parking & traffic assessment;

Cranbrook School, Bellevue Hill

For Cranbrook School
10th May 2018

parking;
traffic;
civil design;
communication;

ptc.

Document Control

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Contact

Steve Wellman
+61 2 8920 0800
+61 421 810 979
steve.wellman@ptcconsultants.co

ptc.
Suite 102, 506 Miller Street
Cammeray NSW 2062
info@ptcconsultants.co
t + 61 2 8920 0800
ptcconsultants.co

Contents

1. Introduction

1.1 Project Summary

Parking and Traffic Consultants (PTC) has been engaged by Cranbrook School to undertake a Parking and Traffic Assessment to accompany a State Significant Development Application (DA) to the Department of Planning and Environment..

In summary, the development is focused on two areas:

- The Centenary Building
    - This involves the demolition of the existing War Memorial Hall and Mansfield Building, and the construction of a new five level, multi-purpose teaching facility.
    - The existing structures have a GFA of 1,500m^2, while the new structures will have a total GFA of 6,528m^2. This results in a net increase in GFA of 4,758m^2.
- The Aquatic and Fitness Centre
    - The construction of a new 50 metre, 8 lane swimming pool, learn to swim pool, multi-purpose sports hall and fitness centre and modifications to the existing oval to accommodate the structure beneath the school oval.
    - The construction of an underground parking facility for 124 vehicles and 20 bicycles.
    - The GFA of the Aquatic and fitness centre will be 6,036m^2.

The development also proposes the relocation of the existing on-street 'Drop off / Pick up' facility from Rose Bay Avenue to the existing internal driveway. This relocation will displace the existing 29 car space located in this area, therefore providing a net gain of 95 spaces as part of the development.

1.2 Purpose of this Report

This report presents the following considerations in relation to the Traffic and Parking assessment of the proposal;

- Section 2 - A description of the existing school facilities (including set-down and pick-up facilities)
- Section 3 - A description of the proposed development
- Section 4 - A description of the road network and transport facilities serving the development
- Section 5 - Assessment of the existing traffic activity and surrounding road network associated with the site (including set-down and pick-up facilities)
- Section 6 - Assessment of the proposed traffic activity and surrounding road network associated with the site (including set-down and pick-up facilities)
- Section 7 - Conclusion.

1.3 Summary of Response to Secretary's Environmental Assessment Requirements (SEARs)

Table 1 – Secretary's Environmental Assessment Requirements (SEARs)

Number	SEARSs	Comments and Reference
Item 6 – Transport and Accessibility		
6.1	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;	The existing daily and peak hour vehicular movements are outlined in **Section 5** and the existing public transport, pedestrian and cycle movement and existing traffic and transport facilities are outlined in **Section 4.**
6.2	An assessment of the operation of existing and future transport networks including public transport networks, and their ability to accommodate the forecast number of trips to and from the development;	As outlined in **Section 5**, the existing transport network adequately serves the existing school campus and as outlined in **Section 3**, the development does not propose any increase in the staff FTE or student population beyond the existing enrolment cap and therefore does not propose any changes to the existing transport networks.
6.3	Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips based on surveys of the existing and similar schools within the local area;	As outlined in **Section 3**, the development does not propose any increase in the staff FTE or student population beyond the existing enrolment cap and therefore does not propose any changes to the existing transport networks.
6.4	The adequacy of public transport, pedestrian and bicycle networks and associated infrastructure to meet the likely future demand of the proposed development;	As outlined in **Section 5**, the existing transport network adequately serves the existing school campus and as outlined in **Section 3**, the development does not propose any increase in the staff FTE or student population beyond the existing enrolment cap and therefore does not propose any changes to the existing transport networks.
6.5	The impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site in consultation with Council, Roads and Maritime Services and Transport for NSW and identify measures to integrate the development with the transport network;	As outlined in **Section 5**, the existing public transport infrastructure adequately serves the existing school campus and as outlined in **Section 3**, the development does not propose any increase in the staff FTE or student population beyond the existing enrolment cap and therefore does not propose any changes to the existing public transport infrastructure.
6.6	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;	As outlined in **Section 6.2**, the development proposes to relocate the existing on street drop off and pick up facility from Rose Bay Avenue to the existing on site 'Port Cochere' and therefore reducing vehicle and pedestrian (student) movements along Rose Bay Avenue and Victoria Road.
6.7	Details of travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location specific sustainable travel	As outlined in **Section 5**, the existing transport network adequately serves the existing school campus and as outlined in

	plan and the provision of facilities to increase the non-car mode share for travel to and from the site;	**Section 3**, the development does not propose any increase in the staff FTE or student population beyond the existing enrolment cap and therefore does not propose any changes to the existing transport networks.
6.8	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, 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. The following intersections must be examined/modelled (but not limited to): • New South Head Road/Rose Bay Avenue; • New South Head Road/Victoria Road	As outlined in **Section 5**, the existing road network infrastructure adequately serves the existing school campus and the changes to the traffic facilities outlined in **Section 6 ,** should not change the origin and destination of staff and students accessing and egressing the site and therefore should not affect the traffic movements on the existing road network.
6.9	The proposed walking and cycling access arrangements and connections to public transport services;	No alterations are proposed to the existing pedestrian access arrangements on New South Head Road, to the public transport provisions on New South Head Road.
6.10	Details of any proposed school bus routes along bus capable roads (i.e. travel lanes of 3.5 m minimum) and infrastructure (bus stops, bus layovers etc.);	No additional bus routes are proposed as part of the development.
6.11	The proposed access arrangements (ensuring that vehicle and pedestrian access be from local roads and not major arterial roads wherever possible), 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;	The proposed vehicular access point to the relocated 'Drop Off and Pick Up' and the proposed on-site parking facility are outlined in **Section 6.2** and **Section 6.5** respectively
6.12	Measures to maintain road and personal safety in line with CPTED principles;	No alterations are proposed to the road and pedestrian networks.
6.13	Proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance;	The proposed cycle parking provision is outlined in Section 6.5.8 and complies with the council requirements.
6.14	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;	The proposed car parking provision is outline in **Section 6.5** and complies with the council requirements
6.15	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;	The proposed alterations to the on street parking provisions are outlined in **Section** 6.4 and the proposed on-site parking provision is outlined in **Section 6.5**
6.16	Details of emergency vehicle access arrangements;	No alterations are proposed to the existing

		emergency vehicle access arrangements
6.17	An assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures;	As outlined in **Section 6.2**, the development proposes to relocate the existing on street drop off and pick up facility from Rose Bay Avenue to the existing on site internal driveway and therefore reduce pedestrian (student) movements along Rose Bay Avenue and Victoria Road.
6.18	Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times);	Details of the proposed service vehicle arrangements are outlined in **Section 6.5.7**
6.19	Proposed management of construction traffic impacts detailed within a draft Construction Traffic Management Plan, which includes: • Assessment of cumulative impacts associated with other construction activities (if any); • An assessment of road safety at key intersection and locations subject to heavy vehicle construction traffic movements and high pedestrian activity; • Details of construction program detailing the anticipated construction duration and highlighting significant and milestone stages and events during the construction process; • Details of anticipated peak hour and daily construction vehicle movements to and from the site; • Details of on-site car parking and access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle; • Details of temporary cycling and pedestrian access during construction; and • 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.	A Concept Construction Traffic Management Plan has been prepared and can be found in Attachment 4 of this report.

2. Development Site

2.1 General Background

Cranbrook School is located in the suburb of Bellevue Hill, approximately 6 kilometres east of Sydney CBD. The campus is located to the south east of New South Head Road, with a 430 metre frontage to New South Head Road, a 140 metre frontage to Victoria Road and a 370 metre frontage to Rose Bay Avenue.

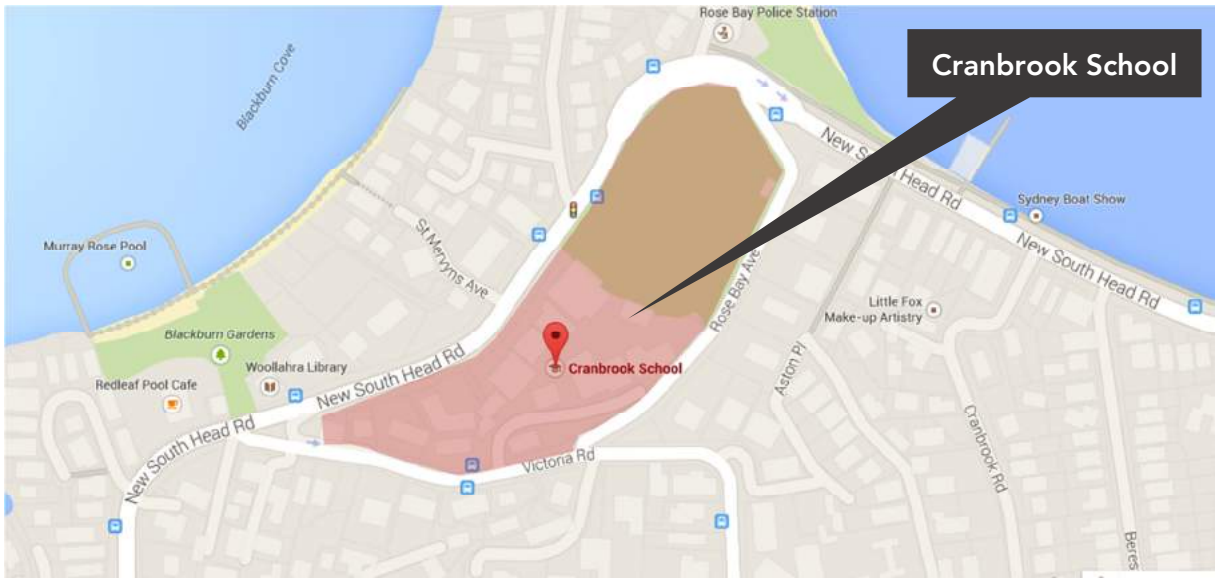


Figure 1 – Cranbrook School Location Plan

The school was founded in 1918 by the Reverend Frederick Thomas Perkins and Cranbrook has a non-selective enrolment.

Cranbrook is an Anglican independent day and boarding school for boys, catering for Pre-school to Year 12.

The school is affiliated with the International Coalition of Boys' Schools, the Association of Heads of Independent Schools of Australia, the Junior School Heads Association of Australia, the Australian Boarding Schools' Association, the Headmasters' and Headmistresses' Conference and is a founding member of the Combined Associated Schools.

The Pre-school campuses are in two locations, namely Darling Point and Vaucluse, with the Junior School located in Rose Bay and Senior School campus being operated from Bellevue Hill, which is the subject of this report.

The Senior School caters for students from year 7 to year 12.

The current site layout is shown in Figure 2.

Figure 2 – Existing Cranbrook School Campus

2.2 School Population

The current student enrolment cap for the Senior School is 1115 and the current staff full time equivalent (FTE) population is 168.

2.3 School Start and Finish Times

The core school start and finish times are; 8.15am to 3.20pm, with out of school activities running before and after school.

2.4 On and Off Site Parking Provisions and Site Access and Egress

The existing parking provisions for the site consists of a small number of allocated on site spaces and usage of the unrestricted on street parking provision in the vicinity of the site.

These two provisions are dealt with separately as the purpose of this study is to determine the most appropriate parking supply for the school, having regard for the on street parking, which also provides a valuable resource for the community as a whole.

A survey of the on street parking provisions within the vicinity of the school was undertaken on 17th March 2015 and details of this can be found in Section 5.1 of this report.

The site currently provides parking for 29 vehicles within the internal driveway at the main school entrance. These spaces are allocated to senior staff members and employees. This area is posted with a 10 kph speed limit and is designated as a 'shared zone' for use by vehicles and pedestrians. This area is accessed via the main school entrance off Victoria Road and the exit is via a driveway onto Rose Bay Avenue. There are also

five maintenance vehicle access points to the school, two off New South Head Road, two off Rose Bay Avenue and one off Victoria Road.

In addition to the vehicular access points, pedestrian access to the site is via the following locations;

- Main gate to internal driveway, Victoria Road,
- Internal driveway exit driveway, Rose Bay Avenue; and
- Pedestrian access gate, New South Head Road

The parking area and site access and egress points are shown on Figure 3.

Figure 3 – On Site Parking & Site Access & Egress

3. Proposed Development

The proposed development is focused on two main areas of the campus:

- The Centenary Building
    - This involves the demolition of the existing War Memorial Hall and Mansfield Building, with the construction of a new five level, multi-purpose teaching facility.
    - The existing structures have a GFA of 1,500m2, while the new structures will have a total GFA of 6,528m2. This results in a net increase in GFA of 4,758m2.

Figure 4 is an extract of the proposed development plans, produced by Architectus, showing a typical level of the proposed War Memorial Hall.

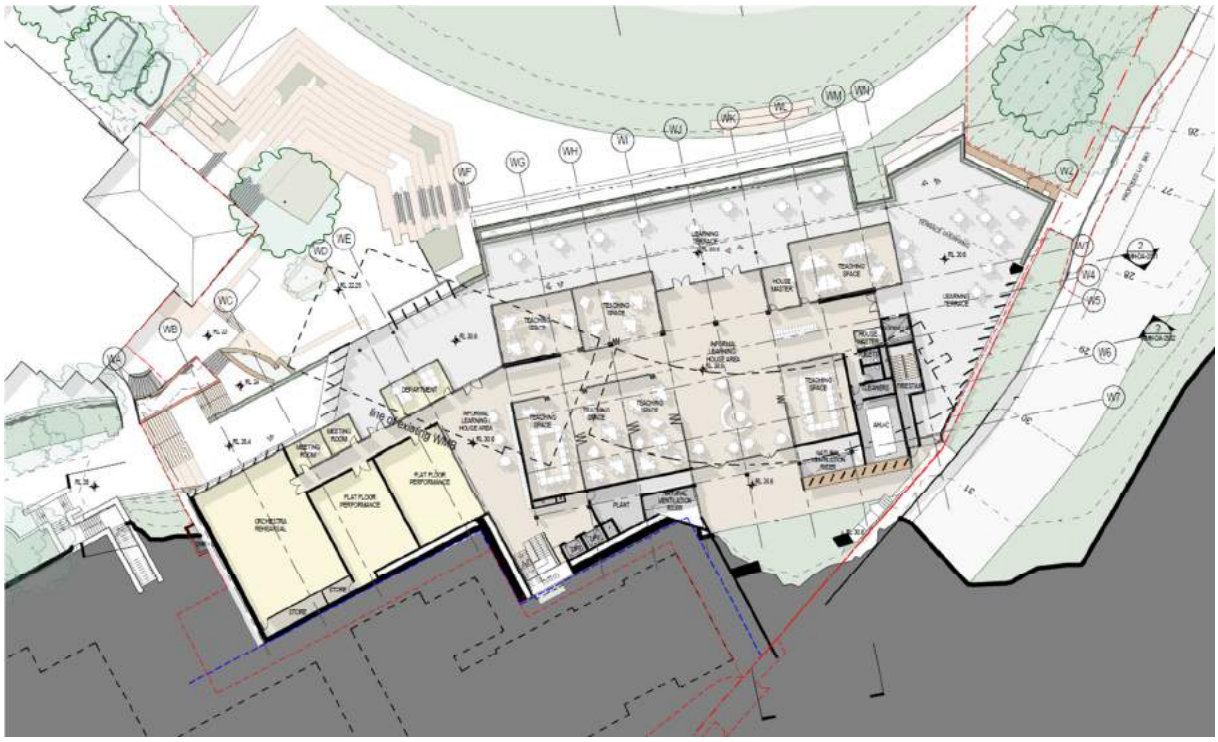


Figure 4 – The Proposed War Memorial Hall

- The Aquatic and Fitness Centre
    - The construction of a new 50 metre, 8 lane swimming pool, learn to swim pool, multi-purpose sports hall and fitness centre and modifications to the existing oval to accommodate this structure 'under' the school oval.
    - The construction of an underground parking facility for 124 vehicles and 20 bicycles.
    - The GFA of the Aquatic and fitness centre will be 6,036m^2.

Figure 5 is an extract of the proposed development plans, produced by Architectus, showing the proposed Aquatic and Fitness Centre and the underground car park.

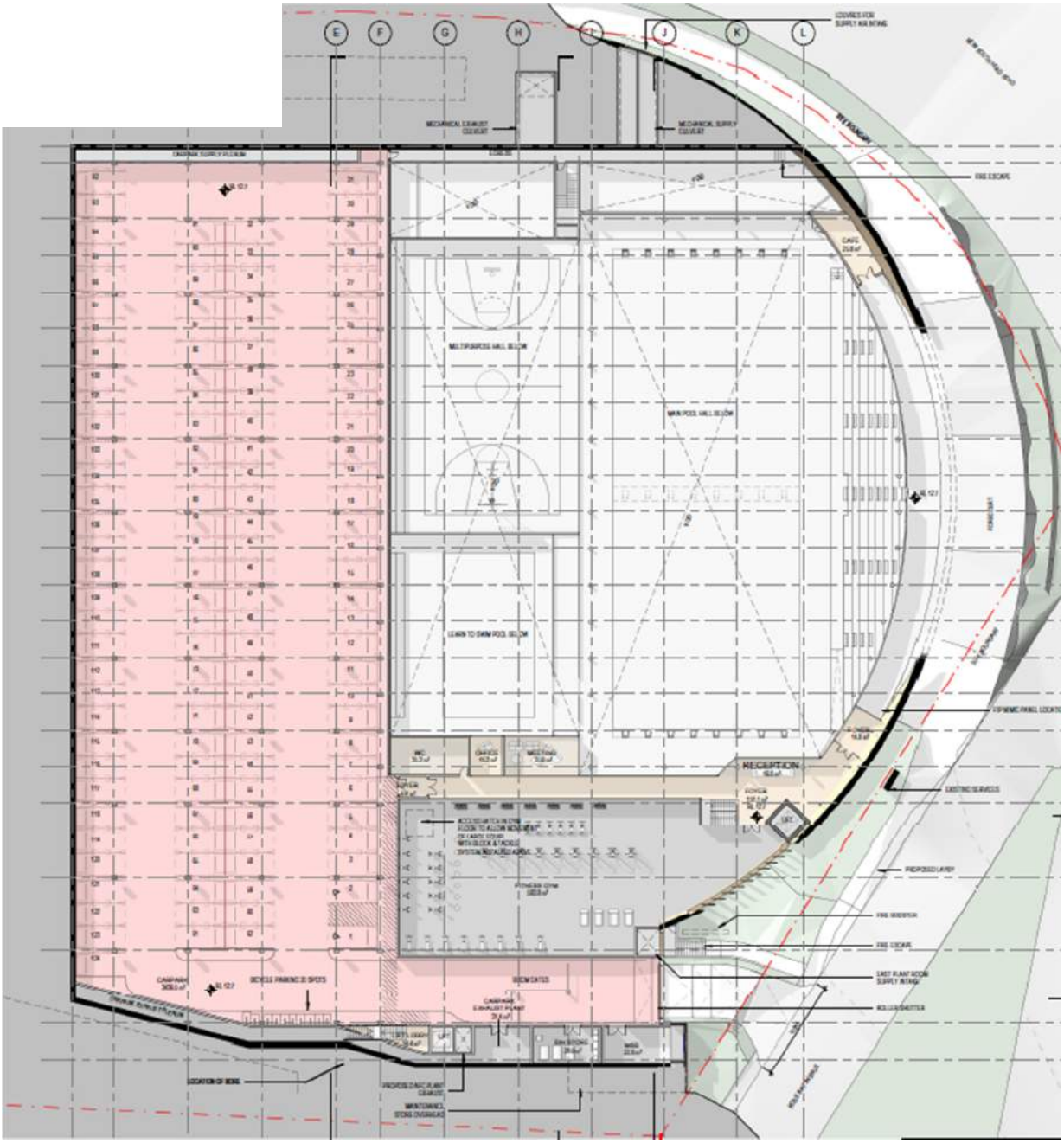


Figure 5 – The Aquatic and Fitness Centre

The development also proposes the relocation of the existing on-street 'Drop off / Pick up' facility from Rose Bay Avenue to the existing 'internal driveway. Details of this facility are shown in Figure 6.

This relocation will displace the existing 29 car space located in this area, therefore providing a net gain of 95 spaces as part of the development.

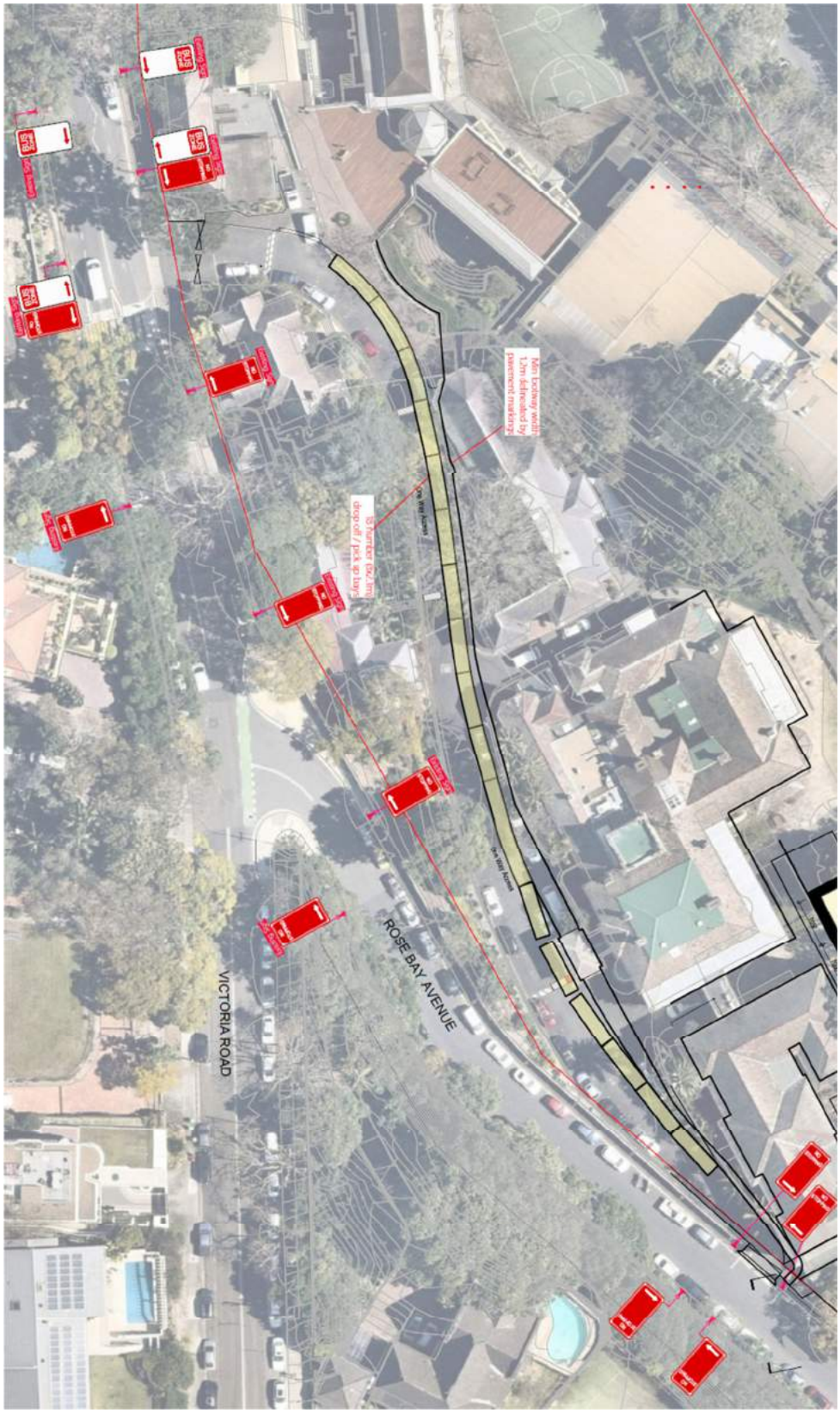


Figure 6 – The Proposed Drop Off & Pick Up facility

The development **does not** proposed any increase to the staff FTE or student population beyond the existing enrolment cap as outlined in Section 2.

4. Transport Environment

4.1 Road Network

The site is located on the south west side of New South Head Road, in the suburb of Bellevue Hill and in this regard, has a good connection to the eastern Sydney arterial road network and the wider Sydney area.

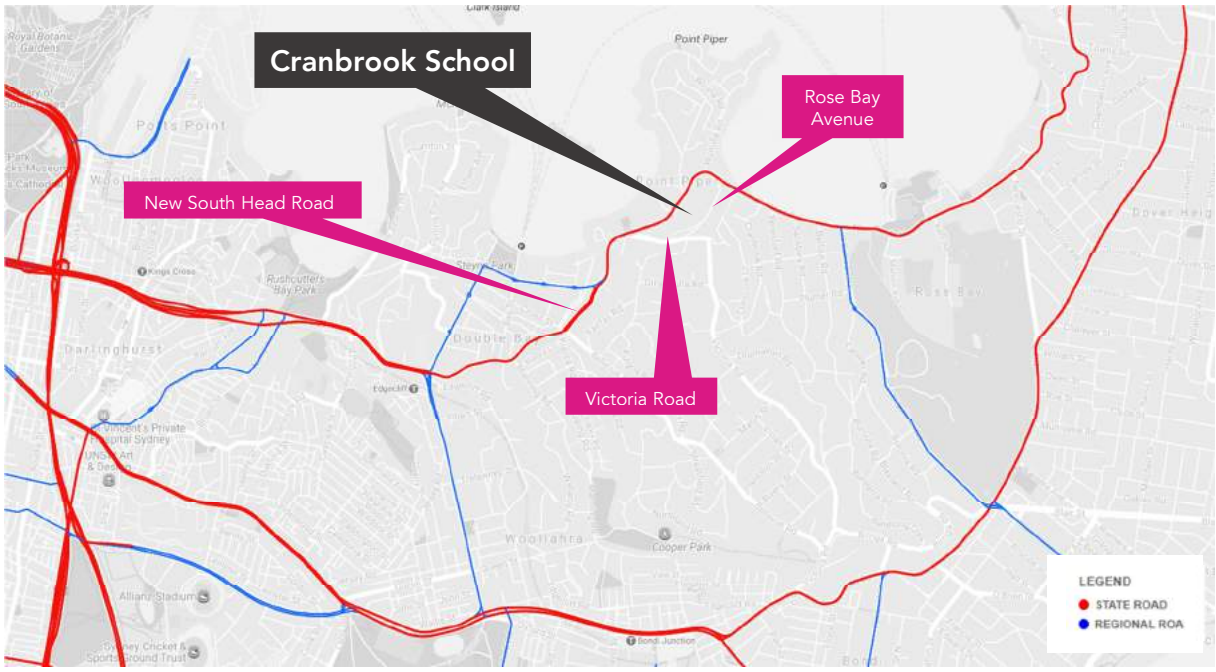


Figure 7 – Road Hierachy

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as follows:

- State Roads - Freeways and Primary Arterials (RMS Managed)
- Regional Roads - Secondary or sub arterials (Council Managed, Part funded by the State)
- Local Roads - Collector and local access roads (Council Managed)

The road network servicing the site includes:

Table 2 – New South Head Road

New South Head Road	
Road Classification	**State Road**
Alignment	**East / West**
Number of Lanes	**2/3 lanes in each direction**
Carriageway Type	**Un-divided**
Carriageway Width	**18 metres**
Speed Limit	**60 kph (outside School Zone times)**
School Zone	**Yes**
Parking Controls	**Eastbound - ½P 9am to 4pm Mon to Friday, No parking 4pm to 6pm Westbound – un-restricted**
Site Frontage	**Yes**

Figure 8 – New South Head Road – Westbound towards Victoria Road

Table 3 – Victoria Road

Victoria Road	
Road Classification	**Local Road**
Alignment	**East / West**
Number of Lanes	**1 lane in each direction**
Carriageway Type	**Un-divided**
Carriageway Width	**12 metres**
Speed Limit	**50 kph (outside School Zone times)**
School Zone	**Yes**
Parking Controls	**Un-restricted**
Site Frontage	**Yes**

Figure 9 – Victoria Road – Westbound towards School Entry Gate

Table 4 – Rose Bay Avenue

Rose Bay Avenue	
Road Classification	**Local Road**
Alignment	**North / South**
Number of Lanes	**1 lane in each direction**
Carriageway Type	**Un-divided**
Carriageway Width	**10 metres**
Speed Limit	**50 kph (outside School Zone times)**
School Zone	**Yes**
Parking Controls	**Un-restricted, with school drop off zone at peak times**
Site Frontage	**Yes**

Figure 10 – Rose Bay Avenue – Northbound towards School Exit Gate

4.2 Bicycle Network

Woollahra Municipal Council has developed the Woollahra Bicycle Strategy 2009, which reviewed the 'Woollahra Waverly Bike Plan 2000' and set out to develop a bicycle strategy for future implementation.

The key elements of the bicycle strategy are;

- Completing major (regional) routes that provide regional connectivity;
- Every Street a Cycling Street – promoting and facilitating cycling on all local roads with minimum new construction;
- Recreational routes for safe and family-friendly cycling in the vicinity of parks and reserves;
- Developing cycle facilities at/to public transport Interchanges and urban villages;
- Integrated policies and planning instruments – inclusion of cycle facilities and considerations within road construction and maintenance programs as well as in development planning; and
- Targets to provide a balance between civil works and encouraged programs, including a ride-to-school strategy to develop sustainable travel habits and cycling confidence from a young age.

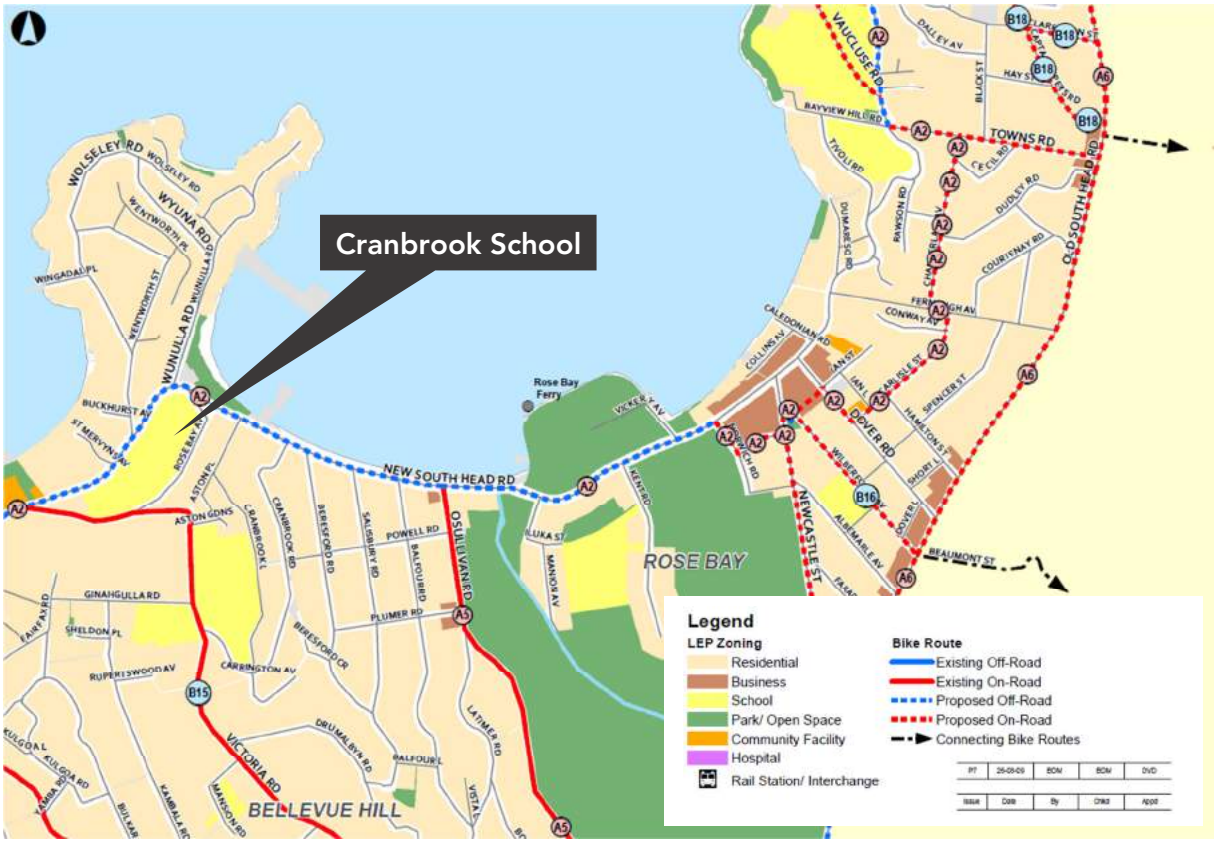


Figure 11 – Local Bicycle Network (Source:Woolahra Municpal Council)

As shown in Figure 11, the school is served by an existing on-road cycle route along Victoria Road and a proposed off-road route along New South Head Road. These routes provide access to the local cycle network and links to the greater Sydney cycle network.

4.3 Bus Services

The site is well serviced by buses that operate from the following 7 bus stops in close proximity to the site

- New South Head Road: Routes – 323, 324, 325 and L24
- Victoria Road: Route 326

These services are operated by Sydney Bus Network and the bus stop locations are shown in Figure 12:

Figure 12 – Bus Services

These services run between 04:30 and 00:30 and provide access from the local area to the City at approximately 30 minute intervals, with additional services at peak times.

4.4 School Bus Service

In additional to the STA bus routes services Cranbrook School, the school operates two private services;

- North Shore Bus Services;
- South; and
- Inner West Services.

The routes are operated by the school and drop off and pick up students at the STA bus stop located on New South Head Road at the corner of Wolsely Road. The services timetables are summarised in Table 5,Table 6 and Table 7.

Table 5 – North Shore Bus Service

CRANBROOK SCHOOL

BUS SCHEDULE - NORTH SHORE

MORNING TIMETABLE

7.00am	Seaforth	Sydney Rd Nth side at STA stop (front of BELLE Property)
7.05am	Spit Bridge	Spit Bridge Bus Stop (just after Bridge, city side)
7.08am	Beauty Point	Spit Rd STA Bus Stop opposite Medusa St lights
7.10am	Stanton Rd	STA Bus Stop, cnr Stanton Rd and Spit Rd
7.11am	Mosman	Spit Rd STA Bus Stop, west of Awaba St (near shops)
7.13am	Spit Junction	STA set down stop Spit Rd & Clifford St at Mosman Cinema
7.15am	Cremorne	Military Rd and Spofforth St at main entrance to Cremorne Town Centre
7.20am	Neutral Bay	Falcon & Watson Sts – outer STA bus stop (Shed B) via Falcon St, Miller St (L) Blue St
7.25am	Nth Syd Oval	STA Bus Stop on Miller St before Ridge St in front of N Sydney Oval
7.30am	Nth Syd Stn	Blue St (at Greenwood Plaza Rail entrance) thence via Blue, Walker, Berry, Arthur Sts, Warringah Freeway, Harbour Bridge, Cahill Ex'way, East Dist, Kings X exit William St
7.50am	Ascham	STA Bus Stop on New South Head Rd just past lights prior to gates to Ascham School
8.00am	Cranbrook	Cranbrook, STA bus stop New South Head Road opposite Wolseley Rd, Bellevue Hill
8.15am	Cranbrook	JS New South Head Road near Kent Road

AFTERNOON TIMETABLE

3.20pm	Cranbrook JS	STA bus stop New South Head Rd near Kent Rd, Rose Bay
3.35pm	Cranbrook	STA Bus Stop New South Head Rd opposite Wolesely Rd, North side
3.40pm	Ascham	Edgecliff Station on New South Head Rd
4.05pm	Nth Syd Stn	Blue St (sth side at STA Bus Stop near train Station entry)
4.07pm	Nth Syd Oval	Nth Syd Oval Stop then into Falcon St
4.10pm	Neutral Bay	STA Bus Stop (at big Bear Shopping Plaza) then Military Road
4.15pm	Cremorne	STA Bus Stop (opposite Cabramatta Rd)
4.18pm	Spit Junction	STA Bus Stop on Spit Rd after Military Rd turn (at Priceline Pharmacy)
4.20pm	Mosman	STA Bus Stop Spit Rd at Awaba St
4.21pm	Mosman	STA Bus Stop Spit Rd at 7 Eleven Service Station
4.23pm	Beauty Point	STA Bus Stop Spit Rd at Medusa St
4.31pm	Seaforth	STA Bus Stop, Sydney Rd

Then return to Cranbrook: Second trip from the School via same route and stops as above to Seaforth Mon–Thurs inclusive

5.30pm	Cranbrook JS	STA bus stop New South Head Rd near Kent Rd, Rose Bay
5.32pm	Cranbrook	STA Bus Stop New South Head Rd opposite Wolesely Rd
5.35pm	Ascham	Edgecliff Station on New South Head Rd
6.00pm	Nth Syd Stn	Blue St (sth side at STA Bus Stop near train Stn entry)
6.02pm	Nth Syd Oval	Nth Syd Oval Stop then then into Falcon St
6.05pm	Neutral Bay	STA Bus Stop (at big Bear Shopping Plaza) then Military Road
6.10pm	Cremorne	STA Bus Stop (opposite Cabramatta Rd)
6.13pm	Spit Junction	STA Bus Stop on Spit Rd after Military Rd turn (at Priceline Pharmacy)
6.15pm	Mosman	STA Bus Stop Spit Rd at Awaba St
6.16pm	Mosman	STA Bus Stop Spit Rd at 7 Eleven Service Station
6.18pm	Beauty Point	STA Bus Stop Spit Rd at Medusa St
6.26pm	Seaforth	STA Bus Stop, Sydney Rd

End of service

* All timings are subject to change due to traffic conditions however every endeavour will be kept to maintain to this schedule.

MAY 2016

Table 6 – South Bus Service

CRANBROOK SCHOOL

BUS SCHEDULE – SOUTH

MORNING TIMETABLE

7.22am	Little Bay	Cnr of Little Bay Rd and Namatjira Place. No Shelter
7.24am	Chifley	Anzac Pde near Forrest St. Shelter Available
7.26am	Maroubra South	Anzac Pde near Beauchamp Rd. Shelter Available
7.30am	Maroubra North	Maroubra Rd near Flower St. Shelter Available
7.32am	Malabar	Malabar Rd opposite Mermaid Ave. Shelter Available
7.32am	South Coogee	Malabar Rd near Nymboida St. Shelter Available
7.35am	South Coogee 2	Arden St near Malabar Rd. Shelter Available
7.38am	Coogee	Arden St near Carr St. Shelter Available
7.40am	Coogee 2	Coogee Oval @ Arden St near Dolphin St. No Shelter
7.44am	Clovelly	Arden St near Brandon St. No Shelter
7.46am	Bronte	Macpherson St near Leichhardt St. Shelter Available
7.47am	Bronte 2	Leichhardt St near Macpherson St. No Shelter
7.50am	Bronte 3	Murray St near Gibson St. Shelter Available
7.50am	Tamarama	Alfred St near Birrel St. No Shelter
8.03am	Bondi Beach	Glenayr Ave near Hall St. Shelter Available
8.05am	North Bondi	Glenayr Ave near Blair St. No Shelter
TBCam	Cranbrook	STA bus stop New South Head Rd opposite Wolseley Rd, North side

AFTERNOON TIMETABLE

TBCpm	Cranbrook	STA bus stop New South Head Rd opposite Wolseley Rd, North side
3.40pm	North Bondi	Blair St near Mitchell St. No Shelter
3.41pm	North Bondi 2	Glenayr Ave near Warners Ave. Shelter Available
3.43pm	Bondi Beach	Glenayr Ave near Hall St. Shelter Available
3.50pm	Bondi	Bondi Rd near Watson St. Shelter Available
3.53pm	Tamarama	Alfred St Opposite Belgrave St. No Shelter
3.56pm	Bronte	Murray St near Bronte Rd. Shelter Available
3.57pm	Bronte 2	Leichardt St near Bronte Rd.
3.58pm	Bronte 3	Macpherson St near Lugar St. Shelter Available
4.01pm	Clovelly	Arden St near Burnie St.
4.04pm	Coogee	Arden St near Dolphin St.
4.05pm	Coogee 2	Arden St near Carr St.
4.07pm	Coogee 3	Arden St near Malabar Rd.
4.10pm	South Coogee	Malabar Rd near Denning St.
4.11pm	South Coogee 2	Malabar Rd near Liguria St.
4.15pm	Maroubra	Maroubra Rd near French St.
4.16pm	Maroubra 2	Maroubra Rd near Flower St.
4.17pm	Maroubra 3	Anzac Pde near Beauchamp Rd.
4.19pm	Malabar	Anzac Pde near Franklin St.
4.24pm	Little Bay	Little Bay Rd near Nurla Ave. No Shelter

AUGUST 2016

Table 7 – Inner West Bus Service

CRANBROOK SCHOOL

Bus Schedule — Inner West

MORNING TIMETABLE		
6.45am	Hunters Hill	Church St Bus Stop near Herberton Ave
7.07am	Birchgrove	Rowntree St @ Cameron St STA bus stop
7.09am	Balmain	Rowntree St @ Darling St
7.11am	Rozelle	Darling St at Elliott St
7.16am	Leichhardt	STA Bus Stop in Moore St near Catherine St
7.21am	Annandale	STA Bus Stop on Booth Street near Johnston Street
7.42am	SCEGGS	STA Bus Stop between Forbes & Dowlings Sts
7.45am	Ascham	STA Bus Stop on New South Head Rd
7.48am	Cranbrook	STA bus stop New South Head , cnr Wolseley Rd, Bellevue Hill
8.00am	Cranbrook Jr	New South Head Road near Kent Road, Rose Bay

AFTERNOON TIMETABLE		
3.35pm	Cranbrook Jr	STA bus stop New South Head Rd opposite Wolseley Rd, North side
3.40pm	Ascham	Edgecliff Station on New South Head Rd
3.43pm	SCEGGS	STA Stop @ Bourke & William Sts
4.04pm	Annandale	STA Bus Stop on Booth Street near Johnston Street
4.08pm	Leichhardt	STA Bus Stop in Moore St near Catherine St
4.10pm	Balmain	Cnr Darling and Elliott Sts
4.12pm	Balmain	Darling St @ Rowntree St
4.20pm	Birchgrove	Cnr Rowntree St @ Cameron St STA Bus Stop
4.47pm	Hunters Hill	Church St Bus Stop opp Herberton Ave

End of service

** All timings are subject to change due to traffic conditions however every endeavor will be kept to maintain to this schedule.

4.5 Ferry Services

The site is located a distance of approximately 1200 metres from Double Bay Wharf.

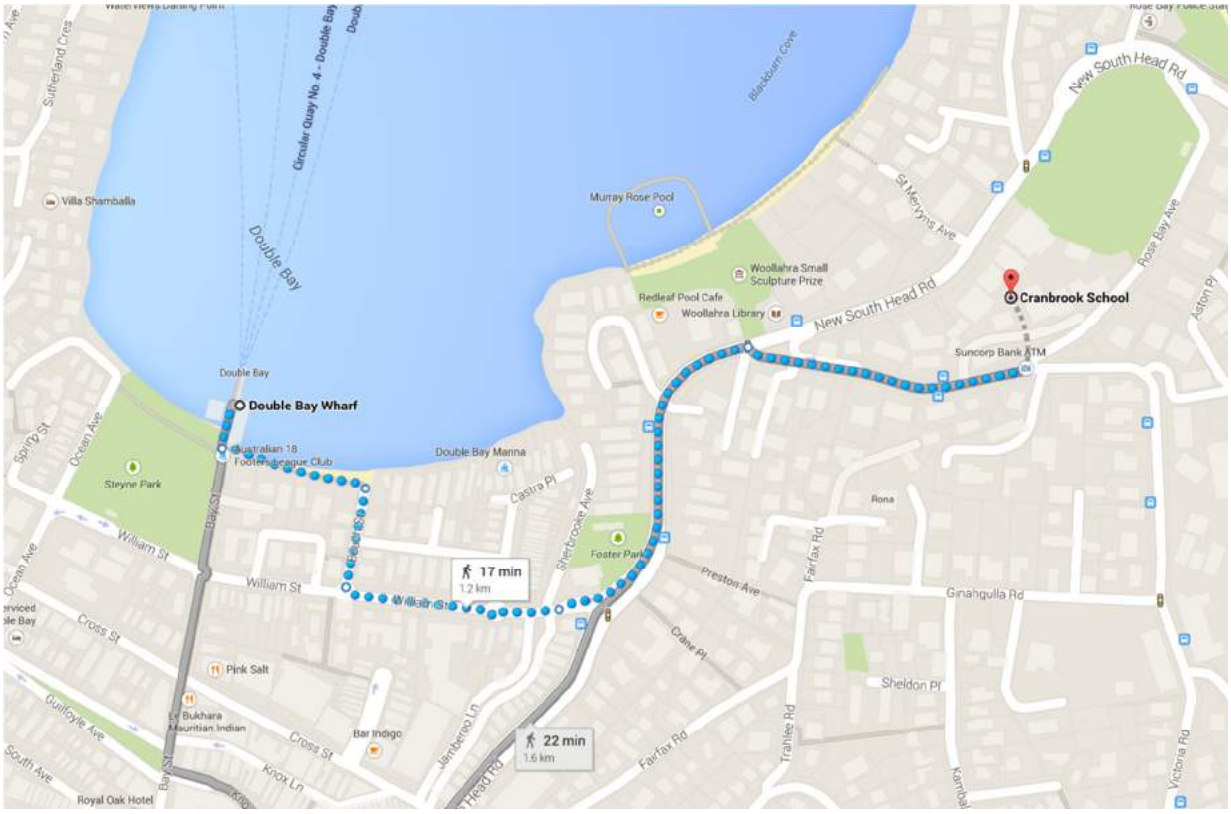


Figure 13 – Ferry Services

Double Bay Wharf is operated by Sydney Ferries and operates the F7 Eastern Suburbs service between Circular Quay and the Eastern Suburbs and are summarised as follows;

F7 Eastern Suburbs:

- Circular Quay to Double Bay – approximately 30 minutes intervals between 07:00 and 21:00
- Double Bay to Circular Quay – approximately 30 minute intervals between 06:50 and 19:20

5. Parking and Travel Characteristics

5.1 On Street Parking Inventory

As with the majority of schools in Sydney and the historical development of the campus, Cranbrook School provides limited parking within the campus. The current on-site parking provision is limited to 29 vehicles within the internal driveway as shown in Figure 3 and these spaces are reserved for senior staff members.

Additional parking is available to staff and students on the surrounding road network and in order to assess the availability of these provisions, an 'On-Street Parking Inventory' was undertaken to record the approximate number of spaces within close proximity of the school.

This survey was undertaken on the roads bounding the campus, these being;

- Victoria Road; and
- Rose Bay Avenue.

Details of the parking restrictions in place on the subject roads can be found in Figure 14 and summarised in Table 8.

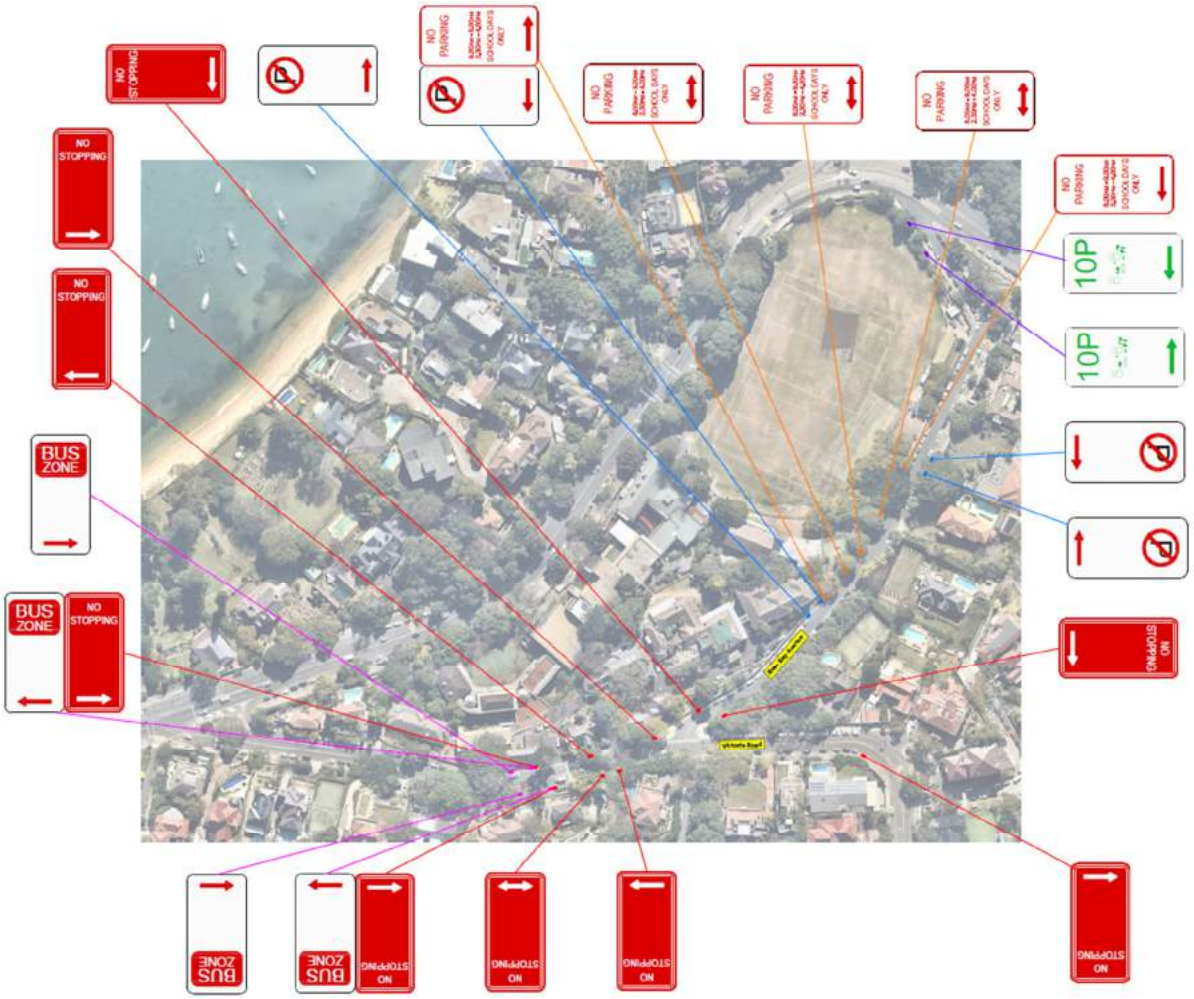


Figure 14 – Existing On Street Parking Provision

Table 8 – Existing On Street Parking Provisions

Parking Restriction	Approximate Number of Spaces
Un-Restricted	**98 spaces**
10P Parking (8am to 8pm mon to fri)	**3 spaces**
Restricted parking (9am to 2.30pm and 4pm 8am mon to fri, 24 hours sat and sun)	**16 spaces**
Drop off & Pick Up (8am to 9am and 2.30pm to 4pm mon to fri)	**16 spaces**

In summary, the survey shows the following:

- Within the vicinity of the site, along Victoria Road and Rose Bay Avenue, there is approximately 98 spaces of unrestricted parking;
- 100 metre (16 vehicle) 'drop off / pick' zone is in place along the west side of Rose Bay Avenue, north of the 'porte-cochere' exit.

5.2 Drop of and Pick Up Demand

In order to assess the demand for drop-off and pick-up capacity, a video survey was undertaken on a typical term day during the morning arrival and afternoon departure periods. This survey was undertaken on Wednesday 18th March 2015, between 07:30-09:30 (morning drop-off) and 14:30-16:30 (afternoon pick-up) at the Main Gate on Victoria Road and the 'No Parking' zone along Rose Bay Avenue.

It should be noted that although this assessment was undertaken in 2015, the student numbers have not changed since this time and therefore, the data is still valid.

The locations of the surveys are shown in Figure 15.

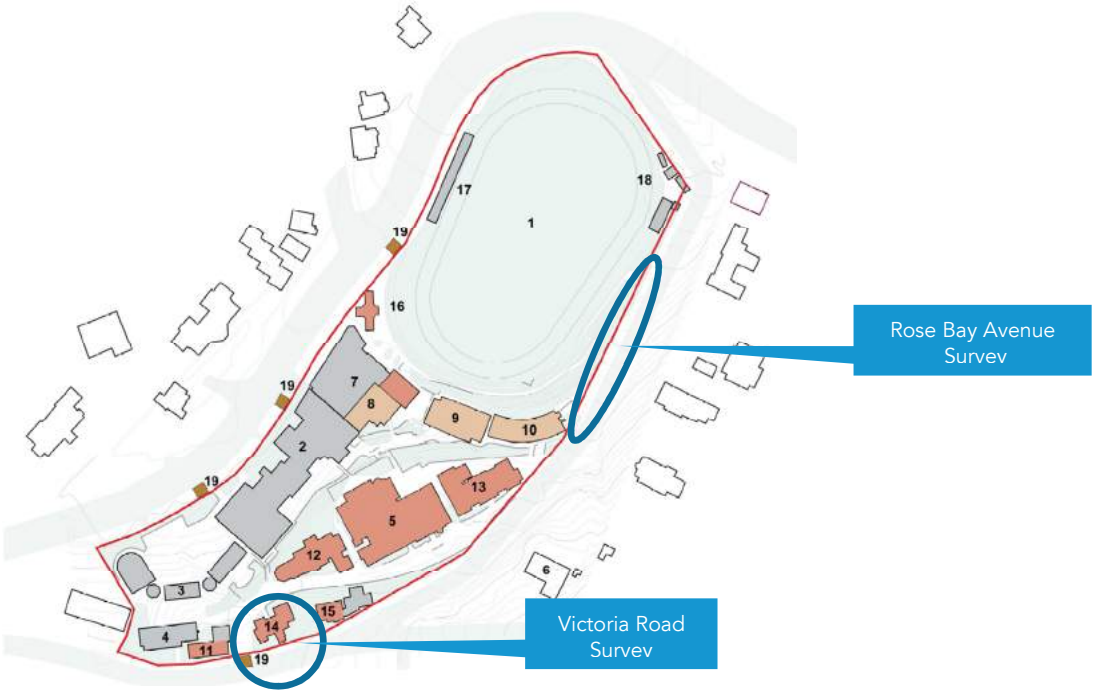


Figure 15 – Video Survey Locations

The results of the surveys enable the determination of not only the demand, but also the average dwell time of vehicles (how long they are stationary at the kerb) and how often, and to what extent, queuing occurred beyond the capacity of the area.

5.3 Drop-Off and Pick-Up Survey Results

A summary of the survey results for both the drop-off and pick-up activity in Victoria Road and Rose Bay Avenue are shown in Table 9, Table 10 and a comparison between the number of vehicles and dwell time is shown in Figure 16 and Figure 17.

Table 9 – Summary of Drop-Off and Pick-Up Activity – Victoria Road

Victoria Rd				
West LEG	Morning 7:30AM-9:30AM		Afternoon 2:30PM-4:30PM	
	Total Drop-off	Ave Drop-off Time	Total Pick-up	Ave Pick-up Time
North	44	00:42	19	03:26
South	39	00:37	9	03:19
Total	83		28	
East LEG	Morning 7:30AM-9:30AM		Afternoon 2:30PM-4:30PM	
	Total Drop-off	Ave Drop-off Time	Total Pick-up	Ave Pick-up Time
North	1	00:45	3	05:19
South	33	00:41	4	05:23
Total	34		7	

Table 10 – Summary of Drop-Off and Pick-Up Activity – Rose Bay Avenue

Rose Bay Ave				
	Morning 7:30AM-9:30AM		Afternoon 2:30PM-4:30PM	
	Total Drop-off	Ave Drop-off Time	Total Pick-up	Ave Pick-up Time
West	46	00:32	11	06:17
East	69	00:48	31	08:23
Total	115		42	

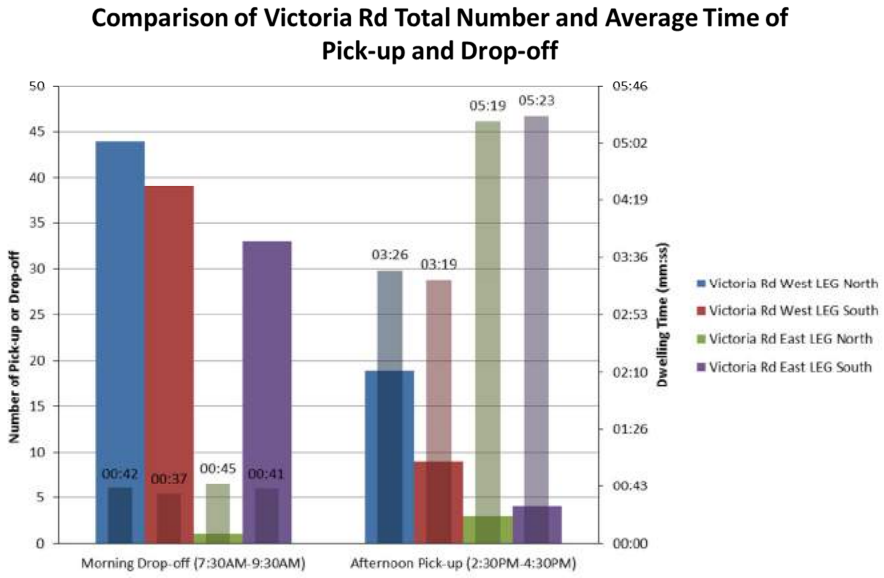


Figure 16 – Comparisons of Vehicle Numbers and Dwell Time on Victoria Road

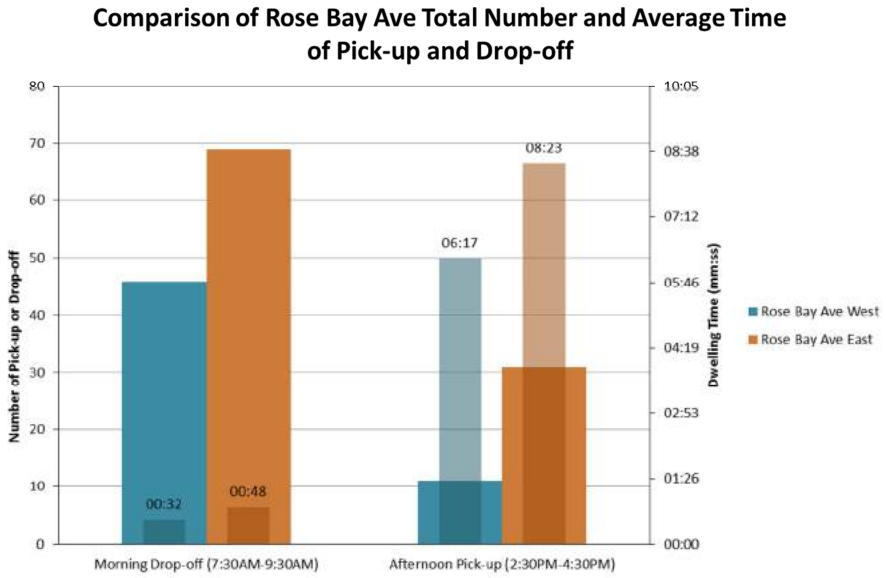


Figure 17 – Comparisons of Vehicle Numbers and Dwell Time on Rose Bay Avenue

Based on the survey data, the following can be ascertained:

- 117 vehicles are undertaking drop-off along Victoria Road with an average dwell time of 40 seconds.
- 35 vehicles are undertaking pick-up on Victoria Road with an average dwell time of 218 seconds.
- 115 vehicles are undertaking drop-off along Rose Bay Avenue with an average dwell time of 42 seconds; and
- 42 vehicles are undertaking pick-up along Rose Bay Avenue with an average dwell time of 461 seconds.

The survey data collected indicates 50% of drop–off and pick-up activity is being undertaken along Victoria Road, which is isolated from the designated zone along Rose Bay Avenue.

This location on Victoria Road is a point of high activity as it is also the location of the main STA bus stop which services the school, the main school entrance and a pedestrian crossing, which is highly trafficked by students. In this regard, any additional activity in this area, such as drop-off and 'pick-up' should be discouraged.

In summary:

- 232 vehicles were recorded undertaking Drop-Off activities over the two areas, with an average dwell time of 41 seconds. If this activity was undertaken in a 30 minute peak period, this would result in a required Drop-Off zone of 6 spaces (36 metres).
- 77 vehicles were recorded undertaking Pick-Up activities over the two areas, with an average dwell time 5 ½ minutes. Again, if this activity was limited to a 30 minute peak period, this would result in a required Pick-Up zone of 15 spaces (90 metres)

However, additional data from the online travel survey (refer to Section 5.5) must be included to finalise the demand.

5.4 Traffic Volume Survey

In addition to the drop off / pickup demand survey, a traffic volume survey was undertaken along New South Head Road, Victoria Road and Rose Bay Avenue, to ascertain the overall daily and peak hour traffic volumes within the vicinity of the site.

The traffic volume survey was undertaken for a seven day period commencing on 18th March 2015, by a series of loop detectors.

It should be noted that although this assessment was undertaken in 2015, the student numbers have not changed since this time and therefore, the data is still valid.

Figure 18 indicates the locations that these surveys were undertaken and Table 11, Table 12, and Table 13 summarise the findings of this survey.

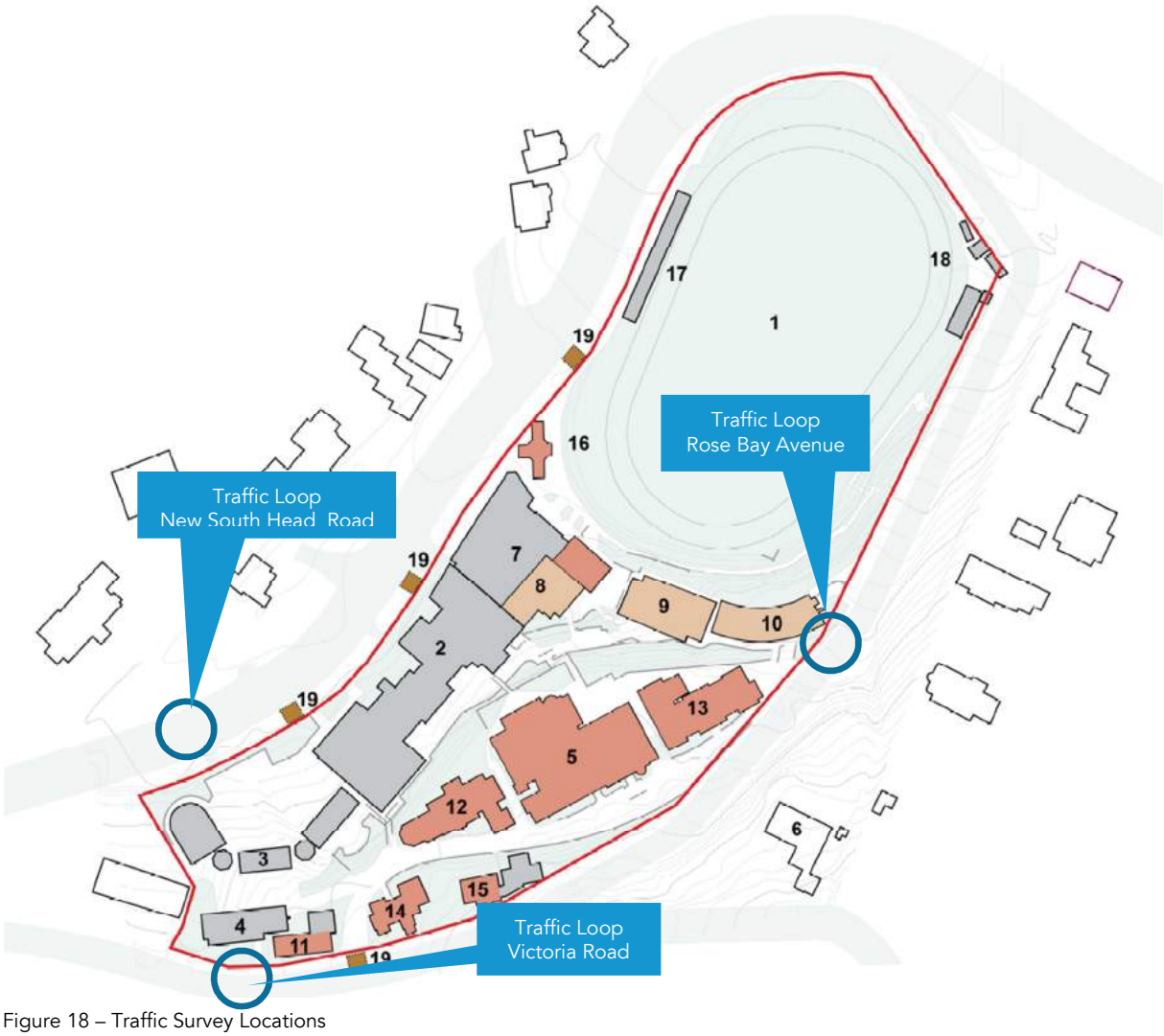


Figure 18 – Traffic Survey Locations

Table 11 – Summary of Traffic Volume on New South Head Road

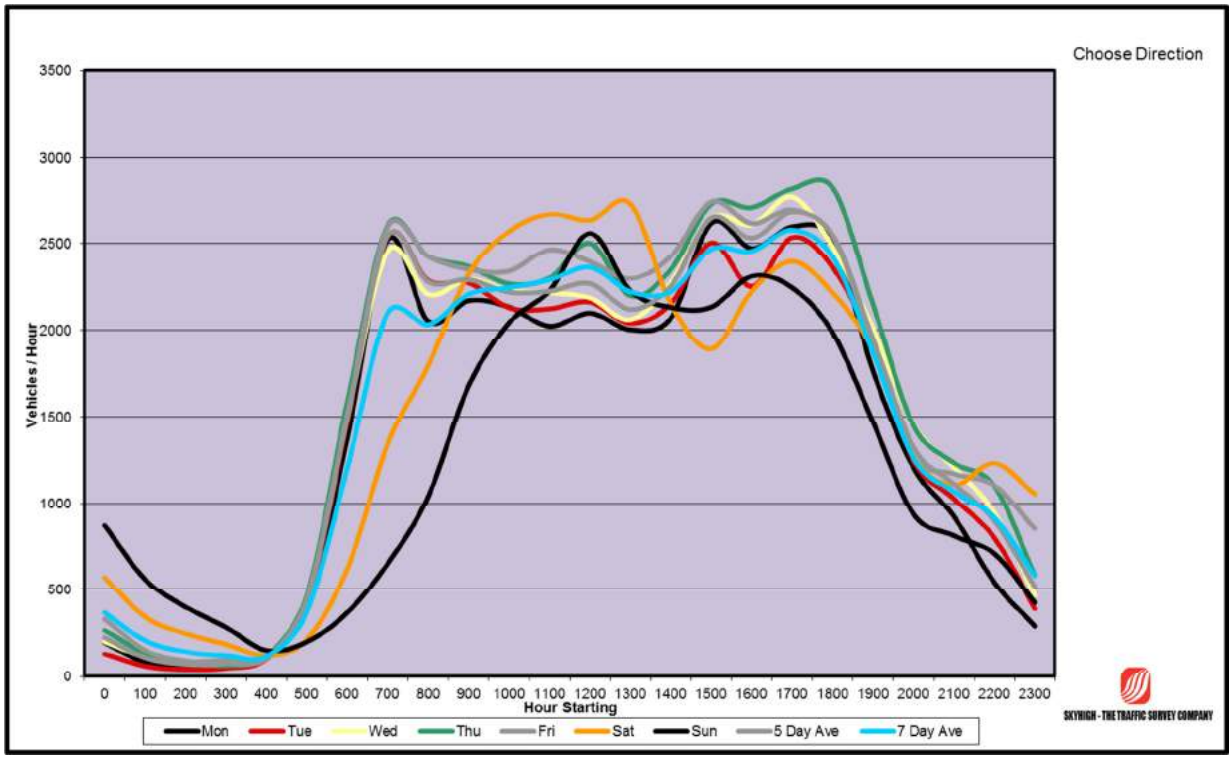


Table 12 – Summary of Traffic Volume on Victoria Road

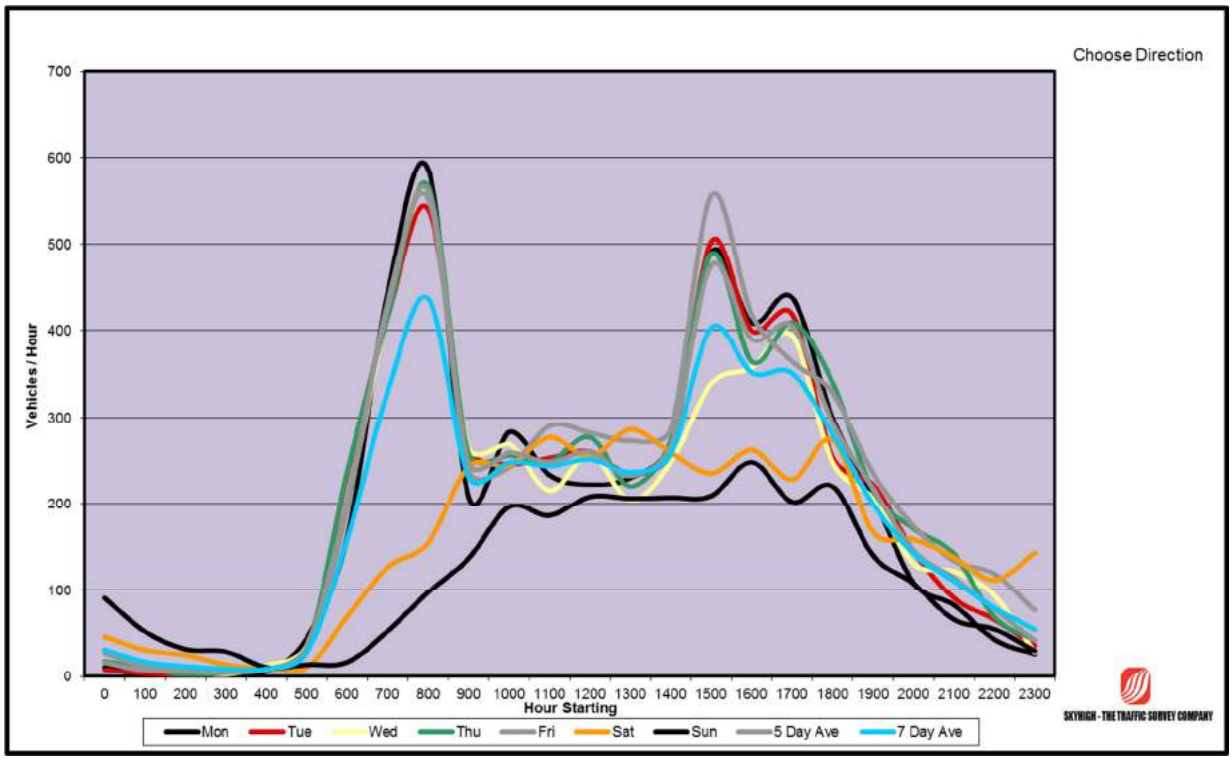
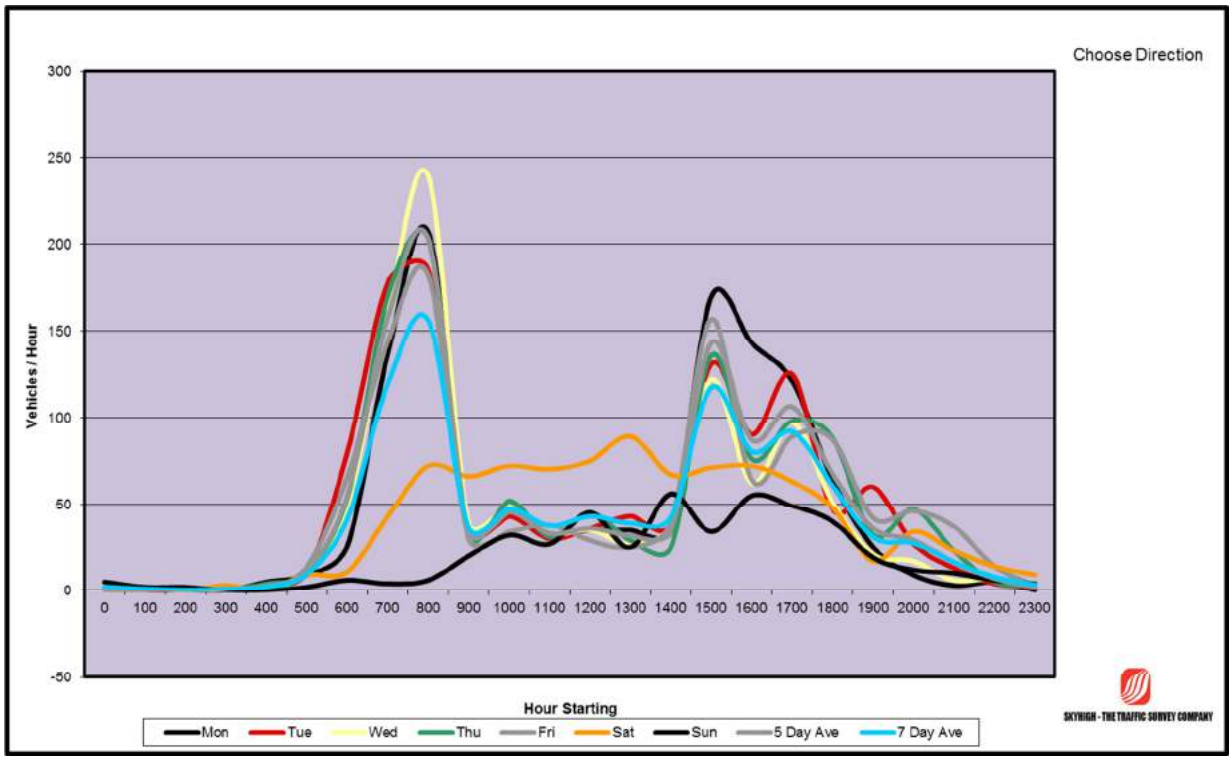


Table 13 – Summary of Traffic Volume on Rose Bay Avenue



Based on the survey data, the following can be ascertained:

- New South Head Road has an average weekday volume of 36,938 vehicles (both directions) with an AM peak of 2,544 (07:00-08:00) and a PM peak of 2683 (17:00-18:00)
- Victoria Road has an average weekday volume of 4,946 vehicles (both directions) with an AM peak of 561 (08:00-09:00) and a PM peak of 476 (15:00-16:00)
- Rose Bay Avenue has an average weekday volume of 1,143 vehicles (both directions) with an AM peak of 203 (08:00-09:00) and a PM peak of 143 (15:00-16:00)

The survey data also indicated that,

- New South Head Road has a vehicle classification split of 1% cycle and motor cycle, 92% cars and 7% commercial vehicles and an average weekday speed of 48.7kph northbound and 43.1kph southbound.
- Victoria Road has a vehicle classification split of 1% cycle and motor cycle, 94% cars and 5% commercial vehicles and an average weekday speed of 40kph westbound and 37.5kph eastbound ; and
- Rose Bay Avenue has a vehicle classification split of 2% cycle and motor cycle, 96% cars and 5% commercial vehicles and weekday average speed of 28kph northbound and 29.6kph southbound.

With reference to Section 4 of the RMS Guide to Traffic Generating Developments, the roads in the vicinity of the site have the following mid block level of service (LOS):

- New South Head Road - LOS: D
- Victoria Road – LOS: A
- Rose Bay Avenue – LOS: A

5.5 Online Travel Survey

In order to estimate the parking demand and travel characteristics of Cranbrook School, an online survey of students and staff was undertaken during April 2015. The surveys typify the usual travel characteristics of students and staff to and from school, parking demand patterns and locations where students are dropped-off and picked-up. The following section provides a summary of the results while a full presentation of the survey output is presented in Attachment 1.

5.5.1 Student Survey

The student survey comprised the following questions:

Q1- What year group are you in?

Q2 - How do you travel to school in the morning on a typical day?

Q3 - How do you travel from school in the afternoon on a typical day?

Q4 - If by car, how many other students travel with you?

Q5 - Why is the car your preferred method of transport to and from school?

Q6 - If you come by car, where are you dropped-off in the morning?

Q7 - If you come by car, where are you picked-up in the afternoon?

Q8 - If you park and walk to the school, which street do you generally park in?

Q9 - What is the postcode of where you live?

Q10- Are there any parts of your journey that you feel are difficult or cause you concern? If so, please nominate.

5.5.2 Staff Survey

The staff survey comprised the following questions:

Q1 - How do you travel to and from school on a typical day?

Q2 - Do you have allocated parking?

Q3 - Why do you travel to and from school by car?

Q4 - If you drive, where do you typically park?

Q5 - In a typical week, how many days do you:

a - Come to work in the morning only?

b - Come to work in the afternoon only?

c - Come to work all day?

d - Come to work part day? If so please specify your shift;

Q6 - Are there any parts of your journey that you feel are difficult or cause you concern? If so, please nominate:

5.5.3 Key Survey Findings – Student Survey

The key findings from the student survey results were:

- 46% of students travel to school by car in the morning and 40% travel by bus.
- 51% of these students are dropped off along Rose Bay Avenue, with 32% utilising Victoria Road
- 29% of students are picked up by car in the afternoon and 54% travel by bus.
- 54% pick up on Rose Bay Avenue and 24% use the Victoria Road frontage.

The main reasons for using the car as a mode of transport were;

- The car is used for more than one purpose – 51%
- It takes longer via public transport – 39%
- Heavy bags / bulky items to carry - 31%

The general concerns raised regarding travelling to and from school were in relation to the drop off and pick up periods and the vehicle behaviors in both Victoria Road and Rose Bay Avenue. Also concerns were raised regarding crossing New South Head Road.

5.5.4 Key Survey Findings – Staff Survey

The key findings from the staff survey results were:

- 79% of staff travelled to and from school by car as the driver.
- Of those who drove 93% did not have an on-site parking space.
- 61% of staff parked along Rose Bay Avenue.

The main reasons for using the car as a mode of transport were;

- There is no direct route via public transport – 55%
- It takes longer via public transport – 51%
- Heavy bags / bulky items to carry - 32%

The general concerns raised by staff were the availability of parking and driver student behaviour on the surrounding roads.

These findings will be utilised, with the findings of the video surveys (Section 5.2), to calculate the final Drop-Off and Pick-Up provision required for the school.

6. Parking and Traffic Assessment

6.1 Planning Policy Requirements

The Woollahra Development Control Plan (DCP) 2015 sets out the planning policy requirements for Educational Establishments within Woollahra Municipal Council LGA.

The objectives of this chapter are to encourage schools to provide safe, efficient and coordinated traffic networks which consider all users.

Section F2.6, of this chapter, sets out the Traffic, Parking and Access objectives for educational establishments. The objectives for educational establishments are shown in Table 14 and Table 15

Table 14 – Traffic, Parking and Access Requirements (Section F2.6, Woollahra DCP 2015)

Objectives		Controls	
O1	To require efficient and effective road and pedestrian circulation networks.	C1	The educational establishment does not unreasonably impact on the surrounding road network, specifically in relation to pedestrian safety and vehicle traffic.
O2	To minimise conflict between vehicles and pedestrians, particularly at entrances.	C2	Pedestrian access is provided to all frontages that adjoin the public domain.
		C3	Pedestrian access is segregated from vehicular access with clearly defined paths.
		C4	Equitable access is provided in accordance with Part E of this DCP, Chapter E1 Parking and Access.
O3	To minimise the impact on the surrounding community due to the arrival and departure of students.	C5	Pedestrian areas are at key entry points to accommodate concentrations of pedestrians, e.g. pick up time.
		C6	For a new educational establishment or major development of an existing establishment—an internal driveway for vehicles is provided for picking-up and dropping-off students.
O4	To minimise demand for on-street parking.	C7	Development complies with the parking requirements in Part E of this DCP, Chapter E1 Parking and Access.
O5	To provide adequate on-site parking for staff, visitors, disabled persons, delivery, service, emergency vehicles, and tertiary students.	C8	Provision is made on-site for service and emergency vehicles.
O6	To encourage use of bicycles as a means of travel to educational establishments.	C9	Bicycle parking is provided.
		C10	For secondary and tertiary establishments—dedicated secure bicycle parking is provided at the following rates: a) 5% of staff numbers; b) 10% of full time student numbers; at a central location and with associated change rooms and showers.

Table 15 – Non Residential Parking Rates (Section E1.5.2, Woollahra DCP 2015)

Land Use	Minimum Parking Generation Rate
Educational establishment	1 space per 100m2 On-site parking for disabled persons is provided at a minimum rate of one car space per 50 car spaces or part thereof.

6.2 Drop off and Pick Up facilities

Based on the requirements of Objective 3 and Control C6, *'For a new educational establishment or major development of an existing establishment—an internal driveway for vehicles is provided for picking-up and dropping-off students'*, an internal drop off / pick facility is proposed, utilising the existing school internal driveway.

As shown in Figure 19 (and Attachment 3), access to this facility is proposed via the existing Victoria Road Gate, with egress via the existing Rose Bay Avenue Gate.
It is proposed that this operation is to be managed as a 'Head of Queue' operation, which is discussed later in this section.

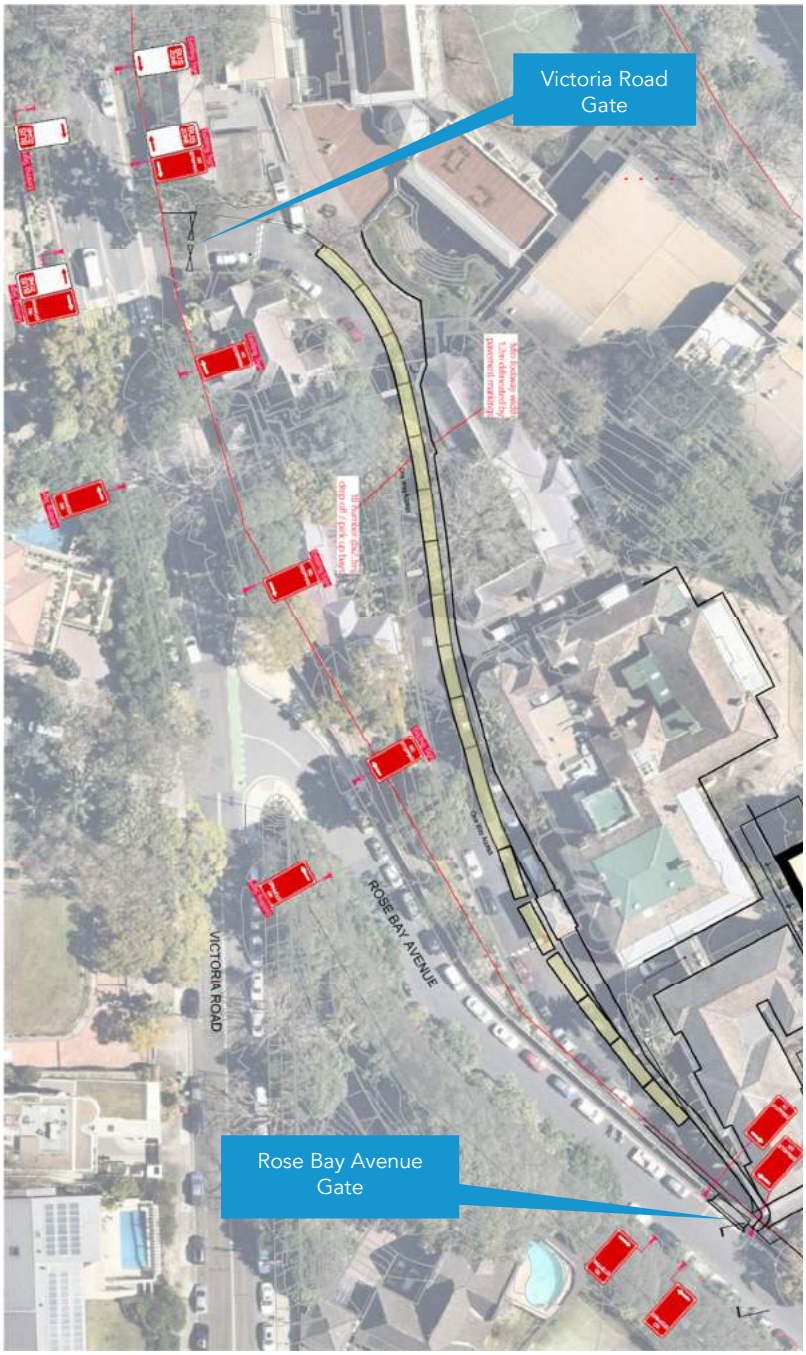


Figure 19 – Proposed Drop off / Pick Up Facilities

A review of the results from the Drop off / Pick up Survey (Section 5.3) and the Student Online Survey (Section 5.5) indicates the following is required to manage this activity;

6.2.1 Drop Off Demand

- Based on data from the video surveys;
    - The average dwell time during the morning drop off period is approximately 45 seconds.
- Based on data from the online surveys;
    - 46% of students travel to school by car (513 students)
    - The weighted car occupancy rate is 1.34 students per vehicle, which equates to 384 vehicles
- Required drop-off facility;
    - Utilising a 30 minutes drop off operation period, 7.45am to 8.15am, and allowing for every vehicle to arrive in this time period, a provision of 10 spaces is required to operate the drop-off activity.

6.2.2 Pick Up Demand

- Based on data from the video surveys;
    - The average dwell time is 5 ½ minutes. However, based on data collected from studies at Cranbrook Junior School, which operates an internal 'Head of Queue' operation, the dwell time is reduced to 120 seconds.
- Based on the online surveys;
    - 29% of students travel from school by car (329 students)
    - The weighted car occupancy rate is 1.34 students per vehicle, which equates to 242 vehicles.
- Required pick-up facility;
    - Utilising a 30 minutes pick up operation period, 3.15pm to 3.45pm, and allowing for every vehicle to arrive in this time period, a provision of 16 spaces is required to operate the pick-up activity.

As shown in Figure 19, the drop-off/pick-up facility accommodates 18 spaces, in a head of queue formation.

The operation will be managed by the school, where, during the drop off period (7.45am to 8.15am), vehicles join the queue of vehicles and students alight when the vehicle reaches the end of the queue.

During the pick up period (3.15pm to 3.45pm), students wait in a designated area and are to be called to the head of the queue when their vehicle is approaching. Approaching vehicles will place a name plate in the window of the vehicle, to inform staff of the student they are picking up.

It should be noted that the spaces provided are 8 metres in length. This allows for vehicles to exit the queue in one movement, should they have undertaken their drop off or pick up activity prior to reaching the head of the queue.

The internal driveway will be open for use between 6.30am – 9.00am and 3.00pm – 6.30pm to accommodate students who attend before and after school activities and outside of these times the internal driveway will be limited to pedestrian access only.

No parking spaces are provided within the internal driveway

To assist vehicles exiting left at the Rose Bay Avenue Gate, as shown in Figure 19, a 'No Stopping' parking restriction is proposed opposite the gate on the southern kerbline of Rose Bay Avenue.

The provision of an on-site drop off / pick up facility also allows for the existing on-street zone to be reallocated as un-restricted parking. This is further discussed in Section 6.4.

Also, the relocation of the drop off and pick facility, should reduce the pedestrian movements along Rose Bay Avenue and Victoria Road, as students will not need to use the existing footways in these locations as drop off and pick up activity will be undertaken within the campus boundaries.

6.3 Traffic Assessment

6.3.1 Victoria Road Gate

The development is not proposing any increase in student or staff numbers and therefore will not generate additional traffic movements, however, the proposal to relocate the drop off and pick up facility within the existing port-cochere, will alter the vehicle movements undertaken at the Victoria Road Gate.

As discussed in Section 5.4, Victoria Road has an AM peak traffic flow of 561 vehicles and a PM peak flow of 476 vehicles and, as discussed in Section 6.2, the drop off activity would generate 384 vehicle movements in the AM peak and 242 vehicle movements in the PM peak.

As the pick-up activity falls outside the network peak period, we have only assessed the effect of the drop off activity in the AM peak period, as this represents the worse case scenario.

6.3.2 Intersection Modelling

In order to confirm the current operation of the intersection, an assessment was undertaken using the SIDRA intersection modelling software, which presents a range of performance indicators (Level of Service, Average Delay, etc.).

Typically there are three performance indicators used to summarise the performance of an intersection, being:

- Degree of Saturation – The total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation. (e.g. 0.8=80% saturation)
- Average Delay- The average delay encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay.
- Level of Service (LoS) - This is a categorization of average delay, intended for simple reference. The RMS adopts the following bands:

Table 16 – Level of Service Definitions

Level of Service	Average Delay (secs/vehicle)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity. At signals, incidents would cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Extra capacity required	Extreme delay, major treatment required

6.3.3 Proposed Traffic Movements

As discussed in Section 5.4, Victoria Road has an AM peak traffic flow of 561 vehicles and, as discussed in Section 6.2, the drop off activity would generate 384 vehicle movements in the AM peak.

The traffic surveys indicated that the traffic distribution on Victoria Road is split at 62% westbound and 38% eastbound. As the development does not generate additional traffic numbers, it has been assumed that this split in traffic distribution would apply to vehicles accessing the Victoria Road Gate.

As discussed in Section 5.3, 50% of the drop off activity is currently undertaken in Rose Bay Avenue. This equates to 192 vehicles. Therefore, 192 additional vehicles will be utilising the Victoria Road Gate intersection, increasing the overall AM peak traffic flow to 753 vehicles.

Figure 20, shows the proposed traffic volumes utilised for the modelling of the Victoria Road Gate.

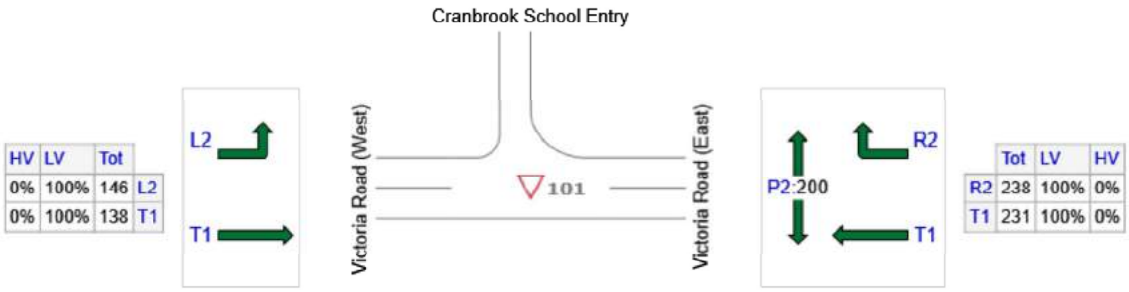


Figure 20 – Proposed Traffic Volumes (Victoria Road Gate)

6.3.4 Victoria Road Gate Modelling

The Victoria Road Gate intersection is a three arm priority controlled intersection with a one way, inbound movement into the development.

A summary of the SIDRA modelling results for the proposed conditions at the Victoria Road Gate intersection are presented in Table 17 and Attachment 2

Table 17 – Proposed Victoria Road Gate Modelling Summary

Intersection	Weekday AM Peak (7am to 9am)		
	Deg Sat (V/C)	Avg Delay (Sec)	LoS
Victoria Road East	0.394	4.2	A
Victoria Road West	0.137	2.3	A
All Vehicles	**0.394**	**3.4**	**A**

The results indicate that with the proposed intensification, the intersection would operate within its operational capacity during the AM and PM Peak with a level of service A.

6.4 On Street Parking Provision

With the proposed relocation of the 'Drop-Off and Pick Up' within the existing internal driveway, as discussed in section 6.2, the provision of on-street loading zones (discussed in section 6.5.7) and the proposed new driveway to access the underground parking facility (discussed in section 6.5), alterations are proposed to the existing on-street parking provisions.

With reference to Figure 21 and Figure 22 (and Attachment 3), the proposed alterations to the on-street parking restrictions are as follows;

- The existing school drop off/pick up zone along Rose Bay Avenue will generally be reallocated as un-restricted parking,
- Two, 15m Loading Zones will be provided along Rose Bay Avenue,
- A 15m School Bus Zone will also be provided along Rose Bay Avenue,
- Two areas of 'No Stopping' will be provided to assist vehicle exiting left out of the two exit driveways; (Rose Bay Ave Gate and the underground car park driveway) and
- No Stopping restriction will be provided on the inside of the 90 degree bend in Rose Bay Avenue to improve the visibility in this location.

Note; there are no proposed changes to the parking restriction on Victoria Road

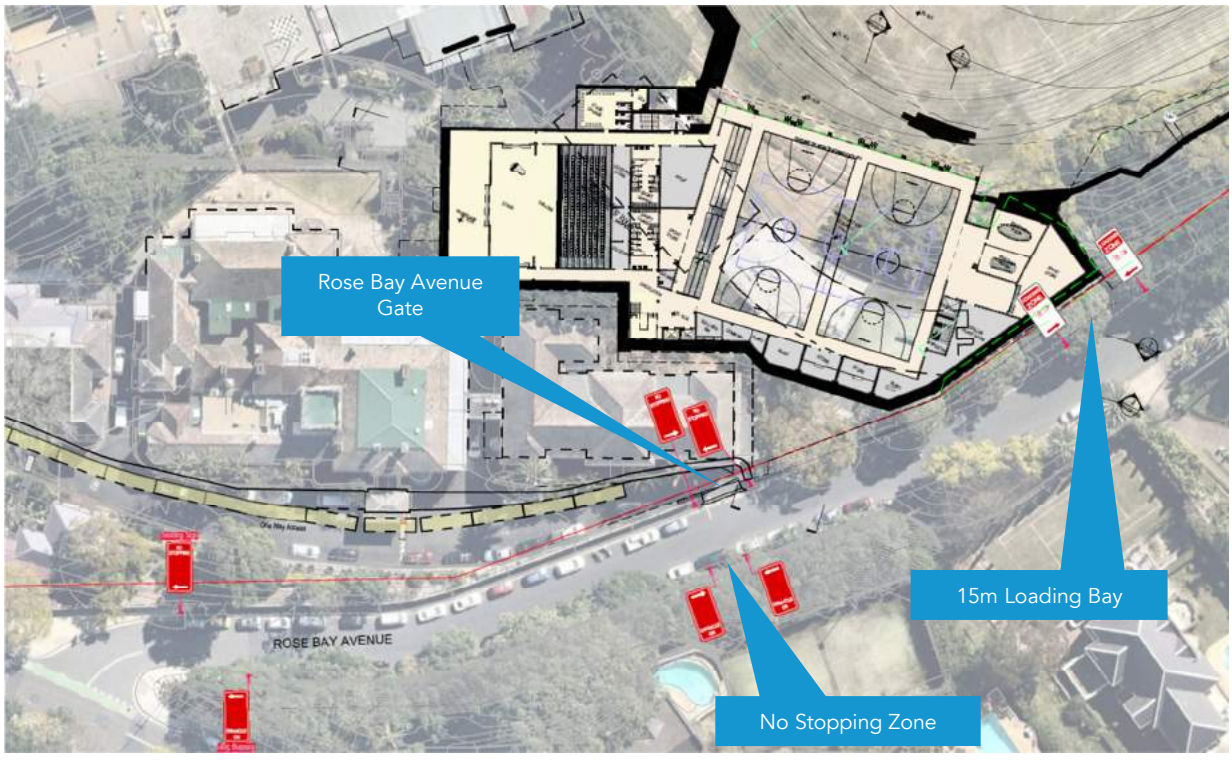


Figure 21 – Proposed On-Street Parking Provisions (Rose Bay Avenue west)

Figure 22 – Proposed On-Street Parking Provisions (Rose Bay Avenue east)

Table 18 – Proposed On Street Parking Provisions

Parking Restriction	Approximate Number of Spaces
Un-Restricted	**112 spaces**
Restricted parking (2.30pm to 9 am mon to fri, 24 hours sat and sun)	**6 spaces**
Loading Zone (9am to 2.30pm mon to fri)	**2 spaces (15m)**
School Bus Zone	**1 space (15m)**

In summary, the proposed on-street parking provisions will provide:

- 112 unrestricted parking spaces (24 hour, 7 day a week);
- 6 unrestricted parking spaces (24 hour, Sat & Sun); and
- 6 restricted parking spaces (18 ½ hours, Mon to Fri).

The proposed alterations to the on street parking facilities results in a net gain of approximately 11 un-restricted parking spaces (including the existing 10P spaces) and a reduction of approximately 10 restricted parking spaces. Therefore the proposed changes should have no effect on the on-street parking provisions in the vicinity of the development. Refer to Table 8 for the existing on street parking provisions.

It should also be noted that the provision of the 126 space car park as part of the Sports and Fitness facility (as stated in Section 6.5) should increase the availability of on-street parking in the vicinity of the school, with staff utilising the new parking facility.

It should be noted as outlined in Section 3, that the development does not propose any increases in the staff FTE or student population beyond the existing enrolment cap and the measures outlined in Section 6.2 (Drop off and Pick Up facilities), Section 6.4 (On Street Parking Provision) and Section 6.5 (On Site Parking Provision), should not change the origin and destination of staff and students accessing and egressing the site and therefore should not affect the peak hour traffic movements on the external road network.

6.5 Parking Provision

6.5.1 Planning Policy Requirement

The Woollahra Development Control Plan (DCP) 2015 sets out the planning policy requirements for Educational Establishments within Woollahra Municipal Council LGA.

As shown in Table 19, Section E1.5.2 sets out the parking requirements for Educational Establishments.

Table 19 – Non Residential Parking Rates (Section E1.5.2, Woollahra DCP 2015)

Land Use	Minimum Parking Generation Rate
Educational establishment	**1 space per 100m2** **On-site parking for disabled persons is provided at a minimum rate of one car space per 50 car spaces or part thereof.**

The proposed development will provide a total additional GFA of 10,794m^2 and therefore based on the planning policy requirements the development would require a minimum of **108 spaces,** 2 of which will need to be designated as accessible spaces.

6.5.2 Proposed Parking Provision

As shown in Figure 23 (and Attachment 3), the development will accommodate 124 parking spaces (including 2 accessible spaces) within an underground car park, accessed from a new driveway off Rose Bay Avenue.

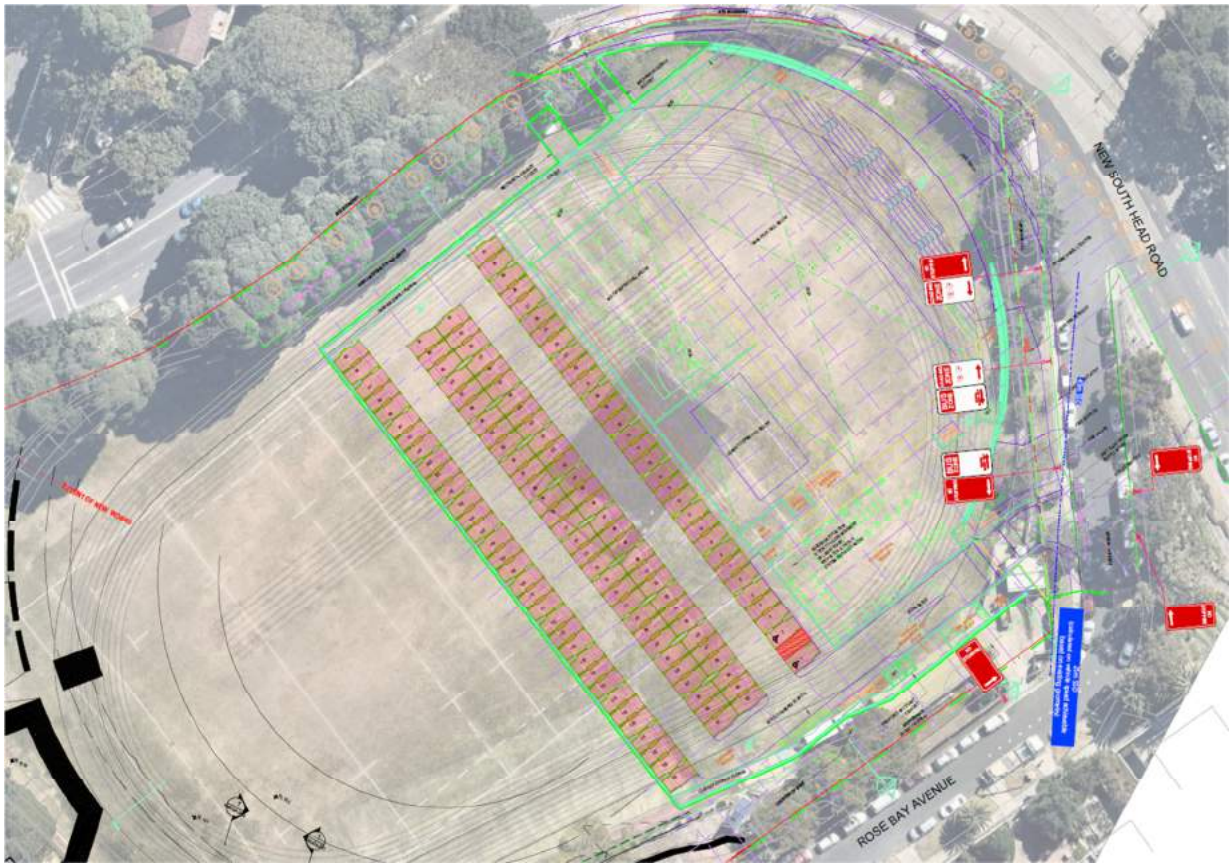


Figure 23 – Proposed Car Parking

Taking into consideration the displacement of the existing 29 spaces from within the internal driveway (as discussed in Section 6.2), the net gain in parking provision will be 95 spaces. Given that there is no proposed increase in staff numbers as part of the development, the provision of 95 additional spaces has been deemed acceptable, in accordance with the DCP requirements.

It should also be noted that the provision of the 124 space car park as part of the Sports and Fitness facility should increase the availability of on-street parking in the vicinity of the school, with staff utilising the new parking facility.

6.5.3 Learn to Swim School

The School currently operates public learn to swim classes in its existing 25 metre pool and these learn to swim classes are proposed to continue in the new learn to swim pool within the Sports and Fitness Centre. These learn to swim programs are for children who may or may not be students of the School and are expected to run for various levels of ability for 30 minute periods, between 7.30am and 7.30pm Monday to Friday, 7.30am to 5.00pm on Saturdays and 7.30am to 12.30pm on Sundays.

To assess the parking provision required to accommodate the learn to swim activity, we have reviewed the Schools' Operational Management Plan which indicates that the peak vehicle activity for learn to swim students to be as follows:

- Monday to Friday – 4.30pm to 5.30pm – 100 vehicles
- Saturday to Sunday - 9.00am to 10.00am - 68 vehicles

As shown, the peak activity period for the learn to swim facility is between 4.30pm and 5.30pm, Monday to Friday.

As stated in Section 6.5.2, the development provides a parking provision of 124 spaces, with school staff being the primary users. The peak usage time of the learn to swim facility is outside the school staff core hours of 8.00am to 4.00pm and patrons would be able to use the Aquatic and Fitness Centre car park.

It should also be noted (as stated in Section 6.4) that the provision of the car park also increases the availability of on-street parking in the vicinity of the school, which would also be available for use by patrons of the learn to swim facility, should the need arise. Again, given the peak activity periods are outside peak school usage, the on street car parking will be predominantly vacated at these times.

The peak traffic activity for the learn to swim facility is also outside of the network peak traffic activity along Rose Bay Avenue and westbound along New South Head Road and therefore should have no adverse impact on the traffic activity on the external road network and should be within daily volume variations.

6.5.4 Vehicular Access

The proposal involves the construction of a new driveway off Rose Bay Avenue and as discussed in Section 6.4 has a minor effect on the on street parking restrictions along the site frontage.

According to AS2890.1, Table 1.1 the car park facility is categorised as Class 1 (Employee and commuter parking) facility. However, as the facility is a sports centre, the access has been designed in line with the requirements of a Class 2 (long term city centre, parking, sports facilities entertainment centres…). With reference to Table 3.1 and 3.2, the access facility is categorised as a Category 3 with a width of between 10m and 12m with a 1m separation.

The proposed driveway width is 11m, therefore meeting this minimum requirement.

6.5.5 Sight Distance

The sight distance requirements are described in Section 3.2.4 of AS2890.1 and are prescribed on the basis of the posted speed limit or the 85th percentile vehicle speed along the frontage road.

Rose Bay Avenue has a posted speed of 50 kph, which requires a desirable visibility distance of 69m and a minimum distance of 45m.

As shown in Figure 24 (and Attachment 3), the driveway is located in a position that provides a min of 45m visibility to the left and 25m to the right.

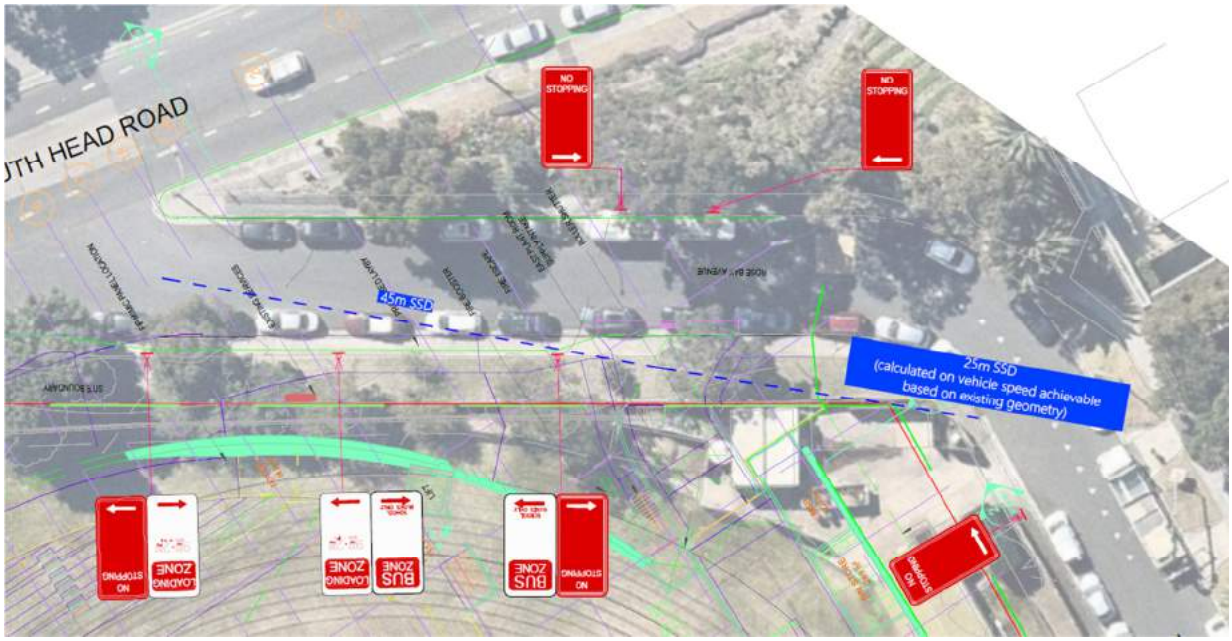


Figure 24 – Proposed Driveway

The following assessment was undertaken to determine the suitability of the 25m visibility to the right.

The radius of the existing road centreline radius on the approach to the driveway (from the right) is 17.2m. The following equation (based on Formula 5, Austroads Guide to Road Design: Part 3 – Geometric design) was used to calculate the speed that vehicles would negotiate the approach radius:

$$V = \sqrt{(127(e+f))R}$$

Where; V= Vehicle speed (kph)

e = superelevation (0.023)

f = side friction factor (0.3)

R = radius (m) (17.2)

From this formula, it has been calculated that the negotiable speed of the approach radius is **26.6 kph.**

Then, using Formula 1 (Austroads Guide to Road Design: Part 3 – Geometric design) the Stopping Sight Distance (SSD) required was calculated.

$$SSD = Rt\ V/3.6 + V^2/254\ (d+0.01a)$$

Where; Rt = reaction time (1.5 sec)

V = vehicle speed (kph) (26.6 kph)

d = mean value on wet sealed roads (0.46)

a = longitudinal grade (0.1)

From this formula, it has been calculated that a suitable SSD for the driveway would be **17.15m.**

The proposed visibility (to the left) is 25 metres and is therefore deemed acceptable.

Also, as discussed in Section6.4, a 'No Stopping' restriction is proposed on the approach to the driveway, which will further improve the visibility on approach.

6.5.6 Car Park Arrangement

The car park access and parking arrangements have been designed in accordance with the requirements of Section 2 of AS2890.1.

Table 1.1 of AS2890.1 presents a number of classifications applicable to different land-uses. According to the Table, the most appropriate car park classification applicable to the subject car park will be a Class 2 facility, which is suitable for "Long term city & town centre parking, sports facilities…".

The parking space dimensions and associated aisle widths for each classification are presented in Table 2.2, and accordingly, a Class 2 facility requires parking space dimensions of 2.5 x 5.4 metres with an access aisle width of 5.8 metres. The proposed car park has been designed to provide compliant parking space widths of 2.5 metres and an aisle width of 5.8 metres (minimum). An assessment of all elements of the car park has been undertaken including column locations, aisle extensions and ramp grades and in this regard, the car park design complies with the requirements of AS2890.1.

Included with the parking arrangements is the provision of two accessible parking spaces. These spaces have been assessed against the requirements of AS2890.6. The standard requires parking space dimensions of 2.4 x 5.4 metres with a shared space of 2.4 metres width adjacent to any spaces. An assessment of all elements of the car park has been undertaken and in this regard the car park design complies with the requirements of AS2890.6.

6.5.7 Service Vehicles

Due to site limitations and heritage and trees of significant importance, it is not possible to provide service vehicle areas within the site. Therefore, it is proposed that servicing will be undertaken on street in two designated loading bays.

As shown in Figure 25 (and Attachment 3), the bays will be 15m in length to accommodate the expected largest vehicle, that being a Medium Rigid vehicle and these bays will operate between 9.30am and 2pm. Outside of these times the bays will revert to on street parking spaces.

In conjunction with this, a 15m 'School Bus Zone' is proposed on Rose Bay Avenue, adjacent to the proposed car park driveway, for use by 2 school mini buses or a school bus.

Figure 25 – Proposed Loading Bays

6.5.8 Bicycle Provision

The Woollahra Development Control Plan (DCP) 2015 sets out the planning policy requirements for Educational Establishments within Woollahra Municipal Council LGA.

As shown in Table 19, Section E1.5.2 sets out the parking requirements for Educational Establishments.

Table 20 – Traffic, Parking and Access Requirements (Section F2.6, Woollahra DCP 2015)

Land Use		Minimum Parking Generation Rate	
O6	**To encourage use of bicycles as a means of travel to educational establishments.**	**C9**	**Bicycle parking is provided.**
		C10	**For secondary and tertiary establishments—dedicated secure bicycle parking is provided at the following rates: a) 5% of staff numbers; b) 10% of full time student numbers; at a central location and with associated change rooms and showers.**

As outlined in Section 2, the school has a staff FTE of 115 and a student population enrolment cap of 1115.

Applying the Council requirements to the existing school population leads to the following requirements:

- Staff – 1 space for 5% member of staff – 6 spaces
- Students - 1 space for 10% of students - 112 spaces
- Total - 118 spaces

The proposed car park includes the provision of 20 bicycle spaces, therefore providing 100 spaces throughout the campus.

Given that there is no proposed increase in staff or student numbers as part of the development, the provision of 20 additional spaces has been deemed acceptable, in accordance with the DCP requirements and also promotes a heathier and an alternative mode of transport for both staff and students.

7. Conclusion

In summary, the proposed redevelopment of the War Memorial Building and Aquatic and Sports Centre at Cranbrook School increases the school GFA by 10,794m^2, but proposes no increase in student or staff numbers.

Due to the relocation of the drop of and pick up activity to the internal driveway, the assessment of the traffic activity has established that the development is likely to increase traffic movements at the Victoria Road Gate. However, traffic modelling indicates that this relocation should have no detrimental effect on the surrounding road network and this would remove unsafe practices currently being undertaken on-street as part of the drop off and pick up process.

The proposed parking provision of 124 spaces is considered suitable with reference to the DCP requirements. The parking and vehicular access have been designed in accordance with AS2890 Part 1 and Part 6 and the location of the access driveway will not present any capacity constraints or safety concerns.

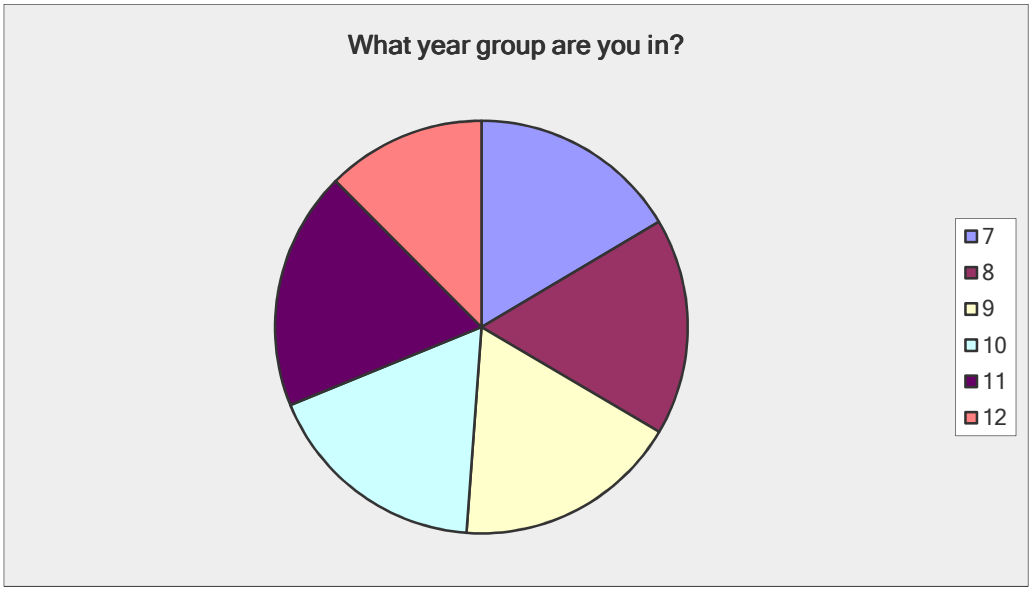
The proposed alterations to the on street parking facilities results in a net gain of approximately 11 un-restricted parking spaces and a reduction of approximately 10 restricted parking spaces. Therefore the proposed changes should have no effect on the on-street parking provisions in the vicinity of the development.

Servicing of the site will be undertaken utilising two loading zones located in Rose Bay Avenue, sized to accommodate medium rigid vehicles.

Attachment 1 Online Survey Results

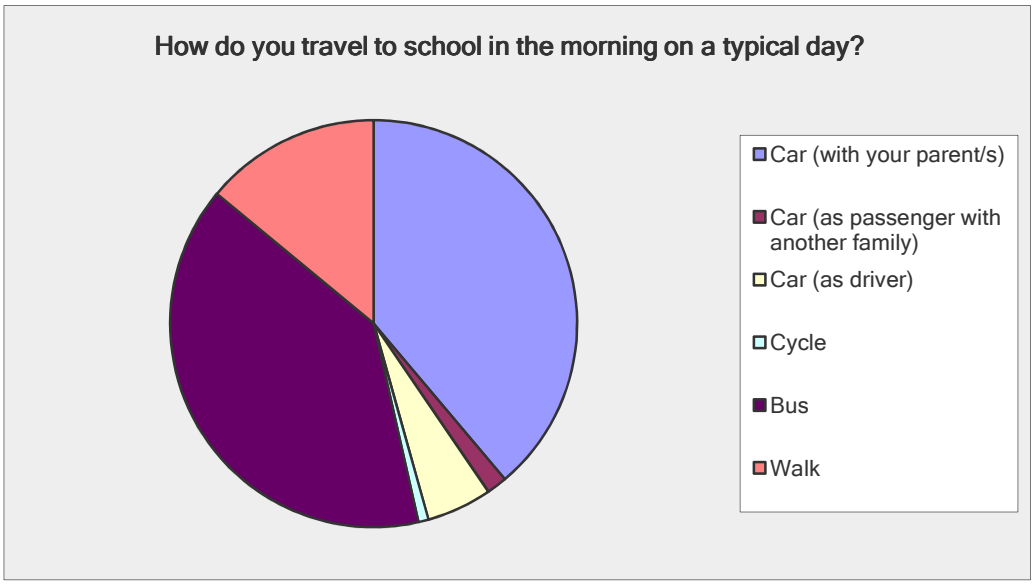
Cranbrook School Student Travel Survey

What year group are you in?		
Answer Options	**Response Percent**	**Response Count**
7	16.5%	137
8	17.0%	141
9	17.7%	147
10	17.7%	147
11	18.7%	155
12	12.5%	104
	answered question	**831**
	skipped question	**0**



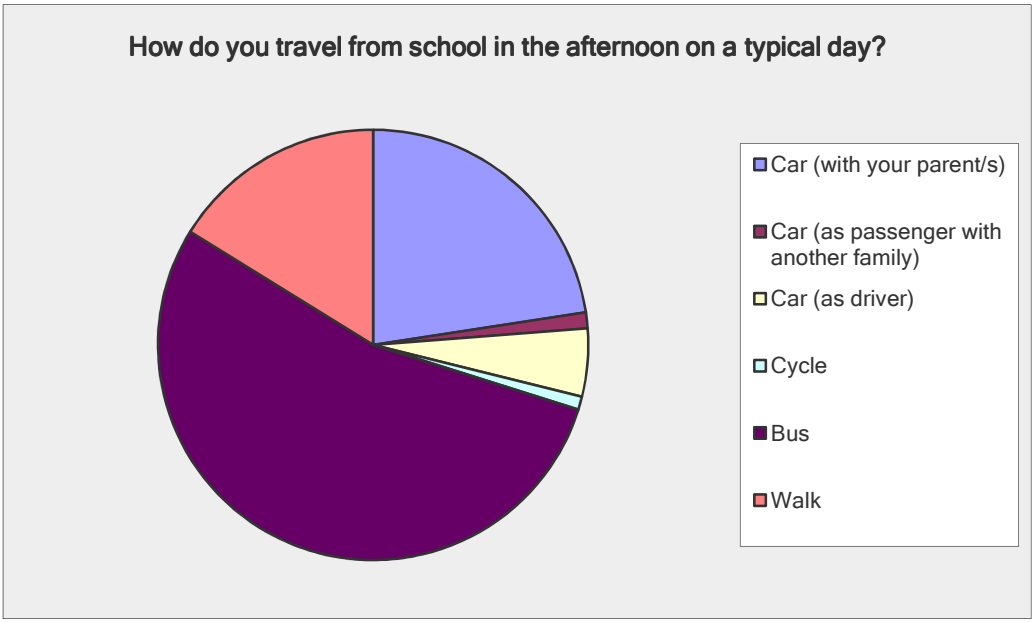
Cranbrook School Student Travel Survey

How do you travel to school in the morning on a typical day?		
Answer Options	**Response Percent**	**Response Count**
Car (with your parent/s)	38.9%	323
Car (as passenger with another family)	1.6%	13
Car (as driver)	5.2%	43
Cycle	0.8%	7
Bus	39.6%	329
Walk	14.0%	116
	answered question	**831**
	skipped question	**0**



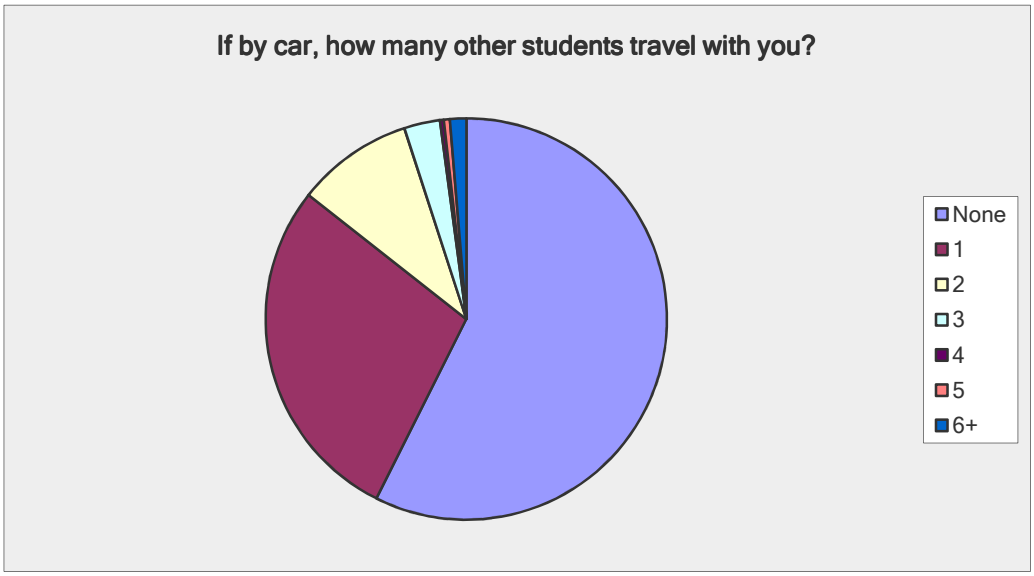
Cranbrook School Student Travel Survey

How do you travel from school in the afternoon on a typical day?		
Answer Options	**Response Percent**	**Response Count**
Car (with your parent/s)	22.6%	187
Car (as passenger with another family)	1.2%	10
Car (as driver)	5.1%	42
Cycle	1.0%	8
Bus	54.0%	448
Walk	16.2%	134
	answered question	**829**
	skipped question	**2**



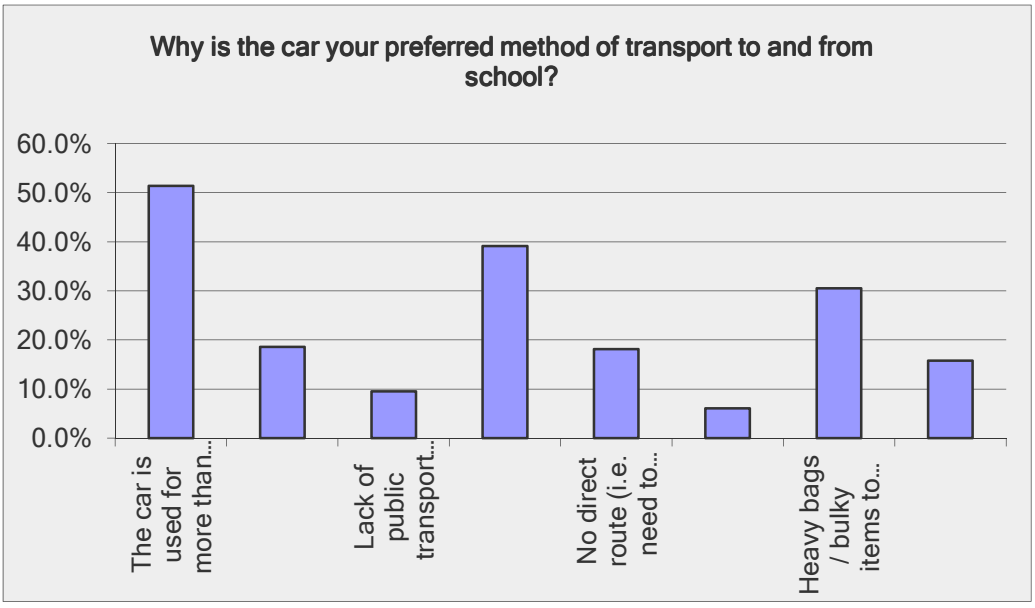
Cranbrook School Student Travel Survey

If by car, how many other students travel with you?		
Answer Options	**Response Percent**	**Response Count**
None	57.4%	354
1	28.2%	174
2	9.4%	58
3	2.9%	18
4	0.3%	2
5	0.5%	3
6+	1.3%	8
	answered question	**617**
	skipped question	**214**



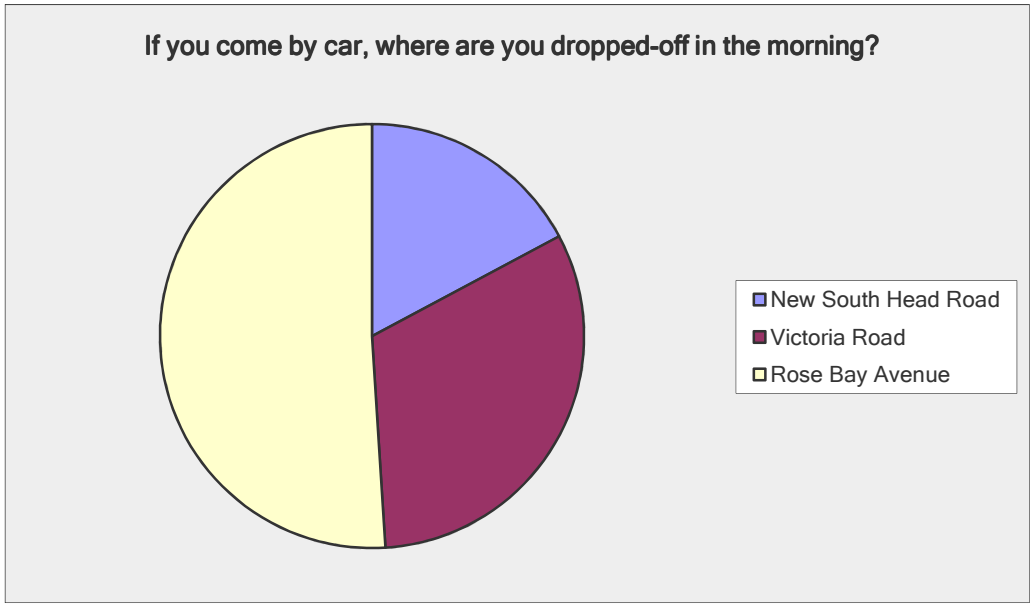
Cranbrook School Student Travel Survey

Why is the car your preferred method of transport to and from school?		
Answer Options	**Response Percent**	**Response Count**
The car is used for more than one purpose? (eg my brother is dropped at school, or my parent drives to work after dropping me)	51.4%	276
Lack of convenient bus/train stop close to home	18.6%	100
Lack of public transport services	9.5%	51
Takes longer by public transport	39.1%	210
No direct route (i.e. need to change buses, or from train to bus to complete journey)	18.1%	97
Personal security	6.1%	33
Heavy bags / bulky items to carry	30.5%	164
Other (please specify below)	15.8%	85
Other (please specify)		117
	answered question	537
	skipped question	294



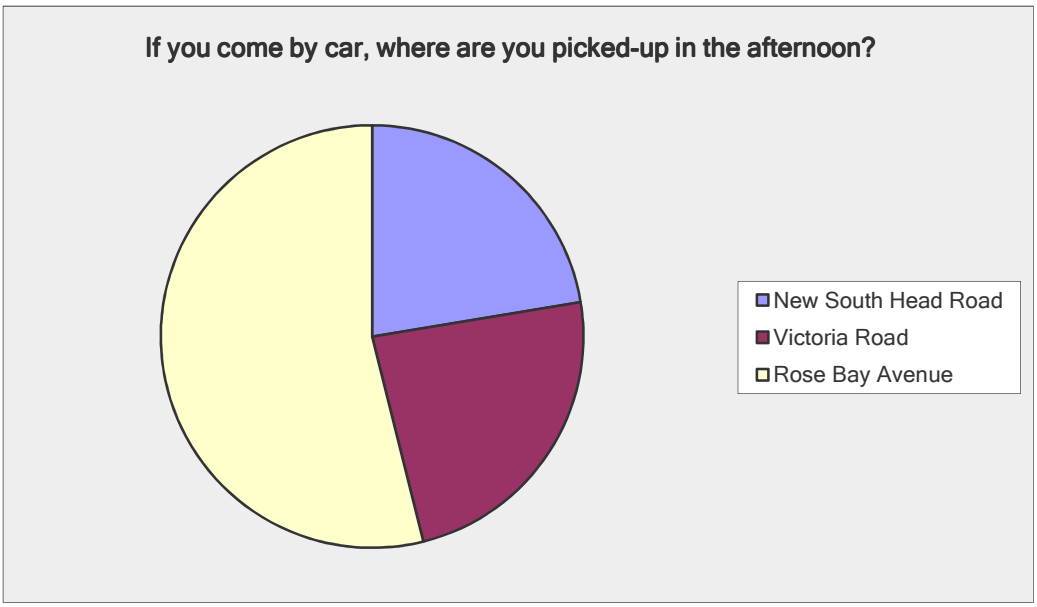
Cranbrook School Student Travel Survey

If you come by car, where are you dropped-off in the morning?		
Answer Options	**Response Percent**	**Response Count**
New South Head Road	17.2%	86
Victoria Road	31.8%	159
Rose Bay Avenue	51.0%	255
Other (please specify)		61
	answered question	**500**
	skipped question	**331**



Cranbrook School Student Travel Survey

If you come by car, where are you picked-up in the afternoon?		
Answer Options	**Response Percent**	**Response Count**
New South Head Road	22.4%	88
Victoria Road	23.7%	93
Rose Bay Avenue	53.9%	212
Other (please specify)		85
	answered question	**393**
	skipped question	**438**



Cranbrook School Student Travel Survey

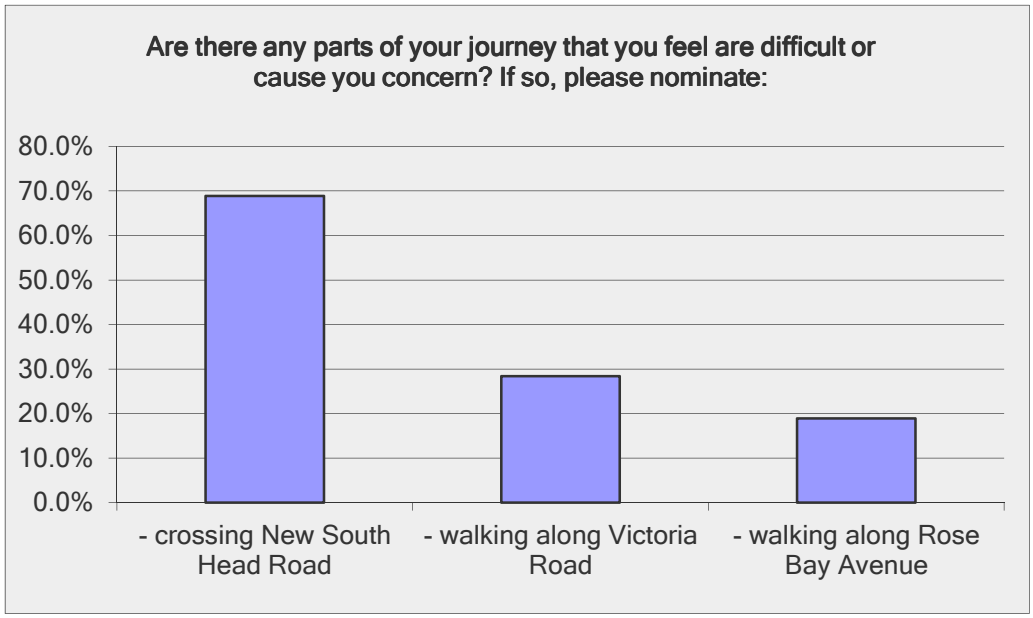
If you park and walk to the school, which street do you generally park in?	
Answer Options	**Response Count**
	180
answered question	**180**
skipped question	**651**

Cranbrook School Student Travel Survey

What is the postcode of where you live?	
Answer Options	**Response Count**
	752
answered question	**752**
skipped question	**79**

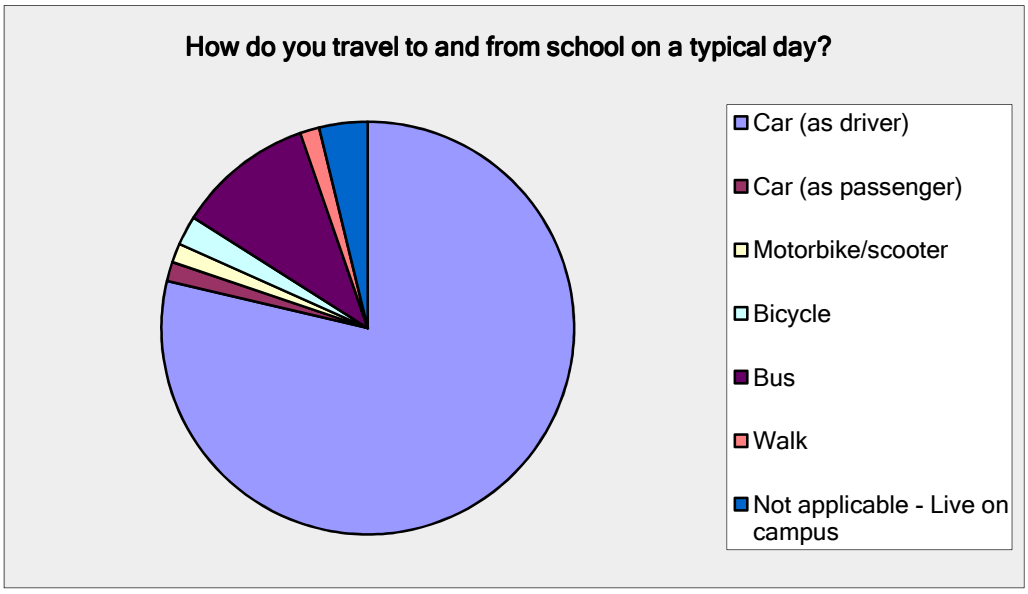
Cranbrook School Student Travel Survey

Are there any parts of your journey that you feel are difficult or cause you concern? If so, please nominate:		
Answer Options	**Response Percent**	**Response Count**
- crossing New South Head Road	68.9%	51
- walking along Victoria Road	28.4%	21
- walking along Rose Bay Avenue	18.9%	14
Other (please specify)		107
	answered question	**74**
	skipped question	**757**



Cranbrook School Staff Travel Survey

How do you travel to and from school on a typical day?		
Answer Options	**Response Percent**	**Response Count**
Car (as driver)	78.6%	103
Car (as passenger)	1.5%	2
Motorbike/scooter	1.5%	2
Bicycle	2.3%	3
Bus	10.7%	14
Walk	1.5%	2
Not applicable - Live on campus	3.8%	5
	answered question	**131**
	skipped question	**0**

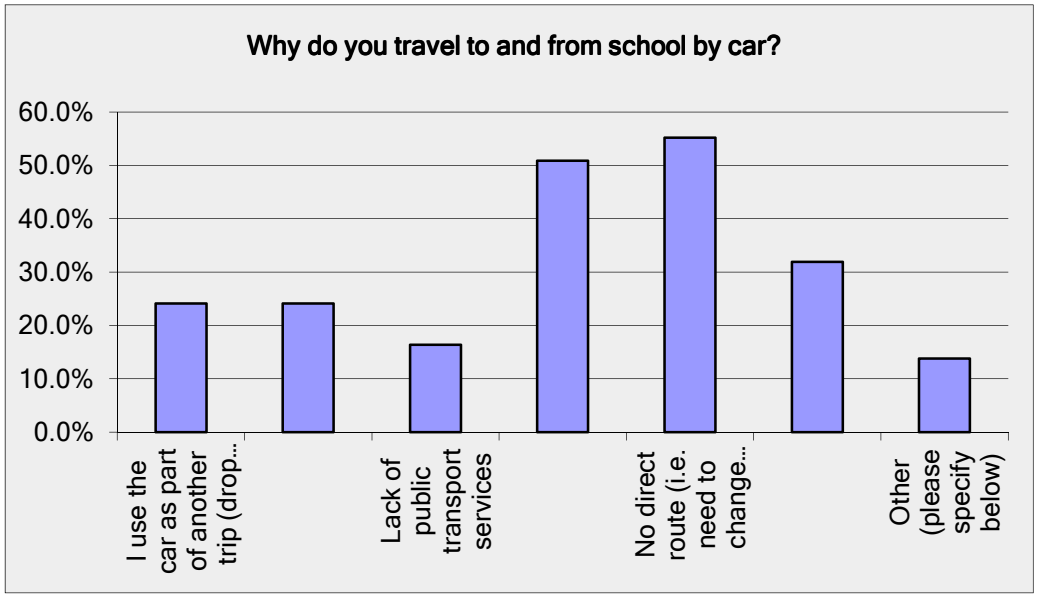


Cranbrook School Staff Travel Survey

Do you have allocated parking?		
Answer Options	**Response Percent**	**Response Count**
Yes	6.7%	7
No	93.3%	97
	answered question	**104**
	skipped question	**27**

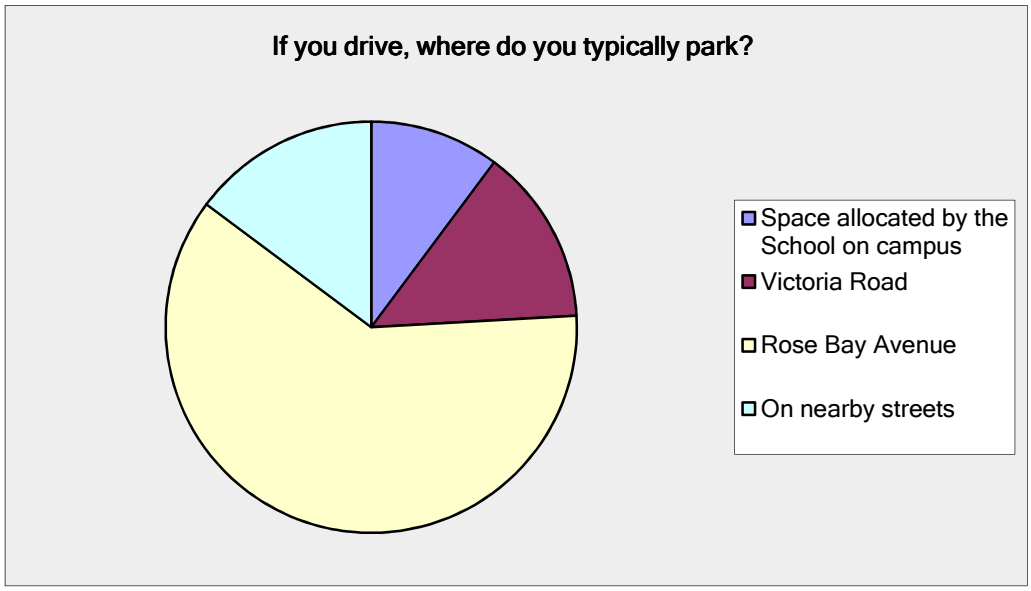
Cranbrook School Staff Travel Survey

Why do you travel to and from school by car?		
Answer Options	**Response Percent**	**Response Count**
I use the car as part of another trip (drop children / partner at school / work)	24.1%	28
Lack of convenient bus/train stop close to home	24.1%	28
Lack of public transport services	16.4%	19
Takes longer by public transport	50.9%	59
No direct route (i.e. need to change buses, or from train to bus to complete journey)	55.2%	64
Heavy bags / bulky items to carry	31.9%	37
Other (please specify below)	13.8%	16
Other (please specify)		21
	answered question	**116**
	skipped question	**15**



Cranbrook School Staff Travel Survey

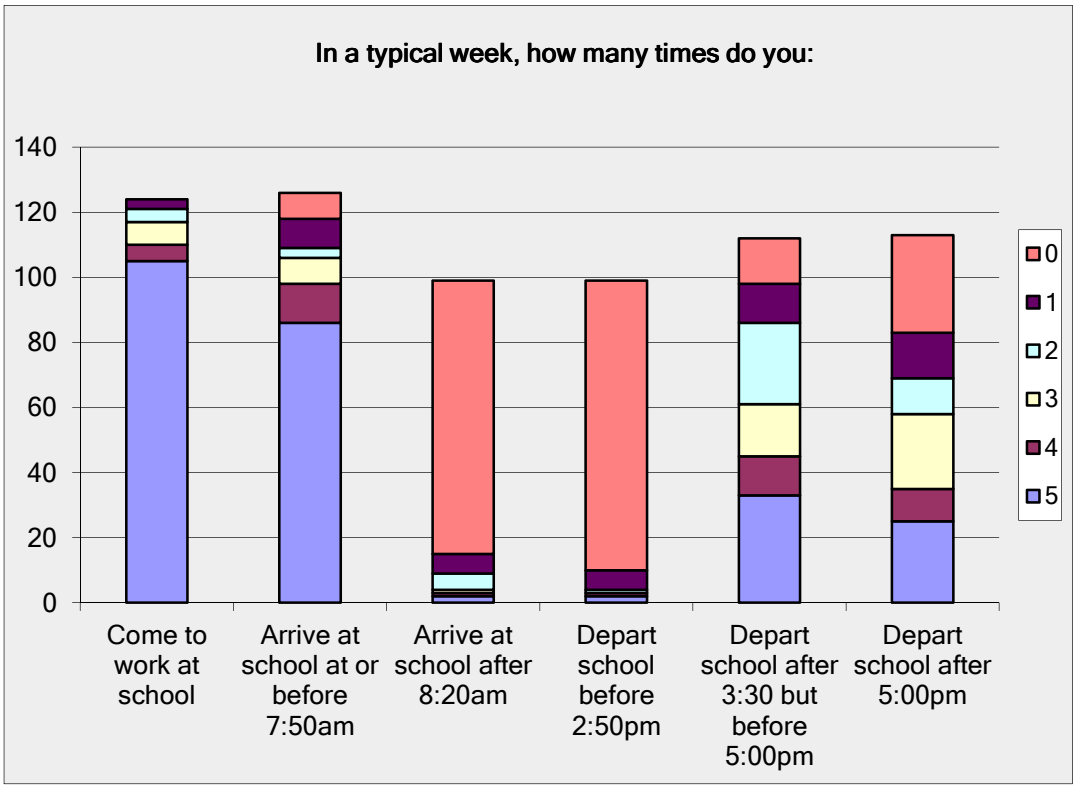
If you drive, where do you typically park?		
Answer Options	**Response Percent**	**Response Count**
Space allocated by the School on campus	10.2%	11
Victoria Road	13.9%	15
Rose Bay Avenue	61.1%	66
On nearby streets	14.8%	16
Other (please specify)		21
	answered question	108
	skipped question	23



Cranbrook School Staff Travel Survey

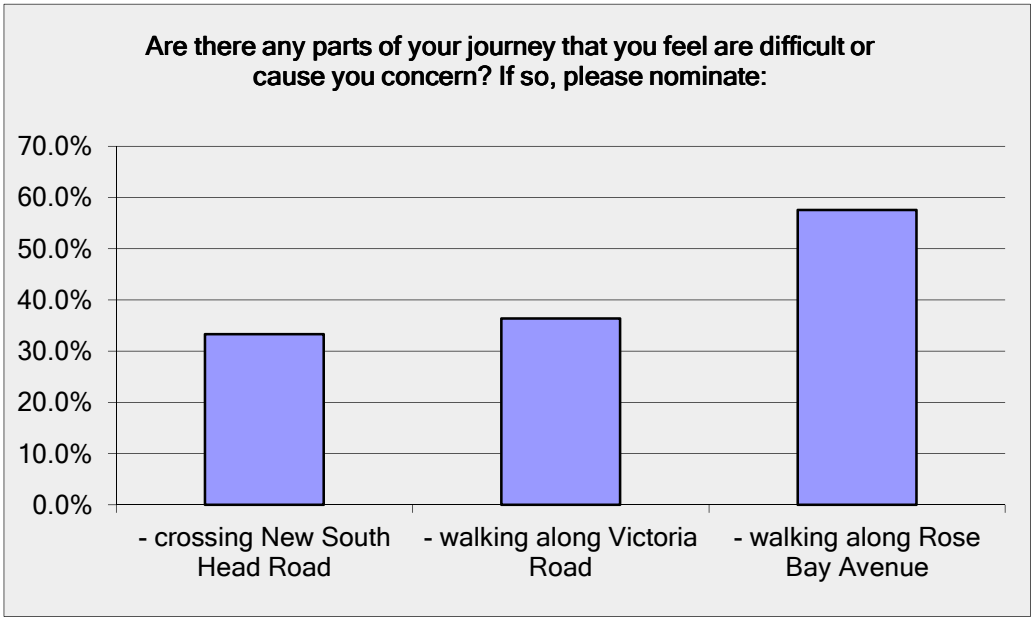
In a typical week, how many times do you:

Answer Options	0	1	2	3	4	5	Response Count
Come to work at school	0	3	4	7	5	105	124
Arrive at school at or before 7:50am	8	9	3	8	12	86	126
Arrive at school after 8:20am	84	6	5	1	1	2	99
Depart school before 2:50pm	89	6	1	0	1	2	99
Depart school after 3:30 but before 5:00pm	14	12	25	16	12	33	112
Depart school after 5:00pm	30	14	11	23	10	25	113
					answered question		127
					skipped question		4



Cranbrook School Staff Travel Survey

Are there any parts of your journey that you feel are difficult or cause you concern? If so, please nominate:		
Answer Options	**Response Percent**	**Response Count**
- crossing New South Head Road	33.3%	11
- walking along Victoria Road	36.4%	12
- walking along Rose Bay Avenue	57.6%	19
Other (please specify)		16
	answered question	33
	skipped question	98



Attachment 2 Traffic Modelling

LANE SUMMARY

Site: 101 [Vic_Cran Entry AM]

New Site
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Victoria Road (East)													
Lane 1	90	0.0	1006	0.089	23[6]	1.0	LOS A	0.4	2.9	Short	10	0.0	NA
Lane 2	379	0.0	963	0.394	100	4.9	LOS A	2.4	17.0	Full	500	0.0	0.0
Approach	469	0.0		0.394		4.2	NA	2.4	17.0				
West: Victoria Road (West)													
Lane 1	146	0.0	1839	0.079	100	3.4	LOS A	0.0	0.0	Short (P)	30	0.0	NA
Lane 2	138	0.0	1006	0.137	100	1.0	LOS A	0.7	4.7	Full	500	0.0	0.0
Approach	284	0.0		0.137		2.3	NA	0.7	4.7				
Intersection	753	0.0		0.394		3.4	NA	2.4	17.0				

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

6 Lane under-utilisation due to downstream effects

Organisation: PARKING AND TRAFFIC CONSULTANTS | Processed: Friday, 3 November 2017 10:06:49 AM
Project: Z:\PCI - PROJECT WORK FILES\NSW\Cranbrook School - Cranbrook Senior School - Revised DA Stage\Analysis\Project1.sip7

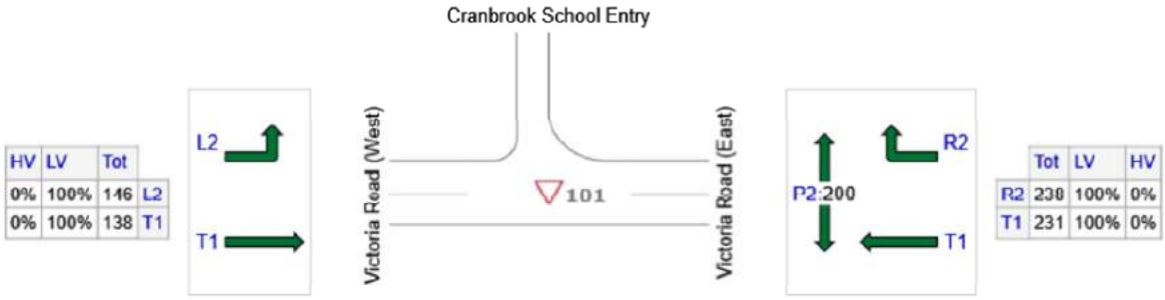
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [Vic_Cran Entry AM]

New Site
Giveway / Yield (Two-Way)

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
E: Victoria Road (East)	469	469	0
W: Victoria Road (West)	284	284	0
Total	753	753	0

Organisation: PARKING AND TRAFFIC CONSULTANTS | Created: Friday, 3 November 2017 10:09:17 AM
Project: Z:\PCI - PROJECT WORK FILES\NSW\Cranbrook School - Cranbrook Senior School - Revised DA Stage\Analysis\Project1.sip7

Attachment 3 Traffic Assessment Plans

Attachment 4 Concept Construction Traffic Management Plan

ptc - cranbrook school - SSDA Design 10-05-18.dwg

COMMENTS

A3

ptc.

Suite 102, 506 Miller Street,
Cammeray NSW 2062

t +61 2 8920 0800

ptcconsultants.co

REV	DATE	COMMENT	DRAWN	REVIEWED
5	10/05/18	Updated Traffic Assessment	SW	AM
4	09/05/18	Updated Traffic Assessment	SW	AM
3	05/04/18	Updated Traffic Assessment	SW	AM
1	08/12/17	Traffic Assessment	SW	AM

PROJECT:
Cranbrook Senior School

DRAWING TITLE:
Traffic Layout - Sheet 1
Driveway Layout

CLIENT: Cranbrook School

DRG. #: DA-001

PROJECT #: T2-2170

SCALE: 1:500

REV: 5

ptc - cranbrook school - SSDA Design 10-05-18.dwg

COMMENTS

A3

NEW WORKS
CARPARK SUPPLY PLENUM
EGRESS
VOID
MULTIPURPOSE HALL BELOW
MAIN POOL HALL BELOW
LEARN TO SWIM POOL BELOW
ACCESS HATCH IN GYM FLOOR TO ALLOW MOVEMENT OF LARGE EQUIP. WITH BLOCK & TACKLE SYSTEM INSTALLED ABOVE
FITNESS GYM
FORECOURT
SITE BOUNDARY
FIP MIMIC PANEL LOCATION
EXISTING SERVICES
PROPOSED LAYBY
FIRE BOOSTER
FIRE ESCAPE
EAST PLANT ROOM SUPPLY INTAKE
ROLLER SHUTTER
BOOM GATES
CARPARK
BICYCLE PARKING 20 SPOTS
CARPARK EXHAUST PLENUM
CARPARK EXHAUST PLANT
LIFT LOBBY
LIFT
BIN STORE
LOCATION OF BORE
PROPOSED AFC PLANT EXHAUST
MAINTENANCE STORE OVERHEAD
LOADING ZONE
NO STOPPING
BUS ZONE
ROSE BAY AVENUE
25m SSD (calculated on vehicle speed achievable based on existing geometry)

ptc.

Suite 102, 506 Miller Street,
Cammeray NSW 2062

t +61 2 8920 0800

ptcconsultants.co

REV	DATE	COMMENT	DRAWN	REVIEWED
5	10/05/18	Updated Traffic Assessment	SW	AM
4	09/05/18	Updated Traffic Assessment	SW	AM
3	05/04/18	Updated Traffic Assessment	SW	AM
1	08/12/17	Traffic Assessment	SW	AM

PROJECT: Cranbrook Senior School

DRAWING TITLE: Traffic Layout - Sheet 2
Car Park Access & Layout

CLIENT: Cranbrook School

DRG. #: DA-001

PROJECT #: T2-2170

SCALE: 1:500

REV: 5