

St Catherine's School, Waverley

Traffic and Transport Assessment

001

Rev A | 18 August 2014

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

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

Job number 236045-00

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Appendix A

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SIDRA results

1 Introduction

Arup has been commissioned by St Catherine's School, Waverley (the School), to assist with the preparation of an Environmental Impact Statement (EIS) to accompany a Development Application (DA) for the School which is located at 26 Albion Street, Waverley.

The DA seeks concept approval for the School's Campus Master Plan and detailed design approval of the proposed Stage 1 works which comprise of a new Research, Performing Arts and Aquatic Centre (RPAC).

This report has been prepared to address Key Issue No. 6 Transport and Accessibility (refer below) as stated in the Director General's Environmental Assessment Requirements (DGRs) issued on 29 January 2014 – State Significant Development (SSD) 6339.

1.1 Director General's Assessment Requirements

Table 1: Director General's Assessment Requirements

Issue	Section
Construction traffic management planning	
Detail access arrangements at all stages of construction and measures to mitigate any associated pedestrian, cycleway, public transport or traffic impacts.	Section 9.1.3
Details regarding car parking arrangements during construction, including the displacement of visitor and staff car parking. Alternative off-site arrangements should be made for staff and construction workers.	Section 9.1.4
Operational traffic management planning	
Detail how the development has taken into consideration student and visitor travel patterns and contributes to the achievement of transport objectives contained in NSW 2021 and the draft Metropolitan Strategy for Sydney 2031, and Sydney's Bus Future (2013).	Chapter 2 and Section 4.1
Provide details of the trip generation of the development by new staff and students at key stages of the development.	Section 6.1 and Section 6.2
Assess the implications of the proposed development at key stages for non-car travel modes, including the accessibility of the site by public transport and potential implications from the proposed development for bus travel times and bus stop operation. Identify facilities or measures to increase non-car mode share for travel to and from the site, such as implementing a location-specific sustainable travel plan.	Section 3.8 and Chapter 7
Provide details of the daily and peak vehicle movements likely to be generated by the development at the key stages of the development including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required).	Section 6.4
Detail the proposed access and parking provisions associated with the proposed development, including compliance with the requirements of the relevant parking codes and Australian Standards (ie: turn paths, sight distance requirements, aisle widths; etc).	Section 6.6
Detail the proposed service vehicle movements (including vehicle type and the likely arrival and departure times).	Section 5.5

1.2 Project background

Lyle Marshall & Associates Pty Ltd recently completed a report titled *Parking Accumulation Surveys On-Street and Utilisation Of Drop-Off And Pick-Up Zones During Peak School Arrival and Departure Periods* (Appendix A). The report assesses existing parking conditions, the morning drop-off and afternoon pick-up arrangements, and then makes management recommendations that would improve traffic conditions around the site.

1.3 Scope of report

This transport report supports the development application (DA) for the redevelopment of the School. The transport assessment will be based on the current mode of travel for staff and students with targets set for achieving greater use of non-car travel modes for access.

Measures will be identified with the School that could be implemented as part of a location-specific sustainable travel plan to encourage non-car travel modes. This may also apply to events held at the School. There will also be measures required to educate and encourage improved drop-off and pick-up activity on the frontage roads.

2 Planning to address state policies and guidelines

2.1 NSW 2021

The New South Wales (NSW) 2021 is a ten-year plan developed by NSW government primarily aimed at *making NSW number one*. The document sets a framework to guide Government policy and decision making in the delivery of economic and community priorities. The framework is based on five (5) key strategies:

- Restoring economic growth;
- Return quality service for health, transport, education, police, justice and community service, with particular focus on customer service;
- Build infrastructure that drives the economy and improves people's lives;
- Strengthen our local environments and communities; and
- Restore accountability and transparency to government.

The five key strategies are embodied within the development objectives of the Campus Master Plan for the School. The key driver of the Campus Master Plan is to strengthen the local environment and community by delivering high quality educational outcomes and first class educational facilities. The plan also aims to contribute to the economic benefits for NSW and improve quality and choice through improvements to the quality of education and community facilities, among others.

The transport strategies of the State Plan are to:

- Reduce travel time;
- Grow patronage on public transport by making it an attractive choice;
- Improve customer experience with transport services; and
- Improve road safety.

NSW 2021 outlines that an integrated transport system is required to ensure different transport modes work together and that the interests of the travelling public are put first.

The design of the School aims to integrate and promote these strategies and promote the set goals and aspirations within the School community in order to contribute to the overall target to make NSW number one again.

2.2 Draft Metropolitan Strategy for Sydney 2031

The draft metropolitan strategy to 2031, replaces the Metropolitan Plan for Sydney 2036. This draft strategy will better align with the Long Term Transport Master Plan and the State Infrastructure Strategy released in 2012. It will form a key link to the various plans that have been developed including the short term Regional Action Plans and NSW 2021 Plan. The metropolitan draft strategy focuses on driving sustainable growth of Sydney to 2031, with focus on the following five outcomes:

- Balanced growth;
- A liveable city;
- Productivity and prosperity;
- Healthy and resilient environment; and
- Accessibility and connectivity.

The enhancement of school facilities and improvements to teaching and learning outcomes will respond to the future student attendance and improved educational standards.

2.3 Sydney's Cycling Future (2013)

Sydney's Cycling Future presents a new direction in the way we plan, prioritise and provide for cycling in Sydney. This supports the change in culture we are seeing in Sydney with more people choosing to ride a bike for transport. The overarching goal of Sydney's Cycling Future is to make cycling a safe, convenient and enjoyable transport option for short trips. This is particularly relevant to school trips, many of which are short distance from surrounding residential precincts.

The following principles will be used to guide the delivery of Sydney's Cycling Future:

- Ensure cycling initiatives are based on sound evidence
- Prioritise cost effective solutions
- Deliver in collaboration with partners
- Support a culture of cycling for transport

The plan for the future of bike riding looks at how local government areas may implement strategies including lowering speed limits on certain roads and installing new signage for cyclists at major locations (such as schools and public transport hubs).

Key aspects in which the School could integrate with and benefit from these initiatives include:

- Additional way finding signage, including distances to and from major hubs close to the School
- Development and testing of alternative bus shelter design to reduce obstacles for cyclists on bus corridors. Specific opportunities apply to the Albion Street and Macpherson Street frontages
- Increased mode share of cyclists if a greater number of end of trip facilities are provided including showers and lockers with bicycle parking.

2.4 Planning Guidelines for Walking and Cycling

The planning guidelines for walking and cycling were developed by the NSW Government to recognise the importance of walking and cycling in NSW cities. This report looks at how to increase mode share of walking and cycling, by improving security and public amenities.

In relation to the School, passive surveillance is encouraged in design of pedestrian and bicycle facilities, to increase safety. This generally applies to major walkways or further within school grounds where pedestrian flows are higher.

- Narrow pedestrian overpasses and underpasses should be avoided for security and connectivity reasons.
- Appropriate lighting should be provided (which cannot be vandalised) along major pedestrian and cycling routes, especially for routes to and from major transport nodes or hubs
- Internal roadways should be provided to link any cul-de-sacs or road ends to minimise the distances pedestrian need to walk.

The Master Plan incorporates the following features which enhance and extend these principles:

- Redistributed pedestrian entries to the campus on Albion Street and Macpherson Street
- Reconfigured pedestrian links between campus facilities
- Provision of bicycle racks, showers and lockers

2.5 Sydney's Bus Future (2013)

The Sydney's Bus Future document was released in December 2013. It is the key framework for improving and delivering better bus services throughout the Sydney metropolitan area. Bus services will be focused into three key routes:

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

The School has been identified along a suburban route (Bondi to Burwood via Eastgardens). Key points relating to the School are as follows:

- Extra bus services could be implemented
- A focus is on improved journey times from point to point

These initiatives will assist both regular and school bus services.

3 Existing conditions

3.1 Site location

The School is located in Waverley, in Sydney's Eastern Suburbs on a site area of 22,327m² (as per DGR request report). The School is surrounded by Albion Street, Macpherson Street and Leichhardt Street / Bronte Road. Figure 1 shows the School location.

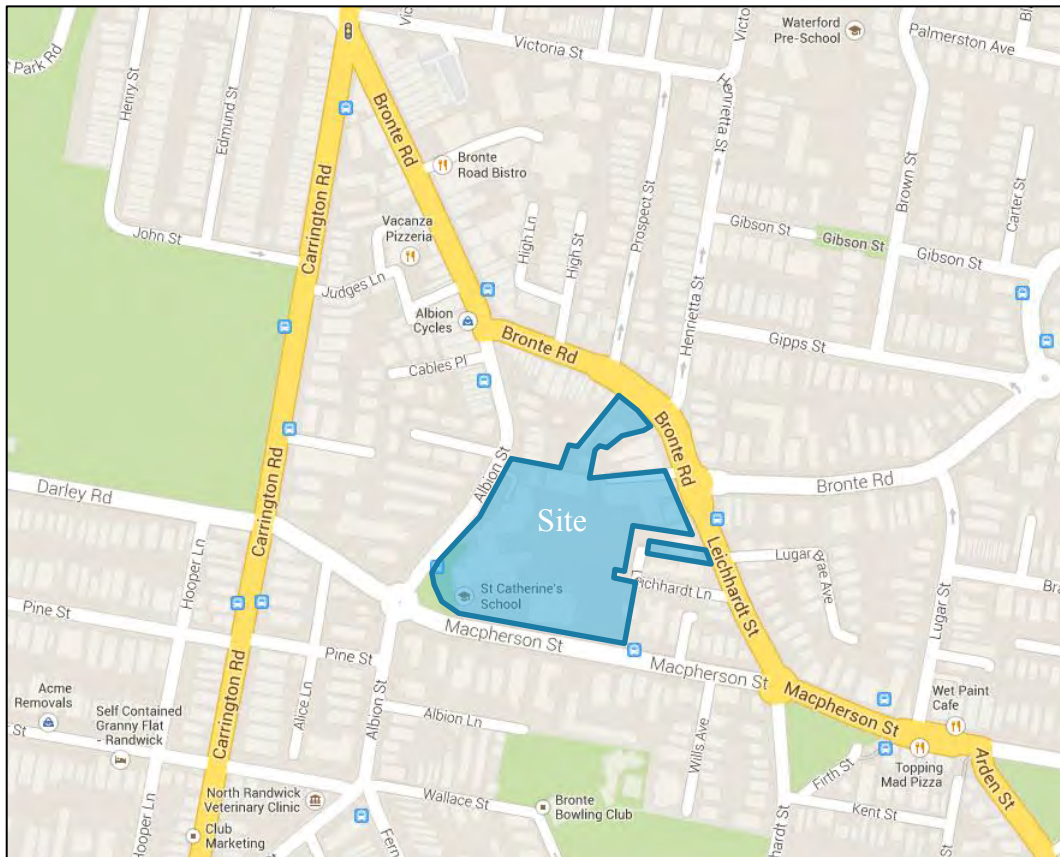


Figure 1: Site location

3.2 Description of the site

The School caters from Kindergarten to Year 12 day and boarding classes. It is both the oldest Anglican girls' school and the oldest independent girls' school in Australia.

The School is separated into a Junior School and Senior School, with 376 and 594 students enrolled respectively (taken from data in October 2013). There are no existing limits for student enrolment. The School also caters for up to 70 boarders and the boarders program is purposely limited in order to create 'extended family' lifestyle.

There are also currently 202 staff members consisting of 175 full-time and 27 part-time employees.

3.3 Site access

There is a number of vehicle and pedestrian separated accesses surrounding the School. The main vehicle accesses are located on Albion Street via three gates. On Albion Street, the northern two gates are one way, with Gate 3 an entry only and Gate 2 an exit only. The southernmost gate (Gate 1) is two-way with pedestrian access.

There are also further entry/exit locations surrounding the School to access various parts of the campus. These accesses generally provide pedestrian and vehicle access and include:

- Macpherson Street provides a vehicle and a pedestrian access to the Dame Joan Sutherland Centre (DJSC) with pedestrian access provided to the southern part of the School.
- Bronte Road provides an emergency pedestrian access only; and
- Leichhardt Street provides a number of pedestrian accesses to the Junior School.

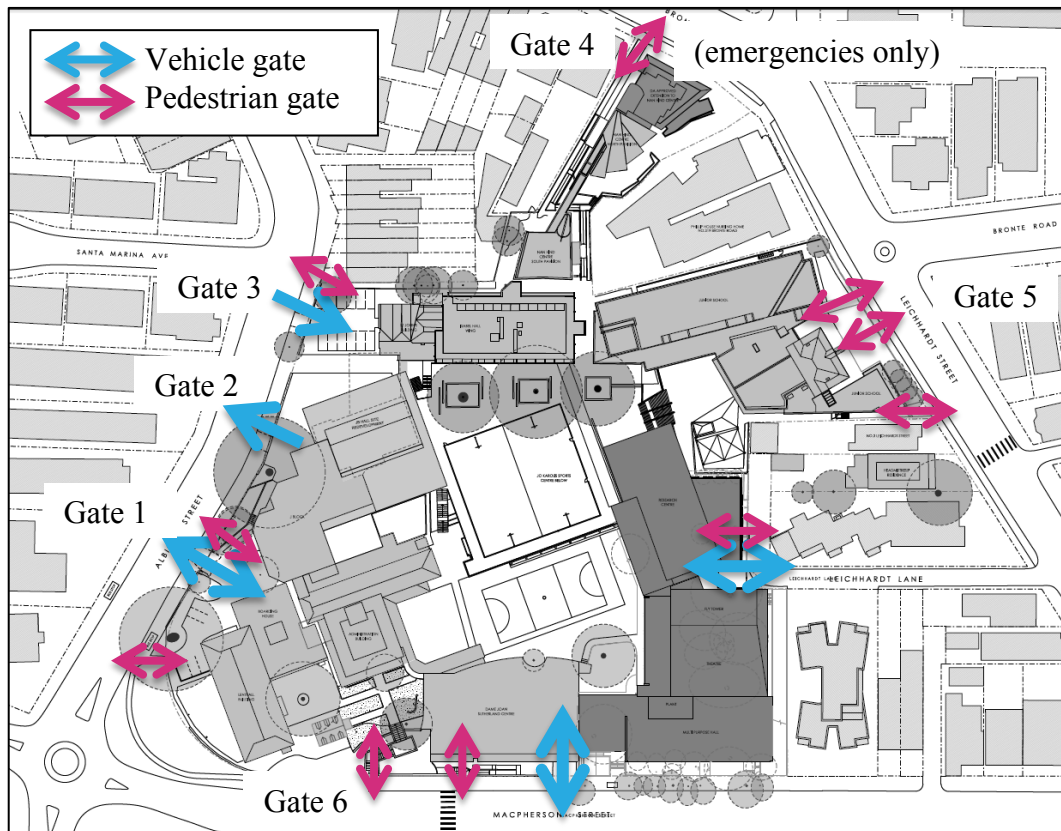


Figure 2: Existing site accesses

3.4 Existing traffic conditions

Bronte Road, Leichhardt Street and Macpherson Street provide regional routes for commuter traffic during the peak periods and general traffic all day. They are important streets in the functional road hierarchy for the area. Albion Street is also an important street for access from the residential areas to the south across to these regional routes.

Traffic surveys were undertaken in March 2014 during a typical Thursday and Saturday. Seven-day automatic tube counts were performed on Macpherson Street, Albion Street and Leichhardt Street. Intersection counts were performed at key intersections surrounding the site, including:

- Macpherson Street / Albion Street
- Macpherson Street / Leichhardt Street
- Bronte Road / Leichhardt Street
- Bronte Road / Albion Street.

The survey locations and shown in Figure 3 and the key results are presented in Table 2.



Figure 3: Traffic survey locations

Table 2 Traffic Survey Results – two-way hourly traffic flow

Peak Period	AM Peak (8am-9am)	PM School Peak (3pm-4pm)	PM Commuter Peak (5pm-6pm)	Weekend Peak (12pm-1pm)
Leichhardt Street (between Macpherson Street and Bronte Road)	1,173	1,180	1,253	1,277
Albion Street (between Macpherson Street and Bronte Road)	903	833	517	897
Macpherson Street (between Albion Street and Leichhardt Street)	1,138	1,190	1,131	1,282

The traffic flows recorded for each of the peak periods during the week indicate that the flows are fairly consistent between weekday and weekend peaks. The PM school and commuter peaks are also very similar in traffic flows.

The queuing of vehicles in Leichhardt Street and Macpherson Street during school drop-off and pick-up periods often extends into the travel lane thereby blocking and slowing the path of through traffic.

The speed limits on surrounding local roads are 50km/h, except during school hours. During 8:00am–9:30am and 2:30pm–4:00pm on school days, adjacent roads to the School have 40 km/h school zones in place.

3.5 Traffic safety

Crashes were analysed on the surrounding streets of the School over a five year period (from July 2008 – June 2013 inclusive). Overall, there were 45 crashes recorded, of which there were no fatalities, 28 injuries and 17 non-casualty (tow away) crashes. The data also indicates a fairly even distribution of crashes per year as shown in Figure 4.

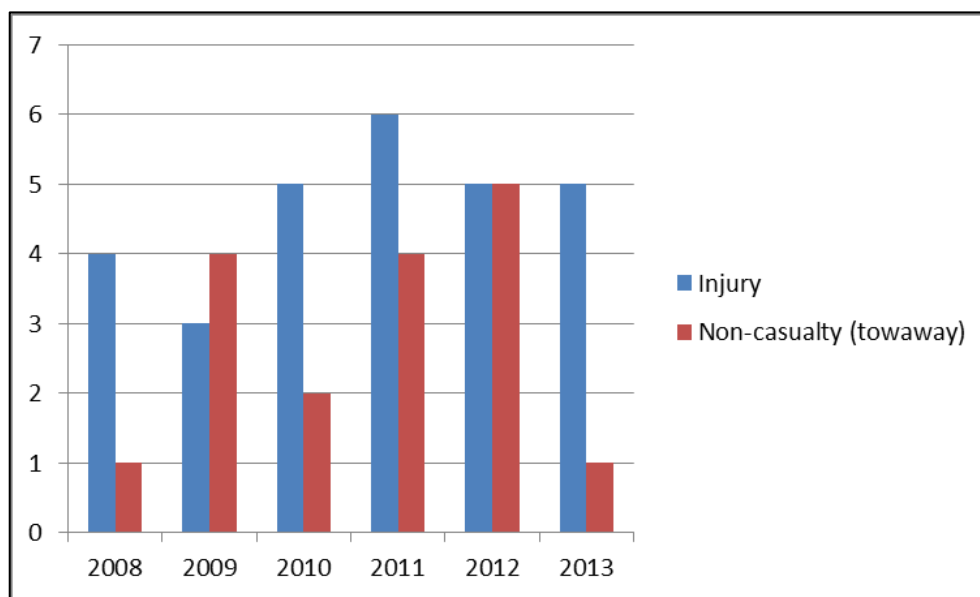


Figure 4: Degree of crashes per year (2008-2013) on surrounding streets*

*Note that 2008 and 2013 only had data for half of the year

The crash data was sorted into hourly time periods (Figure 5). Crashes were more concentrated in the commuter peak periods. Interestingly, the highest recorded hourly time period was in the PM peak hour (6pm-7pm), which does not coincide with the School's key operating hours.

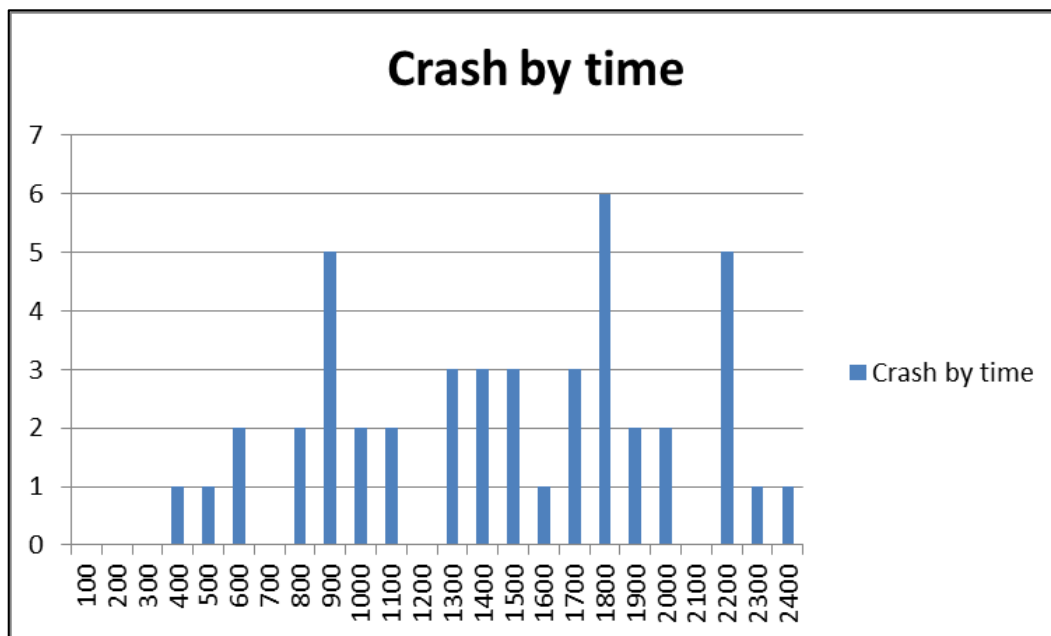


Figure 5: Crashes by time period

The crash data was classified into the various road user movement (RUM) codes to analyse crash clustering. The majority of crash types were recorded as vehicles from same direction, followed by pedestrian related crashes (Figure 6).

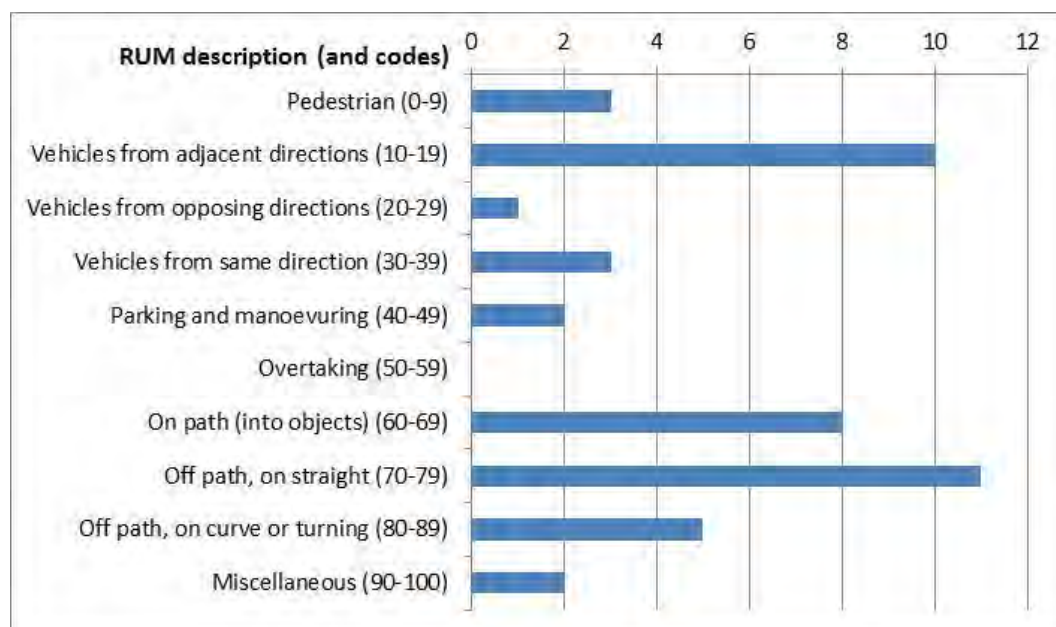


Figure 6: Crash types by road user movement categories

Crash clusters for the purposes of this study were defined as three or more crashes with the same RUM code, within 50m of each other. Crash clusters were focused around key intersections and are detailed in Table 3 and Figure 7.

Table 3: Investigation of crashes at intersections by road user movements

Primary street	Cross street	Adjacent cross traffic	Out of control	Off causeway into object	Same rear end	Opposite right through
Macpherson Street	Carrington Road	2	2		6	5
Macpherson Street	Albion Street	3	1			
Macpherson Street	Leichhardt Street	4		4		
Bronte Road	Albion Street	2	3		3	

There were also a number of crashes that involved a vehicle hitting a door, which occurred along Macpherson Street (2) and Albion Street (2).

There were 3 crashes that involved pedestrians recorded. One occurred at the zebra crossing on Macpherson Street, and two crashes occurred either side of the Bronte Road / Albion Street intersection.

3.6 Parking supply and demand

3.6.1 On-street parking supply

All kerb space on the roads fronting the School provides unrestricted parking apart from the drop-off zones and bus zones. Restricted ½P zones begin further north on Albion Street and Bronte Road near the shopping district. The parallel spaces on-street are not line marked.

3.6.2 Short term pick-up and set-down areas

Students who are driven to the School have designated drop-off and pick-up areas on-street known as carlines. All these carlines are located in zones which are designated 'No Parking School Days' and vary in time restrictions. However, the zones are usually split into separate areas with a 'No Stopping' zone in-between (due to either a pedestrian crossing or access).

The car line locations (and time restrictions) are:

- the west side of Leichhardt Street between Bronte Road and Leichhardt Lane. (8.00am-9.00am / 2.30pm-4.00pm)
- the north side of Macpherson Street between Albion Street and the bus stop, (8.00am-9.15am / 2.45pm-4.15pm)
- the east side of Albion Street between the pedestrian signals and Santa Marina Avenue. (8.00am-9.00am / 3.00pm-4.15pm)

A teacher is on duty in the courtyard from 7.50am until classes commence at 8.20am allowing students to be dropped off early. Parents are advised that students should arrive at school by 8.15am. The gates are open during the afternoon between at 2.45pm and 4.00pm. Finishing times are staggered between year groups to help alleviate congestion around the School as shown in Table 4.

Table 4: School finishing times

Years	Finish time	Collection location
Kindergarten	2.45pm	Courtyard
Years 1 and 2	2.50pm	Leichhardt Street car line
Years 3 and 4	3.00pm	Leichhardt Street car line
Years 5 and 6	3.00pm	MacPherson Street car line
7-10	3.20pm	Macpherson/Albion
11-12	3.20pm	Macpherson/Albion

Senior School students have varying start and finish times depending on their choice of curriculum (i.e. whether they have extra-curricular activities). Classes nominally begin at 8.20am and finish as per Table 4. The majority of students were observed to arrive after 8.00am and leave the School gates after 3.30pm (which is supported by the travel surveys).

Junior School students were seated and marshalled into vehicles as they arrived on Leichhardt Street.



Figure 8: School drop-off/pick-up zones

3.6.3 Off-street parking provision

There are currently a total of 56 parking spaces within the School grounds. All other staff members and visitors park on-street or use alternative methods of travel.

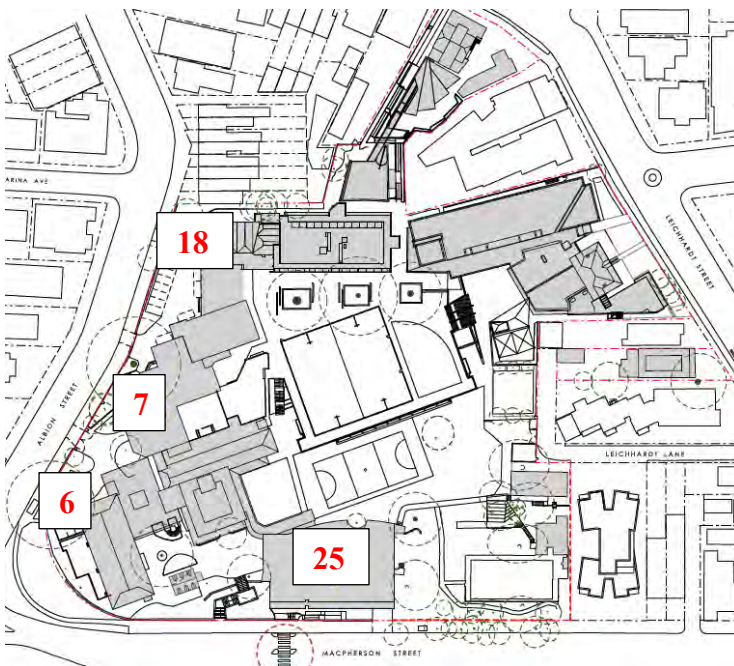


Figure 9: Existing off-street parking provision

3.6.4 Current on-street parking demand

Parking accumulation surveys were performed by Lyle Marshall and Associates in December 2013 to determine the extent of on-street parking occupancy. The on-street parking provision on the surrounding roads is generally unrestricted, with up to 560 parking spaces available within 5 minutes' walk. This reduces to approximately 460 spaces during the day when the time restrictions and school drop-off/pick-up zones are in operation.

Parking is heavily utilised in the surrounding streets, with occupancy around 90% in the morning dropping away to 75% occupancy in the afternoon and peaking again at approximately 90% after 9pm. Parking occupancy is summarised in Figure 10.

Parking is utilised by school staff during the day and by residents/visitors during the evenings and weekends. Students are also able to drive, but are not permitted to park on-site and are discouraged by the School to do so.

During the day, there is spare capacity for parking with occupancy between 80-90%; however during evenings, parking is utilised up to 95% occupancy by 10pm.

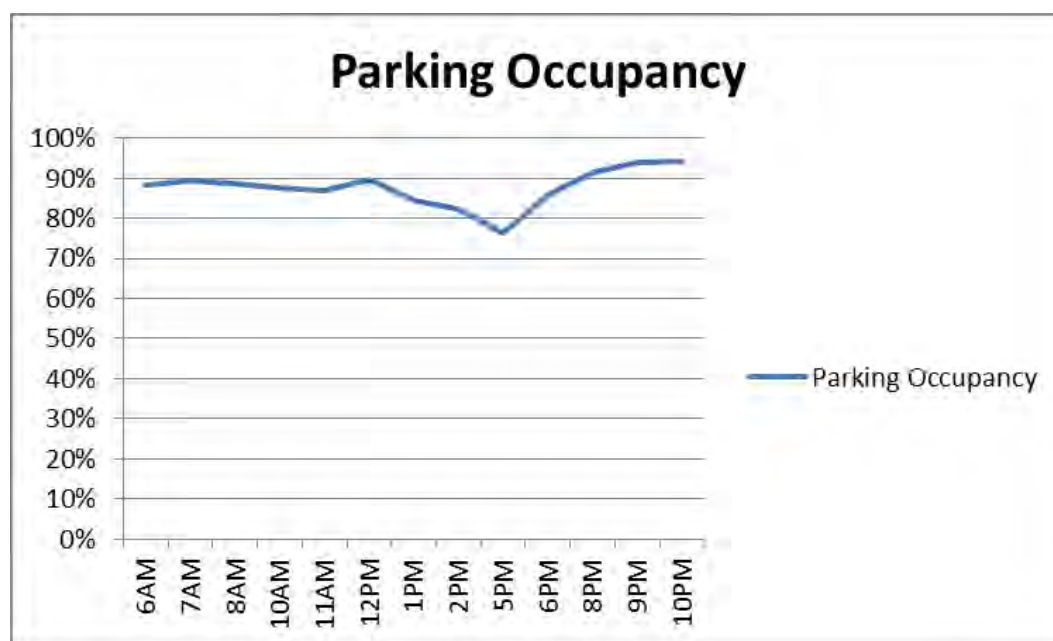


Figure 10: Parking occupancy in surrounding streets

Source: Lyle Marshall and Associates

Arup conducted further on-street parking occupancy surveys in three time periods to determine the availability of car parking within 5 minutes' walk of the new entrance to the School on Macpherson Street. The area and streets covered are shown in Figure 11. The area selected included streets further to the south when compared to the Lyle Marshall and Associates survey area.

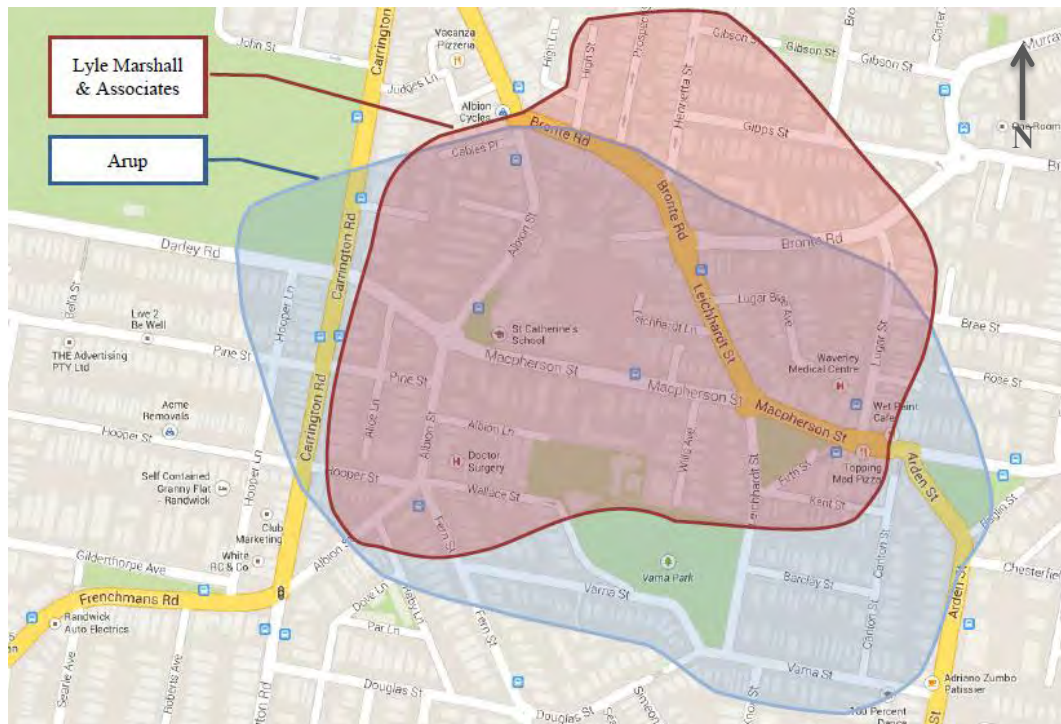


Figure 11: Comparison of 5 minute walk on-street parking survey areas

The number of available on-street car parking spaces within 5 minutes' walk of the main entrance to the School is shown in Figure 12, Figure 13 and Figure 14.

- 7.30 – 8.00pm Saturday 3 May 2014 237 spaces
- 2.30 – 3.00pm Sunday 11 May 2014 152 spaces
- 7.30 – 8.00pm Tuesday 13 May 2014 204 spaces

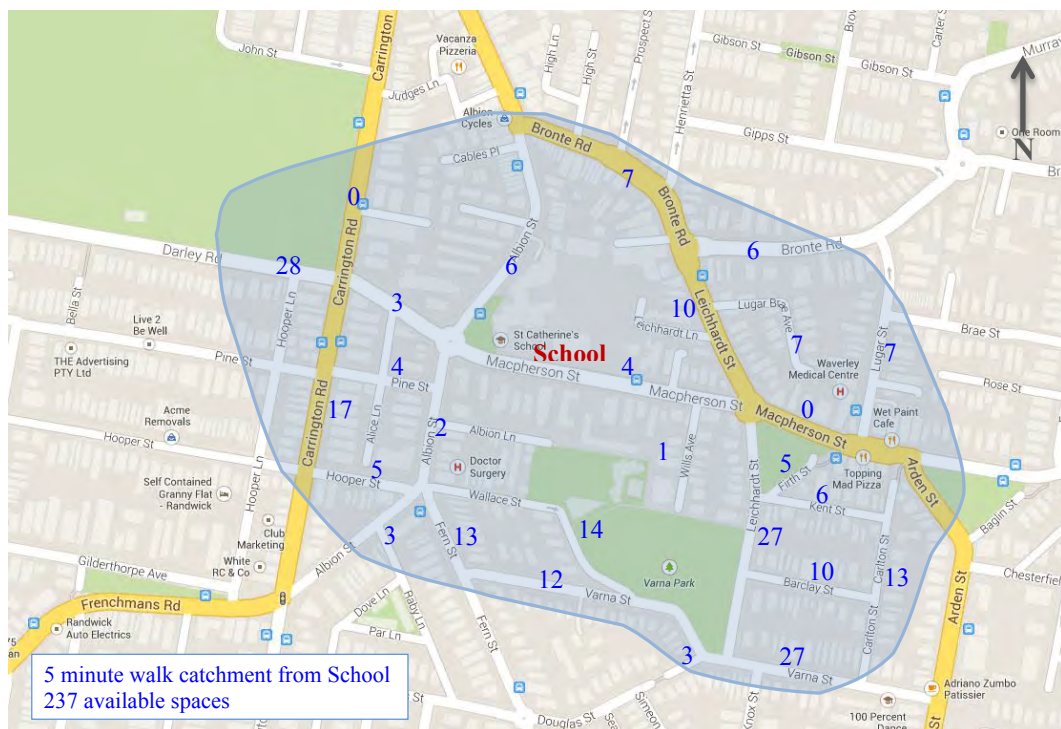


Figure 12: Available on-street spaces 7.30 – 8.00pm Saturday 3 May 2014

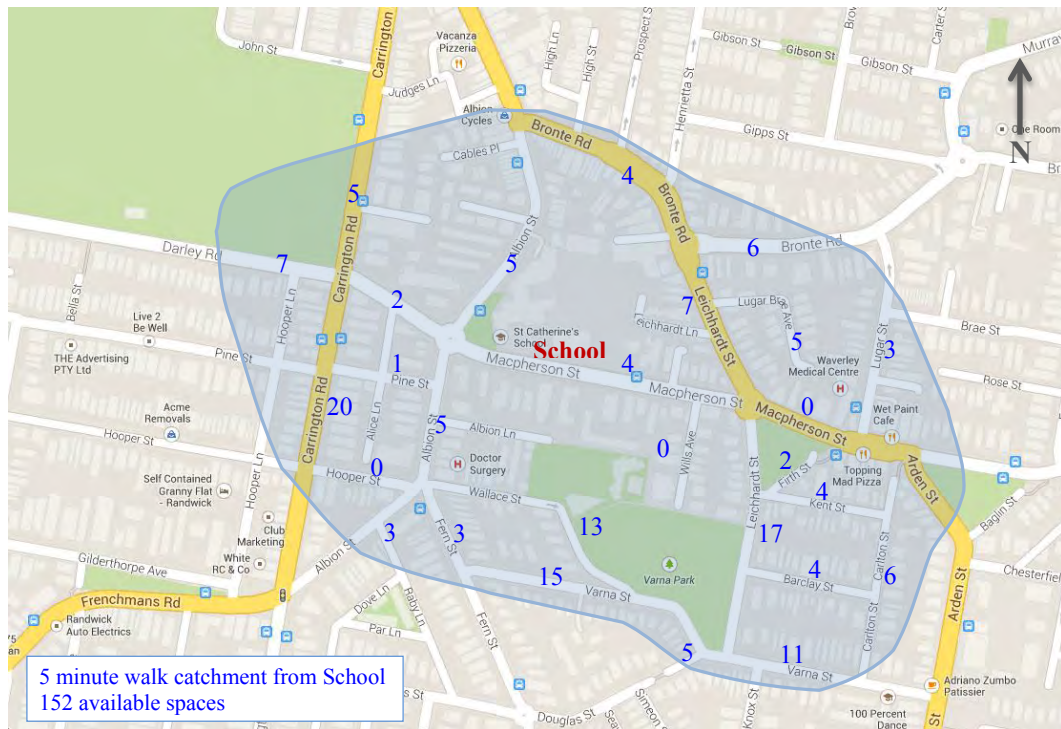


Figure 13: Available on-street spaces 2.30 – 3.00pm Sunday 11 May 2014

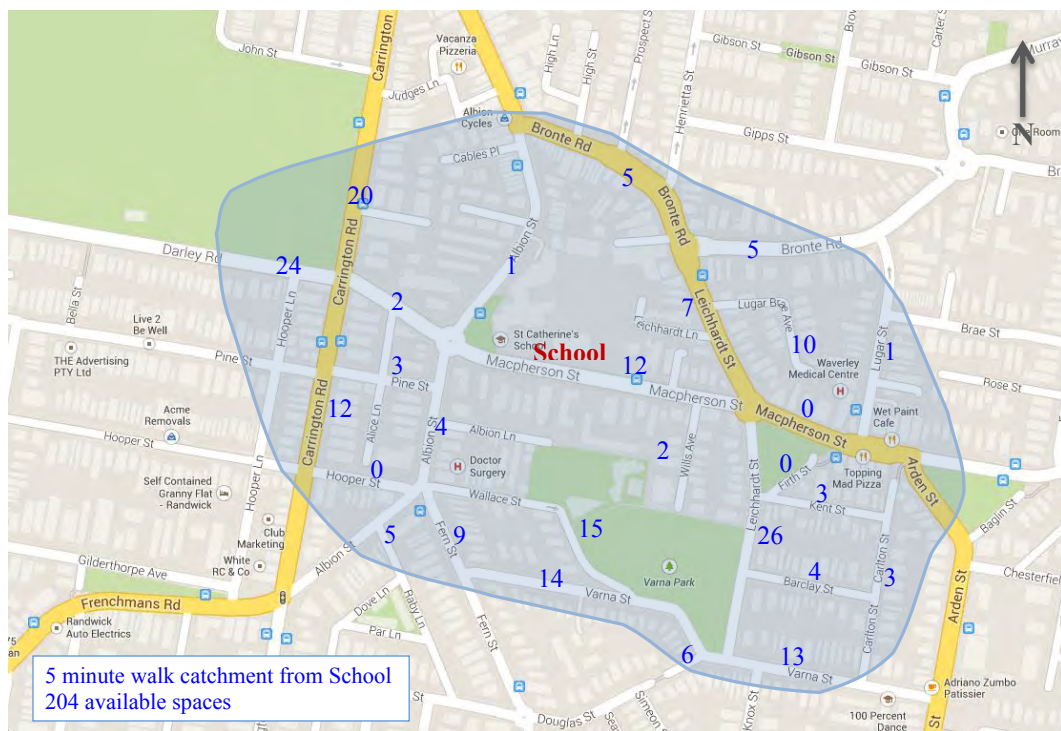


Figure 14: Available on-street spaces 7.30 – 8.00pm Tuesday 13 May 2014

3.7 Modal split

Travel demand surveys were completed in April 2014 by the School for both staff and students to recognise the current mode of transport to the School. The survey had a large number of responses from 579 students and 103 staff, representing more than half of the School. The results for staff and students are presented in Figure 15 and further detailed in Appendix B.

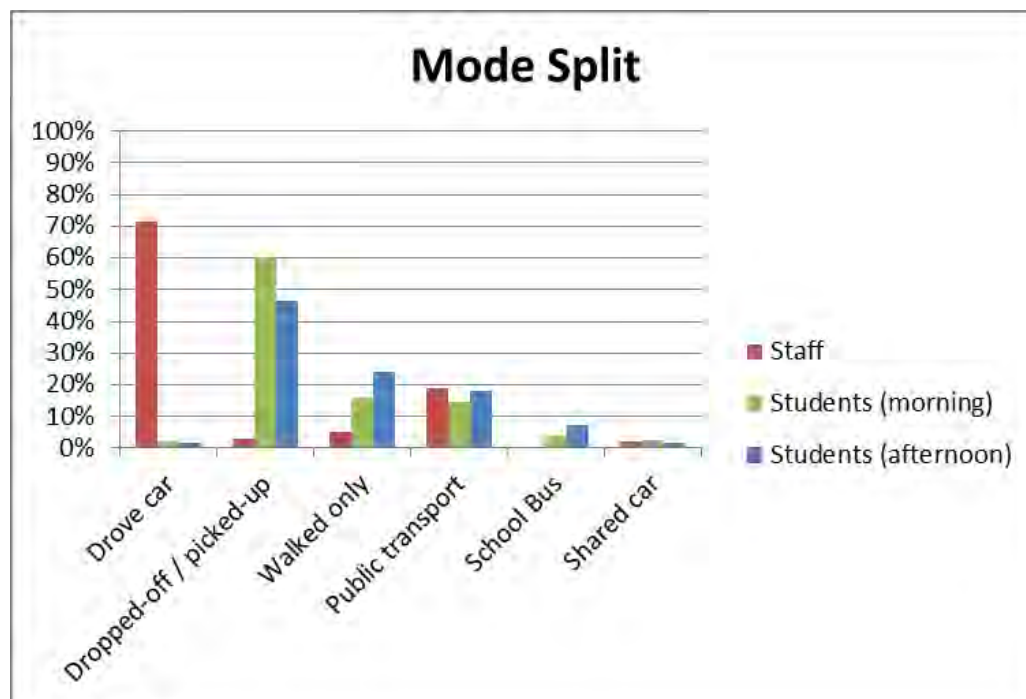


Figure 15: Travel demand survey summary

It was found that 71% of staff drove to the School with 3% as passengers. Public transport usage was approximately 19% and 5% walked to the School. Limited staff parking is available on the site and of the staff that drove, 61% of staff nominated that they park on-street.

For students, modes vary by arrival and departure. In the morning, 60% of students were dropped off at the School by car, decreasing to 46% being picked up from the School in the afternoon. As a result, there was a shift to walking in the afternoon, increasing from 16% to 24%; with slight increases to school bus usage (4% to 7%) and public transport (15% to 18%). No single student or staff member was recorded cycling to school.

The survey also asked students and staff when they normally arrive and depart the School. Departure profiles are shown in Figure 16. The majority of students arrive between 8.00am-8.20am (approximately 67%) and depart between 3.30pm-3.45pm (approximately 81%).

Comparably, staff members typically arrive between 7.30am-8.00am (35% for full-time and 30% for part-time). Full-time staff members depart fairly evenly between 4.00pm-6.00pm (approximately 20% recorded every half hour) and the majority of part-time staff departed before 4.00pm (44%). Interestingly, the departure peaks for students and staff do not coincide as shown below in the graph. **(note that school starts at 8.20am with staggered finishing times up to 3.20pm).**

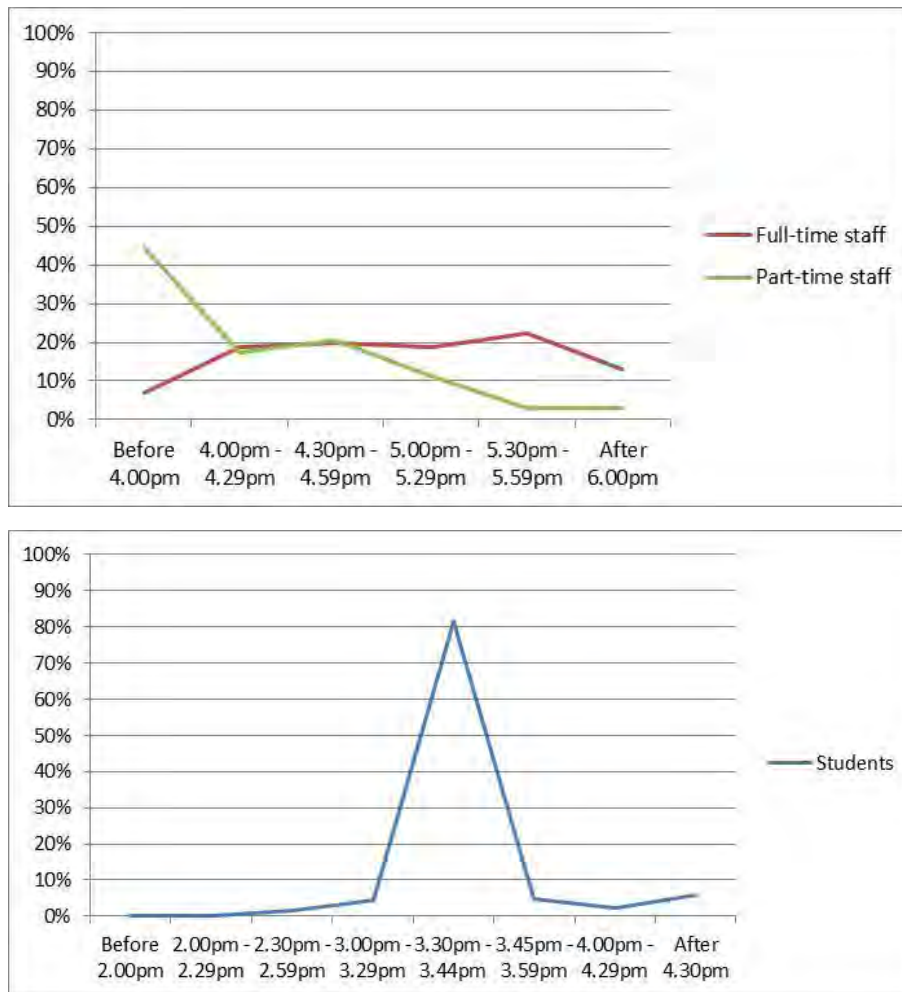


Figure 16: Departure profiles

The surveys also analysed staff and students (and parents) concerns and suggestions for improvements. The main comments provided were:

- Better organisation of drop off and pick up activity
- Possible on-site drop off/pick-up
- More staggered start/finish times
- Stop students driving to school
- Drop-off facilities going through bus stops and 'No Stopping' zones
- Junior School drop-off not sufficient on Leichhardt Street and may need to be expanded to Macpherson Street

3.7.1 Journey to Work 2011

The Journey to Work (JTW) census data 2011 has been reviewed for the Travel Zone (524) containing the School, which provides an indication of the mode share for staff. The modes of travel are shown in Figure 17 and the origins for the trips made to Zone 524 (highlighted in blue) are shown in Figure 18. The JTW data indicates that approximately 60% drove to work, with an additional 4% being a car passenger. Public transport usage is approximately 15% for train and 7% for buses. Walkers were high at 11%. These results are relatively consistent with the travel demand surveys completed by staff at the School.

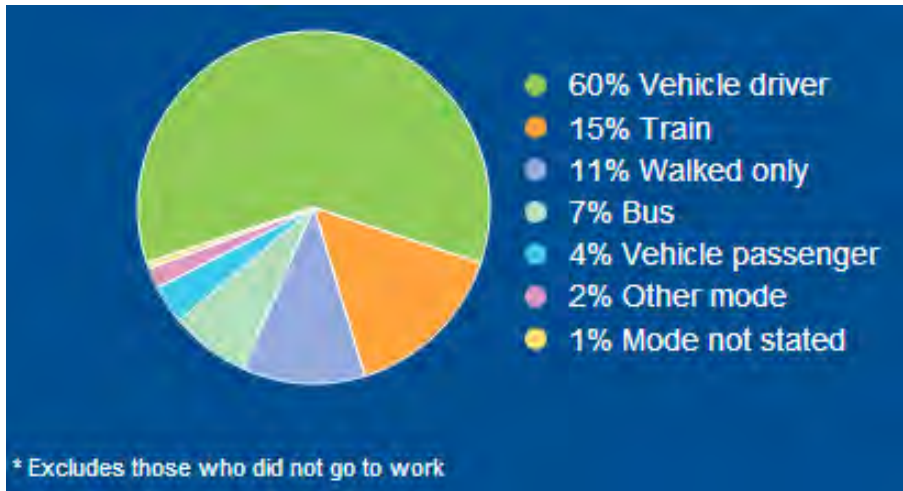


Figure 17: JTW Census data, 2011

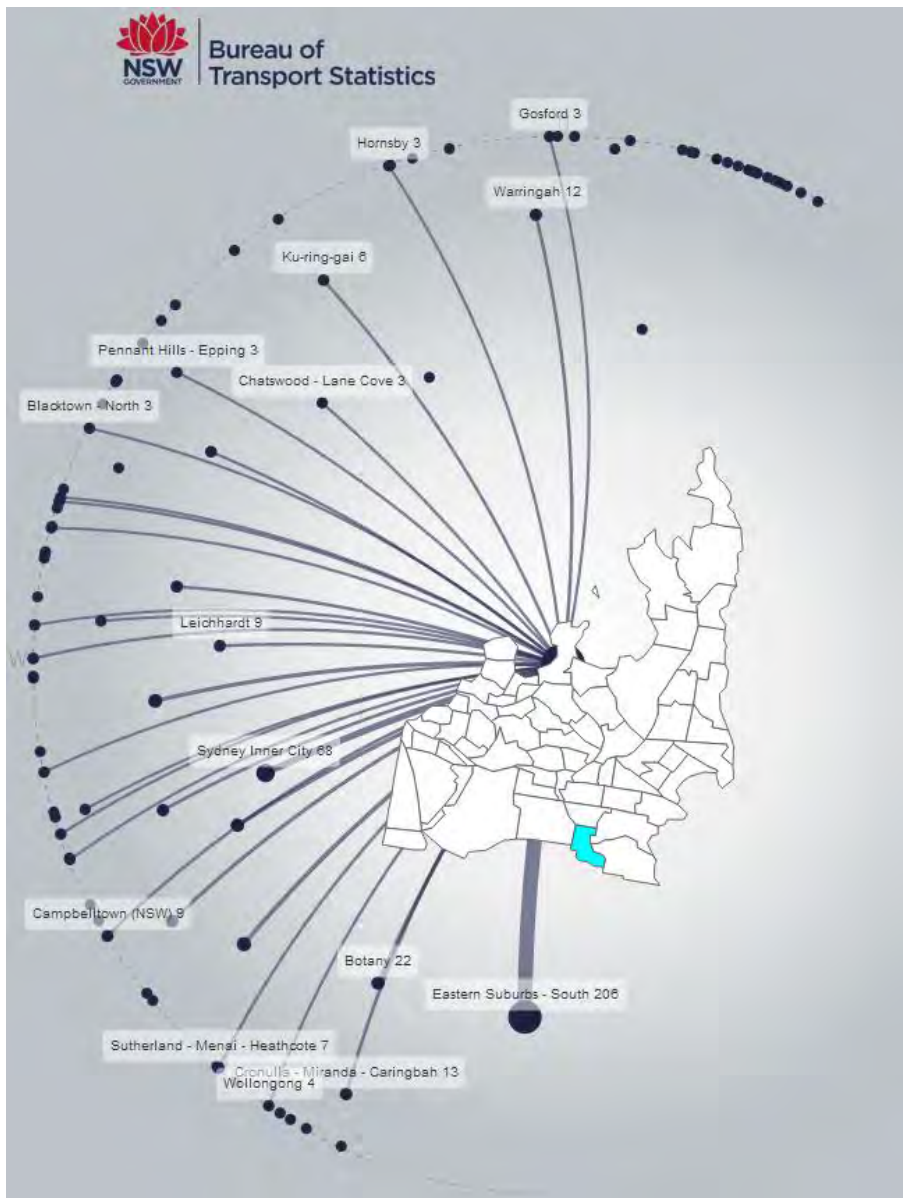


Figure 18: JTW Visualiser (Travel Zone 524)

3.7.2 Home locations of staff and students

Suburb data for students and staff has been plotted to indicate the accessibility to different modes of transport. Interestingly, more than 30% of staff and approximately 60% of students live within 1.5km of the School and could walk. The concentration of staff home location in the Sydney area is shown in Figure 19 and the student home locations are shown Figure 20. The vast majority of students and staff live in the eastern suburbs.

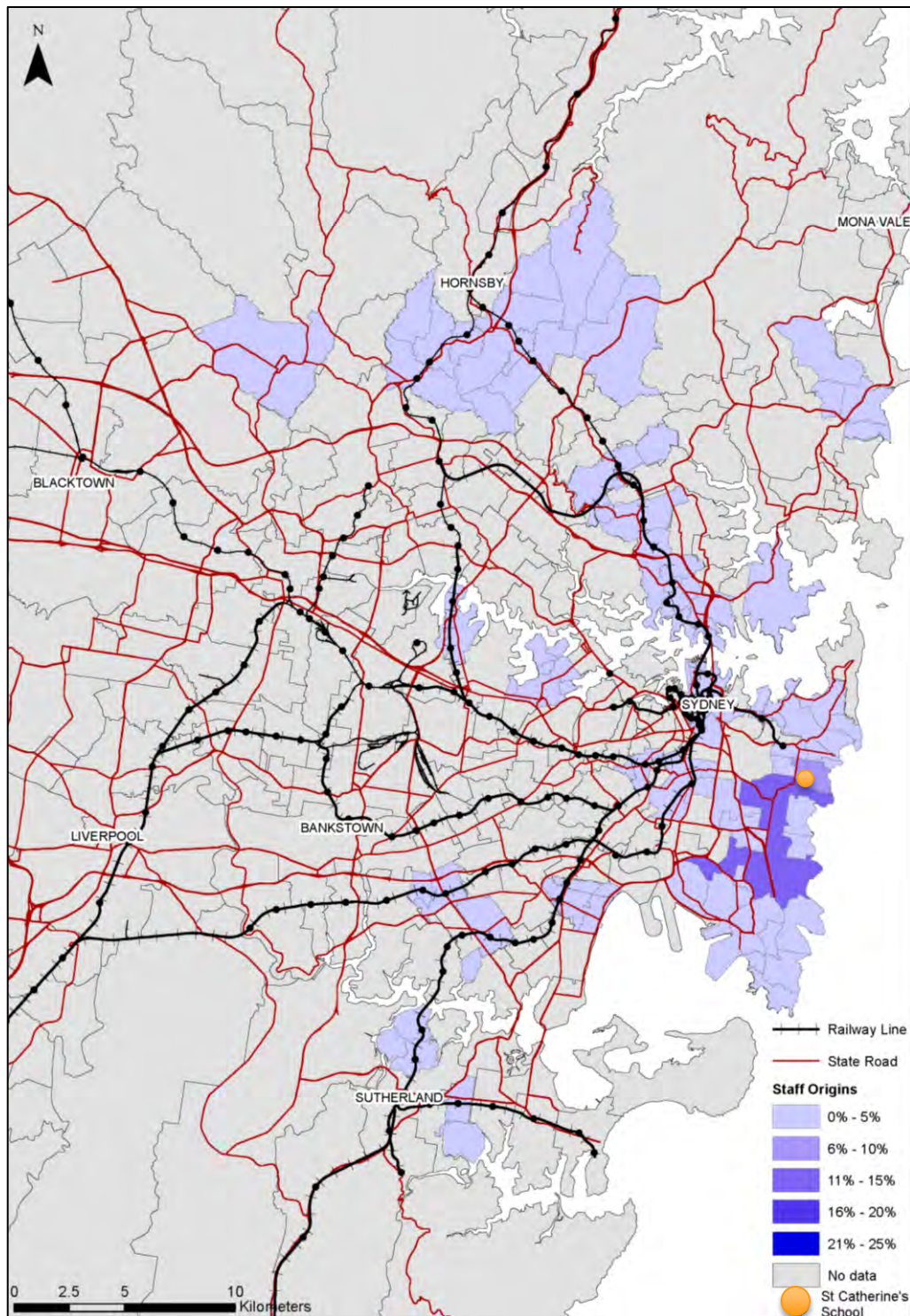


Figure 19: Staff postcode origins

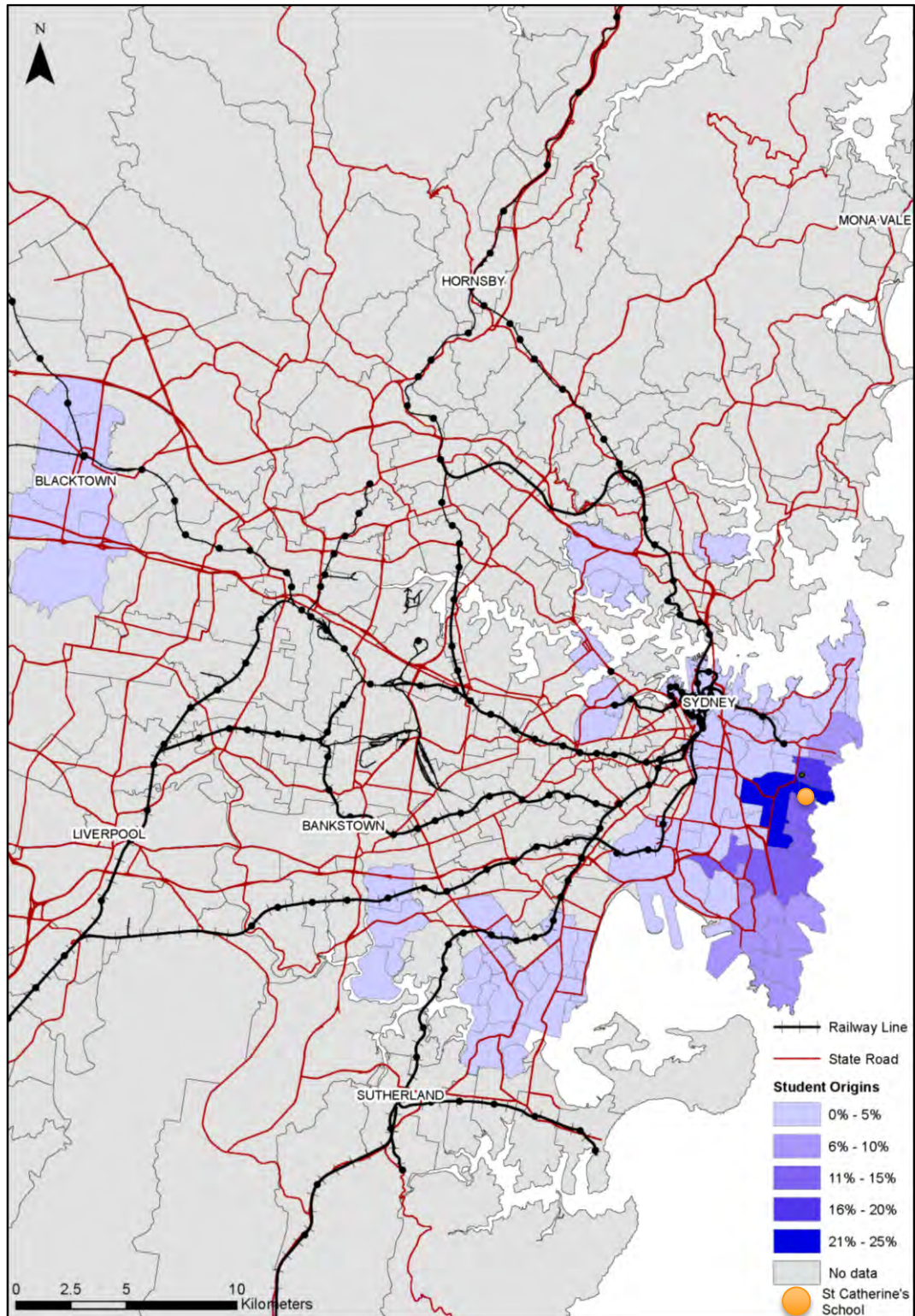


Figure 20: Student postcode origins

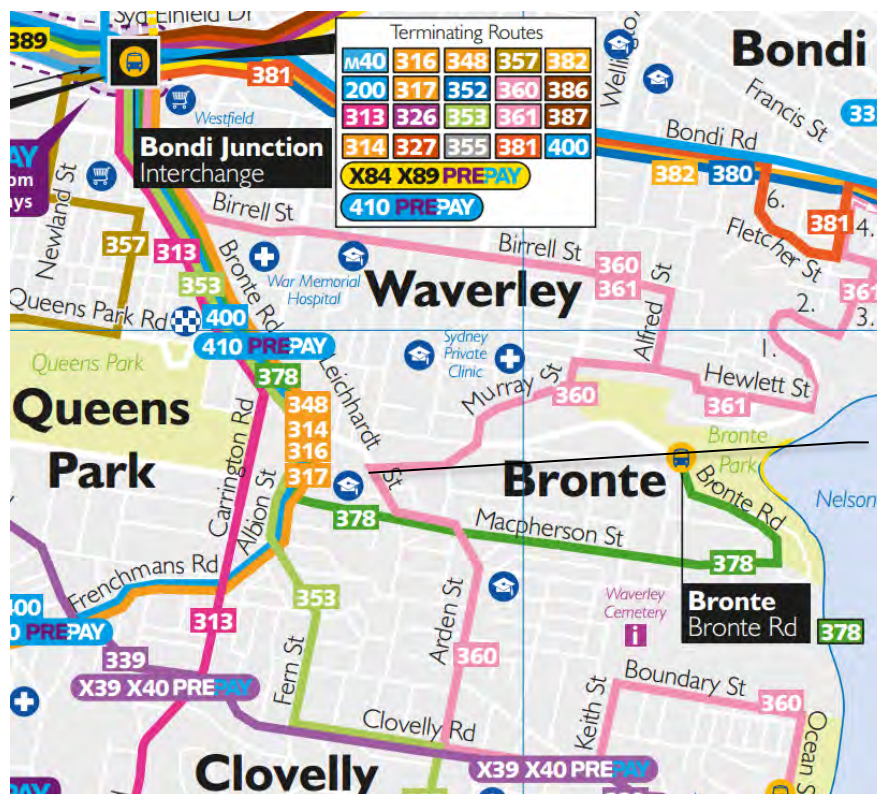
3.8 Public transport

3.8.1 General public buses

Public transport to the School, shown in Table 5, is available by bus from stops located on Macpherson Street, Albion Street and Leichhardt Street. Sydney Buses operates routes outlined in Figure 21. All buses (except route 378) listed below originate at Bondi Junction Station, providing good access to the T4 Eastern Suburbs Line.

Table 5: Bus services

Route Number	Stop	Destination	Frequency
313	Carrington Road	Coogee	2 per hour
314	Albion Street	Coogee	2 per hour
316	Albion Street	Eastgardens	2 per hour
317	Albion Street	Eastgardens	2 per hour
348	Albion Street	Wolli Creek	2 per hour
353	Albion Street	Eastgardens	2 per hour
360	Leichhardt Street	North Clovelly	2 per hour
378	Albion Street / Macpherson Street	Railway Square / Bronte Beach	Every 10 minutes
400	Albion Street	Burwood	Every 10 minutes
410	Albion Street	Rockdale	Every 10 minutes



St Catherine's
School

Figure 21: Surrounding bus routes

Source: Sydneybuses.info

3.8.2 School Buses

Additionally there are school services which operate from the Albion Street bus stops in the afternoon (between 3.30pm and 4.00pm). These routes are detailed in Table 6.

Table 6: School bus routes

Route Number	Origin	Destination	Departure Time
400	Waverley College	Eastgardens	3.35pm
604	St Clare's College	King St / Botany Rd	3.31pm
657	St Clare's College	Bunnerong St / Franklin St	3.31pm
661	Cranebrook School	Randwick Junction	3.42pm
662	Cranebrook School	Maroubra Junction	3.57pm

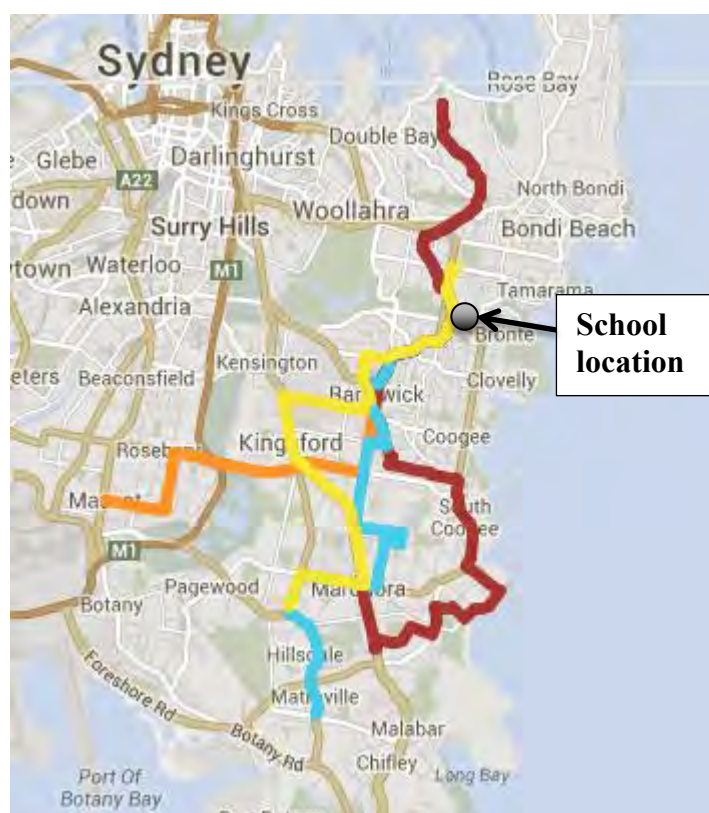


Figure 22: School bus routes

3.8.3 Minibuses

The School operates three minibus services. These are usually used during school hours to move students to events and excursions. They may also be used for after-school activities such as extra-curricular events and classes.

3.8.4 School bus charters

For larger events, buses are chartered with student pick-up and set-down occurring in Albion Street.

3.9 Pedestrian / bicycle networks

The surrounding streets have pedestrian footpaths either side of the road. Each street also has a mid-block pedestrian crossing. There is a signalised crossing on Albion Street, and a zebra crossing each on Leichhardt Street and Macpherson Street.

Cycling routes surrounding the site include nearby paths at Queens Park and on-road routes (mixed traffic). These are shown below in Figure 23.

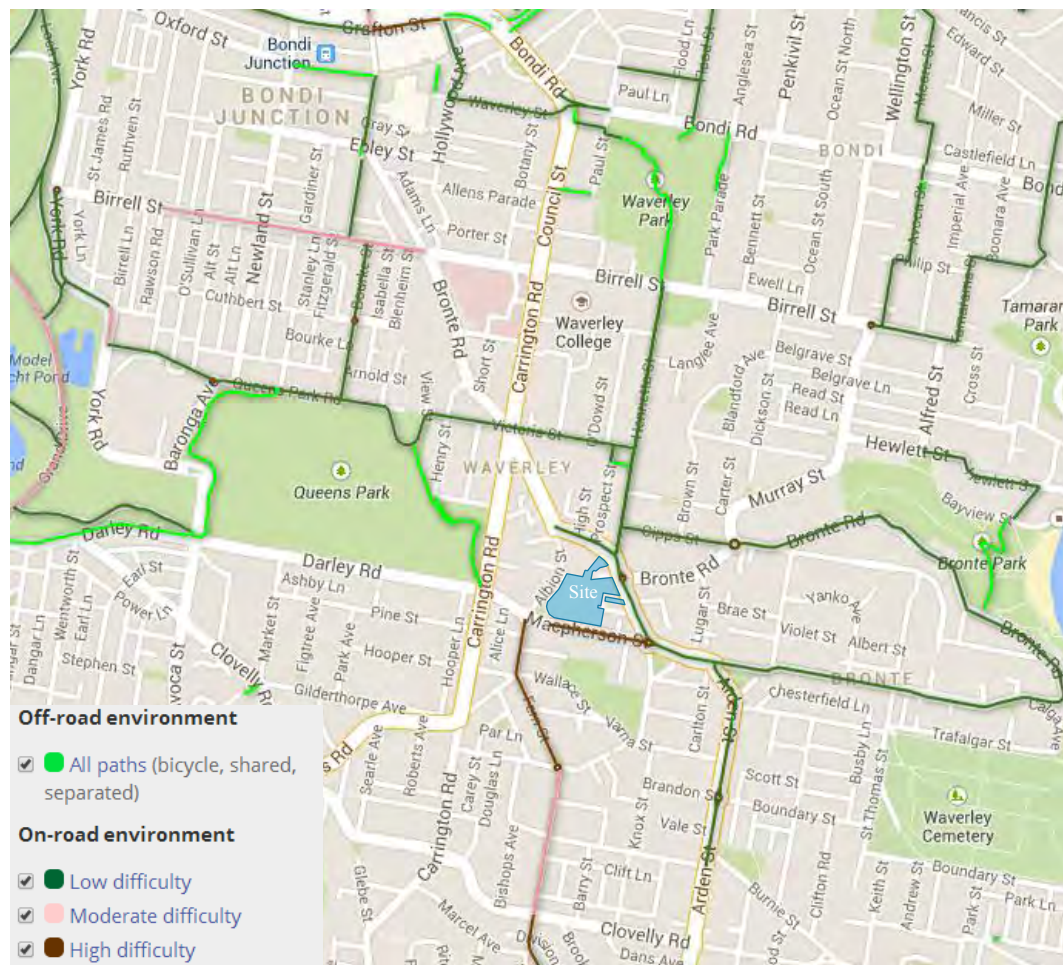


Figure 23: Bicycle network

3.10 Other proposed developments

A review of Waverley Council's DAs indicates that the only proposed development within close proximity to the School is a 60 place Child Care Facility at 23 Macpherson Street. This site is just to the east of the School on the southern side of Macpherson Street. The development will provide a drop off/pick up zone with time limited parking on Macpherson Street for the morning drop-off and afternoon pick-up times. This will occur on the opposite side of the street to the School's pick-up drop-off zone and will not impact on the operation of the zone.

4 St Catherine's School Campus Master Plan

4.1 Objectives

The School has identified the following objectives for the Campus Master Plan:

- Provide state-of-the-art facilities which complement the School's commitment to providing broad, challenging and vibrant education within a nurturing environment
- Enhance the current educational curriculum for Sport and Personal Development, Health and Physical Education by introducing an Aquatic Centre in place of the existing, aged outdoor pool
- Enhance the current educational curriculum for Performing Arts by providing a new state-of-the-art professional grade Performing Arts Auditorium which addresses the constraints of the existing "play-box theatre" within the DJSC (i.e. small spectator gallery, insufficient back-of-house facilities, inadequate size to accommodate school performances etc)
- Introduce the new Research, Performing Arts and Aquatic Centre (RPAC) which reflects a contemporary world-leading teaching and learning environment for staff and K-12 students, equipped with a broad variety of leading-edge and learning based technology within a diverse range of learning environments
- Ensure an efficient, adaptive reuse of residual spaces created by the development of new facilities to create a variety of education based precincts throughout the School campus
- Create new Junior School and Senior School entries off Albion Street and Leichhardt Street respectively, which are sympathetic to existing traffic conditions and provide a safe, accessible pedestrian link between Albion Street and Leichhardt Street for the School community
- Create a new, safe formal school entry from Macpherson Street directly to the Administration Building via the Museum, separating vehicle entry from pedestrian entry whilst emphasising the significance of the School's heritage
- Minimise dependency on external facilities to support the educational curriculum, as well as co-curricular and extracurricular activities offered by the School to the community.

4.2 The plan

The proposed Campus Master Plan comprises a number of new buildings, internal refurbishments and the reallocation of some internal spaces across the site. The primary new buildings (and associated demolition works) include:

- Demolition of the existing outdoor swimming pool and construction of a new multi-level building (i.e. the RPAC). The core facilities proposed within the RPAC include the new RPAC, Aquatic Centre and Multi-Purpose Hall, with pedestrian links to the existing DJSC and Jo Karaolis Sports Centre (JKSC).
- Demolition of the existing Jane Barker Hall (JBH) and construction of a new building.

- Demolition of the existing print room, reception and link building between Lenthall and the Administration Building (Level 6) and construction of new boarder's common room.

The Campus Master Plan also proposes:

- A total site Gross Floor Area (GFA) of 22,958m² which equates to a floor space ratio (FSR) of 1:1 (the existing/approved/commenced GFA on the site is 20,274m² which equates to a FSR of 0.9:1)
- A total of 75 car spaces (a net increase of 19 car spaces)

The Campus Master Plan is illustrated and explained in the *St Catherine's School, Waverley Master Plan* (November 2013) and *Gross Floor Space Calculation*, by Mayoh Architects.



Figure 24: Campus Master Plan

4.3 Student /staff increase

The School had an October 2013 enrolment of 970 students, with 202 employees (including 175 full time and 27 part time employees). The Campus Master Plan will provide the potential for up to:

- 14-16 additional students to be introduced progressively each year, starting at 2015 and ending at 2029 (i.e. increasing to a total of 1,200)
- 10 additional employees (approximately)

4.4 Description of site access / parking / loading / bicycle facilities

The School currently has numerous pedestrian entries, but there is no clear hierarchy or function of access points. The Campus Master Plan preserves and improves the pedestrian environment on the site by improving the clarity and function of the following key pedestrian access points:

- New formal pedestrian school entry from Macpherson Street
- New Senior School entry off Albion Street
- Junior School pedestrian entry from Leichhardt Street with a major internal student link to the Senior School entry from Albion Street.

Lifts are included in the RPAC and future new building on the JBH site to facilitate accessibility throughout the site. Other secondary entries will be retained or consolidated with proposed entries as shown in Figure 25 (for example the pedestrian entry to the DJSC will be consolidated with the New Performing Arts entry from Macpherson Street).

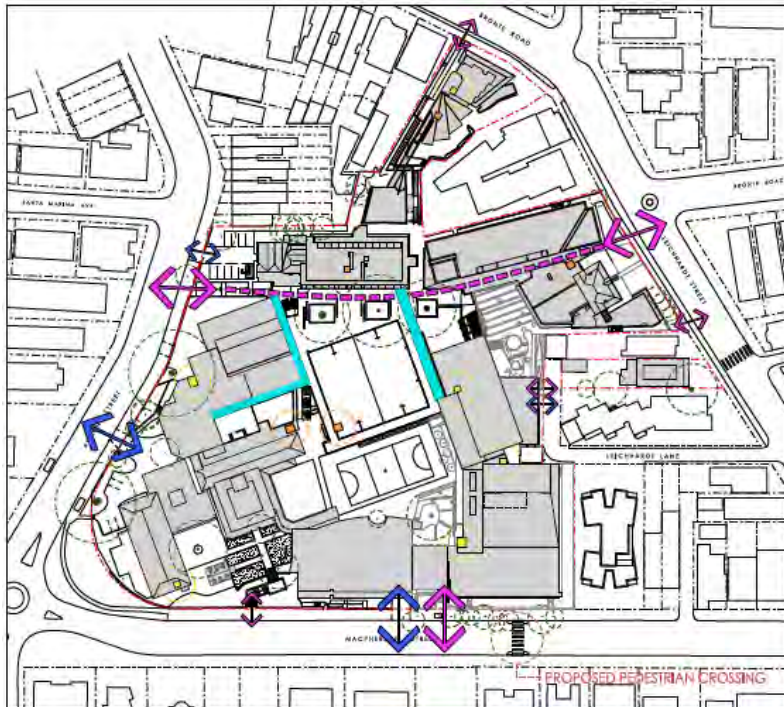


Figure 25: Proposed access arrangements

5 Stage 1 development

5.1 Description

The proposed SSD comprises the following:

Detailed design approval for RPAC which comprises:

- (a) Demolition of the existing swimming pool, change rooms, portable class room
- (b) Tree removal
- (c) Construction of RPAC in the location of existing swimming pool and the approved commenced Indoor Sports Complex (DA 258/89) to include basement car parking, an Aquatic Centre with associated amenities, Multi-Purpose Hall, 500 seat Performing Arts Auditorium with associated amenities and RPAC.
- (d) Landscaping of the site.

5.2 Proposed profile of use

5.2.1 Existing venues

The School currently holds a number of events/activities both internally and externally for the public. Current event venues and their capacities are outlined below:

- JKSC holding 1,000 attendance
- Isabel Hall Courtyard holds 600 standing attendance
- DJSC holds up to 250 attendance
- JBH holds up to 250 seated attendance
- Cloisters holds up to 120 attendance
- Nan Hind Centre holds up to 100 attendance

The RPAC development proposes to consolidate events from these existing facilities into the new facilities. It is also proposed to redevelop the JBH site in a future stage of the Campus Master Plan.

5.2.2 Existing profile of events/activities

There is an annual calendar of events and activities that are held in the various on-site venues. In addition to these, the School Musical event is held at NIDA Parade Playhouse, and occurs once a year periodically. A schedule of these existing events and activities and the potential future sports venue to be used is provided in Table 7. The events currently held in the JKSC will remain in this venue and there is no envisaged change in attendance. A number of the events that are moving into the new venues are envisaged to increase in size, although the majority will not change.

Table 7: Indicative usage profile (existing and forecast)

Event	Frequency (days p/yr)	Day of Week	Current indicative usage profile			Forecasted indicative usage profile			Change	Event Number for parking
			Hours	Existing facility where event is currently held	Estimated current attendance at event	Hours	New facility where event is proposed	Estimated forecasted attendance at event		
School Open Day	5	Weekday	9am - 11am	Dame Joan Sutherland	120 externals	9am - 11am	Performing Arts Auditorium	120 externals	0	120
School Open Night (Twilight Session - Term 1 and 4 only)	3	Weekday	5.30pm - 7.30pm	Dame Joan Sutherland	120 externals	5.30pm - 7.30pm	Performing Arts Auditorium	120 externals	0	120
Rehearsal Senior School Musical	5	Weekend	9am - 2pm	NIDA	60 students	10am - 1pm	Performing Arts Auditorium	60 students	0	0
Senior School Musical Event	2	Weekday	6.30pm - 9.30pm	NIDA - Parade Playhouse	659 audience with orchestra pit in use	6.30pm - 9.30pm	Performing Arts Auditorium	500 audience (school community)	500	500
Senior School Musical Event	1	Saturday	NA	NA	NA	6.30pm - 9.30pm	Performing Arts Auditorium	500 audience (school community)	500	500
Prep - St. Cath's Got Talent	2	Weekday	3pm - 6.30pm	Dame Joan Sutherland	60 students	3pm - 6.30pm	Performing Arts Auditorium	60 students	0	0
St. Cath's Got Talent Event	1	Weekday	6pm - 9pm	Dame Joan Sutherland	250 audience	6pm - 9pm	Performing Arts Auditorium	500 audience (school community)	250	500
Prep - Trinity Evening	12	Weekday	3pm - 6.30pm	Dame Joan Sutherland	60 students	3pm - 6.30pm	Performing Arts Auditorium	60 students	0	0
Trinity Evening	1	Weekday	6pm - 10pm	Dame Joan Sutherland	250 audience	6pm - 10pm	Performing Arts Auditorium	500 audience (school community)	250	500
Rehearse BTC Showcase Event	11	Weekday	3pm - 6.30pm	Dame Joan Sutherland	60 students	3pm - 6.30pm	Performing Arts Auditorium	60 students	0	0
BTC Showcase Event	2	Weekday	6pm - 9pm	Dame Joan Sutherland	250 audience	6pm - 9pm	Performing Arts Auditorium	500 audience (school community)	250	500
Infants Christmas Musical Rehearsal	3	Weekday	9am - 5pm	Dame Joan Sutherland	130 students	9am - 5pm	Performing Arts Auditorium	130 students	0	0
Infants Christmas Musical	1	Weekday	9am - 12pm	Dame Joan Sutherland	250 audience	9am - 12pm	Performing Arts Auditorium	300 audience	50	300
Junior Musical Rehearsal	2	Weekend	9am - 5pm	Dame Joan Sutherland	150 students	9am - 5pm	Performing Arts Auditorium	150 students	0	0
Junior Musical Rehearsal	2	Weekday	During school hours	Dame Joan Sutherland	150 students	During school hours	Performing Arts Auditorium	150 students	0	0
Junior Musical	2	Weekday	6.30pm - 9.30pm	Dame Joan Sutherland	250 audience	6.30pm - 9.30pm	Performing Arts Auditorium	400 audience	150	400
Stage 2 Music Evening Rehearsal	2	Weekday	During school hours	Dame Joan Sutherland	100 students	During school hours	Performing Arts Auditorium	100 students	0	0
Stage 2 Music Evening	1	Weekday	6.30pm - 9.30pm	Dame Joan Sutherland	250 audience	6.30pm - 9.30pm	Performing Arts Auditorium	300 audience	50	300
Stage 3 Music Evening Rehearsal	2	Weekday	During school hours	Dame Joan Sutherland	150 students	During school hours	Performing Arts Auditorium	150 students	0	0
Stage 3 Music Evening	1	Weekday	6.30pm - 9.30pm	Dame Joan Sutherland	250 audience	6.30pm - 9.30pm	Performing Arts Auditorium	350 audience	100	350
Potential Use by Educational Establishment (Evening)	4	NA	NA	NA	NA	6.30pm - 9.30pm	Performing Arts Auditorium	500 audience	500	500
Potential Use by Educational Establishment (Matinee)	1	NA	NA	NA	NA	1.30pm - 4.30pm	Performing Arts Auditorium	500 audience	500	500
Amateur Societies Performance Evening	6	NA	NA	NA	NA	6.30pm - 9.30pm	Performing Arts Auditorium	500 audience	500	500
Amateur Societies Performance Matinee	2	NA	NA	NA	NA	1.30pm - 4.30pm	Performing Arts Auditorium	500 audience	500	500
Parent Breakfast - Junior School (K-6)	7	Weekday	7am - 9am	Jane Barker Hall	30 parents	7am - 9am	Multi-Purpose Hall	30 parents	0	0
Parent Breakfast - Senior School (7-12)	6	Weekday	7am - 9am	Jane Barker Hall	45 parents	7am - 9am	Multi-Purpose Hall	45 parents	0	0
Welcome Cocktail Party	1	Weekday	6pm - 9pm	Isabell Hall Wing Courtyard	600 externals (standing)	6pm - 9pm	Multi-Purpose Hall	600 externals (standing)	0	0
Old Girls Union - Annual 5yr Reunion	1	Weekday	6pm - 8pm	Cloisters*	60 externals	6pm - 8pm	Multi-Purpose Hall	60 externals	0	0
Allwell Scholarship Testing	1	Weekend	10am - 1pm	Dame Joan Sutherland	100 external students	10am - 1pm	Multi-Purpose Hall	100 external students	0	0
Kindergarten Parents DVD evening	1	Weekday	6pm - 9pm	Nan Hind Centre	100 parents	6pm - 9pm	Multi-Purpose Hall	100 parents	0	0
Old Girls Union - Mothers and Daughters Breakfast	1	Weekday	7.30am - 9.30am	Jane Barker Hall	60 (30/30 split)	7.30am - 9.30am	Multi-Purpose Hall	60 (30/30 split)	0	0
Old Girls Union - Jane Barker Luncheon	1	Weekday	10.30am - 1.30pm	Jane Barker Hall	80 externals	10.30am - 1.30pm	Multi-Purpose Hall	80 externals	0	0
Evening of Eminence - Junior School	1	Weekday	6pm - 8.30pm	Dame Joan Sutherland	160 parents	6pm - 8.30pm	Multi-Purpose Hall	250 externals	90	90
Creative Connections	1	Weekday	4.30pm - 8.15pm	Dame Joan Sutherland + Chapel	250 (yr 12 + parents + staff)	4.30pm - 8.15pm	Multi-Purpose Hall	250 (yr 12 + parents + staff)	0	0
Kindergarten Grandparents Morning	1	Weekday	8am - 11am	Nan Hind Centre	60 grandparents	8am - 11am	Multi-Purpose Hall	60 grandparents	0	0
Old Girls Union Year 12 Afternoon Tea	1	Weekday	2.30pm - 4pm	Jane Barker Hall	120 students (Yr 12)	2.30pm - 4pm	Multi-Purpose Hall	120 students (y12)	0	0
Blues Sports Breakfast	1	Weekday	7am - 9am	Jane Barker Hall	100 students	7am - 9am	Multi-Purpose Hall	100 externals	0	0
Kindergarten Orientation Day	1	Weekday	8am - 1pm	Jane Barker Hall	50 externals	8am - 1pm	Multi-Purpose Hall	50 parents	0	0
Orientation Day yr 4-11	1	Weekday	9am - 4pm	Dame Joan Sutherland	20 p/hr externals	9am - 4pm	Multi-Purpose Hall	20 p/hr external	0	0
Rowing Season Launch	1	Weekday	6pm - 10pm	Nan Hind Centre	100 parents	6pm - 10pm	Multi-Purpose Hall	100 external	0	0
Duke of Edinburgh Presentation Evening	1	Weekday	6pm - 9pm	Dame Joan Sutherland	90 parents	6pm - 9pm	Multi-Purpose Hall	90 parents	0	0
Yr 6 Graduation Dinner	1	Weekday	6pm - 9pm	Jane Barker Hall	250 (seated)	6pm - 9pm	Multi-Purpose Hall	250	0	0
Chairman's Thank You Cocktail Party	1	Weekday	6pm - 9pm	Cloisters*	80 (volunteers, parents etc.)	6pm - 9pm	Multi-Purpose Hall	80 (volunteers, parents etc.)	0	0
HSC Results Event	1	Weekday	During school hours	Cloisters*	120 students (Yr 12)	During school hours	Multi-Purpose Hall	120 students (Yr 12)	0	0
Staff Christmas Lunch	1	Weekday	During school hours	Jane Barker Hall	200 (seated)	During school hours	Multi-Purpose Hall	200	0	0
Allwell testing Yr 4	1	Weekday	During school hours	Dame Joan Sutherland	50 external students	During school hours	Multi-Purpose Hall	50 external students	0	0
Boarders dance	1	Weekday	7pm - 10pm	Jane Barker Hall	300 external students and boarders	7pm - 10pm	Multi-Purpose Hall	300 external students and boarders	0	0
Boarder Parents Dinner	1	Weekday	6.30pm - 9.30pm	Magnolia Room	40 parents	6.30pm - 9.30pm	Multi-Purpose Hall	40 parents	0	0
Valedictory Dinner	1	Weekday	6.30pm - 9.30pm	Magnolia Room	120 (boarders + parents + staff)	6.30pm - 9.30pm	Multi-Purpose Hall	120 (boarders + parents + staff)	0	0
Boarders Xmas Dinner	1	Weekday	6.30pm - 9.30pm	Magnolia Room	140 (boarders + parents + staff)	6.30pm - 9.30pm	Multi-Purpose Hall	140 (boarders + parents + staff)	0	0
Parent Event	4	Weekday	NA	NA	NA	During school hours	Research Centre	50 parents	0	0
Book week activities	5	Weekday	During school hours	Senior/Junior Library	Students only	During school hours	Research Centre	Students + parental involvement	50	50
Boarders after school tutorials	Weekdays all year	Weekday	3.20pm - 9pm	Lenthall Building	70 students/tutors mix	3.20pm - 9pm	Research Centre	70 students/tutors mix	30	30
Speech Night Guest Supper	1	Weekday	5.30pm - 7.00pm	Reception Room	30 (parents + school council + staff)	5.30pm - 7.00pm	Board Room	30 (parents + school council + staff)	0	0

*Cloisters refers to the grass area west of the central artificial netball courts

LEGEND

	Denotes new event to take place on the St Catherine's School site
	Denotes existing event occurring on the St Catherine's School site where the attendance will increase
	Students/staff only

5.2.3 Proposed Aquatic Centre

The proposed aquatic centre replaces the existing outdoor pool with two new indoor pools including a diving facility. The new pools will generate the majority of new activity as it is proposed to utilise both pools during weekends, and before/after school with Learn to Swim classes, squad swimming, diving and water polo (training and competition). Currently the diving program is held off-site at Waverley College pool and this will move to the new pool.

The anticipated utilisation of the aquatic centre is outlined in Table 8. The typical attendance at the aquatic centre will increase from 75 currently up to 250 at any one time when both Water Polo and Learn to Swim are occurring concurrently during the weekend.

Table 8: Aquatic Centre utilisation

Period	Existing			Future		
	Times	Event	Attendance (per hour)	Times	Event	Attendance (per hour)
	Outdoor Pool			Main Pool		
Before and after School	6.30am – 8.20am & 3.20pm – 6.30pm	Water Polo training	20	6.00am - 8.20am & 3.20pm – 8.00pm	Water Polo training	50
	5.00am – 8.20am & 3.20pm – 6.00pm	Squad Swimming	20		Squad Swimming	30
	6.00am - 8.20am	Diving (off-site at Waverley College)	20 students		Diving (on-site)	20 students
Weekday (school hours)	8.20am - 3.20pm	School Use Only	NA		School Use Only	NA
Weekend	7.30am - 2.00pm Sat Only	Water Polo	75	8.00am – 6.00pm Sat & Sun	Water Polo	150
	Outdoor Pool			Shallow Pool		
Weekday	3.20pm - 6.00pm	Learn to Swim	20	7.00am – 7.00pm	Learn to Swim	100
Weekend		NA		8.00am – 6.00pm	Learn to Swim	100
Total maximum attendance			75			250

5.2.4 Combined on-site activity

The various events and activities outlined in the preceding sections will be scheduled to minimise overlapping activity. For example, if a major event is to be held on a weekend in the Performing Arts Auditorium, then the Aquatic Centre activity will be scheduled to finish prior to the commencement of the major event.

5.3 Car parking provision

Additional basement car parking is proposed under the new RPAC building as shown in Figure 26. Access will be via a new internal connection from the existing basement parking area under the DJSC, hence utilising the existing two-way driveway on Macpherson Street. This will add 22 spaces to the existing 25 spaces, resulting in 47 car parking spaces in the basement. Basement car parking will be allocated for staff parking during the week but will be available for visitors to the RPAC building at weekends.

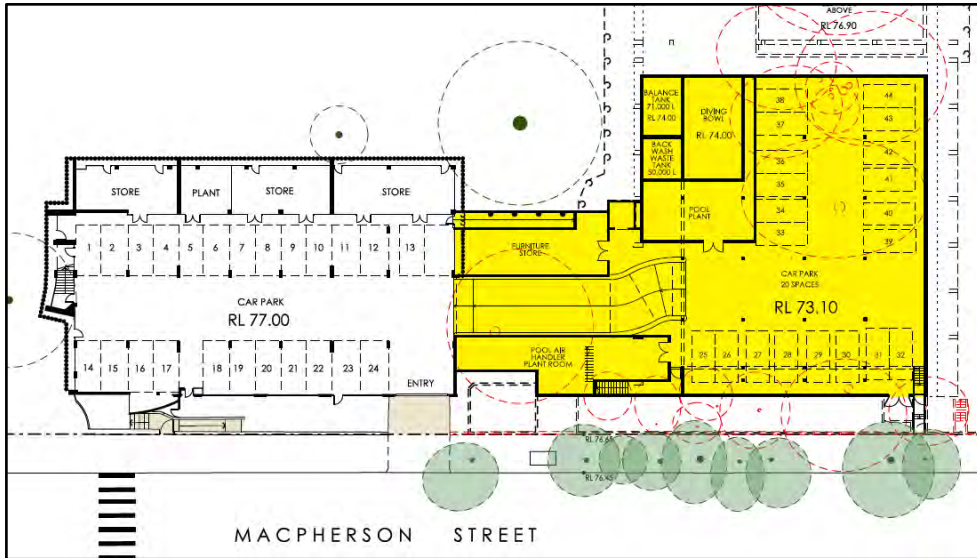


Figure 26: RPAC Basement Car Park

In addition, there will be parking space alterations in other areas of the campus, predominately along Albion Street. When the basement parking provision is included, this brings the total campus parking provision to 75 car spaces (a net increase of 19 spaces).

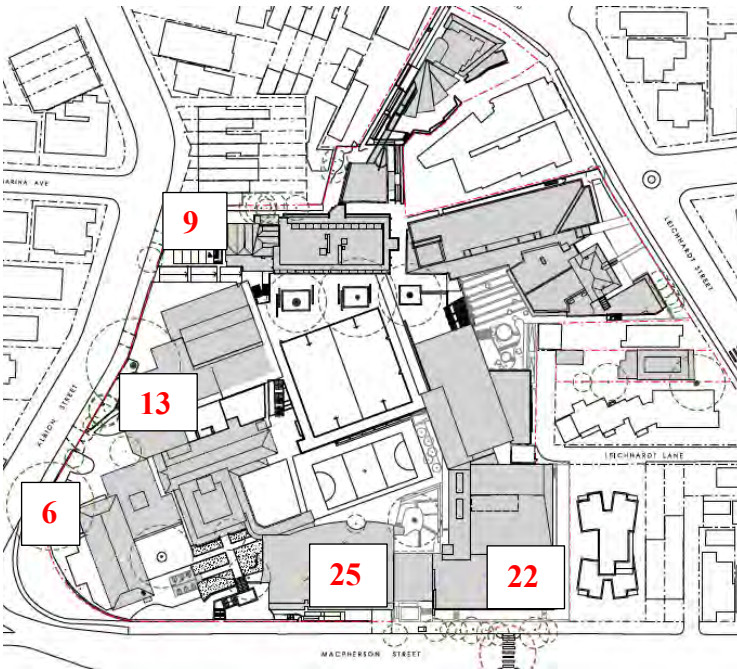


Figure 27: Proposed off-street car parking

5.4 Proposed site accesses

The campus will consolidate a number of entry/exit points so that access is more controlled into school grounds. This will provide an accessible through site link from Albion Street to Leichhardt Street for wet weather throughout the campus. Changes to the site accesses are shown below in Figure 28.

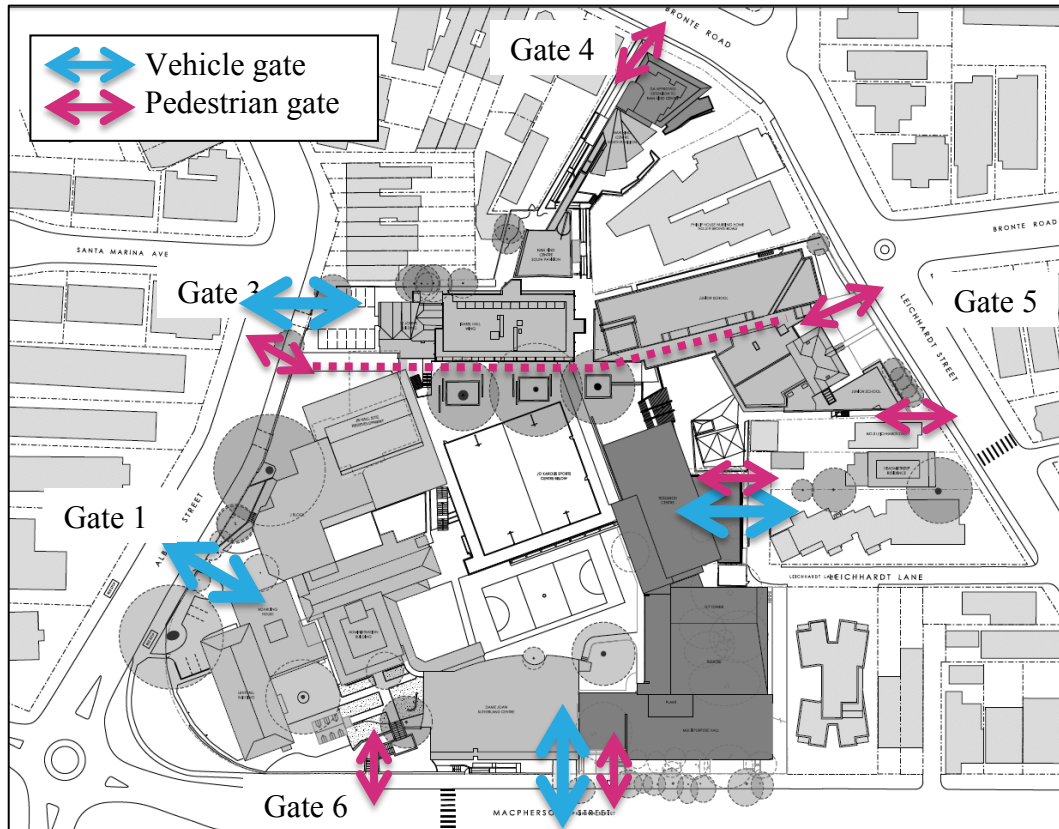


Figure 28: Proposed site accesses

5.5 Bicycle facilities

The School is proposing to provide bicycle facilities as part of the Campus Master Plan. Bicycle parking has been provided in accordance with the *NSW Planning Guidelines for Walking and Cycling 2004*. The School will provide (as shown in Figure 29):

- Six (6) staff bicycle racks with lockers and full bathroom including showers/toilets in the secure staff car parking area in Level 4 J Block (requires key to access); and
- Nine (9) visitor bicycle racks adjacent to the Level 6 Student Centre (in the St Johns Building), which is easily accessed from Albion Street.

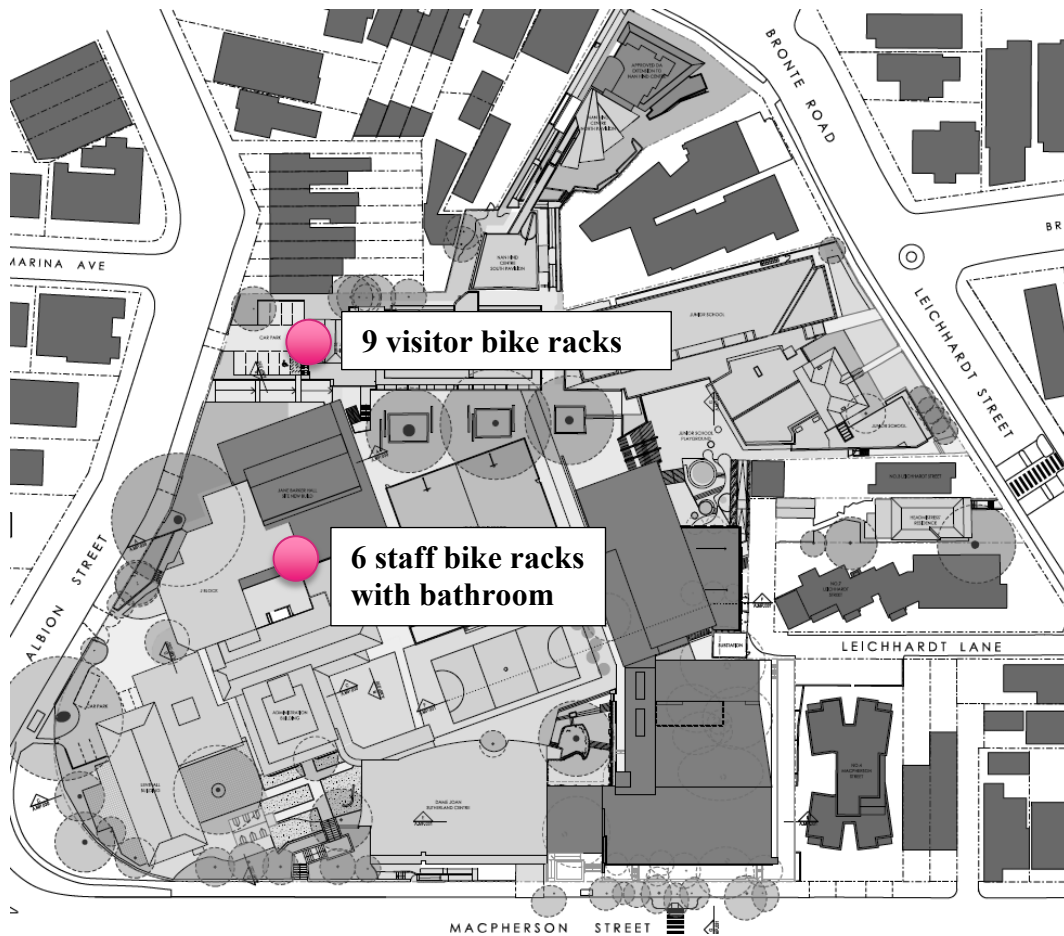


Figure 29: Proposed bicycle facilities

5.6 School bus parking

School bus parking currently occurs at a rear access on Leichhardt Lane, adjacent to a substation. Buses drive in a forward direction up the lane, and reverse into the access driveway, so that they are able to leave in a forwards direction.

From Stage 1 development up to when the Master Plan is finalised, it is proposed to relocate bus parking to Gate 1 at Albion Street. Buses are able to drive in and out of the site in a forwards direction. Once the Master Plan is finalised, buses may be able to move back to Leichhardt Lane via a new access. Buses will operate via the new access similarly to the existing access on Leichhardt Lane.



Figure 30: Swept path of FUSO minibus at Gate 1

5.7 Service vehicle access and waste collection

Council currently collects waste and recyclable materials in Leichhardt Lane. The Council truck reverses along Leichhardt Lane from Leichhardt Street before 7am, prior to school activity commencing and before commuter peak hours in Leichhardt Street. The bin store, shown in Figure 31 is proposed to be located adjacent to the Ausgrid substation which will provide direct access onto the lane for collection.

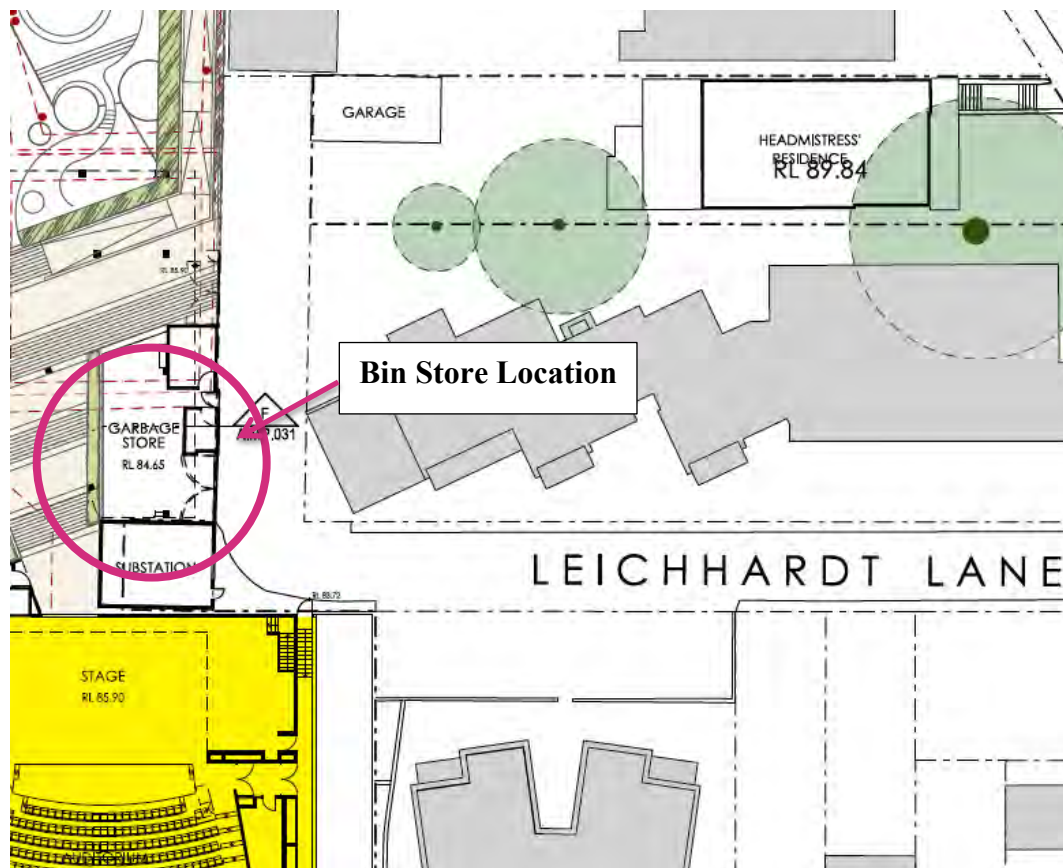


Figure 31: Proposed bin store

The main service vehicle access is Gate 1 from Albion Street. Service vehicles also access the site from Gate 3 for fire hydrants, bakery and canteen deliveries. Deliveries usually occur within the car parking area and will continue to do so under the new arrangements.

6 Transport impact assessment

6.1 School drop-off / pick-up zones

6.1.1 Future management strategy

Observations by Arup during the morning and afternoon drop-off/pick-up peaks indicate that many of the recommendations put forward by Lyle Marshall & Associates are warranted.

- Staff to be present in Leichhardt Street, Macpherson Street and Albion Street. Staff to be briefed and given written instructions for effective traffic management.
- Seek Council approval to rationalise the “No Parking” signposting to 8:00am to 9:00am and 2:30pm – 4:00pm in all Zones in Leichhardt Street, Macpherson Street and Albion Street. There is no requirement to have different time limits in the three streets.
- Queuing Bays to be marked and numbered in all Zones.
- Circular letter to be sent to all parents at the commencement of the School Year explaining the Road Rules applying to “No Stopping” Zones and instructions to be followed when dropping-off and picking-up students.
- With effective traffic management, the existing Drop-Off and Pick-Up Zones have sufficient queuing spaces for the busiest period.

Lyle Marshall & Associates suggested that the *No Parking zones be signposted for P5, which would allow parents to effectively park and leave their vehicles rather than having to wait in the vehicle and move on within 2 minutes*. Arup disagrees with this proposal; ‘No Parking’ signposting should be retained as it gives a sense of urgency to parents that they are not to stay too long. Arup agrees that the time restrictions should be changed to be consistent as often there are parked vehicles blocking the drop-off queues in the morning.

Enforcement is required for parents that infringe on ‘No Stopping’ zones. Observations noted that parents would often stop and block the through traffic on the surrounding streets and intersections by these actions. Stopping near crossings also affects safety of children crossing by reducing available sightlines. Parents will be advised to loop around the block until a queuing space is available. Traffic controllers employed by the School would allow for this to occur.

It is recommended that the School adopt a student registration system for the Junior School. This would require each car to display a number or the child’s name on the windscreen to allow the traffic controllers to match children with their car as it approaches the pick-up area. This results in a quicker turnover of spaces in the pick-up zone.

6.1.2 Proposed school zone improvements

Macpherson Street

School access to the Macpherson Street school zone will be improved by the new pedestrian access to the School via the RPAC building as shown in Figure 32.

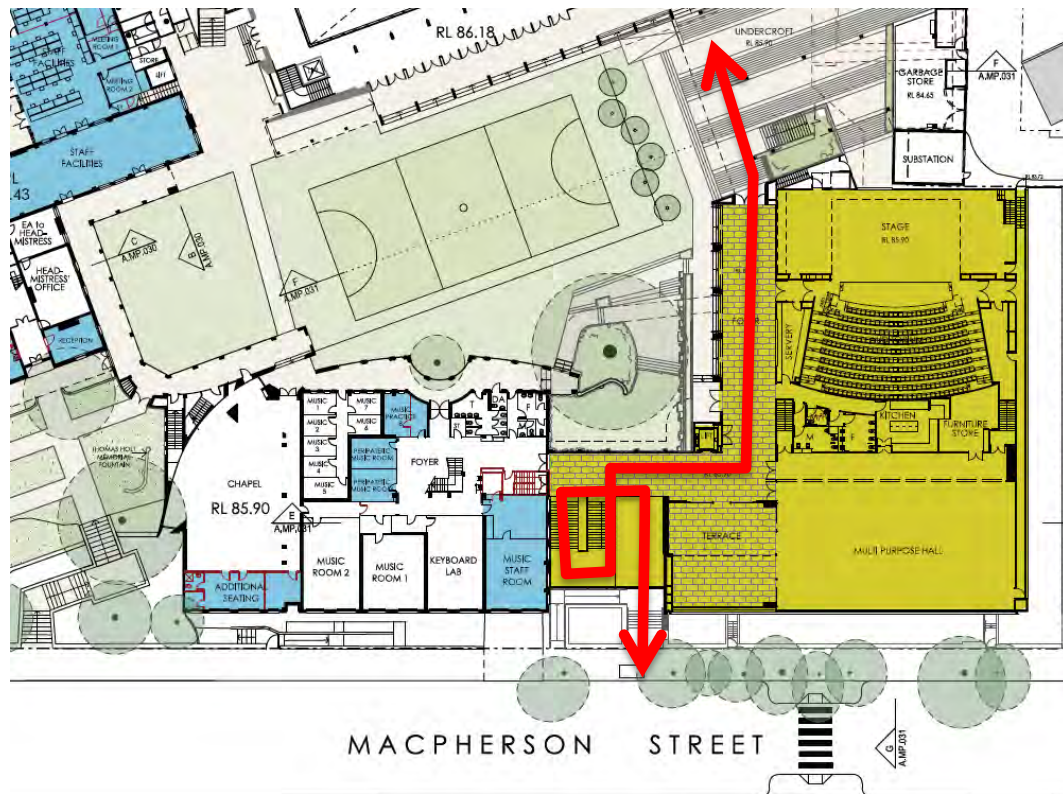


Figure 32: New school pedestrian access to Macpherson Street

With the School access being located further to the east, the existing drop-off/pick-up zone will function more efficiently as it will encourage vehicles to proceed further east and hence reduce the occurrence of vehicle queuing back towards the Albion Street roundabout. Further improvements to the Macpherson Street school zone have been identified to provide a more efficient level of operation and to allow additional use by the School. These are shown in Figure 33 and include:

- Relocating the existing zebra crossing to the east to coordinate with the existing bus zones and to relate to the new school pedestrian access via the RPAC building.
- Building integrated kerb extensions on each side of the pedestrian crossing so that the crossing is better defined and complies with Roads and Maritime Services (RMS) guidelines for appropriate 'No Stopping' areas on approach and departure
- Relocating the kerbside bus zones, so that they are on the departure side of the zebra crossing (i.e. located after passing the crossing in the respective travel lane)
- Creating a continuous 'No Parking' drop-off/pick-up zone for up to 20 vehicles which will permit an efficient flow of vehicles.

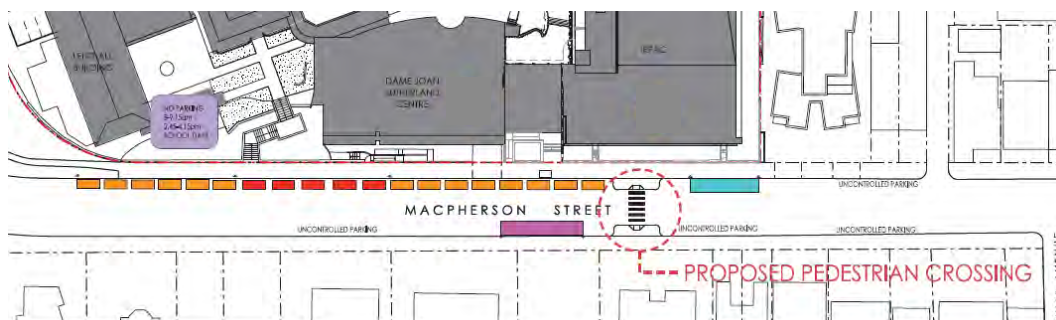


Figure 33: Proposed adjustments to the zebra crossing in Macpherson Street

With these improvements to the Macpherson Street No Parking zones, it is recommended that additional pick-up activity can occur here with use by Years 3-4 prior to Years 5-6 and Years 7-10. This adjustment is outline in Table 9.

Table 9: Proposed adjustments to drop-off/pick-up/zone allocation

Year	Existing		Proposed	
	Finish time	Pick-up location	Finish time	Pick-up location
K	2.45pm	Courtyard	2.45pm	Courtyard
1-2	2.50pm	Leichhardt Street	2.50pm	Leichhardt Street
3-4	3.00pm	Leichhardt Street	3.00pm	Macpherson Street
5-6	3.00pm	Macpherson Street	3.15pm	Macpherson Street
7-10	3.20pm	Macpherson/Albion Street	3.20pm	Macpherson Street
11-12	3.20pm	Macpherson/Albion Street	3.20pm	Albion Street

Leichhardt Street

Waverley Council has recently approved a trial adjustment to the location of the northbound bus zone in Leichhardt Street to improve bus operations. Figure 34 shows the approved location for the bus zone moving from south of Leichhardt Lane to north of the lane.

This has the advantage of creating one feeder queue for the Junior School Years 1-4 drop-off / pick-up. It is located to the south of the bus zone and cars will need to proceed north past the bus zone to join the drop-off / pick-up zone.

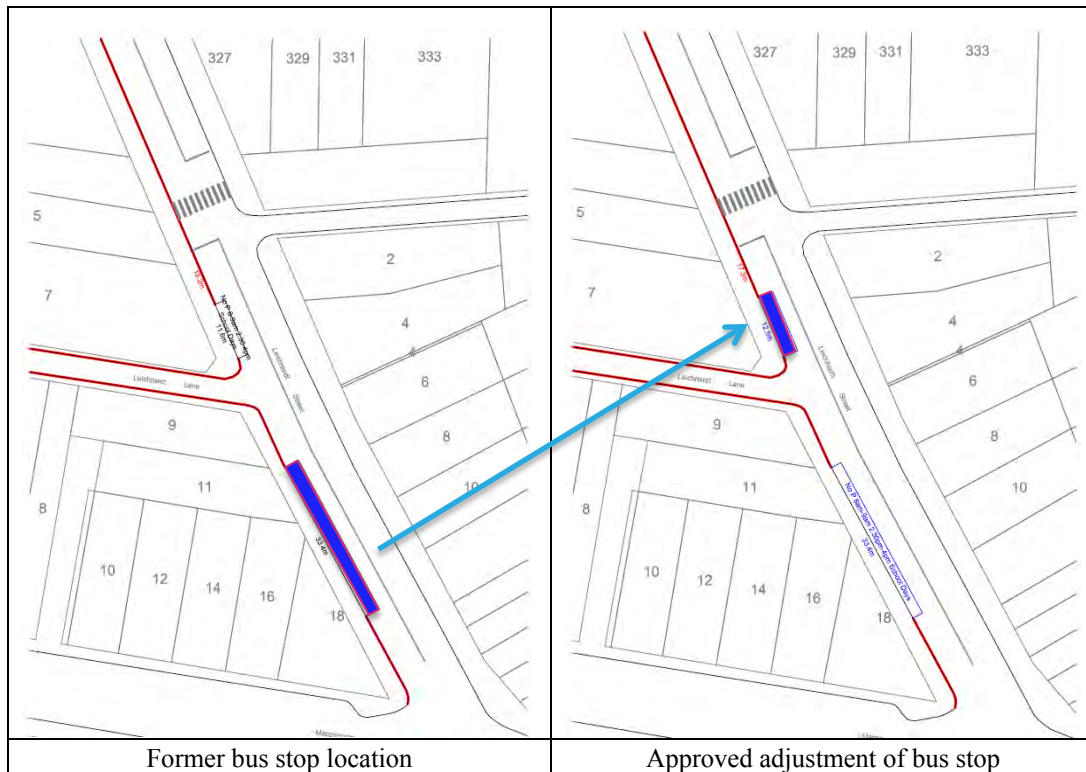


Figure 34: Approved trial adjustment to Bus Zone in Leichhardt Street

Albion Street

No changes are proposed to the existing 'No Parking' zones in Albion Street which service the Senior School.

6.2 Car parking assessment

6.2.1 Off-street car parking areas

The basement car parking proposed under the new RPAC building, described in Section 5.3, will be accessed via a new ramp connection from the existing basement parking area under the DJSC. This will add 22 spaces to the existing 25 spaces resulting in 47 car parking spaces in the basement. The existing two-way driveway on Macpherson Street will be utilised for access meaning there will be no changes to the Macpherson Street frontage driveway. During design development the car park will be assessed for compliance against AS2890.1.

At-grade car parks accessed from Albion Street will be rationalised as shown in Figure 35 and Figure 36. There will be parking space alterations in other areas of the campus, predominately along Albion Street. When the basement parking provision is included, this brings the total campus parking provision to 75 car spaces (a net increase of 19 spaces).

The existing driveways on Albion Street will be maintained for access to these small car parking areas.



Figure 35: Albion Street southern car park



Figure 36: Albion Street northern car park

6.2.2 On-street car parking

Future parking demand is outlined in Section 3.6.4. There are a number of events and activities throughout the year that will increase car parking demand based on the new facilities.

Performing Arts Auditorium, the Multi Purpose Hall, RPAC and the JKSC

A number of annual events currently held in the DJSC that will be relocated into the Performing Arts Auditorium which will increase the capacity of the event from 250 to 500. There are a number of new events also planned with a capacity of 500 that will be held in the Performing Arts Auditorium. The annual events that will attract external visitation and the number of times they occur each year are outlined in Table 10.

The number of car parking spaces required has been calculated by applying an assumed car mode of 80% and car occupancy of 2.5 people. On this basis, a car parking demand of up to 160 cars is anticipated for the large capacity events. With car parking for 47 cars in the venue, approximately 113 cars would park on-street. The on-street car parking utilisation described in Section 3.6.4 indicates that there are in excess of 200 car spaces available within 5 minutes' walk of the venue between 7.30 and 8.00pm. At this time the majority of residents have returned home for the night and hence these spaces are available for occasional use by event attendees.

Table 10: Annual events in the Performing Arts Auditorium

Performing Arts Auditorium Events	Time	Frequency	Attendance	Car Parking
School Open Day	9.00am – 11.00am	5 days/year	120	38
School Open Night (Twilight Session)	5.30pm - 7.30pm	2 days/year	120	38
^t Senior School Musical Event	5.30pm - 9.30pm	2 days/year	500	160
^t Senior School Musical Event	6.30pm - 9.30pm	1 day/year	500	160
St. Cath's Got Talent Event	6.00pm – 9.00pm	1 day/year	500	160
Trinity Evening	6.00pm – 10.00pm	1 day/year	500	160
BTC Showcase Event	6.00pm – 9.00pm	2 days/year	500	160
Infants Christmas Musical	9.00am – 12.00pm	1 day/year	300	96
^t Junior School Musical	6.30pm - 9.30pm	2 days/year	400	128
Stage 2 Music Evening	6.30pm - 9.30pm	1 day/year	300	96
Stage 3 Music Evening	6.30pm - 9.30pm	1 day/year	350	112
* Performance Evening	6.30pm - 9.30pm	4 days/year	500	160
* Performance Matinee	1.30pm - 4.30pm	1 day/year	500	160
Amateur Societies Performance Evening	6.30pm - 9.30pm	6 days/year	500	160
Amateur Societies Performance Matinee	1.30pm - 4.30pm	2 days/year	500	160

**This event may have potential use by another school*

^t These events occur every other year (not annually)

The majority of other events to be held in the Performing Arts Auditorium, the Multi Purpose Hall, the RPAC and the JKSC already occur on-site and there is no planned change to the frequency or size of these events. The venue use will be scheduled so that events in the various venues do not overlap. This leaves limited opportunity for additional external hire of the venues to that currently programmed.

Aquatic Centre

The proposed Aquatic Centre replaces the existing Outdoor Pool with two new indoor pools including a diving facility. The new pools will generate the majority of new activity as it is expected to utilise both pools during weekends, and before/after school with Learn to Swim classes, squad swimming, diving and Water Polo (training and competition). Currently the diving program is held off-site at Waverley College pool and this will move to the new pool.

The anticipated utilisation of the aquatic centre is outlined in Section 5.2.3 and Table 8. The typical attendance at the aquatic centre will increase from 60 currently up to 250 at any one time when both Water Polo and Learn to Swim are occurring concurrently at the weekend. The anticipated car parking demand has been calculated based on anticipated car mode and car occupancy and is shown in Table 11. The maximum expected attendance is the total using the shallow pool and main pool during any expected time period. Note that events cannot occur simultaneously in the Main Pool.

Table 11: Aquatic Centre car parking demand

Period	Future		Cars /hour			Additional cars / peak hour		
	Time	Event	Attendance (per hour)	Mon-Fri	Sat-Sun	Additional attendance	Mon-Fri	Sat-Sun
Main Pool								
Before and after School (Weekdays)	6.00am - 8.20am & 3.20pm - 8.00pm	Water Polo training	50	41	0	30	25	0
		Squad Swimming	30	25	0	10	8	0
		Diving (on-site)	20	16	0	20	13	0
During school hours (Weekdays)	8.20am - 3.20pm	School Use Only	NA	NA	NA	0	NA	NA
Weekend	8.00am – 6.00pm Sat & Sun	Water Polo	150	0	68	75	0	34
Shallow Pool								
Weekday	7.00am – 7.00pm	Learn to Swim	100	45	0	100	45	0
Weekend	8.00am – 6.00pm	Learn to Swim	100	0	45	100	0	45
Total maximum attendance			250	86	113	175	70	79

Note: Car mode assumed as 90% for each event and occupancy assumed as 1.1 (for before and after school events) and 2.0 (for all day events)

The peak parking demand occurs at the weekend when 113 cars are anticipated. With car parking for 47 cars available in the venue during non-school times,

approximately 66 cars would park on-street. The on-street car parking utilisation described in Section 3.6.4 indicates that there are in excess of 150 car spaces available within 5 minutes' walk of the venue between 2.30pm and 3.00pm.

6.2.3 Alternative strategies for event car parking

A number of strategies could be investigated to reduce the reliance of on-street car parking for major events at the School. These could include:

- Operating a shuttle bus loop service within the Eastern Suburbs on a route with designated pick-up points. This would operate 2 or 3 times prior to the event to pick-up event attendees and later drop them on the same route.

6.3 Traffic Assessment

To undertake an assessment of likely travel for students and staff accessing the School, the transport survey data of students and staff attending the School has been considered and compared with supporting JTW Census data in 2011. All car activity for students is associated with drop-off in the morning and pick-up in the afternoon.

6.3.1 Mode split arrival and departure analysis

The existing mode split for student and staff arrival for each group is shown in Table 12. The projected staff increase of 10 has been applied to full-time workers, resulting in an additional 8 vehicles. The 70 students that board (live) at the School are predominantly from the Senior School and assumed to be removed from the total Senior School students.

The analysis indicates that 599 students are currently dropped off in the morning by car. The student demographic data indicates that 20% of students also have a sister attending the School. Therefore, a car occupancy factor of 1.2 has been applied to students (assuming all girls are driven to their drop off point) which results in a total of 496 car trips. A car occupancy factor of 1.2 is consistent with the observed student drop off and pick-up activity from the Lyle Marshall & Associates report. The same mode split and occupancy factor has been applied to the proposed future maximum student numbers across each student group. This results in an increase of 126 car trips, 30 public transport trips, 8 school bus trips and 34 walk trips.

Table 12: Mode split morning arrival

Morning Arrival	No.	Car			Public Transport		Walk		School Bus		Ride-share	
		%	No. People	No. Cars	%	No. People	%	No. People	%	No. People	%	No. People
Existing		Car occupancy 1.2				Total students include 70 boarders with no travel						
Junior School	376	80%	303	252	4%	14	10%	36	2%	9	4%	14
Senior School	524	57%	299	247	19%	100	18%	95	4%	21	2%	9
Total Students	970		602	499		114		131		30		23
Full-time staff	175	75%	131	131	17%	29	6%	11	-	-	2%	4
Part-time staff	27	71%	19	19	29%	8	0%	0	-	-	0%	0
Total Staff	202		150	150		37		11		0		4
Proposed		Car occupancy 1.2				Total students include 70 boarders with no travel						
Junior School	465	80%	375	311	4%	17	10%	45	2%	11	4%	17
Senior School	665	57%	379	314	19%	127	18%	120	4%	27	2%	12
Total Students	1,200		754	625		144		165		38		29
Full-time staff	185	75%	139	139	17%	31	6%	11	-	-	2%	4
Part-time staff	27	71%	19	19	29%	8	0%	0	-	-	0%	0
Total Staff	212		158	158		39		11		0		4
Increase of trips												
Students	230		152	126		30		34		8		6
Staff	10		8	8		2		0		0		0
Total	240		160	134		32		34		8		6

The existing mode split for student and staff departures for each group is shown in Table 13. The analysis indicates that 481 students are picked up in the afternoon by car. Given the car occupancy factor of 1.2, the car trips result in a total of 398 car trips. The same mode split has been applied to the proposed future student numbers across each student group. This result is an increase in 99 car trips, 39 public transport trips, 15 school bus trips and 53 walk trips. In the afternoon, more students use non-car modes to travel home than in the morning due to the morning drop-off time coinciding with the journey to work time and the afternoon having a range of after school activities.

Table 13: Afternoon departure mode

Afternoon Departure	No.	Car			Public Transport		Walk		School Bus		Ride-share	
		%	No. People	No. Cars	%	No. People	%	No. People	%	No. People	%	No. People
Existing		Car occupancy 1.2				Total students include 70 boarders with no travel						
Junior School	376	78%	293	242	4%	16	14%	51	4%	16	0%	0
Senior School	524	36%	188	156	26%	133	29%	152	7%	39	2%	12
Total Students	970		481	398		149		203		55		12
Full-time staff	175	75%	131	131	17%	29	6%	10	-	-	2%	5
Part-time staff	27	71%	19	19	29%	8	0%	0	-	-	0%	0
Total Staff	202		150	150		37		10		0		5
Proposed		Car occupancy 1.2				Total students include 70 boarders with no travel						
Junior School	465	78%	361	299	4%	20	14%	64	4%	20	0%	0
Senior School	665	36%	240	198	26%	168	29%	192	7%	50	2%	15
Total Students	1,200		601	497		188		256		70		15
Full-time staff	185	75%	139	139	17%	31	6%	10	-	-	2%	5
Part-time staff	27	71%	19	19	29%	8	0%	0	-	-	0%	0
Total Staff	212		158	158		39		10		0		5
Increase of trips												
Students	230		120	99		39		53		15		3
Staff	10		8	8		2		0		0		0
Total	240		127	106		42		53		15		3

6.3.2 Traffic generation

The predicted traffic generation for the increase of school and staff population as a result of the Master Plan has been calculated based on the rates in Table 12 and Table 13. Given the site has no on-site facilities for pick-up/drop-off, it is assumed that no extra trips are generated to/from the site itself for the purposes of the student increase. However, there is an anticipated increase in traffic generation on the surrounding road network due to drop-off and pick-up increases associated with the forecast future student and staff population increases.

Pick-up and drop-off traffic volumes observed (259 vehicles in the AM peak and 153 vehicles in the PM peak) in the Lyle Marshall & Associates report suggest that these figures may in fact be approximately double the amount of car trips actually generated during the peak drop-off and pick-up times. This may be due to a number of factors such as extracurricular activities, early drop-offs / late pick-ups, vehicles using nearby streets and varying travel patterns day to day. Therefore, it is estimated that the traffic flows in Table 12 and Table 13 are more than what would occur during a nominal day during the peak hours. Hence, the additional traffic flows from students have been decreased by a factor of 30% on the road network, resulting in a total school related increase of 102 cars in the AM peak hour and 80 cars in the PM peak hour.

Additionally, there will be increases resulting from the use of the proposed Stage 1 facilities and the regular events that are scheduled to occur. The majority of trips will occur due to use of the proposed Aquatic Centre. The events at the other facilities have not been assessed as they do not occur regularly and the larger events already occur on the road network. The assumed attendances and car occupancy from Table 11 indicate an additional 70 cars in each the AM and PM peak and an additional 79 cars in the weekend peak (12pm-1pm).

Therefore, there is an additional total of 172 cars in the AM peak hour (8am-9am), 150 cars in the PM 'school' peak hour (3pm-4pm) and 79 cars in the weekend peak hour (12pm-1pm).

6.3.3 Traffic distribution and assignments

It has been assumed that the additional cars are applied twice onto the existing flows outlined in Section 3.4 to account for the drop-off and pick-up nature of the trips. The flow distributions have been estimated from the resident locations of the travel surveys and the respective origins/destinations (outlined in Section 3.7.2). Staff and student distributions were remarkably similar during each peak, and have been assumed as the same distribution for this analysis. Figure 37 shows the distribution of additional school traffic on each frontage road and the peak flow proportions on the approach roads.

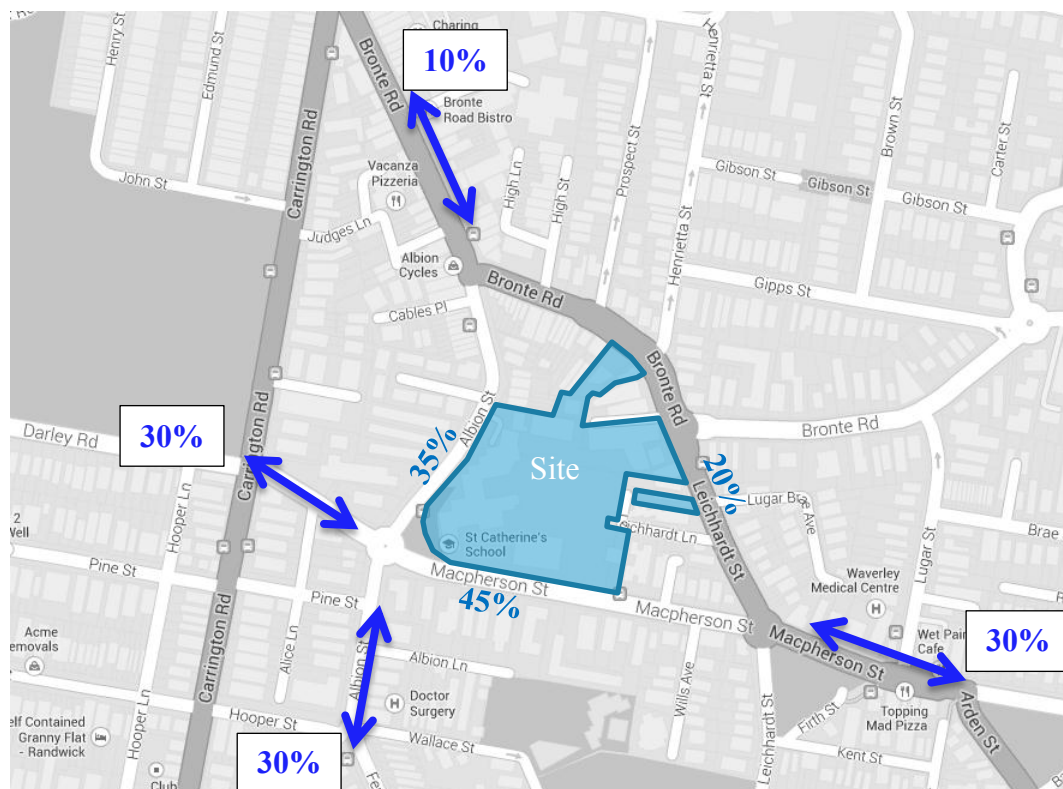


Figure 37: Peak flow proportions

For the purposes of this analysis, student car trips to the School were assumed to the nearest 'No Parking' zone as per the following:

- Trips from the east used both Leichhardt Street and Macpherson Street,
- Trips from the west used Macpherson Street
- Trips from the south used both Albion Street and Macpherson Street
- Trips from the north used both Albion Street and Macpherson Street.

The return trips that were picking up and dropping off were assumed to perform a u-turn at the following roundabout and head back to the same point of origin (except for Albion Street, where flows continued either north or south from the respective origins). It should be noted that the analysis has been conservative in that a number of u-turns have been assumed due to the increased student numbers, which utilise any spare capacity at the roundabouts. The existing traffic flows show that only a small proportion of the traffic currently perform these manoeuvres.

Additionally, all vehicle trips have been assumed to use the existing adjacent intersections to search for parking spaces in surrounding streets, which may not happen in reality. It was observed that parents would often park in surrounding streets to pick-up children.

6.4 Impact of generated traffic

6.4.1 Traffic modelling

In order to determine the road network impacts of the School, the traffic increases must be assessed with the increase of car trips by student and staff numbers, and the regular events scheduled. The surrounding intersections have been assessed using RMS approved Signalised & unsignalised Intersection Design and Research Aid (SIDRA) software. Two scenarios, existing and future were modelled in the AM, PM and Weekend peak hours.

Traffic conditions at this intersection is summarised in terms of:

- Level of Service (LoS);
- Degree of Saturation (DoS);
- Average Delay; and

In urban areas, the traffic capacity of the major road network is generally a function of the performance of traffic intersections. This performance is quantified in terms of the LoS, which is an index of the operational performance of traffic at an intersection and is based on the average delay per vehicle. LoS ranges from A = very good to F = highly congested conditions, as shown in Table 14.

Table 14: Level of Service criteria for intersections

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

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

6.4.2 Results and analysis

The modelling undertaken shows the overall impact of the Master Plan and Stage 1 development. The results of the scenarios tested are shown in Table 15. The detailed SIDRA outputs are provided in Appendix C.

Table 15: Results of traffic modelling

Intersection	Peak Period	Scenario	LoS	Delay (s)	DoS
Bronte Road / Albion Street	AM	Existing	A	7	0.62
		Future	A	8	0.66
	PM	Existing	A	9	0.76
		Future	A	9	0.77
	Weekend	Existing	A	10	0.79
		Future	A	10	0.80
Bronte Road / Leichhardt Street	AM	Existing	A	9	0.68
		Future	A	9	0.70
	PM	Existing	A	8	0.65
		Future	A	9	0.66
	Weekend	Existing	A	10	0.69
		Future	A	10	0.69
Macpherson Street / Leichhardt Street	AM	Existing	B	20	0.92
		Future	C	36	1.01
	PM	Existing	B	26	0.97
		Future	D	44	1.05
	Weekend	Existing	B	28	0.94
		Future	C	31	0.96
Macpherson Street / Albion Street	AM	Existing	B	18	0.87
		Future	C	31	0.98
	PM	Existing	C	34	0.97
		Future	E	60	1.06
	Weekend	Existing	B	24	0.91
		Future	C	28	0.94

The traffic modelling results indicate that the intersections on Macpherson Street (Albion Street and Leichhardt Street roundabouts) are operating near capacity under all scenarios. The existing PM peak hour conditions show the most impact; however, the roundabouts operate satisfactorily at all other times, given the adequate LoS and average intersection delay.

Given that the DoS for these intersections is already over 0.9 in the existing peak hours, the intersections are sensitive to small changes in traffic volumes. As a result of the forecasted additional school traffic, it is anticipated that there will be an increase in the overall average delay. Therefore, the modelling concludes that the additional traffic generated by the School will have a modest impact on the operation of the roundabout intersections along Macpherson Street.

It is important to note that school drop off and pick up generally is quite concentrated before the indicative start and finish time. While there may be a level of congestion experienced, this is usually short-term (i.e. over the course of 15 minutes) and the expected traffic flows would not cause considerable impacts to the overall peak hour of the local road network. Additionally, the PM commuter peak hour occurs after the School's PM peak hour, which actually has higher overall traffic volumes.

As stated in Section 6.3, the assignment of traffic has conservatively assumed that **all trips** utilise the existing adjacent intersections to the School. In reality, these vehicles may use surrounding streets to pick up and drop off children and would likely not cause congestion on these intersections due to limited capacity and time restrictions of the pick-up / drop-off kerb space at the School.

6.5 Excursion Buses

Both the Junior School and Senior School use Albion Street to pick-up and drop-off for excursions and camps. Normally most groups have 2 buses which will park between Gate 2 and Gate 3 on Albion Street in the School days Bus Zone. Very rarely is Macpherson Street used for buses due to parking restrictions. There are no changes proposed as part of the Master Plan.

6.6 Transport assessment

The proposal is considered to have minimal additional impacts on the operation of the local road network. Reasons for this include the following:

- Traffic movements at the key access points into the site operate efficiently;
- Additional traffic movements estimated are conservative as many of them would likely be vehicles already counted in the surveys or not additional due to sisters at the School already;
- The total forecast increase in peak hour traffic of 172 cars in the AM peak hour, 150 cars in the PM peak hour and 79 cars in the weekend peak hour is distributed onto the overall local road network;
- There are opportunities for a mode shift away from private vehicle travel, with the site located along key bus routes to Bondi Junction, and walking and cycling available;
- It is expected there will be minimal change in staff trips with only a minor increase in staff proposed at the School and only a minimal increase in car parking on the site;
- The roundabouts encourage parents to loop and turnaround, providing more efficiency for drop-off and pick-up activity (resulting in a more localised congestion rather than overall road network congestion); and
- School drop off and pick up generally is quite concentrated before the indicative start and finish time. While there may be a level of congestion experienced, this is usually short-term (i.e. over the course of 15 minutes) and the expected traffic flows would not cause considerable impacts to the overall peak hour of the local road network.

7 Travel demand measures

Travel demand management measures, such as Work Place Travel Plans (WPTP) and car pooling, can be implemented/expanded to ensure full information regarding future site sustainable access and public transport access options is available to all site users. This may also further reduce car trips to the site.

The suburb data for students plotted in Section 3.7.2 indicates that almost 40% of students live within 1.5km of the School and could walk or cycle.

7.1.1 Car Pooling

Car pooling is an effective measure to reduce the reliance on private vehicle access to the site. The School have indicated they have a 'ride-share' scheme which operates in a similar matter to carshare schemes (i.e. students or staff share a private vehicle to travel to the School). However, travel survey data indicates low usage by both students and staff (less than 2%). Possible ways to further encourage ride-sharing may include Staff registering their interest in car pooling by indicating where they live and their shift times to be matched with like travellers.

7.1.2 Work Place Travel Plan (WPTP)

The implementation of a WPTP would contribute to reducing parking demand, particularly for staff, and encourage other forms of transport to the site. The Premier's Council for Active Living (PCAL) describes the three key objectives for a WPTP as follows:

- To reduce the need to travel
- To improve non-car travel methods
- To ensure the most efficient use of car parking spaces

The WPTP should be tailored to suit the specific requirements of site users.

Framework objectives and measures for the preparation of a WPTP for the development include the following:

- Increase of travel choices for employees, with an emphasis on improving access by sustainable modes of transport;
- Encouragement of high mode share to sustainable modes from private vehicle usage;
- Reduce the number of car journeys associated with business travel by staff and visitors with communication technologies;
- Raising awareness of sustainable transport amongst staff with travel guides (online and print planners);
- Facilitation of the sustainable and safe travel of new employees;
- Utilising the close proximity via bus routes to the train station with train / bus reimbursement schemes and services tailored to suit employee's needs;
- Ensuring adequate end-trip facilities are provided at the site to enable staff and visitors to commute by active transport modes;

- Implementation of ride sharing and car sharing schemes; and
- Further encouragement of car pooling and off-peak travel

The development of the WPTP would be undertaken using the above framework, considering Waverley Council's objectives to encourage less traffic in the area and create pedestrian friendly precincts. With the appropriate framework in place, implementation of a detailed and targeted WPTP for the eventual occupants of the buildings will be more effective.

8 Recommended transport actions

Action	Description	Result
Rationalisation of the “No Parking” signposting.	All zones to be 8:00am to 9:00am and 2:30pm – 4:00pm in Leichhardt Street, Macpherson Street and Albion Street.	Improved legibility of “No Parking” in school zones.
Macpherson Street Drop-off / pick-up school zone.	Increase in length from 17 to 20 spaces. It is proposed to relocate the zebra crossing so that the vehicle queue is continuous which will result in improved operation.	Improved traffic flow.
Macpherson Street Drop-off / pick-up school zone.	The new school pedestrian access is moved to the east on Macpherson Street which will move it closer to the front of the school zone.	Encourages cars to move to the front of the queue.
Leichhardt Street Drop-off / pick-up school zone.	Relocated bus zone. This was approved at the 22 April 2014 Waverly Traffic Committee meeting.	Improved single queuing area for cars. This will improve behaviour of drivers.
Leichhardt Street Drop-off / pick-up school zone.	Consider relocating Years 3-4 pick-up from Leichhardt Street to Macpherson Street.	Reduces use of Leichhardt Street zone and hence improved traffic flow.
Management of school zones.	A staff member to be present in Leichhardt Street, Macpherson Street and Albion Street. Controllers to be briefed and given written instructions for effective traffic management.	Improved traffic flow and school zone safety.
Junior School student registration scheme.	This would require each car to display a number or the child’s name on the windscreen to allow the traffic controllers to match children with their car as it approaches the pick-up area.	This results in a quicker turnover of spaces in the pick-up zone.
New car park under the RPAC Building.	This will add 22 spaces to the existing 25 spaces in the DJSC resulting in 47 car parking spaces.	These 44 spaces will be available for public use in the evenings and at weekends.
WPTP	Reduce use of private vehicle for staff access to the site	Reduced on-street car parking demand

9 Construction traffic management planning

9.1 Outline construction traffic management plan

9.1.1 Construction programme and construction traffic

Anticipated duration of construction activities is estimated below. As the project is in its preliminary stages, the following timeframes are approximate within an overall two year construction period and may vary considerably once a contractor is appointed.

Table 1: Estimated Construction Timeframe

Stage	Timeframe
Demolition and excavation works	3 months
Building construction	18 months
Fit-out works	3 months

9.1.2 Construction traffic

Construction routes

Construction activities at the School will generate vehicle trips primarily Albion Street and Macpherson Street. The main access roads will be via the state road network and vehicles will likely originate from this network. The majority of trips will likely be generated from the west and will access the site from the Eastern Distributor via Darley Road. Trips from the north may access the site via Carrington Road, while trips from the south may access the site via Frenchmans Road. These routes are shown in Figure 38.

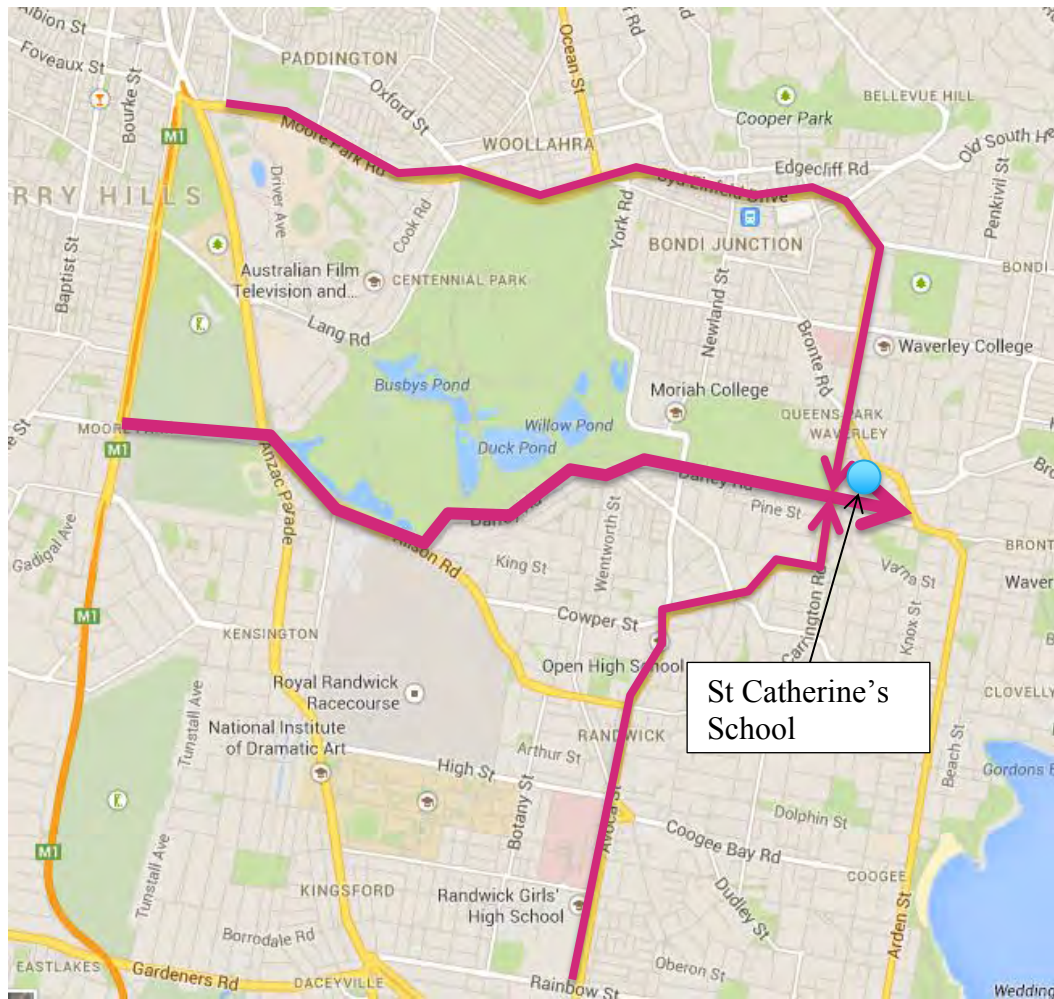


Figure 38: Construction vehicle routes to site

Vehicles that will access the site during construction will mainly comprise private vehicles for workers. Heavy vehicles including Articulated Vehicles (AV) such as precast delivery trucks and Heavy Rigid (HR) such as concrete trucks are also expected to access the site. These different types of vehicles may access the site at the same time.

Other heavy machinery plants such as cranes will have to be delivered to site in the preliminary stage. All heavy goods such as girders or machinery plants are likely to be delivered outside of peak traffic hours.

Construction traffic

Workers will generate additional traffic to the site. Typically each stage of the construction is likely to have a workforce of approximately 75 personnel, generating a potential 75 car trips (assuming everyone drives). However, construction workers generally start earlier and finish earlier than the commuter peak periods, and would likely not coincide with the School peak periods.

Heavy vehicle trips generated would be 2,700 over the span of the excavation and demolition period resulting in the order of 42 truck movements per day or four peak hour trips.

9.1.3 Cumulative impact of existing site and construction traffic

Road network impacts

The traffic generation of this magnitude is less than the amount of trips generated and assessed for the operational phase of the development and therefore the potential impacts are anticipated to be minimal.

It is anticipated that construction of the driveway laybacks on Macpherson Street may require possession of the northern kerbside parking lane. This would be required to occur outside of peak times and near existing drop-off zones to minimise the impact on parking.

Parking

There will be no room on the School site for parking of construction staff and trade vehicles associated with the construction of the development. On-street car parking will be utilised by workers who drive during various stages of construction.

Pedestrians

Pedestrians on Macpherson Street will be impacted from walking past the site during construction. Traffic controllers with appropriate accreditation will hold construction vehicles and allow pedestrians to cross these work areas. This arrangement is envisaged to be required only during construction of vehicular access to the RPAC site from Macpherson Street and subsequent restoration of the kerb. During all other phases of construction of RPAC, construction vehicles will be required to give way to pedestrians on entry and exit to the site.

9.1.4 Measures to ameliorate impacts

Mitigation measures would be adopted during the construction phase to ensure traffic movements have minimal impact on surrounding land uses and the community in general, and would include the following:

- Truck loads would be covered during transportation off-site
- Establishment and enforcement of appropriate on-site vehicle speed limits (20km/h), which would be reviewed depending on weather conditions or safety requirements
- Neighbouring properties would be notified of construction works and timing. Any comments would be recorded and taken into consideration when planning construction activities.
- All activities, including the delivery of materials would not impede traffic flow along local roads
- Materials would be delivered and spoil removed during standard construction hours
- Avoid idling trucks alongside sensitive receivers
- Deliveries would be planned to ensure a consistent and minimal number of trucks arriving at site at any one time

9.1.5 Driver code of conduct

Traffic Controllers will be used to stop traffic on the public street(s) to allow trucks to enter or leave the site. Where possible, vehicles must enter and exit the site in a forward direction. They must wait until a suitable gap in traffic allows them to assist trucks to enter or exit the site. The Roads Act does not give any special treatment to trucks leaving a construction site - the vehicles already on the road have right-of-way. Vehicles entering, exiting and driving around the site will be required to give way to pedestrians at all times.

9.1.6 Public transport services affected

The construction work will be focused on Macpherson Street. A works zone is proposed along the kerbside lane, where a bus zone is located. Therefore, the bus zone may need to be relocated slightly east to allow for the works zone. Bus routes would not be impacted by construction of the driveways.

9.1.7 Construction traffic provisions made for emergency vehicles, heavy vehicles, cyclists and pedestrians

Construction works and vehicle storage would be mainly confined to the site. As such, no additional specific provisions for emergency vehicles, heavy vehicles, cyclists or pedestrians have been identified on the surrounding road network.

10 Conclusions

This traffic and transport report assesses the proposed Campus Master Plan and Stage 1 works for St Catherine's School, Waverley. This report has been prepared to address Key Issue No. 6 Transport and Accessibility as stated in the Director General's Environmental Assessment Requirements issued on 29 January 2014 (SSD 6339).

Key conclusions resulting from this assessment are listed below.

Event management

- There are a number of annual events currently held in existing on-site facilities that will be relocated into the Performing Arts Auditorium which will increase the capacity of events from 250 to 500. There are a number of new events also planned with a capacity of 500 that will be held in the Performing Arts Auditorium.
- The majority of other events to be held in the Performing Arts Auditorium, the Multi Purpose Hall, the RPAC and the JKSC already occur on-site and there is no planned change to the frequency or size of these events; and
- The venue use will be scheduled so that events in the various venues do not overlap leaving limited opportunity for additional external hire of the venues to that currently programmed.

Parking assessment

- At-grade car parks accessed from Albion Street will be rationalised, and a new basement car park on Macpherson Street will bring the total campus parking provision to 75 car spaces (a net increase of 19 spaces);
- A car parking demand of up to 160 cars is anticipated for the large capacity events, with approximately 113 cars parking on-street, well within the existing on-street car parking availability of 200 car spaces (available within 5 minutes' walk of the School between 7.30 and 8.00pm);
- A number of strategies could be investigated to reduce the reliance of on-street car parking for major events at the School including operating a shuttle bus loop service within the Eastern Suburbs on a route with designated pick-up points; and
- On-street 'No Parking' zones will be amended with better management strategies for more efficient drop-off and pick-up activities to occur.

Traffic assessment

- Traffic movements at the key access points into the site currently operate efficiently;
- The roundabouts encourage parents to loop and turnaround, providing more efficiency for drop-off and pick-up activity (resulting in a more localised congestion rather than overall road network congestion);
- Additional traffic movements estimated are conservative as many of them would likely be vehicles already counted in the surveys or not additional due to sisters at the School already;

- It is expected there will be minimal change in staff trips with only a minor increase in staff proposed at the School and only a minimal increase in car parking on the site;
- There is a forecast increase in peak hour traffic of 172 cars in the AM peak hour, 150 cars in the PM peak hour and 79 cars in the weekend peak hour as a result of the Master Plan and Stage 1 development;
- Traffic modelling indicates that additional traffic generated by the School will have a modest impact on the operation of the roundabout intersections along Macpherson Street;
- There are opportunities for a mode shift away from private vehicle travel, with the site located along key bus routes to Bondi Junction, and walking and cycling available; and
- School drop off and pick up generally is quite concentrated before the indicative start and finish time. While there may be a level of congestion experienced, this is usually short-term (i.e. over the course of 15 minutes) and the expected traffic flows would not cause considerable impacts to the overall peak hour of the local road network.

Appendix A

Parking Accumulation Surveys
On-Street and Utilisation Of
Drop-Off And Pick-Up Zones
During Peak School Arrival and
Departure Periods

by Lyle Marshall and Associates

ST CATHERINES SCHOOL FOR GIRLS WAVERLEY

PARKING ACCUMULATION SURVEYS ON-STREET AND UTILISATION OF DROP-OFF AND PICK-UP ZONES DURING PEAK SCHOOL ARRIVAL AND DEPARTURE PERIODS

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**Job No.: 1142/13
Report No.: 33/13**

DECEMBER, 2013

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5.0 SUMMARY

APPENDIX 1:

Table 1 Signposted Parking Restrictions within 5-7 Minutes Walk of St. Catherine's School, Waverley – Blue, Green & Red Areas.

Table 2 Parking Accumulation Friday 25/10/13.

Blue Area 5:00pm to 10:00pm.

Red Area 8:00pm to 10:00pm.

Green Area 8:00pm to 10:00pm.

Table 3 Parking Accumulation:

Blue Area 10:00am – 2:00pm Wed. 30/10/13.

Red Area 10:00am – 6:00pm Mon. 28/10/13.

Green Area 10:00am – 6:00pm Mon. 28/10/13.

Table 4 Parking Accumulation Wednesday 30/10/2013.

Blue Area 6:00am – 8:00am

Red Area 6:00am – 8:00am

Green Area 6:00am – 8:00am

Table 5A Student Drop-Off Leichhardt Street Area 2 Mon. 28/10/13, Area 1 Tues. 29/10/13.

Table 5B Student Pick-Up Leichhardt Street Area 2 Mon. 28/10/13, Area 1 Tues. 29/10/13.

Table 6A Student Drop-Off Macpherson Street Wed. 30/10/13.

Table 6B Student Pick-Up Macpherson Street Fri. 25/1013.

Table 7A Student Drop-Off Albion Street Mon. 28/10/13.

Table 7B Student Pick-Up Albion Street Mon. 28/10/13.

1.0 INTRODUCTION

1.1 Background

St Catherine's School is embarking on a RPAC project to provide improved facilities for students in both curricular and extracurricular activities.

Redevelopment of the existing in ground swimming pool site adjacent to the Dame Joan Sutherland Centre fronting Macpherson Street is planned to provide a basement level Aquatic Centre containing a main pool and shallow pool, a 3 level Lyric Theatre with a spectator gallery to seat approximately 500 persons above the Aquatic Centre, a multifunction (256 seats) space adjacent to the theatre and a separate 2 level junior / senior combined Research Centre at the northern end of the above development.

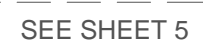
It is understood that there will not be any increase in school enrolment and staff numbers. There are currently a total of 55 parking spaces within the school grounds.

1.2 Scope of Investigations and Report

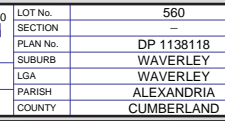
The purpose of this study is to determine the availability and existing utilisation of parking spaces on-street within 5 to 7 minutes walking distance of St Catherine's School and to determine the number of students being dropped off and picked up by vehicle in No Parking Zones in Leichhardt Street, Macpherson Street and Albion Street and the degree of utilisation of each of these zones to provide a data base for assessment of the parking and traffic impacts of the proposed RPAC development.

The attached aerial plan prepared by Chase Burke Harvey Surveying and Land Development Consultants shows the features and details of various properties comprising St Catherine's School.

DIAL 1100
BEFORE YOU DIAL



- NOTE: "T-7X12" Denotes a Tree with 0.7m Trunk Diameter & 12m Spread. Spread Notations are Approximate and are not Necessarily Symmetrical



CONTOUR INTERVAL:	-
DATUM:	AHD AUSTRALIAN HEIGHT DATUM
ORIGIN OF LEVELS:	PM 26687
R.L.:	80.706

REV.	REVISION DETAILS	DATE
" "		" "

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DEVELOPMENT
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Features, Levels and Details over Various Properties Collectively Known as "St. Catherines School for Girls", Albion Street, WAVERLEY

SHEET No.	1
No. of SHEETS:	6
DRAWING No:	D 10167-5
REV:	-

THIS PLAN TO BE READ IN CONJUNCTION
WITH CBH REPORT WITH REFERENCE: 2010/167/5
DRAWING No: D 10167-5

2.0 EXISTING ON-STREET PARKING SUPPLY

The parallel spaces on-street are not line marked. All driveways, No Stopping Zones, No Parking Zones, Bus Zones were measured and located in all streets in the area surveyed, as shown on **Sheet 1 of Drawing No. 1142-13**. A space length of **6 metres** was adopted for intermediate spaces and **5.4 metres** for unobstructed end spaces in accordance with **Figure 2.5 in AS/NZS 2890.1 - 2004**

2.1 Time Restricted and Time Limit Parking Spaces

The *time restricted parking spaces* within **5 – 7 minutes walking distance** of St. Catherine's School are as follows:-

- **Half hour** parking between **8:30am – 6:00pm** Monday to Friday and **8:30am – 12:30pm** Saturday.
- **Two hour** parking **8:30am – 6:00pm** Monday to Saturday *Authorised Residents Vehicles Excepted*.
- **One** Loading Zone space from **8:30am – 4:00pm** Monday to Saturday.
- 'No Parking School Days' Zones in Leichhardt Street, Macpherson Street and Albion Street that are used for 'drop-off' and 'pick-up' generally from **8:00am – 9:00am** and **2:30pm – 4:00pm**.
- No Parking **7:00am – 5:00pm** Monday to Saturday Leichhardt Lane – **6** spaces.

Outside the above time periods the spaces are available with '*no time limit*' restrictions.

The total number of these spaces is listed in **Table 2.1** and the locations are shown on **Sheet 1 of Drawing No. 1142-13**. This means that the number of spaces available for unrestricted parking *varies* throughout the day from **7:00am** to **6:00pm** and is a *maximum* of **94** from **6:00pm** to **6:00am** on weeknights and Saturday night and for *24 hours* on *Sunday*.

2.2 Unrestricted Parking (No Time Limit) Spaces

There are **463 spaces** with no time limit within **5 – 7 minute walking distance** of St. Catherine's School. These locations and number of spaces are shown on **Sheet 1 of Drawing No. 1142 – 13** and the **Table 1** in **Appendix 1**.

The total number of spaces **available** for *unrestricted parking* is a *maximum* of **557** from **6:00pm** to **7:00am Monday to Saturday** and for *24 hours* on *Sunday*. The *minimum* number of spaces **available** for *unrestricted parking* is **463** from **8:00am** to **9:00am** and **2:30pm** to **4:00pm** on *Schooldays*.

TABLE 2.1 SUMMARY KERBSIDE PARKING RESTRICTIONS AND NUMBER OF PARKING SPACES

SPACES AVAILABLE FOR UNRESTRICTED PARKING																						
					MONDAY TO FRIDAY										SATURDAY				SUNDAY	DIS	BZ	COUNCIL
1/2P	NPSD	2P	NP	LZ																		
8:30-6:00pm Mon to Fri	8:00-9:00am 2:30-4:00pm	8:30-6:00pm Mon to Sat ARVE	7:00-5:00pm Mon to Sat	8:30-4:00pm Mon to Sat	6:00 AM	7AM	8AM	8AM-9AM	9AM-2:30PM	4PM-5PM	5PM-6PM	6PM- MIDNIGHT	8:30AM- 12:30PM	12:30PM- 5PM	5PM-6PM	6PM- MIDNIGHT	24 HOURS	24 HOURS				
8:30-12:30 Sat																						
15	35	37	6	1	557	551	516	463	498	498	504	557	498	513	519	557	5	12	1			

LEGEND
NPSD NO PARKING SCHOOL DAYS
ARVE AUTHORISED RESIDENTS VEHICLES EXCEPTED
LZ LOADING ZONE
NP NO PARKING
DIS DISABLED PARKING
BZ BUS ZONE
MZ MAIL ZONE
C COUNCIL

NOTE: The number of spaces available between 2:30pm and 4:00pm on Schooldays is also**463**.

3.0 PARKING ACCUMULATION ON-STREET

3.1 Parking Accumulation in Time Restricted and Time Limit Parking Spaces

Time Limit parking spaces were surveyed at *hourly intervals* from **6:00am** to **10:00pm** on school days in October 2013. The surveys were completed over a 3 day period, **25th**, **28th** and **30th** October.

The complete Survey Data is contained in **Tables 2, 3 and 4** in **Appendix 1** and is summarised in **Table 3.1**.

The number of vehicles parked in the *half hour spaces* often *exceeded* the number of spaces calculated because many vehicles occupied *less than 6 metres* and some vehicles were parked *contrary to the signposted restrictions*. All spaces except the **6** 'No Parking spaces' in Leichhardt Lane were almost fully occupied, as shown in **Table 3.1**. **Peak** occupancy was **82** (87%) at **9:00pm**. If the **6 'No Parking'** spaces in Leichhardt Lane are *excluded*, the peak occupancy was **93%**.

The '**No Parking School Days Zones**' were not fully occupied between the signposted drop-off and pick-up times **9:00am** to **2:30pm**. The signposting may deter some drivers. The drop-off and pick-up spaces should be signposted **P5 Drop-Off** and **Pick-Up School Days 8:00 – 9:00am** and **2:30 – 4:00pm**.

3.2 Parking Accumulation in Unrestricted Parking Spaces

The *occupancy* at each hour from **6:00am** to **10:00pm** is shown in **Table 3.1** and ranged from a *minimum* of **367** vehicles at **5:00pm** (79.3%) to a *maximum* of **453** vehicles (97.8%). The *low occupancy* at **5:00pm** is due to *drivers who work in the area leaving and prior to the influx of residents returning home* from work.

TABLE 3.1 PARKING ACCUMULATION ON-STREET SCHOOL DAYS ST. CATHERINES SCHOOL

SIGNPOSTED PARKING SPACES	Number of Spaces	NUMBER OF VEHICLES												
		6AM	7AM	8AM	10AM	11AM	12	1PM	2PM	5PM	6PM	8PM	9PM	10PM
½ p 8:30 – 6:00PM Mon. to Fri. 8:30am – 12:30pm Sat.	15	10	15	19	18	19	16	16	19	12	16	15	15	14
NPSD 8:00 – 9:00am 2:30 – 4:00pm	35	14	15	8	17	15	28	15	17	16	28	24	28	24
2P 8:30 – 6:00pm Mon - Sat. ARVE.	37	28	35	37(1MB)	31	31	31	28	30	30	31	35	35	35
NP 7:00am – 5:00pm Mon. to Sat.	6	1	2	1	0	0	0	0	0	1	1			
LZ 8:30am – 4:00pm Mon. to Sat.	1	0	0	0	1	1	1	1	1	0	0	0	0	0
Disabled. 24/7	5	4	4	4	4	4	4	4	3	4	4	4	4	4
BZ Bus Zone 24/7	12(Bus Zones)													
Unrestricted No. Time Limit	463	440 (13MB)	431 (16MB)	430 (14MB)	422	418	424	410	392	367	403	436	445	453

Note: MB Motor Bike.

4.0 CHILDREN DROPPED OFF BY VEHICLE IN AM ARRIVAL PERIOD**4.1 Leichhardt Street No Parking Zones**

There are 2 “No Parking Zones” on the eastern side of Leichhardt with a sign posted time restriction **8:00am – 9:00am** and **2:30pm – 4:00pm** School Days that are used to drop-off and pick-up students. These Zones are marked 1 and 2 and are separated by a marked *pedestrian crossing* with “**No Stopping**” restrictions **signposted** to the **north** and **south** of the **pedestrian crossing**. The **two Zones** are shown on **Sheet 1 of Drawing No. 1142 – 13**.

The full Survey results for **Drop-off** and **Pick-up** are in **Tables 5A** and **5B** in **Appendix 1**. The Summary follows:-

4.1.1 Morning ‘Drop Off’.

Zone	Time Period	No. Vehicles in Queue	Total Vehicles	Length of Stay	No. of Vehicles	No. of Students Dropped Off
1 (2 spaces)	8:07-8:08am	2	4	< 1 min	1	5
Drop-Off	8:07-8:17am			1 min	2	
				2 min	1	
2 (5 spaces)	8:02 am	7	107	< 1 min	78	135
	8:03 am	4		1 min	24	
	8:06 am	8		2 min	3	
	8:08 am	5		3 min	1	
	8:12 am	8		4 min	1	
	8:20 am	9				
	8:24 am	5				
	8:25 am	7				
Drop-off Period 8:00 – 8:40am						
TOTAL ZONES 1 AND 2			111			140

Car Occupancy: **1.26 students / vehicle.**

Length of Stay **≤ 2 minutes – 138 vehicles (98.6%).**

Comments:

- **Zone 1** was under utilised.
- **Zone 2** Queues extended into “No Stopping” Zone on 5 occasions. Vehicles are not permitted to stop in a “No Stopping Zone – Infringement.
- Queues could have been reduced by 2 if Zone 1 had been utilised with effective Traffic Management.

Recommendations:

1. Provide effective Traffic Management.
2. Seek Council approval to **change signposting** to **P5 8:00am to 9:00am** and **2:30 pm to 4:00pm**.
3. Mark out and number all queueing bays.

4.1 (Continued)**4.1.2. Afternoon 'Pick-Up'**

Zone	Time Period	No. Vehicles in Queue	Total Vehicles	Length of Stay	No. of Vehicles	No. of Students Picked Up
1 (2 spaces)	1	1	1	< 1 min	1	Est 1
Pick-Up	3:25 -3:26PM					
2 (5 spaces)	2:30-2:56 pm	4	68	< 30 secs	41	82
	2:58 pm	3		1 min	10	
	3:01 pm	4		2 min	4	
	3:02 pm	5		3 min	3	
	3:10 pm	7		5 min	1	
	3:11 pm	5		8 min	2	
	3:30 pm	3		10 min	1	
				16 min	1	
				25 min	2	
				28 min	1	
				29 min	1	
TOTAL ZONES 1 and 2			Length of Stay ≤ 2 mins 69	56 Vehicles	81.2% 83	

Car Occupancy: 1.20 students per vehicle.
Pick-Up Period 2:30 – 4:03pm.

Comments:

- Maximum length of stay in a “No Parking” Zone is 2 minutes.
- 12 vehicles overstayed the time limit – Infringement.
- 4 vehicles were queued after 4:00pm – Infringement.
- Zone 1 underutilised – With effective Traffic Management all queues would have been less than 5 vehicles.

Recommendations:

1. Provide effective Traffic Management.
2. Seek Council approval to change signposting (as for Morning Drop-Off).
3. Mark out Bays (as for Morning Drop Off).

4.2 Macpherson Street No Parking Zones

There are 3 "No Parking" Zones on the northern side of Macpherson Street along the frontage of St. Catherine's School with a signposted *Time Restriction* **8:15 – 9:15am** and **2:45 – 4:15pm** Schooldays that are used to drop-off and pick-up students. The zones are marked 1, 2 and 3 on **Sheet 1 of Drawing No. 1142-13**. Zones 1 and 2 are separated by a *marked pedestrian crossing* with "No Stopping" restrictions signposted to the east and west of the crossing.

The full Survey results for drop-off and pick-up are in **Tables 6A** and **6B** respectively in **Appendix 1**. The Summary follows with comments and recommendations.

4.2.1 Morning 'Drop-Off'

Zone	Time Period	No. Vehicles in Queue	Total Vehicles	Length of Stay	No. of Vehicles	No. of Students Dropped Off
1 (6 spaces)	8:00-8:01am	5		< 1 min	55	5
	8:02am	3		1 min	21	
	8:03-8:04am	4		2 min	1	
	8:05-8:06am	3		3 min	1	
	8:07-8:08am	5				
	8:09-8:10am	4				
	8:12-8:13am	4				
	8:14am	5				
	8:20am	4				
	8:21-8:22am	6				
	8:23-8:24am	4				
	8:28-8:29am	4	78			98
Drop-Off Period 8:00 to 8:50am						
2 (3 spaces)	8:01-8:02am	1	3	< 1 min	1	5
				1 min	1	
				2 min	1	
Drop-off Period 8:00 – 8:45am						
3 (7 spaces)	8:00-8:06am	4	6	< 1 min	2	6
				7 min	1	
				8 min	1	
Drop-off Period 8:00 – 8:20am						
TOTAL			87			109

Car Occupancy: 1.26 students / vehicle.

Length of Stay ≤ 2 minutes – 81 vehicles (93.1%).

Comments:

- Vehicles queued to roundabout in Albion Street on one occasion blocking traffic in roundabout.
- Traffic Controller who was managing traffic could have prevented problems by directing vehicles to Zones 2 and 3 that were underutilised.
- Vehicles queued in "No Stopping" Zone west of "No Parking" Zone – Infringement.
- There are adequate queueing spaces in Zones 1, 2 and 3 if properly managed.

4.2 (Continued)**Recommendations:**

1. Traffic Controller(s) to be provided with a written '*set of instructions*' and be *briefed* so that they understand the instructions and are able to effectively manage the Drop-Off Zones.
2. Seek Council approval to change signposting to **P5 8:00 to 9:00am** and **2:30 to 4:00pm** Schooldays.
3. The current **8:15am** start time is too late as **41** vehicles (37.6%) had dropped-off students *before 8:15am*. It is recommended that the hours be changed to **8:00 – 9:00am** and **2:30 – 4:00pm**, the same as in Leichhardt Street.
4. It is recommended that the queueing bays be '*marked and numbered*' in all **3 Zones**.

4.2.2 Afternoon 'Pick-Up'

Zone	Time Period	No. Vehicles in Queue	Total Vehicles	Length of Stay	No. of Vehicles	No. of Students Dropped Off
1 (6 spaces)	2:30-3:07pm	7		1 min	20	5
	3:07-3:15pm	6		2 min	6	
	3:20-3:22pm	8		3 min	2	
	3:25-3:27pm	5		4 min	3	
	3:27-3:29pm	4		5 min	1	
	3:37-3:39pm	5		6 min	2	
	3:39-3:40pm	4		7 min	1	
				8 min	3	
	3:41-3:42pm	5	49	10 min	3	56
				11 min	1	
				21 to 40min	7	
Pick Up Period 2:30 – 4:17pm (Only 3 Vehicles after 4:00pm)						
2 (3 spaces)	2:30-3:10pm	3	7	1 min.	1	9
				3 min	1	
				4 min	1	
				5 min	1	
				37 min	1	
				40 min	1	
				45 min	1	
Pick-Up Period 2:30 – 3:30pm						
3 (7 spaces)	2:50–3:10pm	5	8	4 min	1	9
				13 min	1	
				27 min	1	
				29 min	1	
				30 min	1	
				40 min	2	
				46 min	1	
Pick-Up Period 2:30 – 3:30pm						
TOTAL			64			74

Car Occupancy: 1.16 students / vehicle.
Length of Stay ≤ 2 minutes – 27 vehicles (42.2%).

4.2 (Continued)

Comments:

- Vehicles queued to the roundabout between **3:00** to **3:30pm** blocking traffic in roundabout.
- Vehicles queued in “**No Stopping**” Zone west of “**No Parking**” Zone. Infringement.
- 6 vehicles were queued in **Zone 1** from **2:30pm** to **3:06pm** and infringed the “**No Parking**” *Time Limit of 2 minutes*.
- **Zones 2** and **3** were underutilised.
- Traffic Controller did not effectively manage the queued vehicles.
- There are adequate queueing spaces if properly managed.
- A total of **5** vehicles parked in **Zones 1, 2** and **3** after **4:00pm**, did not pick up students and were still parked after **4:30pm** – Infringement.

Recommendations:

1. Same comment as for ‘Drop-Off period’.
2. Same comment as for ‘Drop-Off period’.
3. Only **3** vehicles picked up after **4:00pm**. Hence the “**No Parking**” Zone should be altered as stated under *Recommendation 3* in ‘Drop Off’ period to **2:30pm** to **4:00pm**. Parents arriving after **4:30pm** can legally park to pick-up students.
4. As for *Recommendation 4* in ‘Drop-off’ period.
5. *Circular letter* to be sent to all parents to explain the *Road Rules* pertaining to “**No Parking**” and “**No Stopping**” Zones and instructions concerning the need to move to another **queueing Zone** when the **first Zone** is ‘parked out’ and to *obey the instructions* of the *Traffic Controller*.

4.3 Albion Street “No Parking” Zones

There are **3** “No Parking” Zones on the eastern side of Albion Street numbered **1**, **2** and **3** along the frontage of St. Catherine’s School and **3** “No Parking” Zones on the western side of Albion Street numbered **4**, **5** and **6** that are used to ‘Drop-Off’ and ‘Pick-Up’ students.

The signposted *Time Limit restrictions* are **8:00am – 9:15am** and **3:00 to 4:15pm** Schooldays on the eastern side and **8:00 – 9:00am** and **2:30 – 4:00pm** Schooldays on the western side.

4.3 (Continued)

All zones are north of a *signalised pedestrian crossing* with “No Stopping” restrictions signposted *before and after* the crossing on both sides of Albion Street.

The full Survey results for the drop-off and pick-up are in **Tables 7A** and **7B** respectively in **Appendix 1**. The summary follows with comments and recommendations.

4.3.1 Morning ‘Drop-Off’

Zone	Time Period	No. Vehicles in Queue	Total Vehicles	Length of Stay	No. of Vehicles	No. of Students Dropped Off
1 (2 spaces)	8:00-8:01am	3		< 1 min	18	
	8:09am	3		1 min	6	
	8:10am	5	27	2 min	2	27
				4 min	1	
	Drop-Off Period 7:59 to 9:00am					
2 (2 spaces)	8:00am	2		< 1 min	14	
	8:01am	2		1 min	2	
	8:15am	3	16			16
	Drop-Off Period 8:00 to 8:58am					
3 (3 spaces)	NOT USED					
4 (1 spaces)		1	8	< 1 min	7	
				2 min	1	8
Drop-off Period 8:00 – 8:59am						
5 (2 spaces)	NOT USED					
6 (2 spaces)	NOT USED					
TOTAL			51			51

Car Occupancy: 1.0 students / vehicle.

Length of Stay ≤ 2 minutes – 50 vehicles (98.0%).

Comments:

- Vehicles queued past **Gate 2** for a short period.
- Traffic Controller required to direct vehicles into **Zone 3** when Zones **1** and **2** are fully occupied.
- No vehicles dropped-off *after* 9:00am.
- Zones **3**, **5** and **6** were *not used* for drop-off.
- Only **1** vehicle exceeded the time limit of *2 minutes* for parking in a “No Parking” Zone.
- There are more than adequate spaces in the Drop-Off. Zones.
- **2** vehicles parked in the drop-off Zones **2** and **3** after **9:00am** and did not drop off students.

4.3 (Continued)**Recommendations:**

1. A Traffic Controller to be present to manage the drop-off.
2. The current time limit of **9:15am** is not required and should be rationalised **8:00 to 9:00am** Schooldays.
3. Seek Council approval to change the signposting to **P5 8:00 – 9:00am** on Schooldays.
4. That the queueing Bays be '*marked and numbered*'.

4.3.2 Afternoon 'Pick-up'

Zone	Time Period	No. Vehicles in Queue	Total Vehicles	Length of Stay	No. of Vehicles	No. of Students Dropped Off
1 (2 spaces)	2:33-2:42pm	2		< 1 min	1	
	3:04-3:06pm	2		1 min	2	
	3:19-3:30pm	2	10	2 min	1	10
				5 min	2	
				9 min	1	
				11 min	1	
				15 min	1	
				24 min	1	
Pick Up Period 2:29 – 3:51pm						
2 (2 spaces)	3:20-3:25pm	4	4	6 min.	1	4
				7 min	1	
				10 min	2	
Pick-Up Period 3:19 – 3:31pm						
3 (3 spaces)	3:15–3:24pm	2	2	9 min	1	2
				17 min	1	
Pick-Up Period 3:15 – 3:32pm						
4 (1 spaces)	3:24-3:30pm	1	1	6 min	1	1
Pick-Up Period 3:24 – 3:30pm						
5	2:53-2:57pm	2	3	1 min	1	2
				4 min	1	
				9 min	1	
Pick-Up Period 2:53 – 3:07pm						
6	2:30-2:31pm	1	1	1 min	1	0
Pick-Up Period 2:30 – 2:31pm						
TOTAL			20			19

Car Occupancy: 1.0 students / vehicle.
Length of Stay ≤ 2 minutes – 6 vehicles (30%).

4.3 (Continued)

Comments:

- 70% (14 vehicles) overstayed the *2 minute time limit* in a “No Parking” Zone. Infringement.
- Zone 2 was ‘parked out’ over a 5 minute period with 2 vehicles *parked in the Bus Zone*. Infringement.
- There was no Traffic Controller supervising the pick-up.
- No vehicles picked-up students after **3:51pm**

Recommendations:-

1. A Traffic Controller be present to supervise the pick-up.
2. Seek Council approval to change the signposting to **P5 2:30 – 4:00pm** Schooldays.
- 3, As for *Recommendation 4* in ‘Drop-Off’ period.

5.0 SUMMARY

- The purpose of the Study was to determine the availability and existing utilisation of parking spaces on-street within **5 – 7** minutes walk of St. Catherine's School and the number of students being 'dropped off' and 'picked up' by vehicles in "No Parking" Zones **8:00 – 9:00am** and **2:30 – 4:00pm** Schooldays.

Parking Supply:

- The total number of Time Limit and Time Restricted Parking spaces is **94**.
- The total number of unrestricted parking spaces is **463**.
- The total number of spaces available for unrestricted parking is a **maximum** of **557** from **6:00pm** to **7:00am** Monday to Saturday and for **24 hours** on **Sunday**.
- The **minimum** number of spaces available for unrestricted parking is **463** from **8:00am** to **9:00am** and **2:30** to **4:00pm** on **Schooldays**.
- At **7:00am**, **9:00am – 2:30** and **5:00pm** Monday to Friday the number of spaces available for *unrestricted* parking is **551**, **498** and **504**.

Parking Demand:

- The number of vehicles parked in the unrestricted parking spaces *decreased* from **440** at **6:00am** to a *minimum* of **367** at **5:00pm** and then *increased* to **453** at **10:00pm** on **Schooldays** Monday to Friday.
- The **½ P** and **2P** *time restricted parking spaces* were almost fully 'parked out' from **6:00am** to **10:00pm**.
- There were some **18** to **20 spaces** vacant in the "No Parking" Zones schooldays before and after the **8:00 – 9:00am** and **2:30 – 4:00pm** school arrival and departure periods and only **7** to **11** spaces after **6:00pm**

School Drop-Off 8:00 – 9:00am:

- There are **2 Drop-Off, Pick-Up Zones** (**7** spaces) in Leichhardt Street, **3 Zones** (**16** spaces) in Macpherson Street and **6 Zones** (**12** spaces) in Albion Street.
- **A total of 259 vehicles dropped off 300 students between 7:59am and 9:00am.** The number of students per vehicle was **1.26** in Leichhardt and Macpherson Streets and **1.0** in Albion Street.

COMMENTS:

Leichhardt Street:

Zone 1 was underutilised.

Zone 2 Queues extended into "No Stopping" Zones on 5 occasions. No Traffic Controller for supervision of drop-off.

5.0 (Continued)

Macpherson Street:

- Vehicles *queued* to roundabout on 1 occasion blocking traffic in roundabout.
- Vehicles *queued* in “No Stopping” Zone. Infringement.
- Traffic Controller could have *prevented problems by directing vehicles* into **Zones 2 and 3**.

Albion Street:

- Vehicles *queued* past **Gate 2** for a short period.
- Zones **3, 5 and 6** were not used.
- Only **1** vehicle *exceeded* the *2 minute time limit* in a “No Parking” Zone.

School Pick-Up 2:30 – 4:00pm

- A total of **153 vehicles** picked up **176 students** between **2:30pm and 4:17pm**. The number of students per vehicle was **1.20** in **Leichhardt** Street, **1.16** in **Macpherson** Street and **1.0** in **Albion** Street.

COMMENTS:

Leichhardt Street

- Zone 1 was underutilised.
- No traffic Controller to supervise pick-up.
- **12** vehicles overstayed the *2 minute* time limit – Infringement.
- **4** vehicles queued after **4:00pm**.

Macpherson Street

- Vehicles queued to roundabout between **3:00pm** and **3:30pm** blocking traffic in roundabout.
- Vehicles queued in “No Stopping” Zone. Infringement.
- **6** vehicles parked for longer than *2 minutes* between **2:30pm** and **3:06pm** in **Zone 1** – Infringement.
- There are *adequate queueing spaces* if properly managed.

Albion Street

- **70%** (**14 vehicles**) overstayed the *2 minute* time limit. Infringement.
- **Zone 2** was ‘parked out’ for **5 minutes** with **2 vehicles** queued in the Bus Zone.
- No vehicles picked-up students after **3:51pm**.
- There was no *Traffic Controller* present.

5.0 (Continued)

RECOMMENDATIONS:

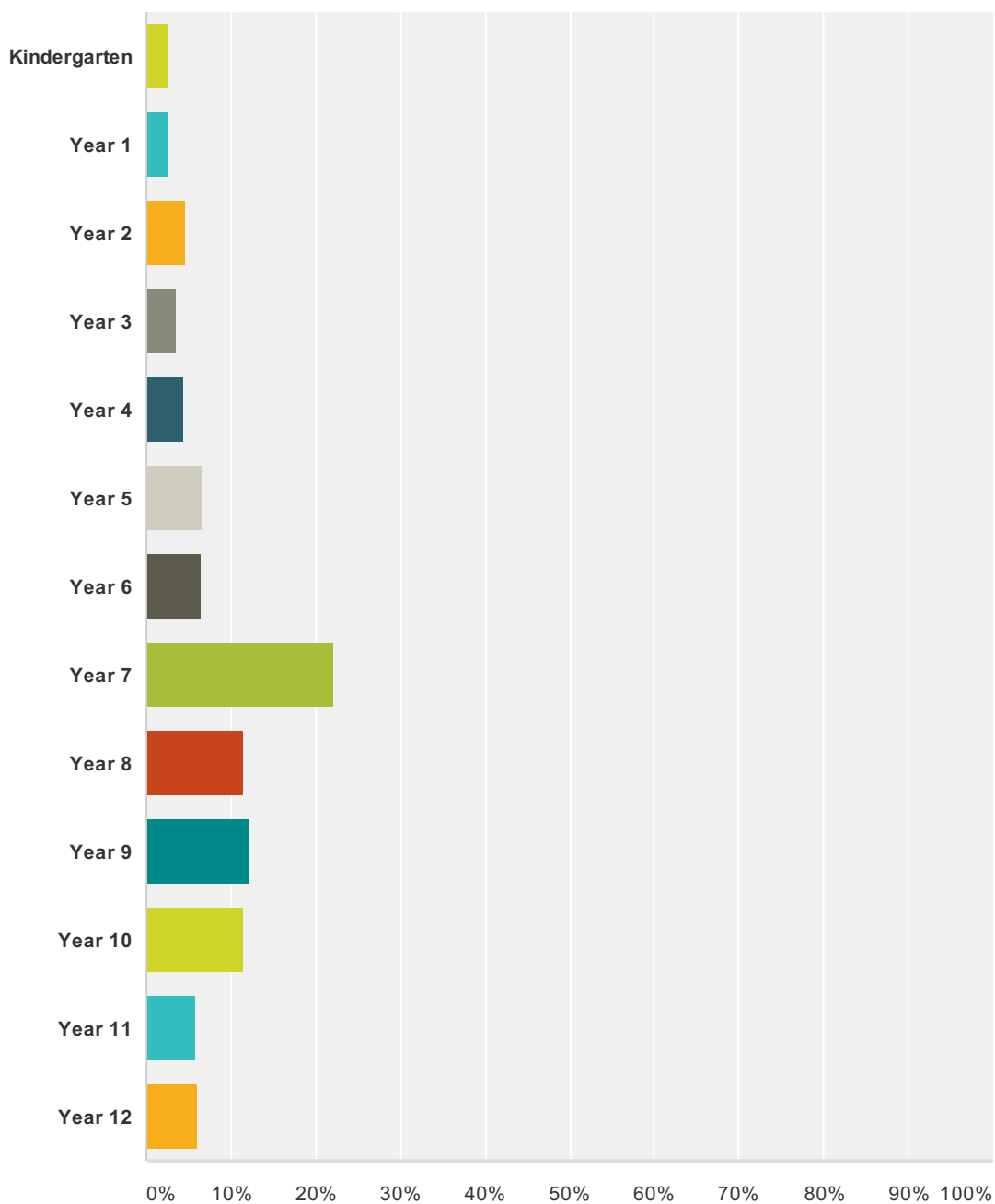
- A Traffic Controller with *RMS Blue Certificate accreditation* to be present in Leichhardt Street, Macpherson Street and Albion Street. Controllers to be briefed and given *written instructions for affective traffic management*.
- Seek Council approval to change the signposting from “No Parking” to **P5 8:00am to 9:00am and 2:30pm – 4:00pm** in **all Zones** in *Leichhardt Street, Macpherson Street* and *Albion Street*.
- The proposed signposting will be easier to understand.
- There is no requirement to have different time limits in the three streets.
- Queueing Bays to be **marked** and **numbered** in all **11 Zones**.
- *Circular letter* to be sent to all parents at the *commencement* of the School Year explaining the **Road Rules** applying to “**No Stopping**” **Zones** and instructions to be followed when *dropping-off and picking-up students*.
- With *effective traffic management*, the **existing Drop-Off** and **Pick-Up Zones** have **sufficient queueing spaces** for the **busiest period**.

Appendix B

Travel survey results

Q1 What year are you currently attending?

Answered: 579 Skipped: 2



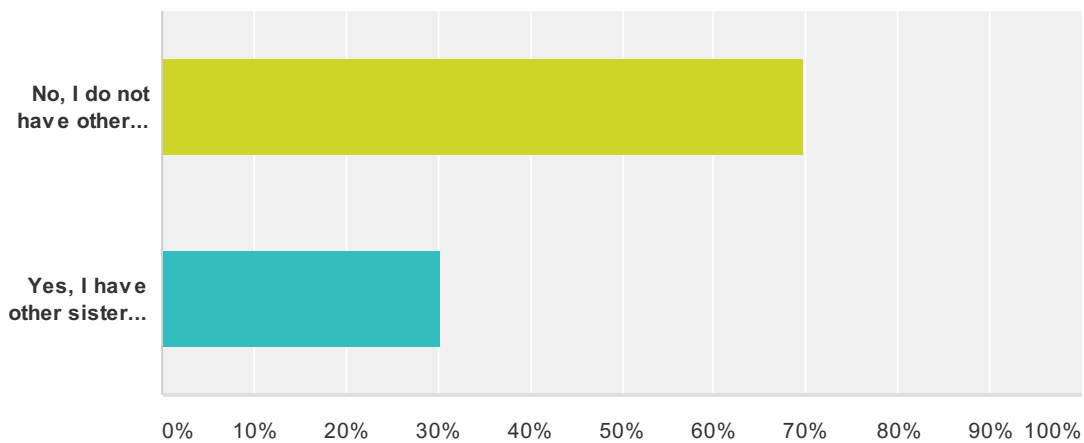
Answer Choices	Responses
Kindergarten	2.76% 16
Year 1	2.59% 15
Year 2	4.66% 27
Year 3	3.45% 20
Year 4	4.32% 25
Year 5	6.74% 39

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Year 6	6.56%	38
Year 7	22.11%	128
Year 8	11.40%	66
Year 9	12.09%	70
Year 10	11.40%	66
Year 11	5.87%	34
Year 12	6.04%	35
Total		579

Q2 Do you have any sisters that attend St. Catherine's School?

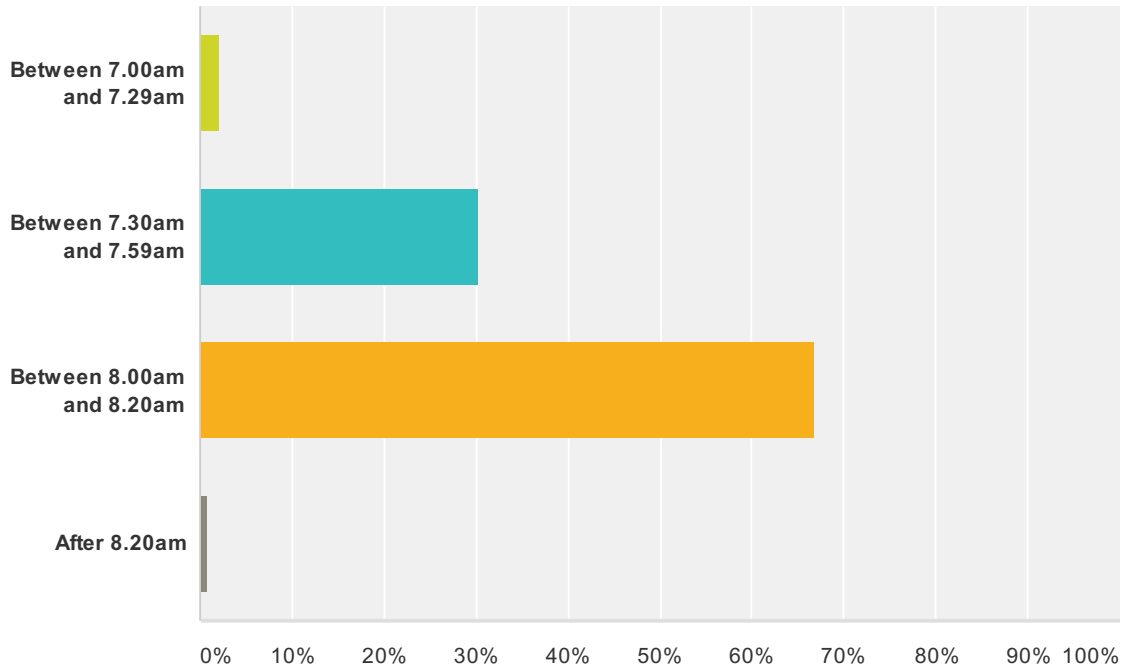
Answered: 576 Skipped: 5



Answer Choices	Responses	
No, I do not have other sisters attending	69.79%	402
Yes, I have other sisters attending (please indicate number of sisters)	30.21%	174
Total		576

Q3 On a typical day, what time would you normally arrive at school? (i.e. on a day that you do not have sports or other co/extracurricular activities BEFORE classes start)?

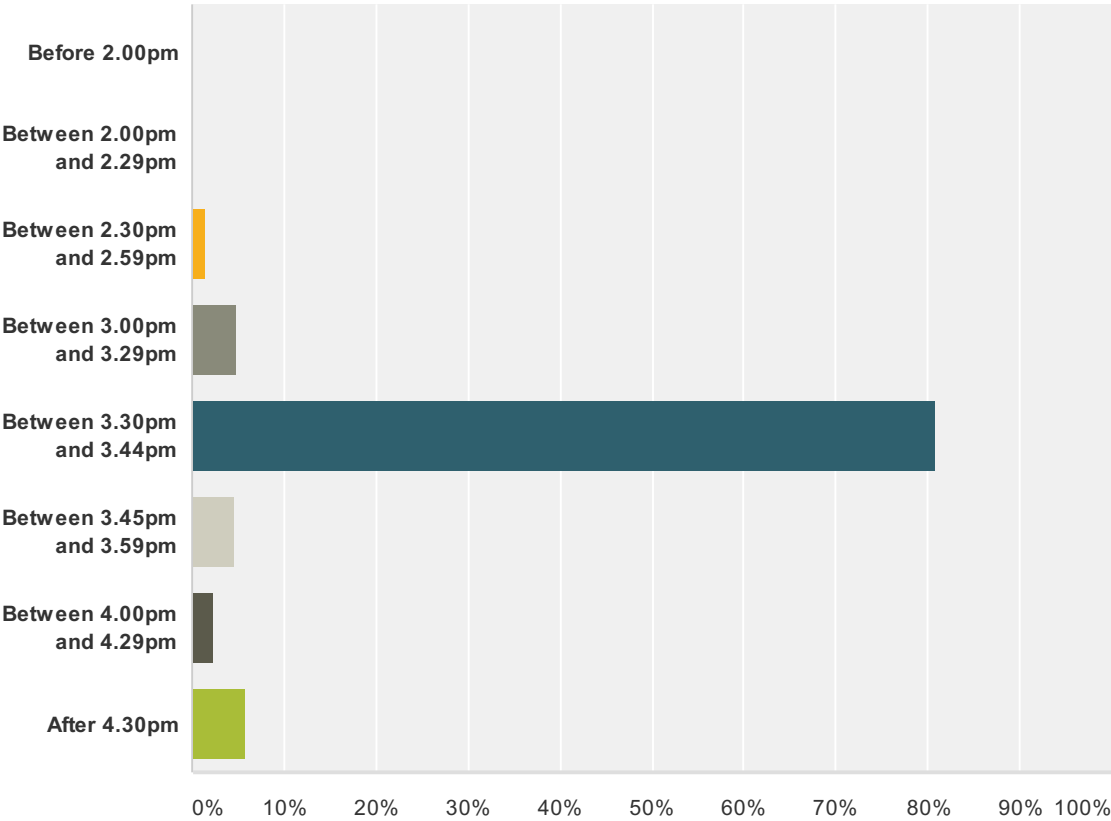
Answered: 565 Skipped: 16



Answer Choices	Responses	
Between 7.00am and 7.29am	2.12%	12
Between 7.30am and 7.59am	30.27%	171
Between 8.00am and 8.20am	66.73%	377
After 8.20am	0.88%	5
Total		565

Q4 On a typical afternoon when school has finished for the day, what time would you normally leave the school grounds? (i.e. on a day that you do not have sports or other co/extracurricular activities AFTER school)

Answered: 565 Skipped: 16



Answer Choices	Responses	
Before 2.00pm	0.18%	1
Between 2.00pm and 2.29pm	0.00%	0
Between 2.30pm and 2.59pm	1.42%	8
Between 3.00pm and 3.29pm	4.78%	27
Between 3.30pm and 3.44pm	80.88%	457
Between 3.45pm and 3.59pm	4.60%	26
Between 4.00pm and 4.29pm	2.30%	13
After 4.30pm	5.84%	33
Total		565

Q5 What postcode are you most likely to travel to school from in the morning? (This may be the suburb in which you live)

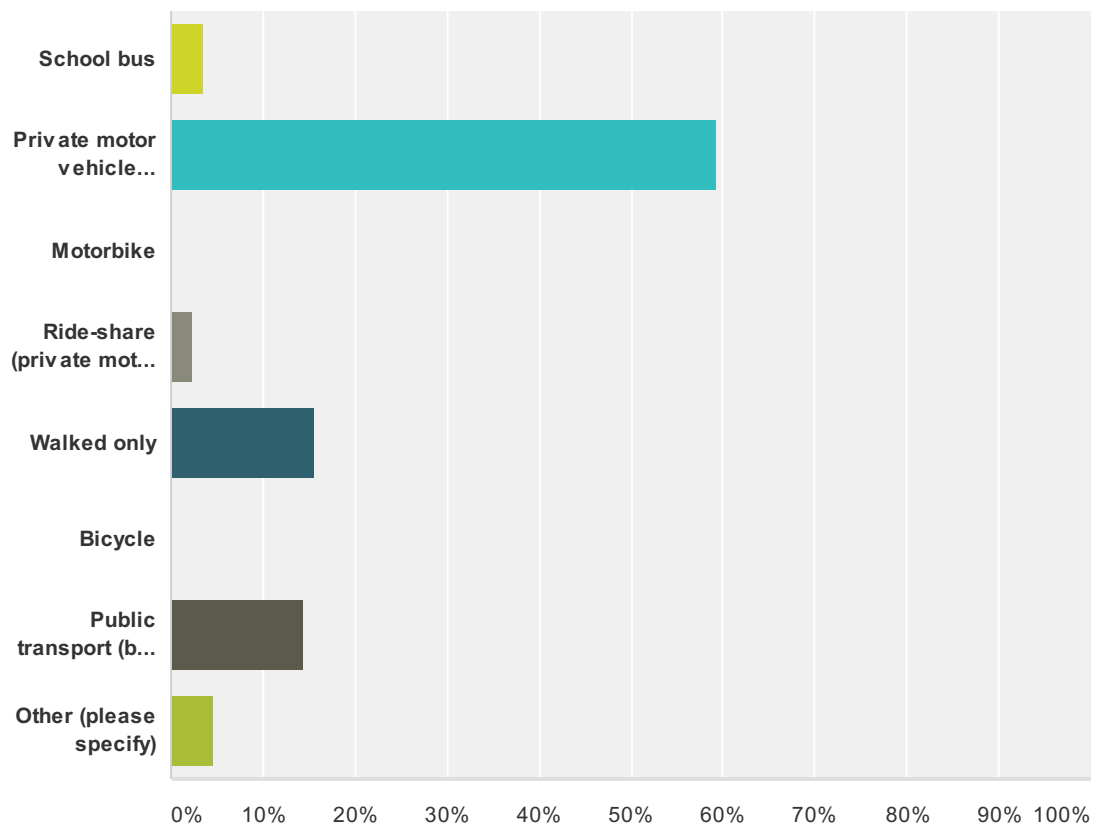
Answered: 559 Skipped: 22

**Q6 What postcode are you most likely to travel to from school in the afternoon?
(This may be the suburb in which you live)**

Answered: 559 Skipped: 22

Q7 On a typical day, how are you most likely to arrive / travel to school?

Answered: 559 Skipped: 22



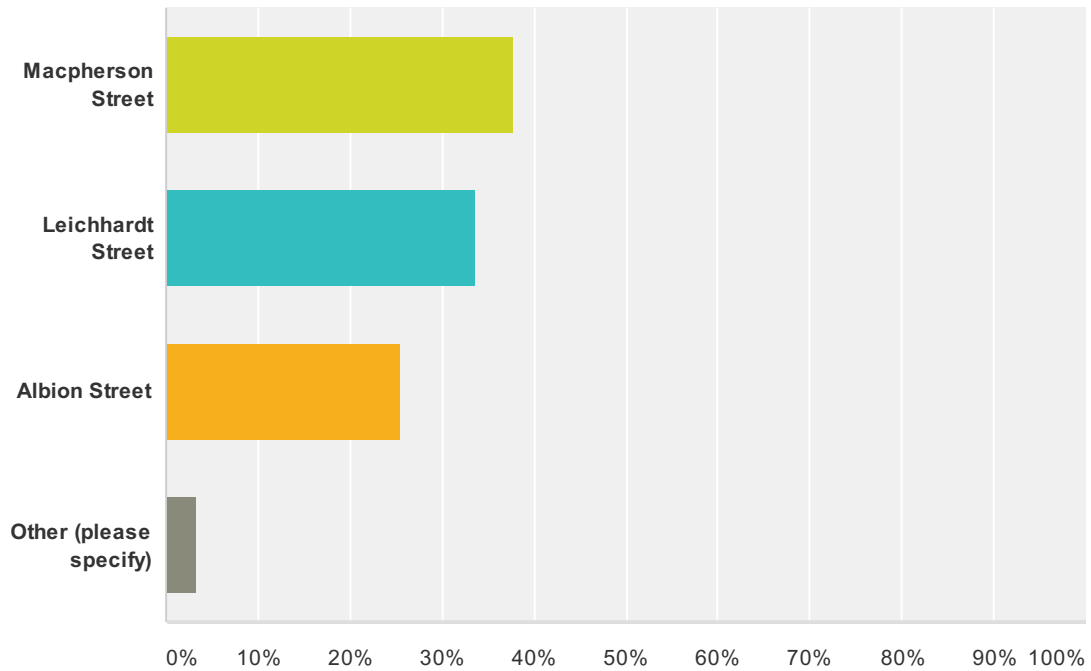
Answer Choices	Responses	
School bus	3.58%	20
Private motor vehicle (Dropped-off)	59.39%	332
Motorbike	0.00%	0
Ride-share (private motor vehicle)	2.33%	13
Walked only	15.56%	87
Bicycle	0.00%	0
Public transport (bus and or train)	14.49%	81
Other (please specify)	4.65%	26
Total		559

Q8 You indicated that you ride share to school, how many other St. Catherine's School students share the car? (Note: this could be your sister(s) and/or friend(s))

Answered: 13 Skipped: 568

Q9 When you get dropped off in the morning by a private motor vehicle, where are you most likely to get dropped off?

Answered: 331 Skipped: 250



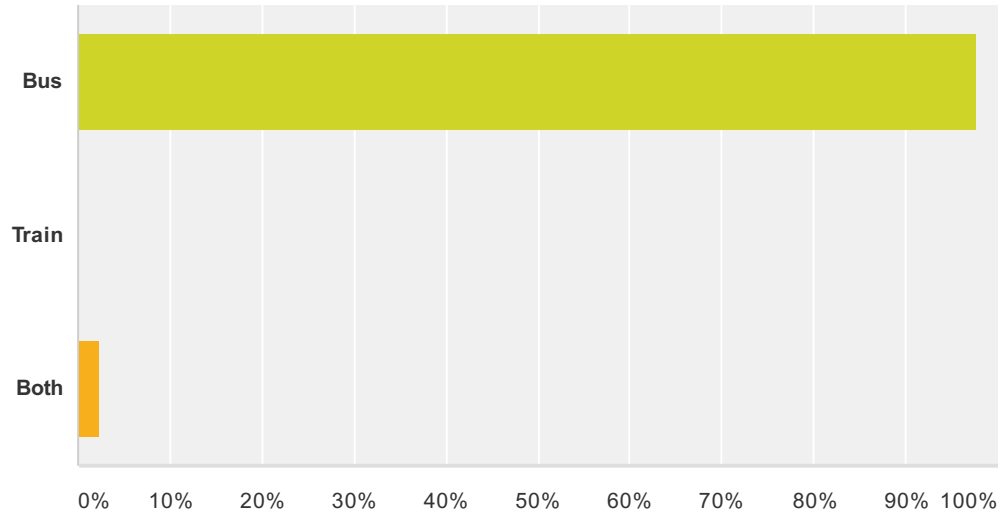
Answer Choices	Responses	
Macpherson Street	37.76%	125
Leichhardt Street	33.53%	111
Albion Street	25.38%	84
Other (please specify)	3.32%	11
Total		331

Q10 If you travel to school by private vehicle and your parent/caretaker parks in a nearby location before walking with you to the appropriate school entrance, where is your parent/caretaker most likely to park their car?

Answered: 188 Skipped: 393

Q11 Do you take a bus or train to school? (Please indicate if you take both)

Answered: 88 Skipped: 493



Answer Choices	Responses	
Bus	97.73%	86
Train	0.00%	0
Both	2.27%	2
Total		88

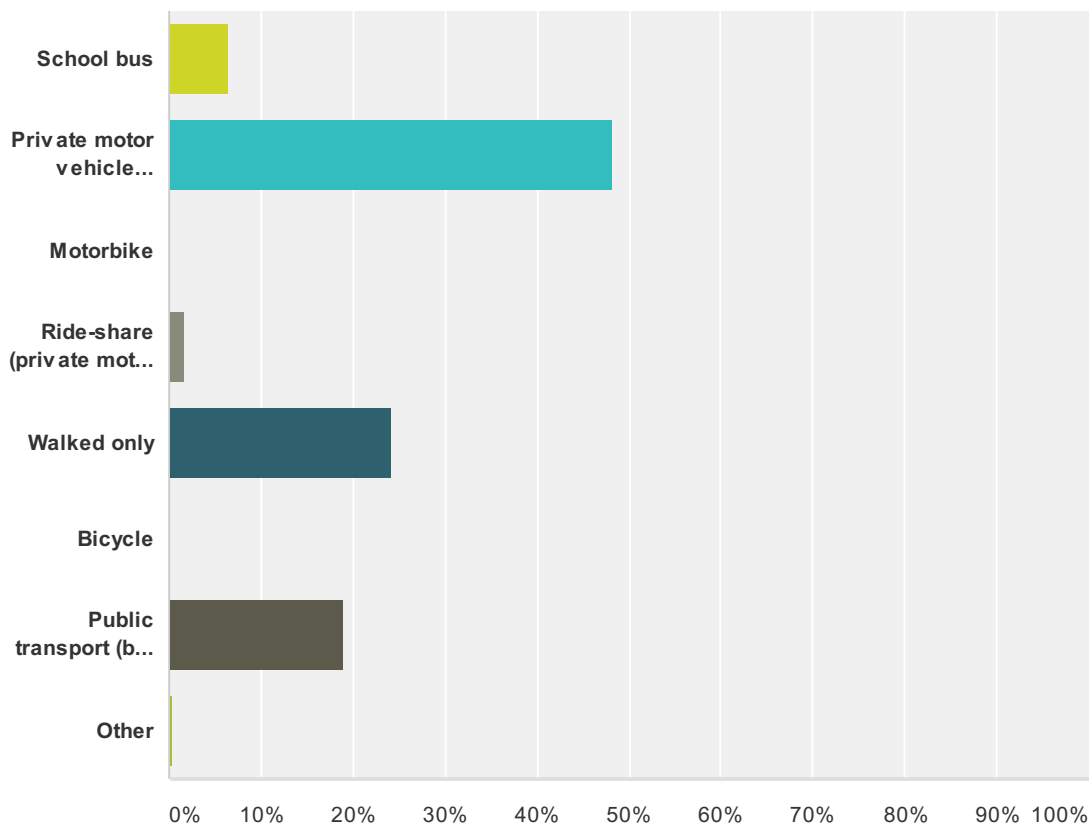
Q12 You indicated that you take both a train and bus to school; please provide details of the journey to school. If you take more than one train and bus, please indicate all of these below. Please indicate the departure and arrival details for each station/stop. (e.g. if you take the Western and Eastern Suburbs lines, then a 400 bus indicate the station you originally get on, transferred to and finally off from, as well as the bus stop you got on and off from. Also indicate the departure times from the stations/stop you get on.)

Answered: 78 Skipped: 503

Answer Choices	Responses	
Train departure station(s)	24.36%	19
Train line(s)	24.36%	19
Train departure time(s)	24.36%	19
Train arrival station	24.36%	19
Bus departure stop(s)	97.44%	76
Bus route number(s)	98.72%	77
Bus departure time(s)	97.44%	76
Bus arrival stop	97.44%	76

Q13 On a typical day, how are you most likely to travel home/depart from work?

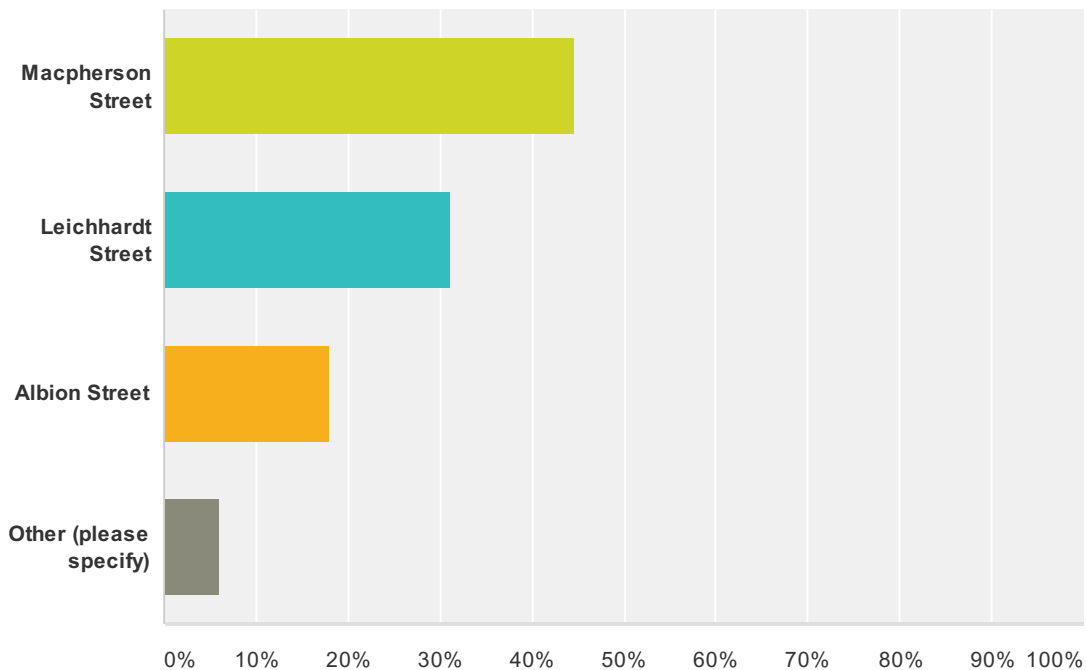
Answered: 552 Skipped: 29



Answer Choices	Responses	
School bus	6.52%	36
Private motor vehicle (Dropped-off)	48.19%	266
Motorbike	0.00%	0
Ride-share (private motor vehicle)	1.63%	9
Walked only	24.28%	134
Bicycle	0.00%	0
Public transport (bus and or train)	19.02%	105
Other	0.36%	2
Total		552

Q14 When you get picked up in the afternoon by a private motor vehicle, where are you most likely to get picked up?

Answered: 266 Skipped: 315



Answer Choices	Responses	
Macpherson Street	44.74%	119
Leichhardt Street	31.20%	83
Albion Street	18.05%	48
Other (please specify)	6.02%	16
Total		266

Q15 If you ride share home from work, how many other St. Catherine's School staff share the car?

Answered: 9 Skipped: 572

Q16 What is the primary reason you were taken by a private vehicle from school? i.e. If you do not walk home, cycle home, take the school bus home or take public transport home after school, what is the main reason for this?

Answered: 47 Skipped: 534

Q17 If you take public transport home from work, please provide details of the trip home including: - Location of bus stop(s) (departure and arrival) - Bus route number(s) - Time(s) and/or - Train station(s) (departure and arrival) - Train route(s) - Time(s)

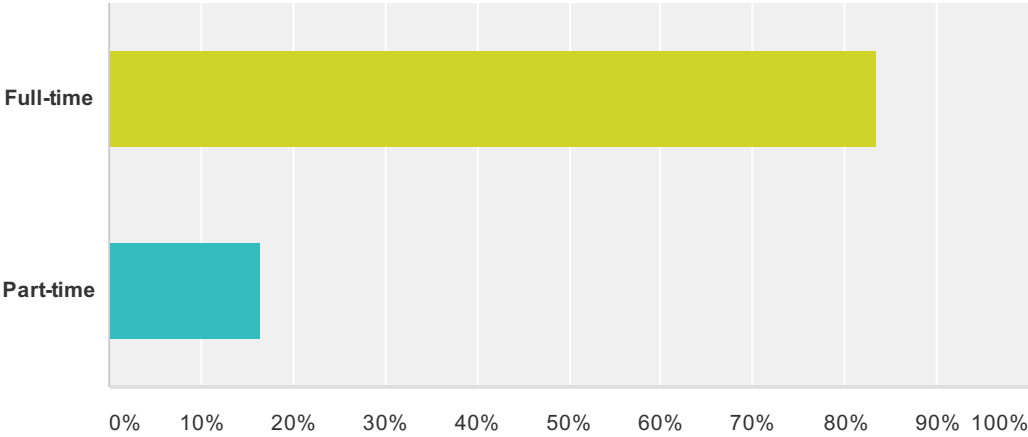
Answered: 105 Skipped: 476

Q18 Do you or your parents have any suggestions to help reduce traffic congestion in and around St. Catherine's School in the morning or afternoon?

Answered: 318 Skipped: 263

Q1 Do you work full-time or part-time at St. Catherine's School?

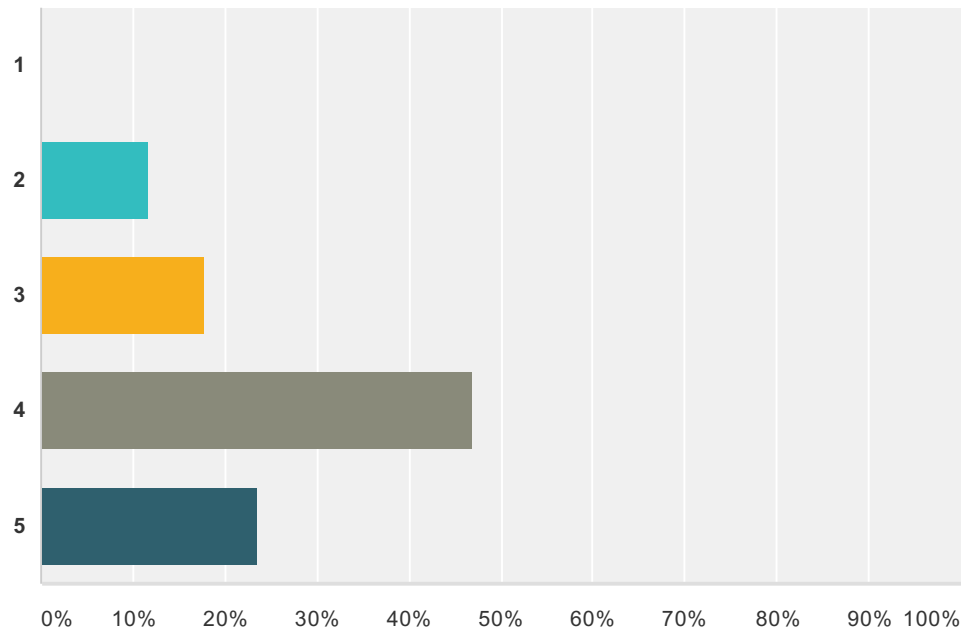
Answered: 103 Skipped: 0



Answer Choices	Responses	
Full-time	83.50%	86
Part-time	16.50%	17
Total		103

Q2 How many days per week do you attend St. Catherine's School for work purposes?

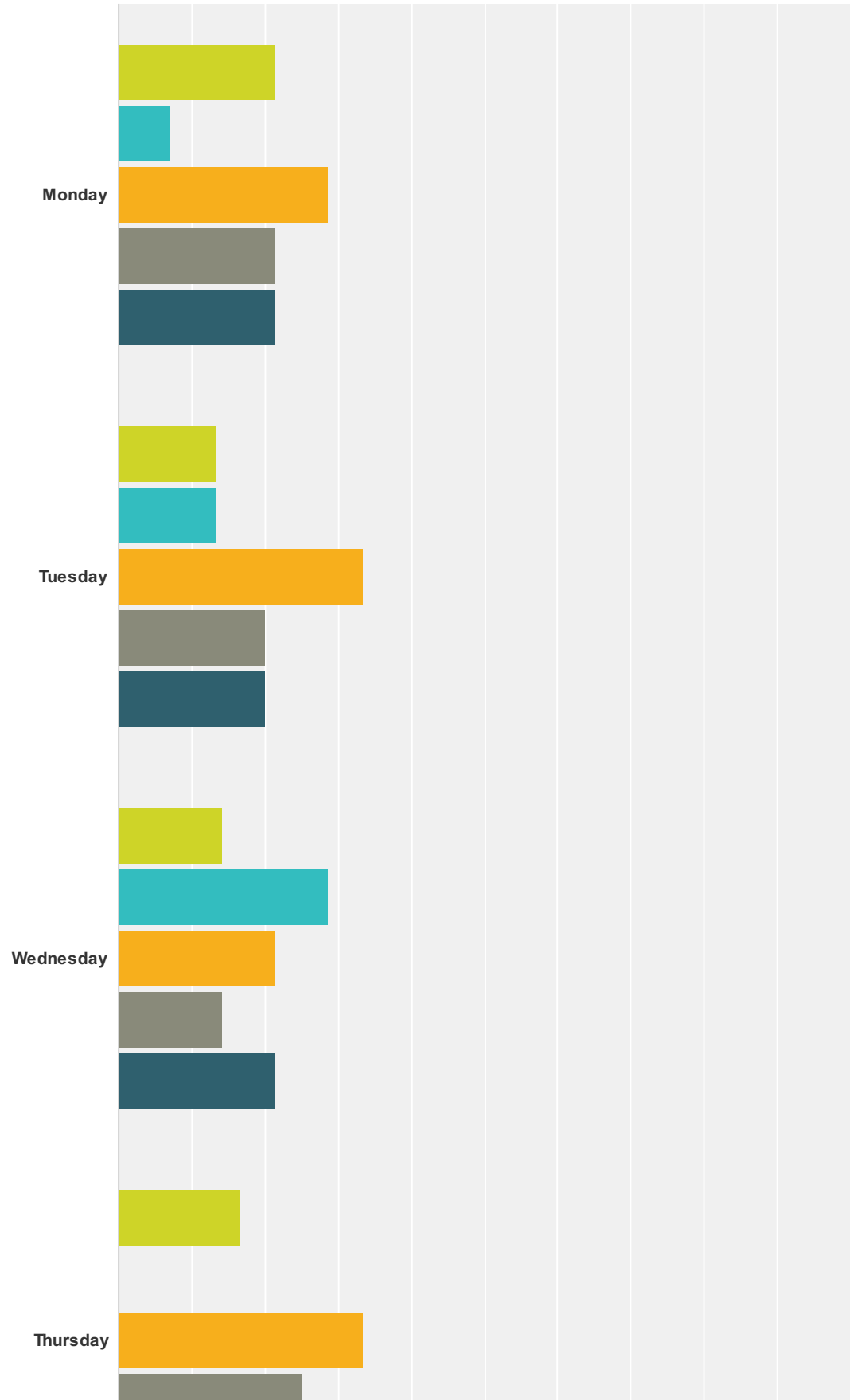
Answered: 17 Skipped: 86



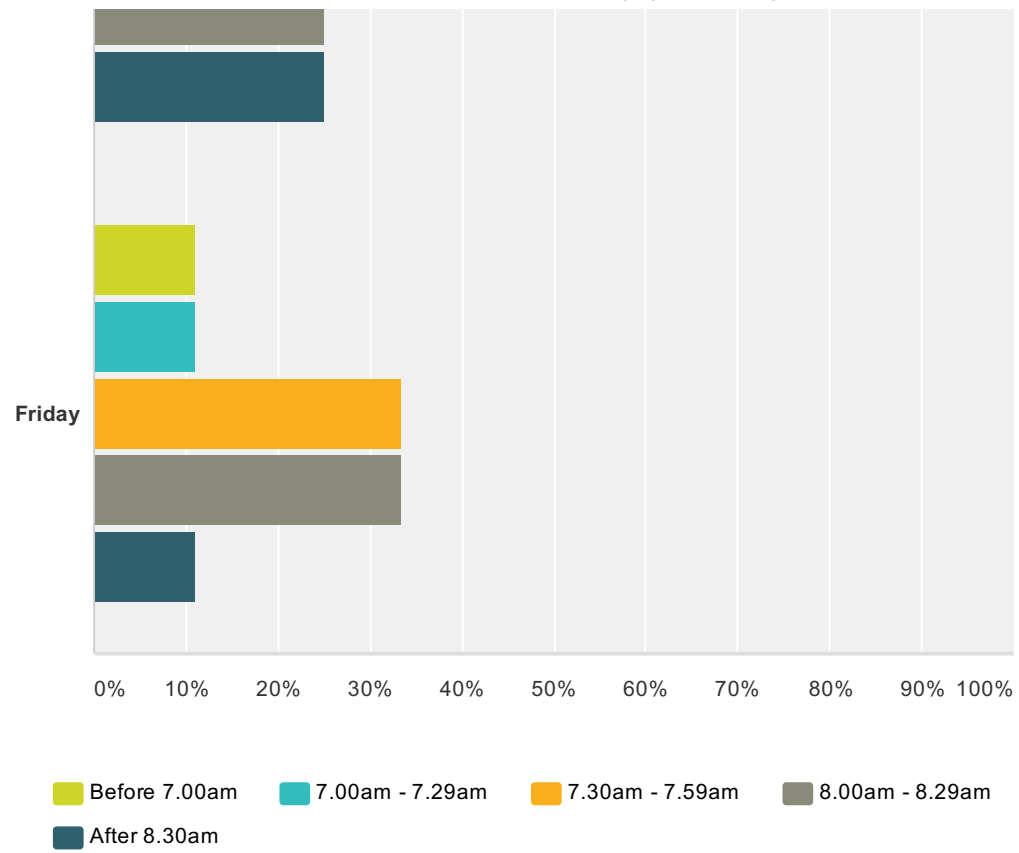
Answer Choices	Responses	
1	0.00%	0
2	11.76%	2
3	17.65%	3
4	47.06%	8
5	23.53%	4
Total		17

Q3 What days and times do you arrive/attend the school?

Answered: 17 Skipped: 86



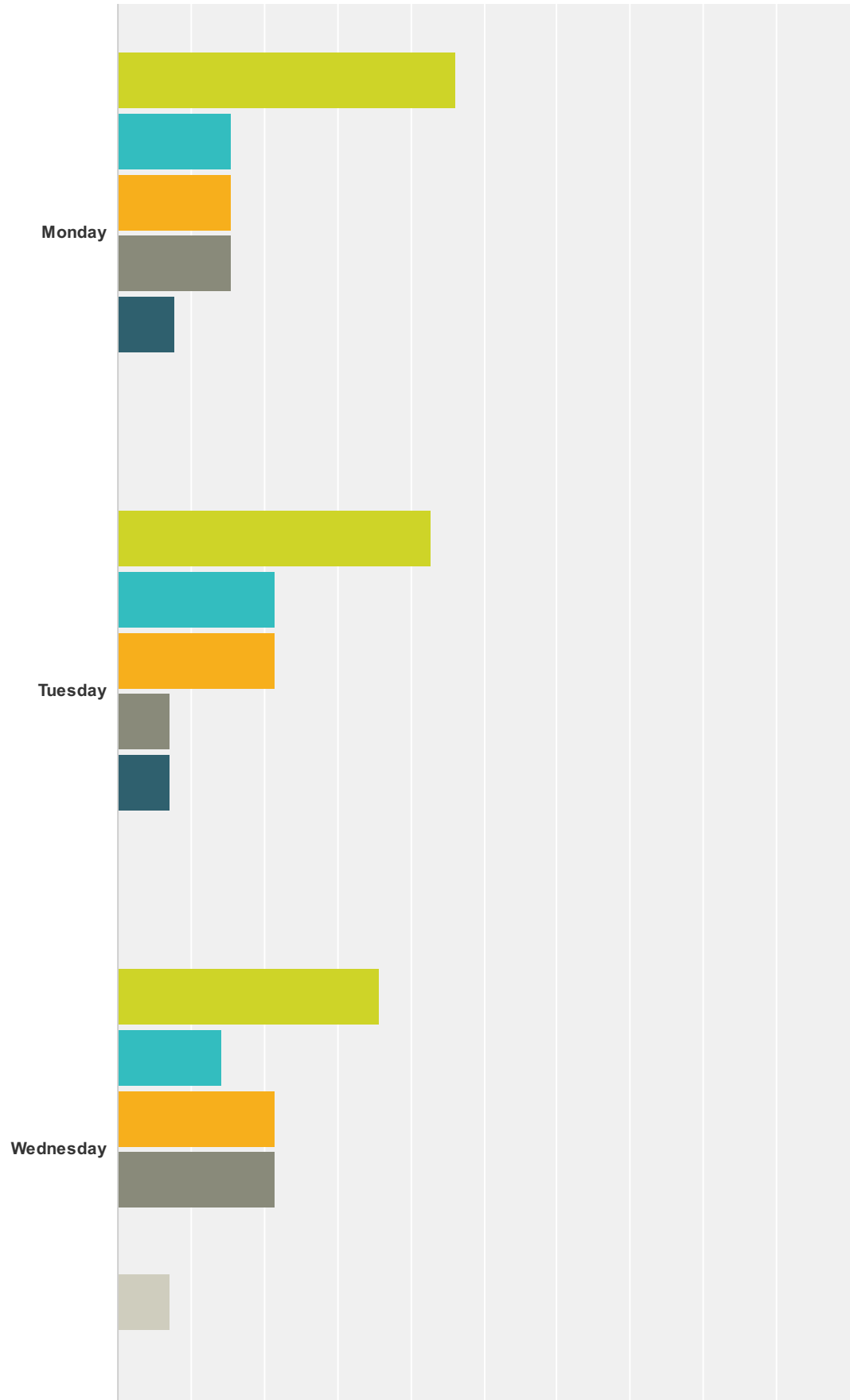
St Catherine's School Travel Survey (for Staff)



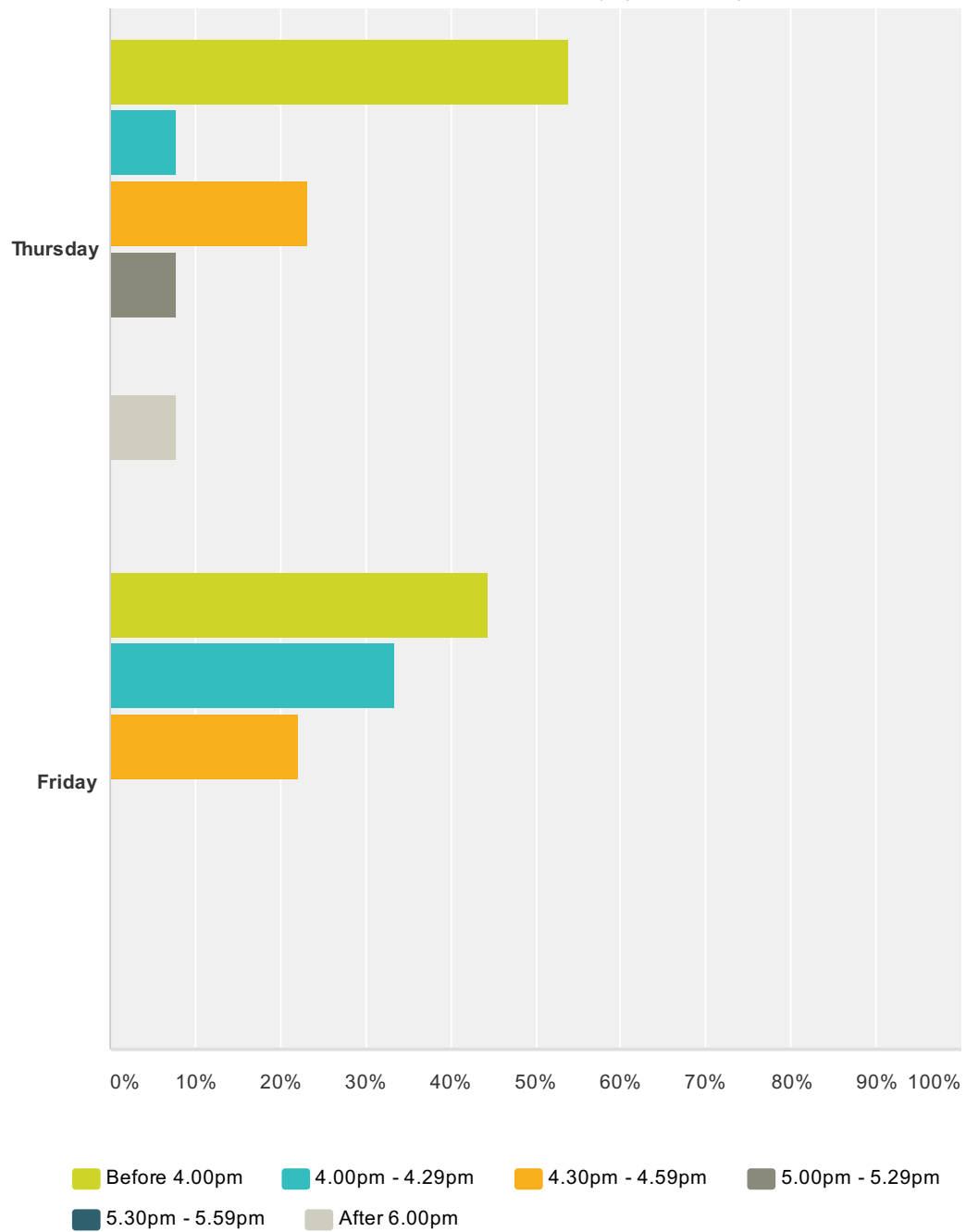
	Before 7.00am	7.00am - 7.29am	7.30am - 7.59am	8.00am - 8.29am	After 8.30am	Total
Monday	21.43% 3	7.14% 1	28.57% 4	21.43% 3	21.43% 3	14
Tuesday	13.33% 2	13.33% 2	33.33% 5	20.00% 3	20.00% 3	15
Wednesday	14.29% 2	28.57% 4	21.43% 3	14.29% 2	21.43% 3	14
Thursday	16.67% 2	0.00% 0	33.33% 4	25.00% 3	25.00% 3	12
Friday	11.11% 1	11.11% 1	33.33% 3	33.33% 3	11.11% 1	9

Q4 What days and times do you depart from the school?

Answered: 17 Skipped: 86



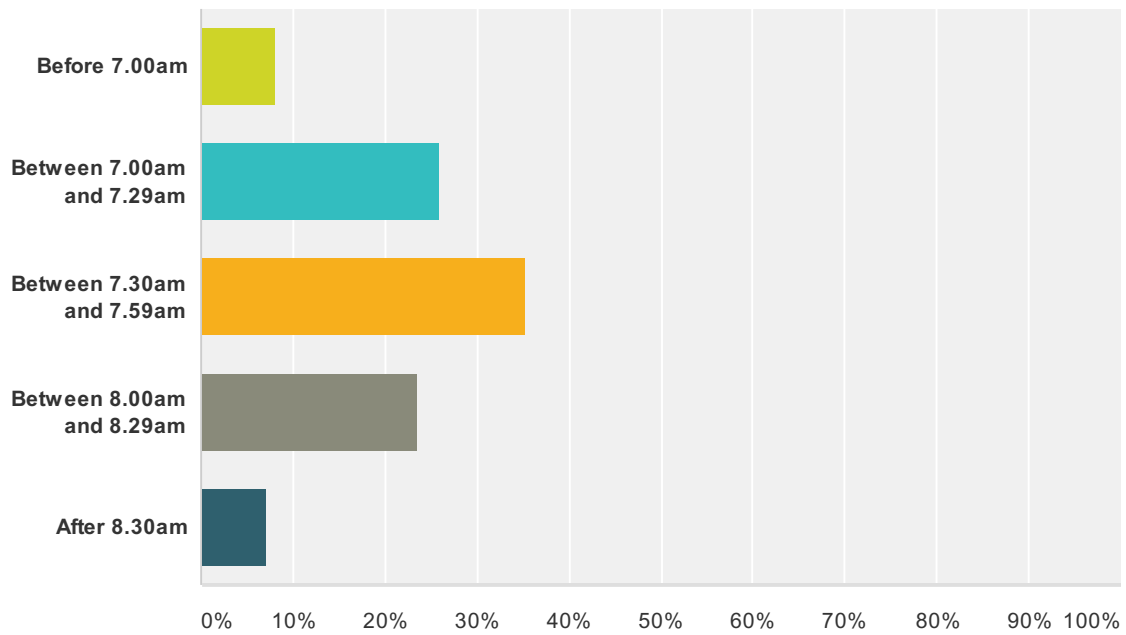
St Catherine's School Travel Survey (for Staff)



	Before 4.00pm	4.00pm - 4.29pm	4.30pm - 4.59pm	5.00pm - 5.29pm	5.30pm - 5.59pm	After 6.00pm	Total
Monday	46.15% 6	15.38% 2	15.38% 2	15.38% 2	7.69% 1	0.00% 0	13
Tuesday	42.86% 6	21.43% 3	21.43% 3	7.14% 1	7.14% 1	0.00% 0	14
Wednesday	35.71% 5	14.29% 2	21.43% 3	21.43% 3	0.00% 0	7.14% 1	14
Thursday	53.85% 7	7.69% 1	23.08% 3	7.69% 1	0.00% 0	7.69% 1	13
Friday	44.44% 4	33.33% 3	22.22% 2	0.00% 0	0.00% 0	0.00% 0	9

Q5 What time do you typically arrive at work?

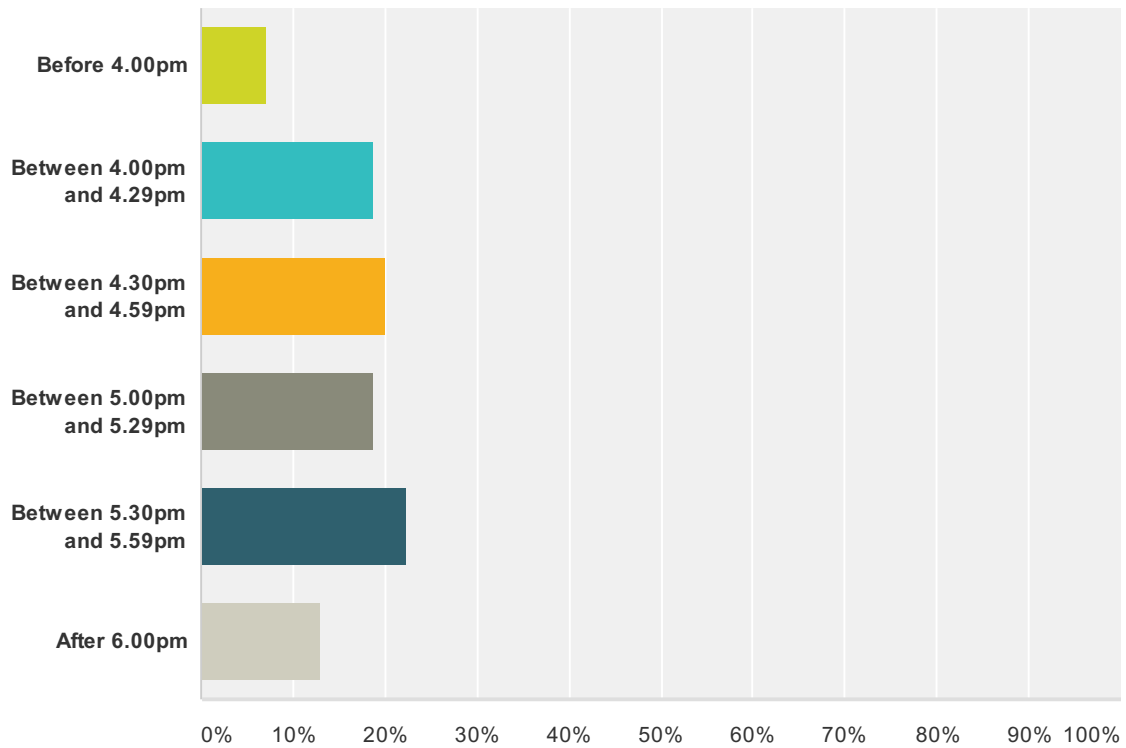
Answered: 85 Skipped: 18



Answer Choices	Responses
Before 7.00am	8.24% 7
Between 7.00am and 7.29am	25.88% 22
Between 7.30am and 7.59am	35.29% 30
Between 8.00am and 8.29am	23.53% 20
After 8.30am	7.06% 6
Total	85

Q6 What time do you typically leave work?

Answered: 85 Skipped: 18



Answer Choices	Responses	
Before 4.00pm	7.06%	6
Between 4.00pm and 4.29pm	18.82%	16
Between 4.30pm and 4.59pm	20.00%	17
Between 5.00pm and 5.29pm	18.82%	16
Between 5.30pm and 5.59pm	22.35%	19
After 6.00pm	12.94%	11
Total		85

Q7 What postcode are you most likely to travel to school from in the morning? (This may be the postcode in which you live)

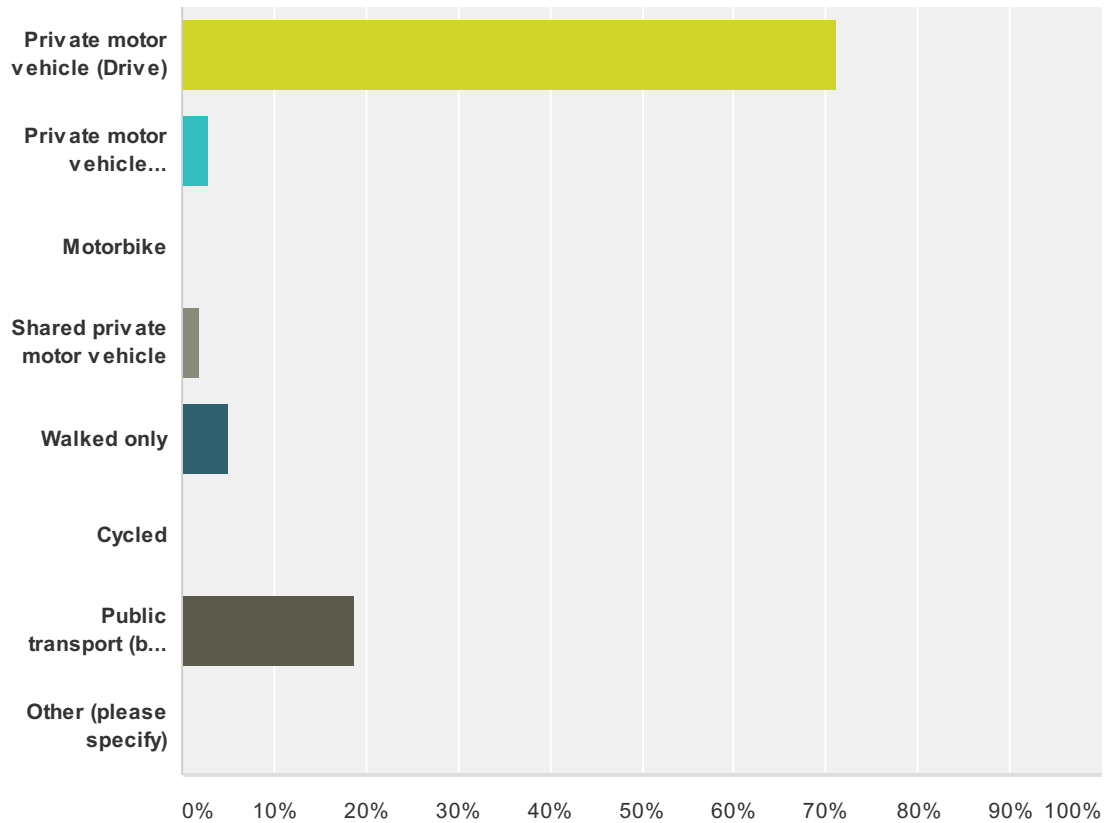
Answered: 84 Skipped: 19

**Q8 What postcode are you most likely to travel to from school in the afternoon?
(This may be the postcode in which you live)**

Answered: 84 Skipped: 19

Q9 On a typical day, how are you most likely to arrive / travel to work?

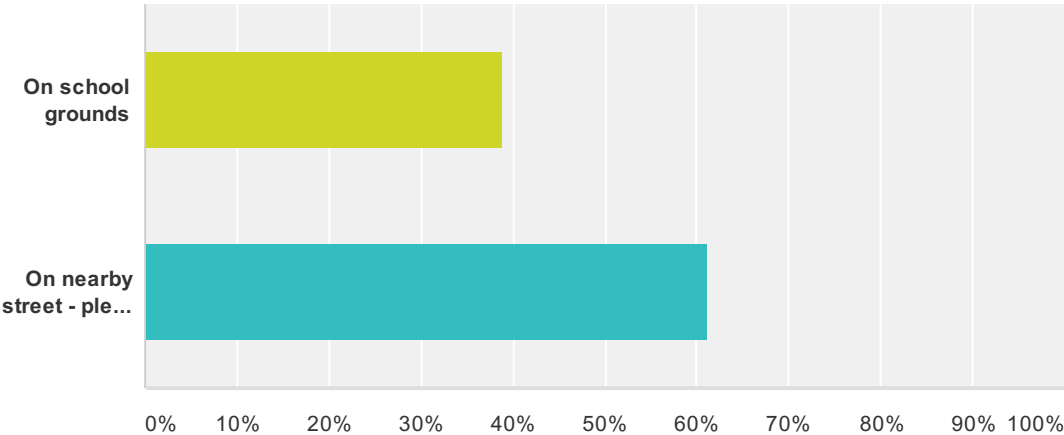
Answered: 101 Skipped: 2



Answer Choices	Responses	
Private motor vehicle (Drive)	71.29%	72
Private motor vehicle (Dropped-off)	2.97%	3
Motorbike	0.00%	0
Shared private motor vehicle	1.98%	2
Walked only	4.95%	5
Cycled	0.00%	0
Public transport (bus and or train)	18.81%	19
Other (please specify)	0.00%	0
Total		101

Q10 Where are you most likely to park?

Answered: 72 Skipped: 31



Answer Choices	Responses	
On school grounds	38.89%	28
On nearby street - please specify	61.11%	44
Total		72

Q11 You indicated that you ride share to work, how many other St. Catherine's School staff share the car?

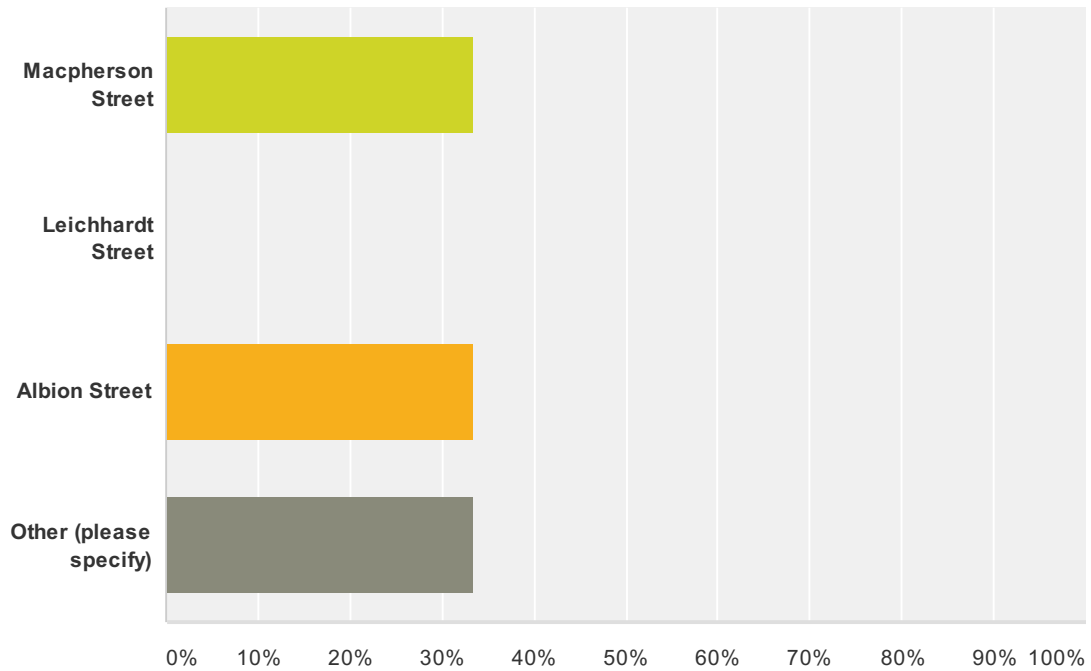
Answered: 2 Skipped: 101

Q12 What is the primary reason you drive/ride a private vehicle to work?

Answered: 74 Skipped: 29

Q13 When you get dropped off in the morning by a private motor vehicle, where are you most likely to get dropped off?

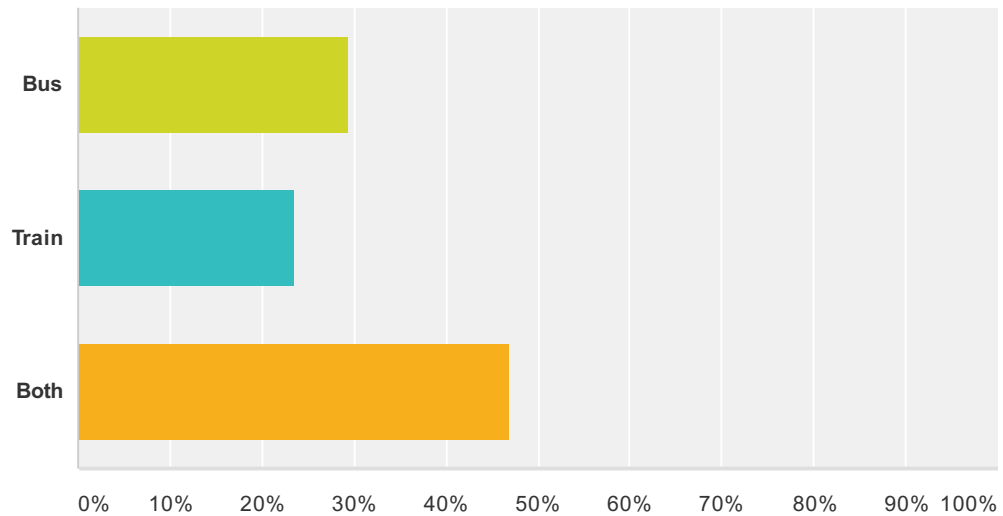
Answered: 3 Skipped: 100



Answer Choices	Responses	
Macpherson Street	33.33%	1
Leichhardt Street	0.00%	0
Albion Street	33.33%	1
Other (please specify)	33.33%	1
Total		3

Q14 Do you take a bus or train to work in the morning? (Please indicate if you take both)

Answered: 17 Skipped: 86



Answer Choices	Responses	
Bus	29.41%	5
Train	23.53%	4
Both	47.06%	8
Total		17

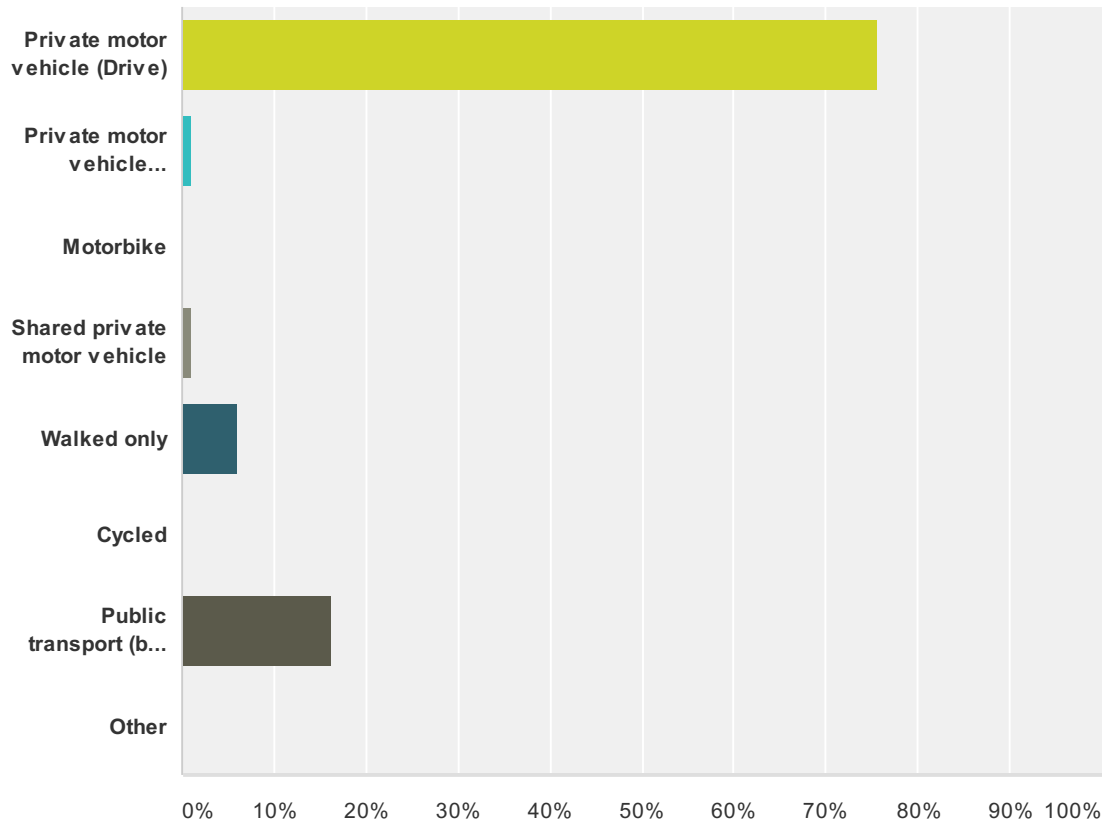
Q15 Please provide details of the bus and/or train journey to work. If you take more than one train and bus, please indicate all of these below. Please indicate the departure and arrival details for each station/stop. (e.g. if you take the Western and Eastern Suburbs lines, then a 400 bus indicate the station you originally get on, transferred to and finally off from, as well as the bus stop you got on and off from. Also indicate the departure times from the stations/stop you get on.)

Answered: 17 Skipped: 86

Answer Choices	Responses	
Train departure station(s)	70.59%	12
Train line(s)	64.71%	11
Train departure time(s)	52.94%	9
Train arrival station	64.71%	11
Bus departure stop(s)	88.24%	15
Bus route number(s)	94.12%	16
Bus departure time(s)	76.47%	13
Bus arrival stop	88.24%	15

Q16 On a typical day, how are you most likely to travel home/depart from work?

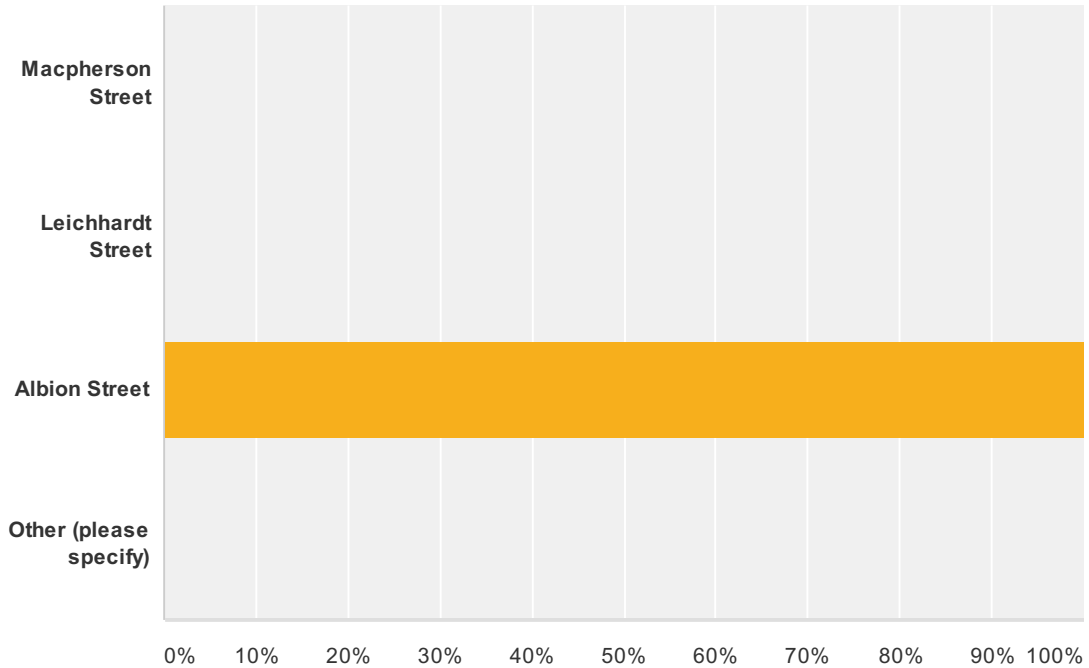
Answered: 98 Skipped: 5



Answer Choices	Responses	
Private motor vehicle (Drive)	75.51%	74
Private motor vehicle (Dropped-off)	1.02%	1
Motorbike	0.00%	0
Shared private motor vehicle	1.02%	1
Walked only	6.12%	6
Cycled	0.00%	0
Public transport (bus and or train)	16.33%	16
Other	0.00%	0
Total		98

Q17 When you get picked up in the afternoon by a private motor vehicle, where are you most likely to get picked up?

Answered: 1 Skipped: 102



Answer Choices	Responses
Macpherson Street	0.00% 0
Leichhardt Street	0.00% 0
Albion Street	100.00% 1
Other (please specify)	0.00% 0
Total	1

Q18 If you ride share home from work, how many other St. Catherine's School staff share the car?

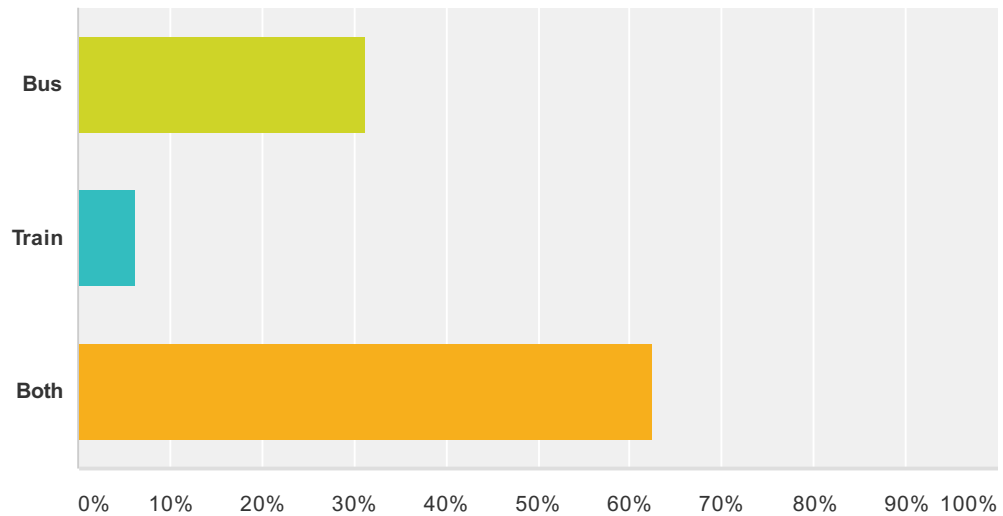
Answered: 1 Skipped: 102

Q19 What is the primary reason you drive/ride a private vehicle from work? (please indicate if same reason as you drive/ride to work)

Answered: 75 Skipped: 28

Q20 Do you take a bus or train from work in the afternoon? (Please indicate if you take both)

Answered: 16 Skipped: 87



Answer Choices	Responses	
Bus	31.25%	5
Train	6.25%	1
Both	62.50%	10
Total		16

Q21 Please provide details of the bus and/or train journey from work. If you take more than one train and bus, please indicate all of these below. Please indicate the departure and arrival details for each station/stop. (e.g. if you take the Western and Eastern Suburbs lines, then a 400 bus indicate the station you originally get on, transferred to and finally off from, as well as the bus stop you got on and off from. Also indicate the departure times from the stations/stop you get on.)

Answered: 16 Skipped: 87

Answer Choices	Responses	
Train departure station(s)	68.75%	11
Train line(s)	68.75%	11
Train departure time(s)	56.25%	9
Train arrival station	68.75%	11
Bus departure stop(s)	87.50%	14
Bus route number(s)	87.50%	14
Bus departure time(s)	75.00%	12
Bus arrival stop	87.50%	14

Q22 Do you have any suggestions to help reduce traffic congestion in and around St. Catherine's School in the morning or afternoon?

Answered: 55 Skipped: 48

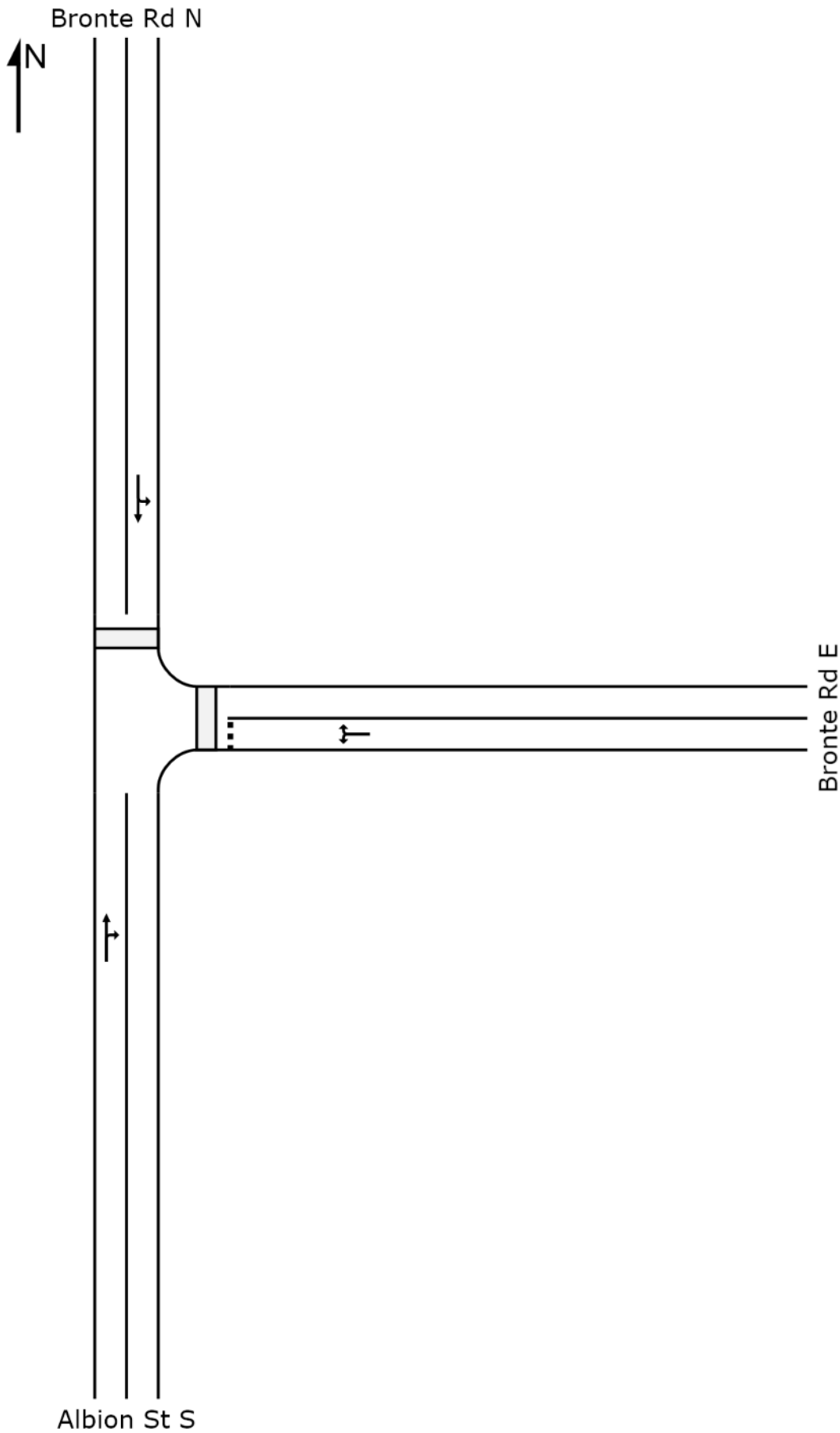
Appendix C

SIDRA results

SITE LAYOUT

▽ Site: AM Existing

Albion St / Bronte Rd
Giveaway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: AM Existing

Albion St / Bronte Rd
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
2	T1	325	34.0	0.599	5.1	LOS A	5.8	48.3	0.56	0.74	53.2
3	R2	217	3.0	0.599	10.6	LOS A	5.8	48.3	0.56	0.74	51.2
Approach		542	21.6	0.599	7.3	NA	5.8	48.3	0.56	0.74	52.4
East: Bronte Rd E											
4	L2	126	0.0	0.281	7.8	LOS A	1.0	7.3	0.44	0.75	51.9
6	R2	167	2.0	0.281	7.7	LOS A	1.0	7.3	0.44	0.75	51.4
Approach		294	1.1	0.281	7.7	LOS A	1.0	7.3	0.44	0.75	51.6
North: Bronte Rd N											
7	L2	248	8.0	0.619	10.0	LOS A	6.4	54.6	0.59	0.73	51.8
8	T1	297	38.0	0.619	4.4	LOS A	6.4	54.6	0.59	0.73	53.4
Approach		545	24.3	0.619	7.0	NA	6.4	54.6	0.59	0.73	52.7
All Vehicles		1381	18.3	0.619	7.3	NA	6.4	54.6	0.55	0.74	52.3

Level of Service (LOS) Method: Delay (RTA NSW).

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: AM Future

Albion St / Bronte Rd
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
2	T1	373	34.0	0.662	6.0	LOS A	7.5	62.6	0.59	0.80	52.6
3	R2	217	3.0	0.662	11.5	LOS A	7.5	62.6	0.59	0.80	50.7
Approach		589	22.6	0.662	8.1	NA	7.5	62.6	0.59	0.80	51.9
East: Bronte Rd E											
4	L2	126	0.0	0.298	8.0	LOS A	1.1	7.9	0.46	0.76	51.8
6	R2	172	2.0	0.298	8.0	LOS A	1.1	7.9	0.46	0.76	51.2
Approach		298	1.2	0.298	8.0	LOS A	1.1	7.9	0.46	0.76	51.4
North: Bronte Rd N											
7	L2	253	8.0	0.635	10.3	LOS A	6.9	58.6	0.60	0.74	51.7
8	T1	306	38.0	0.635	4.6	LOS A	6.9	58.6	0.60	0.74	53.3
Approach		559	24.4	0.635	7.2	NA	6.9	58.6	0.60	0.74	52.5
All Vehicles		1446	18.9	0.662	7.7	NA	7.5	62.6	0.57	0.77	52.0

Level of Service (LOS) Method: Delay (RTA NSW).

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: PM Existing

Albion St / Bronte Rd
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
2	T1	289	34.0	0.555	5.3	LOS A	4.7	38.9	0.53	0.69	53.1
3	R2	169	3.0	0.555	10.8	LOS A	4.7	38.9	0.53	0.69	51.2
Approach		459	22.6	0.555	7.4	NA	4.7	38.9	0.53	0.69	52.4
East: Bronte Rd E											
4	L2	105	0.0	0.256	8.1	LOS A	0.9	6.5	0.50	0.79	51.7
6	R2	143	4.0	0.256	8.0	LOS A	0.9	6.5	0.50	0.79	51.1
Approach		248	2.3	0.256	8.0	LOS A	0.9	6.5	0.50	0.79	51.4
North: Bronte Rd N											
7	L2	265	2.0	0.759	12.9	LOS A	11.7	101.4	0.73	0.97	49.9
8	T1	379	45.0	0.759	7.4	LOS A	11.7	101.4	0.73	0.97	51.2
Approach		644	27.3	0.759	9.7	NA	11.7	101.4	0.73	0.97	50.7
All Vehicles		1352	21.1	0.759	8.6	NA	11.7	101.4	0.62	0.84	51.4

Level of Service (LOS) Method: Delay (RTA NSW).

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: PM Future

Albion St / Bronte Rd
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
2	T1	327	34.0	0.606	6.0	LOS A	5.7	47.9	0.55	0.73	52.7
3	R2	169	3.0	0.606	11.5	LOS A	5.7	47.9	0.55	0.73	50.9
Approach		497	23.4	0.606	7.9	NA	5.7	47.9	0.55	0.73	52.1
East: Bronte Rd E											
4	L2	105	0.0	0.269	8.2	LOS A	1.0	6.9	0.52	0.80	51.6
6	R2	148	4.0	0.269	8.2	LOS A	1.0	6.9	0.52	0.80	50.9
Approach		254	2.3	0.269	8.2	LOS A	1.0	6.9	0.52	0.80	51.2
North: Bronte Rd N											
7	L2	271	2.0	0.771	13.3	LOS A	12.4	107.3	0.75	1.00	49.7
8	T1	384	45.0	0.771	7.7	LOS A	12.4	107.3	0.75	1.00	50.9
Approach		655	27.2	0.771	10.0	NA	12.4	107.3	0.75	1.00	50.4
All Vehicles		1405	21.4	0.771	8.9	NA	12.4	107.3	0.63	0.87	51.1

Level of Service (LOS) Method: Delay (RTA NSW).

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: WE Existing**

Albion St / Bronte Rd
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
2	T1	368	19.0	0.678	7.1	LOS A	7.4	57.9	0.60	0.84	52.0
3	R2	208	2.0	0.678	12.6	LOS A	7.4	57.9	0.60	0.84	50.2
Approach		577	12.9	0.678	9.1	NA	7.4	57.9	0.60	0.84	51.3
East: Bronte Rd E											
4	L2	58	0.0	0.212	8.2	LOS A	0.7	4.7	0.53	0.79	51.6
6	R2	134	2.0	0.212	8.1	LOS A	0.7	4.7	0.53	0.79	51.0
Approach		192	1.4	0.212	8.2	LOS A	0.7	4.7	0.53	0.79	51.2
North: Bronte Rd N											
7	L2	289	6.0	0.792	13.9	LOS A	13.4	107.8	0.77	1.06	49.5
8	T1	405	25.0	0.792	8.3	LOS A	13.4	107.8	0.77	1.06	50.9
Approach		695	17.1	0.792	10.6	NA	13.4	107.8	0.77	1.06	50.3
All Vehicles		1463	13.4	0.792	9.7	NA	13.4	107.8	0.67	0.94	50.8

Level of Service (LOS) Method: Delay (RTA NSW).

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: WE Future**

Albion St / Bronte Rd
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
2	T1	373	19.0	0.685	7.3	LOS A	7.6	59.5	0.60	0.85	51.9
3	R2	208	2.0	0.685	12.8	LOS A	7.6	59.5	0.60	0.85	50.1
Approach		581	12.9	0.685	9.2	NA	7.6	59.5	0.60	0.85	51.2
East: Bronte Rd E											
4	L2	58	0.0	0.214	8.3	LOS A	0.7	4.8	0.53	0.80	51.6
6	R2	134	2.0	0.214	8.2	LOS A	0.7	4.8	0.53	0.80	51.0
Approach		192	1.4	0.214	8.2	LOS A	0.7	4.8	0.53	0.80	51.2
North: Bronte Rd N											
7	L2	289	6.0	0.797	14.1	LOS A	13.8	110.6	0.78	1.08	49.4
8	T1	409	25.0	0.797	8.4	LOS A	13.8	110.6	0.78	1.08	50.8
Approach		699	17.1	0.797	10.8	NA	13.8	110.6	0.78	1.08	50.2
All Vehicles		1472	13.4	0.797	9.8	NA	13.8	110.6	0.68	0.95	50.7

Level of Service (LOS) Method: Delay (RTA NSW).

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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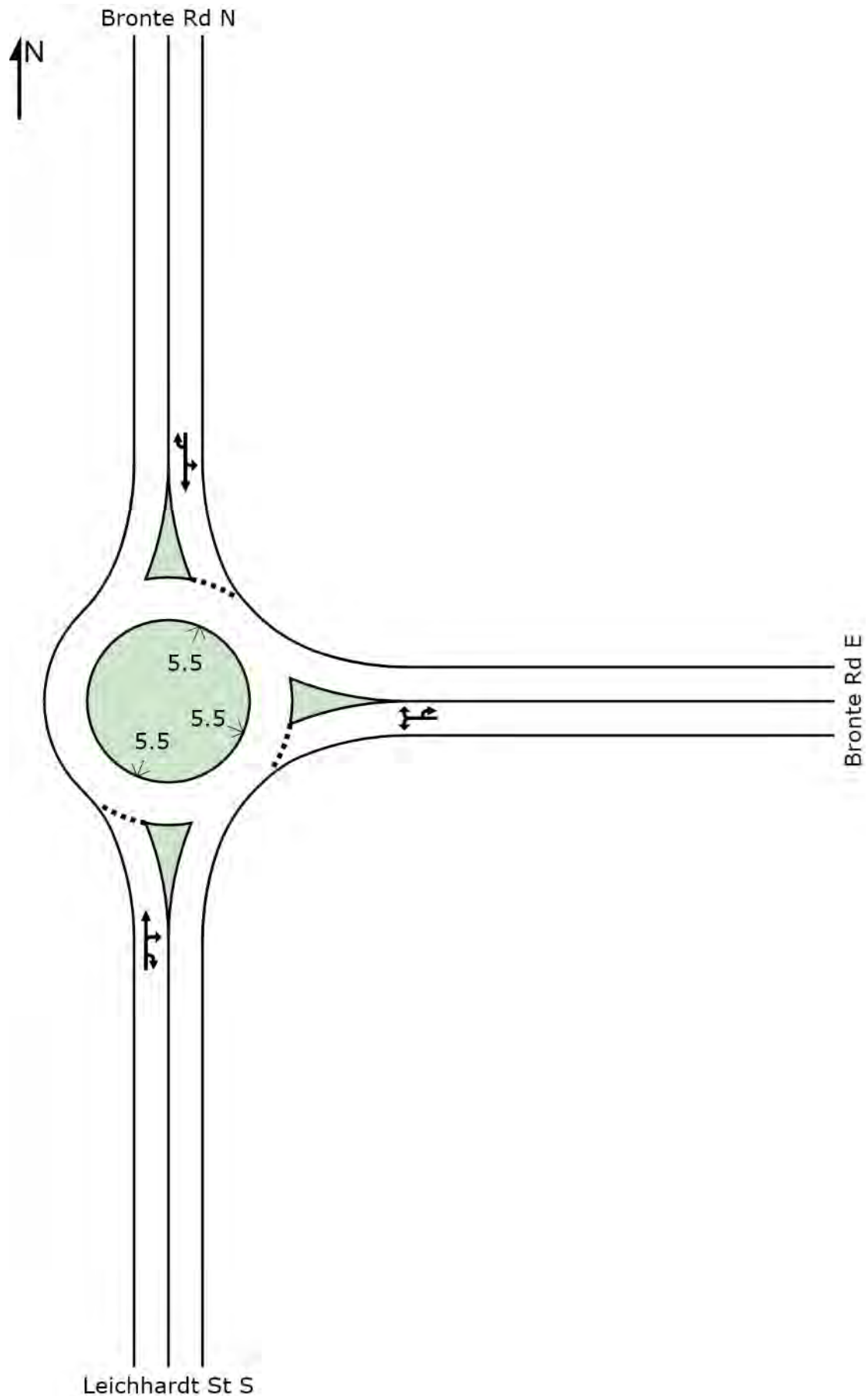
SIDRA
INTERSECTION 6

SITE LAYOUT



Site: AM Existing

Leichhardt St / Bronte Rd
Roundabout



MOVEMENT SUMMARY

 **Site: AM Existing**

Leichhardt St / Bronte Rd
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
2	T1	192	1.0	0.579	6.1	LOS A	5.5	41.4	0.55	0.63	50.3
3	R2	451	13.0	0.579	8.9	LOS A	5.5	41.4	0.55	0.63	47.5
3u	U	24	0.0	0.579	10.1	LOS A	5.5	41.4	0.55	0.63	48.7
Approach		666	9.1	0.579	8.1	LOS A	5.5	41.4	0.55	0.63	48.4
East: Bronte Rd E											
4	L2	607	10.0	0.684	8.1	LOS A	7.5	56.2	0.74	0.70	47.4
6	R2	107	1.0	0.684	10.1	LOS A	7.5	56.2	0.74	0.70	49.9
6u	U	6	0.0	0.684	11.5	LOS A	7.5	56.2	0.74	0.70	48.7
Approach		721	8.6	0.684	8.5	LOS A	7.5	56.2	0.74	0.70	47.8
North: Bronte Rd N											
7	L2	119	6.0	0.387	9.5	LOS A	2.5	18.3	0.74	0.81	48.7
8	T1	154	3.0	0.387	8.9	LOS A	2.5	18.3	0.74	0.81	49.6
9u	U	14	0.0	0.387	12.8	LOS A	2.5	18.3	0.74	0.81	51.0
Approach		286	4.1	0.387	9.3	LOS A	2.5	18.3	0.74	0.81	49.3
All Vehicles		1674	8.0	0.684	8.5	LOS A	7.5	56.2	0.66	0.69	48.3

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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.

Processed: Tuesday, 29 April 2014 5:45:39 PM

SIDRA INTERSECTION 6.0.20.4660

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

 **Site: AM Future**

Leichhardt St / Bronte Rd
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
2	T1	196	1.0	0.599	6.2	LOS A	5.9	44.5	0.57	0.63	50.2
3	R2	458	13.0	0.599	8.9	LOS A	5.9	44.5	0.57	0.63	47.4
3u	U	38	0.0	0.599	10.1	LOS A	5.9	44.5	0.57	0.63	48.6
Approach		692	8.9	0.599	8.2	LOS A	5.9	44.5	0.57	0.63	48.4
East: Bronte Rd E											
4	L2	607	10.0	0.700	8.8	LOS A	8.1	60.8	0.77	0.73	46.8
6	R2	107	1.0	0.700	10.8	LOS A	8.1	60.8	0.77	0.73	49.4
6u	U	6	0.0	0.700	12.2	LOS A	8.1	60.8	0.77	0.73	48.1
Approach		721	8.6	0.700	9.2	LOS A	8.1	60.8	0.77	0.73	47.2
North: Bronte Rd N											
7	L2	119	6.0	0.403	9.7	LOS A	2.7	19.2	0.76	0.83	48.5
8	T1	158	3.0	0.403	9.1	LOS A	2.7	19.2	0.76	0.83	49.4
9u	U	14	0.0	0.403	13.1	LOS A	2.7	19.2	0.76	0.83	50.8
Approach		291	4.1	0.403	9.6	LOS A	2.7	19.2	0.76	0.83	49.1
All Vehicles		1703	7.9	0.700	8.8	LOS A	8.1	60.8	0.69	0.70	48.0

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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.

Processed: Monday, 18 August 2014 10:27:24 AM

SIDRA INTERSECTION 6.0.24.4877

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

 **Site: PM Existing**

Leichhardt St / Bronte Rd
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
2	T1	162	3.0	0.517	5.7	LOS A	4.7	34.2	0.45	0.61	50.4
3	R2	449	6.0	0.517	8.3	LOS A	4.7	34.2	0.45	0.61	48.1
3u	U	26	0.0	0.517	9.6	LOS A	4.7	34.2	0.45	0.61	48.9
Approach		638	5.0	0.517	7.7	LOS A	4.7	34.2	0.45	0.61	48.8
East: Bronte Rd E											
4	L2	569	13.0	0.650	8.2	LOS A	6.6	50.4	0.72	0.71	47.3
6	R2	83	1.0	0.650	10.1	LOS A	6.6	50.4	0.72	0.71	49.9
6u	U	7	0.0	0.650	11.5	LOS A	6.6	50.4	0.72	0.71	48.7
Approach		660	11.3	0.650	8.5	LOS A	6.6	50.4	0.72	0.71	47.7
North: Bronte Rd N											
7	L2	144	2.0	0.418	9.3	LOS A	2.8	19.4	0.73	0.81	49.0
8	T1	175	0.0	0.418	8.8	LOS A	2.8	19.4	0.73	0.81	49.9
9u	U	6	0.0	0.418	12.7	LOS A	2.8	19.4	0.73	0.81	51.1
Approach		325	0.9	0.418	9.1	LOS A	2.8	19.4	0.73	0.81	49.5
All Vehicles		1623	6.8	0.650	8.3	LOS A	6.6	50.4	0.62	0.69	48.5

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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.

Processed: Tuesday, 29 April 2014 3:01:12 PM

SIDRA INTERSECTION 6.0.20.4660

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

 **Site: PM Future**

Leichhardt St / Bronte Rd
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
2	T1	167	3.0	0.533	5.7	LOS A	5.0	36.2	0.46	0.61	50.4
3	R2	455	6.0	0.533	8.4	LOS A	5.0	36.2	0.46	0.61	48.1
3u	U	37	0.0	0.533	9.7	LOS A	5.0	36.2	0.46	0.61	48.8
Approach		659	4.9	0.533	7.8	LOS A	5.0	36.2	0.46	0.61	48.8
East: Bronte Rd E											
4	L2	569	13.0	0.664	8.7	LOS A	7.0	53.8	0.75	0.73	46.8
6	R2	83	1.0	0.664	10.7	LOS A	7.0	53.8	0.75	0.73	49.5
6u	U	7	0.0	0.664	12.0	LOS A	7.0	53.8	0.75	0.73	48.2
Approach		660	11.3	0.664	9.0	LOS A	7.0	53.8	0.75	0.73	47.2
North: Bronte Rd N											
7	L2	144	2.0	0.431	9.7	LOS A	2.9	20.7	0.75	0.83	48.8
8	T1	180	0.0	0.431	9.1	LOS A	2.9	20.7	0.75	0.83	49.6
9u	U	6	0.0	0.431	13.1	LOS A	2.9	20.7	0.75	0.83	50.9
Approach		331	0.9	0.431	9.4	LOS A	2.9	20.7	0.75	0.83	49.3
All Vehicles		1649	6.7	0.664	8.6	LOS A	7.0	53.8	0.63	0.70	48.3

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: WE Existing**

Leichhardt St / Bronte Rd
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
2	T1	112	1.0	0.586	6.2	LOS A	5.7	41.9	0.57	0.64	50.1
3	R2	562	8.0	0.586	8.9	LOS A	5.7	41.9	0.57	0.64	47.5
3u	U	1	0.0	0.586	10.1	LOS A	5.7	41.9	0.57	0.64	48.4
Approach		675	6.8	0.586	8.4	LOS A	5.7	41.9	0.57	0.64	48.0
East: Bronte Rd E											
4	L2	579	10.0	0.688	8.6	LOS A	7.9	59.4	0.78	0.72	47.0
6	R2	106	0.0	0.688	10.5	LOS A	7.9	59.4	0.78	0.72	49.6
6u	U	17	0.0	0.688	11.9	LOS A	7.9	59.4	0.78	0.72	48.3
Approach		702	8.2	0.688	9.0	LOS A	7.9	59.4	0.78	0.72	47.4
North: Bronte Rd N											
7	L2	183	0.0	0.566	12.8	LOS A	5.0	35.0	0.87	0.99	46.5
8	T1	197	0.0	0.566	12.3	LOS A	5.0	35.0	0.87	0.99	47.1
9u	U	12	0.0	0.566	16.3	LOS B	5.0	35.0	0.87	0.99	48.6
Approach		392	0.0	0.566	12.7	LOS A	5.0	35.0	0.87	0.99	46.9
All Vehicles		1768	5.9	0.688	9.6	LOS A	7.9	59.4	0.72	0.75	47.5

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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.

Processed: Tuesday, 29 April 2014 3:03:29 PM

SIDRA INTERSECTION 6.0.20.4660

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INTERSECTION 6

MOVEMENT SUMMARY

 **Site: WE Future**

Leichhardt St / Bronte Rd
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
2	T1	112	1.0	0.586	6.2	LOS A	5.7	41.9	0.57	0.64	50.1
3	R2	562	8.0	0.586	8.9	LOS A	5.7	41.9	0.57	0.64	47.5
3u	U	1	0.0	0.586	10.1	LOS A	5.7	41.9	0.57	0.64	48.4
Approach		675	6.8	0.586	8.4	LOS A	5.7	41.9	0.57	0.64	48.0
East: Bronte Rd E											
4	L2	579	10.0	0.688	8.6	LOS A	7.9	59.4	0.78	0.72	47.0
6	R2	106	0.0	0.688	10.5	LOS A	7.9	59.4	0.78	0.72	49.6
6u	U	17	0.0	0.688	11.9	LOS A	7.9	59.4	0.78	0.72	48.3
Approach		702	8.2	0.688	9.0	LOS A	7.9	59.4	0.78	0.72	47.4
North: Bronte Rd N											
7	L2	183	0.0	0.566	12.8	LOS A	5.0	35.0	0.87	0.99	46.5
8	T1	197	0.0	0.566	12.3	LOS A	5.0	35.0	0.87	0.99	47.1
9u	U	12	0.0	0.566	16.3	LOS B	5.0	35.0	0.87	0.99	48.6
Approach		392	0.0	0.566	12.7	LOS A	5.0	35.0	0.87	0.99	46.9
All Vehicles		1768	5.9	0.688	9.6	LOS A	7.9	59.4	0.72	0.75	47.5

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

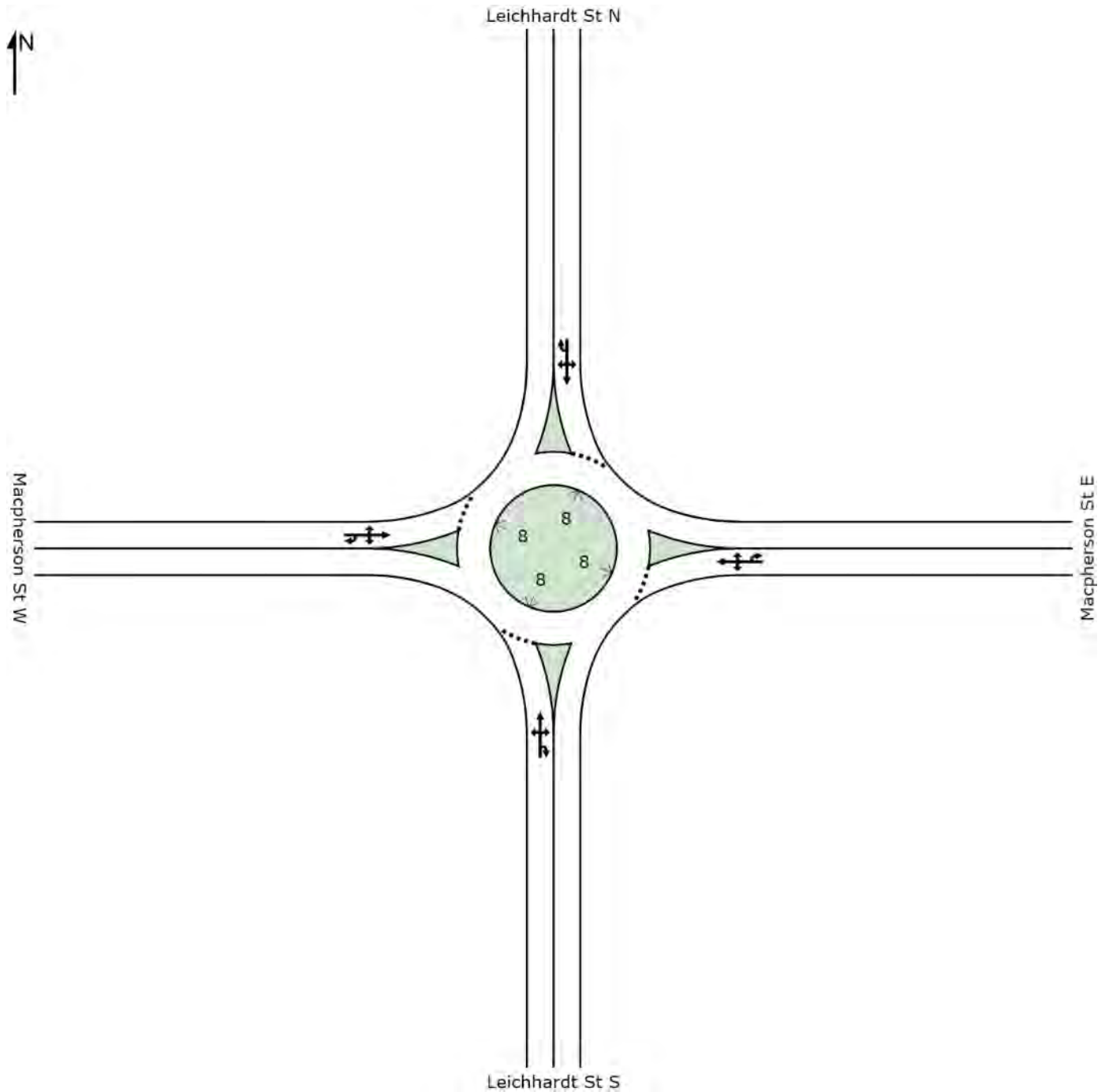
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

 **Site: AM Existing**

Leichhardt St / Macpherson St
Roundabout



Created: Wednesday, 7 May 2014 8:42:03 AM
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INTERSECTION 6

MOVEMENT SUMMARY

 **Site: AM Existing**

Leichhardt St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
1	L2	37	0.0	0.429	19.4	LOS B	3.3	23.1	0.98	1.05	34.8
2	T1	118	0.0	0.429	19.3	LOS B	3.3	23.1	0.98	1.05	43.0
3	R2	6	0.0	0.429	22.3	LOS B	3.3	23.1	0.98	1.05	40.3
3u	U	1	0.0	0.429	23.8	LOS B	3.3	23.1	0.98	1.05	40.7
Approach		162	0.0	0.429	19.5	LOS B	3.3	23.1	0.98	1.05	41.5
East: Macpherson St E											
4	L2	12	0.0	0.917	30.8	LOS C	19.8	151.5	1.00	1.50	33.5
5	T1	313	13.0	0.917	30.8	LOS C	19.8	151.5	1.00	1.50	28.2
6	R2	281	9.0	0.917	33.7	LOS C	19.8	151.5	1.00	1.50	36.3
6u	U	9	0.0	0.917	35.2	LOS C	19.8	151.5	1.00	1.50	34.0
Approach		615	10.7	0.917	32.2	LOS C	19.8	151.5	1.00	1.50	32.7
North: Leichhardt St N											
7	L2	327	9.0	0.851	15.0	LOS B	16.0	120.0	1.00	0.98	44.0
8	T1	49	0.0	0.851	14.8	LOS B	16.0	120.0	1.00	0.98	45.0
9	R2	400	9.0	0.851	17.8	LOS B	16.0	120.0	1.00	0.98	40.6
9u	U	19	0.0	0.851	19.2	LOS B	16.0	120.0	1.00	0.98	46.8
Approach		796	8.2	0.851	16.5	LOS B	16.0	120.0	1.00	0.98	42.6
West: Macpherson St W											
10	L2	243	5.0	0.659	12.1	LOS A	6.9	51.4	0.88	0.97	43.6
11	T1	229	10.0	0.659	12.0	LOS A	6.9	51.4	0.88	0.97	41.0
12	R2	17	1.0	0.659	14.8	LOS B	6.9	51.4	0.88	0.97	40.9
12u	U	22	0.0	0.659	16.4	LOS B	6.9	51.4	0.88	0.97	33.4
Approach		512	6.9	0.659	12.3	LOS A	6.9	51.4	0.88	0.97	42.2
All Vehicles		2084	8.0	0.917	20.3	LOS B	19.8	151.5	0.97	1.13	39.0

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: AM Future**

Leichhardt St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
1	L2	37	0.0	0.478	24.2	LOS B	3.9	27.3	1.00	1.09	31.9
2	T1	118	0.0	0.478	24.1	LOS B	3.9	27.3	1.00	1.09	40.4
3	R2	6	0.0	0.478	27.0	LOS B	3.9	27.3	1.00	1.09	37.5
3u	U	1	0.0	0.478	28.5	LOS C	3.9	27.3	1.00	1.09	37.8
Approach		162	0.0	0.478	24.3	LOS B	3.9	27.3	1.00	1.09	38.8
East: Macpherson St E											
4	L2	12	0.0	1.012	64.9	LOS E	37.1	283.9	1.00	2.16	23.3
5	T1	335	13.0	1.012	64.9	LOS E	37.1	283.9	1.00	2.16	18.4
6	R2	303	9.0	1.012	67.8	LOS E	37.1	283.9	1.00	2.16	26.0
6u	U	9	0.0	1.012	69.2	LOS E	37.1	283.9	1.00	2.16	23.5
Approach		659	10.7	1.012	66.3	LOS E	37.1	283.9	1.00	2.16	22.4
North: Leichhardt St N											
7	L2	341	9.0	0.935	25.8	LOS B	25.4	190.0	1.00	1.25	38.2
8	T1	49	0.0	0.935	25.6	LOS B	25.4	190.0	1.00	1.25	38.9
9	R2	400	9.0	0.935	28.6	LOS C	25.4	190.0	1.00	1.25	34.2
9u	U	23	0.0	0.935	30.1	LOS C	25.4	190.0	1.00	1.25	41.1
Approach		814	8.2	0.935	27.3	LOS B	25.4	190.0	1.00	1.25	36.6
West: Macpherson St W											
10	L2	243	5.0	0.742	14.7	LOS B	9.4	69.3	0.95	1.08	41.4
11	T1	255	10.0	0.742	14.7	LOS B	9.4	69.3	0.95	1.08	38.5
12	R2	17	1.0	0.742	17.5	LOS B	9.4	69.3	0.95	1.08	38.4
12u	U	49	0.0	0.742	19.0	LOS B	9.4	69.3	0.95	1.08	30.5
Approach		564	6.7	0.742	15.2	LOS B	9.4	69.3	0.95	1.08	39.5
All Vehicles		2199	8.0	1.012	35.7	LOS C	37.1	283.9	0.99	1.47	31.3

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: PM Existing**

Leichhardt St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
1	L2	31	0.0	0.214	14.4	LOS A	1.4	10.0	0.91	0.92	38.4
2	T1	45	0.0	0.214	14.3	LOS A	1.4	10.0	0.91	0.92	46.1
3	R2	11	0.0	0.214	17.2	LOS B	1.4	10.0	0.91	0.92	43.6
3u	U	1	0.0	0.214	18.7	LOS B	1.4	10.0	0.91	0.92	44.0
Approach		87	0.0	0.214	14.7	LOS B	1.4	10.0	0.91	0.92	43.6
East: Macpherson St E											
4	L2	8	0.0	0.847	20.2	LOS B	14.3	107.2	1.00	1.24	38.8
5	T1	327	10.0	0.847	20.2	LOS B	14.3	107.2	1.00	1.24	33.9
6	R2	269	7.0	0.847	23.2	LOS B	14.3	107.2	1.00	1.24	41.4
6u	U	17	0.0	0.847	24.6	LOS B	14.3	107.2	1.00	1.24	39.5
Approach		622	8.3	0.847	21.6	LOS B	14.3	107.2	1.00	1.24	38.0
North: Leichhardt St N											
7	L2	388	12.0	0.974	39.1	LOS C	32.1	238.5	1.00	1.57	32.9
8	T1	71	0.0	0.974	38.8	LOS C	32.1	238.5	1.00	1.57	33.5
9	R2	298	3.0	0.974	41.8	LOS C	32.1	238.5	1.00	1.57	28.9
9u	U	27	0.0	0.974	43.3	LOS D	32.1	238.5	1.00	1.57	35.9
Approach		784	7.1	0.974	40.2	LOS C	32.1	238.5	1.00	1.57	31.7
West: Macpherson St W											
10	L2	306	3.0	0.796	14.6	LOS B	12.0	89.0	0.99	1.05	41.6
11	T1	293	12.0	0.796	14.6	LOS B	12.0	89.0	0.99	1.05	38.6
12	R2	18	1.0	0.796	17.4	LOS B	12.0	89.0	0.99	1.05	38.6
12u	U	58	0.0	0.796	18.9	LOS B	12.0	89.0	0.99	1.05	30.6
Approach		675	6.6	0.796	15.0	LOS B	12.0	89.0	0.99	1.05	39.7
All Vehicles		2168	7.0	0.974	26.0	LOS B	32.1	238.5	0.99	1.29	35.6

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: PM Future**

Leichhardt St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
1	L2	31	0.0	0.230	15.4	LOS B	1.6	10.9	0.93	0.94	37.6
2	T1	45	0.0	0.230	15.3	LOS B	1.6	10.9	0.93	0.94	45.4
3	R2	11	0.0	0.230	18.2	LOS B	1.6	10.9	0.93	0.94	42.8
3u	U	1	0.0	0.230	19.7	LOS B	1.6	10.9	0.93	0.94	43.2
Approach		87	0.0	0.230	15.7	LOS B	1.6	10.9	0.93	0.94	42.9
East: Macpherson St E											
4	L2	8	0.0	0.892	25.0	LOS B	18.0	134.9	1.00	1.36	36.3
5	T1	344	10.0	0.892	25.0	LOS B	18.0	134.9	1.00	1.36	31.1
6	R2	286	7.0	0.892	27.9	LOS B	18.0	134.9	1.00	1.36	39.0
6u	U	17	0.0	0.892	29.3	LOS C	18.0	134.9	1.00	1.36	36.9
Approach		656	8.3	0.892	26.3	LOS B	18.0	134.9	1.00	1.36	35.4
North: Leichhardt St N											
7	L2	394	12.0	1.052	83.2	LOS F	54.3	403.2	1.00	2.36	22.5
8	T1	71	0.0	1.052	82.9	LOS F	54.3	403.2	1.00	2.36	22.7
9	R2	298	3.0	1.052	85.9	LOS F	54.3	403.2	1.00	2.36	18.7
9u	U	33	0.0	1.052	87.4	LOS F	54.3	403.2	1.00	2.36	25.0
Approach		795	7.1	1.052	84.3	LOS F	54.3	403.2	1.00	2.36	21.3
West: Macpherson St W											
10	L2	306	3.0	0.870	19.5	LOS B	16.8	124.5	1.00	1.19	38.1
11	T1	318	12.0	0.870	19.5	LOS B	16.8	124.5	1.00	1.19	34.8
12	R2	18	1.0	0.870	22.3	LOS B	16.8	124.5	1.00	1.19	34.8
12u	U	80	0.0	0.870	23.8	LOS B	16.8	124.5	1.00	1.19	26.5
Approach		722	6.6	0.870	20.0	LOS B	16.8	124.5	1.00	1.19	35.8
All Vehicles		2260	7.0	1.052	44.3	LOS D	54.3	403.2	1.00	1.64	28.0

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: WE Existing**

Leichhardt St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
1	L2	31	0.0	0.941	35.1	LOS C	23.6	176.7	1.00	1.60	26.3
2	T1	329	14.0	0.941	35.1	LOS C	23.6	176.7	1.00	1.60	34.7
3	R2	297	2.0	0.941	37.9	LOS C	23.6	176.7	1.00	1.60	31.9
3u	U	3	0.0	0.941	39.4	LOS C	23.6	176.7	1.00	1.60	32.2
Approach		660	7.9	0.941	36.4	LOS C	23.6	176.7	1.00	1.60	33.2
East: Macpherson St E											
4	L2	226	1.0	0.832	17.6	LOS B	13.8	98.7	1.00	1.16	40.9
5	T1	327	3.0	0.832	17.5	LOS B	13.8	98.7	1.00	1.16	36.5
6	R2	98	6.0	0.832	20.5	LOS B	13.8	98.7	1.00	1.16	43.4
6u	U	8	0.0	0.832	22.0	LOS B	13.8	98.7	1.00	1.16	41.6
Approach		660	2.7	0.832	18.1	LOS B	13.8	98.7	1.00	1.16	39.5
North: Leichhardt St N											
7	L2	83	5.0	0.753	20.4	LOS B	9.2	72.0	0.99	1.23	41.5
8	T1	298	20.0	0.753	20.5	LOS B	9.2	72.0	0.99	1.23	41.7
9	R2	52	1.0	0.753	23.2	LOS B	9.2	72.0	0.99	1.23	38.0
9u	U	21	0.0	0.753	24.7	LOS B	9.2	72.0	0.99	1.23	44.2
Approach		454	14.2	0.753	20.9	LOS B	9.2	72.0	0.99	1.23	41.5
West: Macpherson St W											
10	L2	109	1.0	0.890	37.6	LOS C	15.6	112.6	1.00	1.49	29.6
11	T1	309	5.0	0.890	37.5	LOS C	15.6	112.6	1.00	1.49	26.0
12	R2	34	0.0	0.890	40.4	LOS C	15.6	112.6	1.00	1.49	25.9
12u	U	3	0.0	0.890	41.9	LOS C	15.6	112.6	1.00	1.49	18.0
Approach		456	3.6	0.890	37.8	LOS C	15.6	112.6	1.00	1.49	26.9
All Vehicles		2229	6.8	0.941	28.1	LOS B	23.6	176.7	1.00	1.37	35.1

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: WE Future**

Leichhardt St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Leichhardt St S											
1	L2	31	0.0	0.957	40.0	LOS C	26.1	194.9	1.00	1.70	24.6
2	T1	329	14.0	0.957	40.1	LOS C	26.1	194.9	1.00	1.70	32.9
3	R2	297	2.0	0.957	42.9	LOS D	26.1	194.9	1.00	1.70	30.1
3u	U	3	0.0	0.957	44.4	LOS D	26.1	194.9	1.00	1.70	30.4
Approach		660	7.9	0.957	41.3	LOS C	26.1	194.9	1.00	1.70	31.4
East: Macpherson St E											
4	L2	226	1.0	0.848	18.7	LOS B	14.8	106.2	1.00	1.19	40.2
5	T1	340	3.0	0.848	18.6	LOS B	14.8	106.2	1.00	1.19	35.7
6	R2	98	6.0	0.848	21.5	LOS B	14.8	106.2	1.00	1.19	42.8
6u	U	8	0.0	0.848	23.0	LOS B	14.8	106.2	1.00	1.19	41.0
Approach		673	2.7	0.848	19.1	LOS B	14.8	106.2	1.00	1.19	38.7
North: Leichhardt St N											
7	L2	83	5.0	0.766	21.4	LOS B	9.6	75.1	1.00	1.25	40.9
8	T1	298	20.0	0.766	21.5	LOS B	9.6	75.1	1.00	1.25	41.2
9	R2	52	1.0	0.766	24.2	LOS B	9.6	75.1	1.00	1.25	37.4
9u	U	21	0.0	0.766	25.7	LOS B	9.6	75.1	1.00	1.25	43.7
Approach		454	14.2	0.766	22.0	LOS B	9.6	75.1	1.00	1.25	40.9
West: Macpherson St W											
10	L2	109	1.0	0.915	42.7	LOS D	17.7	128.1	1.00	1.57	27.8
11	T1	322	5.0	0.915	42.6	LOS D	17.7	128.1	1.00	1.57	24.2
12	R2	34	0.0	0.915	45.5	LOS D	17.7	128.1	1.00	1.57	24.1
12u	U	3	0.0	0.915	47.0	LOS D	17.7	128.1	1.00	1.57	16.5
Approach		468	3.7	0.915	42.9	LOS D	17.7	128.1	1.00	1.57	25.1
All Vehicles		2255	6.7	0.957	31.1	LOS C	26.1	194.9	1.00	1.43	33.7

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

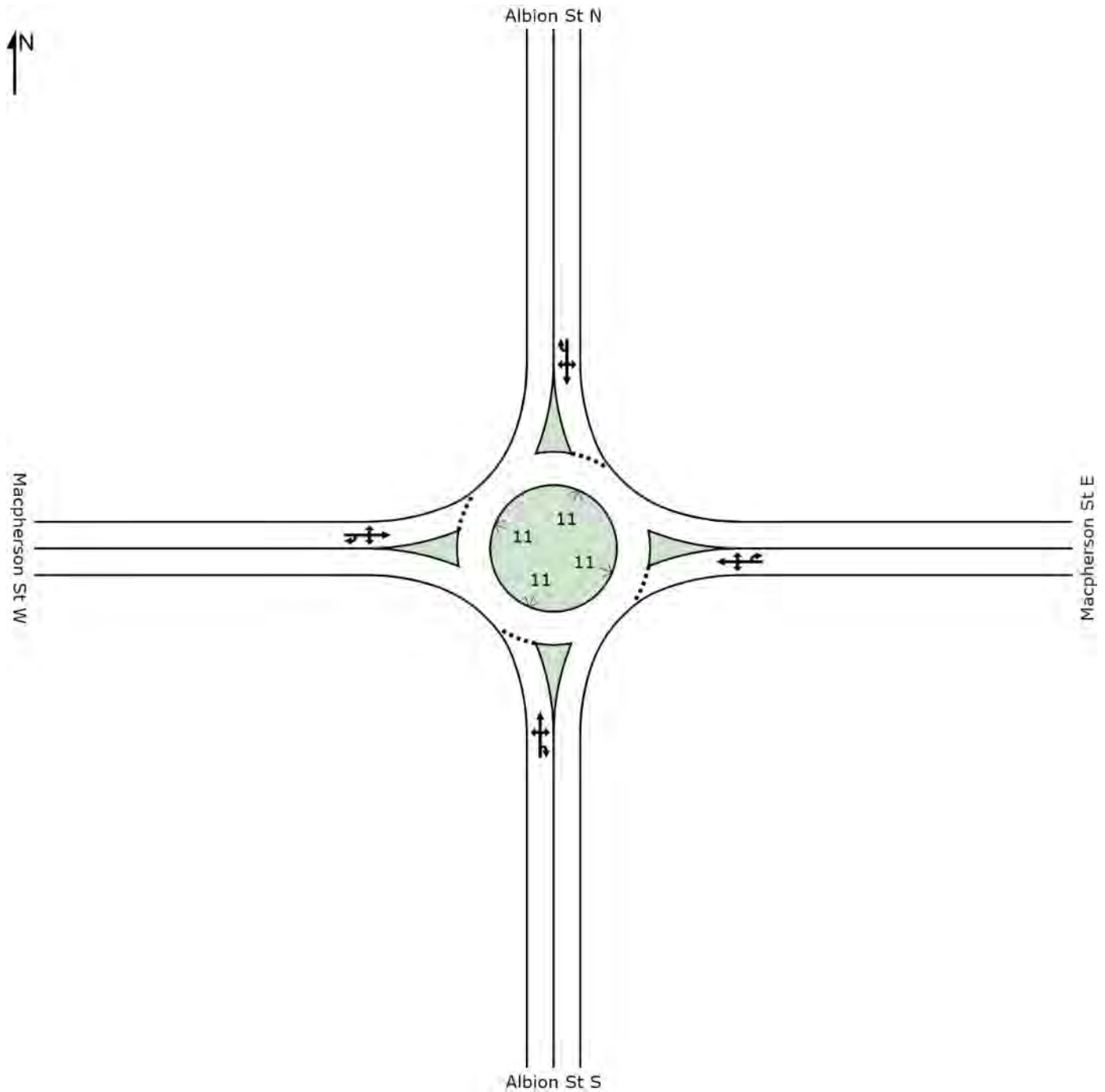
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

 **Site: AM Existing**

Albion St / Macpherson St
Roundabout



Created: Tuesday, 6 May 2014 5:00:31 PM
SIDRA INTERSECTION 6.0.20.4660

Project: J:\236000\236045-00 St Catherines School\Work\Internal\Analysis\SIDRA\Mcpherson-Albion.sip6
8000047, ARUP PTY LTD, PLUS / Floating

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

 **Site: AM Existing**

Albion St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
1	L2	38	0.0	0.864	25.4	LOS B	15.1	105.7	1.00	1.37	30.9
2	T1	333	0.0	0.864	25.6	LOS B	15.1	105.7	1.00	1.37	23.2
3	R2	199	0.0	0.864	29.0	LOS C	15.1	105.7	1.00	1.37	36.7
3u	U	1	0.0	0.864	30.7	LOS C	15.1	105.7	1.00	1.37	37.1
Approach		571	0.0	0.864	26.8	LOS B	15.1	105.7	1.00	1.37	28.5
East: Macpherson St E											
4	L2	242	0.0	0.866	17.5	LOS B	16.9	118.1	1.00	1.16	41.0
5	T1	403	0.0	0.866	17.7	LOS B	16.9	118.1	1.00	1.16	36.9
6	R2	120	0.0	0.866	21.1	LOS B	16.9	118.1	1.00	1.16	26.2
6u	U	18	0.0	0.866	22.8	LOS B	16.9	118.1	1.00	1.16	42.1
Approach		783	0.0	0.866	18.3	LOS B	16.9	118.1	1.00	1.16	36.7
North: Albion St N											
7	L2	77	0.0	0.522	8.2	LOS A	4.2	29.6	0.77	0.84	42.5
8	T1	268	0.0	0.522	8.4	LOS A	4.2	29.6	0.77	0.84	44.0
9	R2	68	0.0	0.522	11.8	LOS A	4.2	29.6	0.77	0.84	34.1
9u	U	27	0.0	0.522	13.5	LOS A	4.2	29.6	0.77	0.84	15.9
Approach		441	0.0	0.522	9.2	LOS A	4.2	29.6	0.77	0.84	40.8
West: Macpherson St W											
10	L2	73	0.0	0.513	11.9	LOS A	4.3	30.4	0.91	0.99	18.6
11	T1	215	0.0	0.513	12.0	LOS A	4.3	30.4	0.91	0.99	42.0
12	R2	32	0.0	0.513	15.4	LOS B	4.3	30.4	0.91	0.99	41.6
12u	U	3	0.0	0.513	17.1	LOS B	4.3	30.4	0.91	0.99	21.7
Approach		322	0.0	0.513	12.4	LOS A	4.3	30.4	0.91	0.99	36.5
All Vehicles		2117	0.0	0.866	17.8	LOS B	16.9	118.1	0.94	1.12	34.4

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: AM Future**

Albion St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
1	L2	38	0.0	0.981	54.3	LOS D	29.4	206.1	1.00	1.91	20.7
2	T1	355	0.0	0.981	54.4	LOS D	29.4	206.1	1.00	1.91	16.4
3	R2	221	0.0	0.981	57.9	LOS E	29.4	206.1	1.00	1.91	26.1
3u	U	1	0.0	0.981	59.6	LOS E	29.4	206.1	1.00	1.91	26.3
Approach		615	0.0	0.981	55.7	LOS D	29.4	206.1	1.00	1.91	20.2
East: Macpherson St E											
4	L2	261	0.0	0.947	29.1	LOS C	27.4	192.1	1.00	1.47	34.6
5	T1	422	0.0	0.947	29.3	LOS C	27.4	192.1	1.00	1.47	29.8
6	R2	120	0.0	0.947	32.7	LOS C	27.4	192.1	1.00	1.47	22.0
6u	U	32	0.0	0.947	34.4	LOS C	27.4	192.1	1.00	1.47	35.4
Approach		835	0.0	0.947	29.9	LOS C	27.4	192.1	1.00	1.47	30.5
North: Albion St N											
7	L2	77	0.0	0.578	9.8	LOS A	5.2	36.7	0.84	0.93	40.7
8	T1	279	0.0	0.578	10.0	LOS A	5.2	36.7	0.84	0.93	42.1
9	R2	74	0.0	0.578	13.4	LOS A	5.2	36.7	0.84	0.93	31.9
9u	U	32	0.0	0.578	15.1	LOS B	5.2	36.7	0.84	0.93	15.2
Approach		461	0.0	0.578	10.8	LOS A	5.2	36.7	0.84	0.93	38.7
West: Macpherson St W											
10	L2	95	0.0	0.631	15.8	LOS B	6.3	44.4	0.98	1.12	17.0
11	T1	237	0.0	0.631	16.0	LOS B	6.3	44.4	0.98	1.12	38.5
12	R2	32	0.0	0.631	19.4	LOS B	6.3	44.4	0.98	1.12	38.1
12u	U	3	0.0	0.631	21.1	LOS B	6.3	44.4	0.98	1.12	20.0
Approach		366	0.0	0.631	16.3	LOS B	6.3	44.4	0.98	1.12	32.8
All Vehicles		2277	0.0	0.981	30.8	LOS C	29.4	206.1	0.96	1.42	27.5

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: PM Existing**

Albion St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
1	L2	24	2.0	0.926	35.3	LOS C	20.5	160.2	1.00	1.59	26.2
2	T1	281	27.0	0.926	35.7	LOS C	20.5	160.2	1.00	1.59	23.5
3	R2	268	1.0	0.926	38.9	LOS C	20.5	160.2	1.00	1.59	31.9
3u	U	14	0.0	0.926	40.6	LOS C	20.5	160.2	1.00	1.59	32.2
Approach		587	13.5	0.926	37.3	LOS C	20.5	160.2	1.00	1.59	28.0
East: Macpherson St E											
4	L2	213	2.0	0.966	41.8	LOS C	28.3	203.8	1.00	1.75	29.6
5	T1	346	3.0	0.966	41.9	LOS C	28.3	203.8	1.00	1.75	24.6
6	R2	96	9.0	0.966	45.4	LOS D	28.3	203.8	1.00	1.75	18.7
6u	U	37	0.0	0.966	47.0	LOS D	28.3	203.8	1.00	1.75	30.2
Approach		692	3.4	0.966	42.6	LOS D	28.3	203.8	1.00	1.75	25.7
North: Albion St N											
7	L2	75	9.0	0.850	26.6	LOS B	13.4	113.7	1.00	1.41	28.3
8	T1	340	34.0	0.850	26.8	LOS B	13.4	113.7	1.00	1.41	28.4
9	R2	75	1.0	0.850	30.2	LOS C	13.4	113.7	1.00	1.41	19.1
9u	U	13	0.0	0.850	31.9	LOS C	13.4	113.7	1.00	1.41	13.3
Approach		502	24.5	0.850	27.4	LOS B	13.4	113.7	1.00	1.41	27.0
West: Macpherson St W											
10	L2	87	1.0	0.741	20.4	LOS B	8.9	64.6	1.00	1.21	19.9
11	T1	278	6.0	0.741	20.6	LOS B	8.9	64.6	1.00	1.21	34.8
12	R2	25	1.0	0.741	23.9	LOS B	8.9	64.6	1.00	1.21	34.7
12u	U	25	0.0	0.741	25.6	LOS B	8.9	64.6	1.00	1.21	23.0
Approach		416	4.3	0.741	21.0	LOS B	8.9	64.6	1.00	1.21	31.6
All Vehicles		2197	11.1	0.966	33.6	LOS C	28.3	203.8	1.00	1.53	27.5

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: PM Future**

Albion St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
1	L2	24	2.0	0.993	57.8	LOS E	31.7	247.7	1.00	2.03	19.8
2	T1	298	27.0	0.993	58.3	LOS E	31.7	247.7	1.00	2.03	17.7
3	R2	285	1.0	0.993	61.4	LOS E	31.7	247.7	1.00	2.03	25.0
3u	U	14	0.0	0.993	63.1	LOS E	31.7	247.7	1.00	2.03	25.2
Approach		621	13.5	0.993	59.8	LOS E	31.7	247.7	1.00	2.03	21.6
East: Macpherson St E											
4	L2	231	2.0	1.056	89.5	LOS F	52.4	377.0	1.00	2.63	19.2
5	T1	364	3.0	1.056	89.6	LOS F	52.4	377.0	1.00	2.63	14.9
6	R2	96	9.0	1.056	93.1	LOS F	52.4	377.0	1.00	2.63	12.0
6u	U	47	0.0	1.056	94.7	LOS F	52.4	377.0	1.00	2.63	19.4
Approach		738	3.3	1.056	90.4	LOS F	52.4	377.0	1.00	2.63	16.2
North: Albion St N											
7	L2	75	9.0	0.922	39.9	LOS C	19.2	162.4	1.00	1.67	22.8
8	T1	347	34.0	0.922	40.1	LOS C	19.2	162.4	1.00	1.67	22.9
9	R2	82	1.0	0.922	43.5	LOS D	19.2	162.4	1.00	1.67	14.5
9u	U	18	0.0	0.922	45.2	LOS D	19.2	162.4	1.00	1.67	10.2
Approach		522	24.1	0.922	40.8	LOS C	19.2	162.4	1.00	1.67	21.5
West: Macpherson St W											
10	L2	104	1.0	0.850	31.1	LOS C	13.3	96.5	1.00	1.39	15.7
11	T1	295	6.0	0.850	31.3	LOS C	13.3	96.5	1.00	1.39	28.9
12	R2	25	1.0	0.850	34.6	LOS C	13.3	96.5	1.00	1.39	28.8
12u	U	25	0.0	0.850	36.3	LOS C	13.3	96.5	1.00	1.39	18.5
Approach		449	4.2	0.850	31.7	LOS C	13.3	96.5	1.00	1.39	25.7
All Vehicles		2331	10.8	1.056	59.8	LOS E	52.4	377.0	1.00	2.02	19.7

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: WE Existing**

Albion St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
1	L2	31	0.0	0.909	27.6	LOS B	19.7	147.5	1.00	1.44	29.6
2	T1	329	14.0	0.909	27.9	LOS B	19.7	147.5	1.00	1.44	26.6
3	R2	297	2.0	0.909	31.2	LOS C	19.7	147.5	1.00	1.44	35.3
3u	U	3	0.0	0.909	32.9	LOS C	19.7	147.5	1.00	1.44	35.7
Approach		660	7.9	0.909	29.4	LOS C	19.7	147.5	1.00	1.44	31.1
East: Macpherson St E											
4	L2	226	1.0	0.804	15.3	LOS B	12.4	88.5	1.00	1.11	42.5
5	T1	327	3.0	0.804	15.5	LOS B	12.4	88.5	1.00	1.11	38.6
6	R2	98	6.0	0.804	18.9	LOS B	12.4	88.5	1.00	1.11	27.2
6u	U	8	0.0	0.804	20.6	LOS B	12.4	88.5	1.00	1.11	43.7
Approach		660	2.7	0.804	16.0	LOS B	12.4	88.5	1.00	1.11	38.4
North: Albion St N											
7	L2	83	5.0	0.726	17.3	LOS B	8.4	66.2	0.97	1.19	34.1
8	T1	298	20.0	0.726	17.5	LOS B	8.4	66.2	0.97	1.19	34.6
9	R2	52	1.0	0.726	20.9	LOS B	8.4	66.2	0.97	1.19	24.6
9u	U	21	0.0	0.726	22.6	LOS B	8.4	66.2	0.97	1.19	16.9
Approach		454	14.2	0.726	18.1	LOS B	8.4	66.2	0.97	1.19	33.0
West: Macpherson St W											
10	L2	109	1.0	0.856	31.2	LOS C	13.6	98.5	1.00	1.40	15.6
11	T1	309	5.0	0.856	31.5	LOS C	13.6	98.5	1.00	1.40	28.9
12	R2	34	0.0	0.856	34.8	LOS C	13.6	98.5	1.00	1.40	28.8
12u	U	3	0.0	0.856	36.5	LOS C	13.6	98.5	1.00	1.40	18.5
Approach		456	3.6	0.856	31.7	LOS C	13.6	98.5	1.00	1.40	26.1
All Vehicles		2229	6.8	0.909	23.6	LOS B	19.7	147.5	0.99	1.28	32.4

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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: WE Future**

Albion St / Macpherson St
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Albion St S											
1	L2	31	0.0	0.939	34.0	LOS C	23.6	176.6	1.00	1.59	26.8
2	T1	336	14.0	0.939	34.3	LOS C	23.6	176.6	1.00	1.59	24.1
3	R2	303	2.0	0.939	37.6	LOS C	23.6	176.6	1.00	1.59	32.5
3u	U	3	0.0	0.939	39.3	LOS C	23.6	176.6	1.00	1.59	32.9
Approach		673	7.9	0.939	35.8	LOS C	23.6	176.6	1.00	1.59	28.4
East: Macpherson St E											
4	L2	233	1.0	0.834	17.3	LOS B	14.0	100.3	1.00	1.17	41.2
5	T1	334	3.0	0.834	17.4	LOS B	14.0	100.3	1.00	1.17	37.0
6	R2	98	6.0	0.834	20.9	LOS B	14.0	100.3	1.00	1.17	26.3
6u	U	8	0.0	0.834	22.5	LOS B	14.0	100.3	1.00	1.17	42.3
Approach		673	2.7	0.834	17.9	LOS B	14.0	100.3	1.00	1.17	37.1
North: Albion St N											
7	L2	83	5.0	0.756	19.1	LOS B	9.4	73.6	0.99	1.24	32.8
8	T1	304	20.0	0.756	19.3	LOS B	9.4	73.6	0.99	1.24	33.3
9	R2	58	1.0	0.756	22.6	LOS B	9.4	73.6	0.99	1.24	23.3
9u	U	21	0.0	0.756	24.3	LOS B	9.4	73.6	0.99	1.24	16.1
Approach		466	14.1	0.756	19.9	LOS B	9.4	73.6	0.99	1.24	31.7
West: Macpherson St W											
10	L2	116	1.0	0.897	38.5	LOS C	16.5	118.8	1.00	1.51	13.7
11	T1	316	5.0	0.897	38.7	LOS C	16.5	118.8	1.00	1.51	25.8
12	R2	34	0.0	0.897	42.1	LOS C	16.5	118.8	1.00	1.51	25.8
12u	U	3	0.0	0.897	43.8	LOS D	16.5	118.8	1.00	1.51	16.3
Approach		468	3.6	0.897	39.0	LOS C	16.5	118.8	1.00	1.51	23.2
All Vehicles		2280	6.7	0.939	27.9	LOS B	23.6	176.6	1.00	1.38	30.0

Level of Service (LOS) Method: Delay (RTA NSW).

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.

Roundabout Capacity Model: SIDRA Standard.

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.