

Department of Education

**Alexandria Park Community
School**

**Transport Assessment updated with
Response to Submissions**

Rev A | 26 September 2018

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 256193

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1 Introduction

This Transport Assessment has been prepared by Arup on behalf of the NSW Department of Education (the 'Applicant'). It accompanies an Environmental Impact Statement (EIS) prepared in support of State Significant Development Application SSD 17_8373 for the redevelopment of 'Alexandria Park Community School' at 7-11 Park Road, Alexandria (the 'Site'). The EIS seeks development consent for the following works:

The redevelopment of the Alexandria Park Community School ('the School') will address issues of capacity for schools in the inner city areas of Sydney and is also driven by the population growth resulting from the large number of residential developments that are transforming the former industrial precincts of Zetland, Waterloo and Alexandria.

The new school has been briefed to accommodate up to 1,000 primary school students and up to 1,200 secondary school students on one campus in an integrated and fully connected school building.

Specifically, this project includes:

- Demolition of all existing buildings on-site, including the temporary pop-up schools;
- Remediation of specific areas of the site containing contaminated fill;
- Construction of multiple school buildings of up to five stories, arranged along the western and southern parts of the site comprising:
 - Classroom home bases;
 - Collaborative learning spaces;
 - Specialist learning hubs;
 - Learning support spaces;
 - Offices for teachers and administrative staff;
 - Library; and
 - Student canteen.
- Construction of a sports hall and multiple outdoor sports courts;
- An all-weather multipurpose synthetic sports field;
- Informal play spaces and Covered Outdoor Learning Space or COLA;
- A community centre;
- A pre-school for 39 children;
- Site landscaping including green links, community garden and open space;
- Construction of a new on-site car park and associated vehicular access point off Belmont Street; and
- Augmentation and construction of ancillary infrastructure and utilities as required.

Delivery of the project will be undertaken in sequential phases to maintain an operational school on the Park Road Campus and will involve enabling works separate to this application followed by three main construction phases for the new building and external works.

The purpose of this report is to provide an assessment of the proposal as described above and detailed within the EIS.

1.1 Background

The Department of Education and Communities has developed a master plan for the redevelopment of the Park Road Campus, which commenced in mid-2016.

There is currently a pop-up school on the Park Road Campus and includes the relocation of classes and students from the Mitchell Road Campus into the new pop-up high school, shown in Figure 1



Figure 1: Pop-up School completed in the Park Road Campus

A second pop-up school will be constructed to accommodate the remaining students to help facilitate the construction of a new permanent school for up to 800 secondary school students (Years 7 – 12) and 1,000 primary school students (Years K – 6). The new school will include classrooms, general and specialist learning spaces and administration, as well as student services, library, canteen, gymnasium, communal hall and a Covered Outdoor Learning Area (COLA). The redevelopment will continue to provide accommodation for Wunanbiri pre-school.

1.2 Scope

This report will be a Transport Assessment, supporting the proposed development, suitable for the SSD lodgement. The general scope of works include:

- Existing travel and parking conditions
- Existing travel behaviour of students and staff
- Generation of people and car trips
- Travel Demand Management strategy
- Vehicle access
- Any required road/intersection upgrades
- Car parking arrangements
- Pedestrian and bicycle access

2 Agency Requirements

2.1 SEARS Report

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

- Application Number SSD: 8373
- Proposal Name: Alexandria Park Community School Redevelopment
- Location: Park Road, Alexandria
- Applicant: Urbis, on behalf of the Department of Education
- Date of Issue 27 April 2017

The submission meets all the requirements of the SEARs in relation to the traffic and transport details. This is subject to several transport improvements for the efficient running of the school, which are detailed in this report. 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
1	Include a transport and accessibility impact assessment, which details, but not limited to the following:	This report details a transport and accessibility impact assessment of the proposed school development
2	accurate details of the current daily and peak hour vehicle, public transport, pedestrian and cycle movement and existing traffic and transport facilities provided on the road network located adjacent to the proposed development;	Discussed in section 2.2
3	an assessment of the operation of existing and future transport networks including the bus network and their ability to accommodate the forecast number of trips to and from the development;	Discussed in section 7
4	details of the estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and cycle trips based on traffic surveys of similar schools, including the existing school on site;	Discussed in section 5, 6 and 7
5	the adequacy of public transport, pedestrian and bicycle networks and infrastructure to meet the likely future demand of the proposed development;	Existing pedestrian and cycle network (A2MP to further improve cycling in the future) is considered adequate for the future school.
6	the impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site in consultation with Roads and Maritime Services and Transport for NSW and identify measures to integrate the development with the transport network;	Discussed in section 4

#	SEARs Report	Arup response
7	details of any upgrading or road improvement works required to accommodate the proposed development;	Discussed in section 4.
8	details of travel demand management measures to minimise the impact on general traffic and bus operations and to encourage sustainable travel choices and details programs for implementation;	Discussed in the Green Travel Plan appended to report
9	the impact of trips generated by the development on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvement works, if required (note: traffic modelling is to be undertaken with scope to be agreed by TfNSW and RMS in advance);	Discussed in section 7
10	the proposed active transport access arrangements and connections to public transport services;	The future connections to public transport will not differ from the current provision which is considered adequate.
11	details of proposed school bus routes along bus capable roads and infrastructure (bus stops, bus layovers etc.);	Discussed in section 3.6
12	the proposed access arrangements, including car and bus pick- up/drop-off facilities, and 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;	Discussed in section 5.1
13	measures to maintain road and personal safety in line with CPTED principles;	No changes to existing road network are proposed as a result of the school expansion.
14	the proposed car and bicycle parking provision, including end of trip facilities, which must be taken into consideration of the availability of public transport and the requirements of Council's relevant parking codes and Australian Standards;	Discussed in section 5.3
15	proposed bicycle parking facilities in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance;	Discussed in section 5.3
16	details of the proposed number of car parking spaces and compliance with appropriate parking codes and justify the level of car parking provided on-site;	Discussed in section 5.2
17	details of emergency vehicle access arrangements;	Discussed in section 5.5
18	an assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures;	Existing pedestrian and cycle network (A2MP to further improve cycling in the future) is considered adequate for the future school.

#	SEARs Report	Arup response
19	service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times);	Discussed in section 0
20	in relation to construction traffic: assessment of cumulative impacts associated with other construction activities (if any);	Detailed in the CTMP appended to report
21	an assessment of road safety at key intersection and locations subject to heavy vehicle construction traffic movements and high pedestrian activity;	
22	details of construction program detailing the anticipated construction duration and highlighting significant and milestone stages and events during the construction process;	
23	details of anticipated peak hour and daily construction vehicle movements to and from the site;	
24	details of access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle;	
25	details of temporary cycling and pedestrian access during construction;	
26	traffic and transport impacts during construction, including cumulative impacts associated with other construction activities, and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of the impact (which must include vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures for all demolition/construction activities).	

Relevant Policies and Guidelines:

- 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)

2.2 Response to Submissions

Submissions were received on the Transport Assessment issued on 1 December 2017. Responses to the submissions have been included within this updated report with the references identified in Table 2.

Table 2: Agency Submissions

Agency Submissions	Response
Department of Planning and Environment	
The Traffic Assessment (TA) should be updated to address Clause 7.9(2) and Clause 7.9(3) of the SLEP 2012, including a breakdown of proposed gross floor area (GFA) for both the school and pre-school relative to the relevant maximum parking space ratios.	Sect 5.2
The TA should also be amended to address:	
<ul style="list-style-type: none"> The current and proposed mode share (arrival and departure) for students and staff; 	Sect 3.3.2 and 6.1.1
<ul style="list-style-type: none"> traffic, transport and parking impacts associated with the proposed out of school hour services, pre-school and community use (including weekend use); 	Sect 5.7
<ul style="list-style-type: none"> all traffic impacts during the PM period; 	Sect 6.1
<ul style="list-style-type: none"> updated on-street staff parking impacts; 	Sect 5.2
<ul style="list-style-type: none"> modelling of a plus ten-year post development scenario; 	Sect 7.2
<ul style="list-style-type: none"> the minimum parking provisions detailed Table 3.5 of the Sydney DCP regarding 'Child care centres'; and 	Sect 5.3.2
<ul style="list-style-type: none"> clarification of why a rate of 1 bicycle parking space to 50 students has been adopted for primary school students. 	Sect 5.3.3
The Green Trave Plan (GTP) should be amended to:	
<ul style="list-style-type: none"> detail the current, proposed and future targeted mode share (arrival and departure) for students and staff; and 	See GTP – Sect 2.2
<ul style="list-style-type: none"> objectives and targets (i.e. site-specific, measurable, achievable and timeframes for implementation) to define the direction and purpose of the GTP. 	See GTP – Sect 3.2
Transport for NSW	
Park Road: A significant portion of student pick-up/drop off will occur along Park Road; a dead-end road without a cul-de-sac. The Transport Assessment should assess whether vehicles can turn around at the end of Park Road within a single movement. Appropriate parking restrictions and/or a cul-de-sac should be proposed by the Applicant if the assessment determines that this cannot be achieved.	Sect 5.1.1
Prior to commencement of school operations with expanded student capacity, the proponent should provide additional data and the proposed student catchment area to determine the likely demands on the transport network (all modes). The student catchment area and travel data provided to TfNSW will assist with future bus service planning.	Sect 5.6.1

To accommodate future demand for bus services, additional bus pick-up/drop-off zones should be provided, which may include additional bus stands in Park Road and Power Avenue. This should be undertaken in consultation with the Sydney Coordination Office. Any impacts to kerbside uses on Park Road and Power Avenue should be identified and mitigated.	Sect 5.6.1
Updated mode share data of staff travel to work should be provided by the Applicant to estimate the on-street parking demands.	Sect 6.1.1
The Transport Assessment should provide details on the likely on-street staff parking impacts because of the increased staff numbers. Further justification should be provided for the proposed parking provision and adequacy to accommodate the future demand, given the existing parking supply constraints.	Sect 5.2

3 Existing conditions

3.1 Study area

Alexandria Park Community School Park Road Campus is a Kindergarten to Year 12 School. The school is bounded by Buckland Street in the north, Park Road in the east and a shared pedestrian path connecting Belmont Street and Buckland Street in the west. Alexandria Park is located just east of the school which is segregated by Park Road. The location of the school is shown in Figure 2.

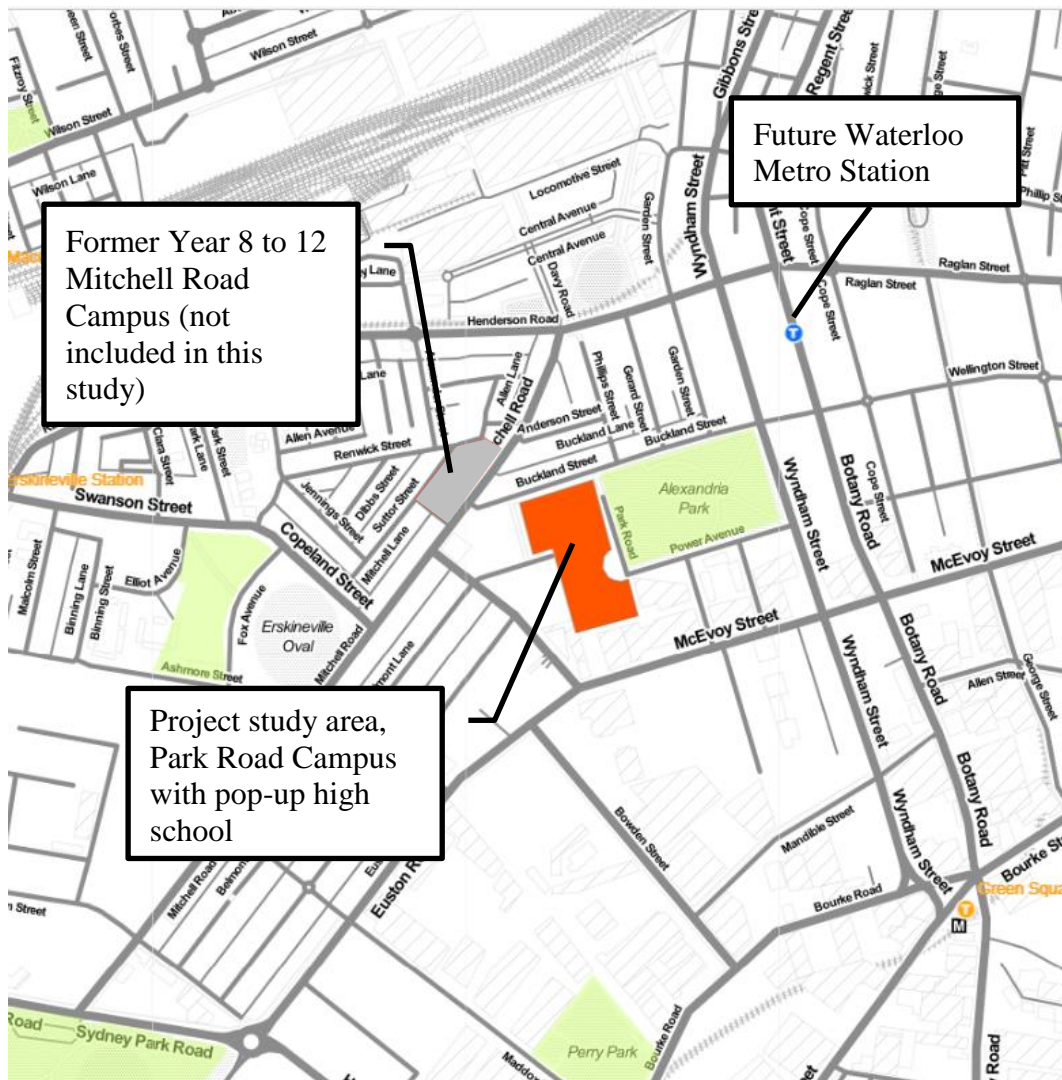


Figure 2: Site location map

3.2 Existing land uses

The existing land uses surrounding the site defined by the Sydney Local Environmental Plan (2012), as illustrated in Figure 3. There is a diverse range of General Residential, Mixed Use, Business Park, and Local Centre land uses surrounding the site.

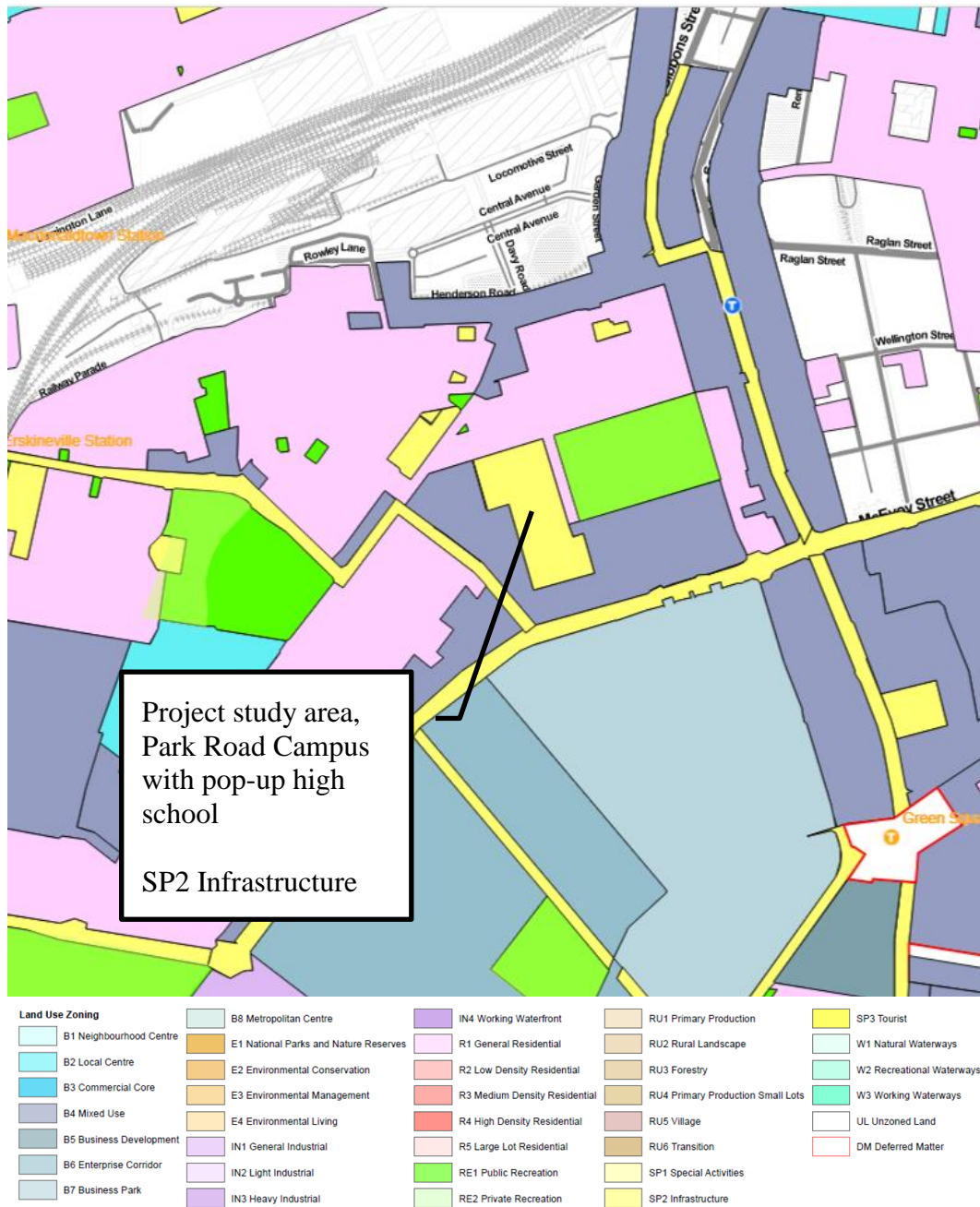


Figure 3: Land zoning map

3.3 Travel characteristics

3.3.1 Journey to Work

The travel characteristics of the workers in local employment area are provided by the Bureau of Transport Statistics 2011 Journey to Work data. The data identified 1,467 people as working in the local travel zones that cover the Alexandria Park Community School campuses. The mode split of those commuting to the area is presented in Figure 4.

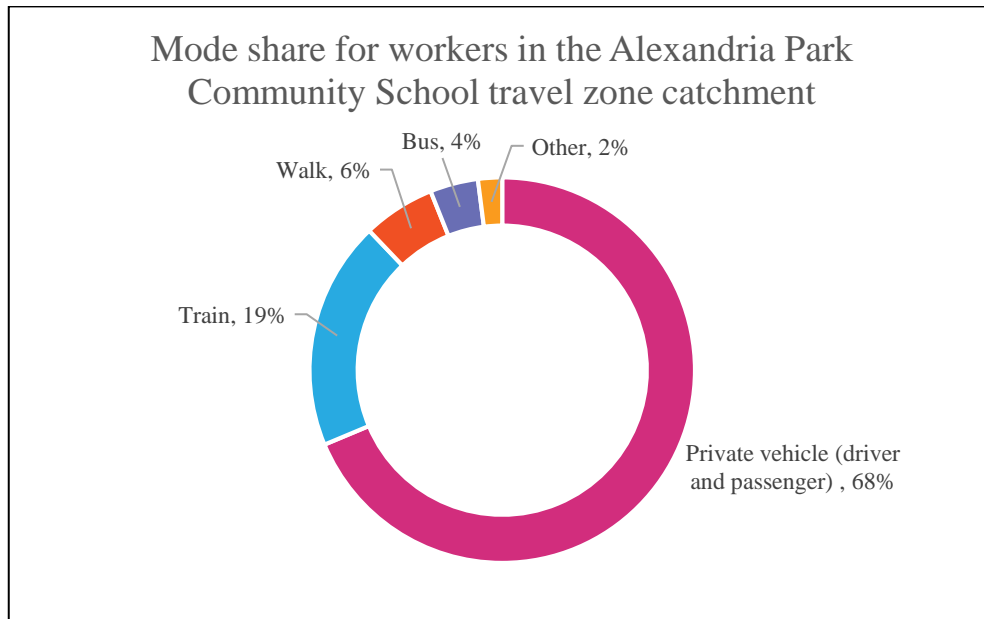


Figure 4: Journey to work mode share data for the local travel zones around Alexandria Park Community School (BTS 2011 Journey to Work¹)

Public transport accounts for almost a quarter of all commuting trips to the area, with train use relatively high due to the close proximity to Erskineville, Green Square and Redfern train stations (see Section 3.6 for additional detail). The levels of active transport (i.e. walking and cycling) are relatively low, however, given the anticipated future increase in residential population in the Erskineville and Alexandria area, this would be expected to improve.

Travel by private car is high, however, given the limited amount of parking available in the area, this would be expected to reduce.

¹ <http://visual.bts.nsw.gov.au/jtwbasic/#258,257>
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3.3.2 Travel Surveys

Travel surveys were undertaken by staff and students at the school in late 2017. This enables the existing mode of travel to be determined. For staff the current car mode is 82% which is higher than the 2016JTW data for this area which has a 59% mode share to car. This indicates that there is good potential for more staff to use alternative modes of travel.

For the students, the Kinder to Y2 have almost a 50% car mode whilst Y3-Y12 have only a 23% car mode for the drop-off reducing to 16% for the pick-up. It is expected that these same car modes for student activity will be maintained for the expanded school.

Table 3: Staff travel mode

Mode	Staff existing	
Car	81.8%	45
Car pool	-	-
Walk	3.6%	2
Cycle	3.6%	2
Public transport	10.9%	6
Total	100.0%	55

Table 4: Student travel mode

Mode	Kinder to Y2				Y3-Y12			
	Arrival		Departure		Arrival		Departure	
Car, my parents drive me to school	48.7%	37	44.7%	34	23.2%	61	15.8%	40
Another parent drives my child to school (car-pool)	0.0%	0	1.3%	1	2.3%	6	1.2%	3
Walk only	38.2%	29	38.2%	29	27.0%	71	26.0%	66
Cycle	9.2%	7	7.9%	6	2.7%	7	2.8%	7
Train and walk	0.0%	0	0.0%	0	20.5%	54	22.8%	58
Train and bus	0.0%	0	0.0%	0	4.6%	12	6.7%	17
Light Rail and walk	1.3%	1	0.0%	0	0.8%	2	0.4%	1
Bus	0.0%	0	0.0%	0	14.8%	39	16.1%	41
School Bus	2.6%	2	2.6%	2	4.2%	11	5.9%	15
Bus to Yurungai or The Settlement			5.3%	4			2.4%	6
Total		76		76		263		254

3.3.3 Site Surveys

Site surveys were carried by Arup out to understand the volume and behaviour of drop-off and pick-up activity associated with Alexandria Park Community School. The surveys were carried out along Park Road, Power Avenue, Belmont Street and Buckland Street. Overall, the existing drop-off and pick-up arrangement was found to operate efficiently with parents following traffic rules and minimal double parking occurrences observed.



Photograph 1: Park Road at 8.30am found to be quieter



Photograph 2: Park Road at 8.55 found to be busy but with a high turnover rate

AM Peak drop-off

The results of the AM peak period drop-off are presented in Figure 5 and Figure 6. The main findings from the surveys were:

- Between 8.15 and 9.15am, a total of 116 students were observed being dropped-off in 90 vehicles
- Approximately 75% of drop-off activity occurs along Park Road which is the main access to the primary school, with younger students typically being escorted into the building by parents
- Around half of all drop-off's take place between 8.45 – 9am
- Average car occupancy is 1.3 students per car
- The overall estimated student drop-off mode share is 20%
- On Park Road, unrestricted spaces are generally all occupied before 8.15 (not staff). The 15-minute parking is used for drop-off as well as to escort children into the school.
- Some informal drop-off occurs outside of the school entrance on Park Road and occasional double-parking to escorting children into the school (two times in total)

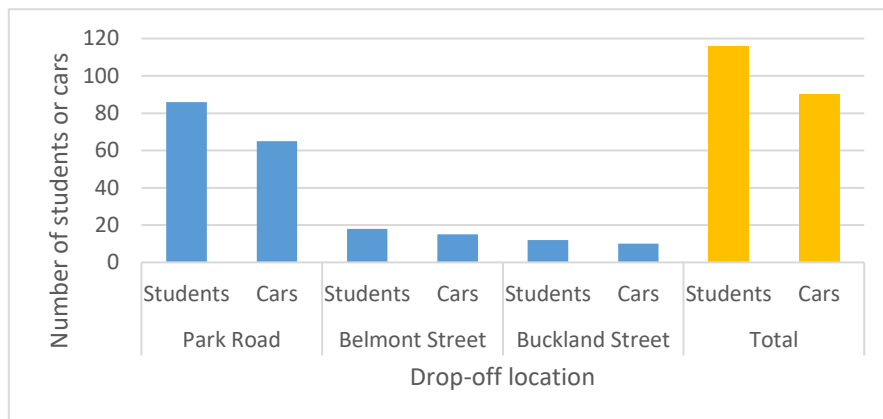


Figure 5: Alexandria Park Community School drop-off activity

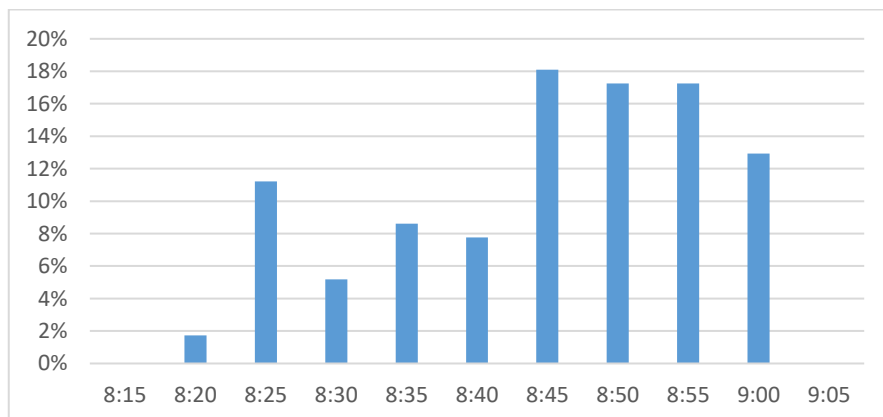


Figure 6: Alexandria Park Community School drop-off times

Afternoon Pick Up

The results of the AM peak period drop-off are presented in Figure 7 and Figure 8. The main findings from the surveys were:

- Primary school finishes at 3pm while secondary school finishes at 3.10pm.
- Between 3pm and 3.30pm, a total of 48 students were observed being picked-up in 36 vehicles, with almost all activity occurring between 3pm and 3.15pm.
- Pick-ups concentrated into shorter time period (3pm – 3.15pm), however volumes much lower than AM drop-off
- Most of the 15-minutes spaces on Park Road occupied at 3pm, with staff using 2 of the unrestricted spaces
- Some informal pick-up occurs in the bus turnaround area, while occasional double-parking noted all streets (three times in total).

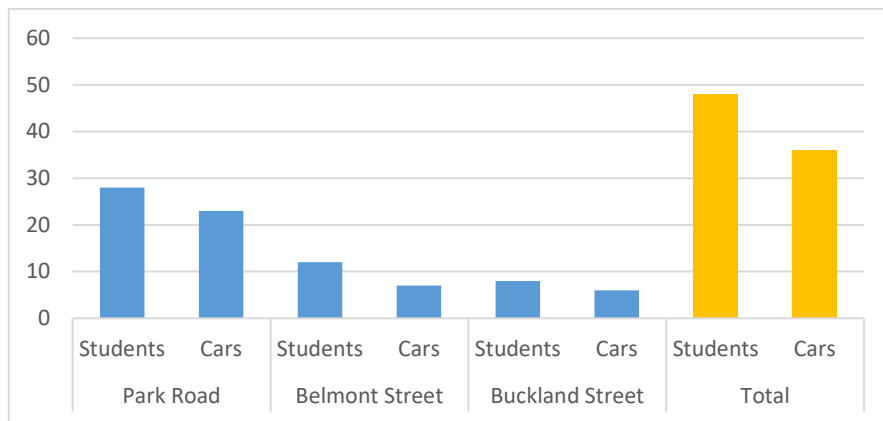


Figure 7: Alexandria Park Community School pick-up activity

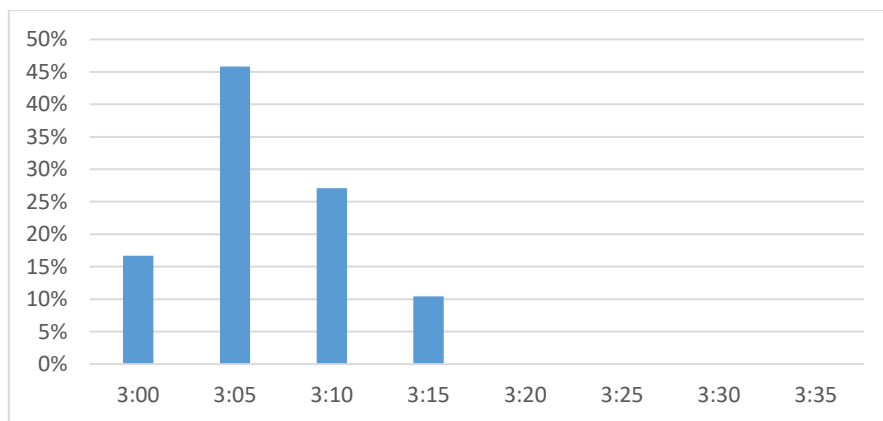


Figure 8: Alexandria Park Community School pick-up times

3.4 Existing Road Network

The study area is surrounded by a series of State and Regional roads, as illustrated in Figure 9. The key roads identified as supporting the primary access into the Alexandria Park Community School campuses include:

- Botany Road (State road)
- McEvoy Street (State road)
- Wyndham Street (Regional road)
- Mitchell Road (Regional road)



Figure 9: Road classification map

3.4.1 Existing volumes

The existing two-way traffic volumes in the surrounding road network are shown in Figure 10, from 8:00am to 9:00am. This morning peak period coincides with the morning commuter peak traffic and the school drop-offs and was found to be higher than the afternoon school peak from 2:00pm to 3:00pm. The AM traffic volume numbers will therefore be used for quantitative traffic modelling further discussed in section 7.

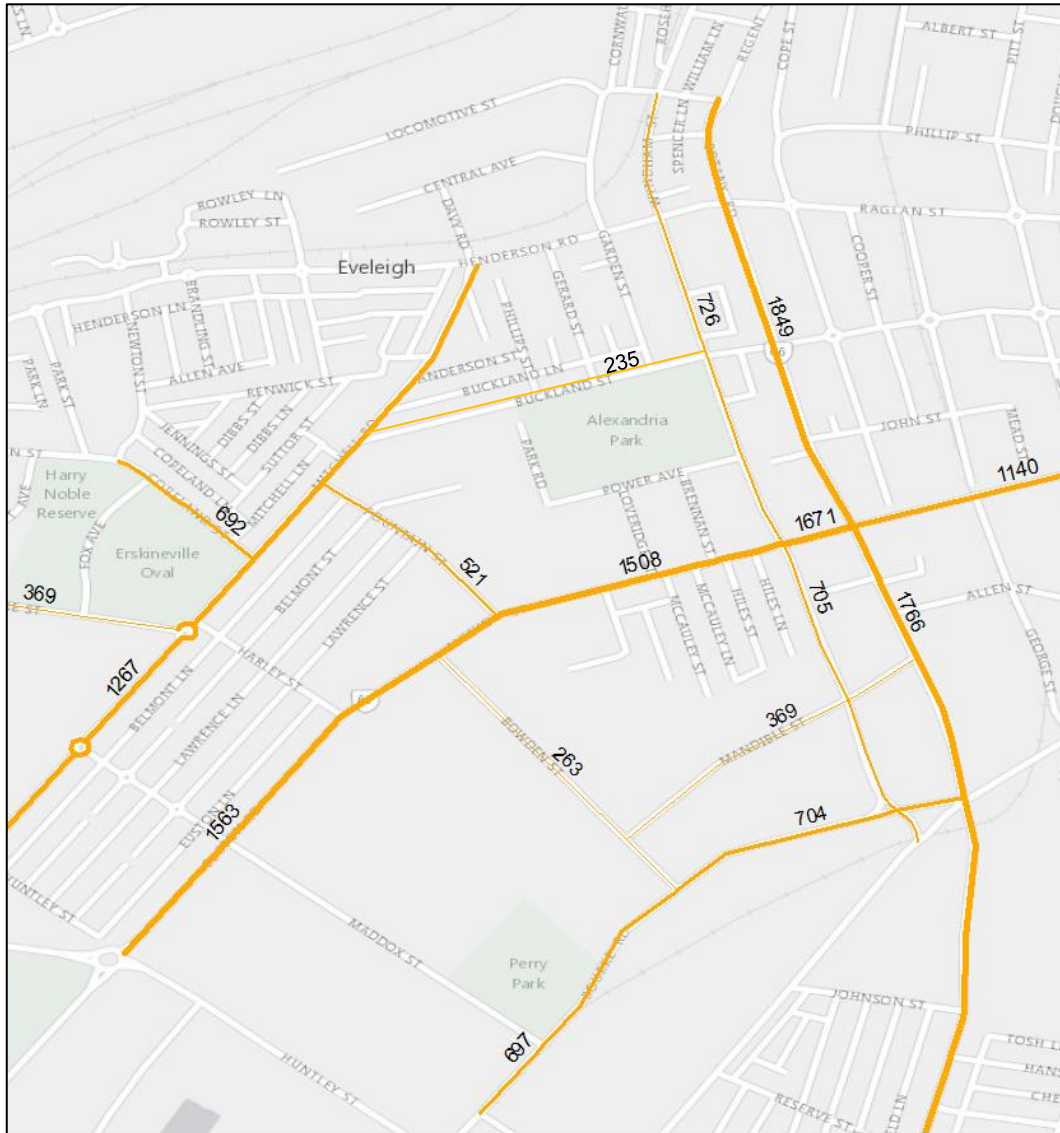
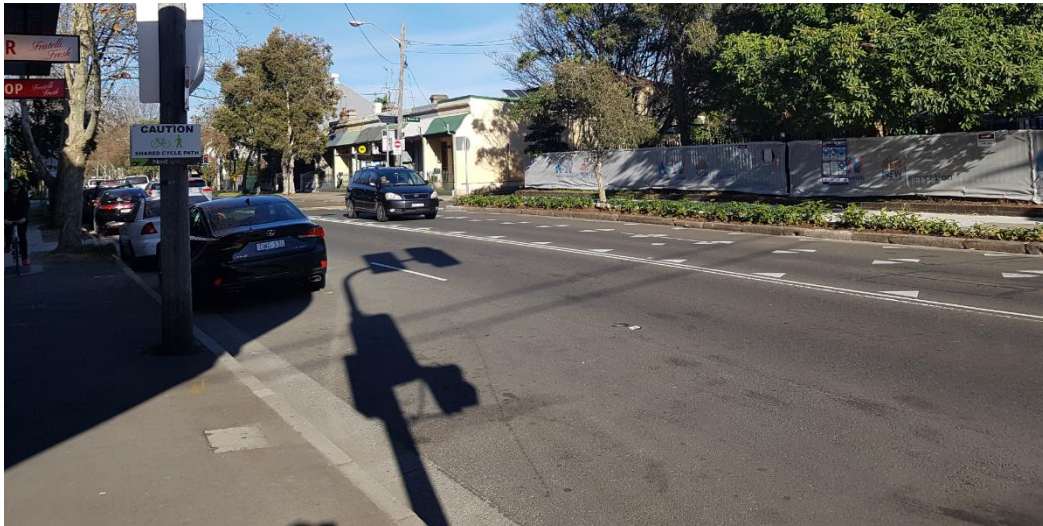


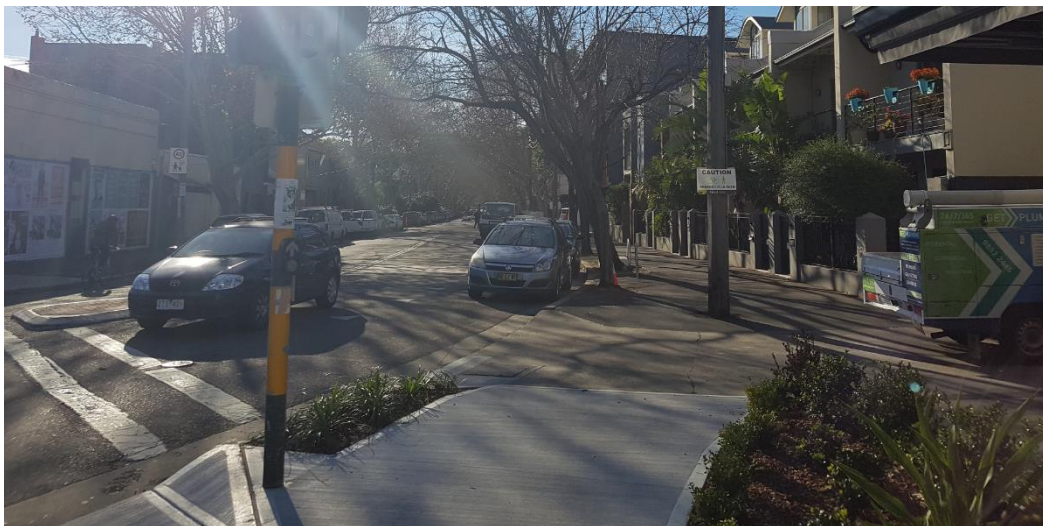
Figure 10: Two-way traffic volumes for the morning peak hour from 8:00am to 9:00am

3.4.2 Mitchell Road

Mitchell Road, near the intersection of Buckland Street was found to operate efficiently with little to no queuing or congestion issues. No right turns are permitted out of Buckland Street. Traffic volume surveys collected in August 2017 indicated that 1,074 vehicles were travelling along Mitchell Road in either direction.



Photograph 3 Mitchell Road facing south. No significant northbound queues were observed



Photograph 4 Mitchell Road / Buckland Street intersection, facing Buckland Street. Minimal queuing and traffic volumes were observed.

3.4.3 Buckland Street

Buckland Street has shared cycling and pedestrian footpaths along the southern side of the road. Traffic volumes were low and mainly from residents. Limited drop-off and pick-up activity was observed along Buckland Street during the site visits, likely due to the existing on-street parking spaces being fully occupied. Unrestricted parking can be found on the southern side of the street fronting the school, and 2P (8am-6pm Mon-Fri) Permit holders excepted restrictions on the northern side.



Photograph 5 Buckland Street facing east at 8:30am



Photograph 6 Buckland Street facing west at 8:45am

3.4.4 Wyndham Street

Wyndham Street near the intersection of Buckland Street was found to have a slow rolling northbound queue during the AM peak. The congestion is caused by downstream intersections towards the city. At certain periods, northbound vehicles were unable to cross the intersection as a result of the vehicles queuing up to the intersection shown in the photographs below. Queue lengths along Buckland Street west of Wyndham Street were observed to be minimal.



Photograph 7 Wyndham Street / Buckland Street, facing north. Vehicles queued to the intersection at 8:50am



Photograph 8 Buckland Street queues at the Wyndham Street / Buckland Street intersection at 9:00am

3.5 Crash data

Historical crash data was provided by RMS from 2012 to 2017. In the five years, no injuries or pedestrian incidents were recorded along Power Avenue, Park Road or Belmont Street. One pedestrian related incident was recorded along Buckland Street at the intersection of Gerard Street. A majority of the crashes occurred along McEvoy Road.



Figure 11: Pedestrian related crashes



Figure 12: Crashes which resulted in injuries

3.6 Public transport

The existing public transport offering in the area consists of rail and bus (public and special school/community services) and is described in further detail in the following sections.

3.6.1 Sydney buses



Figure 13: Public bus infrastructure map

The school is served by the following bus services:

- From the city, the 309 and 310 both stop on Botany Road while the 308 stops on Mitchell Road.
- From the south, the 309 and 310 both stop on Botany Road
- From the east, the 355 stops outside the school on Park Road while the 370 stops on McEvoy Street.
- From the west, the 308 stops on Mitchell Road, the 355 stops outside the school and the 370 stops on McEvoy Street.

Table 5: Bus route frequency

Bus route	Bus frequency during school day peak (8-9AM, 3-4PM)
305	2 in AM, 2 in PM (using Redfern as reference)
308	6 in AM, 4 PM (using St Peters Station as reference)
309	4 in AM, 4 in PM (using Central Station as reference)
310	3 in AM, 4 in PM (using Central Station as reference)
355	3 in AM peak, 3 in PM peak (stops at Alexandria school on weekday peaks)
370	14 in the AM peak, 10 in the PM peak (using Green Square as a reference)

Bus route 355 stops directly outside the school along the bus loop, and provides service between Marrickville Station and Bondi Junction Interchange. Arup conducted school bus occupancy surveys Thursday 15 June 2017 with the following findings:

- The bus arrives once in each school peak hour
 - 8:35am: 5 students alighted
 - 8:56am: 4 students alighted
 - 3:22pm: 10 students boarded
 - 3:37pm: 5 students boarded

Public buses were generally not utilised by students and staff.

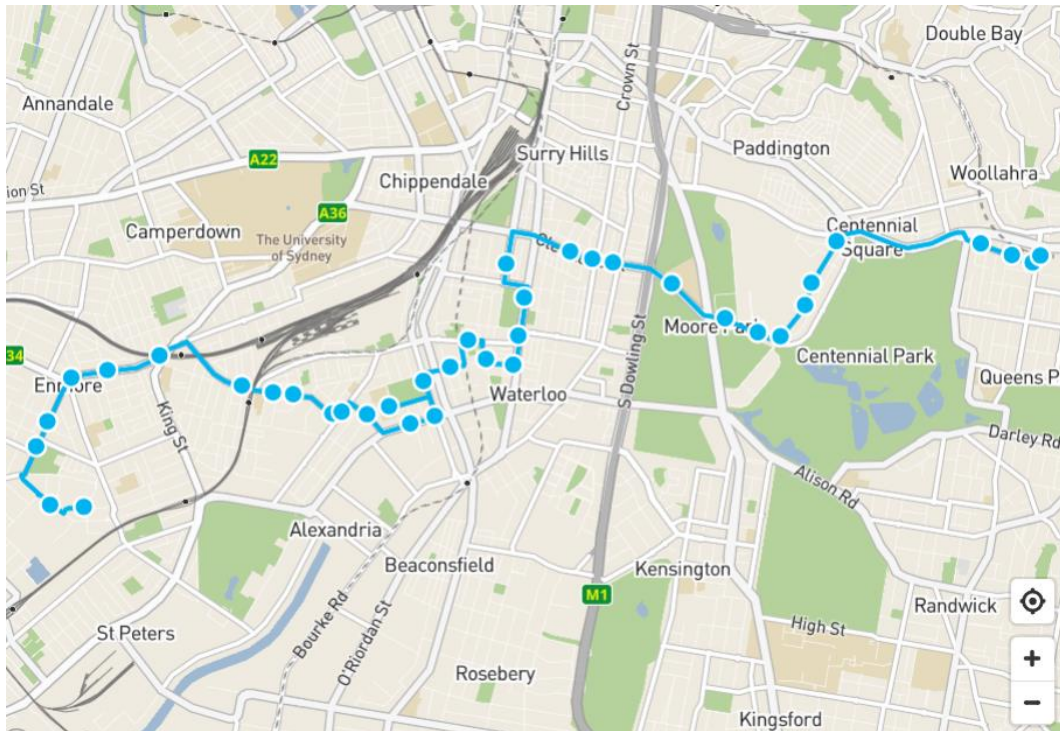


Figure 14 355 Bus Route Marrickville Metro to Bondi Junction

School bus 750E currently operates to the school, Waterloo Station and Redfern Station, with the route shown in Figure 15. Arup conducted school bus occupancy surveys Thursday 15 June 2017 with the following findings:

- The bus arrives once in each school peak hour
 - 8:45am: 35 students alighted
 - 3:20pm: 25 students boarded

School buses typically have 43 seats and can accommodate up to 60 students standing. The existing school bus has additional capacity to accommodate more Alexandria Park Community School students. However, the school bus also serves other schools which need to be consulted with, along with TfNSW, should there be an increase in patronage.

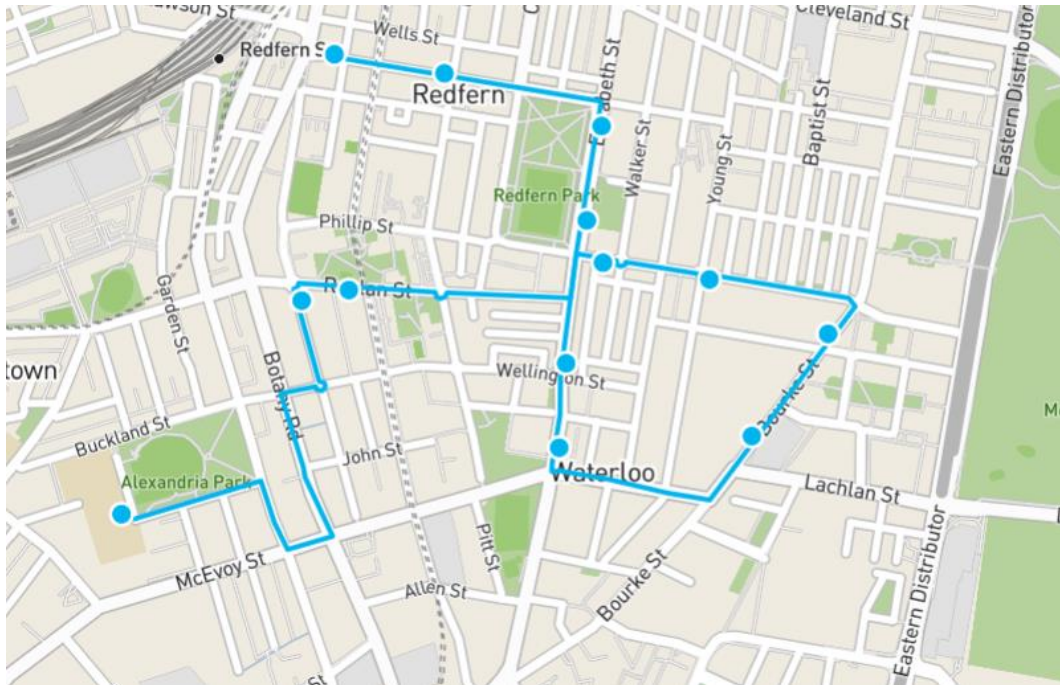


Figure 15 750E School Bus Redfern and George Street to Alexandria Park School



Photograph 9: Students boarding school bus 750E

3.6.3 Train

Alexandria Park Community School is easily accessible to multiple train stations. The campuses are within a 15 minute walk to Redfern, Erskineville and Green Square Railway Stations.

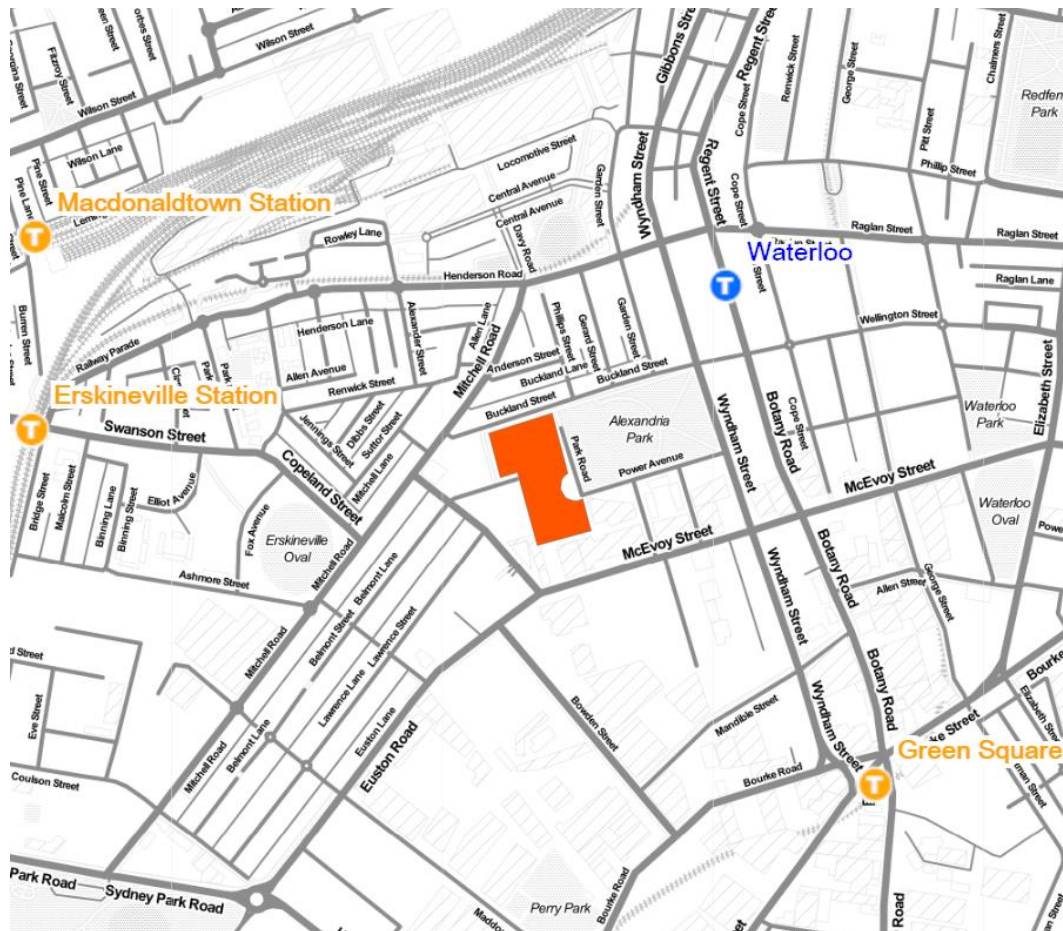


Figure 16: Train infrastructure map

The accessibility to Redfern Railway Station provides high frequency services during peak and off peak periods to a large number of rail routes, including:

- T1 North Shore, Northern and Western Line
- T2 Airport, Inner West and South Line
- T3 Bankstown Line
- T4 Eastern Suburbs and Illawarra Line
- T6 Carlingford Line
- T7 Olympic Park Line

3.7 Active transport

3.7.1 Cycling

The cycling facilities surrounding the site are illustrated in Figure 17, identifying dedicated bicycle lanes, shoulder lanes and mixed traffic roads suitable for riders. The overall cycling infrastructure surrounding the school is robust with good cycling connections in each direction. The residential streets around the school are bicycle friendly with low traffic volumes observed.



Figure 17: City of Sydney active transport map



Photograph 10: Primary school student cycling after school

3.7.2 Walking

The streets surrounding the school sites have good pedestrian accessibility and infrastructure with good quality zebra crossings, footpaths and ramps.

Park Road has a pedestrian crossing across the bus turnaround that facilitates the school (see Photograph 11) allowing safe pedestrian movements towards Buckland Street. A pedestrian crossing is also located on the corner of Park Road and Power Avenue, between the school and Alexandria Park (see Photograph 12). These crossings ensure the safe movement of children to and from the school. A significant number of students were observed walking to and from the school, both accompanied by a parent and unaccompanied.



Photograph 11 Pedestrian crossing at bus turnaround



Photograph 12 Pedestrian crossing across Power Avenue



Photograph 13 Pedestrian path through Alexandria Park. Photo shows a traffic warden assisting students in crossing the roads.



Photograph 14 Pedestrians along Buckland Street

3.8 On-street parking provision

3.8.1 Capacity and restrictions

The existing parking restrictions and supply are presented in Figure 18. There is considerable amount of on-street parking in the area is plentiful, the majority of which is unrestricted and 2P parking bays.



Figure 18 Existing parking provision of the surrounding local road network

The western side of Park Road has 11 bays with P15 Minute restrictions in place between 8am-9.30am and 2.30pm-4pm on Monday-Friday and acts as the main pick-up and drop-off area for the school. The eastern side of Park Road has 21 unrestricted parking bays that were observed to be full during the morning and afternoon peak.

Belmont Street acts as a drop-off and pick-up zone for the Senior Campus with the same P15 Minute restrictions in place for three bays on the north side of the street. The remainder of Belmont Street is comprised of unrestricted parking, with

21 bays in total. The entrance to the staff car park is also located on Belmont Street (28 spaces) and was observed to be exceeding capacity.

On Buckland Street, between Mitchell Road and Phillips Road, there are 31 unrestricted parking bays on the south side of the road, and a further 27 2P parking bays on the north side of the road. These parking bays were observed to be full during the morning peak. Power Avenue has 64 unrestricted parking bays, the majority of which were observed to be full during the morning and afternoon peak. Key parking provisions along roads fronting the school is shown in Figure 19.

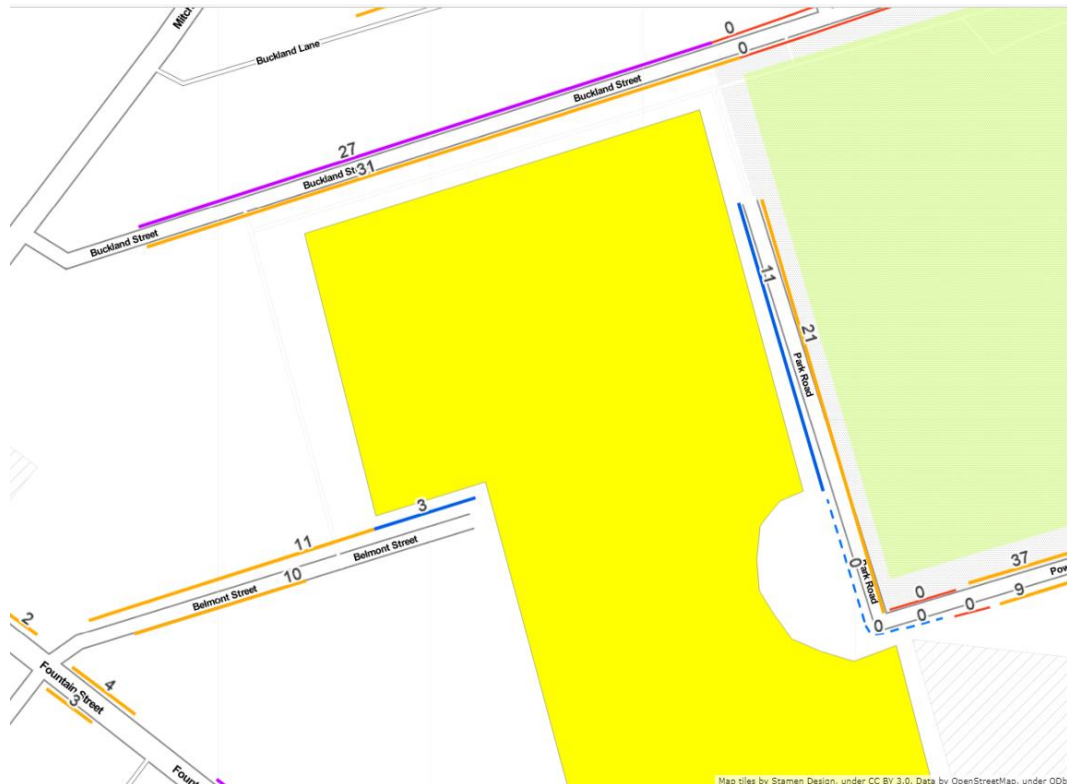


Figure 19: Existing parking provision of the roads fronting the school

3.8.2 Occupancy

3.8.2.1 School periods

Arup has conducted on-street parking surveys during school hours on 15 June 2017. Key findings were:

- Unrestricted on-street parking spaces on local roads near the school were either at or close to capacity at 9:30am.
- These unrestricted spaces remained at a similar level of occupancy at 2:55pm before school finishes.



Photograph 15: On-street unrestricted parking spaces along Power Avenue found to be close to capacity on Thursday at 2:56pm



Photograph 16: On-street unrestricted parking occupancy along Loveridge Street found to be close to capacity on Thursday at 2:56pm

3.8.2.2 School holidays

Arup has conducted on-street parking surveys during school holidays on:

- Wednesday 12 July 2017 10:00am: Surveys identify number of residents and employees (not including teachers) parked on -street
- Wednesday 12 July 2017 8:00pm: Surveys identify number of residents parked on-street once employees have left the precinct
- Thursday 13 July 2017 10:00am: Surveys identify number of residents and employees (not including teachers) parked on -street

Surveys included recording number plates to ascertain the number of parking spaces utilised by residents, compared to staff of the surrounding industrial dwellings. The number of unoccupied spaces on each road along with the maximum available capacity is shown in Table 6.

The data shows that some 96 spaces were available during the PM survey, indicating that some 27% of the existing spaces were used by employees (no teachers were parked during this time). Surveys also showed that Park Road was fully occupied during the AM period despite teachers not working during school holidays. This shows that vehicles using Park Road predominantly consist of employees of surrounding businesses rather than teachers.

Table 6: On-street parking occupancy survey

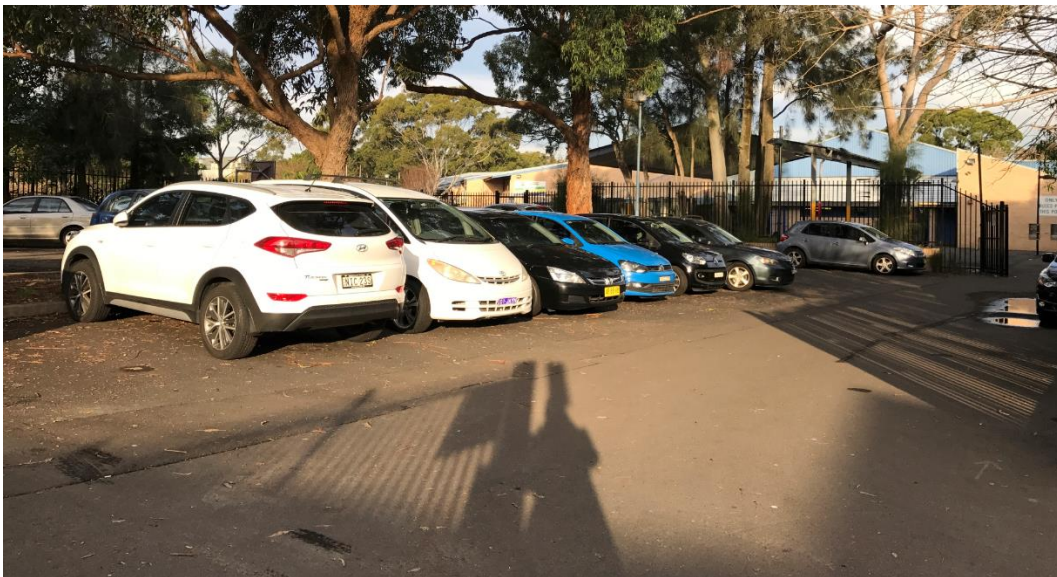
Road	Capacity	Number of empty spaces surveyed		
		Wed AM	Wed PM	Thu AM
Park Road	32	1	26	5
Power Avenue	64	0	25	3
Loveridge Street	32	1	6	1
Brennan Street	33	1	0	2
Wyndham Street	66	0	12	0
Buckland Street	107	2	24	7
Belmont Street	25	1	3	0
Total	359	6	96	18

3.9 Off-street staff parking

The staff car park is located along Belmont Street and has 28 unmarked parking spaces allocated to staff. Site visits carried out on Thursday 15 June 2017 indicated that the car park was fully occupied.



Photograph 17: Staff parking entry along Belmont Street



Photograph 18: Existing staff car park

3.10 Existing School Entrances

There are three access points to the school campus at present as described below and shown in Figure 20:

- Primary School – main access at corner of Park Road and Power Avenue. Bus turnaround and pick-up/drop-off also located there.
- Secondary School – main pedestrian access is on Buckland Street, with an additional access off Belmont Street. The staff car park is located at the end of, and accessed from, Belmont Street. The Wunanbiri pre-school is accessed via Belmont Street also.



Figure 20: Pedestrian entry locations

4 Future Upgrades

4.1 Sydney Metro

By 2024, the Sydney Metro is expected to be operating and running from Sydney's North West region under Sydney Harbour, through new underground stations in the CBD and beyond to the south west. Trains will operate at a 4 minute frequency during peak times. Indicative travel times from Waterloo are two minutes to Central Station and six minutes to Martin Place Station. The Chatswood to Sydenham section of the Sydney Metro has been approved and includes a new station at Waterloo.

This station will be accessed via the corner of Raglan and Cope Streets, about a 10 minute walk from the Park Road school entrance. The route shown in Figure 21 has a comprehensive network of footpaths and pedestrian crossing facilities.

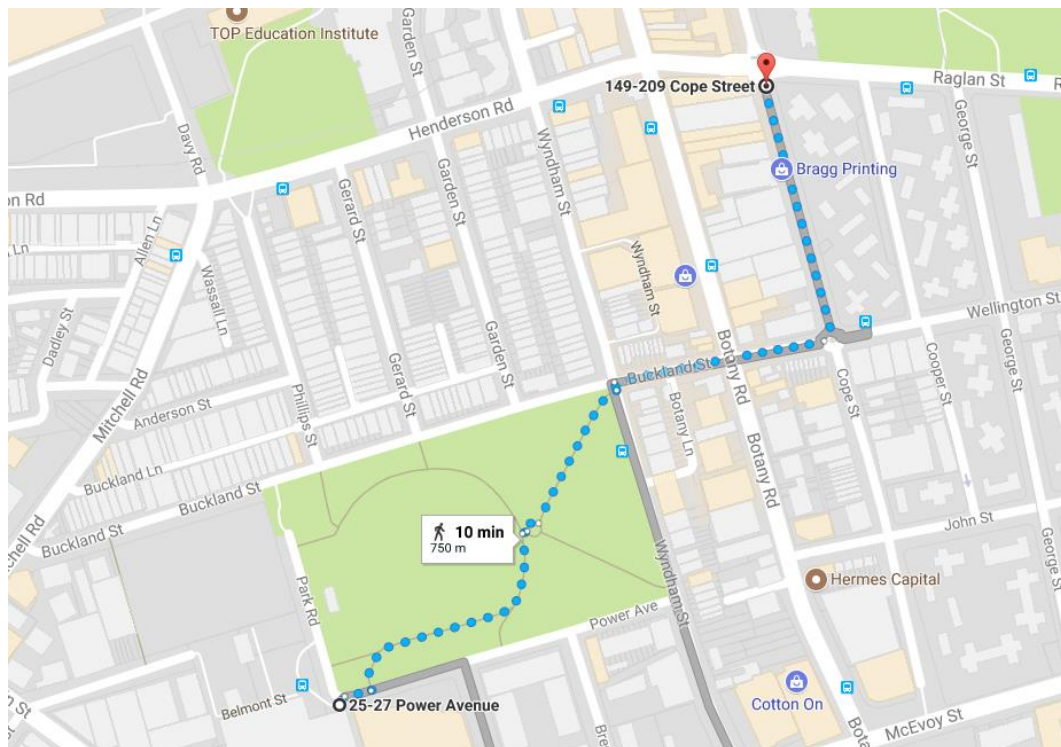


Figure 21: Walk time from the school to the future Waterloo Metro Station

4.2 Green Square

Green Square is an urban renewal project which will see the creation of a new town centre and result in over 30,000 residential dwellings. By 2030 Green Square is expected to be home to 61,000 new residents and 22,000 new workers. The school is a 12 minute walk from Green Square train station.

4.3 Alexandria to Moore Park Connectivity Upgrade

The Alexandria to Moore Park Connectivity Upgrade includes improvements to traffic capacity at key intersections and pinch points to improve traffic flow and provide better access for pedestrians and cyclists. These improvements are being planned to integrate with the CBD and South East Light Rail and WestConnex New M5 projects. The proposed upgrades would improve traffic flows to and from the school.

By 2021 traffic volumes along this key corridor are projected to grow by 50% or more in peak periods. The proposed improvements will support urban renewal along the corridor, and encourage motorists to use alternate routes away from the CBD, a key focus of the Sydney City Centre Access Strategy (Transport for NSW, 2013).²

In the vicinity of the school, the key features of the proposal include:

- Pedestrian and cyclist improvements for the length of the corridor and clearways on both sides of the corridor for extended periods
- A right and left turn bay to be added at Fountain Street, Wyndham Street and Botany Road
- A median to be introduced along McEvoy Street

As a result of the median banning right turns, left turn only manoeuvres into Loveridge Street and Brennan Street from McEvoy Street will be allowed. This means that cars arriving from the east will need to turn right at Wyndham (in a new right turn bay) and then left into Power Avenue. On departure, to travel west you will need to use Power Avenue to access Wyndham Street.



Figure 22 Alexandria to Moore Park preliminary concept design

(Source: RMS website)

² Source: RMS website
| Rev A | 26 September 2018

5.1 Drop-off and pick-up access

To accommodate the anticipated amount of drop-off and pick-up activity associated with the redevelopment, the following is proposed:

- Maintain the 15P parking (8am – 9.30am and 2.30pm – 4pm) along the western side of Park Road (11 spaces)
- Maintain the 15P parking (8am – 9.30am and 2.30pm – 4pm) along the northern side of Belmont Street (2 spaces)
- Convert 60m unrestricted parking along the southern side of Buckland Street to 15P parking (8am – 9.30am and 2.30pm – 4pm, 10 spaces)
- Convert 40m unrestricted parking along the southern side of Buckland Street to no parking (8am – 9.30am and 2.30pm – 4pm, 7 spaces)

The unrestricted parking which is proposed to be converted is adjacent to the Northern boundary of the school as indicatively shown in Figure 24. This is estimated to be sufficient for the anticipated increase in drop-off and pick-up activity associated with the redevelopment.

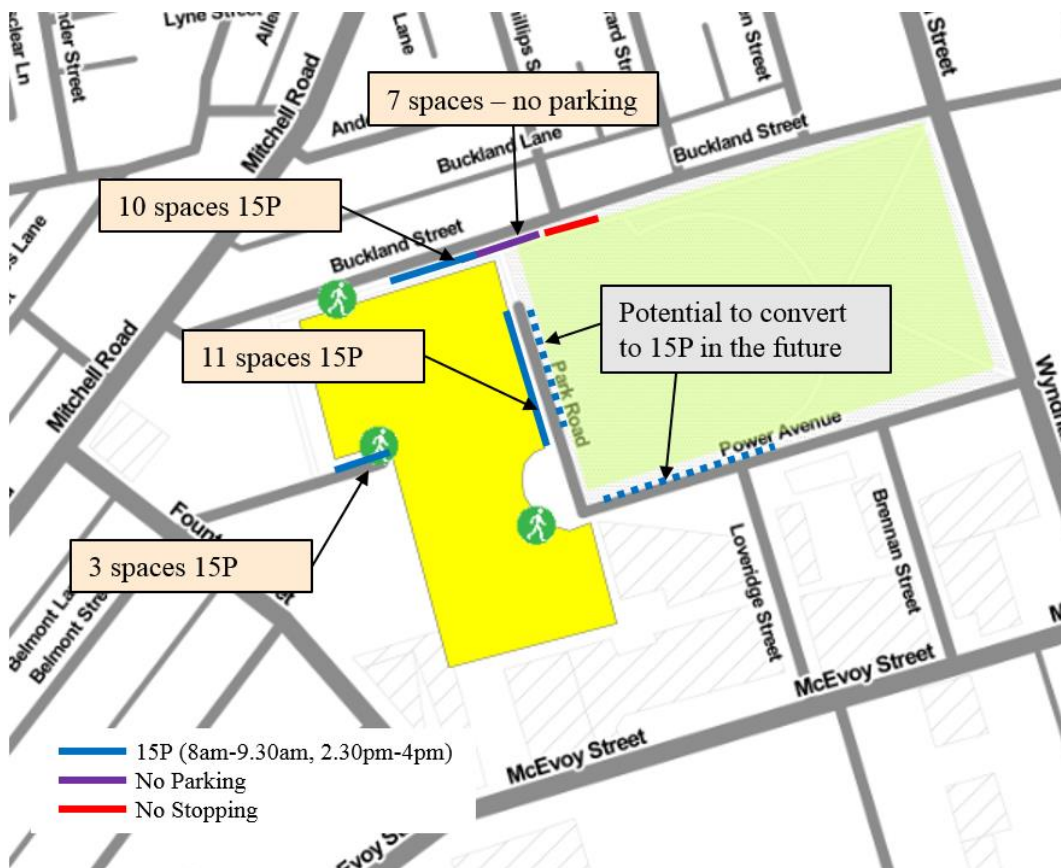


Figure 24 Proposed 15P and no-parking areas

Should additional drop-off and pick-up spaces be required, there are currently 21 unrestricted on-street spaces along the southern side of Buckland Street, directly fronting the school and 40 spaces along Power Avenue which could be converted. This is subject to monitoring of future drop-off and pick-up activity.

5.1.1 Park Road turn around

The 12.8m kerb to kerb dimension in Park Road allows a standard design car to turn in one turn. There is an existing turning area with No Stopping signs which the existing school uses during drop-off and pick-up times and this will be maintained.

5.2 Car Parking

The City of Sydney LEP 2012 provides maximum parking rates for off-street parking for schools and preschool uses.

Clause 7.9(2) Centre-based child care facilities: The maximum number of car parking spaces for a building used for the purposes of a centre-based child care facility is 1 space plus 1 space for every 100 square metres of the gross floor area of the building used for those purposes.

The pre-school proposes a GFA of 281.5m² which equates to a maximum permissible number of 4 spaces. As no allocated parking is proposed for the preschool, staff will be encouraged to use alternative modes of transport.

Clause 7.9(3) Information and education facilities: The maximum number of car parking spaces for a building used for the purposes of information and education facilities is 1 space for every 200 square metres of the gross floor area of the building used for those purposes.

The school proposes a GFA of 20,203m² which equates to a maximum permissible number of 101 spaces. As only 28 car parking spaces are proposed for the school, staff will be encouraged to use alternative modes of transport.

The redevelopment will result in the existing staff car park being displaced by construction, with a new 28 space car park being provided. As such no increase in off-street parking will be provided.

The car park is proposed to be located in the north-west corner of the site and will be accessed off Belmont Street as shown in Figure 25. The amount of on-site parking is limited and as a result, the future additional staff will be encouraged to travel by sustainable modes. Future parking spaces in the school can be allocated and controlled by parking passes which will only be provided to staff who participate in a carpool programme. This initiative is discussed further in section 8.

The Staff travel survey indicates that between 7 and 16 staff vehicles currently park on-street. With no additional car parking proposed on the site, it could be anticipated that more on-street staff parking will occur where available. Unrestricted on-street car parking is already heavily utilised by residents and local workers during the week resulting in limited capacity for expanded staff use. The use of alternative travel modes by staff will be encouraged through the green travel plan initiatives.

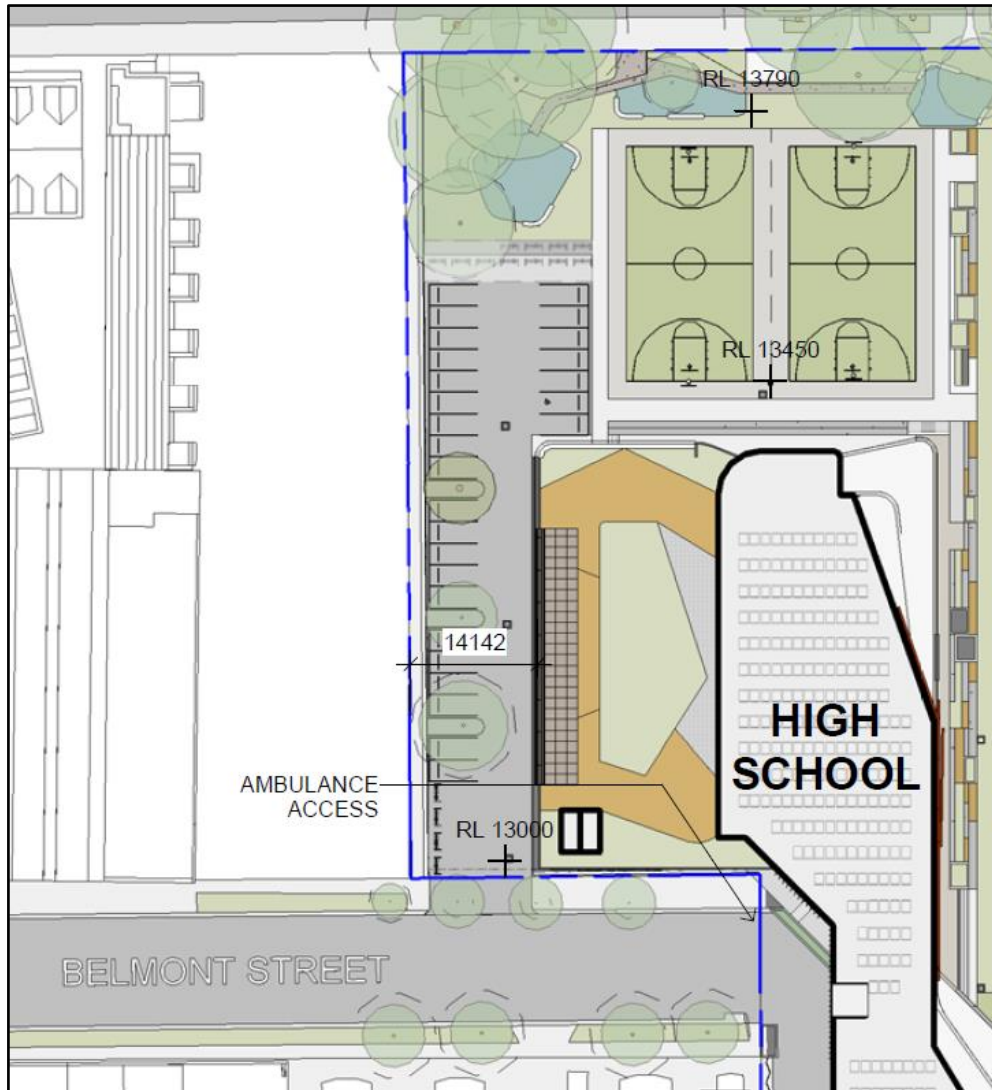


Figure 25: Proposed staff car park

5.3 Bike parking

5.3.1 Department of education guidelines

The Department of Education website states that:

- Not all schools have the facilities to store students' bikes. The decision to install and maintain bike racks is made by the school. Some schools choose not to have bikes brought into the school. This may be due to safety reasons, or the inability to safely secure bikes. Principals have the authority to stop students from bringing bikes, scooters and skateboards onto school property.
- Bikes need to be stored in the area specified by the school. The school accepts no responsibility for loss, damage or theft. We recommend that students lock their bikes with a secure chain.
- The school may assist with safe storage of helmets if space permits.

Source: <https://education.nsw.gov.au/road-safety-education/safe-student-travel/bikes>

5.3.2 City of Sydney guidelines

The City of Sydney 2012 Development Control Plan (DCP) provides guidelines on the number of parking spaces that should be provided:

- Tertiary educational institution - 1 per 10 staff and 1 per 10 students.
- Child care centre - 1 space per 10 staff + 2 spaces per child care centre.
- No rates are provided for primary or secondary schools.

5.3.3 Proposed cycle parking

The overall cycling infrastructure surrounding the school is robust with good cycling connections in each direction. The residential streets around the school are bicycle friendly with low traffic volumes observed. Staff and high school students should be encouraged to cycle to school. High school students are much more likely to cycle and hence 1 bicycle parking space per 10 students has been adopted. A rate of 1 bicycle parking space to 50 students has been adopted for primary school students as a starting point. The take up of cycling to school by students is dependent on the schools policy and the parents willingness to allow their children to cycle.

The following cycle parking provisions are proposed:

Table 7: Proposed bike parking provision

	Number of people	Rate	Bike spaces
School Staff	200	1 per 10 staff	20
High school students	1,000	1 per 10 students	100
Primary school students	1,200	1 per 50 students	24
Total proposed provision			144

A total of 144 bike parking spaces are proposed. To complement the parking facilities, the school should provide two shower facilities for staff as an end of trip provision. The proposed bicycle parking facilities will be located within the school, near the school entry. Bike parking facilities should be designed in accordance to Standards Australia AS2890.3 (Bicycle Parking Facilities), and should be provided in a sheltered and secure location.

Up to 128 student bicycle parking spaces are proposed to be located in three locations; one adjacent to Power Avenue (Figure 26) and two as part of the staff car park (Figure 27).

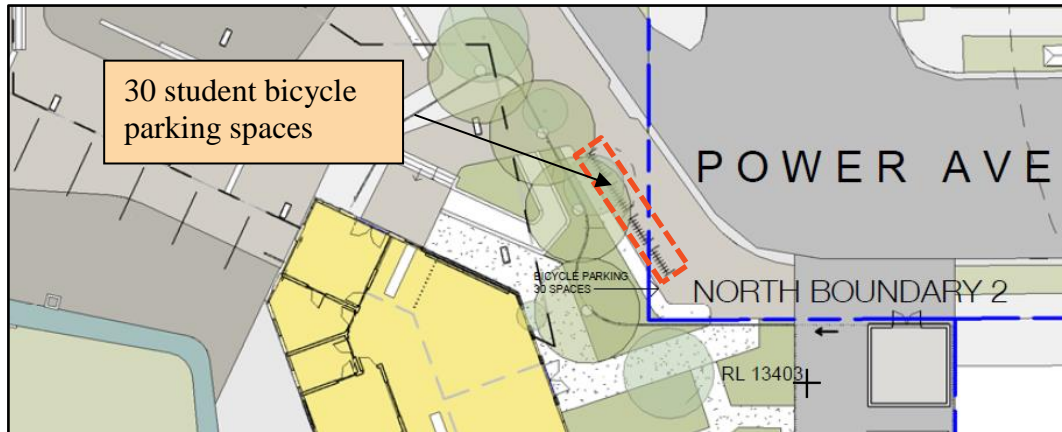


Figure 26: Student bicycle parking spaces –east side

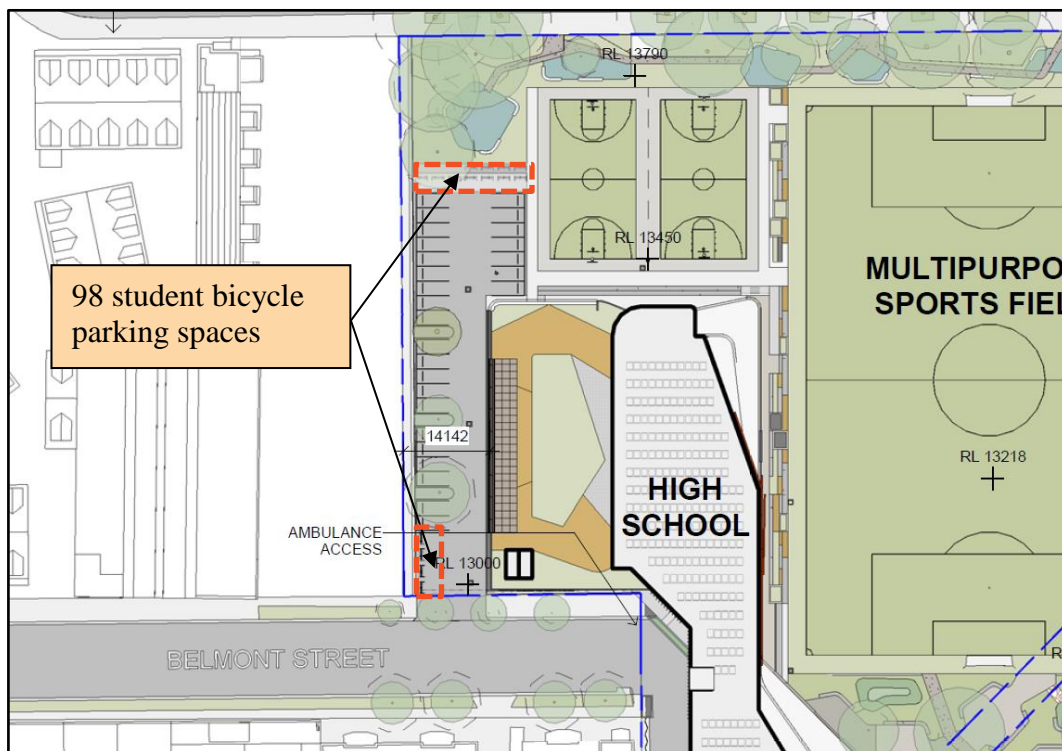


Figure 27: Student bicycle parking spaces – west side

Clear signage warning motorists of oncoming cyclists in the area will be installed in the car park and at the entrance. The car park will be sign posted with 10km/h speed restrictions.

The proposed 20 staff bicycle parking spaces will be located indoors near the end of trip facilities, shown in Figure 28.

In addition, a couple of bicycle parking rails can be located near to the school entrance for casual visitors to the school.

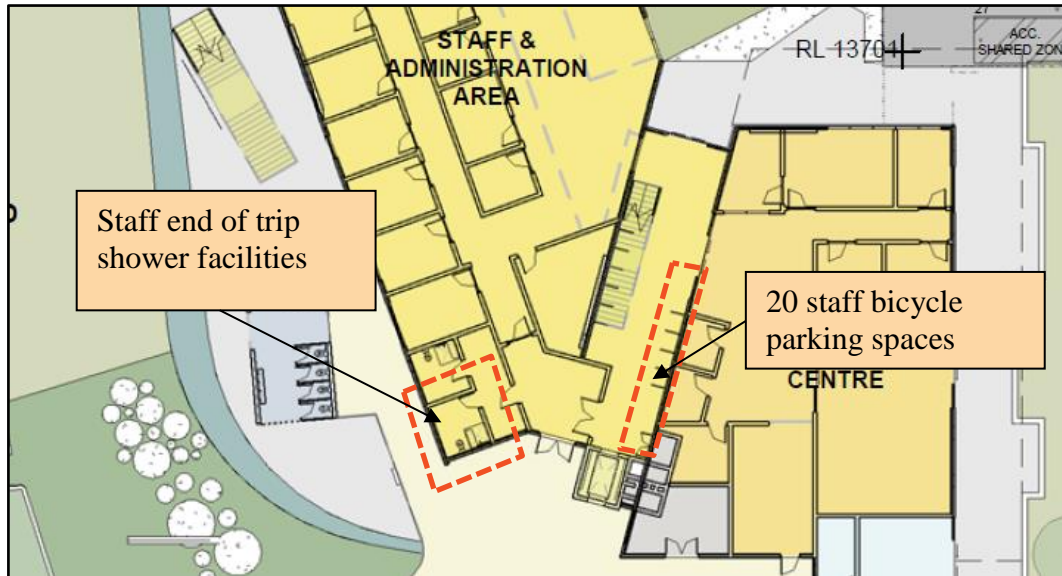
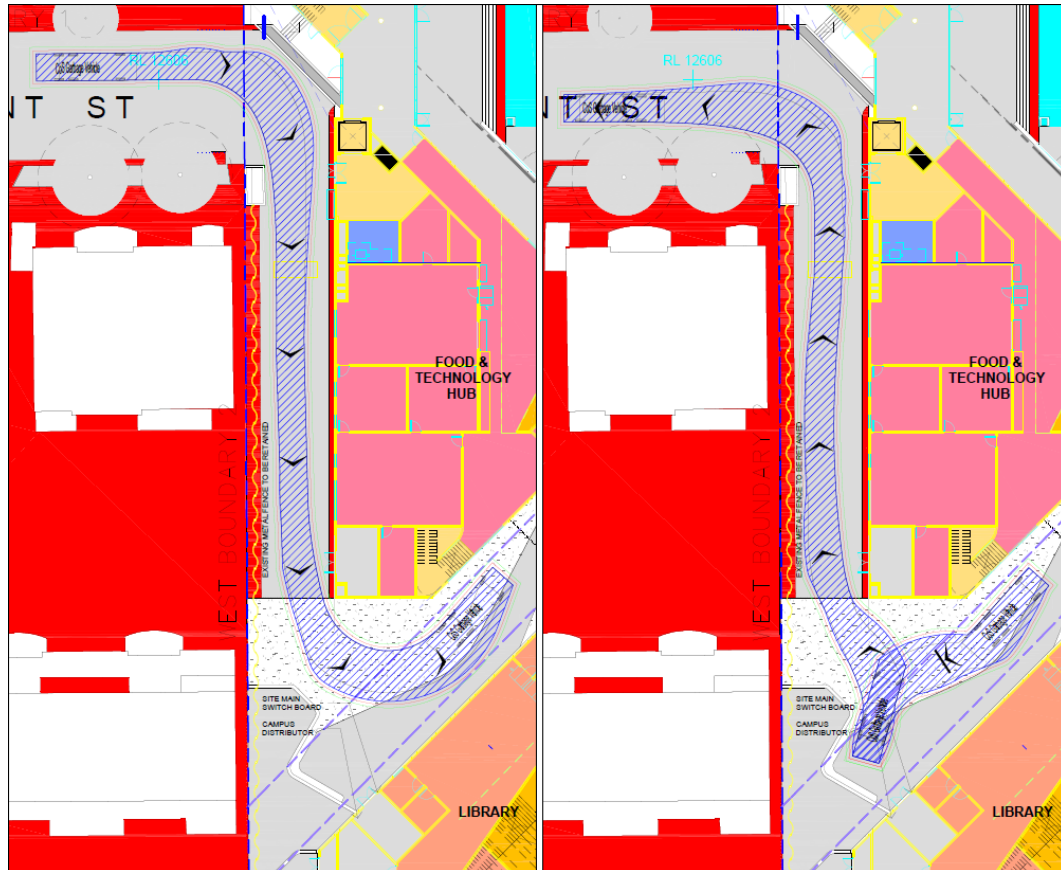


Figure 28: Staff bicycle parking spaces

5.4 Service access

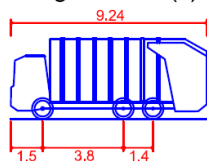
The proposed service area is located off Belmont Street, with an area provided to allow vehicles to reverse into the laneway. The area has been designed to accommodate a 9.25 City of Sydney Garbage vehicle as shown in Figure 29. This area is also designated to serve emergency vehicles.



Legend

- Body Envelope
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope

Design Vehicle(s)

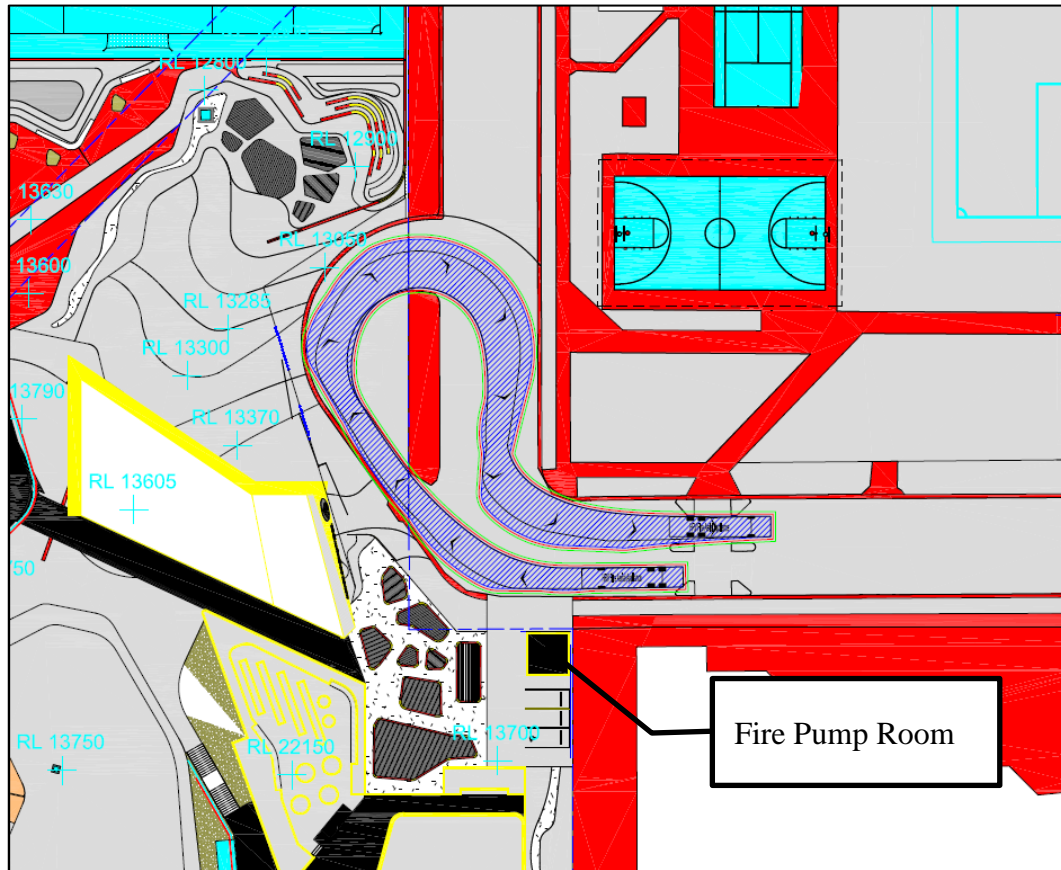


Garbage Truck	9.240m
Overall Length	2.500m
Overall Width	3.814m
Overall Body Height	0.366m
Min Body Ground Clearance	2.500m
Track Width	5.00s
Lock to Lock Time	10.500m
Curb to Curb Turning Radius	

Figure 29 Garbage vehicle swept path

5.5 Emergency vehicles

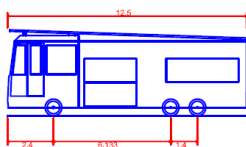
Emergency vehicles will access the fire pump room via Power Avenue. The area has been designed to accommodate a 12.5 HRV Fire Aerial Appliance vehicle as shown in Figure 30. The truck is shown utilising the existing bus loop to exit the site.



Legend

- Body Envelope
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope

Design Vehicle(s)



HRV Fire Aerial Appliance	12.500m
Overall Length	2.500m
Overall Width	4.500m
Overall Body Height	0.418m
Min Body Ground Clearance	2.500m
Track Width	6.00 sec
Lock to Lock Time	12.500m
Curb to Curb Turning Radius	

Figure 30: Fire Truck vehicle swept path accessing the fire pump room and using the bus loop to turnaround

Emergency access to the school and sports field would also be through Power Avenue and Park Road. A gate access will be provided on the western side of the bus loop, shown in Figure 31.

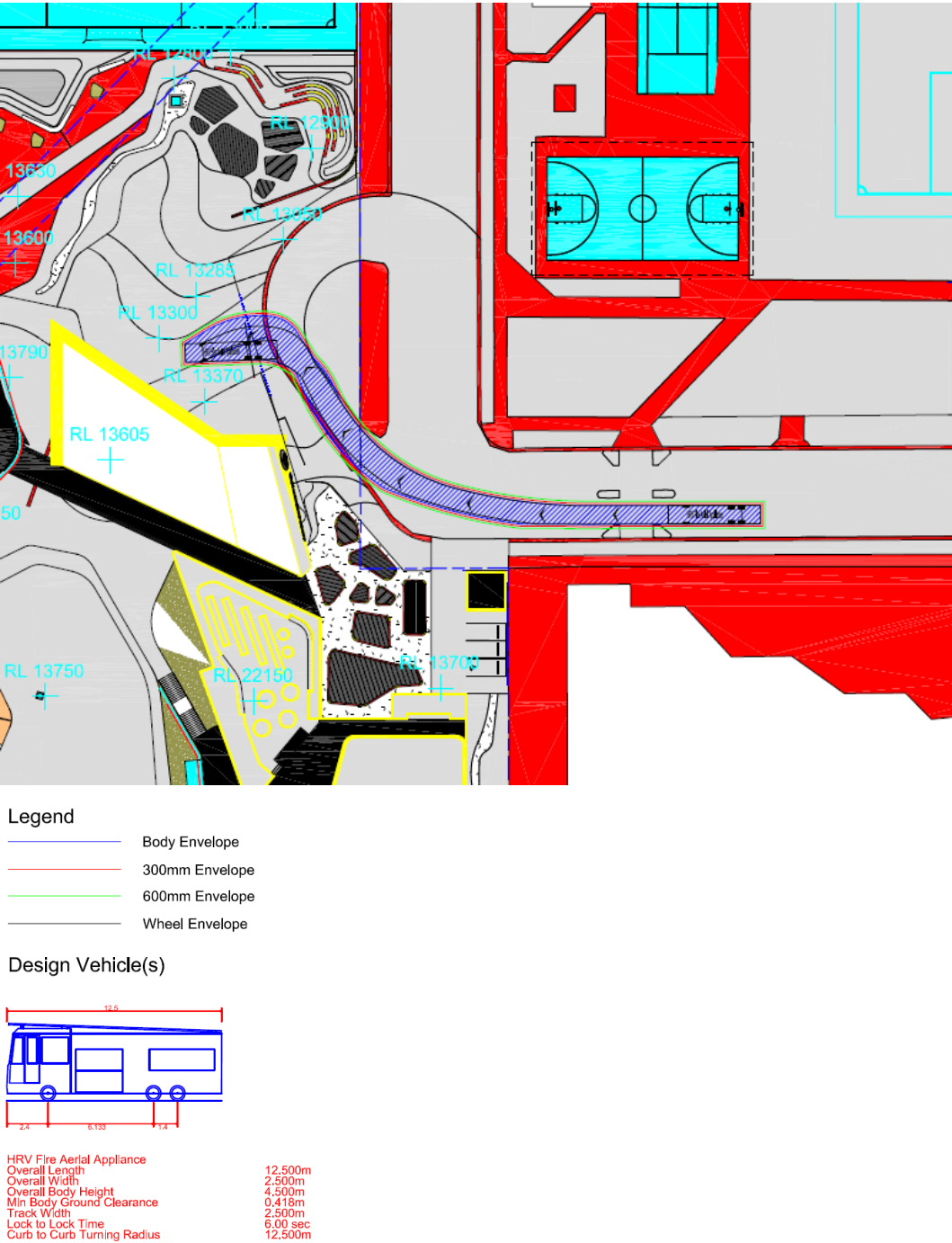
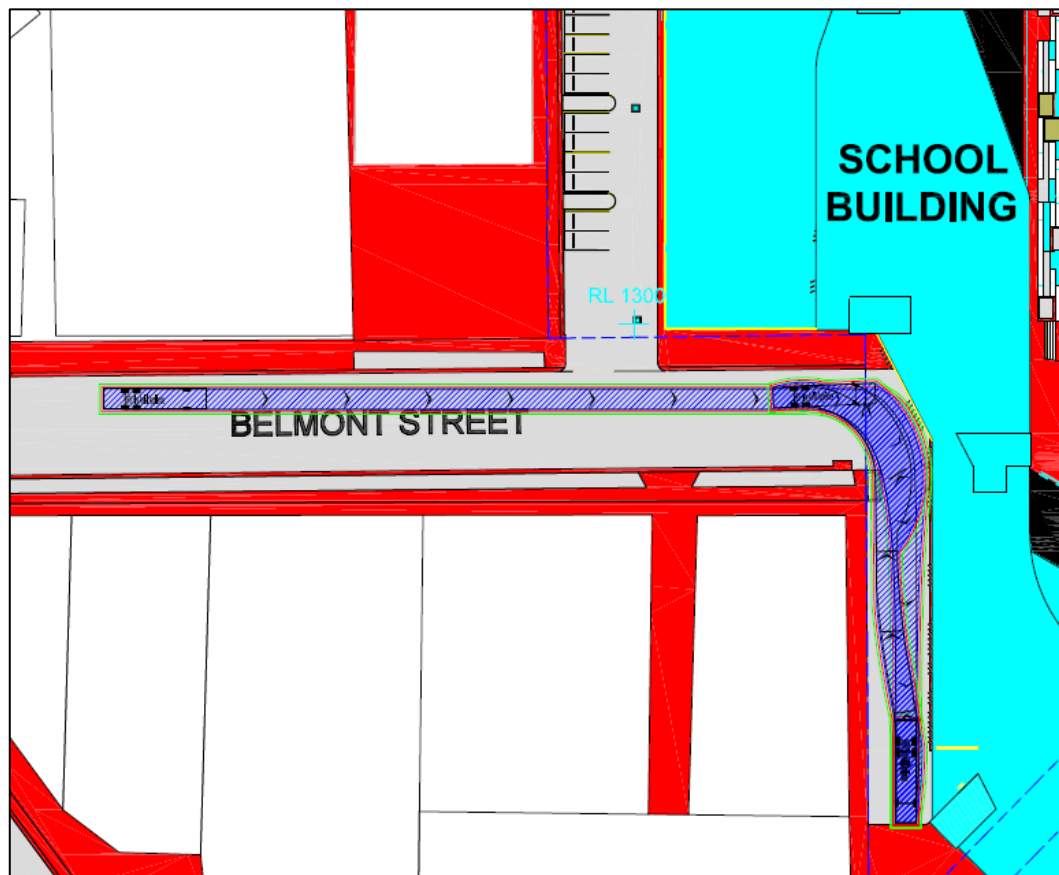


Figure 31: Fire Truck vehicle swept path accessing the school via Park Road

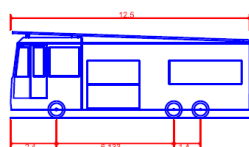
An alternative access to the school is via Belmont Street, shown in Figure 32.



Legend

- Body Envelope
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope

Design Vehicle(s)



HRV Fire Aerial Appliance	12.500m
Overall Length	2.500m
Overall Width	4.500m
Overall Body Height	0.418m
Min Body Ground Clearance	2.500m
Track Width	6.00 sec
Lock to Lock Time	12.500m
Curb to Curb Turning Radius	

Figure 32: Fire Truck vehicle swept path accessing the school via Belmont Street

5.6 Public transport improvements

5.6.1 Sydney buses

The current bus route 355 is underutilised by existing students. The bus arrives at convenient timings for students and staff. No additional buses are proposed but should be subject to monitoring. The school should encourage the usage of this bus by providing travel information on the school website or through school newsletters.

The Department of Education will be able to provide advice on the potential school catchment prior to the school's operations expanding. Currently 16% of students use the regular route bus and 6% use the school bus.

The future use of Park Road and Power Avenue for kerbside school use will be coordinated through the City of Sydney and the SCO. The existing bus loop in Park Road is to be retained and is expected to be able to cater with future bus needs.

5.6.2 School buses

Completion of the school will result in an additional demand for the existing school bus. This school bus also serves other schools along the existing route. Further consultation is required between schools using the existing school bus route 750E and TfNSW to ensure that there is sufficient capacity on the school bus to accommodate the increase in number of students.

The school should also explore alternative routes to further promote the use of school buses. This can be determined by the future students' residential address and other existing school bus routes which could include the APCS as a destination.

5.7 Out of school hour activities

The out of school hour activities that currently occur at the existing school are wide ranging and will be retained for the new school. These are predominantly local community activities and organisations and typical users include:

- Camp Australia;
- Inner City Basketball Club;
- National Aboriginal Sporting Chance Academy (NASCA);
- Aboriginal Education Council (AEC);
- Aboriginal Indigenous Mentoring Experience (AIME);
- City East Community College;
- St Lazarus Serbian Orthodox Church;
- Gondwana Voices

5.7.1 Traffic and parking impacts




It is DoE's intent to retain the existing community uses after hours and on weekends. Given programming schedules have not been arranged yet, the traffic model has assumed a 'status quo' impact with regards to these uses.

6 Traffic Assessment

6.1 Peak period assessment

A comparison of the different peak periods is shown in Table 8. The table also shows Google map typical travel time data for the immediate road network around the school.

Table 8: Peak period comparison

AM Peak 8am to 9am	School Peak 3pm to 4pm	Evening Peak 5pm to 6pm
		
School arrivals coincide with commuter peak period.	Does not coincide with commuter peak period.	School activity is minimal during evening commuter peak.
Car mode share: 26%	Car mode share: 21%	Minimal school activity.

Based on traffic observations and the nature of mode share at each distinct peak period, it can be concluded that the critical peak hour is the AM Peak. This is when school traffic generation coincides most with the AM commute peak hour.

Noting that the School and PM peaks do not coincide, the traffic impacts during each period has been assessed to be acceptable.

6.2 Traffic generation

Traffic generated by the school during the AM peak period will generally consist of the following:

- Staff arrivals by car
- Drop-off activity in the AM peak
- School bus movements

The AM school peak generates more traffic than the PM school peak which also occurs at a quieter time on the road network prior to the PM commuter peak when school is closed. School finishing times are at 3pm and 3.10pm for the primary and secondary schools respectively and do not coincide with the PM peak period, no assessment of this period has been undertaken.

6.2.1 Staff trips

On-site parking will be limited to 28 staff parking spaces which is the same as is presently provided. It is expected that staff will also continue to occupy a small number of the unrestricted spaces along Park Road and Power Avenue.

Given the existing on-street parking is at capacity (discussed in section 3.8) an increase in the number of staff parking will not be accommodated within the off-street car park or on-street. A majority of the staff trips will be by alternative modes, with the accessibility of the site by public transport already very good with further improvement occurring once the Sydney Metro is operational in 2024.

Travel surveys were undertaken by staff at the school in late 2017. This enables the existing mode of travel to be determined. For staff the current car mode is 82% which is higher than the 2016JTW data for this area which has a 59% mode share to car. This indicates that there is good potential for more staff to use alternative modes of travel. Adjusted travel mode targets are outlined in Table 9. With no change in car parking supply and reduced car mode of 24% has been adopted. Carpooling will allow some of these cars to have higher occupancy. The majority of changed staff mode will be by public transport, with minor increases in active transport modes targeted.

Table 9: Staff travel mode

Mode	Staff existing		Staff proposed	
Car	81.8%	45	24.0%	48
Car pool	-	-	10%	20
Walk	3.6%	2	5.0%	10
Cycle	3.6%	2	5.0%	10
Public transport	10.9%	6	56.0%	112
Total	100.0%	55	100.0%	200

6.2.2 School drop-off and pick-up

A conservative estimate of the amount of school drop-off and pick-up activity has been carried out with the following assumptions:

- 2,200 student population
- Overall 20% student car-based mode share (as per existing situation)
- Car occupancy of 1.6 (as observed at other schools a small increase from existing)
- The drop-off and pick-up activity will be split between Park Road and Buckland Street with only minor use of Belmont Street expected.

It is anticipated that drop-off activity will generate 275 vehicles trips to the school during the AM peak hour, an increase of 185 vehicles from the existing situation. As shown in Table 7, the largest increase will occur along Buckland Street where a “15P” and “No Parking” spaces are proposed.

Table 10 Distribution of drop-off activity

Street Name	Existing no. of vehicles	Future distribution	Future no. of vehicles	Change from existing
Park Road	65	55%	151	+86 vehicles
Buckland Street	10	40%	110	+100 vehicles
Belmont Street	15	5%	14	-1 vehicles
Total	90	100%	275	+185 vehicles

6.2.3 School/community buses

At present, two school/community buses drop off children to the school during the AM peak. Assuming a pro-rata increase based on the student population, it is anticipated that there will be 7 school/community buses in the future (an increase of 5 buses).

6.3 Traffic distribution and assignment

Given the spread of housing density around the school, trips by car are more likely from the south and the east. It is assumed that vehicle trips to and from the school will be distributed as follows:

- 10% from the north (e.g. the inner city)
- 30% from the east (e.g. Waterloo)
- 40% from the south (e.g. Green Square)
- 20% from the west (e.g. Erskineville)

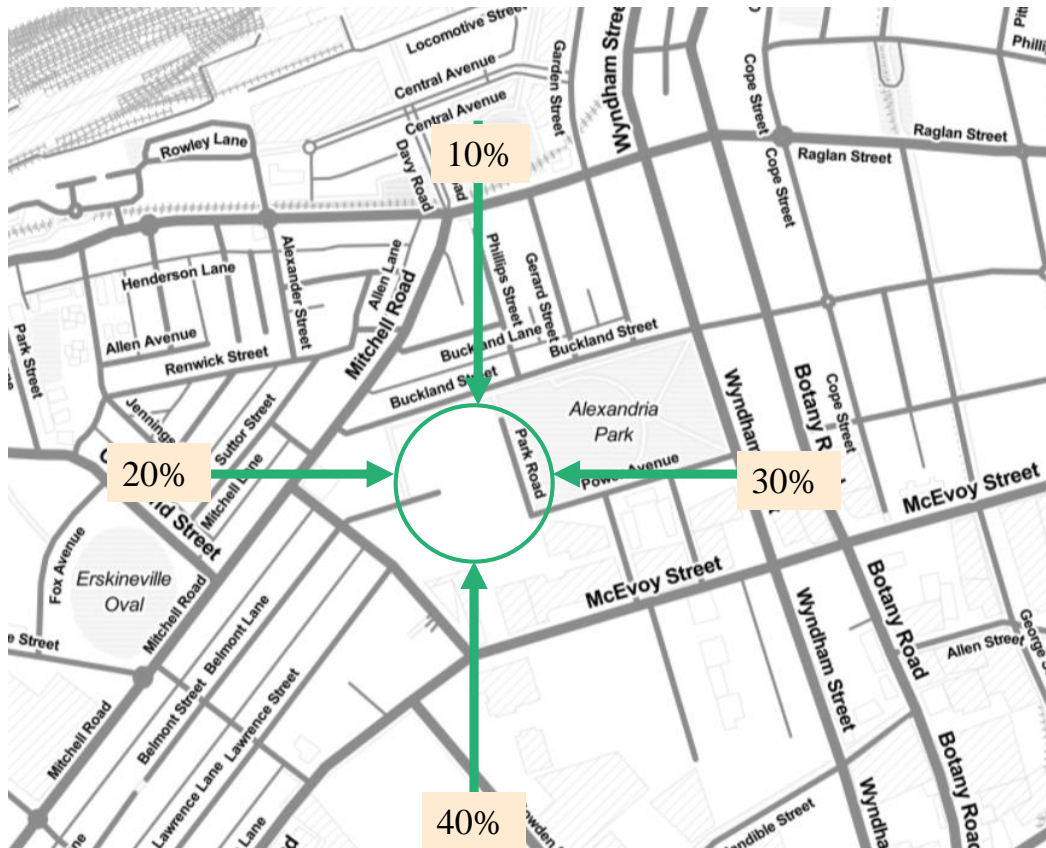
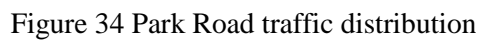


Figure 33 Traffic Distribution

As noted in Section 6.2.2, there will be 86 additional vehicles accessing Park Road and 100 additional vehicles accessing Buckland Street, with each vehicle having an entry and exit trip. Based on the traffic distribution described above, traffic has been assigned onto the road network taking into consideration both existing and future turning restrictions (i.e. no right turns from McEvoy Street). Traffic is expected to access and egress from the school as shown in Figure 34 and Figure 35.



The additional school traffic has been assigned to the road network, resulting in increases at intersection as shown in Figure 36.

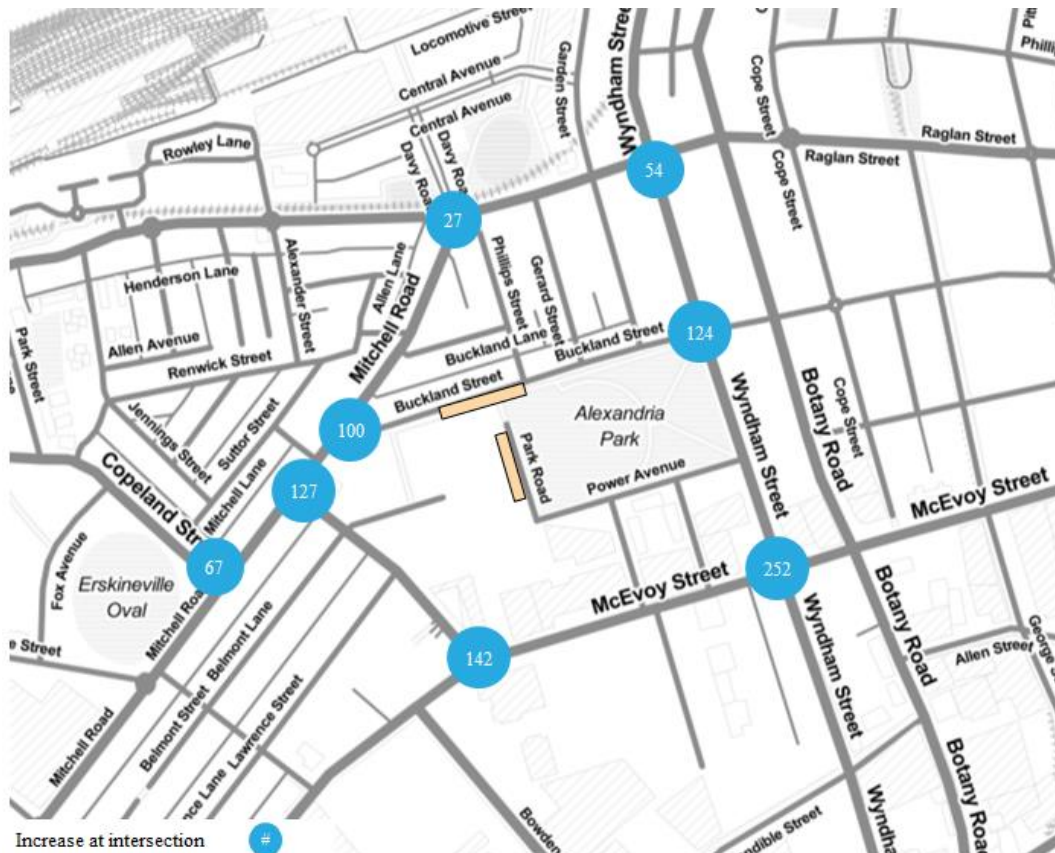


Figure 36 Increase at intersections

The following intersections are to be considered further due to the increase in traffic volumes as a result of the redevelopment.

- McEvoy Street/Wyndham Street
- McEvoy Street/Fountain Street
- Wyndham Street/Buckland Street
- Mitchell Street/Buckland Street
- Mitchell Street/Fountain Street

6.4 Intersection Analysis

McEvoy Street/Wyndham Street

An additional 252 trips are anticipated at this intersection during the AM peak hour as a result of the redevelopment, approximately a 10% increase on existing volumes. The increases are relatively balanced across each of the arms as it accommodates traffic to and from the south, east and west.

This intersection is proposed to be widened with additional lanes as part of the Alexandria to Moore Park project. As shown in Figure 37, a new right-turn and left-turn lane is proposed on McEvoy Street which will add a significant amount of capacity to the intersection. It is therefore considered that the anticipated increase in traffic volumes at this intersection will have an acceptable impact in the context of the increased capacity being provided. RMS modelling for the road corridor includes background traffic growth due to development in the precinct.



Figure 37 McEvoy Street and Wyndham Street intersection upgrade

McEvoy Street/Fountain Street

An additional 142 trips are anticipated at this intersection during the AM peak hour as a result of the redevelopment, approximately an 8% increase on existing volumes. The increases are relatively balanced across each of the arms.

This intersection is proposed to be widened with additional lanes as part of the Alexandria to Moore Park project. As shown in Figure 38, a new right-turn and left-turn lane is proposed on McEvoy Street which will add a significant amount of capacity to the intersection. It is therefore considered that the anticipated increase in traffic volumes at this intersection will have an acceptable impact of the context of the increased capacity being provided.

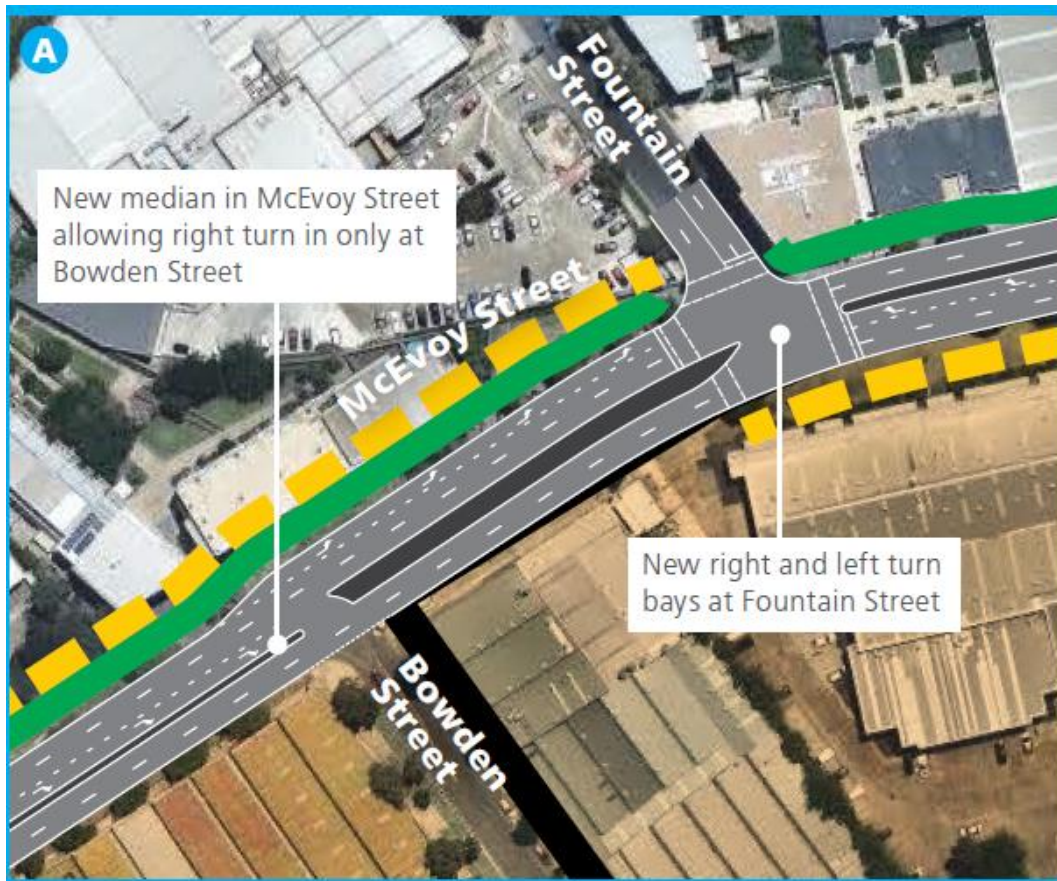


Figure 38 McEvoy Street and Fountain Street intersection upgrade

Wyndham Street/Buckland Street

An additional 124 trips are anticipated at this intersection during the AM peak hour as a result of the redevelopment. An existing and future year SIDRA traffic model of this intersection has been prepared with the results presented in Section 7.

Mitchell Street/Buckland Street

An additional 100 trips are anticipated at this intersection during the AM peak hour as a result of the redevelopment. All of the trips will be left-turn movement from Buckland Street to Mitchell Street due to turning restrictions. An existing and future year SIDRA traffic model of this intersection has been prepared with the results presented in Section 7.

Mitchell Street/Fountain Street

An additional 124 trips are anticipated at this intersection during the AM peak hour as a result of the redevelopment. The majority of movements are left-turns onto Fountain Street and southbound through movements. An existing and future year SIDRA traffic model of this intersection has been prepared with the results presented in Section 7.

7 Traffic modelling

7.1 Modelling assessment criteria

The intersections have been assessed using RMS approved software SIDRA software. The existing intersection performance is assessed in this report in terms of the following three factors for each intersection.

- Degree of Saturation
- Average Delay (Seconds per vehicle)
- Level of Service

In urban areas, the traffic capacity of the major road network is generally a function of the performance of key intersections. This performance is quantified in terms of Level of Service (LoS), is based on the average delay per vehicle. LoS ranges from A = very good to F = unsatisfactory (see Table 11).

Table 11: Level of service criteria for intersections

Level of Service	Average delay (seconds)	Description
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At Capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode
F	Greater than 71	Unsatisfactory with excessive queuing

Another common measure of intersection performance is the degree of saturation (DoS), which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DoS of 1.0 indicates that an intersection is operating at capacity. The desirable maximum degree of saturation for an intersection is 0.9.

Wyndham Street / Buckland Street model calibration

The intersection of Wyndham Street / Buckland Street south approach is currently operating close to capacity as a result of downstream congestions (discussed in section 3.4.4).

In order to obtain an existing base model reflective of current conditions, the south approach lane capacities and phase times were modified to include “dead green time” where vehicles are unable to travel northbound through the intersection. These adjustments are retained for the future model as it assumes the downstream congestion is not resolved.

7.2 Intersection performance

Traffic modelling results for the three intersections are shown in Table 12. The average delay of most approaches are predicted to increase slightly as a result of the additional traffic from the school. However no change in the existing level of service is predicted.

The intersection of Wyndham Street / Buckland Street south approach is currently operating close to capacity as a result of downstream congestions (discussed in section 3.4.4). The additional 113 trips from the school upgrade using Wyndham Street is estimated to increase the overall average delay by 5 seconds.

The proposed Alexandria to Moore Park Connectivity (A2MP) Upgrade would significantly alter travel patterns and congestion levels around the school road network. As such, the results presented below are subject to change upon completion of the A2MP upgrades. However, based on these indicative modelling results, completion of the school is not expected to exacerbate the existing traffic flow conditions.

Modelling a future 10 years growth scenario post development is very difficult due to major changes from the Alexandria to Moore Park Connectivity (A2MP) Upgrade. Modelling for this project will take into account growth in the corridor.

Table 12 Existing and Future AM Peak Hour Intersection Performance

Intersection	Approach	Existing AM Peak		Future with school AM Peak	
		Average Delay (s)	Level of Service	Average Delay (s)	Level of Service
Wyndham Street / Buckland Street	Wyndham St (North)	5	A	7	A
	Wyndham St (South)	57	E	E	62
	Buckland St (West)	43	C	43	C
Mitchell Road / Buckland Street	Mitchell St (North)	4	A	6	A
	Buckland St (East)	47	A	43	D
	Mitchell St (South)	4	A	7	A
Mitchell Road / Fountain Street	Mitchell St (North)	6	A	6	A
	Fountain St (East)	46	D	48	D
	Mitchell St (South)	12	B	20	B

7.3 Future mobility trends

As mentioned in the section above, it is difficult to model 10-year traffic scenarios, especially in the age of transport disruptors such as Mobility as a Service, Autonomous Vehicles, Car Sharing and increased emphasis on Active Mobility. Along with the proposed A2MP upgrades, these disruptors can make it difficult to accurately project traffic growths.

Studies within the precinct, have been carried out such as the Green Square to Ashmore Connector. This section summarises the future mobility trends around the school.

7.3.1 Green Square Redevelopment

The 278 hectare Green Square redevelopment is one of Australia's largest urban renewal projects, with a population expected to peak at 61,000 residents and 21,000 workers by 2030:

- 278 hectare urban renewal area
- \$13 billion urban renewal construction
- 30,500 new residential dwellings
- \$540 million contribution from the City over next 10 years

The project is located some 1km from the school shown in Figure 39.

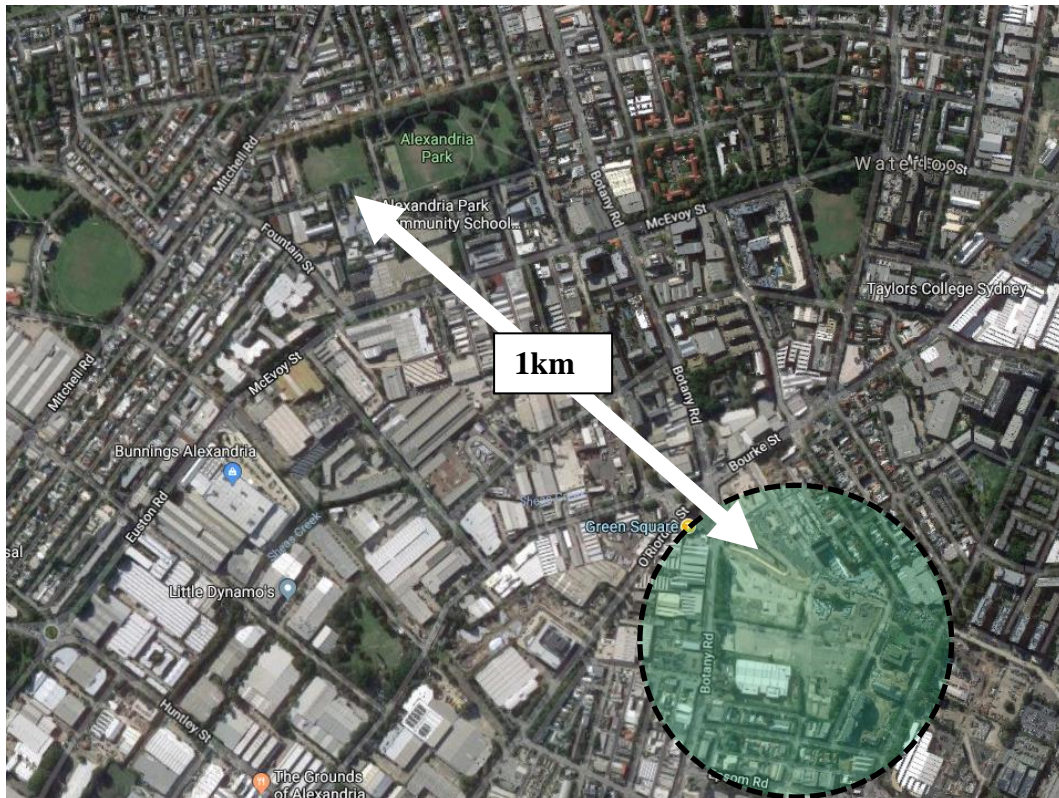


Figure 39: Green Square Redevelopment area

7.3.2 Green Square to Ashmore Connector key findings

Opening in 2021, the project is located just south of the school. The Green Square to Ashmore Connector (GS2AC) will operate as an east-west transport link between Bowden Street and the proposed Geddes Avenue. The purpose of the GS2AC is to improve local connectivity between the proposed GSTC and Ashmore Precinct.

The GS2AC will provide additional east-west permeability and route choice for not just vehicle movements but also for cyclists. Pedestrian time savings will also be obtained through the increased efficiency of road crossings. It is recognised that the existing north-south roads of Botany Road, Bourke Road and O'Riordan Street provide important strategic and local functions. Therefore, the GS2AC has been developed to support and maintain the importance of these aforementioned roads.

Figure 37 Proposed GS2AC intersections and distances



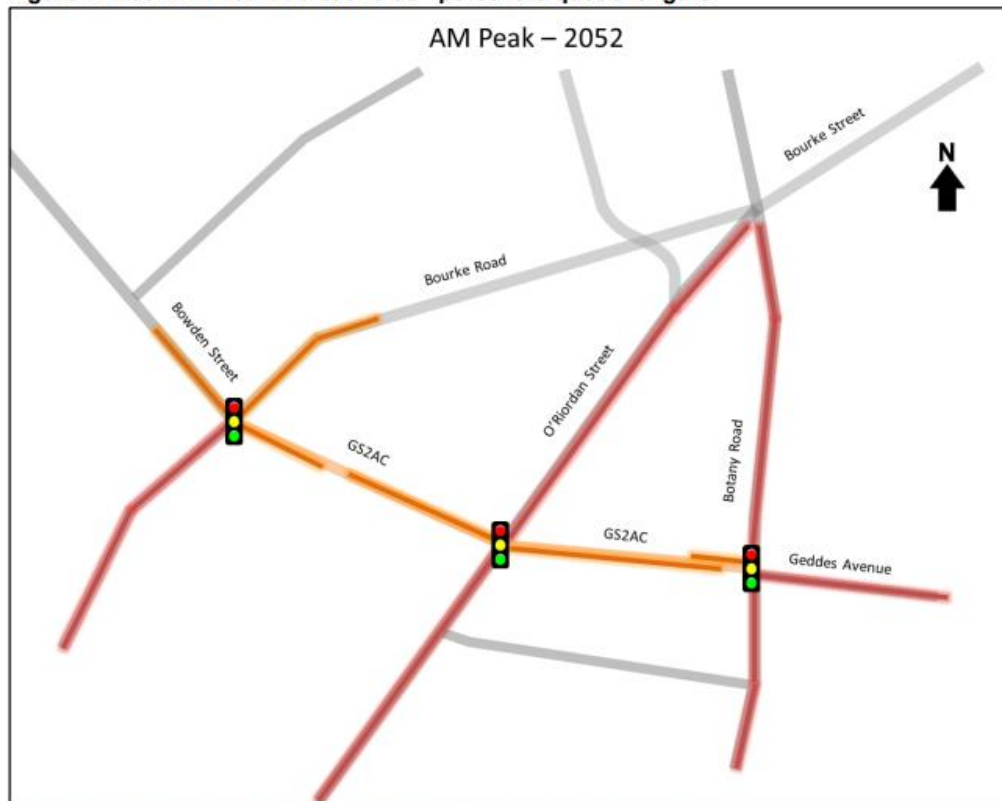
Figure 40: GS2AC

The report findings indicate that Geddes Avenue, which will be the main traffic access point for the Green Square Town Centre would be at capacity in the year 2040. This is a result of the anticipated number of commuter trips in the surrounding network. By the year 2052, significant queueing is anticipated along O' Riordan Street and Botany Road. This is shown in Figure 41.

The report concluded that the GS2AC will provide additional capacity to the surrounding road network. This route strategy has highlighted proposed turning movement bans which will improve the efficiency of the GS2AC as a local east-west connection from the Ashmore Precinct to Green Square Town Centre. The GS2AC will also provide crucial connectivity for cyclists and a dedicated cycleway and pedestrian footpaths.

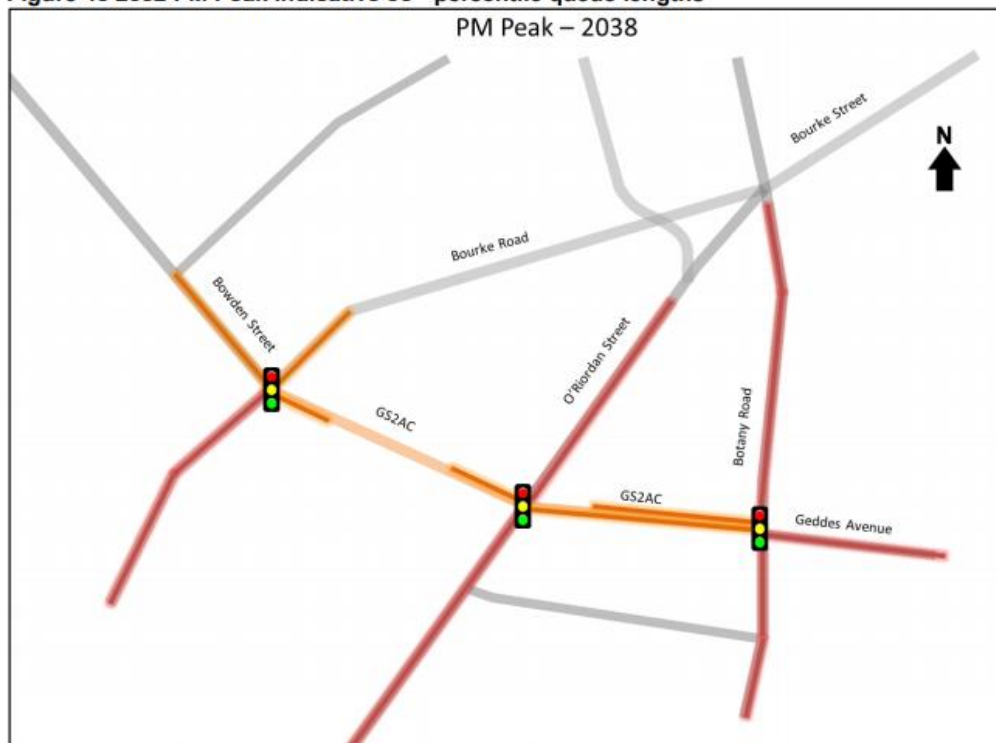
Source: *Green Square to Ashmore Connector Traffic and Transport Impact Assessment*. Viewed on 26 September 2018.

[https://www.cityofsydney.nsw.gov.au/data/assets/pdf_file/0003/304266/Appendix C -Traffic and Transport Impact Assessment.pdf](https://www.cityofsydney.nsw.gov.au/data/assets/pdf_file/0003/304266/Appendix_C-Traffic_and_Transport_Impact_Assessment.pdf)

Figure 44 2052 AM Peak indicative 95th percentile queue lengths

Note: not to scale and diagrams are representative only from Sidra outputs

Source: AECOM, 2017

Figure 45 2052 PM Peak indicative 95th percentile queue lengths

Note: not to scale and diagrams are representative only from Sidra outputs

Source: AECOM, 2017

Figure 41: Indicative traffic queue lengths in the year 2052

7.3.3 Sustainable Sydney 2030

City of Sydney is moving away from a car centric environment and focusing on public transport and active mobility. The Sustainable Sydney 2030 framework has set out the following objectives:

- Target 6 – 80 per cent of City workers commuting on public transport – 80 per cent of work trips by City residents in non-private vehicles;
- Target 7 - By 2030, at least 10 per cent of City trips will be made by bicycle and 50 per cent by pedestrian movement;
- Objective 3.1 – Support and plan for enhanced access by public transport from the Sydney Region to the City of Sydney;
- Objective 3.3 – Reduce the impact of transport on public space in the City Centre and Activity Hubs;
- Objective 3.4 – Manage regional roads to support increased public transport use and reduce car traffic in City streets;
- Objective 4.1 - Develop a network of safe, linked pedestrian and cycle paths integrated with green spaces throughout both the City and Inner Sydney;
- Objective 4.2 - Give greater priority to cycle and pedestrian movements and amenity in the City Centre; and
- Objective 4.3 – Promote green travel for major workplaces and venues in the city.

Along with the school's Green Travel Plan, the school will work towards more sustainable modes of transport, which has been set out in measurable targets in the Green Travel Plan.

Future cycle network improvements are shown in the figure below.

Figure 42 Existing and planned cycle network near Green Square

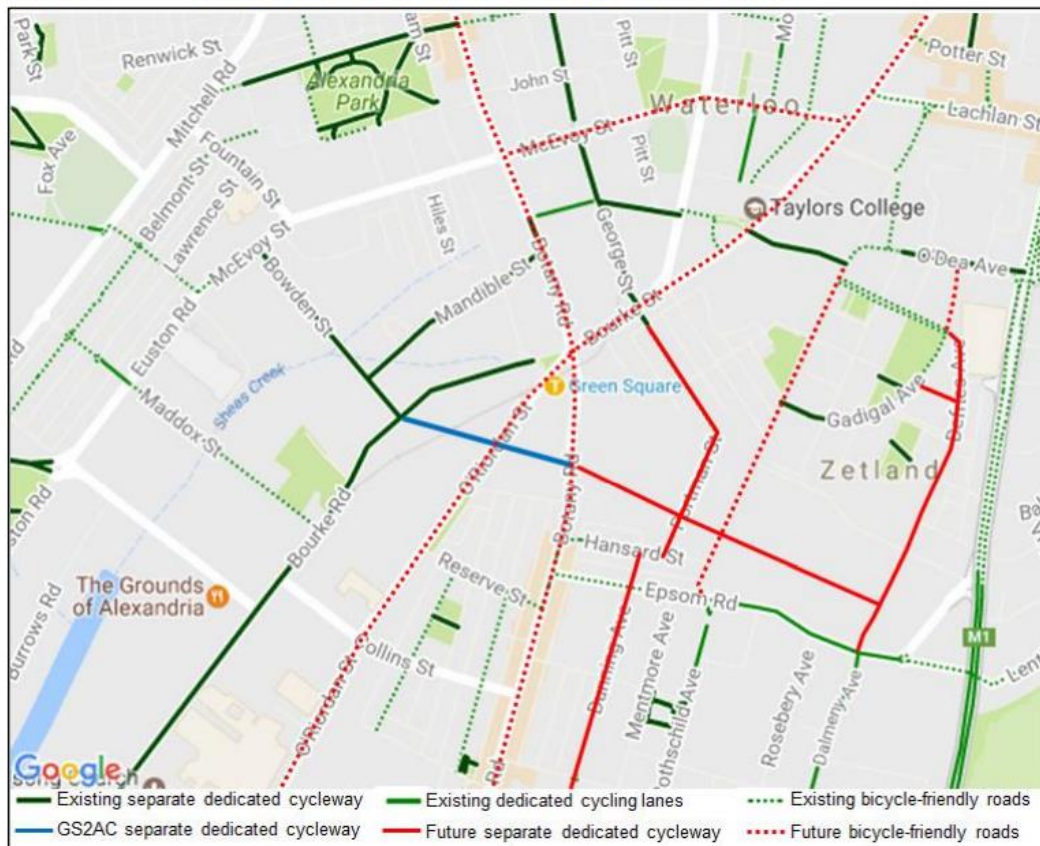


Figure 42: Existing and planned cycle network near Green Square

Source: Green Square to Ashmore Connector Traffic and Transport Impact Assessment

7.3.4 Key findings

There are significant projects on the way with A2MP and GS2AC which aim at alleviating the road congestions, as a result of the Green Square redevelopment project and general growth in the area. The traffic modelling results shown in section 7.2 show that no change in the existing level of service is predicted because of the school. This does not consider the said future road upgrades.

Over the next 10 years, these mobility improvement projects could allow the surrounding road network to operate more efficiently. According to the GS2AC study, road networks are predicted to be at capacity in the year 2052.

As part of the proposed road upgrades, cycleways and pedestrian footpaths are also being improved to encourage active mobility and sustainable transport modes. The school will work towards more sustainable modes of transport, which has been set out in measurable targets in the Green Travel Plan.

8 Green Travel Plan

A Green Travel Plan (GTP) is a tool to minimise the negative impact of private vehicle travel on the environment. The Plan is a package of measures put in place to encourage more sustainable travel. GTP describes ways in which the use of sustainable transport may be encouraged. Using public transport, cycling, walking, working from home, carpooling, making business vehicles more fuel efficient and the use alternative fuels are all more sustainable means of transport than single occupant driving.

More generally, the principles of a GTP are applied to all people travelling to and from a site. Government authorities around the nation are placing increasing emphasis on the need to reduce the number and lengths of motorised journeys and in doing so encourage greater use of alternative means of travel which have less environmental impact than cars.

The main objectives of the Green Travel Plan are to reduce the need to travel and promotion of sustainable means of transport.

The more specific objectives include:

- To reduce the level of single occupancy car borne trips associated with commuting.
- To facilitate the sustainable and safe travel of visitors to the site.
- To reduce site traffic congestion and associated pollution in order to enhance, improve and make safe journeys of minority/sustainable transport mode users.
- To work in partnership with neighbouring organisations/developments, local authorities, retailers and other relevant bodies in achieving the maximum mode shift away from the private car.
- To continually develop, implement, monitor, evaluate and review the progress of the travel plan strategy.
- To facilitate all staff and student access to key facilities such as retail, leisure, health and education.

A preliminary Green Travel Plan has been prepared.

9 Outline Construction Traffic Management Plan

The construction of the development will require access for heavy vehicles travelling to and from the site. Prior to the commencement of construction, a Construction Pedestrian and Traffic Management Plan (CPTMP) should be prepared to ensure the safest possible management of construction access and appropriate mitigation measures. The CPTMP would be prepared by the Construction Contractor and address:

- The likely construction vehicle numbers and frequency;
- Approach and departure routes;
- Parking access arrangements during construction; and
- Provision of acceptable pedestrian management measures

A preliminary CTMP has been prepared alongside the Construction Management Plan and follows the following framework:

- Description of proposed works
- Impact of proposed measures
- Effects on existing and future developments
- Detailed of provisions made for emergency vehicles, heavy vehicles and cyclists
- Measures to ameliorate impacts
- Public transport services affected
- Public consultation

10 Conclusion

A Transport Planning Study has been carried out for the proposed Alexandria Park Community School redevelopment. When completed, the school will accommodate a total student population of 2,200 students, an increase of 1,600 from the existing situation. The redevelopment will deliver significant upgrades, improving the facilities and ensuring the school can cater for the increase in student and staff population. Key findings of the report are:

10.1 Existing condition summary

- The school currently has 54 teaching and non-teaching staff and 600 students from Kinder to Year 12.
- Overall, the existing drop-off and pick-up arrangement was found to operate efficiently with parents following traffic rules and minimal double parking occurrences observed. The drop-off and pick-up profiles have been detailed in the report, with Park Road being the busiest area for these activities
- Wyndham Street near the intersection of Buckland Street was found to have a slow rolling northbound queue during the AM peak. The congestion is caused by downstream intersections towards the city.
- The school is well served by a range of public and school buses with Green Square Station located 15 minutes away.
- The existing school bus has additional capacity to accommodate more Alexandria Park Community School students. However, the school bus also serves other schools which need to be consulted with, along with TfNSW, should there be an increase in patronage.
- The streets surrounding the school sites have good pedestrian accessibility and infrastructure with good quality zebra crossings, footpaths and ramps.
- The overall cycling infrastructure surrounding the school is robust with good cycling connections in each direction. The residential streets around the school are bicycle friendly with low traffic volumes observed.
- Arup has conducted on-street parking surveys during school hours on 15 June 2017. Unrestricted on-street parking spaces on local roads near the school were either at or close to capacity at 9:30am. These unrestricted spaces remained at a similar level of occupancy at 2:55pm before school finishes.
- Arup has also conducted on-street parking surveys during school holidays. Surveys showed that Park Road was fully occupied during the AM period despite teachers not working during school holidays. This shows that vehicles using Park Road predominantly consist of employees of surrounding businesses rather than teachers.
- The staff car park is located along Belmont Street and has 28 unmarked parking spaces allocated to staff. Site visits carried indicated that the car park was fully occupied.

10.2 Proposed upgrade summary

The school is well placed to take advantage of various transport upgrade initiatives such as the Waterloo Metro Station, A2MP upgrades and a comprehensive cycling and walking network. With improvements to the drop-off facilities, drop-off and pick-up traffic will be segregated between two locations and can be managed more effectively. Along with the implementation of the Green Travel Plan, a healthy mode share of public transport users and private vehicles can be achieved to accommodate the increase in staff and students of the school. All the SEARs traffic and transport requirements have been fulfilled in this report with a summary shown in section 2. Key findings of the report are:

- The proposed redevelopment of the school aims to provide a campus that can cater for up to 2,200 students and 200 staff.
- Various on-street parking restriction changes have been implemented to increase the future drop-off and pick-up capacity. This is estimated to be sufficient for the anticipated increase in drop-off and pick-up activity associated with the redevelopment.
- The redevelopment will result in the existing staff car park being displaced by construction, with a new 28 space car park being provided. The car park is proposed to be located in the north-west corner of the site and will be accessed off Belmont Street.
- Completion of the school will result in additional demand for the existing school bus. Further consultation is required between schools using the existing school bus route 750E and TfNSW. The school should also explore alternative routes to further promote the use of school buses. This can be determined by the future students' residential address and existing school bus routes which could include the APCS as a destination.
- A total of 144 bike parking spaces are proposed. On top of that, the school should provide two shower facilities for staff as an end of trip provision.
- Completion of the school will result in approximately 185 additional vehicles.
- The Alexandria to Moore Park Connectivity Upgrade includes improvements to traffic capacity at key intersections and pinch points to improve traffic flow and provide better access for pedestrians and cyclists. The proposed upgrades would improve traffic flows to and from the school.
- The proposed Alexandria to Moore Park Connectivity (A2MP) Upgrade would significantly alter travel patterns and congestion levels around the school road network. As such, the results presented below are subject to change upon completion of the A2MP upgrades. However, based on these indicative modelling results, completion of the school is not expected to exacerbate the existing traffic flow conditions.
- A Green Travel Plan is a tool to minimise the negative impact of private vehicle travel on the environment. The Plan is a package of measures put in place to encourage more sustainable travel. A preliminary Green Travel Plan has been prepared.