major centres and transport interchanges;
- Promoting better use of our existing network; and
- Engaging with our partners across government, councils, developers and bicycle users.

The City of Sydney is moving towards a well-connected cycle network to improve accessibility for workers and visitors to the CBD. The development will encourage people to cycle by providing high quality end of trip facilities for employees and visitors.

Relevance: Considerations to support cycling to access the site for both staff and students whether it is for the last or first mile of their journey or the entire journey.

3.3 Sydney's Walking Future

Sydney's Walking Future produced by Transport for NSW sets out a strategy to encourage people in Sydney to walk more through actions that make it a more convenient, better connected and safer mode of transport.

Key points to emerge from the strategy that are relevant to the project include:

- NSW Government commitment to invest in new walking links that connect people to public transport;
- Prioritisation of investment in walking infrastructure to be prioritised within 2km of centres and public transport interchanges; and
- Commitment to invest in walking facilities as part of the Transport Access Program, including improved circulation spaces around station precincts and safer walking links.

The project has the potential to significantly enhance walkability in the local area.

Relevance: Considerations to support walking to access the site for both staff and students whether it is for the last or first mile of their journey or the entire journey.

3.4 Sydney Bus Future

Sydney's Bus Future produced by Transport for NSW provides the framework for improving and delivering more frequent and reliable bus services throughout Sydney. The core aim of the strategy is to provide an integrated bus network with seamless connections to other transport services.

The strategy also aims to tailor bus services to customer needs. In this vein, bus services will be focused into three key types, with associated priority and infrastructure investment:

- Rapid routes, which will use priority infrastructure, connect regionally throughout the city and have stops every 800m-1km;
- Suburban routes, which will have stops every 400m and have mix of frequent 'turn up and go' and timetabled services; and
- Local routes, which will complete the network using local streets.

Employees and students on the Site will take advantage of these improved connections.

Relevance: Sydney buses are integrating with other public transport modes to assist with journey connections. Direct access is also possible by local bus services.

3.5 Sydney's Light Rail Future (2013)

Sydney's Cycling Future produced by Transport for NSW provides a framework for the way light rail is planned and prioritised in Sydney. The plan identifies four stages for the future of light rail, including the provision of the CBD and South East Light Rail.

This line will be an attractive option to employees and visitors of the development, with Circular Quay being the nearest stop.

Relevance: The light rail route is very well placed to serve as a spine route through the school catchment area for access to the school.

3.6 City Centre Access Strategy

The City Centre Access Strategy was released in 2013 by Transport for New South Wales. The strategy considers all transport modes and their key networks including rail, bus, walking, cycling, buses and cars. The development of the Access Strategy has balanced the needs of customers for each transport mode in order to deliver a more integrated network that makes the best use of finite space in the Sydney city centre. The different transport modes do not function in isolation, but together as an integrated transport system.

Relevance: Sustainable modes are encouraged to access the school to help support the School's growth.

3.7 Harbour Village North Public Domain Study

We have reviewed the Harbour North Public Domain Study from 2012. We note that a number of the proposals have been implemented and others are in planning. The access strategy for the school aligns with a number of the proposals in that document. The Stakeholder Working Group has enabled the team to discuss our development with the City of Sydney and Transport for NSW regarding the access strategy.

The study identifies six guiding directions for long term improvements in Harbour Village North that will strengthen its character as a special destination while improving connections to surrounding areas and enriching community life. Two of these guiding directions are relevant from a movement viewpoint:

1. Improve access, connectivity and wayfinding.
2. Create a network of linked parks and upgrade existing open spaces.

Relevance: The guiding directions will assist with integration of the movements systems that are used for school access.

4 Existing Conditions

It is important to understand the existing conditions and transport behaviours when planning for future expansion of the school. This section examines the existing conditions in terms of transport infrastructure and provision around the Site.

4.1 Context

Fort Street Public School is located in the City of Sydney council area. The School site is bordered by the Cahill Expressway to the north and Upper Fort Street to the south and east.

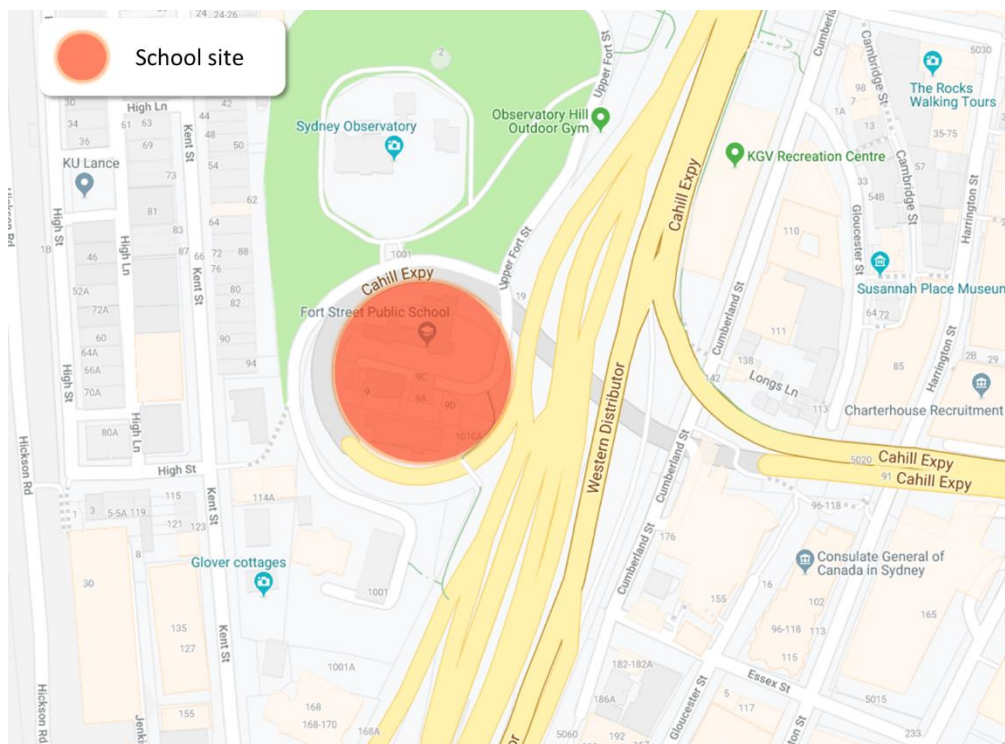


Figure 1: School site boundary

4.2 Current school operations

The School currently caters for around 200 students.

- Standard class hours are between 9:00am and 3:00pm.
- In the morning arrival period, students arrive steadily between 8:20am and 9:00am.
- In the afternoon departure period, most students depart immediately during a short period between 3:00pm and 3:10pm.
- Currently the Out of School Hours Care (OOSH) before or after school has capacity for 45 students on site and is at capacity.

- Offsite at the King George V Recreation Centre there is capacity for 45 with approximately 20 students currently using it after school. Some parents make alternative arrangements for before or after school care.

4.3 Walking

The Cahill Expressway is a barrier to the pedestrian permeability of the school however there are several connections to the local street network. The key pedestrian routes surrounding the school are highlighted in Figure 2.

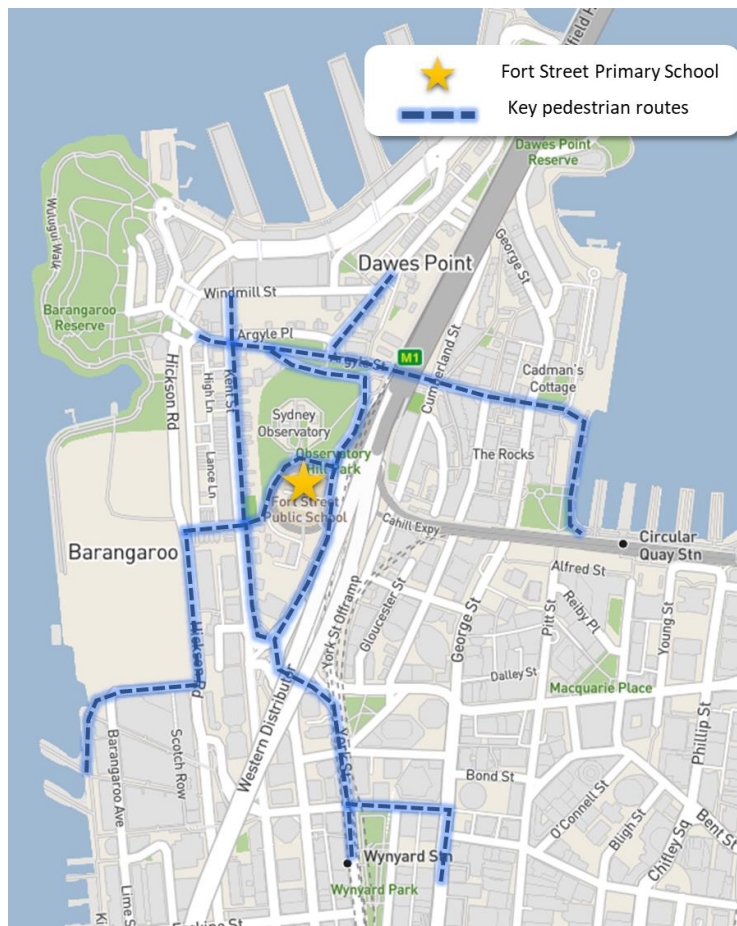


Figure 2 Key pedestrian routes

The school can be accessed from the north and south east side and south west side:

- Upper Fort Street has a footpath on the western side which enable access to the north east corner of the Site. This connects to footpaths in the Observatory Hill, Watsons Road and Argyle Street (Figure 3); and
- A shared path connects to the south east corner of the Site via a pedestrian bridge over the Cahill Expressway allowing pedestrians to approach from the south (Figure 4);
- The south west side is accessed via Kent Street using Agar Steps and walking along the footpath across observatory hill (Figure 5 and Figure 6).



Figure 3 Footpath on the western side of Upper Fort Street



Figure 4 Shared path overpass on the south east side of the school

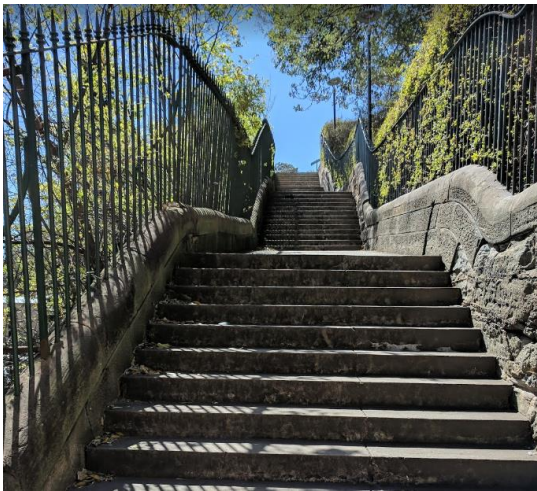


Figure 5 Bottom of Agar Steps



Figure 6 Top of Agar Steps

4.4 Cycling

The school is relatively well connected in the City of Sydney bike network, with a number of cycle routes surrounding the Site. An off road shared path is provided along the western side of the Western Distributor linking to the shared path across the Sydney Harbour Bridge. Kent Street, Argyle Street and Upper Fort Street are all low traffic streets which are considered suitable for cycling. All these routes and a component of the wider City of Sydney cycling network are presented on Figure 7.



Figure 7 Local cycling routes

4.5 Public Transport

4.5.1 Rail

The nearest railway stations to the school are Wynyard Station and Circular Quay Station which are both approximately a 10 minute walk away. They provide access to the T1, T2, T3, T4, T8 and T9 rail lines with connections to a wide range of stations to the north, west, and south west of Sydney.

4.5.2 Ferry

Circular Quay is the main Ferry terminus for a large number of services within Sydney Harbour as well as the Barangaroo Wharf. These two wharves are approximately both a 10 minute walk from the school. These services provide connections to destinations such as Manly, Taronga Zoo, Neutral Bay and Double Bay and service travelling west along Parramatta River.

4.5.3 Bus

There are limited bus services surrounding the school. Bus route number 311 stops on Argyle Street near the intersection with Watson Road. This service provides a connection between Millers Point and Railway Square via Potts Point running approximately every 30 minutes on weekdays.

4.5.4 Future public transport upgrades

As part of future plans for Sydney Metro a station is being constructed at the northern tip of Barangaroo. This station is currently planned to open in 2024 and would be approximately a 5-minute walk from the school.

Sydney CBD Light Rail is due to open in late 2019 and will connect to Circular Quay and Wynyard. Figure 8 presents the future pedestrian routes to and from Fort Street Public School to the Barangaroo Metro Station and Light Rail connections at Circular Quay and Wynyard.



Figure 8 Future pedestrian routes to Sydney Metro and light rail

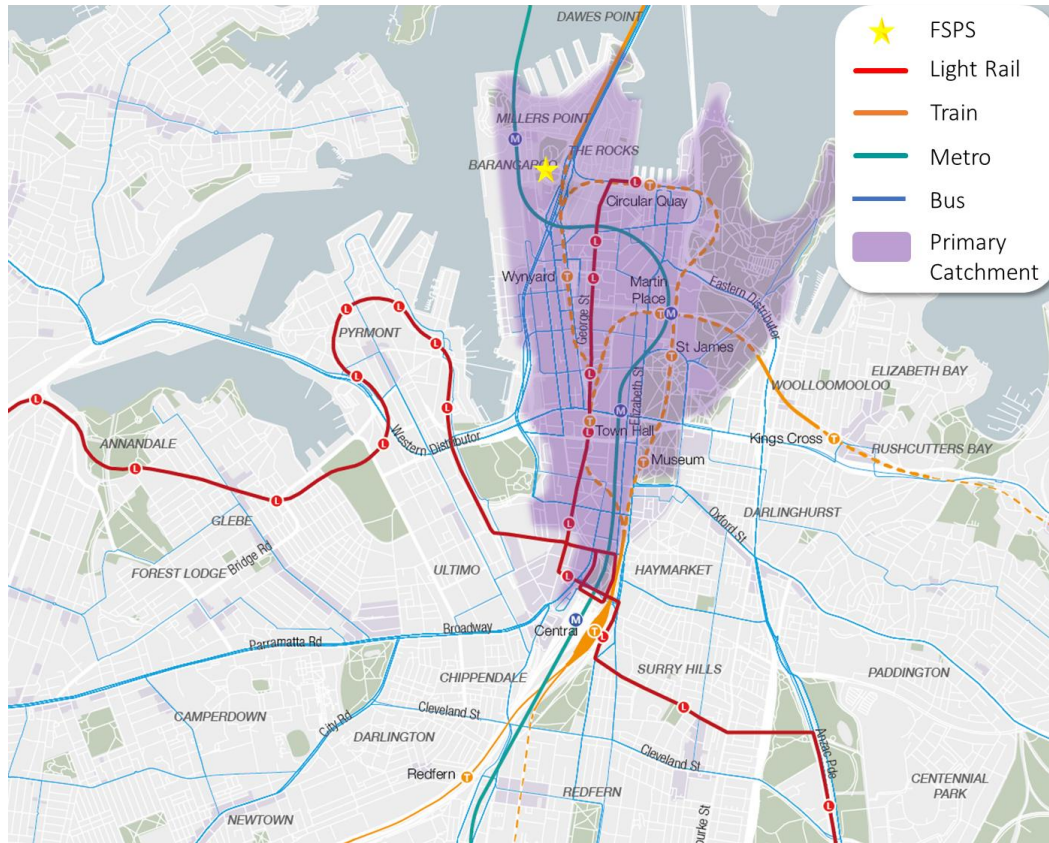


Figure 9 Transport network surrounding the school

Due to the Site's proximity to a number of major railway stations and a key ferry terminus and bus routes, highlighted in Figure 9, it has an extensive 30-minute public transport catchment as outlined in Figure 10. The catchment extends as far south as Zetland and north west to Macquarie University. This good level of accessibility via sustainable public transport modes suggests the school can support a wider catchment than the existing CBD catchment.

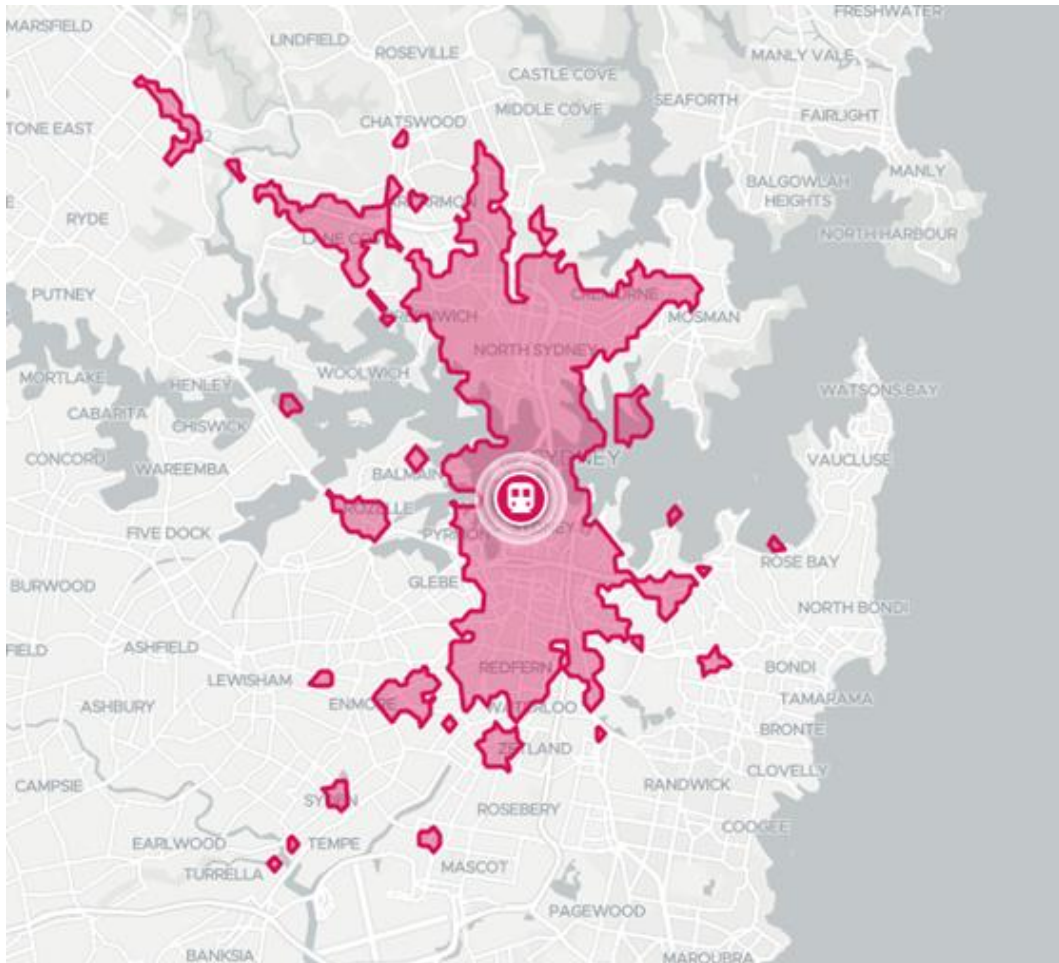


Figure 10 The 30-minute public transport catchment

4.6 Private vehicle access and parking

The school is bordered by the Cahill Expressway to the north and west and Upper Fort Street to the east and south. Upper Fort Street provides the only vehicular access to the school. Vehicles approaching from the south would use Kent Street and Argyle Street as the main access route. The route from the north is more complex with vehicles needing to turn off the Western Distributor onto Grosvenor Street and use Harrington Street to connect to Argyle Street. The surrounding roads are all local roads except for the Cahill Expressway which is a state road. The road network surrounding the school is presented on Figure 11.

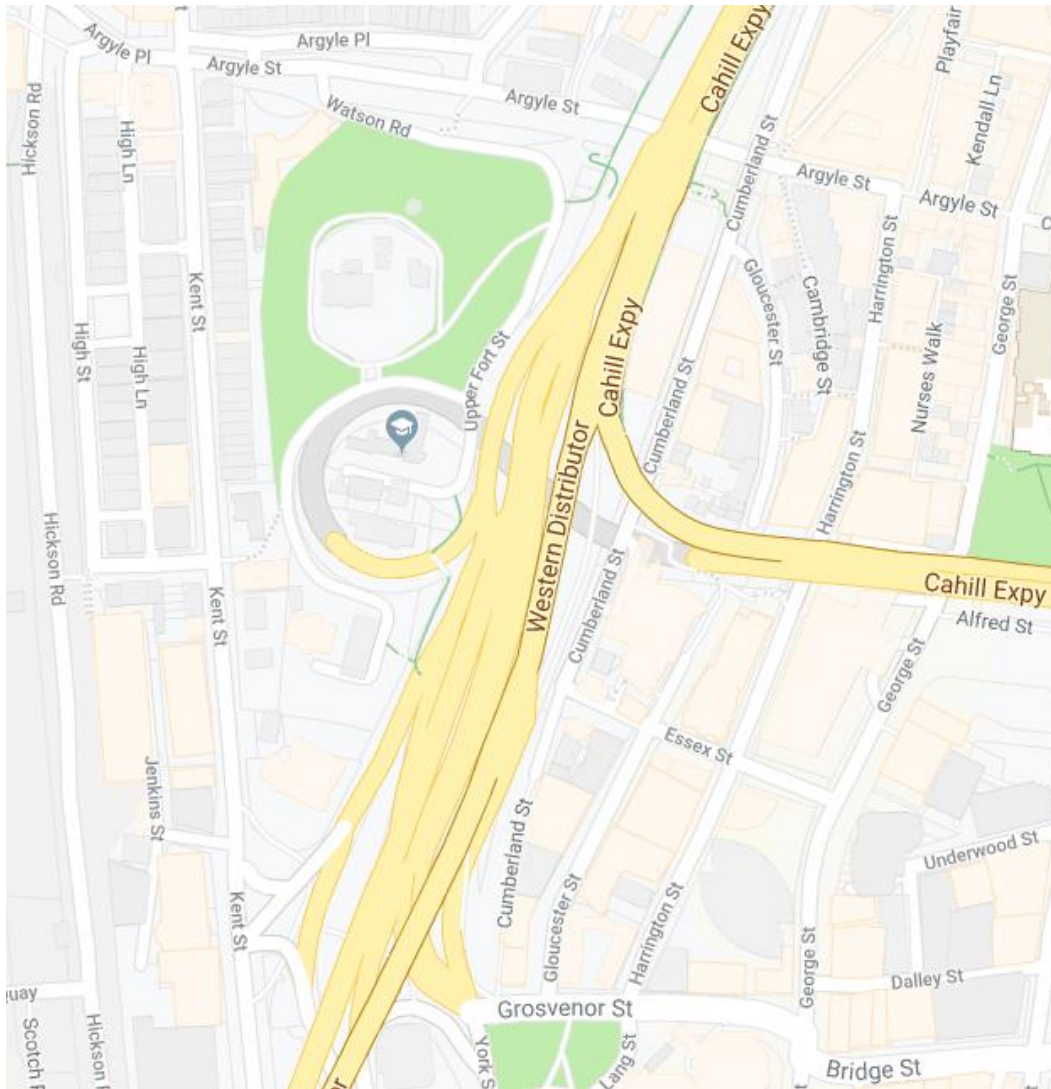


Figure 11 Road network

4.6.1 Kent Street

There are 4 car parking spaces in Kent Street adjacent to the tennis courts (and hence not in front of private residences) which are accessible via the Agar Steps. There would be issue with using these for school pick-up:

- Only providing for 4 cars limits the ability for proper operation. Cars will queue and wait in the traffic lane blocking southbound traffic.
- Council are reluctant to lose resident permit holder spaces due to high resident demand for car parking
- Cars may wait in the taxi zone or 5 minute parking zone in front of the Langham Hotel opposite.



Figure 12 4 parking spaces in front of tennis courts on Kent Street

Figure 13 2P parking restriction with permit holders accepted

4.6.2 Argyle Street

Along Argyle Street there is a No Stopping zone along the southern kerb associated with the pedestrian crossing and beyond this a bus zone as shown in Figure 14. The northern kerb provides 2P parking (resident permit holders excepted).

Similar issues to those identified for Kent Street would exist however if use of Argyle Street was considered for formal school use:

- Only a limited number of spaces could be provided which limits the ability for proper operation. Cars would queue and wait in the traffic lane blocking westbound traffic.
- Council are reluctant to lose permit holder spaces due to high resident demand for car parking



Figure 14: Argyle Street southern kerb

4.6.3 Parking signage

The parking signage along Upper Fort Street on approach to the school provides no preference to the school during pick-up or drop-off periods. In the afternoon cars queue through No Stopping zones and need to queue around cars that are parked in 4P parking zones.

Sydney City Council has been approached to review and improve this situation for the future expansion.



4.6.4 Observed pick-up activity

Students were picked-up in front of the school with cars queuing back along Upper Fort Street. Some parent/carers were observed to park adjacent to the Observatory in No Stopping zones and others parked further down Upper Fort Street which hindered the length of the vehicle queue.

We observed a “walking school bus” leaving the school at the end of the pick-up period (Figure 15). This was a group of students being escorted to the King George V Recreation Centre on Cumberland Street for after school care.



Figure 15: Walking school bus to after school care

5 School travel survey

A school travel survey was conducted of both staff and students attending the school.

Student Survey:

- Home location
- Year
- How many children in your family attend Fort Street Public School? (Tick which year)
- Does your child(ren) attend Out of School Hours care?
- What time does your child(ren) arrive at school?
- On a typical day, how do your child(ren) currently travel to school from home?
- If dropped off by car, how many children of Fort Street Public School are in the car?
- What is the reason your child(ren) are not taking public transport or walking?
- As an alternative to dropping off your child(ren) by car, how would you rather your child(ren) travel to school?
- When school ends at 3:00pm, what does your child(ren) do?
- How does your child(ren) travel to your destination after school?
- Would any of the following travel modes influence your child(ren) travel choice?
 - Light Rail opening at Circular Quay in late 2019
 - Metro Station opening at Barangaroo in 2024
 - Student Opal travel pass available (free public transport travel)
- Any other comments regarding transport to and from the school?

Response:

Survey responses were received representing 153 students (total enrolled 200). Survey respondents have been split to K-2, older siblings of K-2 and 3-6 as shown in Table 2

Table 2: Split of student survey respondents

Year	K-2	+ siblings	3-6	Total
Number	65	20	68	153
%	42%	13%	45%	100%

Older siblings of K-2 students are assumed to travel at the same time and with their mode split.

Staff Survey:

- Home location?
- What time do you arrive at school?
- On a typical day, how do you currently travel to school from home?
- What is the reason for not taking public transport or walking?
- Would you be more inclined to walk / cycle to school on most days if end of trip facilities are provided? Example shower facilities, change rooms and secure bicycle parking
- What would the next most desirable mode of transport be if you didn't drive?
- Would any of the following travel modes influence your travel choice?
 - Light Rail opening at Circular Quay in late 2019
 - Metro Station opening at Barangaroo in 2024
- Any other comments regarding transport to and from the school?

Response:

20 Staff completed the survey.

5.1 Before and After Out of School Hours Care (OOSH)

Currently the OOSH has capacity for 45 students on site and is at capacity.

Offsite at the King George V Recreation Centre there is capacity for 45 but only 20 students currently use it.

The future scenario planning will aim for up to 250 students in OOSH on-site if need be which will require classroom space.

Currently of the 153 students represented by the survey, 16 students use before care and 77 students use after care as shown in Table 3. If this is factored up to 200 students then some 21 students would use before care and 100 students after care. It is likely that some of the after care occurs at alternative locations organised by the parents.

Table 3: OOSH attendance

Year	K-2 + siblings	3-6	Total	%
Neither	28	44	72	49%
Both	8	4	12	8%
After	47	18	65	45%
Before	2	2	4	3%
Total	85	68	153	

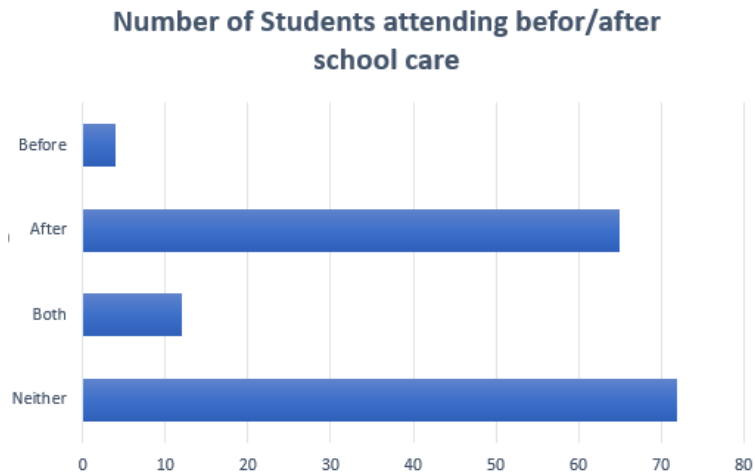


Figure 16: OOSH attendance

5.2 Arrival profile

The arrivals times and profile are shown in Table 4 and Figure 17.

Table 4: Arrival times of students

Year	K-2 + siblings	3-6	Total
Before 8:00am	6	6	12
8:00am to 8:10am	3	4	7
8:10am to 8:20am	3	2	5
8:20am to 8:30am	15	9	24
8:30am to 8:40am	11	16	27
8:40am to 8:50am	29	15	44
8:50am to 9:00am	18	16	34
Total	85	68	153

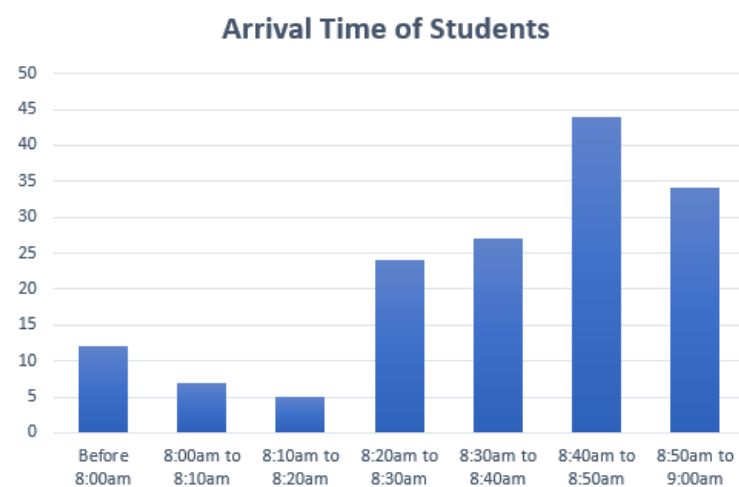


Figure 17: Arrival profile of students

5.3 Travel mode

5.3.1 Arrival

The arrival travel mode of students is shown in Table 5 and Figure 18. Car drop off is the main mode share (33%), Walk with parent second most common (28%) and then catching the train (15%)

Table 5: Student arrival mode of travel'

Year	K-2 + siblings	3-6	Total
Bus and Walk	5	9	14
Car, I drop my child off at school	31	20	51
Car (car pool)	2	1	3
Ferry	2	1	3
Scooter/ Motorbike	3	1	4
Train and bus	6		6
Train and walk	12	12	24
Walk (with a parent)	24	19	43
Walk (unaccompanied)		3	3
Taxi		2	2
Total	85	68	153

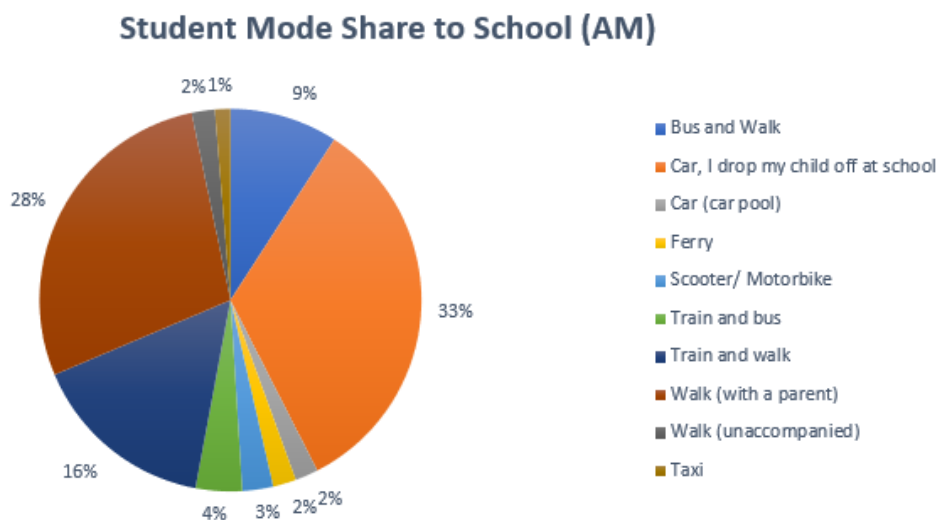


Figure 18: Student arrival mode of travel

5.3.2 Departure

The departure travel mode of students is shown in Table 6 and Figure 19. Car pick up is the main mode share (38%), Walk with parent second most common (24%) and then catching the train (12%)

Table 6: Student departure mode of travel

Year	K-2 + siblings	yr3-6	Total
Bus	1	6	7
Car pool		1	1
Car, pick up my child(ren)	34	25	59
Scooter	4		4
Train and bus	11	2	13
Train and walk	9	9	18
Walk (accompanied by parent)	24	13	37
Walk (unaccompanied)	2	12	14
Total	85	68	153

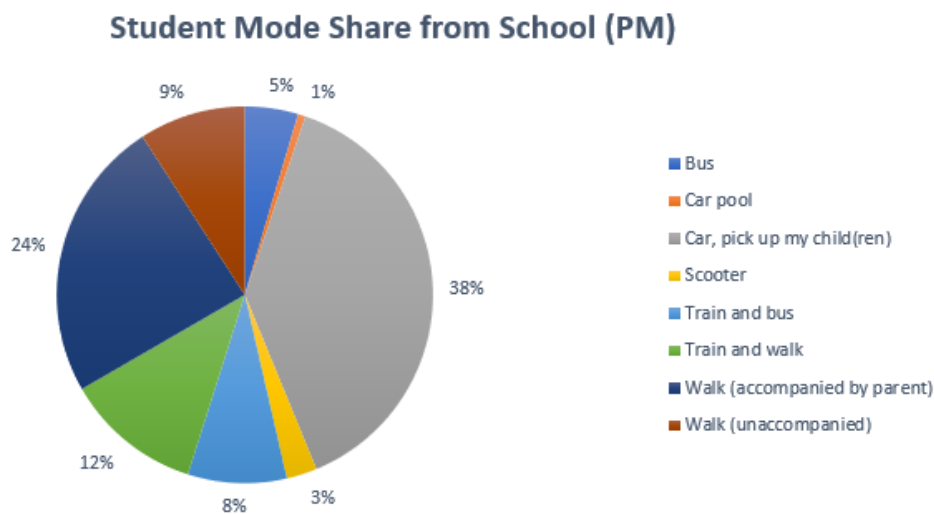


Figure 19: Student departure mode of travel

5.4 Would any of the following travel modes influence your child(ren) travel choice?

The key future influences of changed travel behaviour identified by the survey are opening of the light rail and increased availability to free public transport.

	K-2	3-6	Total	%
Light Rail opening at Circular Quay in late 2019	9	12	21	14%
Light Rail opening at Circular Quay in late 2019, Metro Station opening at Barangaroo in 2024	4	0	4	3%
Light Rail opening at Circular Quay in late 2019, Metro Station opening at Barangaroo in 2024, Student Opal travel pass available (free public transport travel)	6	3	9	6%
Metro Station opening at Barangaroo in 2024	1	4	5	3%
Metro Station opening at Barangaroo in 2024, Student Opal travel pass available (free public transport travel)	3	0	3	3%
No	18	56	74	50%
Student Opal travel pass available (free public transport travel)	24	11	35	23%
Total	65	86	151	

5.5 Key Findings

- Nearly half the student reportedly attend after school care – some of this may not be at the school
- Half of the students arrive between 8:40am-9:00am
- Car drop off is the main mode share (33%), Walk with parent second most common (28%) and then catching the train (15%)
- Average car occupancy is 1.45 students mainly because of siblings, limited carpooling occurring regularly
- The most common reasons parents and students have identified why they don't walk or catch PT are because the walking route isn't safe, they need to be accompanied and the parent drives and no convenient access to PT
- Preferred alternative ways to get to school included a dedicated school bus or walking with a group with friends
- Car pick up is the main mode share (38%), Walk with parent second most common (24%) and then catching the train (12%)
- Bad weather days don't significantly change travel patterns, as expected there are a few parents who will drop their child off instead of walking
- Both students and parents identified that student opal travel pass would influence their travel
- Key additional comments are mainly regarding the cyclist issues (speed and lack of care given to pedestrians/ safety), lack of public transport, bus stops should be closer to school, 311 is unreliable

5.6 Staff survey

There are currently 15 car parking spaces available within the school grounds. Staff travel characteristics are shown in Figure 20, Figure 21 and Table 7.

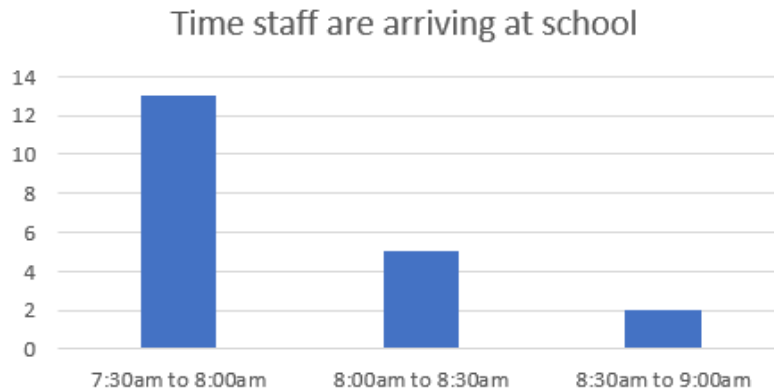


Figure 20: Time of staff arrival

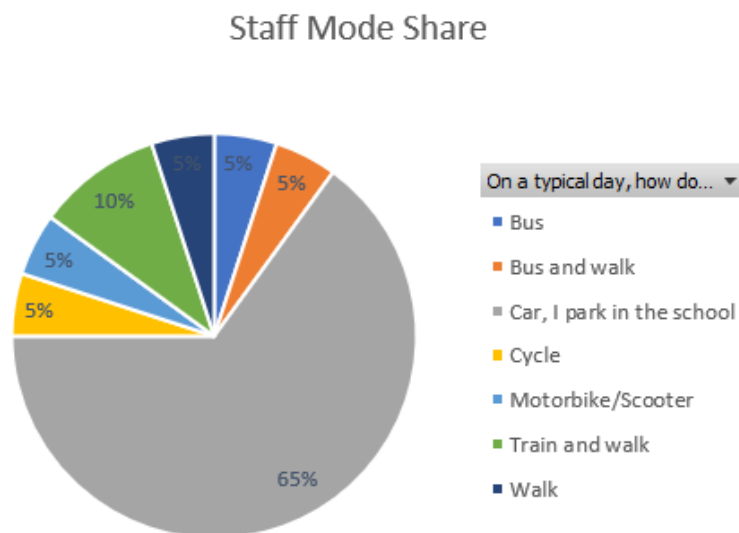


Figure 21: Staff mode of travel

Table 7: Alternative mode if car not available

Alternative mode if car not available	Number	%
Carpool with other staff	4	23%
Bus	2	12%
Cycle	1	6%
Train and walk	6	35%
Light rail and walk	2	12%
Motorcycle/ scooter	1	6%
Walk only	1	6%
Total	17	100%

5.7 Travel activity

5.7.1 Existing activity (200 students)

Based on the student survey, the existing drop-off and pick-up activity for the 200 students enrolled at the school has been extrapolated as shown in Table 8 and Table 9.

Table 8: Student drop-off activity for 200 student school

Drop-off mode in peak hour	K-2 + siblings		3-6		Total
	%	Number	%	Number	
OOSH before	-	10	-	6	16
Car/Taxi	36%	36	32%	27	63
Walk	28%	28	32%	27	55
Public transport	36%	36	36%	30	66
Total	100%	110	100%	90	200

Table 9: Student pick-up activity for 200 student school

Pick-up mode in peak hour	K-2 + siblings		3-6		Total
	%	Number	%	Number	
OOSH after	-	45	-	20	65
Car/Taxi	40%	25	38%	27	52
Walk	30%	20	37%	26	46
Public transport	30%	20	25%	17	37
Total	100%	110	100%	90	200

Based on the car occupancy of 1.45 students per car:

Drop-off = 43 cars

Pick-up = 36 cars

6 Data Collection

6.1 Traffic surveys

Traffic surveys were undertaken in May 2019 during a typical school week at the locations shown in Figure 22.

Intersection counts were conducted between 7.30-9.30am & 2.30-6.30pm weekdays at two locations:

- Argyle Street/Kent Street
- Argyle Street/Watson Road

The results of the surveys are shown in the following figures:

- Figure 23: 7.45-8.45 AM School and Road Peak
- Figure 24: 2.30-3.30 PM School Peak
- Figure 25: 5.30-6.30 PM Road Peak

A seven day tube count was conducted on Watson Road. The results of the survey are shown



Figure 22: Traffic survey locations

Peak hour intersection counts:

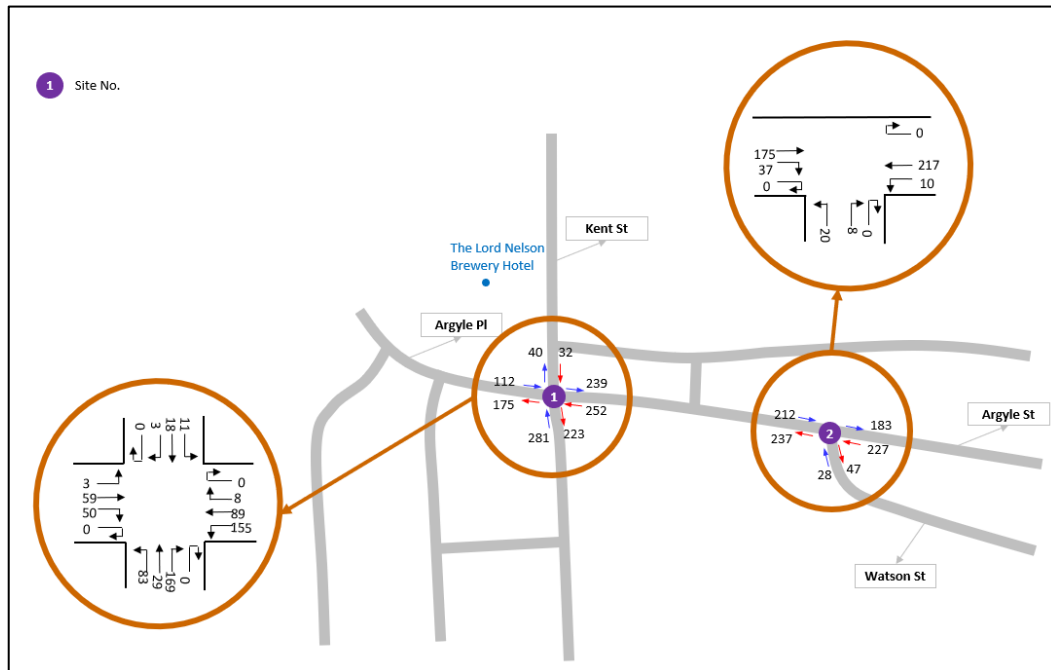


Figure 23: 7.45-8.45 AM School and Road Peak

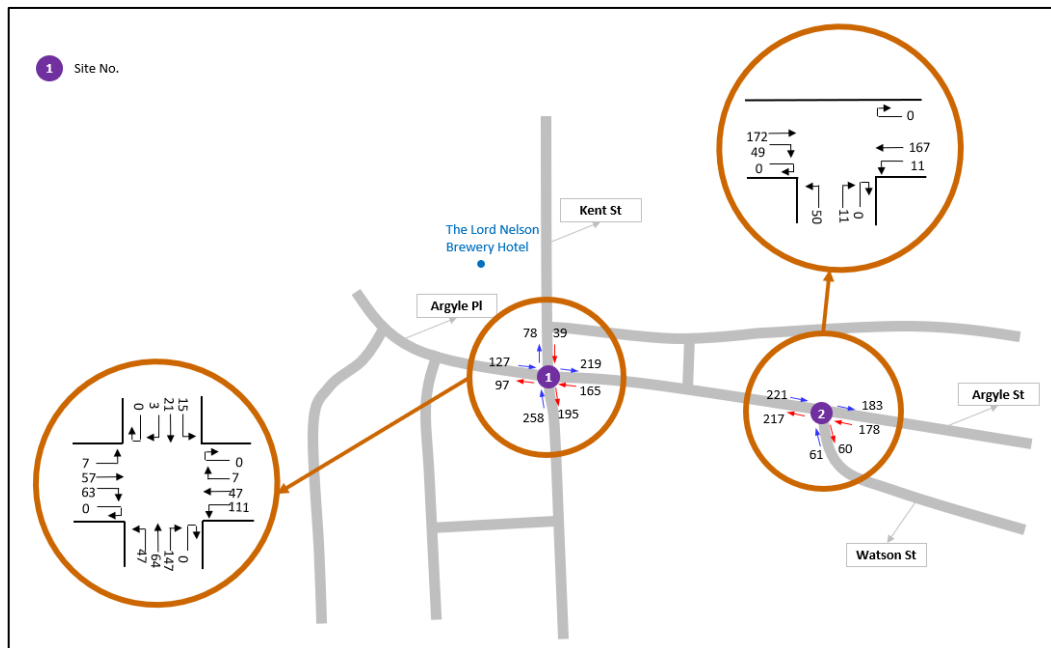


Figure 24: 2.30-3.30 PM School Peak

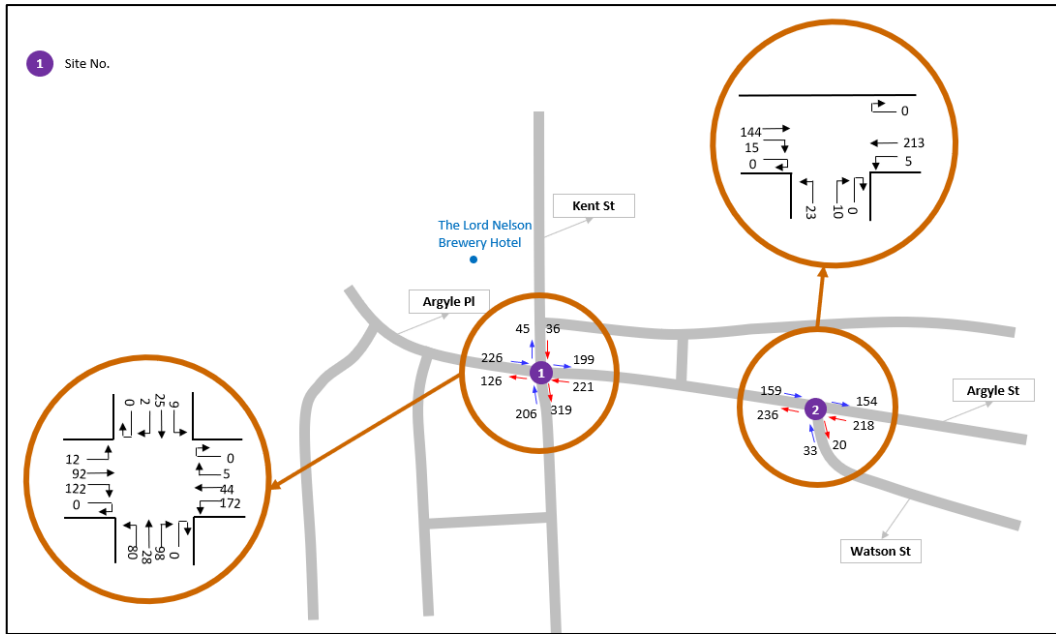


Figure 25: 5.30-6.30 PM Road Peak

Watson Road seven day count:

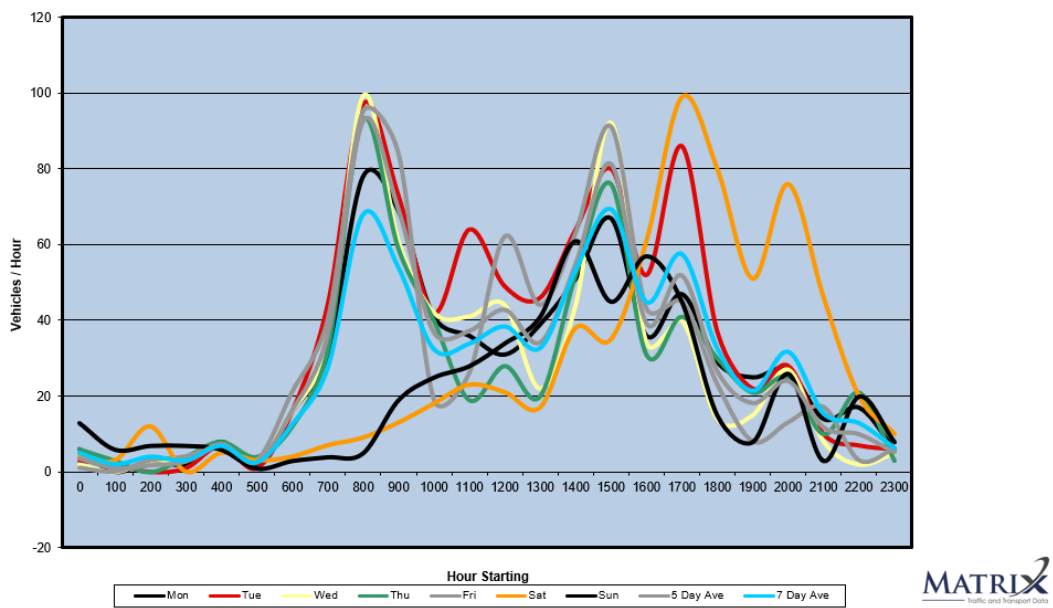


Figure 26: Seven day tube count - hourly profile

Table 10: Watson Road hourly counts over seven days

Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	13-May	14-May	8-May	9-May	10-May	11-May	12-May		
AM Peak	78	97	99	93	95	23	28		
PM Peak	67	86	92	76	91	99	61	707	668
0:00	6	3	2	6	1	4	13	4	5
1:00	0	2	0	3	0	3	6	1	2
2:00	3	0	3	0	3	12	7	2	4
3:00	2	1	3	4	4	0	7	3	3
4:00	8	7	7	8	7	5	6	7	7
5:00	2	1	3	4	3	3	1	3	2
6:00	16	16	16	12	21	4	3	16	13
7:00	31	44	33	32	40	7	4	36	27
8:00	78	97	99	93	95	9	5	92	68
9:00	69	73	61	59	84	13	19	69	54
10:00	41	42	42	40	19	18	25	37	32
11:00	36	64	41	19	26	23	28	37	34
12:00	31	49	44	28	62	21	34	43	38
13:00	39	46	22	20	44	17	41	34	33
14:00	51	64	44	52	63	38	61	55	53
15:00	67	80	92	76	91	35	45	81	69
16:00	36	52	34	31	43	61	57	39	45
17:00	47	86	40	41	45	99	45	52	58
18:00	29	37	14	30	23	80	15	27	33
19:00	25	22	15	21	8	51	8	18	21
20:00	27	28	27	25	13	76	26	24	32
21:00	14	10	8	10	17	46	3	12	15
22:00	17	7	2	21	3	20	20	10	13
23:00	6	6	5	3	6	10	8	5	6
Total	681	837	657	638	721	655	487	707	668

6.2 Site observations

On site observation occurred on Tuesday 12 March 2019 during the drop-off and pick-up periods. During the drop-off period in the morning, vehicles proceed along Upper Fort Street to drop students within the school ground. Limited queuing occurs and traffic flow interacts with the high bicycle activity at this time with cyclists accessing the Harbour Bridge cycleway via Upper Fort Street.

During the pick-up period, vehicle queuing occurs along Upper Fort Street due to vehicles arriving prior to the 3pm school finish time. As shown in Table 11, 19 vehicles were observed to queue along Upper Fort Street. In the afternoon period there is minimal parking along upper Fort Street allowing the queue to form, although an occasional parked vehicle means that the queue needs to proceed past each of the parked cars.

Table 11: Vehicle pick-up survey

	Cars arriving to queue	Parked adjacent to Observatory	Total
2.45pm	6	4	
3.00 pm	13	2	
3.05 pm	6		
3.10 pm	2		
3.15 pm	2		
Total	29	6	35
Peak queue	19		

At 3.17 pm, 18 students walked to King George V Recreation Centre on Cumberland Street accompanied by 2 teachers.

The 35 cars observed at pick-up correlates well with the travel survey results which indicate 36 cars pick-up.

7 School travel catchment

The primary FSPS catchment is focused on the Sydney CBD south to Haymarket and east to Woolloomooloo. As shown in Figure 27 however, approximately 30% of students do not currently live in the allocated FSPS catchment. This trend is likely to be maintained for the expanded school.

Students that live within the school catchment have good opportunity to use active travel modes for access or public transport for longer in catchment trips. The older students outside the catchment are likely to choose public transport as a key travel method unless the parents are dropping younger students. Parents travelling to the city to work and combining the journey to school will often use public transport due to not having access to parking in the CBD.

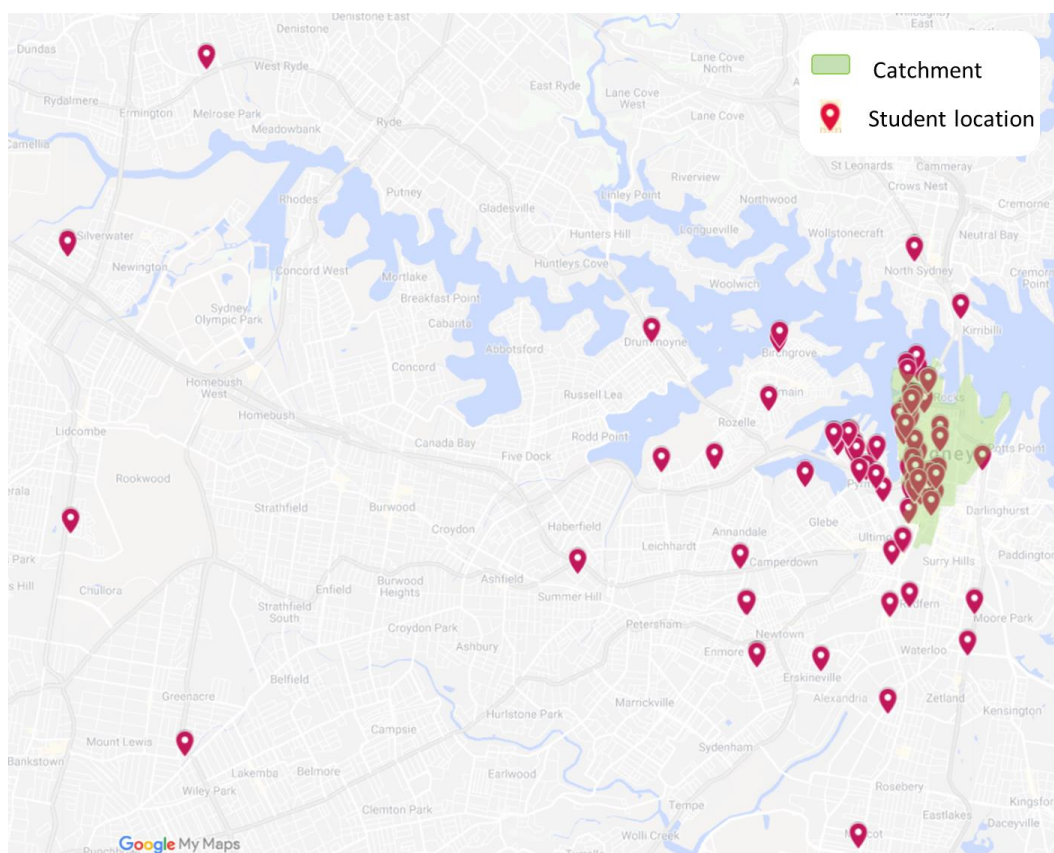


Figure 27: Current school enrolments and school catchment

8 Future activity and development in the precinct

8.1 Museum of Applied Arts & Sciences (MAAS)

8.1.1 Current visitation volume

Average annual visitation is 160,000. 43 % of visitors are from Sydney with the remainder either regional NSW, interstate or overseas visitors.

Current hours of operation:

- Opening hours for general public entry are 10am-5pm, seven days.
- Ticketed tours take place nightly from 6pm-10pm
- Peak times are 10am-1pm, for education groups

8.1.2 Demographics (target audience)/means of travel

- Future visitation volume is expected to grow slightly over time.
- There are no proposed changes to the hours of operation.
- The visitor demographic is broad and made up of many repeat visitors.
- There is general parking and public transport information on the website: <https://maas.museum/sydney-observatory/#getting-here>
- Event organisers and guests are advised that parking is not available, and that public transport and taxis should be used.
- Respondents to visitation surveys conducted in 2017 indicate that 37% of visitors choose to drive and park their car nearby.

8.1.3 Status of work at MAAS

- Scope & aspirations
 - Development of a new Conservation Management Plan
 - Development of a Masterplan which addresses current and future accommodation requirements for MAAS public, education and events programs
 - Development of a Preliminary Business Case to support implementation of the Masterplan (on hold pending finalisation of Masterplan and implementation/funding strategy)
- Assumed redevelopment outcome and changes to operations (best guess given embryonic)
 - New multipurpose facility onsite to accommodate public programs and events (to replace temporary marquee currently in use)
 - New education/entry pavilion with specialist spaces including planetarium and VR/digital studios
 - New lift addition to main Observatory building to enable equitable access to upper levels

- New food and beverage facility onsite TBC
- Potential development of new programs in afternoon period (1pm-6pm) which is currently underutilised (AM is at capacity with education, evening at capacity with telescope viewing tours)
- Current status
 - CMP at 90% completion, due for submission to Heritage Council for endorsement late 2019
 - Masterplan complete to preliminary options – finalisation of masterplanning is pending completion of CMP
- Work complete
 - Visitor research
 - Interpretive/exhibition/visitor experience review
- Timeframes
 - CMP and Masterplan due for completion late 2019
 - Masterplan likely to be implemented in phases over 5+ years from 2020, dependent on funding
- Stakeholder engagement
 - Informal engagement has commenced with City of Sydney, Fort St, National Trust, OEH/Heritage Council to inform preliminary options development
 - No formal engagement with stakeholders as masterplan stakeholder options testing cannot commence until CMP is finalised
- Planning approval strategy
 - Implementation, funding and approvals strategy dependent on scope of development proposed in final Masterplan

8.2 National Trust

The National Trust are not planning for any major increase in visitation at any one time. They expect to hold more regular events of a similar size to those currently being held.

8.3 Fort Street Public School use of Observatory Hill

Use of the adjacent park by school currently includes:

- Cross Country Carnival (annual)
- Running club (weekly)
- Touch football training (weekly at certain times of the year)
- Music Performance in Rotunda (booked through CoS)
- Generally the school avoids boot camp times of day and any wedding/photo shoots

There are no plans to expand these activity types although some additional activity could be expected with the increased school activity.

8.4 Harbour Bridge Cycleway

8.4.1 Proposed cycleway arrangements adjacent to the school

The proposed cycleway, shown indicatively in Figure 29, runs along the eastern boundary of the school site and Upper Fort Street. A number of alignment options were investigated in the vicinity of the school as shown in Figure 28 with the pink alignment currently preferred.

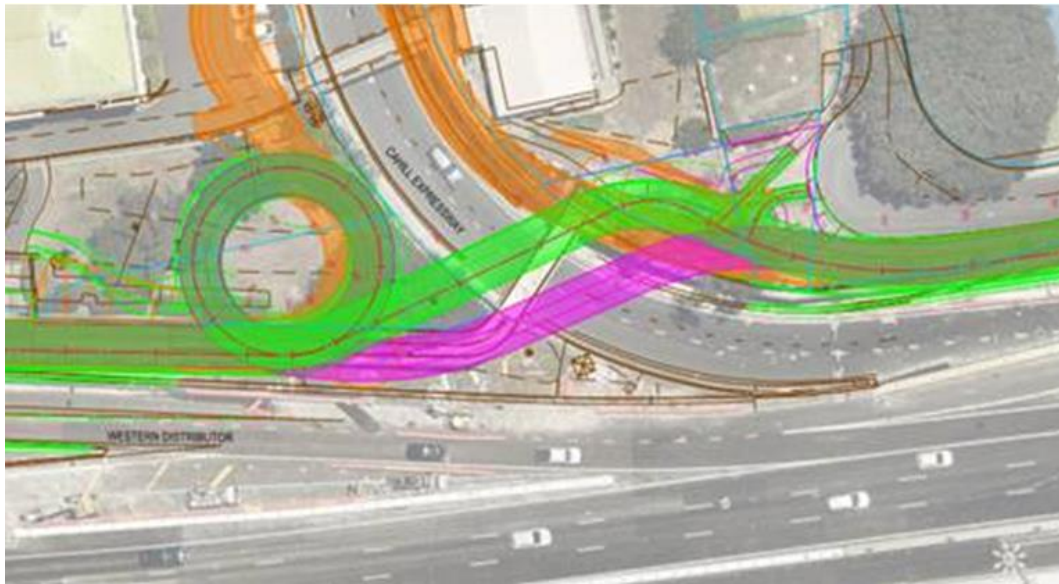


Figure 28: Cycleway alignment options

The key impacts of the cycleway will be during construction which will impact on traffic flow on Upper Fort Street and pedestrian access generally. Maintaining a suitable bicycle diversion route between Kent Street and the Sydney Harbour Bridge will also be required.

Funding and timing of these works is still unknown. It is likely that construction work on the Fort Street Public School will proceed ahead of the cycleway works but that there could be a period of concurrent construction. The construction management plans for each project will need to consider this and make allowance for impacts on school traffic and the bicycle route.

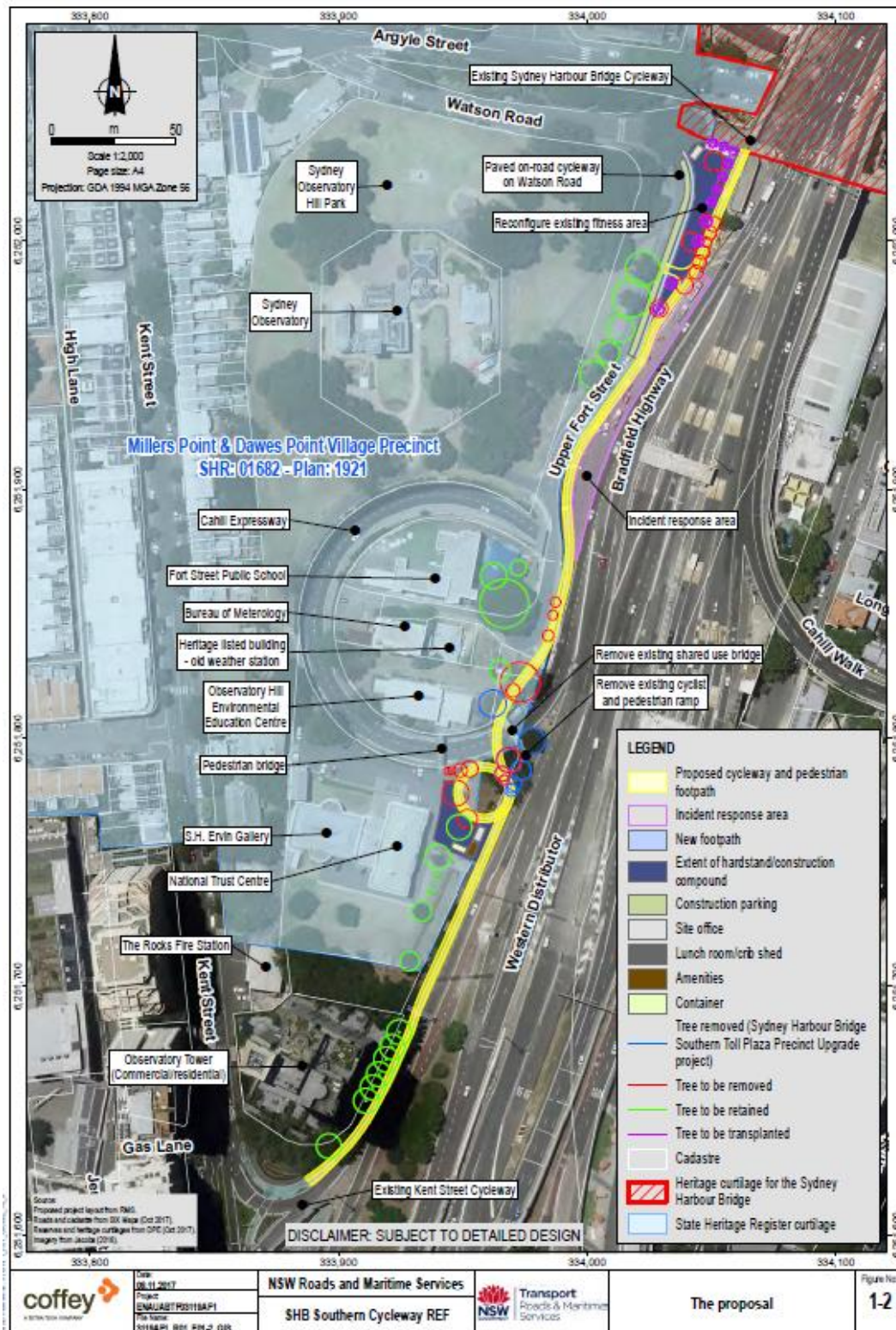


Figure 29: Overall scope of the SHB Southern Cycleway

Source: Sydney Harbour Bridge Southern Cycleway Review of environmental factors, November 2017, Roads and Maritime Services

8.4.2 Interim drop-off/pick-up arrangements prior to completion of the cycleway

Should the cycleway be under construction at a period when the new school opens, alternative arrangements for management of the school drop-off and pick-up activity by car will be needed. This could include timed construction activity to avoid these periods and temporary relocation of the car activity to the Observatory Hill roundabout to avoid the cycleway construction works.

8.4.3 Temporary diversion of the cycleway

The existing cyclist provision from Kent Street cycleway to Sydney Harbour Bridge cycleway would be closed during the construction works for the new cycleway. A cycle detour was proposed in the Environmental Impact Statement for the cycleway, on a route around the site via the temporary ramp on the Sydney Harbour Bridge stairs and would continue onto Watson Road, Argyle Street and Kent Street, connecting to the Kent Street cycleway. The temporary cycle detour would remain until the completion of work in all precincts. This detour would add about 300m to the existing cyclist route from the Upper Fort Street portal towards the Kent Street cycleway via the shared path. The detour would mix cyclists with vehicles and require cyclists to manage their speeds travelling downhill on Watson Road.

Initial review of the routes has been undertaken and discussed with City of Sydney bicycle and traffic representatives, Bicycle NSW and Roads and Maritime Services. More planning will be required to consider this alternative route which would benefit both projects.

There are currently some 2000 cyclists on a weekday and 1000 on a weekend day using the SHB Cycleway. The existing cycling facilities in the precinct are shown in Figure 30.

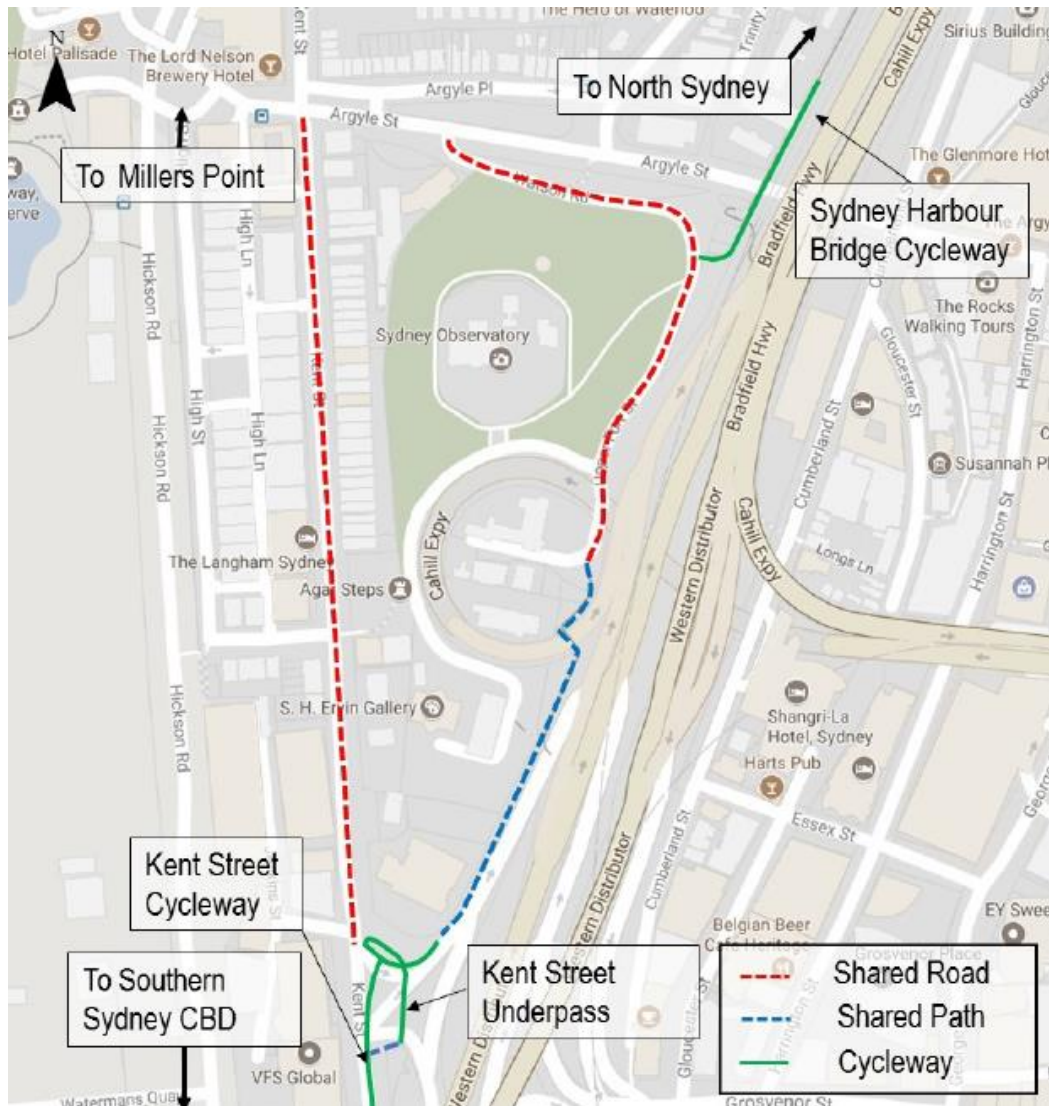


Figure 30: Existing bicycle facilities in the precinct

The existing route is 475m between the Kent Street segregated cycleway and the bridge access. The proposed alternative on-road route via Kent St – Argyle St – Watson Rd is 770m long, increasing the distance by 295m.

The potential cycleway diversion route and facility types are shown in Figure 31. Kent Street is already a shared traffic cycle facility with logos marked in the traffic lane and traffic calming devices along the route.

The key issue to address will be the safety of cyclists traversing Argyle Street as shown in Figure 32. Additional bicycle signage and ground markings may be needed in this section of the route.

Discussion with Roads and Maritime Services will determine whether there are opportunities in the vicinity of the SHB incident response area for interim bicycle route diversion.

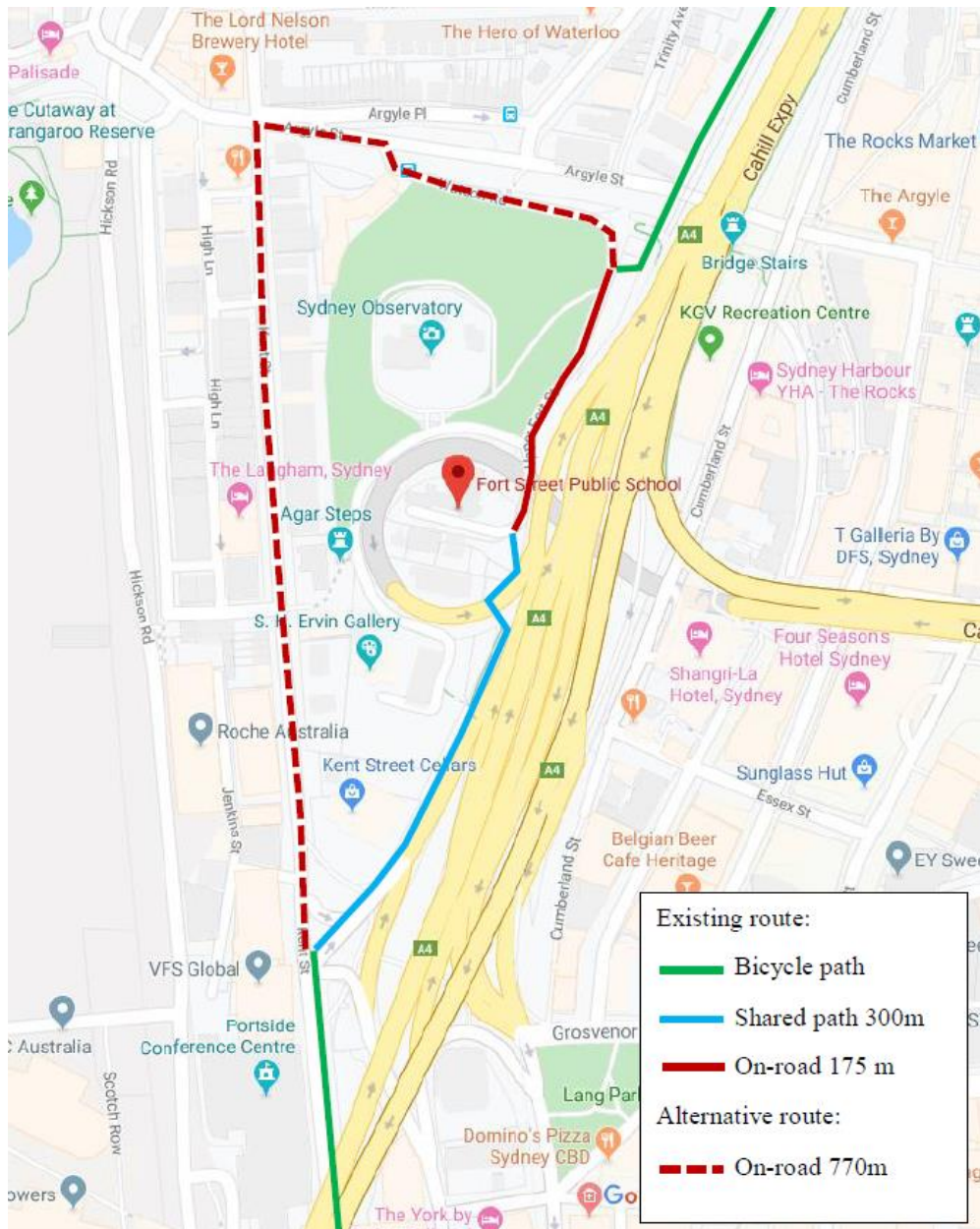


Figure 31: Potential cycleway diversion route

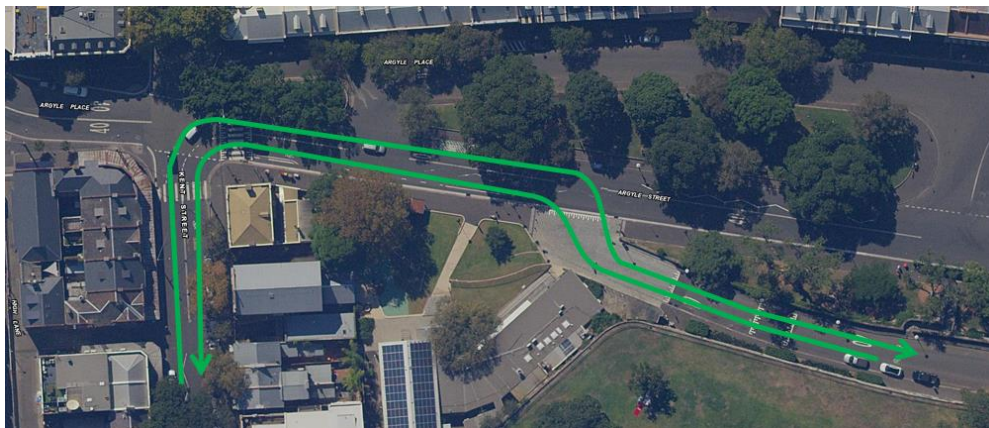


Figure 32: Argyle Street route

9 Future activity

As described in Section 1.3, the SSDA design documented supports 24 Home Base Units for a 550 student population.

9.1 Split of students

The future student split across the school years has been based on the existing survey respondent split. (see Table 12 and Table 13). This makes the same allowance for siblings of the junior years as they often dictate the travel mode.

Table 12: Existing student split across school years

Year	K-2	+ siblings	3-6	Total
Number	65	20	68	153
%	42%	13%	45%	100%

Table 13: Future student split across school years

Year	K-2	+ siblings	3-6	Total
Number	231	72	247	550
%	42%	13%	45%	100%

9.2 Drop-off mode of travel

A significant proportion (23%) of survey respondents indicated that opening of the light rail, which will improve north south movement through the school catchment, could influence their travel choice. In addition, for a 550 student school in this location it could be expected that a wide catchment will continue which favours travel by train, bus and ferry. On this basis, a 25% reduction in car mode has been applied which will be supported by travel demand management strategies and the wider catchment.

The student travel modes and numbers for drop-off based on no change from existing mode choice is shown in Table 14. With a 25% reduction in car mode applied which will be targeted through the Green Travel Plan, future travel is expected to be as shown in Table 15. This results in a reduction in car drop-off mode from 191 cars to 147 cars.

Table 14: Future student travel based on existing mode share

Drop-off mode in peak hour	K-2 + siblings		3-6		Total
	%	Number	%	Number	
OOSH before	-	25	-	15	40
Car/Taxi	36%	100	32%	74	174
Walk	28%	78	32%	74	152
Public transport	36%	100	36%	84	184
Total	100%	303	100%	247	550

Table 15: Future student travel based on mode shift to public transport

Drop-off mode in peak hour	K-2 + siblings		3-6		Total
	%	Number	%	Number	
OOSH before	-	25	-	15	40
Car/Taxi	28%	78	24%	56	134
Walk	28%	78	32%	74	152
Public transport	44%	122	44%	102	224
Total	100%	303	100%	247	550

Based on the car occupancy of 1.45 students per car:

Drop-off = 120 cars (current mode) reduced to 92 (mode shift)

9.3 Pick-up mode of travel

The student travel modes and numbers for pick-up based on no change from existing mode choice is shown in Table 16. With a 25% reduction in car mode applied which will be targeted through the Green Travel Plan, future travel is expected to be as shown in Table 17. This results in a reduction in car pick-up mode from 136 cars to 101 cars.

Table 16: Future student travel based on existing mode share

Pick-up mode in peak hour	K-2 + siblings		3yr-6yr		Total
	%	Number	%	Number	
OOSH after	-	180	-	70	250
Car/Taxi	40%	49	38%	67	116
Walk	30%	37	37%	65	102
Public transport	30%	37	25%	45	82
Total	100%	303	100%	247	550

Table 17: Future student travel based on mode shift to public transport

Pick-up mode in peak hour	K-2 + siblings		3yr-6yr		Total
	%	Number	%	Number	
OOSH after	-	180	-	70	250
Car/Taxi	30%	37	28%	50	87
Walk	30%	37	37%	65	102
Public transport	40%	49	35%	62	111
Total	100%	303	100%	247	550

Based on the car occupancy of 1.45 students per car:

Pick-up = 80 cars (current mode) / 60 (mode shift)

9.4 Future capacity

Drop-off:

The travel survey found that 50% of drop-off occurred in a 20 minute peak period (8.40 - 9.00am).

For a 550 student school this would result in 46 cars arriving in a 20 minute period (2.3 cars /min).

Pick-up:

Pick-up was concentrated around a 15 minute period from 2.55 – 3.10pm.

For a 550 student school with all pick-up occurring during this period, then 60 cars would arrive to pick-up 87 students. As observed, the existing peak queue length is approximately 65% (19/29) of the total number of vehicles resulting in a future peak queue of up to 39 cars. This is cars that arrive early prior to the school bell.

Section 10.1 describes how a queue of up to 48 cars can be accommodated without extending back onto Argyle Street. This means that the future peak queue of 39 cars is able to be contained within Watson Road. If queueing did become a problem, then the easiest solution is to encourage parents to arrive after the school bell when the car line is moving. Other solutions include:

- Increased car pooling
- Increased use of public transport
- Increased use of active transport modes (walking, scooting and cycling)
- Off-site parking in the local streets for pick-up

9.5 Potential overflow queuing arrangement

If vehicles approaching on Argyle Street find that Watson Street queuing area is full, then drivers from both directions can circulate via Argyle Place (yellow loop) or Windmill Street (orange loop).



Figure 33: Potential recirculation route

9.6 Wet weather

12 out of 86 respondents (Years 3-6) indicated that they would change their behaviour and travel by car in rain (13%). This would increase the queue by 5 cars, taking demand to 44 cars. This additional demand is able to be contained within Watson Road which has space for a queue of 48 cars as described in Section 10.1.

10 Proposed access arrangements

10.1 Upper Fort Street kerbside control

A possible kerbside arrangement to provide for up to 48 cars queued without impacting on Argyle Street traffic is shown in Figure 34. This arrangement formalises a school zone for pick-up times along Upper Fort Street for 30 queued vehicles. For the remainder of the day, the existing 2P and 4P parking controls would apply. Along Watson Road the existing No Parking control is retained along the northern kerb allowing for additional queueing area for 18 vehicles. 2P parking is retained along the southern kerb on Watson Road. It is suggested that 15 minute free parking is provided to permit parents to park for access to the OOSH or at times when the pick-up line is not in operation.

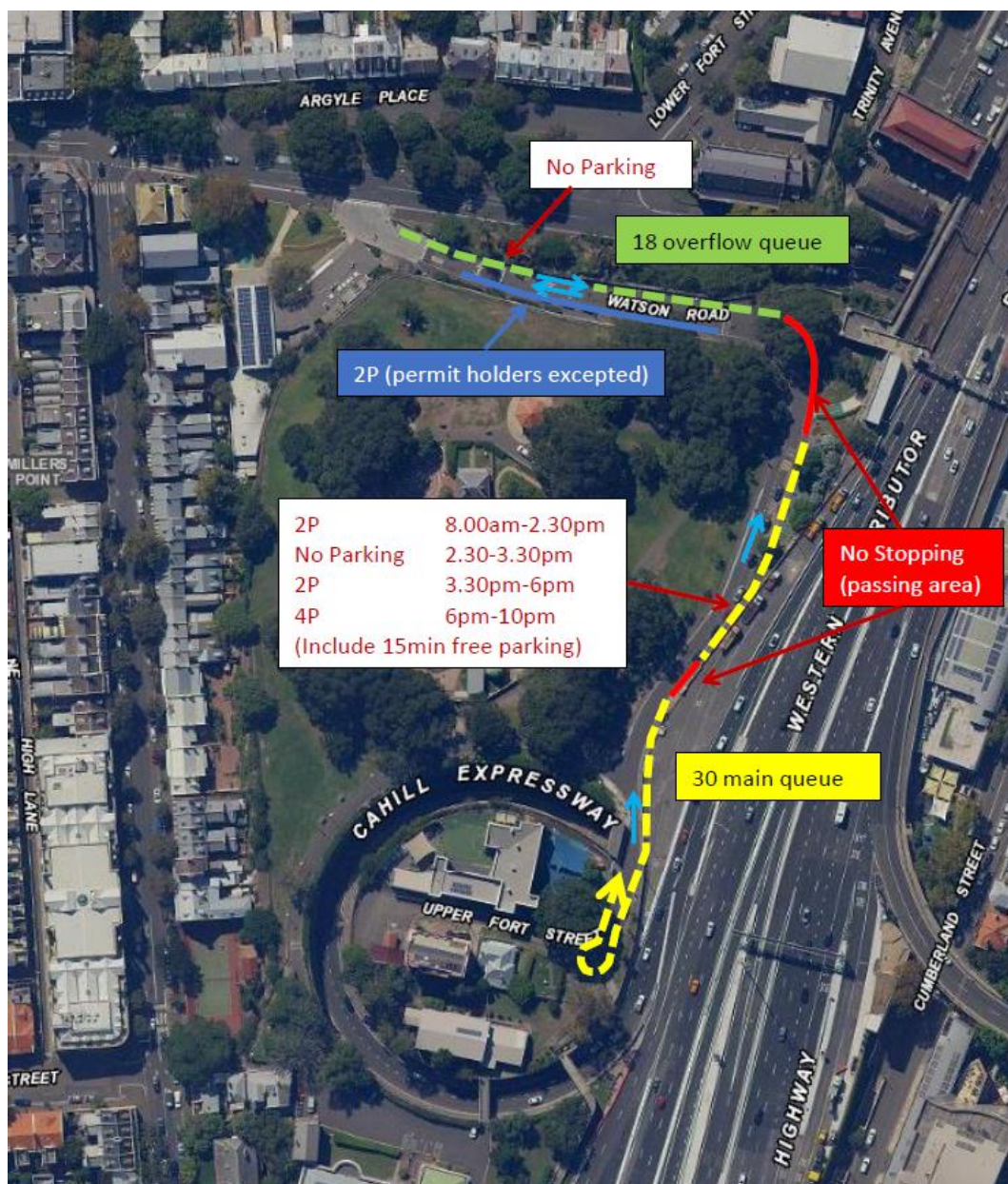


Figure 34: Proposed Fort Street kerbside controls

A No Stopping zone occurs midway along Upper Fort Street at the access gate to the incident response area. This zone acts as a passing zone at all times. A No Stopping zone is also retained at the Watson Road/Upper Fort Street corner associated with the pedestrian crossing. This also allows vehicles to pass in this location when cars are queued waiting in the pick-up line in the afternoon between approximately 2.30pm and 3.00pm. At other times these passing areas allow cars to pass parked cars.

10.2 Removal of Upper Fort Street pinch point

At the entrance to the school there is a pinch point on Upper Fort Street where it crosses the Cahill Expressway loop cutting. It is proposed to widen the road at this point to 6.0m kerb to kerb to enable two-way traffic flow. This will facilitate a smooth flowing car line in drop-off and pick-up periods.

This is enabled by works to the Cahill Expressway ventilation building which functions for air intake. A revised building and ventilation arrangement is in discussion with Roads and Maritime Services. The footpath will be improved at this location for access to the school.

10.3 Car parking

There will be no car parking provided at the school. Visitors will utilise available nearby on-street car parking. If access is required for people with a disability, the vehicle will be granted access to the entry plaza area.

10.4 Deliveries and Waste Management

10.4.1 Deliveries

All deliveries will enter via Upper Fort Street and use the entry plaza area within the school grounds. These activities will be allocated a time slot when the school grounds are not being used for school play activity.

10.4.2 Waste Collection

There are two routes available for the collection vehicles to access the collection point to allow for flexibility of collection. The first route is to drive into Upper Fort Street, through the first school gate and through the second school gate where the vehicle will complete a three-point turn at the dead end. Then the vehicle will exit the second gate and drive forward to stop at the collection point on Upper Fort Street before exiting the first gate.

For the second route the collection vehicle will complete a turning manoeuvre before the school gate outside of the site boundary and reverse into the collection point. Then the vehicle will exit driving forward.

The swept path for the vehicle movements can be found in Figure 35 and is based on a rear loading vehicle for MGBs as specified in Table 18.

Please refer to the Operational Waste Management Plan (Arup Oct 2019) for details on waste location and handling on the site.

Table 18 Rear loading collection vehicle for MGBs

Vehicle Specification	Measurement
Length overall	9.25 m
Width overall	2.6 m
Operational height	4 m
Travel height	3.8 m
Weight (payload)	26 tonnes

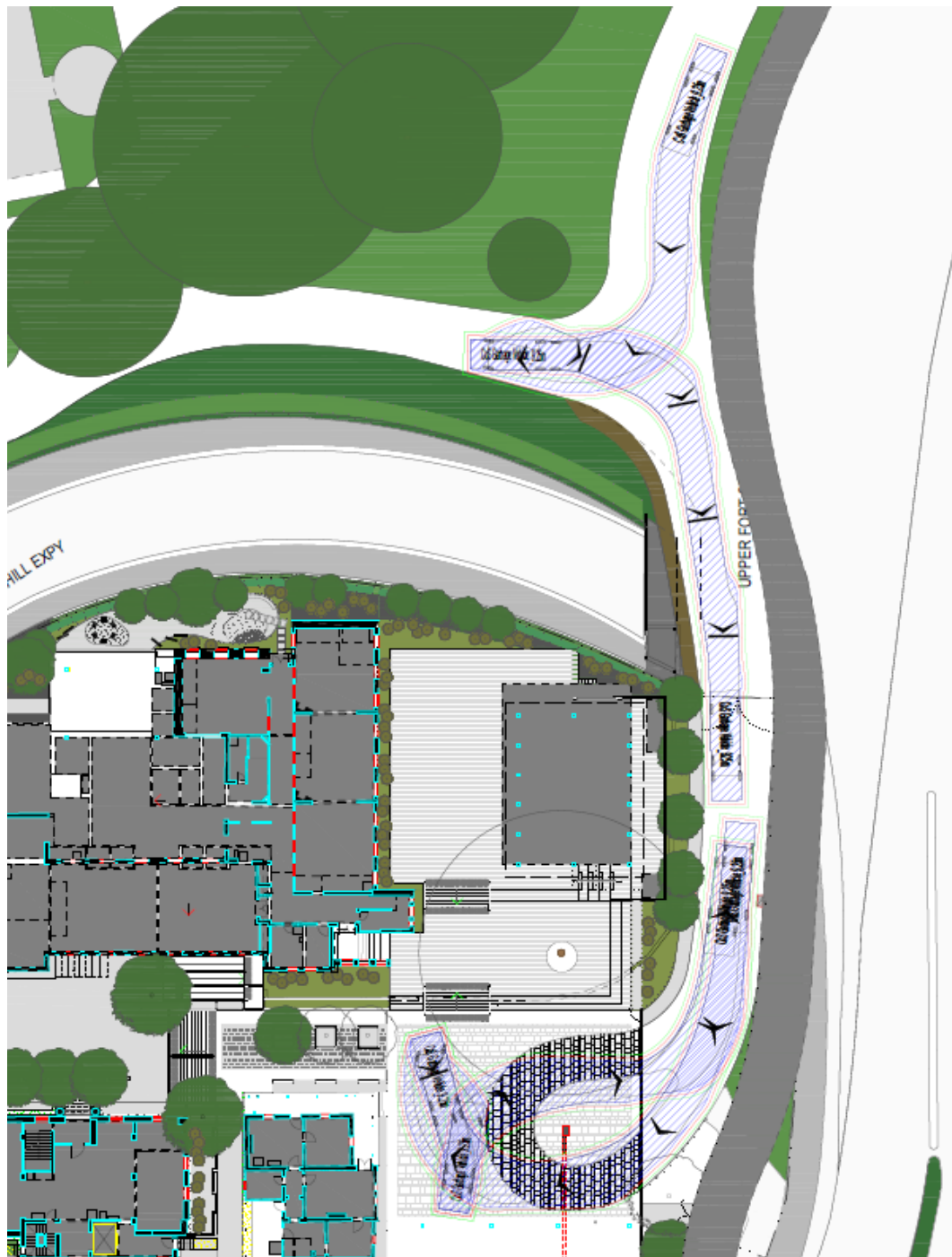


Figure 35: Swept paths for the 9.25m long Council refuse collection vehicle

Reversing has been minimized as much as possible but was not avoidable due to site constraints. The traffic implications of reversing of the truck are that this operation can only occur at non-school pick-up and drop-off times. Prior to the new SHB Cycleway being operational, cyclists and pedestrians will need to be managed along this section of Upper Fort Street.

All the waste collection vehicle specifications should be matched to Council waste collection vehicle specifications as set out in Design requirements for collection vehicle access.

10.5 Cycleway operation of Upper Fort Street with new school

It is likely that the new school will open before the upgrade to the SHB Cycleway. With increased activity associated with school drop-off and pick-up, interaction between cyclists and cars using Upper Fort Street will need to be considered.

10.5.1 Prior to SHB Cycleway opening

The school grounds will be closed off using a gate across the drop-off pick-up loop whilst maintaining access to Upper Fort Street for cyclists as shown in Figure 36. During the morning drop-off and afternoon pick-up periods the gate will be opened to create the vehicle turnaround as shown in Figure 37.

During the morning drop-off period, the cycleway is busiest with morning commuter cyclists. In this period cars are moving along Upper Fort Street and cyclists mix with the traffic flow. During the afternoon pick-up period, cars queue along Upper Fort Street for up to 20 minutes waiting to enter the school. In this period bicycle traffic is significantly lower than in the commuter peaks and cyclists use the western lane of Upper Fort Street for two-way travel.

10.5.2 SHB Cycleway open

When the SHB Cycleway opens, the school grounds will be closed at the property boundary with all cyclist and pedestrian activity using the new facility as shown in Figure 38. During the drop-off and pick-up periods, this gate will be opened as shown in Figure 39.

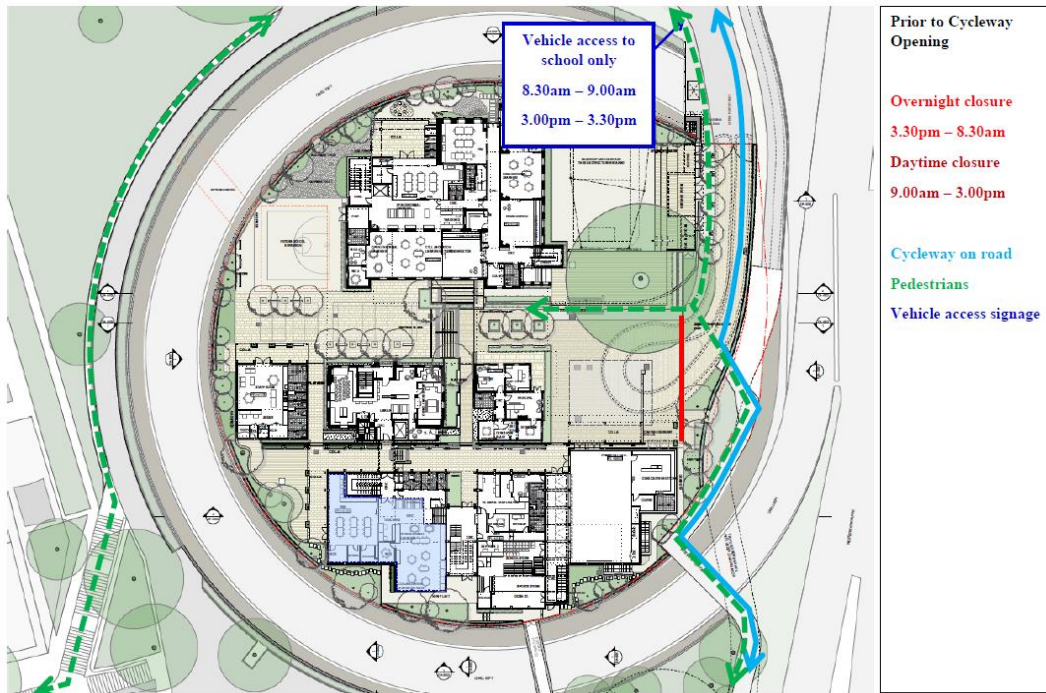


Figure 36: Overnight and daytime school grounds closure cyclist management

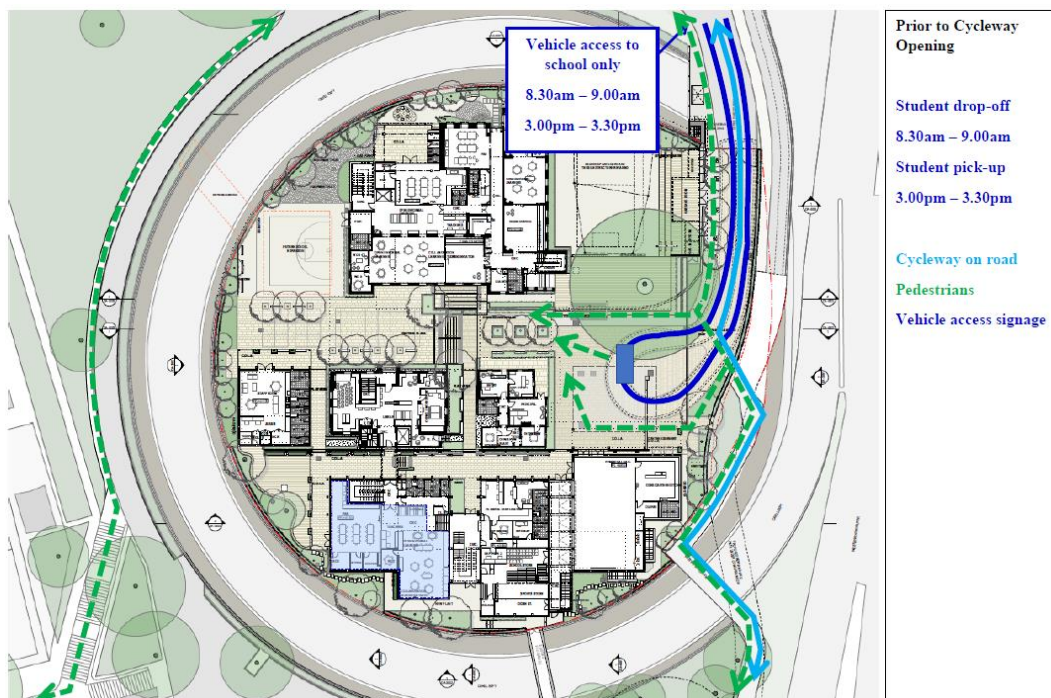


Figure 37: Drop-off / Pick-up period cyclist management

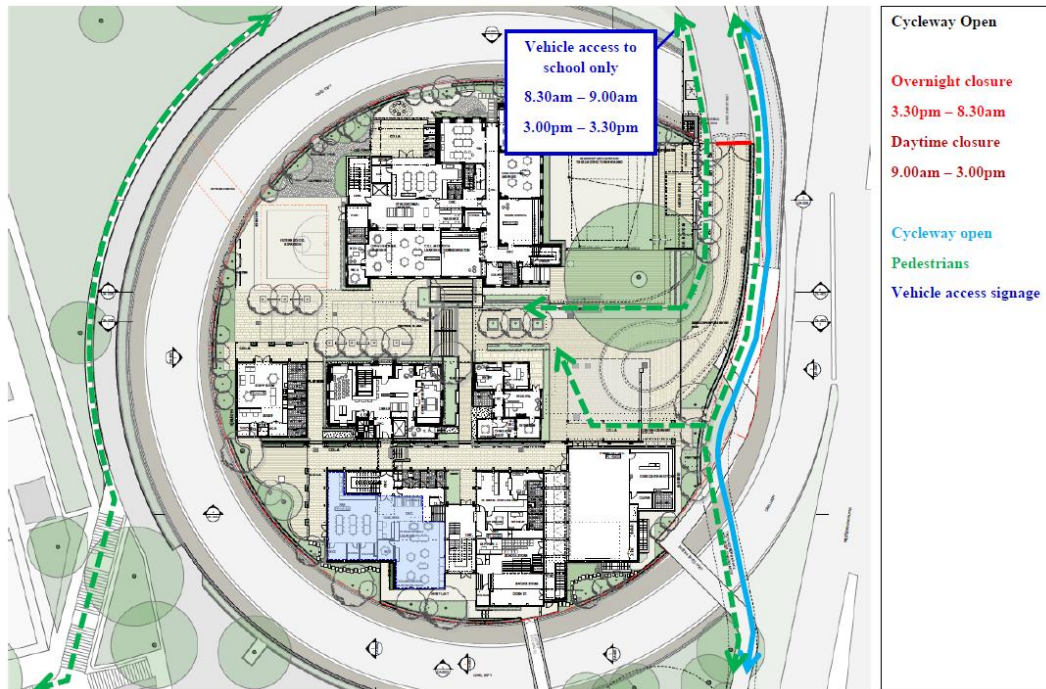


Figure 38: Cycleway open - overnight and daytime school grounds closure

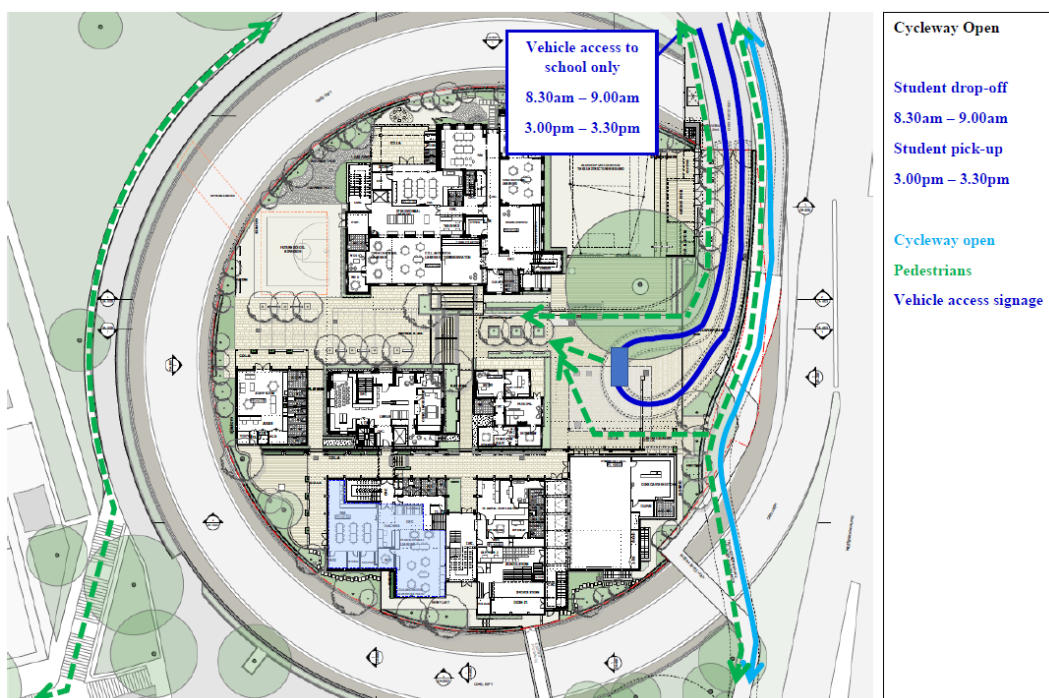


Figure 39: Cycleway open - drop-off / pick-up period

10.6 Excursion bus access

The current arrangement for school excursion bus access will be retained with students being pick-up and dropped off in Argyle Street and using the Watson Road and Upper Fort Street footpaths for access to the school.

10.7 Pedestrian access to the school

There are three pedestrian access routes to the school as shown in Figure 2 in the existing conditions section of this report.

1. Western Distributor on ramp footpath between Kent Street and Upper Fort Street which is currently shared with bicycles accessing the SYB Cycleway. This route will be upgraded as part of the SHB Cycleway project which will provide segregation between cyclists and pedestrians.
2. Footpath along Upper Fort Street which connects to Watson Road and the pedestrian connection to the east under the SHB approach roadway.
3. The Agar Steps from Kent Street to Observatory Hill.

The primary school catchment is predominantly to the south of the school. This will result in the majority of the walk-in catchment using Kent Street either via the Agar Steps or the Western Distributor on-ramp. The latter route will be upgraded to a separate pedestrian facility adjacent to the proposed SHB Cycleway.

Public transport connections are also focused to the south of the site with the predominant route being via the SHB on-ramp:

Western Distributor on-ramp.	Agar Steps	Watson Road and Upper Fort Street
Light rail stop on George Street Wynyard Station	Barangaroo Metro Station Barangaroo Ferry wharf	Circular Quay Ferry wharf Circular Quay Station

The Agar Steps provide an attractive and relatively safe route from the key north-south spine of Kent Street. Students arrive at Observatory Hill and follow the footpath around to the school entry on Upper Fort Street.

10.8 Environmental Education Centre

The Observatory Hill Environmental Education Centre was located on the school site up until 1 year ago when the building was repurposed for school use. The centre now located off site.

10.9 Bicycle / scooter parking and end of trip facilities

Room will be allocated for 5 staff bikes in a secure location providing for a 10% bike mode. Staff have access to shower and locker facilities.

Up to 30 student bikes and 30 scooters will be allocated parking in a number of spaces within the school grounds providing 5% mode share for each.

10.10 Emergency vehicle access

Fire trucks can access the fire boosters located inside the school gate using Upper Fort Street. Other emergency vehicles can utilise the turn around after gaining access through the school gate as shown in Figure 40. Students utilising the playground at these times will need to be managed by school staff.

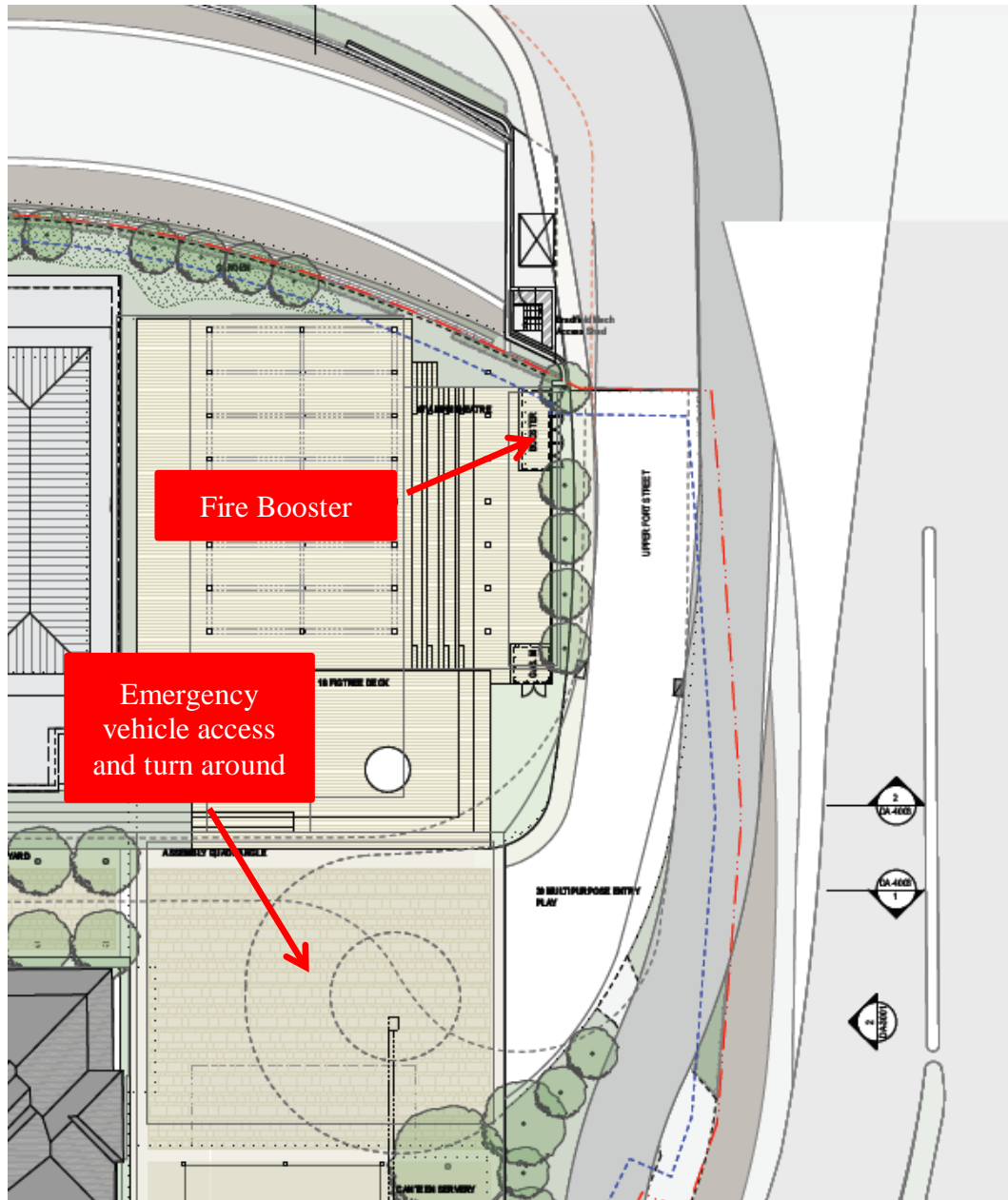


Figure 40: Emergency vehicle access

10.11 Alternative vehicle drop-off and pick-up locations considered

A number of alternative vehicle drop-off and pick-up locations were considered to remove the need for vehicles to enter the school grounds.

The current kerbside conditions for the nearby streets of Kent Street and Argyle Street are discussed in sections 4.6.1 and 4.6.2 of this report. Use of these streets is not considered appropriate for the following reasons:

- Only a limited number of spaces could be provided which limits the ability for proper operation. Cars would queue and wait in the traffic lane blocking traffic movements.
- Council are reluctant to lose permit holder spaces due to high resident demand for car parking

Use of the Observatory Hill roundabout was also considered. To enable this to work there would need to be a number of changes to the parkland as shown in Figure 41. This was not considered to be appropriate for the following reasons:

- Shorter queue length - 6 car queue external versus up to 13 cars queue within school.
- Loss of 5.3m landscape width (2.3m car line + 3.0m footpath) x 40m long (210sqm).
- No shelter available and limited waiting area remote from school grounds

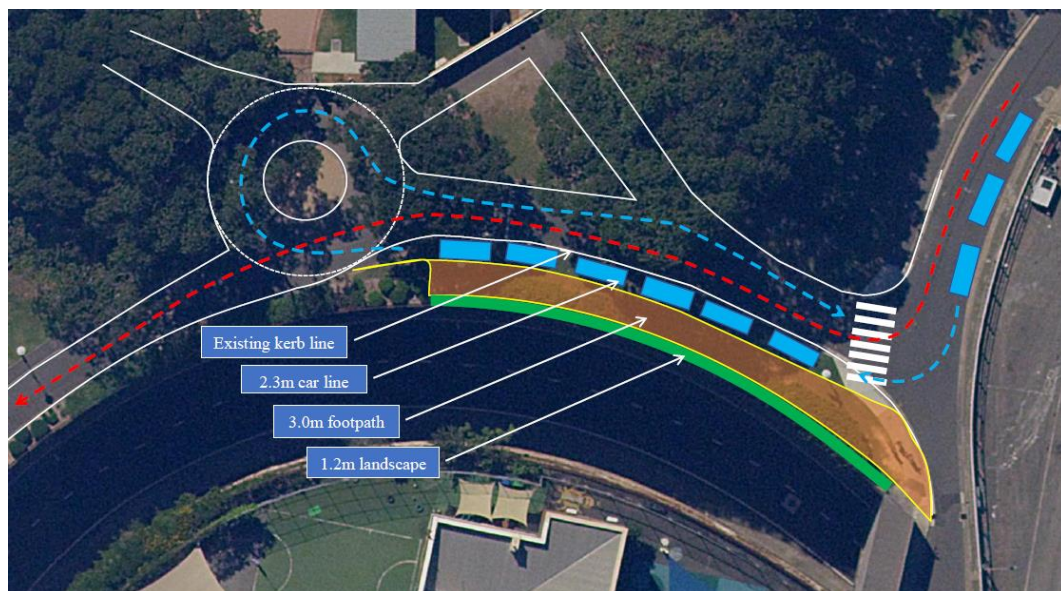


Figure 41: Drop-off / pick-up utilising the Observatory Hill roundabout

The continued use of the internal drop-off / pick-up is considered to be appropriate with a suitable operational management plan. This is not uncommon for public and private schools operating in constrained environments. Lindfield Learning Village opened in 2019 with a similar drop-off / pick-up facility within the school grounds.

11 Traffic Analysis

11.1 External access roads

The two priority-controlled intersections on Argyle Street have been modelled for the future increase from 200 to 550 students. The worst case has been analysed where car mode reduction from existing levels is not achieved.

For the drop-off AM Peak: Future 120 cars – 43 existing cars = additional 77 cars

For the pick-up PM Peak: Future 80 cars – 36 existing cars = additional 44 cars

The additional cars have been distributed onto the road system using the existing traffic turning movements.

Traffic volumes were then increased assuming a 2% per annum growth for 10 years. Compounded annually for 10 years, this equates to over 20% of additional vehicles. The results of the SIDRA modelling are contained in Appendix A. In all scenarios the two intersections continue to operate at level of service A for future traffic flows.

11.2 Internal access roads

A No Stopping zone occurs midway along Upper Fort Street at the access gate to the incident response area. This zone acts as a passing zone at all times. A No Stopping zone is also retained at the Watson Road/Upper Fort Street corner associated with the pedestrian crossing. This also allows vehicles to pass in this location when cars are queued waiting in the pick-up line in the afternoon between approximately 2.30pm and 3.00pm. At other times these passing areas allow cars to pass parked cars.

12 Summary

This report is the Traffic and Transport Assessment, supporting the proposed development for SSD 10340. It is proposed that a number of the existing Fort Street Public School buildings will be refurbished and supplemented with a number of new buildings to accommodate a 550 student school.

Other works in the vicinity of the school include:

- Works to the existing entrance road, including alterations to the Bradfield Tunnel Services Building.
- Modifications to existing pick-up / drop-off arrangements.
- Provision of revised kerbside signage controls.

The report reviews and assesses the following:

- Generation of people and car trips
- Travel Demand Management strategy
- Vehicle access
- Infrastructure upgrades in the precinct
- Public transport accessibility
- Car parking arrangements
- Pedestrian and bicycle access

Key findings of the existing school operations include:

- Nearly half the students reportedly attend after school care – some of this may not be at the school
- Car drop off is the main mode share (33%), Walk with parent second most common (28%) and then catching the train (15%)
- Car pick up is the main mode share (38%), Walk with parent second most common (24%) and then catching the train (12%)
- Average car occupancy is 1.45 students mainly because of siblings, limited carpooling occurring regularly
- Bad weather days don't significantly change travel patterns, as expected there are a few parents who will drop their child off instead of walking

A significant proportion (23%) of survey respondents indicated that opening of the light rail, which will improve north south movement through the school catchment, could influence their travel choice. In addition, for a 550 student school in this location it could be expected that a wide catchment will continue which favours travel by train, bus and ferry. On this basis, a 25% reduction in car mode has been applied which will be supported by travel demand management and wider catchment.

Improved kerbside controls along Upper Fort Street are proposed to enable the drop-off car flow and the pick-up car queuing to be managed whilst maintaining access for other uses on Observatory Hill.

Travel demand management initiatives have been identified by a Green Travel Plan framework which will be implemented by the school to reduce car mode of travel. In addition, there will be no staff car parking on the site which will require staff to use alternative modes of travel. Initiatives that have been identified include:

- Increased car pooling
- Increased use of public transport
- Increased use of active transport modes (walking, scooting and cycling)

The two priority controlled intersections on Argyle Street have been modelled for the existing traffic flows and with the future increase from 200 to 550 students. The worst case has been analysed where car mode reduction from existing levels is not achieved. The additional cars have been distributed onto the road system using the existing traffic turning movements. In all scenarios the two intersections continue to operate at level of service A for future traffic flows.

No Stopping zones will be maintained along Upper Fort Street allowing vehicles to pass in these locations when cars are queued waiting in the pick-up line in the afternoon between approximately 2.30pm and 3.00pm. At other times these passing areas allow cars to pass parked cars.

The transport assessment has concluded that the Fort Street Public School is well located to take advantage of active and public transport modes for student and staff travel. The school can be increased in capacity to 550 students with manageable impacts on the surrounding access roads and footpaths.

Appendix A

SIDRA intersection analysis outputs

A1 Existing AM school and commuter peak.

EX AM Argyle Street/Kent Street (745-845)												
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow s		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Kent Street												
1	L2	83	0	0.29	3.7	LOS A	1.2	8.5	0.3	0.53	0.3	37.5
2	T1	29	0	0.29	3.7	LOS A	1.2	8.5	0.3	0.53	0.3	36.7
3	R2	169	0	0.29	5.5	LOS A	1.2	8.5	0.3	0.53	0.3	37.8
Approach		281	0	0.29	4.8	LOS A	1.2	8.5	0.3	0.53	0.3	37.6
East: Argyle Street												
4	L2	155	0	0.13	3.4	LOS A	0.1	0.5	0.02	0.29	0.02	39
5	T1	89	0	0.13	0	LOS A	0.1	0.5	0.02	0.29	0.02	38.6
6	R2	8	0	0.13	3.6	LOS A	0.1	0.5	0.02	0.29	0.02	38.2
Approach		252	0	0.13	2.2	NA	0.1	0.5	0.02	0.29	0.02	38.9
North: Kent Street												
7	L2	11	0	0.035	6.9	LOS A	0.1	0.9	0.2	0.91	0.2	34.4
8	T1	18	0	0.035	8.4	LOS A	0.1	0.9	0.2	0.91	0.2	34.7
9	R2	3	0	0.035	8.6	LOS A	0.1	0.9	0.2	0.91	0.2	32.7
Approach		32	0	0.035	7.9	LOS A	0.1	0.9	0.2	0.91	0.2	34.4
West: Argyle Street												
10	L2	3	0	0.065	4.2	LOS A	0.3	2.1	0.29	0.23	0.29	37.1
11	T1	59	0	0.065	0.6	LOS A	0.3	2.1	0.29	0.23	0.29	38.2
12	R2	50	0	0.065	4.2	LOS A	0.3	2.1	0.29	0.23	0.29	38.5
Approach		112	0	0.065	2.3	NA	0.3	2.1	0.29	0.23	0.29	38.3
All Vehicles		677	0	0.29	3.6	NA	1.2	8.5	0.19	0.41	0.19	38.1
EX AM Argyle Street/Watson Road (745-845)												
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow s		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Watson Road												
1	L2	20	0	0.028	3.1	LOS A	0.1	0.7	0.33	0.87	0.33	11.2
3	R2	8	0	0.028	4.4	LOS A	0.1	0.7	0.33	0.87	0.33	15.6
Approach		28	0	0.028	3.5	LOS A	0.1	0.7	0.33	0.87	0.33	12.6
East: Argyle Street												
4	L2	10	0	0.115	7.2	LOS A	0	0	0	0.05	0	39.2
5	T1	217	0	0.115	0	LOS A	0	0	0	0.05	0	39.6
Approach		227	0	0.115	0.3	NA	0	0	0	0.05	0	39.6
West: Argyle Street												
11	T1	175	0	0.118	0.2	LOS A	0.3	1.9	0.14	0.17	0.14	38.2
12	R2	37	0	0.118	7.6	LOS A	0.3	1.9	0.14	0.17	0.14	11.8
Approach		212	0	0.118	1.5	NA	0.3	1.9	0.14	0.17	0.14	27.8
All Vehicles		467	0	0.118	1	NA	0.3	1.9	0.08	0.15	0.08	29.8

A2 Existing PM school peak

EX PM S Argyle Street/Kent Street (1430-1530)												
Movement Performance - Vehicles												
Mov	Turn	Demand Flow s		Deg.	Average	Level of	95% Back of Queue		Prop.	Effective	Aver. No.	Average
ID		Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South: Kent Street												
1	L2	47	0	0.26	3.6	LOS A	1.1	7.5	0.25	0.5	0.25	37.7
2	T1	64	0	0.26	3.4	LOS A	1.1	7.5	0.25	0.5	0.25	37
3	R2	147	0	0.26	5.1	LOS A	1.1	7.5	0.25	0.5	0.25	37.9
Approach		258	0	0.26	4.4	LOS A	1.1	7.5	0.25	0.5	0.25	37.7
East: Argyle Street												
4	L2	111	0	0.085	3.4	LOS A	0.1	0.4	0.02	0.32	0.02	38.9
5	T1	47	0	0.085	0	LOS A	0.1	0.4	0.02	0.32	0.02	38.4
6	R2	7	0	0.085	3.6	LOS A	0.1	0.4	0.02	0.32	0.02	38
Approach		165	0	0.085	2.5	NA	0.1	0.4	0.02	0.32	0.02	38.8
North: Kent Street												
7	L2	15	0	0.039	6.9	LOS A	0.1	1	0.19	0.91	0.19	34.6
8	T1	21	0	0.039	7.9	LOS A	0.1	1	0.19	0.91	0.19	34.8
9	R2	3	0	0.039	8.4	LOS A	0.1	1	0.19	0.91	0.19	33
Approach		39	0	0.039	7.5	LOS A	0.1	1	0.19	0.91	0.19	34.6
West: Argyle Street												
10	L2	7	0	0.071	3.9	LOS A	0.3	2.3	0.24	0.25	0.24	37
11	T1	57	0	0.071	0.4	LOS A	0.3	2.3	0.24	0.25	0.24	38.2
12	R2	63	0	0.071	3.9	LOS A	0.3	2.3	0.24	0.25	0.24	38.4
Approach		127	0	0.071	2.3	NA	0.3	2.3	0.24	0.25	0.24	38.3
All Vehicles		589	0	0.26	3.6	NA	1.1	7.5	0.18	0.42	0.18	38
EX PM S Argyle Street/Watson Road (1430-1530)												
Movement Performance - Vehicles												
Mov	Turn	Demand Flow s		Deg.	Average	Level of	95% Back of Queue		Prop.	Effective	Aver. No.	Average
ID		Total	HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Cycles	Speed
		veh/h	%	v/c	sec		veh	m				km/h
South: Watson Road												
1	L2	50	0	0.055	2.9	LOS A	0.2	1.5	0.28	0.88	0.28	11.3
3	R2	11	0	0.055	4.3	LOS A	0.2	1.5	0.28	0.88	0.28	15.6
Approach		61	0	0.055	3.1	LOS A	0.2	1.5	0.28	0.88	0.28	12.2
East: Argyle Street												
4	L2	11	0	0.091	7.2	LOS A	0	0	0	0.07	0	39.1
5	T1	167	0	0.091	0	LOS A	0	0	0	0.07	0	39.5
Approach		178	0	0.091	0.4	NA	0	0	0	0.07	0	39.5
West: Argyle Street												
11	T1	172	0	0.123	0.2	LOS A	0.3	2.3	0.15	0.21	0.15	37.9
12	R2	49	0	0.123	7.5	LOS A	0.3	2.3	0.15	0.21	0.15	11.8
Approach		221	0	0.123	1.8	NA	0.3	2.3	0.15	0.21	0.15	25.7
All Vehicles		460	0	0.123	1.5	NA	0.3	2.3	0.11	0.25	0.11	25.3

A3 Existing PM road peak

EX PM R Argyle Street/Kent Street (1730-1830)												
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow s		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Kent Street												
1	L2	80	0	0.211	3.6	LOS A	0.8	5.8	0.17	0.48	0.17	37.5
2	T1	28	0	0.211	4.1	LOS A	0.8	5.8	0.17	0.48	0.17	36.8
3	R2	98	0	0.211	5.9	LOS A	0.8	5.8	0.17	0.48	0.17	37.8
Approach		206	0	0.211	4.7	LOS A	0.8	5.8	0.17	0.48	0.17	37.6
East: Argyle Street												
4	L2	172	0	0.115	3.4	LOS A	0	0.3	0.02	0.36	0.02	38.8
5	T1	44	0	0.115	0	LOS A	0	0.3	0.02	0.36	0.02	38.3
6	R2	5	0	0.115	3.8	LOS A	0	0.3	0.02	0.36	0.02	37.8
Approach		221	0	0.115	2.8	NA	0	0.3	0.02	0.36	0.02	38.7
North: Kent Street												
7	L2	9	0	0.044	7	LOS A	0.2	1.1	0.31	0.9	0.31	34.1
8	T1	25	0	0.044	8.9	LOS A	0.2	1.1	0.31	0.9	0.31	34.4
9	R2	2	0	0.044	9.2	LOS A	0.2	1.1	0.31	0.9	0.31	32.4
Approach		36	0	0.044	8.4	LOS A	0.2	1.1	0.31	0.9	0.31	34.3
West: Argyle Street												
10	L2	12	0	0.133	4.1	LOS A	0.7	4.7	0.32	0.29	0.32	36.6
11	T1	92	0	0.133	0.6	LOS A	0.7	4.7	0.32	0.29	0.32	38
12	R2	122	0	0.133	4.2	LOS A	0.7	4.7	0.32	0.29	0.32	38.2
Approach		226	0	0.133	2.7	NA	0.7	4.7	0.32	0.29	0.32	38.1
All Vehicles		689	0	0.211	3.6	NA	0.8	5.8	0.17	0.4	0.17	38
EX PM R Argyle Street/Watson Road (1730-1830)												
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow s		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Watson Road												
1	L2	23	0	0.032	3.1	LOS A	0.1	0.8	0.32	0.87	0.32	11.2
3	R2	10	0	0.032	4.1	LOS A	0.1	0.8	0.32	0.87	0.32	15.6
Approach		33	0	0.032	3.4	LOS A	0.1	0.8	0.32	0.87	0.32	12.7
East: Argyle Street												
4	L2	5	0	0.111	7.2	LOS A	0	0	0	0.03	0	39.3
5	T1	213	0	0.111	0	LOS A	0	0	0	0.03	0	39.8
Approach		218	0	0.111	0.2	NA	0	0	0	0.03	0	39.8
West: Argyle Street												
11	T1	144	0	0.086	0.1	LOS A	0.1	0.8	0.07	0.1	0.07	39
12	R2	15	0	0.086	7.6	LOS A	0.1	0.8	0.07	0.1	0.07	11.9
Approach		159	0	0.086	0.8	NA	0.1	0.8	0.07	0.1	0.07	32.4
All Vehicles		410	0	0.111	0.7	NA	0.1	0.8	0.05	0.12	0.05	31.1

A4 Future AM school and road peak – additional 89 cars

FU AM Argyle Street/Kent Street (745-845)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow s		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Kent Street												
1	L2	101	0	0.499	5.1	LOS A	3.3	23	0.48	0.76	0.67	36.1
2	T1	35	0	0.499	6.3	LOS A	3.3	23	0.48	0.76	0.67	34.9
3	R2	266	0	0.499	8.6	LOS A	3.3	23	0.48	0.76	0.67	36.5
Approach		402	0	0.499	7.5	LOS A	3.3	23	0.48	0.76	0.67	36.3
East: Argyle Street												
4	L2	241	0	0.203	3.4	LOS A	0.1	0.9	0.02	0.29	0.02	39
5	T1	139	0	0.203	0	LOS A	0.1	0.9	0.02	0.29	0.02	38.6
6	R2	12	0	0.203	3.8	LOS A	0.1	0.9	0.02	0.29	0.02	38.2
Approach		393	0	0.203	2.2	NA	0.1	0.9	0.02	0.29	0.02	38.9
North: Kent Street												
7	L2	17	0	0.054	7	LOS A	0.2	1.3	0.27	0.91	0.27	33.9
8	T1	22	0	0.054	9.9	LOS A	0.2	1.3	0.27	0.91	0.27	34.2
9	R2	4	0	0.054	9.7	LOS A	0.2	1.3	0.27	0.91	0.27	32.1
Approach		43	0	0.054	8.8	LOS A	0.2	1.3	0.27	0.91	0.27	33.9
West: Argyle Street												
10	L2	4	0	0.095	4.8	LOS A	0.4	3.1	0.36	0.22	0.36	37
11	T1	93	0	0.095	0.9	LOS A	0.4	3.1	0.36	0.22	0.36	38.2
12	R2	61	0	0.095	4.9	LOS A	0.4	3.1	0.36	0.22	0.36	38.4
Approach		157	0	0.095	2.6	NA	0.4	3.1	0.36	0.22	0.36	38.3
All Vehicles		995	0	0.499	4.7	NA	3.3	23	0.27	0.5	0.35	37.5

FU AM Argyle Street/Watson Road (745-845)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow s		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Watson Road												
1	L2	102	0	0.161	3.5	LOS A	0.6	4.3	0.41	0.91	0.41	11.2
3	R2	40	0	0.161	6.5	LOS A	0.6	4.3	0.41	0.91	0.41	15.5
Approach		143	0	0.161	4.3	LOS A	0.6	4.3	0.41	0.91	0.41	12.5
East: Argyle Street												
4	L2	35	0	0.153	7.2	LOS A	0	0	0	0.13	0	38.8
5	T1	265	0	0.153	0	LOS A	0	0	0	0.13	0	39.1
Approach		300	0	0.153	0.9	NA	0	0	0	0.13	0	39
West: Argyle Street												
11	T1	213	0	0.21	0.7	LOS A	1	6.7	0.33	0.34	0.33	36.2
12	R2	130	0	0.21	8.1	LOS A	1	6.7	0.33	0.34	0.33	11.6
Approach		344	0	0.21	3.5	NA	1	6.7	0.33	0.34	0.33	20.4
All Vehicles		786	0	0.21	2.6	NA	1	6.7	0.22	0.36	0.22	21.8

A5 Future PM School Peak – additional 58 cars

FU PM S Argyle Street/Kent Street (1430-1530)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow s		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Kent Street												
1	L2	57	0	0.406	4.1	LOS A	2.2	15.5	0.38	0.63	0.45	36.9
2	T1	78	0	0.406	4.7	LOS A	2.2	15.5	0.38	0.63	0.45	35.9
3	R2	218	0	0.406	6.8	LOS A	2.2	15.5	0.38	0.63	0.45	37.3
Approach		354	0	0.406	5.9	LOS A	2.2	15.5	0.38	0.63	0.45	37
East: Argyle Street												
4	L2	174	0	0.134	3.4	LOS A	0.1	0.7	0.03	0.32	0.03	38.9
5	T1	73	0	0.134	0	LOS A	0.1	0.7	0.03	0.32	0.03	38.4
6	R2	11	0	0.134	3.7	LOS A	0.1	0.7	0.03	0.32	0.03	38
Approach		258	0	0.134	2.5	NA	0.1	0.7	0.03	0.32	0.03	38.8
North: Kent Street												
7	L2	22	0	0.056	7	LOS A	0.2	1.4	0.24	0.91	0.24	34.3
8	T1	26	0	0.056	8.8	LOS A	0.2	1.4	0.24	0.91	0.24	34.6
9	R2	4	0	0.056	9.2	LOS A	0.2	1.4	0.24	0.91	0.24	32.6
Approach		51	0	0.056	8.1	LOS A	0.2	1.4	0.24	0.91	0.24	34.4
West: Argyle Street												
10	L2	9	0	0.098	4.2	LOS A	0.5	3.3	0.31	0.25	0.31	36.9
11	T1	84	0	0.098	0.6	LOS A	0.5	3.3	0.31	0.25	0.31	38.1
12	R2	77	0	0.098	4.3	LOS A	0.5	3.3	0.31	0.25	0.31	38.4
Approach		169	0	0.098	2.5	NA	0.5	3.3	0.31	0.25	0.31	38.2
All Vehicles		833	0	0.406	4.3	NA	2.2	15.5	0.25	0.47	0.28	37.7

FU PM S Argyle Street/Watson Road (1430-1530)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow s		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m				km/h
South: Watson Road												
1	L2	119	0	0.141	3.1	LOS A	0.6	3.9	0.34	0.89	0.34	11.2
3	R2	26	0	0.141	5.7	LOS A	0.6	3.9	0.34	0.89	0.34	15.6
Approach		145	0	0.141	3.6	LOS A	0.6	3.9	0.34	0.89	0.34	12.1
East: Argyle Street												
4	L2	27	0	0.118	7.2	LOS A	0	0	0	0.13	0	38.8
5	T1	204	0	0.118	0	LOS A	0	0	0	0.13	0	39.1
Approach		230	0	0.118	0.8	NA	0	0	0	0.13	0	39
West: Argyle Street												
11	T1	210	0	0.193	0.5	LOS A	0.8	5.6	0.27	0.32	0.27	36.6
12	R2	117	0	0.193	7.7	LOS A	0.8	5.6	0.27	0.32	0.27	11.6
Approach		327	0	0.193	3.1	NA	0.8	5.6	0.27	0.32	0.27	21
All Vehicles		702	0	0.193	2.5	NA	0.8	5.6	0.19	0.38	0.19	21