

Department of Education
Parramatta Region 5 Schools
Traffic and Transport Assessment
Yagoona Public School

Issue | 28 August 2017

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 Job number

Arup
Arup Pty Ltd ABN 18 000 966 165



Arup
Level 10 201 Kent Street
PO Box 76 Millers Point
Sydney 2000
Australia
www.arup.com

ARUP

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1 Introduction

Arup was commissioned by Conrad Gargett Ancher Mortlock Woolley Architects on behalf of the NSW Department of Education and Communities, to develop a Traffic and Transport Assessment for the proposed expansion of Rosehill Public School (the school).

The school has 598 students currently enrolled, and a total of 43 staff (including 8 non-teaching staff). The proposed upgrades provide new learning areas to cater for an additional 184 students.

This report examines the existing and future traffic and transport impacts of the school and supports the development application submission for the proposed upgrades.

1.1 Study area

Yagoona Public School is bounded by Hume Highway in the north, Melanie Street in the south and the T3 railway line in the west. An overbridge is located to the south providing vehicular and pedestrian access shown in Figure 1.



Figure 1: Yagoona Public School boundary

1.2 Consultation

The existing traffic and parking conditions around the school were discussed with at a Pre-DA meeting held in July.

The council would like to be informed about the extent of staff car parking expected on-site and on-street to enable them to make an informed view on the proposal. It is expected that the DCP parking rates be provided unless good justification can be given for lesser provision.

Where pick-up areas are busy or operating poorly, the impact of additional activity may require improvement works and behaviour changes by drivers through education programs.

2 Existing Context

The key public transport nodes and RMS classified round surrounding the school is shown in Figure 2.



Figure 2: Key public transport nodes and classified roads around the school

2.1 Trains

Yagoona Train Station is a 600 metre walk north of the school. The station serves the Sydney Trains T3 Bankstown line

2.2 Buses

Nearby bus stops and routes are shown in Figure 3. Key bus routes are:

- M91 Hurstville to Parramatta via Padstow, Bankstown & Chester Hill
- 911 Bankstown to Auburn via Bass Hill Plaza & Chester Hill

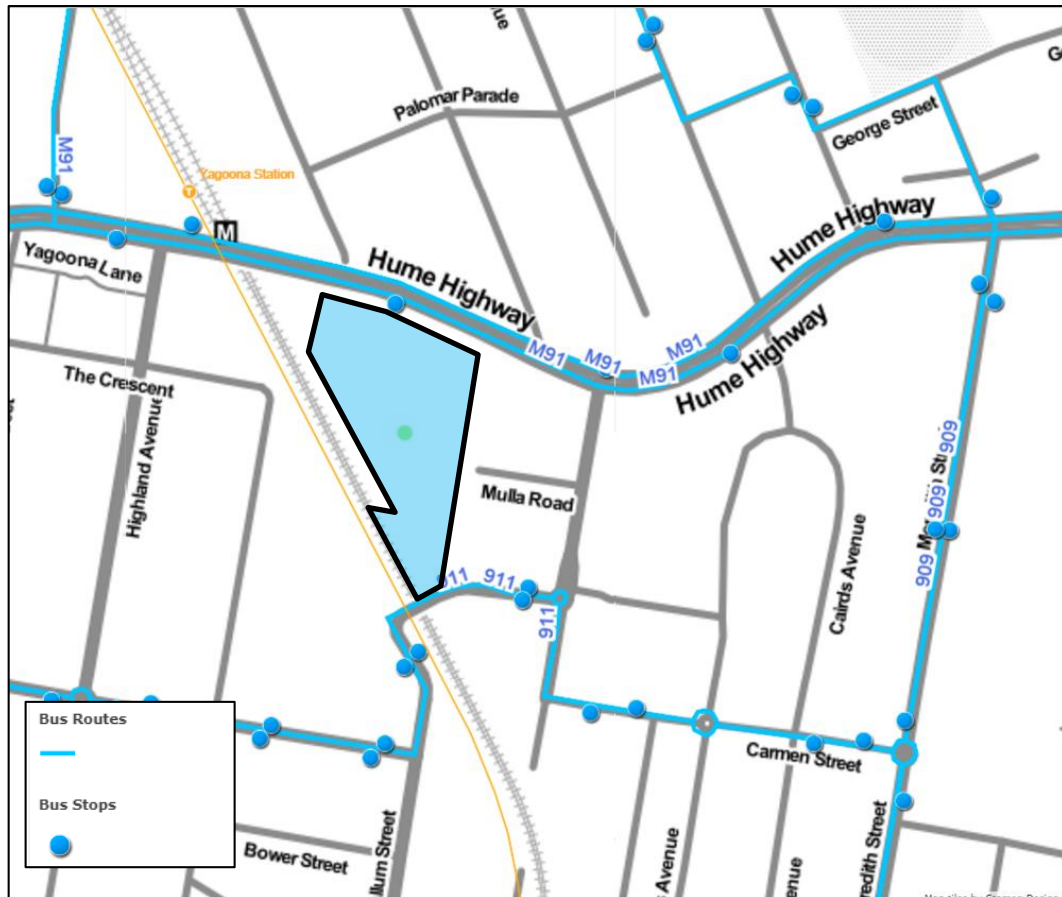


Figure 3: Bus stops and routes surrounding the school

2.3 School buses

School bus services are less common in primary schools as opposed to high schools. This school is not served by a school bus.

2.4 Walking

The school has a network of footpaths leading to the school entries along the Hume Highway, Mulla Road and Melanie Street. Existing pedestrian provisions are shown in Figure 4.

A pedestrian overbridge is located along the Hume Highway just outside the school entrance. A signalised pedestrian crossing is also provided at the intersection of Cooper Road / Hume Highway intersection.

A pedestrian entry along the southern section of the school is located at Melanie Street connecting the school field to the school. The main pedestrian entry is located along Mulla Road and with footpaths leading to the school.



Figure 4: Pedestrian entries and crossings

2.5 Off-street parking

The school has two off-street car parks allocated for staff parking, amounting to a total of 40 off-street parking spaces. Arup has conducted off-street parking surveys on 1 August 2017, Tuesday at 9:30am. During this period, staff fully occupied the existing off-street car park.

The western car park is accessed off The Hume Highway through a left in only manoeuvre. The car park had 29 car spaces however and were fully occupied.

The eastern car park is accessed off Mulla Road, a one way road, and has an exit via the Hume Highway. All 11 angle car parking spaces were fully occupied.

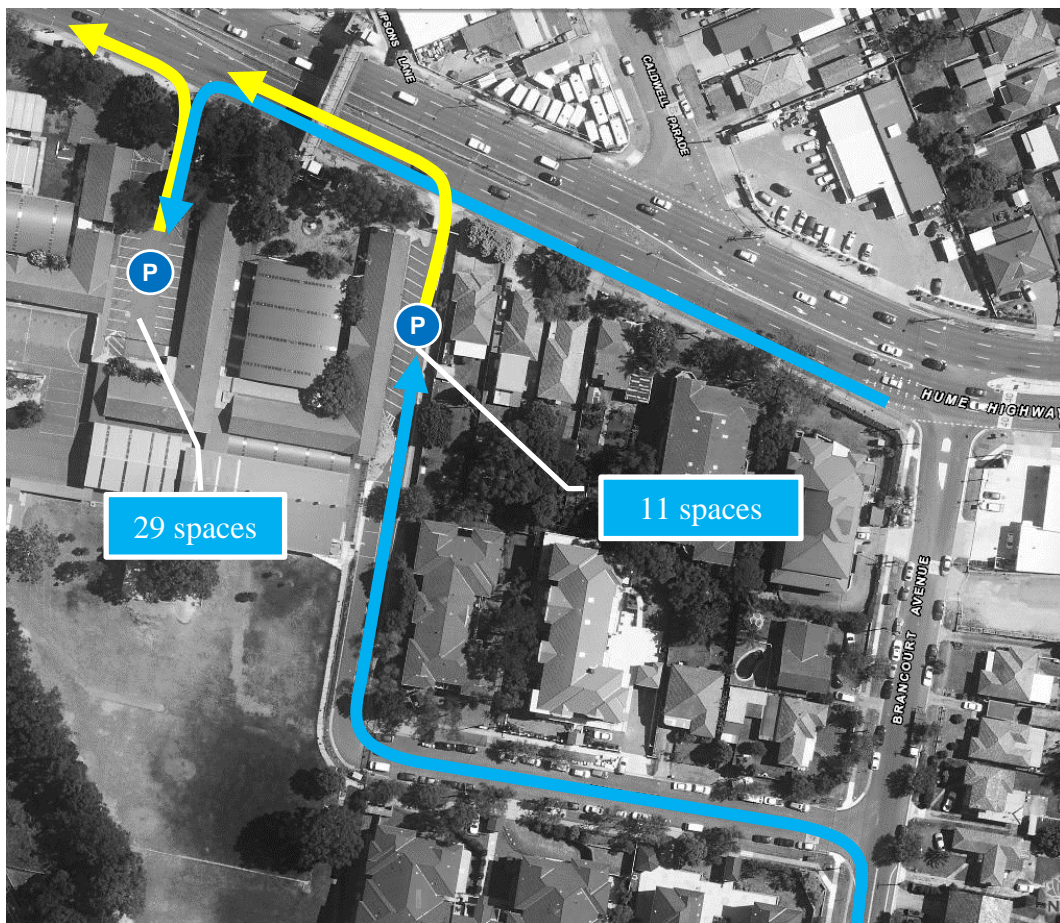


Figure 5: Vehicle access and egress arrangements for each car park



Figure 6: Vehicular entry to the western car park



Figure 7: Western car park at 9:30am fully occupied



Figure 8: Angled parking at the eastern car park

2.6 On-street parking

Arup has conducted on-street parking surveys on 1 August 2017, Tuesday at 9:30am. During this period, staff would have occupied the existing off-street car park and some on-street spaces (if any).

On-street parking was generally busy with Mulla Road Fully occupied, likely occupied by staff and residents.

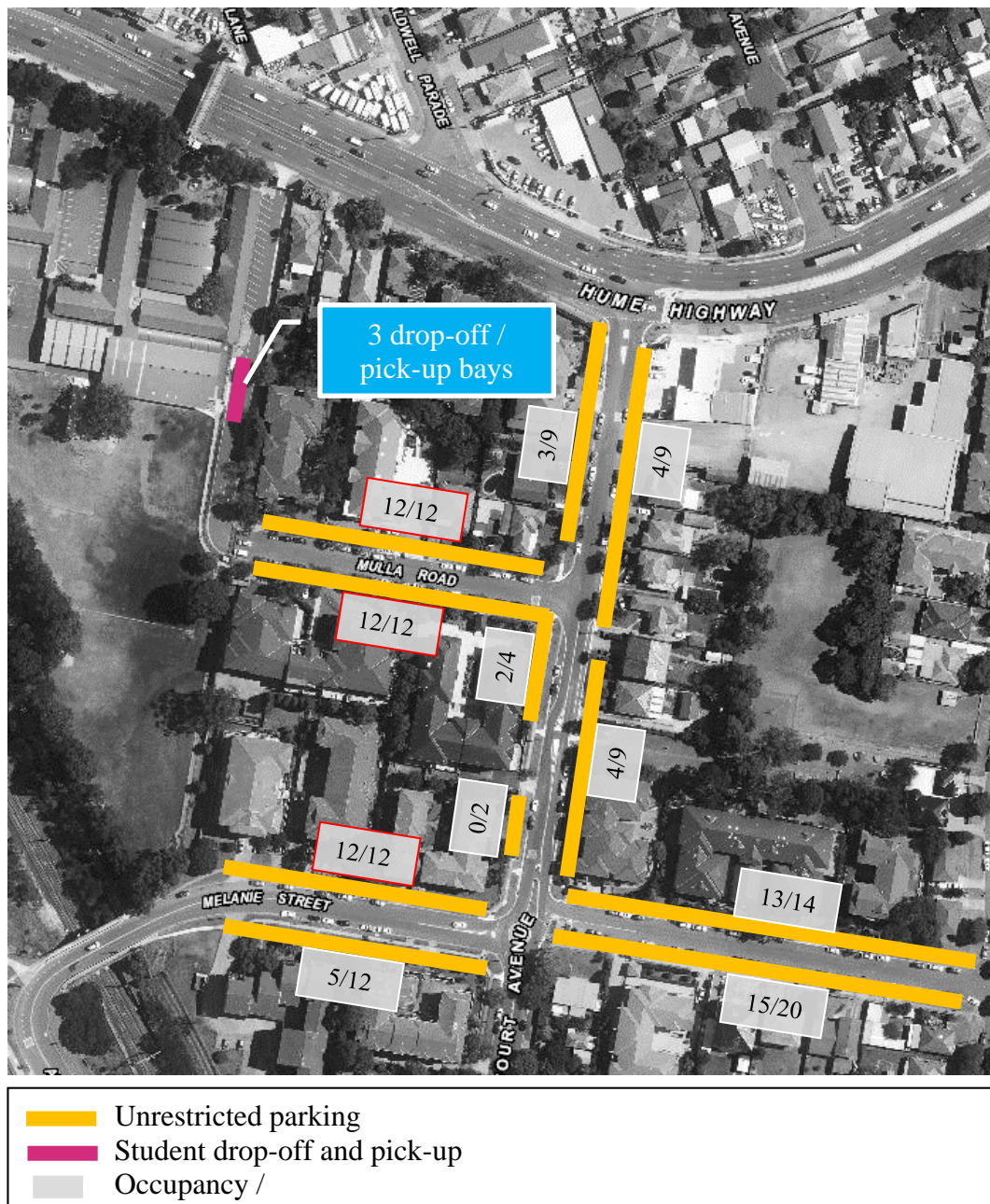


Figure 9: On-street parking restrictions and capacity at time of survey (Thursday 9:30am)

2.7 Vehicle access

The existing vehicle access to the school is shown in Figure 5. The main drop-off and pick-up movements consist of a one way northbound movement within the school boundary. Vehicles would then exit left to the Hume Highway intersection.

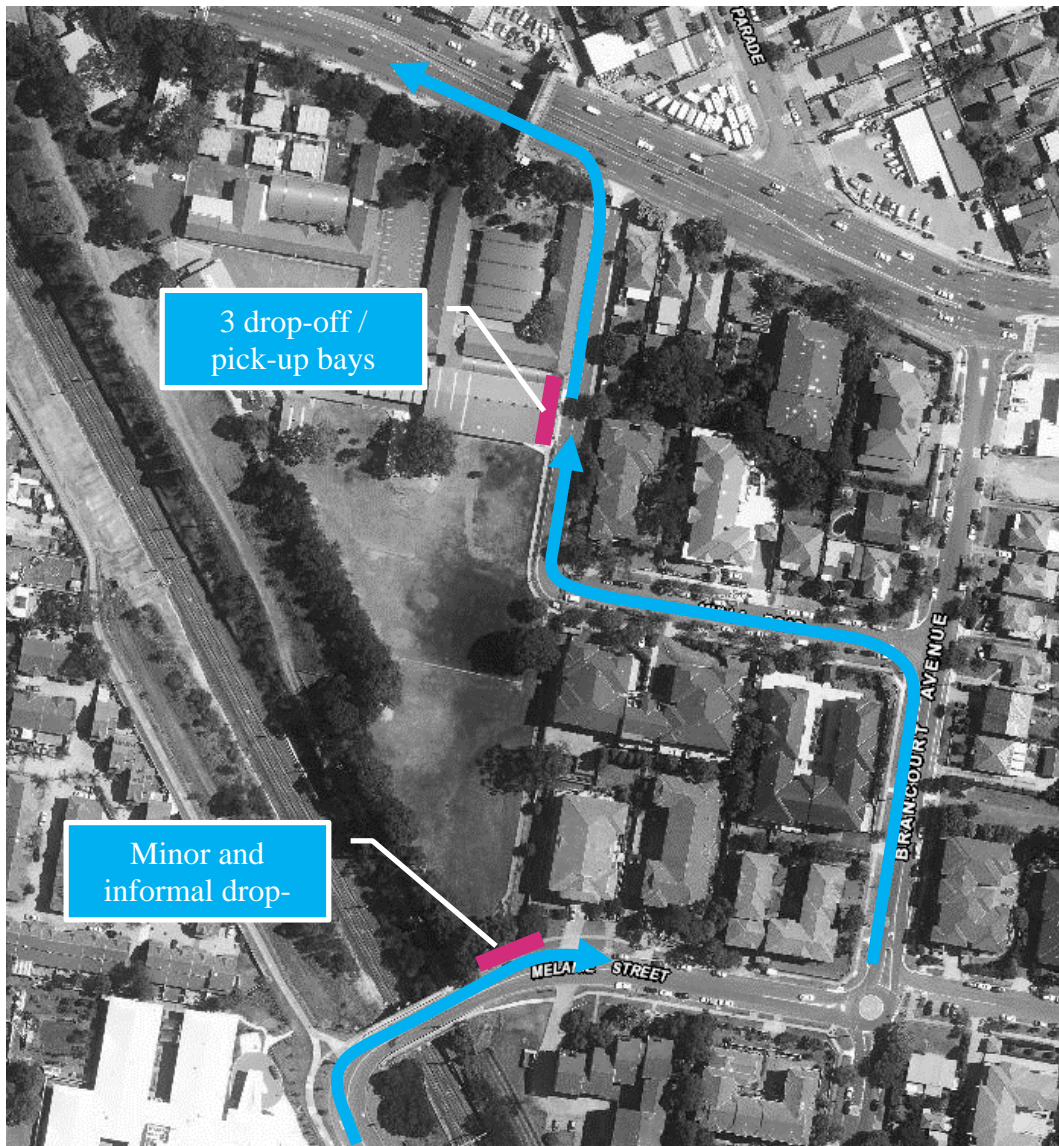


Figure 10: Vehicle access and egress arrangements for drop-off and pick-up activities

2.8 Drop-off period

2.8.1 Drop-off profile

With school commencing at 9:00am, Arup has conducted on-site observations on Tuesday 1 August 2017, commencing at 8:10am to 9:10am. Drop-off activity was surveyed along the existing three spaces within the school and along Melanie Street, which had some informal drop-off activity.

Based on the surveys, a drop-off profile was generated:

- 111 cars dropping off students
- 179 students arriving by cars
- 1.61 students / car
- Based on an existing enrolment of 598 students, a car mode share of 29.9%

The morning drop-off period is at its peak between 8:40 and 9:00am, dispersing at 9:05am.

Although the local streets were busy, the general traffic operation during the drop-off period was found to operate efficiently.

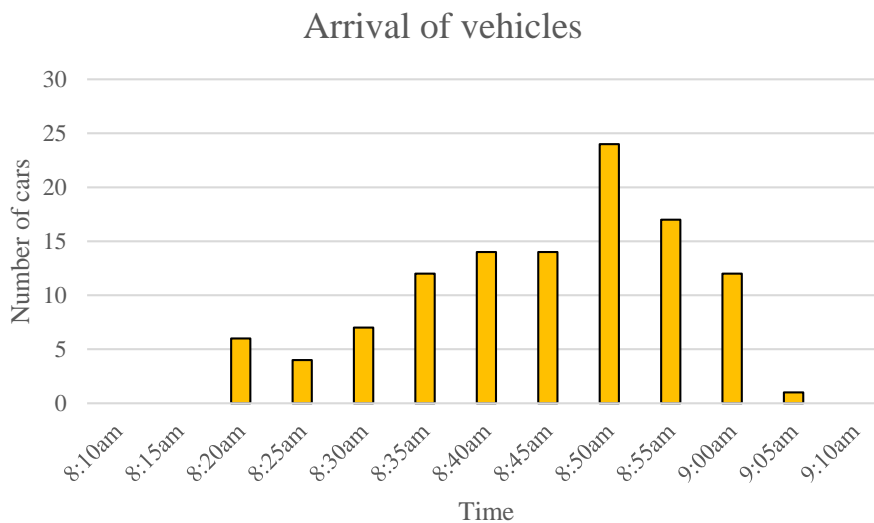


Figure 11: Arrival profile of vehicles observed during school drop-off period

2.8.2 Driver behaviour

Drivers in the AM peak were found to obey traffic rules with images from the survey shown below. Overall the drop-off arrangement operated efficiently with parents dropping their kids off at the designated bays with a high turnover rate. Vehicle queue lengths were contained within the school compound.



Figure 12: Vehicle queue lengths at 8:44am contained within the school

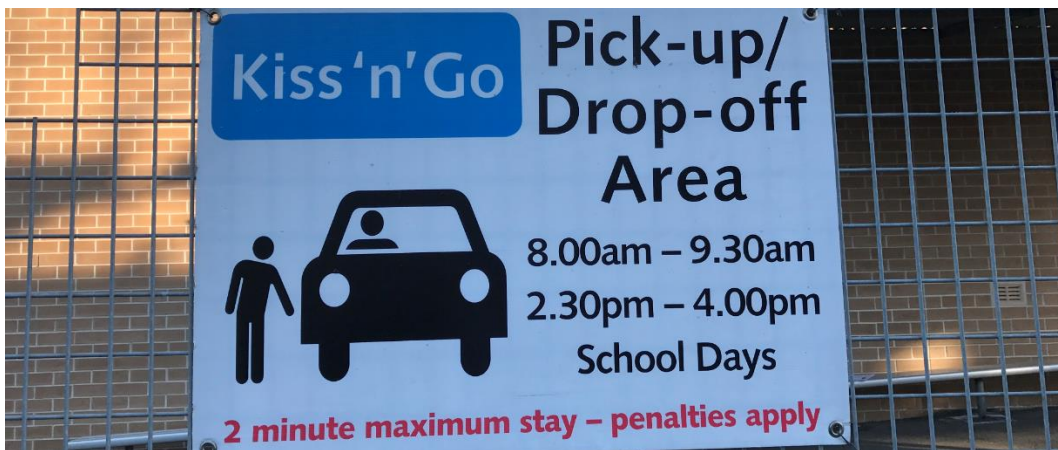


Figure 13: Pick-up / drop-off signage within the school



Figure 14: Drop-off area at 8:30am found to have spare exit capacity to Hume Highway

2.9 Pick-up period

2.9.1 Pick-up profile

With school ending at 3:00pm, Arup has conducted on-site observations on Tuesday 1 August 2017, commencing at 2:55pm to 3:20pm. Pick-up activity was surveyed along the existing three spaces within the school and along Melanie Street, which had some informal pick-up activity.

Based on the surveys, a pick-up profile was generated:

- 66 cars picking-up students
- 99 students leaving by cars
- 1.5 students / car
- Based on an existing enrolment of 598 students, a car mode share of 16.6% which was significantly lower than the drop-off period.

The arrival profile of vehicles observed during the surveys are shown in Figure 11.

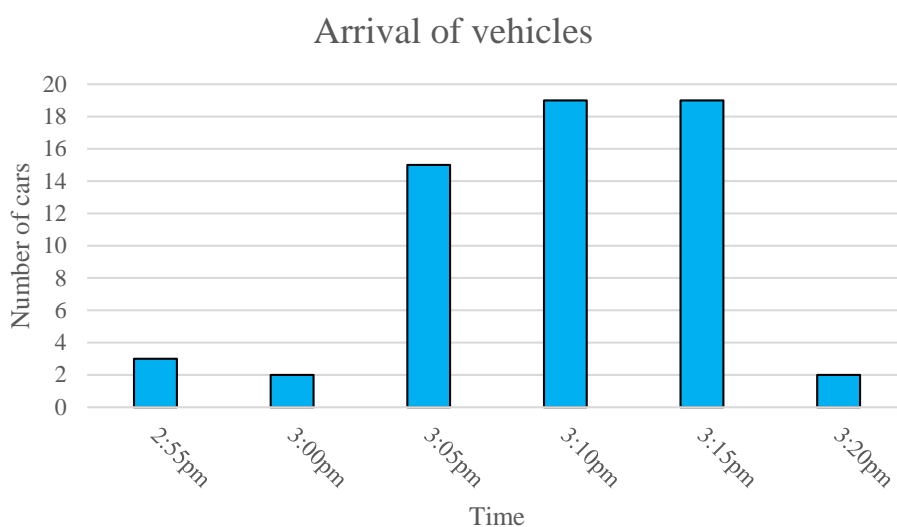


Figure 15: Indicative arrival profile of vehicle picking up students

2.9.2 Operation

Existing pick-up arrangements are organised with three formal pick-up bays within the school compound. Parents would arrive with Teachers located at the pick-up area to usher the children to the right car. However, parents were found to arrive before 2:45pm. Due to the lack of road capacity, queue lengths were observed from the drop-off area extended through to the Brancourt Avenue / Melanie Street roundabout. By 3pm, the queue length extended to the Carmen Street / Brancourt Avenue intersection shown in Figure 16.



Figure 16: Observed queue lengths at 3pm



Figure 17: Queue lengths starting to form along Mulla Road at 2:40pm



Figure 18: Queue lengths at the pick-up area 2:40pm



Figure 19: Queuing at the Barncourt Avenue / Mulla Road intersection



Figure 20: Queuing at the Barncourt Avenue / Mulla Road intersection, facing south



Figure 21: Queuing at the Barncourt Avenue / Melanie Street roundabout



Figure 22: Queuing extending close to the Melanie Street over bridge

2.9.3 Driver behaviour

Driver behaviour was found to be aggressive, impatient and unsafe. Parents queuing to enter the school blocked up certain narrower roads where there is parking on one side of the road. This was observed along Melanie Street and Brancourt Avenue, shown in Figure 23.

As a result of the roads being blocked, general traffic was found to drive on the other side of the road on certain occasions.

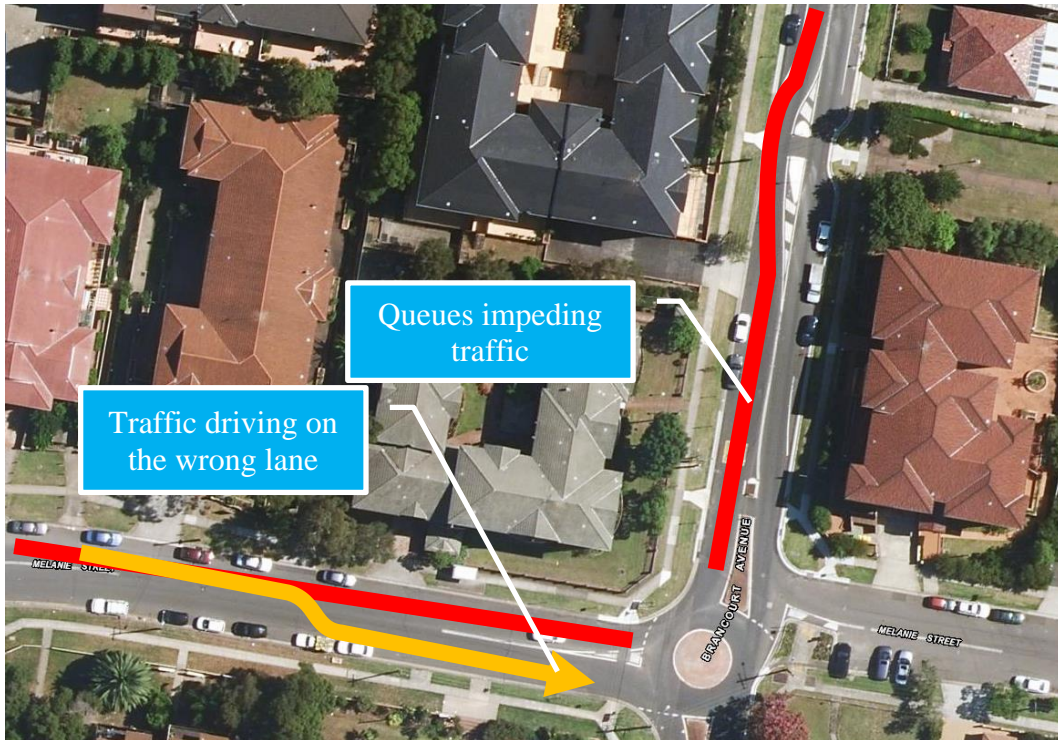


Figure 23: Queues impeding through traffic along Melanie Street and Brancourt Avenue

2.9.4 Key findings

The mode share of the school during the pick-up period is good, with approximately 90% of the students using public transport or walking home and only 66 cars recorded picking up children. The problem lies within the following issues:

- Parents arriving too early at the same time
- Physically constrained road network does not allow for efficient queuing
- Pick-up operation not fast enough

Part of the proposed upgrades will require a strategy to address these issues and is discussed in the sections below.

3 Proposed Upgrades

The project will provide 16 new permanent teaching spaces. Replacing 8 demountable teaching spaces. This will accommodate an additional 184 students, taking the capacity to 782 students. Key upgrades for the school, shown in Figure 24 include:

- A new building at the northern side of the field
- 16 new permanent teaching spaces
- 184 additional students
- 16 additional staff

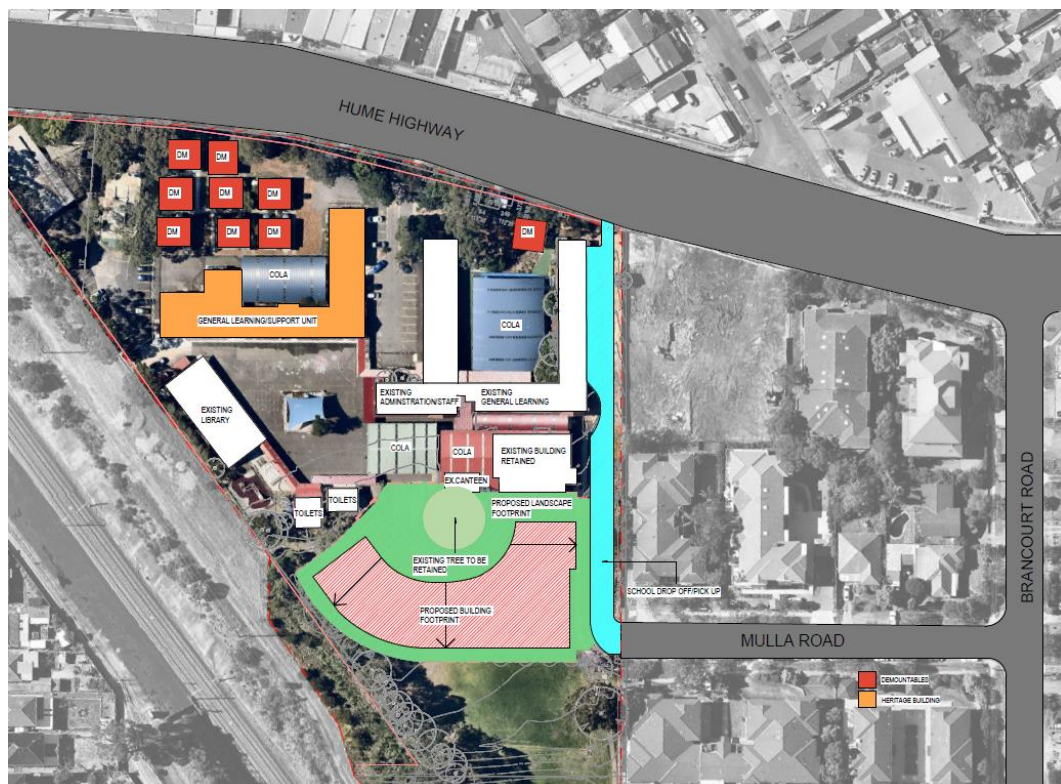


Figure 24: Proposed additional building

4 Impact Assessment

4.1 Forecast traffic

Student drop-offs

Completion of the school will result in an increase of 184 additional students. Using the following assumptions based on survey data (section 2.7), traffic generated by additional students are derived:

- 1.61 children per car
- 29.9% of the children use private vehicle as a mode of transport
- 34 additional vehicles are generated

Student pick-ups

Traffic generated by additional students during pick-ups are derived:

- 1.5 children per car
- 16.6% of the children use private vehicle as a mode of transport
- 20 additional vehicles are generated

Staff driving to school

Completion of the school will result in an increase of 16 additional staff. Journey to Work data indicates a driver rate of 75% for the area. Assuming a similar profile for the school is used, 12 additional vehicles are generated as a result of additional staff.

Total additional traffic

Based on these assumptions, additional traffic generated as a result of the completion of the school can be estimated for each period:

- Drop-off period, additional 46 vehicles
- Pick-up period, additional 32 vehicles

4.2 Traffic impacts

The vehicular access to the school is shown in Figure 25. Assuming an equal split of the 46 vehicle generated by the completion of the school, the impact will be minor to the major wider road network. Existing drop-off impacts will however be exacerbated.

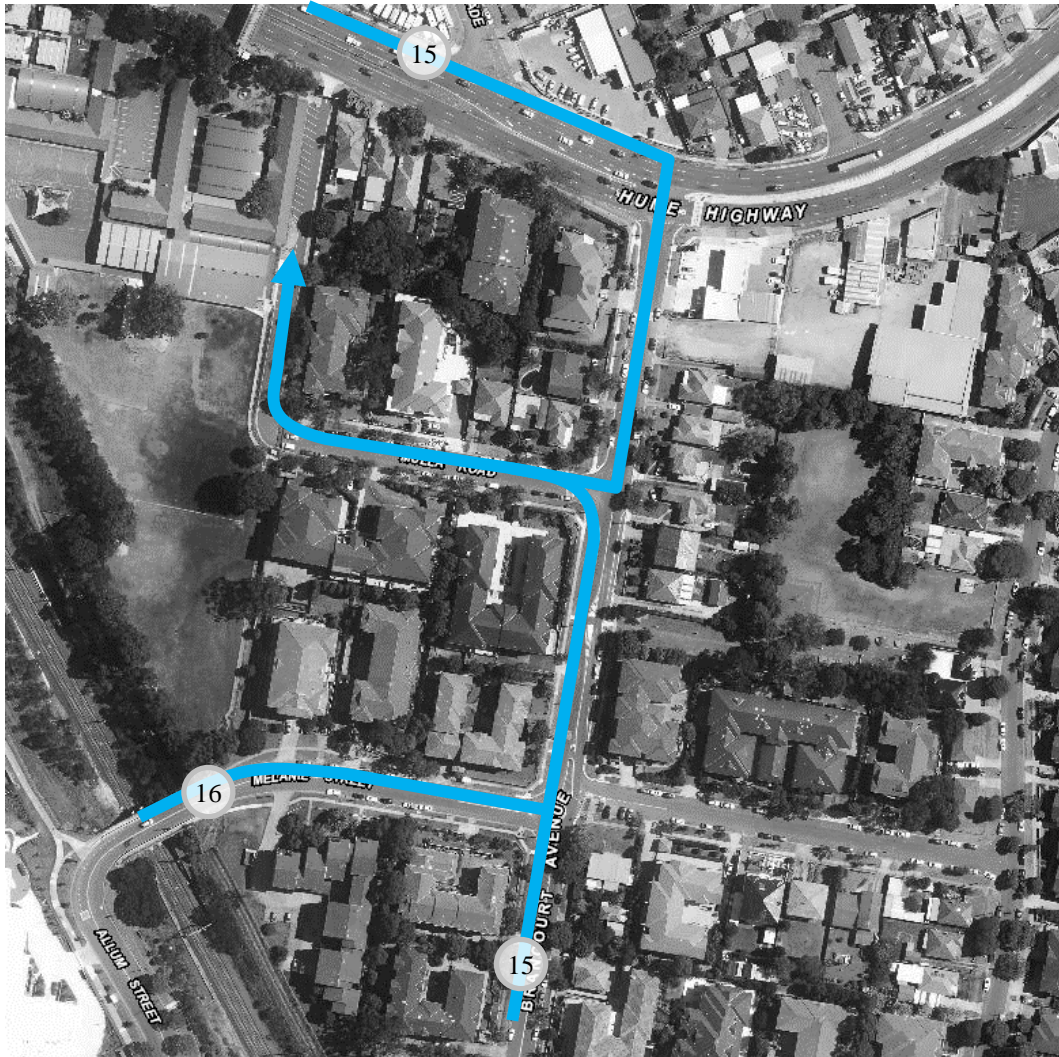


Figure 25: Distribution of additional trips

The increase in traffic at the main access to the school is shown in Table 1. This assumes a conservative estimate that all additional vehicles in the future use Mulla Road.

Table 1: Additional and existing traffic along Mulla Road

| Key street for access to school | Existing traffic flow | Total Additional Traffic | Total |
|---------------------------------|-----------------------|--------------------------|-------|
| Mulla Road | 250 | 46 | 296 |

Note:

- Traffic flows are number of vehicle per hour
- Additional traffic assumes vehicles arrive and leave within the hour
- Traffic does not U-turn therefore vehicles exiting are not included in Total Additional Traffic

4.3 Road network impact

The typical travel time metrics by Google are shown in Figure 26 for morning and afternoon school peak periods. The morning drop-off period is at its peak between 8:40 and 9:00am, dispersing at 9:05am. Local roads surrounding the school were observed to have efficient travel times during the morning drop-off period.

Pick-up periods see a more intense arrival and departure of traffic over 20 minutes however does not coincide with a commuter peak period. Slow travel times are observed along Brancourt Avenue and Melanie Street, which align with site observation discussed in section 2.9. A management plan (discussed in section 4.6) will be required in order for the school pick-up to function safely and efficiently in the future.



Figure 26: Google maps, August 2017 snapshots of typical traffic (travel time) at 9:05am and 3:05pm

4.4 DCP parking requirements

The Bankstown Development Control Plan (BDCP) 2010 provides a guideline on the number of parking spaces which should be provided for schools, shown in Figure 27.

| Land use | Off-street parking requirements |
|----------------------------|--|
| Educational establishments | 1 car space per employee or classroom, whichever is the greater; and 1 car space per 8 students in year 12. |

Figure 27: Extract from BDCP Schedule: Off-street parking requirements

Based on the BDCP parking recommendations, the school currently has a shortfall of 3 parking spaces (40 spaces for 43 staff). No additional car parking spaces are proposed which results in a shortfall of 19 spaces (required by the BDCP).

Table 2: Parking requirements based on DCP

| Existing Staff | Assumed additional staff | Existing car parking provision | Total DCP requirement |
|----------------|--------------------------|--------------------------------|-----------------------|
| 43 | 16 | 40 | 59 |

4.5 Staff parking impact

The school does not propose to provide any additional parking spaces. Additional parking demand can be accommodated along on-street spaces if needed. Parking surveys discussed in section 2.6 indicate that there is an availability of parking along the surrounding local streets such as Brancourt Avenue and Melanie Street to accommodate the additional staff driving.

4.6 Encouraging staff to adopt green travel

To minimise the impact the effects of on-street parking by staff, the school can implement green travel strategies for staff. These solutions are easy and cost effective:

- Staff carpool, the school can help organise a system which will reduce single private vehicle car trips to the school
- Encourage staff to take public transport / active transport

5 Proposed pick-up arrangements

5.1 Increasing pick-up capacity

Based on site surveys and traffic impact estimates there are 66 cars picking up children, with an increase of 20 cars upon the completion of the school.

The first proposed change is to increase the existing three drop-off bays by an additional three bays, doubling the availability of pick-up capacity. This will require removal of a portion of the fencing with a schematic shown in Figure 28.

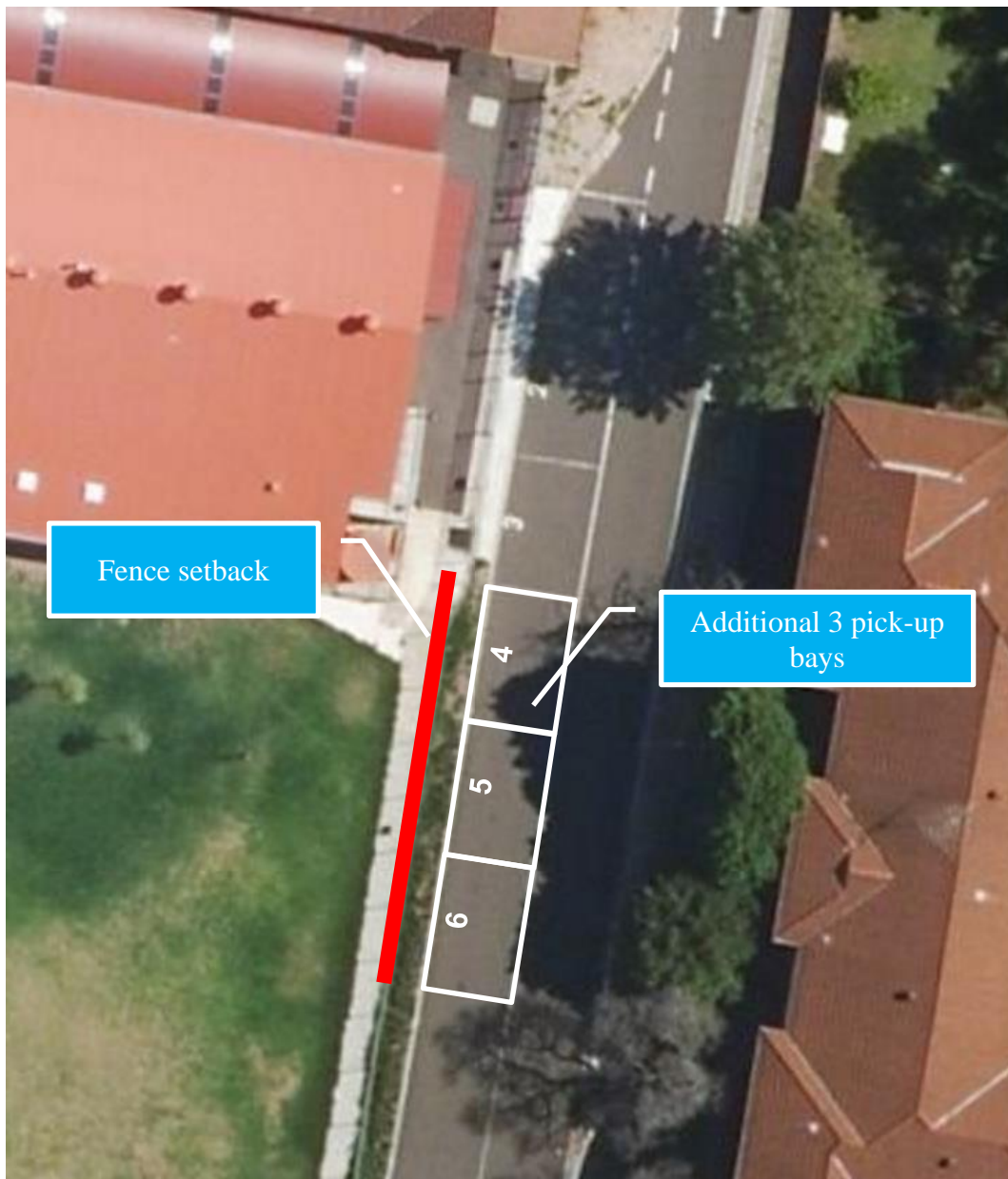


Figure 28: Schematic design for additional drop-off bays

5.2 Child name system

To assist teachers or volunteers in getting kids to the right car more quickly, parents will have to display their child's name on the front screen of the car. This is currently done in several schools around NSW, with an example shown in Figure 29.



Figure 29: Example of student name being displayed in the car

Source: <http://www.bethalto.org/pickup-and-drop-off.html>

5.3 Staggering finish times and pick-up locations

Completion of the school is predicted to have a total of 86 cars picking-up students. By staggering the finish time slightly, the arrival of parents can be managed, reducing the effective queue demand significantly. The initial Year 1 to 3 pick-up queue would disperse by 3:05pm, increasing the on-road storage capacity for the next batch of pick-ups. Year 5 to 6 students could have an alternate pick-up location along Reynolds Avenue.

- Year 1 to 2, finish at 3:00pm
 - Resulting in 28 cars arriving between 2:50pm and 3:05pm
- Year 3 to 4 finish at 3:15pm
 - Resulting in 28 cars arriving between 3:05pm and 3:20pm
- Year 5 to 6 finish at 3:00pm
 - Can only be picked up at Reynolds Avenue or at the school after 3:20pm

Year 5 and 6 students are proposed to finish at the existing school finish time of 3pm, however if they wish to be picked up, by car, a designated pick-up location is allocated on Reynolds Avenue. Year 5 to 6 students would not be allowed to be picked-up from the school compounds.

The pick-up area along Reynolds Avenue can be accessed through a series of foot paths and a refuge island across Brancourt Avenue. This is a 450 metre or 7 minute walk.

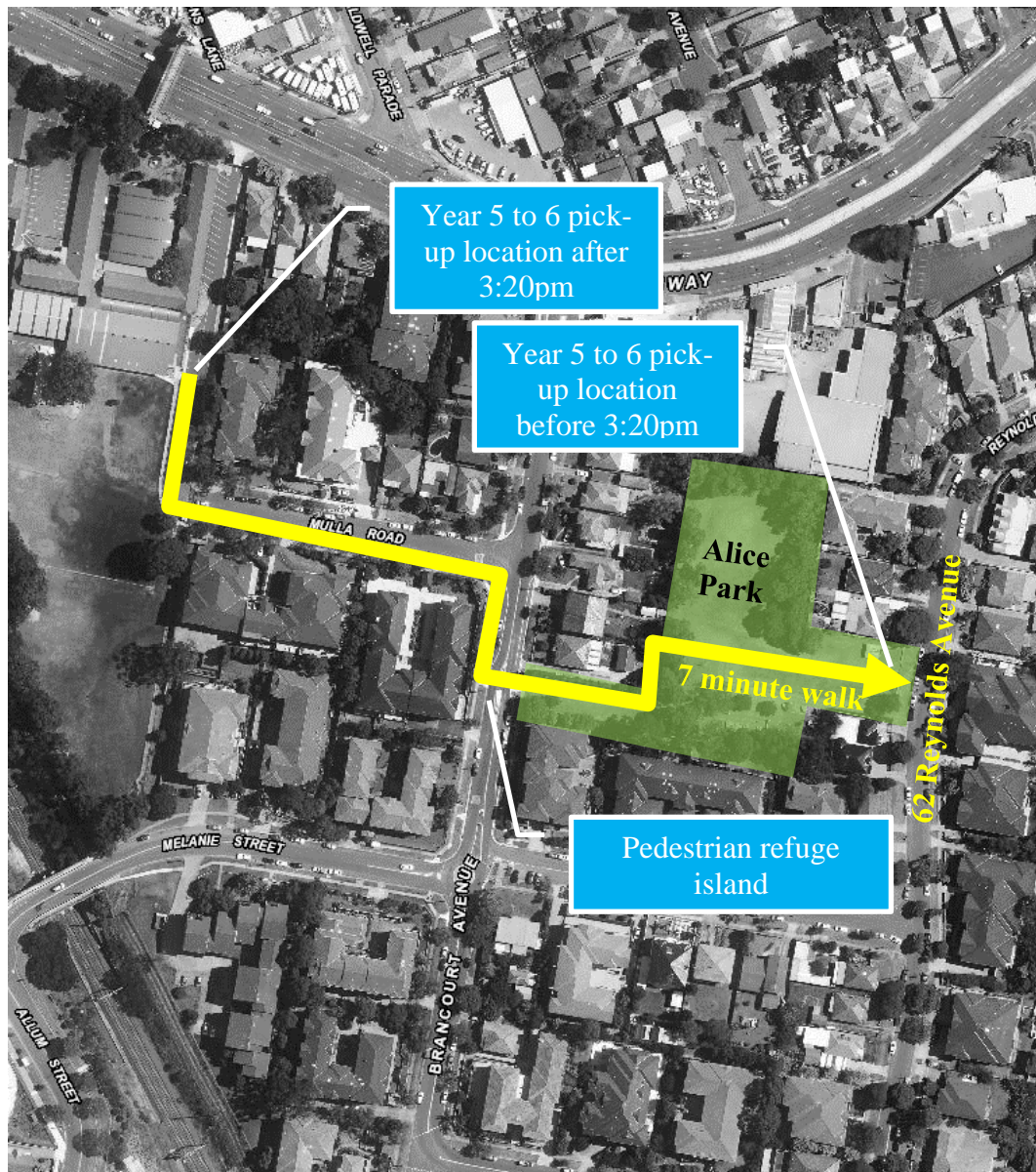


Figure 30: Proposed pick-up location for year 5 to 6 students

5.4 Queuing effects

By implementing the proposed changes, arrival of vehicles will be staggered and pick-ups will be reduced by one third. 6 drop-off bays would also increase the rate of pick-up activity. The queue length could be effectively reduced to less than 130 metres and be contained within Mulla Road.



Figure 31: Observed queue lengths at 3pm

6 Green Travel Plan

A green travel plan can be implemented for students to encourage sustainable means of transport as opposed to private vehicles. These initiatives aim to cultivate a long term sustainable means of transport to the School in order to:

- Reduce private vehicle usage from staff and therefore parking demand
- Reduce private vehicle usage (pick-ups and drop-offs) from students
- Reduce traffic congestion and reduce impact on intersection performance

The targets associated with these travel methods aim to reduce car trips to the development so there is minimal impact to local streets and the surrounding intersection performance.

The success of Travel Smart schools

In Western Australia, the Government has put in place targets to halt the trend of increasing car use by managing travel demand to achieve increases in cycling, walking and public transport use. The TravelSmart to School program works with primary schools to promote safe and active ways to travel to school.

The initiative has achieved:

- 9% less car trips and 12% more walking, cycling and public transport use.
- 30 participating schools (with 13,666 students), up from 8 schools and 2,337 students in 2012.
- 209 school activity blogs posted, up from 54 in 2012.



Figure 32: Travel Smart¹

¹ <http://www.transport.wa.gov.au/activetransport/about-travelsmart.asp>

6.1 Possible transport strategies

This section discusses the various transport strategies which the School may implement.

6.1.1 School buses

School bus routes can be tailored to suit the needs of the school. This can be done by altering existing bus routes or introducing a new bus route.

6.1.2 Subsidised public transport travel

The School Student Transport Scheme (SSTS)². The SSTS provides eligible school students with free or subsidised travel on public transport between home and school, on trains, buses, ferries and long distance coach services.

This initiative can be implemented before the opening of the school. An information package can be sent to parents to inform them of this scheme. The School can also assist parents in applying for this scheme for the students.



Figure 33: Student Opal Card

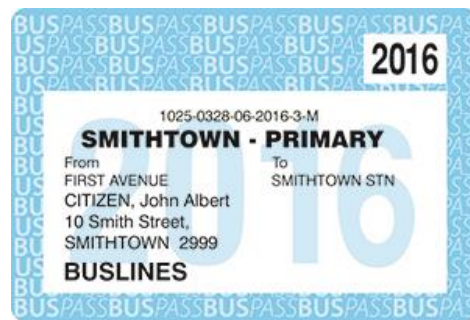


Figure 34: Travel pass for students in rural/regional areas

To be eligible for this scheme, students need to be a resident of NSW, or an overseas student eligible for free government education. Other criteria are stated below.

Students from Kindergarten-Year 2 are eligible if:

- Aged 4 years 6 months, or older.
- No minimum distance criteria applies to these students.

Primary school students from years 3-6 are eligible if:

- The straight line distance from their home address to school is 1.6 km or further.
- The walking distance from home to school is 2.3 km or further.

² (<http://www.131500.com.au/planyourtrip/upload/links/schoolstudenttransportscheme>)

6.1.3 Carpooling

The School may set up a system where real-time carpool information from participants can be displayed or changed. Schedules can be managed through a cloud, google maps or various smartphone applications. Carpooling should be a long term initiative. With consistent promotion of this travel mode and incentives, students and parents will become aware of the benefits and convenience.

An implementation strategy would need to be considered so that student privacy is protected. It is assumed that such an initiative would likely operate through parents on a carpooling forum. This initiative would operate under management of the School by encouraging parents to be proactive in offering carpooling services. This can be promoted in School newsletters, parent teacher meetings and by educating students on the benefits of this initiative. As an incentive for parents, car pool stickers can be given out, giving these shared cars prioritised and designated drop off locations.

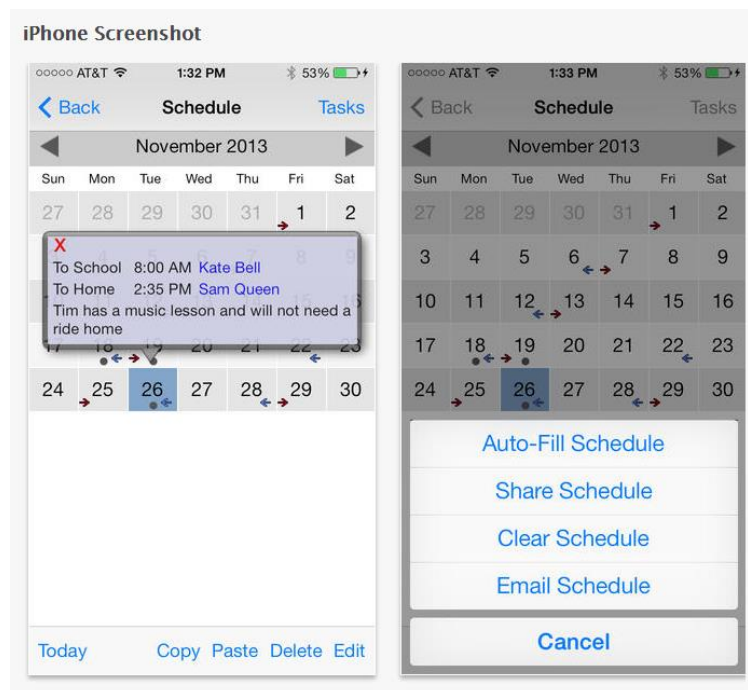
Carpooling initiatives provide an opportunity to significantly reduce cars on the road network.

6.1.3.1 Car pool Apps

A range of free apps are currently available online to assist with the implementation of this initiative; two examples are provided below for information. The School will investigate the most appropriate app that aligns with its Child Protection Policies before promoting this initiative.

Carpool – School Edition

This app is designed specifically for students who carpool to school. It allows students to identify which of their friends live nearby and invite them from their contacts provided they have the app as well. This app is available only on iPhone Operating Systems, however the calendar schedule can be emailed to computers.



Source: iTunes

Figure 35: Carpool School Edition

KarPooler

KarPooler acts as a scheduler and also lets you text all adults linked to the kids in the carpool.

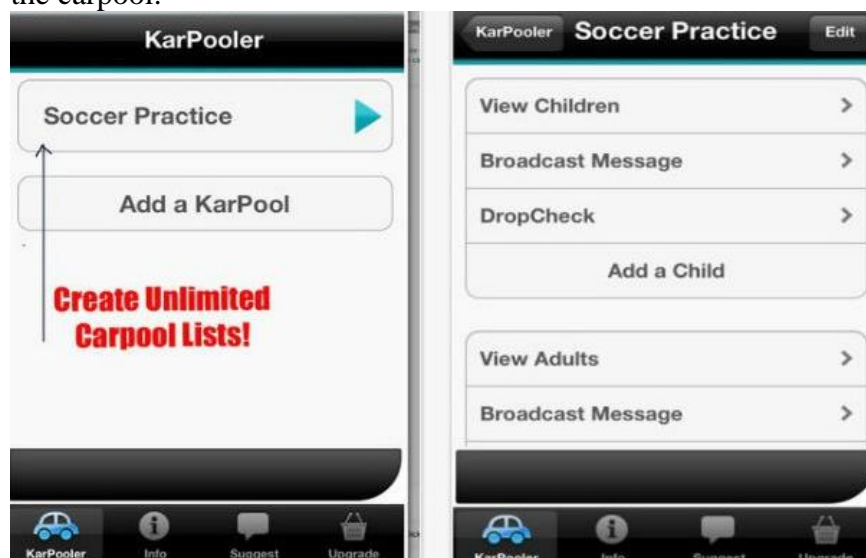


Figure 36: KarPooler app

6.1.4 Walking School Bus

Walking school buses promote a healthy lifestyle by keeping children active, as well as providing a safe environment for walking. Walking to and from school gives children the opportunity to engage in physical activities with their peers. Children walk in a group, with adult volunteers at the front and rear of the group.



Figure 37: Phoenix Primary School WA students walking to school³



Figure 38: Walking school bus route example⁴

³ http://www.transport.wa.gov.au/mediaFiles/active-transport/AT_TS_P_TSTS_community.pdf

⁴ <http://www.travelsmart.gov.au/schools/schools2.html#download>

How It Works:

- Children will be picked up along the way to school by a volunteer parent at designated walking bus stops, or at the train station
- Walking bus stops may be in a form of a landmark, like a bus stop, or at the front gate of the student's house
- Typical sizes of walking school buses are 8-12 children with two adults, with a maximum of 8 children for every adult
- Routes used should be the fastest and safest, with a maximum of 30 minutes travel or 2km (train stations are located within this proximity)

Benefits⁵:

- Children gain a sense of independence and get regular physical activity and exercise
- Develop as individuals through involvement in a responsible and disciplined activity
- Experience being part of a group or team
- Learn about traffic safety and good road sense and become more familiar with their own neighbourhood and surroundings
- Have a chance to build friendships
- Have fun getting to school
- Arrive at school alert and ready to learn.

Issues to be aware of⁶:

- Identification of potential risk and implementation of strategies to minimise risk to children in the traffic environment. This would include assessment of local traffic conditions, distance students need to travel, age of students and other risks or hazards.
- Provision of public liability insurance
- Heavy school bags
- Implementation of satisfactory child protection procedures
- Provision of strategies to address absences/unavailability of bus 'drivers' and supervisors

⁵ <https://www.vichealth.vic.gov.au/programs-and-projects/walking-school-bus>

⁶ <http://www.curriculumsupport.education.nsw.gov.au/policies/road/travel/walkingbus1.htm>

6.2 Promoting transport strategies

Before and after the implementation of the preferred travel alternatives, the School should develop ways to promote and support the travel methods continuously. This section details several initiatives which can be carried out.

6.2.1 Promoting green travel

Marketing and encouraging the different travel strategies will be an important aspect in promoting and implementing the plan. Getting students and staff involved will create a more relaxed and fun environment to encourage students and staff to walk or cycle to School.

6.2.2 Technology

In previous studies carried out by Arup, the issue of students carrying heavy bags was identified as a reason why students are less likely to walk to school.

A culture shift to electronic based teaching and learning is required to aid the initiatives identified. Text books could be provided electronically to limit the need to carry heavy books to and from School. Therefore, students will then have to carry less material to school.

6.2.3 Student involvement

Student involvement is a fun way of educating them about active travel. For example, Cottesloe Primary holds a drawing contest for the healthy travel to School plan logo. Student leaders are also appointed who will encourage and teach peers on the benefits of active transport. These leaders should be properly trained in road safety rules which will help educate peers. This will boost the School spirit and foster leadership skills to achieve change. Some possible incentives include:

- Food or snack vouchers can be given to students who walk or cycle to School. This can be given out to by teachers at entrances.
- Pedometers for walking competitions
- Awards such as different pins for cyclists or children who walk to School
- Most number of steps walked for each year competition

6.2.4 Active travel

A mode shift from motorised transportation (principally being driven by car) to active transport improves children's health by⁷:

- Increasing levels of physical activity (and associated physical, psychological and social health benefits)
- Helping children maintain healthy weight
- Reducing injury due to motor vehicle crashes
- Reducing the environmental health damage caused by excessive car use (eg air and noise pollution, global warming)
- Reducing inequalities in children's health associated with physical activity, obesity, and motor vehicle crash injuries.

The School would support students walking to precinct either for the entire journey or for the last part of a journey from a drop-off point remote from the School.

There are a number of approaches the School could take to provide input to improving pedestrian facilities around the School.

- Local Councils are required to maintain footpaths and crossing points to meet public requirements.
- Safe Routes to school is a road safety program that aims to reduce children's involvement in road accidents. These require the agencies to work together where there is an identified need.
- Local Councils usually undertake PAMP studies across defined areas. This then enables funding to be allocated between local and state government to implement the recommendations of the study.

⁷ Active transport: Children and young people, Dr Jan Garrard, 2009

7 Conclusion

A traffic and transport assessment has been carried out for the proposed school upgrades. The school has 598 students currently enrolled, and a total of 43 staff (including 8 non-teaching staff). The proposed upgrades provide new learning areas to cater for an additional 184 students. Key findings of the report are:

- Yagoona Train Station is a 600 metre walk north of the school. The station serves the Sydney Trains T3 Bankstown line
- The school has a network of footpaths leading to the school entries along the Hume Highway, Mulla Road and Melanie Street.
- The school has two off-street car parks allocated for staff parking, amounting to a total of 40 off-street parking spaces. Both car parks were fully occupied
- The morning drop-off period is at its peak between 8:40 and 9:00am, dispersing at 9:05am. Although the local streets were busy, the general traffic operation during the drop-off period was found to operate efficiently.
- Existing pick-up arrangements are organised with three formal pick-up bays within the school compounds. Parents would arrive with Teachers located at the pick-up area to usher the children to the right car.
- Parents were found to arrive before 2:45pm. By 3pm, the queue length extended to the Carmen Street / Brancourt Avenue intersection
- Driver behaviour was found to be aggressive, impatient and unsafe. Parents queuing to enter the school blocked up certain narrower roads where there is parking on one side of the road.
- The mode share of the school during the pick-up period is good, with approximately 90% of the students using public transport or walking home and only 66 cars recorded picking up children. The problem lies within the following issues:
 - Parents arriving too early at the same time
 - Physically constrained road network does not allow for efficient queuing
 - Pick-up operation not fast enough
- This report has outlined several proposed measures
 - Increasing pick-up capacity
 - Implementing a child name display system on windscreens of cars
 - Staggering finish times
 - Allocating a different pick-up area for year 5 and 6 students
 - Implementing a green travel plan
- By implementing the proposed changes, arrival of vehicles will be staggered and pick-ups will be reduced by one third. 6 drop-off bays would also increase the rate of pick-up activity. The queue length could be effectively reduced to less than 130 metres and be contained within Mulla Road.