



traffic
modelling;

Cranbrook School, Bellevue Hill

For Cranbrook School
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1. Introduction

Ptc. have been engaged by Cranbrook School to prepare responses to the Traffic and Transport comments issued by the approving authorities, in relation to the proposed state significant development (SSD) at Cranbrook School, Bellevue Hill (SSD 8812)

This report relates specifically to the 'Response to Submission (RtS)' provided by the Department of Planning and Environment and is a response to Key Issue 2 –

- Examination and modelling of the following intersections is to be submitted as part of the RtS:
 - New South Head Road / Rose Bay Avenue
 - New South Head Road / Victoria Road

2. Traffic Impact Assessment

2.1 Existing Traffic Volumes

To determine the current traffic volumes, intersection surveys were conducted on the 8th August, 2018 between 7:00am to 9:00am and 3:00pm to 6:00pm on the subject intersections:

- New South Head Road & Rose Bay Avenue
- New South Head Road & Victoria Road

The location of these surveys is shown Figure 1.

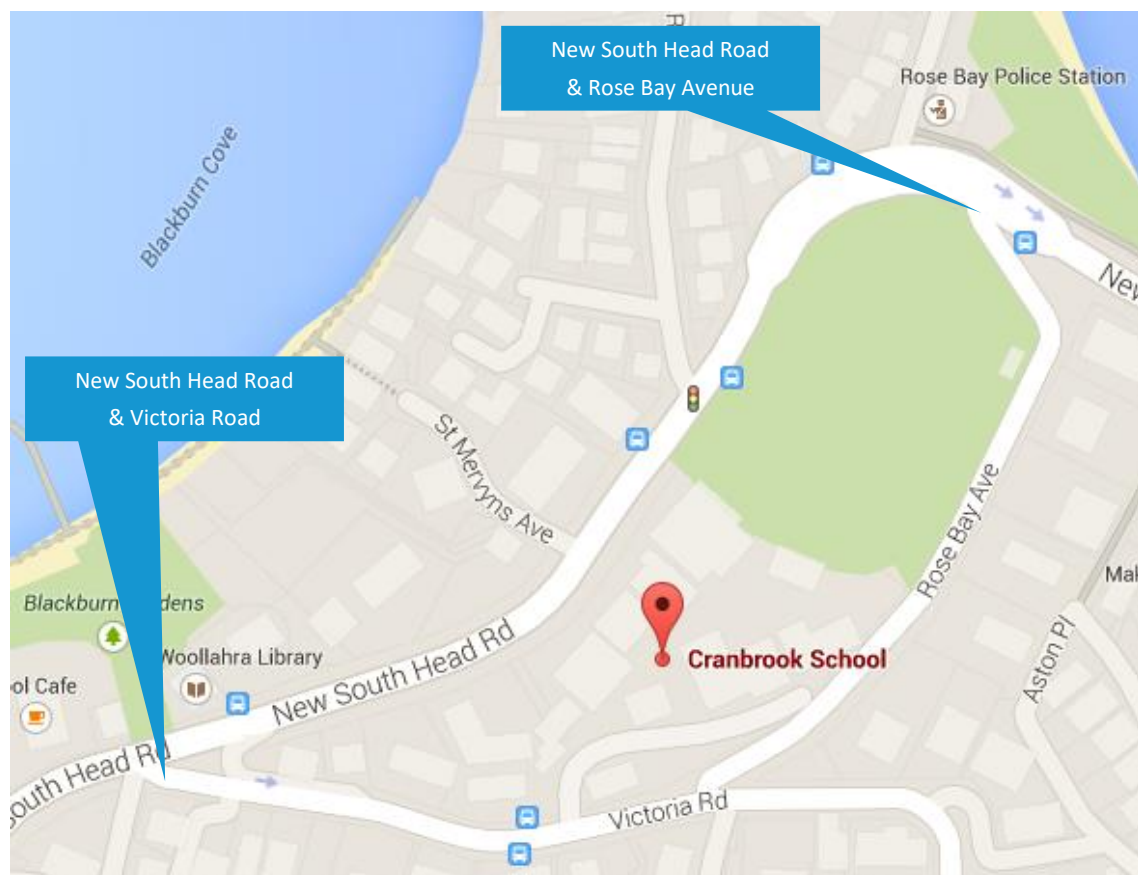


Figure 1 – Location of intersection surveys

The peak hours for the corresponding intersections were determined to be as follows:

- New South Head Road & Rose Bay Avenue:
 - Morning Peak hour: 7.15am to 8.15am
 - Evening Peak Hour: 3.00pm to 4.00pm
- New South Head Road & Victoria Road:
 - Morning Peak hour: 7.00am to 8.00am
 - Evening Peak Hour: 4.45pm to 5.45pm

A diagrammatic representation of the survey results for peak hour volume is shown in Figure 2 and Figure 3.

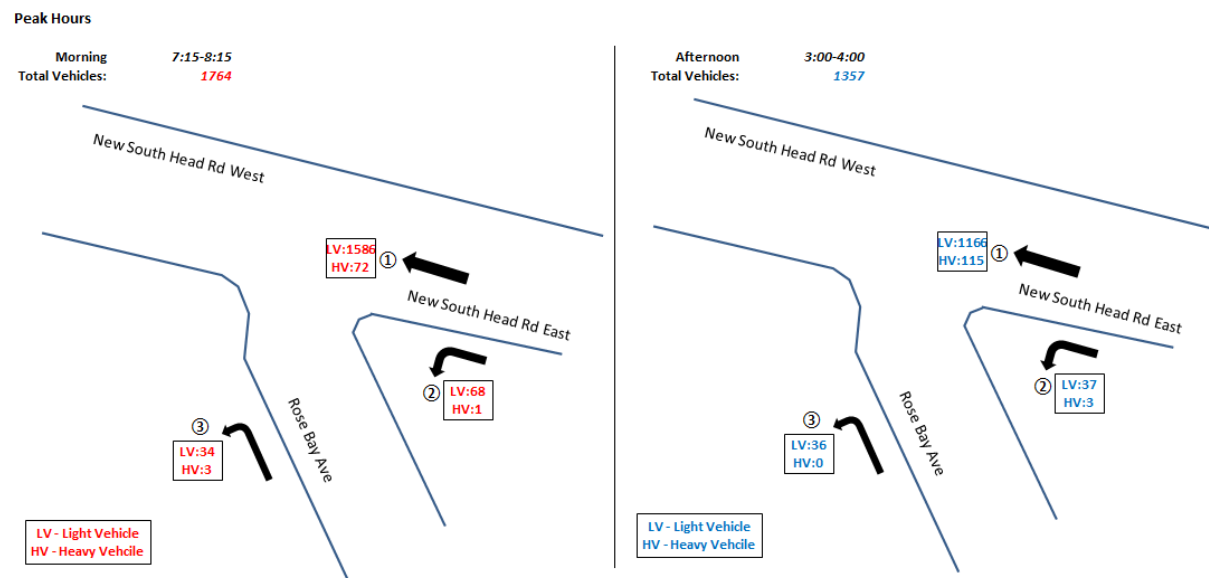


Figure 2 – New South Head Road & Rose Bay Avenue – Existing Traffic Volumes

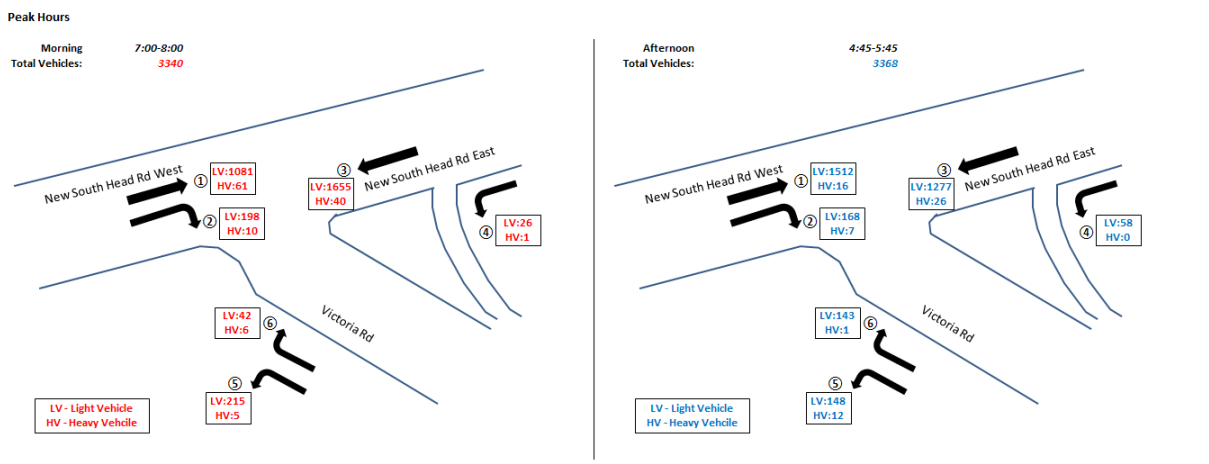


Figure 3 – New South Head Road & Victoria Road – Existing Traffic Volumes

From the survey data, a volume analysis was performed using SIDRA Intersection 7.0 software, a micro-analytical tool for individual intersections and whole-network modelling. The models are based on the collected traffic survey data. SIDRA provides a number of performance indicators, outlined below:

- 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:
- 95% Queue Lengths (Q95) – is defined to be the queue length in metres that has only a 5-percent probability of being exceeded during the analysis time period. It transforms the average delay into measurable distance units.

Level of Service is a good indicator of overall performance for individual intersections, with each level summarised in Table 1

Table 1 – Intersection Performance - Levels of Service

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

The SIDRA results are displayed in Table 2 and the movement summaries can be found in Attachment 1..

Table 2 – Summary of Existing Traffic Conditions

Intersection	Period	Level of Service	Average Delay (sec)	Degree of Saturation	Average Length of Queue (m)
New South Head Road & Rose Bay Avenue	AM Peak	LOS A	0.3	0.460	1.0
	PM Peak	LOS A	.2	0.454	0.6
New South Road & Victoria Road	AM Peak	LOS B	20.8	0.858	181.9
	PM Peak	LOS B	15.8	0.764	134.9

2.2 Proposed Development Traffic Generation

As outlined in Section 3 of the 'Parking and Traffic Assessment' (prepared by **ptc.** dated 10th May 2018 , that the development does not propose any significant increases in the staff FTE and no increase in student population beyond the existing enrolment cap.

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) of the 'Parking and Traffic Assessment' (prepared by **ptc.** dated 10th May 2018), 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.

Attachment 1 - SIDRA Movement Summary

MOVEMENT SUMMARY

 Site: 1 [[AM Existing] New South Head Road / Rose Bay Avenue]  Network: N101 [AM Existing]

Date: 09/08/18
Time: 7:15-8:15
Site Category: (None)
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total	HV	Total	HV									
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Rose Bay Avenue														
1	L2	39	8.1	39	8.1	0.103	13.8	LOS A	0.1	1.0	0.73	0.88	0.73	32.9
Approach		39	8.1	39	8.1	0.103	13.8	LOS A	0.1	1.0	0.73	0.88	0.73	32.9
East: New South Head Road (East)														
4	L2	73	1.4	73	1.4	0.040	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	48.8
5	T1	1745	4.3	1745	4.3	0.460	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1818	4.2	1818	4.2	0.460	0.3	NA	0.0	0.0	0.00	0.02	0.00	58.9
West: New South Head Road (West)														
11	T1	1253	5.6	1253	5.6	0.333	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1253	5.6	1253	5.6	0.333	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		3109	4.8	3109	4.8	0.460	0.3	NA	0.1	1.0	0.01	0.02	0.01	59.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
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 movements.
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.

MOVEMENT SUMMARY

 **Site: 3 [[AM Existing] New South Head Road / Victoria Road]**

 **Network: N101 [AM Existing]**

Date: 09/08/18

Time: 7:00-8:00

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Flows HV %	Arrival Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Vehicles	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Victoria Road														
1	L2	232	2.3	232	2.3	0.330	34.8	LOS C	4.5	32.0	0.82	0.78	0.82	28.3
3	R2	51	12.5	51	12.5	0.330	48.0	LOS D	2.3	17.2	0.94	0.77	0.94	13.8
Approach		282	4.1	282	4.1	0.330	37.2	LOS C	4.5	32.0	0.84	0.78	0.84	25.9
East: New South Head Road (east)														
4	L2	28	3.7	28	3.7	0.016	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	52.8
5	T1	1784	2.4	1784	2.4	0.858	25.8	LOS B	25.5	181.9	0.91	0.90	0.99	39.5
Approach		1813	2.4	1813	2.4	0.858	25.5	LOS B	25.5	181.9	0.90	0.89	0.97	39.6
West: New South Head Road (west)														
11	T1	1202	5.3	1202	5.3	0.578	5.3	LOS A	10.6	77.6	0.43	0.39	0.43	47.2
12	R2	219	4.8	219	4.8	0.646	46.2	LOS D	6.0	44.0	0.98	0.98	1.39	24.2
Approach		1421	5.3	1421	5.3	0.646	11.6	LOS A	10.6	77.6	0.52	0.48	0.58	38.6
All Vehicles		3516	3.7	3516	3.7	0.858	20.8	LOS B	25.5	181.9	0.74	0.72	0.80	38.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate
P4	West Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		53	44.3	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

 Site: 2 [[PM Existing] New South Head Road / Rose Bay Avenue]

 Network: N101 [PM Existing]

Date: 09/08/18

Time: 3:00-4:00

Site Category: (None)

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total	HV %	Total	HV %	v/c	sec		veh	m				km/h
South: Rose Bay Avenue														
1	L2	38	0.0	38	0.0	0.066	10.0	LOS A	0.1	0.6	0.58	0.80	0.58	37.4
Approach		38	0.0	38	0.0	0.066	10.0	LOS A	0.1	0.6	0.58	0.80	0.58	37.4
East: New South Head Road (East)														
4	L2	42	7.5	42	7.5	0.024	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	47.7
5	T1	1348	9.0	1348	9.0	0.366	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1391	8.9	1391	8.9	0.366	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.0
West: New South Head Road (West)														
11	T1	1760	1.0	1760	1.0	0.454	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1760	1.0	1760	1.0	0.454	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		3188	4.5	3188	4.5	0.454	0.2	NA	0.1	0.6	0.01	0.02	0.01	59.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

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 movements.

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.

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MOVEMENT SUMMARY

 **Site: 3 [[PM Existing] New South Head Road / Victoria Road]**

 **Network: N101 [PM Existing]**

Date: 09/08/18

Time: 4:45-5:45

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	Aver. Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
South: Victoria Road														
1	L2	168	7.5	168	7.5	0.281	31.6	LOS C	3.7	27.4	0.77	0.77	0.77	29.6
3	R2	152	0.7	152	0.7	0.631	52.1	LOS D	4.5	31.7	1.00	0.82	1.03	12.9
Approach		320	4.3	320	4.3	0.631	41.3	LOS C	4.5	31.7	0.88	0.79	0.89	21.7
East: New South Head Road (east)														
4	L2	61	0.0	61	0.0	0.033	5.6	LOS A	0.0	0.0	0.00	0.53	0.00	53.3
5	T1	1372	2.0	1372	2.0	0.687	17.6	LOS B	15.5	110.2	0.77	0.70	0.77	44.3
Approach		1433	1.9	1433	1.9	0.687	17.1	LOS B	15.5	110.2	0.74	0.69	0.74	44.6
West: New South Head Road (west)														
11	T1	1608	1.0	1608	1.0	0.764	7.7	LOS A	19.1	134.9	0.55	0.52	0.57	43.1
12	R2	184	4.0	184	4.0	0.464	32.7	LOS C	4.8	34.9	0.92	0.88	1.02	29.1
Approach		1793	1.4	1793	1.4	0.764	10.3	LOS A	19.1	134.9	0.59	0.56	0.61	40.0
All Vehicles		3545	1.8	3545	1.8	0.764	15.8	LOS B	19.1	134.9	0.68	0.63	0.69	40.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate
		ped/h	sec		Pedestrian ped	Distance m	
P4	West Full Crossing	53	44.3	LOS E	0.1	0.1	0.94
All Pedestrians		53	44.3	LOS E			0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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