

NSW Department of Education and
Communities

Lindfield Learning Village

Supplementary Traffic and Transport
Assessment

Issue | 1 June 2018

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

It is not intended for and should not be relied
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is undertaken to any third party.

Job number 251272

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Contents

| | Page |
|--|-----------|
| 1 Introduction | 1 |
| 1.1 Scope | 2 |
| 1.2 Previous studies | 2 |
| 2 Existing Conditions | 3 |
| 2.1 Location | 3 |
| 2.2 Public transport and road performance | 3 |
| 3 Lindfield Learning Village | 4 |
| 3.1 Final built form | 4 |
| 3.2 Staging | 5 |
| 4 Proposed Development - Phase 1 | 6 |
| 4.1 Overview | 6 |
| 4.2 Drop-off and pick-up access | 7 |
| 4.3 Bicycle parking | 12 |
| 4.4 On-street parking changes | 13 |
| 4.5 Vehicle free area | 14 |
| 4.6 Pedestrians | 15 |
| 5 Bus Facilities | 17 |
| 5.1 Proposed arrangements for the Phase 1 school | 17 |
| 5.2 Investigation into future bus arrangements | 18 |
| 5.3 Potential future options for further investigation | 20 |
| 6 Transport Strategies | 23 |
| 6.1 Early implementation | 23 |
| 6.2 Potential school student profile and travel mode | 24 |
| 6.3 School buses | 25 |
| 6.4 Public bus | 26 |
| 6.5 Subsidised public transport travel | 27 |
| 6.6 Carpooling | 28 |
| 6.7 Promoting transport strategies | 29 |
| 6.8 Measuring effectiveness of transport strategies | 31 |
| 7 Traffic Impacts | 32 |
| 7.1 Mode share | 32 |
| 7.2 Traffic generated | 32 |
| 7.3 Traffic distribution | 33 |
| 7.4 Traffic modelling | 34 |
| 8 Conclusion | 36 |

1 Introduction

The NSW Department of Education and Communities is seeking approval for the proposed Lindfield Learning Village. The proposed site is located at the former UTS Ku-ring-gai Campus, which has since been vacated in 2015.

The existing facilities at the site will be converted into the Lindfield Learning Village, with a new K – 12 School and a range of other facilities, for up to 2,100 students and over 160 teaching staff.

The learning village would reduce the existing strain on schools which are currently facing a high demand of new enrolments. It would also provide community facilities to the public, such as auditoriums and gyms.

In order to address bushfire related matters and permit a school for 350 students to be opened for Term 1 2019, the SSD application has been amended as follows:

- Removal of the child care centre from the SSD application
- Creation of phases within the construction stages. Phase 1 will include a school of 350 students and accommodate a 100m AP2 (to be referred to as the “Phase 1 School”)

This report assesses the traffic and transport impacts as well as the required mitigation measures needed for a reduced school size of 350 students. This report also addresses the late submission received from Transport for NSW dated 5 May 2018.

The following comments from TfNSW are addressed in this report:

| TfNSW Comment | Section |
|--|---------|
| Alternate Public Bus Route & Public Transport Accessibility The Applicant should investigate alternative options for the above, such as alterations to the road layout of Shout Ridge to facilitate safe and appropriate bus turnaround. | 5.3 |
| Bus Timetable Constraints The proposed bus stop design should be revised or relocated to ensure regular bus services are not impeded. Further design iterations and/or modifications to bus services should be undertaken in consultation with TfNSW prior to issue of construction certificate. | 5 |
| Suggested Upgrades to Pacific Highway/Grosvenor Road/Burleigh Street It is recommended that the Applicant further consult with Roads and Maritime regarding the upgrade of the abovementioned intersection to mitigate some of the traffic impacts of the proposed development on the Pacific Highway movement corridor. | 7 |

1.1 Scope

This report will be a Transport Assessment, supporting the proposed development, suitable for the Supplementary Response for Submission.

- Generation of people and car trips
- Travel Demand Management strategy and an assessment of the effectiveness of the implemented measures
- Vehicle access and any required road/intersection upgrades
- Public transport accessibility
- Car parking arrangements
- Pedestrian and bicycle access

1.2 Previous studies

The site has a long history of providing education facilities for tertiary studies. Several traffic and transport related studies have been prepared previously.

- McLaren Traffic Engineering, October 2014
- Arup, Traffic and Transport Assessment – Issue C, 13 June 2017
- Consultation with RMS, TfNSW, Ku-ring-gai Council, Department of Planning & Environment, 27 September 2017
- Arup, Response to SSD Comments, 20 November 2017

This report, with the proposed phase 1 school as a subject, is a supplement to the previous Arup reports submitted and should be read in conjunction.

2 Existing Conditions

This section examines the existing conditions in terms of transport infrastructure around the site.

2.1 Location

The proposed site is located about 2km from Lindfield and Roseville Station and approximately 17km north of the Sydney CBD.

The area is located at the end of Eaton Road, surrounded by nature reserves in the south. Towards the north, the area mainly consists of low density houses.

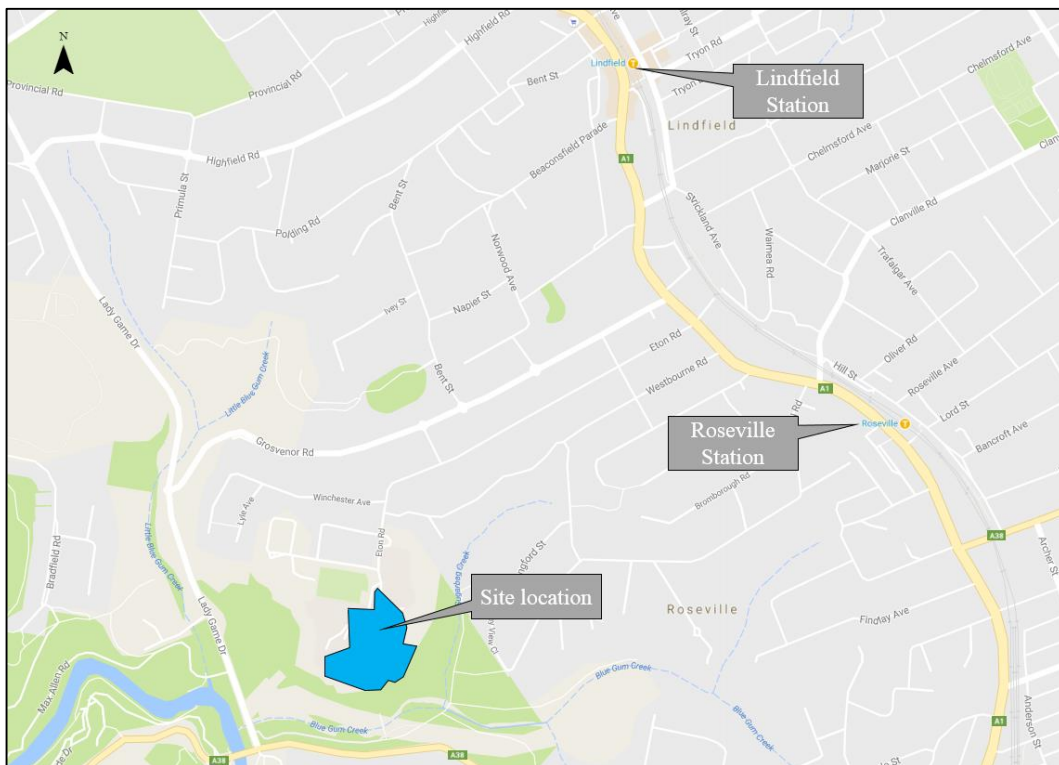


Figure 1: Proposed site location of the Lindfield learning village

2.2 Public transport and road performance

The existing public transport and traffic conditions have not changed significantly since the last transport study in 2017. A detailed analysis of the existing conditions can be found in the Arup June 2017 and November 2017 reports.

3 Lindfield Learning Village

3.1 Final built form

The proposal utilises the ex- Lindfield UTS site to convert it into the Lindfield Learning Village, with a new K - 12 School and other facilities. A staged opening of the proposed school is essential to reasonably allow for traffic impact monitoring and review of final operating scale.

The site is likely to provide approximately:

Kinder to year 12 homebases

- 2,100 students from Kinder to year 12. The students would be grouped into 6 homebases which would commence at staggered times
 - 2 homebases commence at 7:30am
 - 2 homebases commence at 8:30am
 - 2 homebases commence at 9:00am
- A proportion of the students would attend extracurricular activities after finishing school, which would also be staggered.
- Approximately 160 teachers and administration staff

Other facilities

- Aurora College, 12 staff

After hour facilities for community use

- Existing Greenhalgh Auditorium, 750 seat capacity
- Existing Lecture Theatre 1,180 seat capacity
- Existing Lecture Theatre 2,100 seat capacity

Generally, the development is contained to retrofitting the ex-Lindfield UTS site. Minor landscaping works to the site is also envisaged. Enrolments are not anticipated until 2017 to allow for the construction phase.

The staggered arrival and departure of students would reduce the peak traffic generated, minimising the impact to the surrounding road network. This would also reduce the demand on the public transport network and the number of required buses.

Existing auditorium and lecture theatres would provide a learning and function space for the community. These spaces would likely function outside of the road network peak hours, allowing visitors to use them after work. Minimal traffic is hence envisaged to be generated during the peak hours, from afterhours use.

3.2 Staging

The final development will be delivered in several phases. This will allow for traffic impact monitoring and review of final operating scale. It will also allow the assessment of the proposed strategies on a smaller scale:

- School bus provision
- Proposed drop-off and pick-up arrangements
- Green travel plans
- Assessment of effectiveness of green travel plans through evaluating travel methods of students

This report assesses the traffic and transport impacts and requirements of Phase 1, where 350 students would occupy the Phase 1 school. The proposed stages are:

Construction Stage 1

Phase 1 will comprise:

- One home-base accommodating 350 students from Kindergarten to Year 12;
- All requisite technical spaces to support a full primary and secondary curriculum;
- Administration space for approximately 30-50 staff;
- Construction of a 4m wide access trail for bushfire trucks to the south of the building;
- Fencing of the green space around the perimeter of the site.
- Remediation of targeted roof areas to create additional outdoor play areas; and
- Traffic and transport infrastructure associated with the parking and drop-off/pick-up area.

Phases 2A and 2B:

Phase 2A includes the remainder of the original Construction Stage 1, while Stage 2B includes the repurposing of the Phase 1 area. Phases 2A and 2B will comprise:

- Three home-bases totalling approximately 1,000 students (inclusive of the 350 students in Phase 1) from K-12 in the eastern wing of the building.
- All requisite technical spaces to support a full primary and secondary curriculum for 1,000 students;
- Administration space for approximately 80 staff;
- Fencing of the green space around the perimeter of the site, if any remains to be fenced after Phase 1 fencing has been completed;
- Remediation of any targeted roof areas to create additional outdoor play areas if they have not already been remediated under Phase 1; and
- Traffic and transport infrastructure associated with the Eton bus stop, and parking and drop-off/pick-up area if it has not been provided under Phase 1.

Construction Stage 2

- Three home-bases totalling approximately 1,100 students from K-12 in the western wing of the building;
- Additional administration space for 80 staff; and
- Remediation of targeted roof areas to expand outdoor play areas.

4 Proposed Development - Phase 1

4.1 Overview

Phase 1 of the school would accommodate:

- 350 students
- 30-50 staff

The site boundary for Phase 1 is confined to the existing bus loop, the building south of the roundabout and the upper level car park, shown in Figure 2.

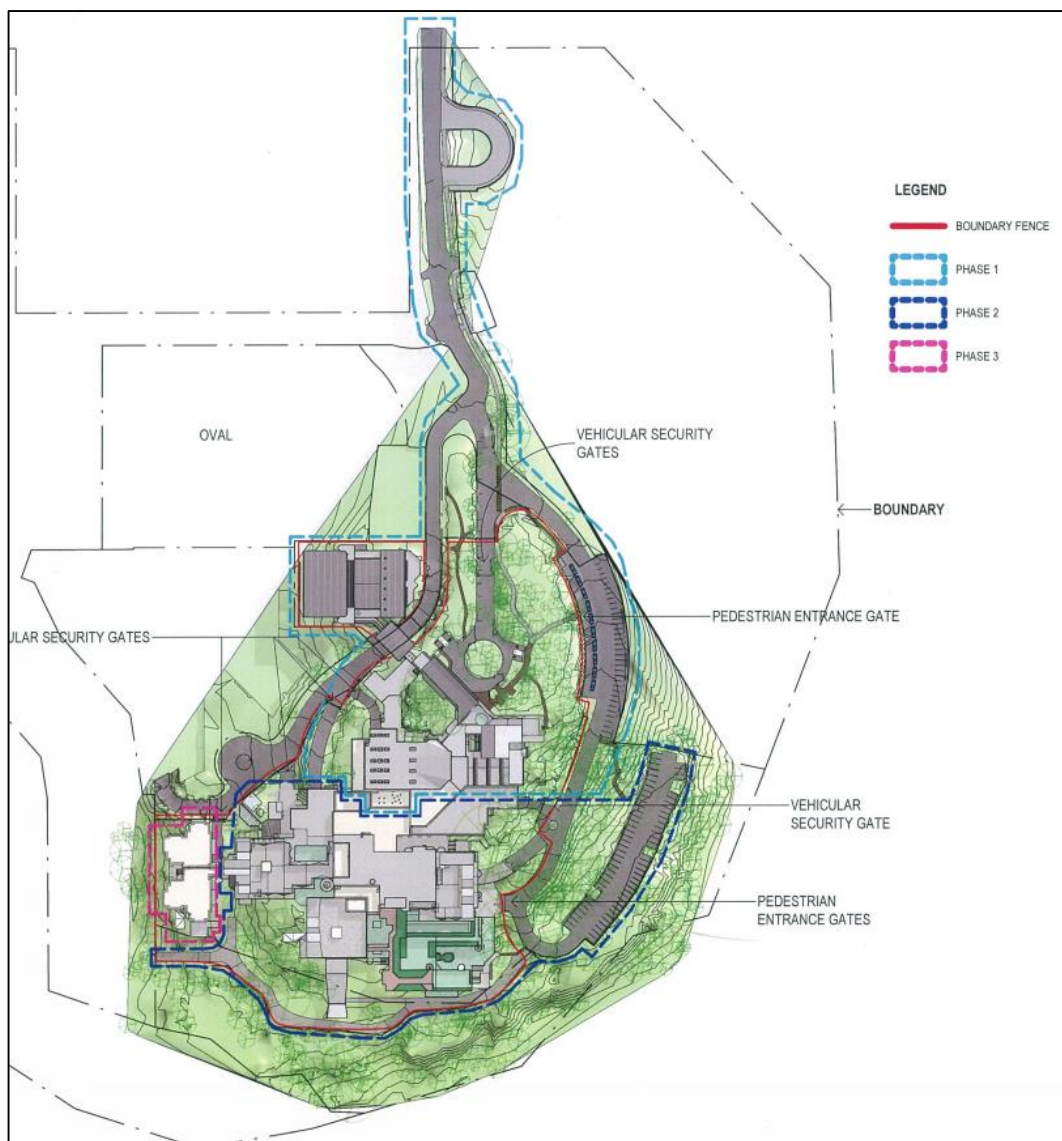


Figure 2: Site boundary for various phases of the school

4.2 Drop-off and pick-up access

The possible drop-off and pick-up locations for the learning village are shown in Figure 3. The bus zones and the proposed private vehicle drop-off/pick-up zones are located in separate areas. The drop-off and pick-up arrangements are discussed in the sections below. It has been assessed for the final built form and hence would be sufficient to accommodate phase 1 students who get dropped off.

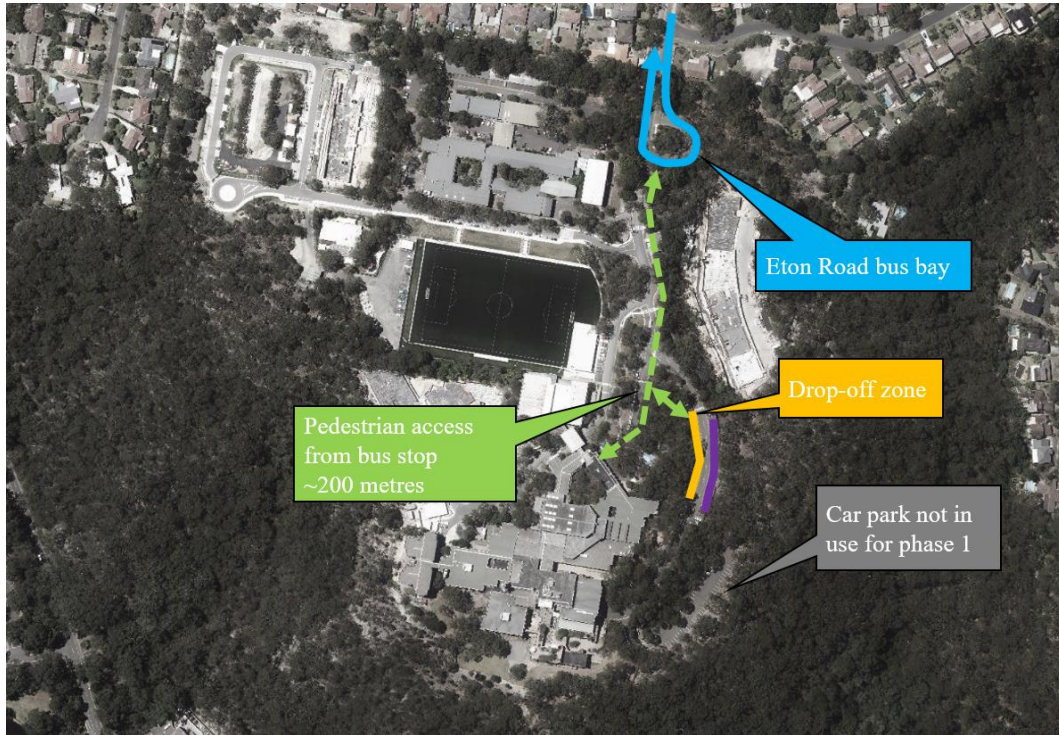


Figure 3: Bus pick-up and drop-off location

4.2.1 Private vehicles

Drop-off

The proposed drop-off and pick-up location is on the upper level car park, which consists of approximately 62 – 90 degree car spaces. A turning head at the loading dock area, would allow vehicles to make a U-turn to access the drop-off bays. This would require minor works to existing kerbs shown in Figure 4.



Figure 4: Proposed location of turning head

The drop-off arrangement is shown in Figure 5, and allows for 10 vehicles to queue at the drop-off bay at any one time. This would require 22 spaces to be converted into drop off bays during the morning peak. These bays can then function as parking spaces for visitors, outside of the school peak hours.

The bays would have no parking permitted from 8:30am to 9:30am and 2:30pm to 3:30pm on school days. This arrangement creates an efficient turnover.

The remaining 5 spaces would be used for short term, 5 minute parking from 8:30am to 9:30am and 2:30pm to 3:30pm on school days. This would allow parents with younger children to walk with their kids to school.

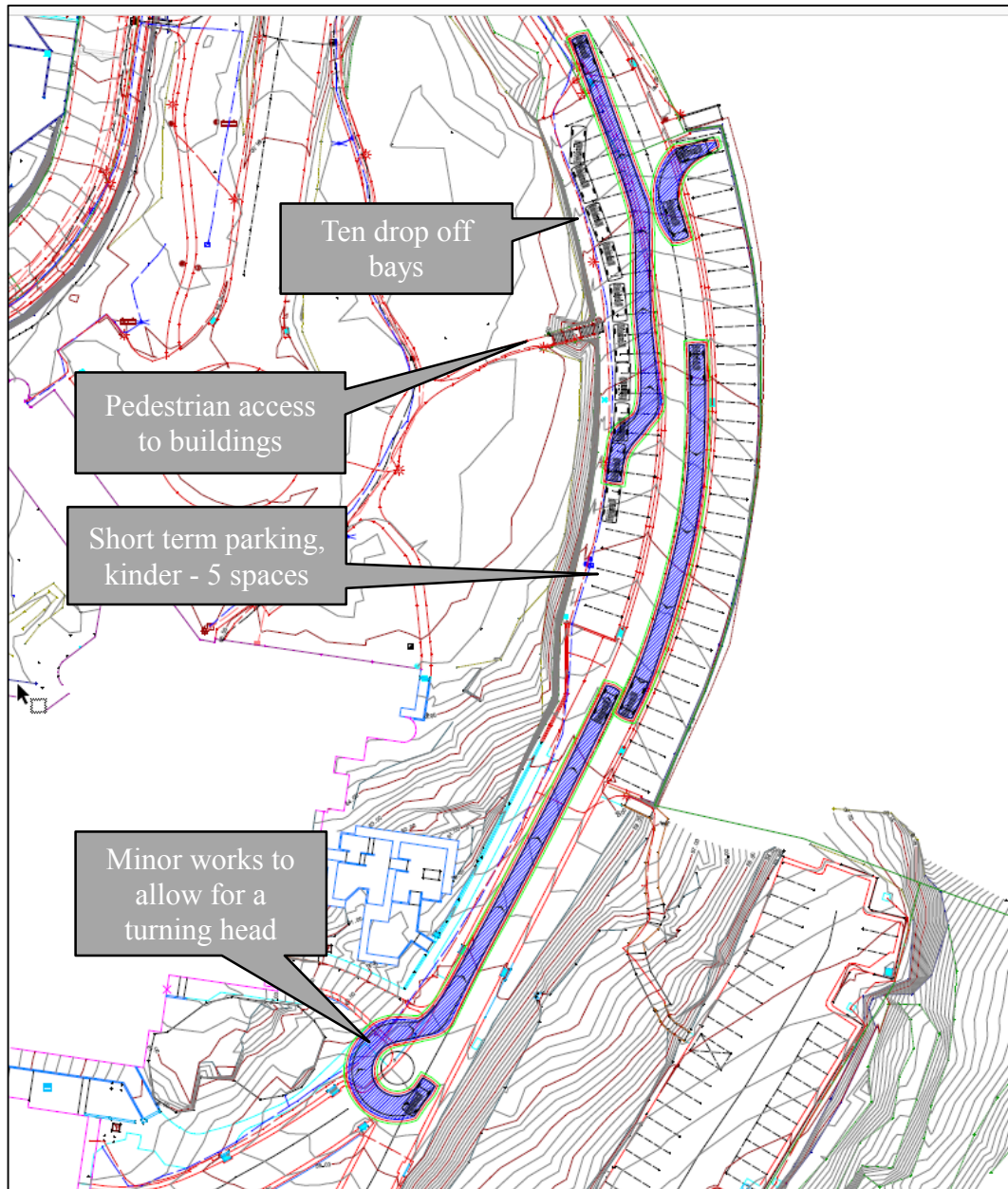


Figure 5: Drop-off arrangement with a proposed turning head

Pick-up

A similar arrangement to Figure 5 is proposed for the pick-up arrangement. Parents should be advised to arrive only after school finishes, rather than park and wait for their children to finish school. This would reduce the number of cars waiting at the pick-up point at any one time.

4.2.2 Proposed parking spaces

The Ku-ring-gai Development Control Plan 2015 (KDCP) provides parking guidelines for the minimum number of parking spaces required for each land use.

Student parking

A majority of the schools around the area, such as Ravenswood Girls School, Lindfield Public School and Chatswood High School do not provide parking for students. Providing parking spaces to students would encourage a non-sustainable mode of transport to the site and would likely compromise pedestrian safety within the school.

If alternative transport strategies are unsuccessful in persuading year 12 students from driving, there is an ample supply of parking on-street with some 319 unrestricted parking spaces. There would not be negative implications of students parking on-street given that most residents have garages.

Staff parking

Due to the topographic and heritage nature of the site, additional parking is not recommended to be constructed.

There is a total of 65 available marked parking spaces in Phase 1. This fulfils the DCP parking requirements with a summary of the calculations shown in Table 1.

Table 1: Proposed allocation of parking spaces

| School use | No. of people | K DCP Standards 2015 Minimum parking | KDCP Minimum | Proposed/ available |
|------------------|---------------|---|--------------|---------------------|
| Year 12 students | 30 | 1 space per 8 Year 12 students | 4 | 0 |
| Teachers | 30-50 | 1 space per equivalent full-time employee | 40 | 40 |
| Visitor | - | No rate | 0 | 24 |
| Disabled | | 2% of total parking spaces | 1 | 1 |
| Total | | | 45 | 65 |

4.2.3 Proposed parking allocations

The proposed parking arrangements for parking within the learning village is illustrated in Figure 6. Phase 1 would utilise the upper level car park, and part of the on-street parking outside the roundabout. There will be a total of 65 car parking spaces which meet the DCP parking requirements.

As discussed in section 5.2, Carpark 2 would require modifications during school drop-off and pick-up periods:

- 22 spaces to be allocated for drop-off and pick-ups
- 5 spaces to be allocated for short term parking

These 27 spaces can operate as visitor or staff parking spaces outside of school drop-off and pick-up periods.

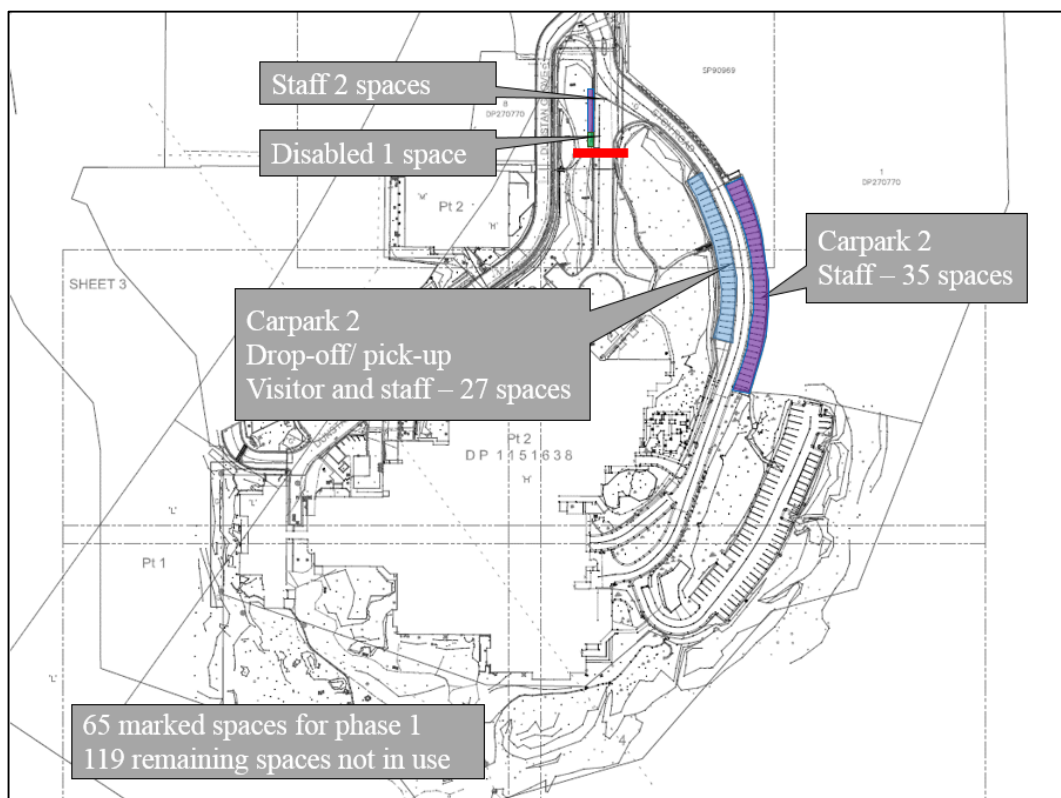


Figure 6: Parking allocations for Phase 1

4.3 Bicycle parking

The Department of Education website states that:

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

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

The Kuring-Gai DCP does not provide guidance on the number of bicycle parking facilities required.

There are existing bicycle racks throughout the learning village at key buildings. These will be consolidated where necessary to provide sufficient bicycle parking for Phase 1 student use. Staff bicycle parking will be provided in a secure room.

Any additional bicycle parking facilities should be designed in accordance to *Standards Australia AS2890.3 (Bicycle Parking Facilities)*.

4.4 On-street parking changes

In order to allow wider manoeuvring width for buses to pass each other, the following parking restrictions are recommended at sections shown in Figure 7.

The proposed on-street parking changes along Eton Road would allow the safe manoeuvre of buses to pass each other. Existing unrestricted parking spaces on the west of Austral Avenue should be monitored for future changes. These proposed changes would result in 15 car spaces be lost along Eton Road.



Figure 7: Proposed on-street parking changes

4.5 Vehicle free area

It is proposed to gate off the access road and existing roundabout in front of the main entrance. This area would be used as an outdoor area, but would still permit emergency vehicle access. No general parking or drop-off / pick-ups will be permitted in this area. The area is outlined in green, shown in Figure 8.

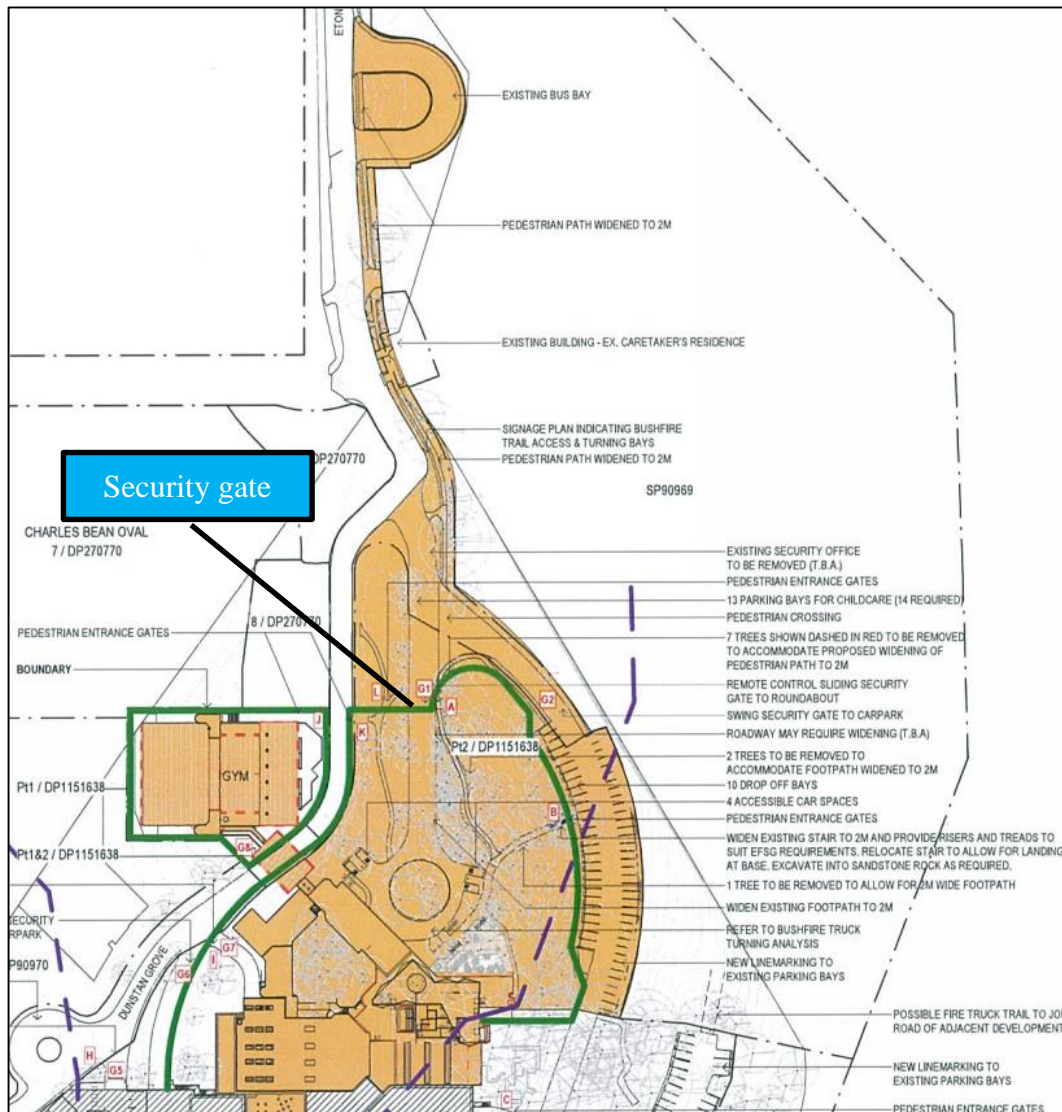


Figure 8: Proposed security gate restricting vehicle access, with exception to emergency vehicles

4.6 Pedestrians

4.6.1 School Zones, consultation

Arup has initially recommended school zones be implemented at non-standard School Zone times, in anticipation of the staggered start times of the final built form.

Roads and Maritime is unsupportive of school zones given it is a policy change issue which will take time to implement. It was agreed in the meeting that temporary measures will be investigated and implemented, such as appropriate signage and to calm traffic in the area. This is until a change in school zone policy is made in the future.

DPE has highlighted the need for this policy revision given staggered start times will be more prevalent with schools in the future. It was agreed that staggered start and finish times help ease traffic conditions. Roads and Maritime is willing to review this policy at a later stage when more schools require this policy change.

For the Phase 1 school, standard school time can be used. The need to implement school zones will be reviewed during initial operations.

4.6.2 Footpath upgrades at the school

Pedestrian infrastructure upgrades will be carried out for Phase 1 within the vicinity of the school boundary as shown in Figure 9.

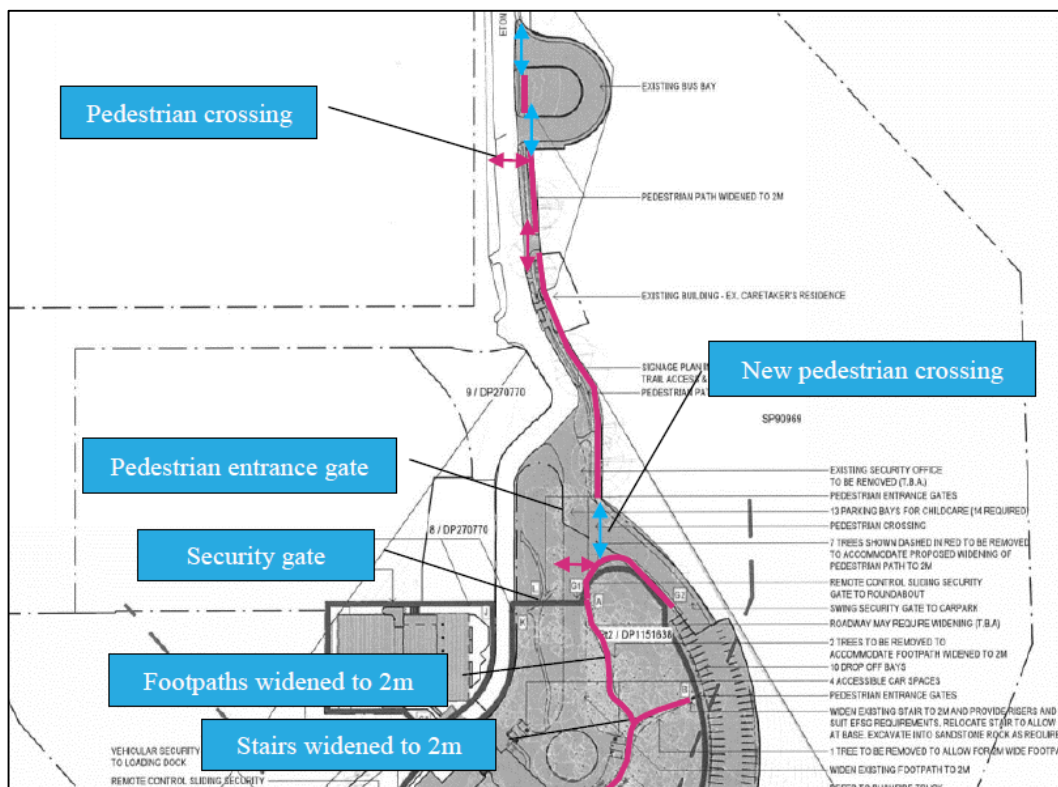


Figure 9: Pedestrian upgrades for Phase 1

4.6.3 Footpath upgrades on the local road network

Further upgrades to the wider local road network should also be considered to improve walkability to the school. A continuous footpath route from Lindfield Learning Village to Lindfield Public School and the Pacific Highway has been identified as a good spine route. The potential works are itemised in Table 2 and include footpath widening in narrow sections, pedestrian crossing points and new footpaths where missing. The Department of Education are keen to work with Council to identify ways of funding and including these works on the forward works program.

Table 2: Potential footpath upgrade works

| Location | Potential footpath works |
|---------------|---|
| 1, 2, 4 and 8 | Footpath upgrade – widening or new surface |
| 3 and 5 | Pedestrian crossing locations – zebra or refuge |
| 6 and 7 | New footpath |

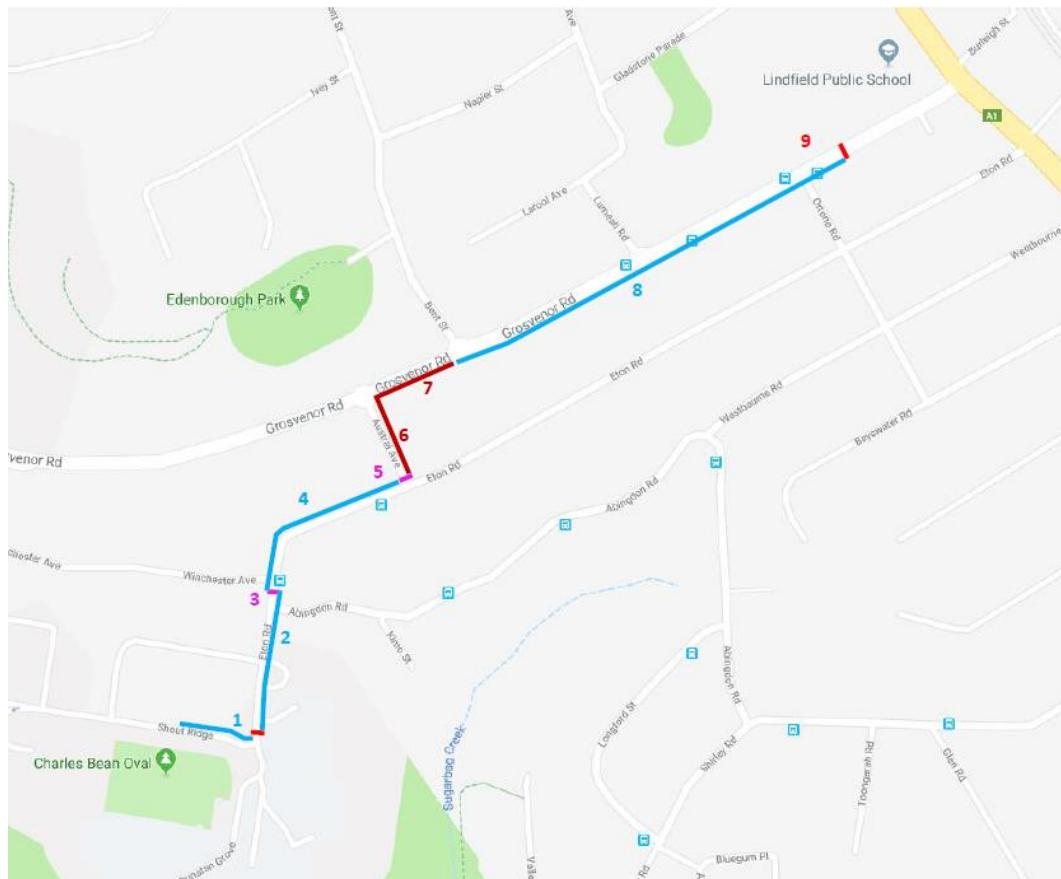


Figure 10: Potential spine pedestrian route

5 Bus Facilities

5.1 Proposed arrangements for the Phase 1 school

The closest bus stop to the site is located along Eton Road, shown in Figure 11. Eton Road bus bay forms a loop, allowing buses to enter, exit and drop off passengers efficiently.



Figure 11: Eton Road Bus Bay

School buses are proposed to use the existing bus bay loop at Eton Road. Students and staff would then walk 200 metres, approximately 2 minutes, to the school.

The bus bay currently serves only one bus route 565. The current timetable for this stop for buses in both directions is identified in Table 3.

Adopting school hours of 9.00am to 3.30pm requires school buses to drop-off between 8.30am – 8.45am and pick-up between 3.15pm – 3.45pm. As shown in Table 3, no route buses are scheduled during the drop-off time, however the 3.26pm routes service to Macquarie University coincides with the pick-up period.

Table 3: Bus interaction

| Morning period | | Afternoon period | |
|--|---|--|--|
| Route 565 | School buses drop-off | Route 565 | School buses pick-up |
| 7.36am 7.48am 8.05am 8.19am 8.29am 8.48am 9.03am 9.26am | 5 buses arrive between 8.30am and 8.45am. No route buses scheduled at this time. | 2.21pm 2.33pm 3.01pm 3.13pm 3.26pm 3.53pm 4.01pm | 5 buses arrive between 3.15 and 3.30pm and depart by 3.45pm. 1 route bus is scheduled during this period. |
| Legend: Towards Macquaire Uni / Towards Chatswood | | | |

School start and finish times are flexible for the Phase 1 school and could be adjusted to suit a bus servicing strategy. The transport strategy described in Section 6.2 identifies a potential for 88 students to utilise buses for school travel. This number of students can be managed by a number of potential bus options. Bus strategies for the school will change over time as the school expands in later phases. Potential bus services include:

- Regular route bus – utilise the existing 565 route bus.
- School bus – dedicated or shared with other nearby schools.
- Shuttle bus – Department of Education funded shuttle service to take students to an interchange point or via a dedicated route within the catchment.

5.2 Investigation into future bus arrangements

Further investigation has been undertaken for future bus operations to enable the route bus services to operate independently of the school bus services when these increase to service the expanded school in later phases. The existing bus loop does not allow independent operation of buses which is required with increased activity.

These arrangements would be required for subsequent Phase 2. Initial options investigated the use of the new roads within the residential estates, shown in Figure 12, to reroute the public bus services. These were found to be inadequate as outlined below:

- The Shout Ridge roundabout is 24m diameter which is not enough for a 12.5m bus to execute a full turn. Expansion of the roundabout to the north would encroach on private property as shown in Figure 13.
- The Hamilton Corner loop road is a very narrow two-way road suitable for local car access only. The 12.5m bus path would require the road to be converted to one-way and corner kerbs to be adjusted.
- The Shout Ridge / Eton Road intersection is very tight and does not permit two-way bus /car movements. The intersection would need to be widened.
- The Dunstone Grove route and turn around is tight and the turnaround has parks cars within it.

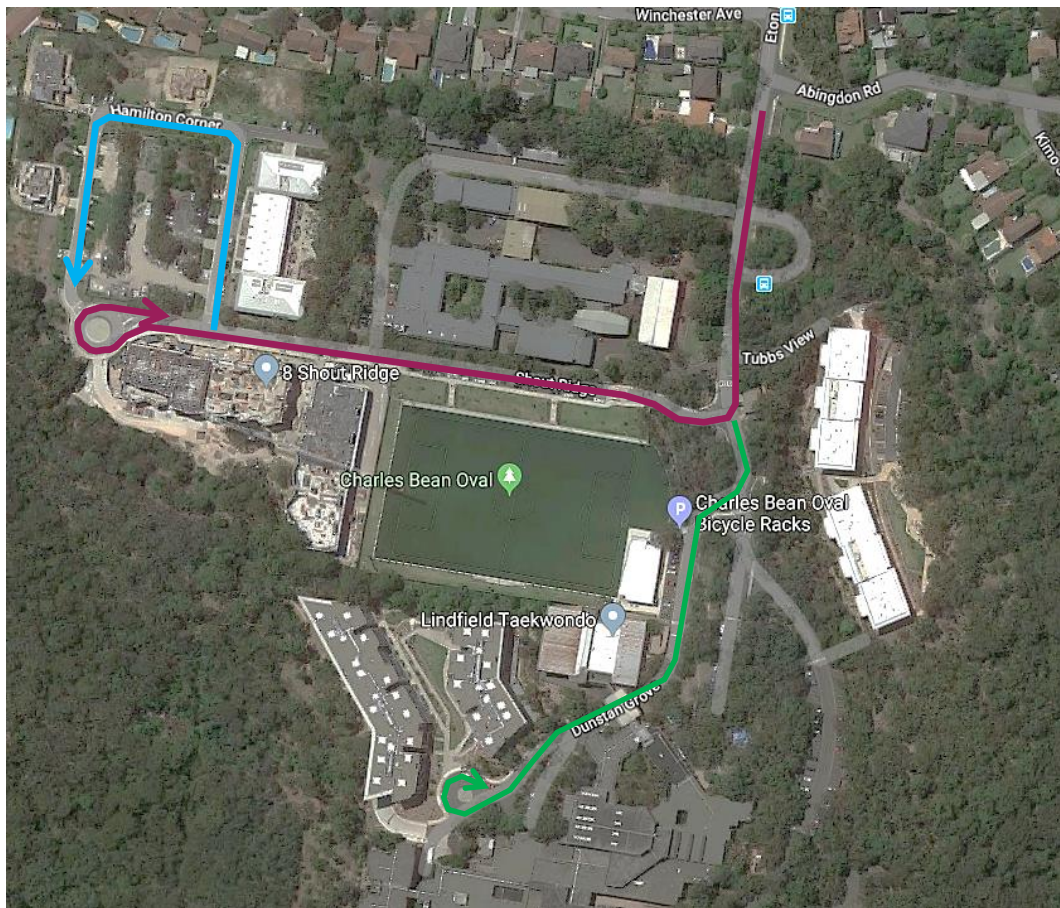


Figure 12: Bus route options investigated



Figure 13: Utilising existing Shout Ridge roundabout option, 12.5 metre bus

5.3 Potential future options for further investigation

An alternative location for school buses is required to allow the existing bus loop to operate for regular route buses. Options will require further development and consultation with Transport for NSW and other parties involved.

Option 1: A 30 metre diameter roundabout at the Dunstan Grove / Eton Road intersection

The new roundabout is shown in Figure 14. A new bus stop would be located along Eton Road which is closer to the school. The size of this bus zone may be limited to available kerb length.

Construction of the roundabout would require the removal of sections of the median and several trees. The vehicle paths are shown in Figure 15. A 30m diameter roundabout enables a 14.5m bus to execute a full turn around the roundabout.

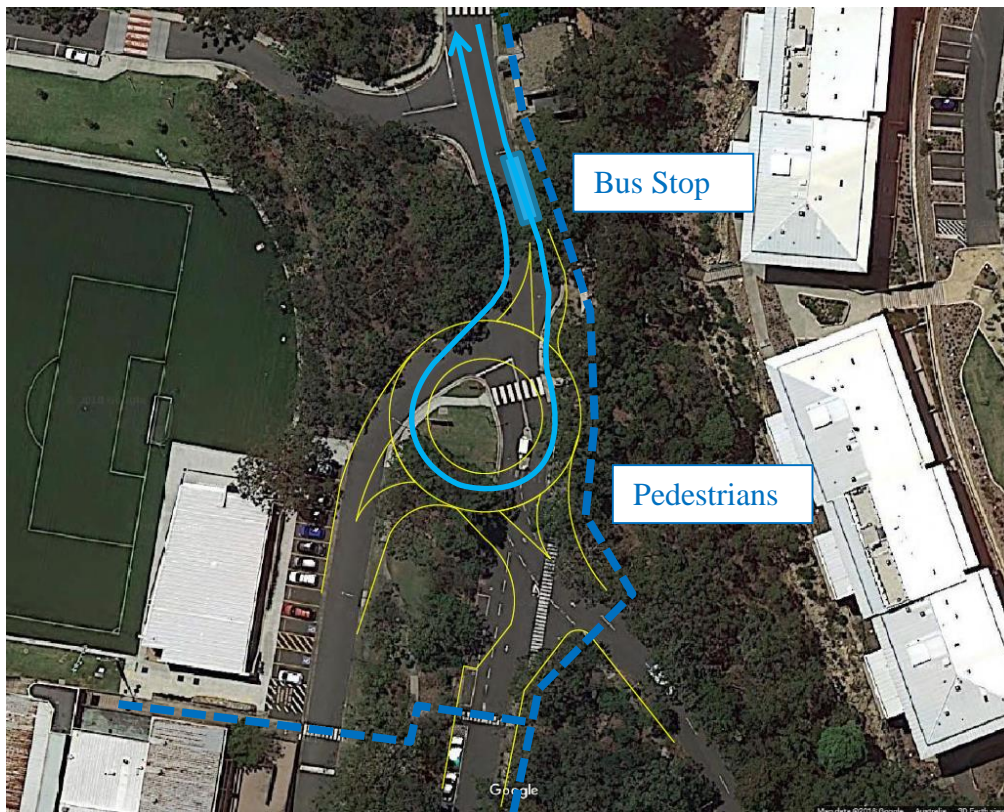


Figure 14: Possible 30m diameter roundabout at school entrance



Figure 15: Vehicle turning paths (bus and car)

Option 2: A new bus road and including bus bays at the main school entry.

Option 2 involves expanding the existing entry driveway to accommodate bus zones and turnaround as shown in Figure 16. This provides the school with a dedicated bus zone on the site with direct student access to the front door of the school.



Figure 16: Option 2 school bus zone

6 Transport Strategies

This section discusses the various transport strategies which the Learning Village may implement, before and during the implementation of Phase 1 of the school.

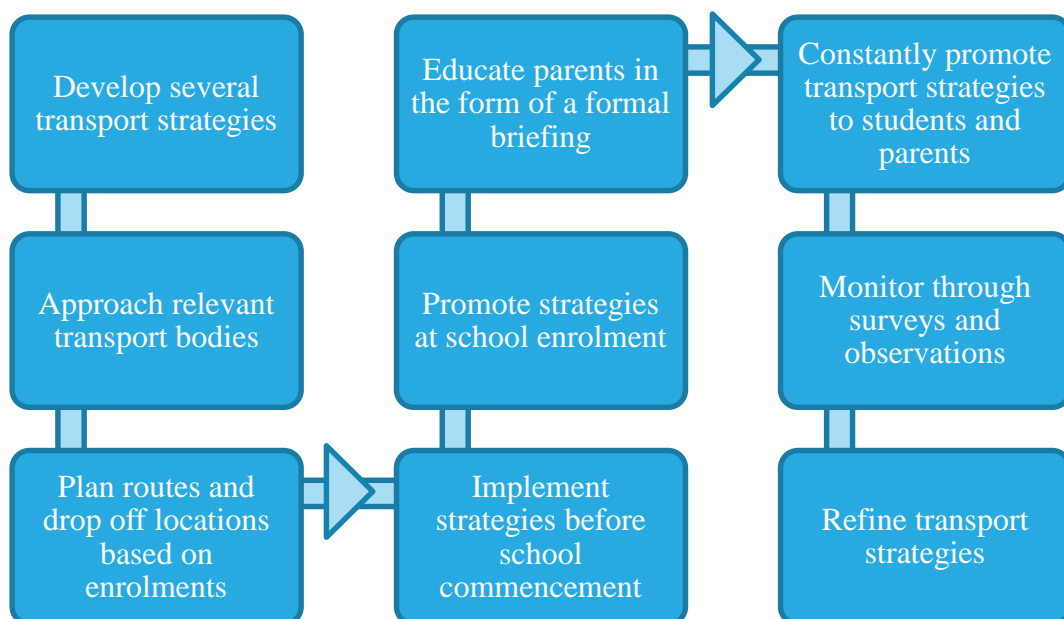
6.1 Early implementation

Convenient and legible means of public transport and active transport, to and from the school should be provided before opening of Phase 1.

Establishing sustainable transport habits to and from the school, at early inception stages, will be crucial to the success of the school both in early and later stages. Providing highly efficient public transport for students from opening day, would attract cultivate sustainable public transport based commuting habits.

Evidence from new residential developments studied in Sydney, suggests that enabling such habits from an early stage will be more successful to implement than trying to change private vehicle reliant travel habits in the future. This poses several advantages to the school, as well as the wider network:

- **Healthier students** – Students who use active and public transport will be encouraged to walk or cycle more than children who take private vehicles
- **Easing congestion** – The school can reduce forecast congestion of the surrounding road network due to development trips, through the provision of a multi-modal and efficient public transport system.
- **Feasibility testing** – Early implementation of sustainable transport means allows the measure of the effectiveness in moving students away from private vehicles



6.2 Potential school student profile and travel mode

The school has started taking enquiries for enrolments which provides an indication of the home locations. Given that the school will be setting up a new catchment with adjustments to the existing school catchments needed, initial enrolments are unlikely to be constrained although preference may be given to students living closer to the school.

The other aspect of enrolments that would affect travel habits is the age of the students. Based on the enquiries so far, a potential school student profile has been developed assuming class sizes of 25 students/class in the primary school and 30 students/class in the secondary school. It is anticipated that more secondary enrolments may be in Year 7 which makes sense to start a new secondary school with limited interest above Year 10.

Potential bus and walk/cycle mode of travel have been assigned resulting 88 bus passengers and 35 walk/cycle from the local catchment as shown in Table 4. This means that 228 students could rely on private car drop-off and pick-up.

Table 4: Potential school student profile and travel mode

| | Year | Classes | Students | | Bus | | Walk/cycle | | Car | |
|--------------|------|-----------|------------|-----|-----|-----------|------------|-----------|-----|------------|
| | | | | | % | No | % | No | % | No |
| Primary | K | 1 | 25 | 225 | 0% | 0 | 10% | 3 | 90% | 23 |
| | 1 | 1 | 25 | | 0% | 0 | 10% | 3 | 90% | 23 |
| | 2 | 1 | 25 | | 0% | 0 | 10% | 3 | 90% | 23 |
| | 3 | 1 | 25 | | 0% | 0 | 10% | 3 | 90% | 23 |
| | 4 | 1 | 25 | | 20% | 5 | 10% | 3 | 70% | 18 |
| | 5 | 2 | 50 | | 20% | 10 | 10% | 5 | 70% | 35 |
| | 6 | 2 | 50 | | 20% | 10 | 10% | 5 | 70% | 35 |
| Secondary | 7 | 2 | 65 | 125 | 50% | 33 | 10% | 7 | 40% | 26 |
| | 8 | 1 | 30 | | 50% | 15 | 10% | 3 | 40% | 12 |
| | 9 | 1 | 30 | | 50% | 15 | 10% | 3 | 40% | 12 |
| | 10 | 0 | 0 | | 50% | 0 | 10% | 0 | 40% | 0 |
| | 11 | 0 | 0 | | 50% | 0 | 10% | 0 | 40% | 0 |
| | 12 | 0 | 0 | | 50% | 0 | 10% | 0 | 40% | 0 |
| Total | | 13 | 350 | | | 88 | | 35 | | 228 |

6.3 School buses

An appropriate school bus route should be developed with consultation of TfNSW, bus companies, and surrounding schools.

Each school bus can accommodate approximately 70 students. The number of school buses serving the school is subject to sharing the school buses with other schools.

6.3.1 School bus routes

School bus routes can be tailored to suit the needs of the learning village. This can be done by altering existing bus routes or introducing a new bus route. Schools near the learning village, which include

- Chatswood High School (Forest Coaches, Transdev)
- Chatswood Public School (Forest Coaches, Transdev)
- Roseville Public School (Transdev)
- Beaumont Road Public School (Shorelink Bus 565)



Figure 17: School bus 683 which stops at Chatswood Station

6.4 Public bus

A bus stop and bus loop is located just north of the site, providing convenient access to future patrons from Bus Route 565. The bus route services key train stations which high train frequencies such as Macquarie University, Chatswood, Lindfield and Roseville. Improving the public bus system would not only provide convenient access to the school, but also to existing and future residents living in the vicinity.

Improving bus frequencies

The existing bus route 565 only runs once every hour, which would make it difficult for students and staff to access and may prove to be a capacity issue. Increasing the frequencies during School peak periods would allow students and staff to more easily access the buses from the train stations and would be viewed as a more convenient mode of transport.

The bus route currently serves Beumont Road Public School. This improved bus frequency would also provide amenity to the Beumont Road Public School and residential dwelling located around the site.

According to Sydney Buses, rigid buses (standard) carry a maximum of 58 people (43 seated and 15 standing) or some 70 students. For the purpose of this analysis, each bus would be able to accommodate 60 students.

It is recommended that bus frequencies are increased up to three buses per hour in each direction for Phase one. This would increase bus reliability and encourage usage early on.

Table 5: Recommended bus route 565 improved frequencies

| School peak period | Proposed frequency for Phase 1 | Proposed frequency for final phase | Primary user type |
|--------------------|--------------------------------|------------------------------------|--|
| 7:30am to 9:00am | 3 per hour | 5 per hour | Students, staff, residents |
| 2:30pm to 4:00pm | 3 per hour | 5 per hour | Students, staff, |
| 4:00pm to 7:00pm | 3 per hour | 3 per hour | Staff, extracurricular students, residents |

Consultation with TfNSW

In 2016, NSW government announced that some 3,800 extra weekly service will be added as part of a \$108 million investment to buses. As part of the Budget commitment, there will be 12 new or extended routes including a new cross suburban link between the Inner West and Lower North Shore.

Consultation with representatives from TfNSW on 7 March 2017 has indicated that the proposed increased frequencies of bus service 565 is favourable in assisting the efficient operation of the learning village, businesses and residential dwellings. However this increase in bus frequencies would be subject to TfNSW Growth Service's initiative.

6.5 Subsidised public transport travel

The School Student Transport Scheme (SSTS)¹. 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 Learning Village can also assist parents in applying for this scheme for the students.



Figure 18: Student Opal Card

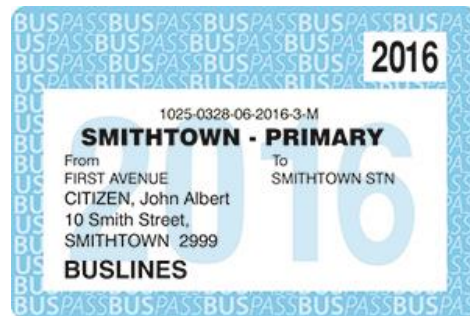


Figure 19: Travel pass for students in rural/regional areas

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.

Secondary school students from years 7-12 are eligible if:

- The straight line distance from their home address to school is 2 kilometres, or further, or
- The walking distance from home to school is 2.9 kilometres or further.

School students who live too close to the school to be eligible for free travel may qualify for a School Term Bus Pass which provides bus travel at a discounted price for the whole school term.

¹ (<http://www.131500.com.au/planyourtrip/upload/links/schoolstudenttransportscheme>)

6.6 Carpooling

6.6.1 Overview

The Learning Village 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 Learning Village by encouraging parents to be proactive in offering carpooling services.

6.6.2 Awareness

The easiest way of setting up a carpool programme would be to organise booths and provide handouts during school enrolments and registrations. This would educate the parents that the initiative exists. A formal briefing can also be organised, educating parents of the chosen carpool platform. This would also allow parents to meet face to face.

This can be further promoted in Learning Village 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.

6.6.3 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.

6.7 Promoting transport strategies

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

6.7.1 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 Learning Village.

6.7.2 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 Learning Village. Therefore, students will then have to carry less material to school.

6.7.3 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 Learning Village 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 Learning Village. 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 Learning Village
- Most number of steps walked for each year competition

6.7.4 Active travel

A mode shift from motorised transportation (principally being driven by car) to active transport improves children's health by²:

- 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 Learning Village 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 Learning Village.

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

- 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.

² Active transport: Children and young people, Dr Jan Garrard, 2009

6.8 Measuring effectiveness of transport strategies

6.8.1 Questionnaire

As discussed above, early planning and implementation of transport strategies before the opening of the school is crucial to the success of enabling long term sustainable transport modes. The school shall provide travel surveys to students and parents at 3, 6 and 12 months upon opening of the school.

The questionnaire surveys should be aimed at understanding how students are travelling to school. It should also assess the reason for not taking public transport. Based on the findings, the transport strategies should be improved and customised to suit the needs of these students.

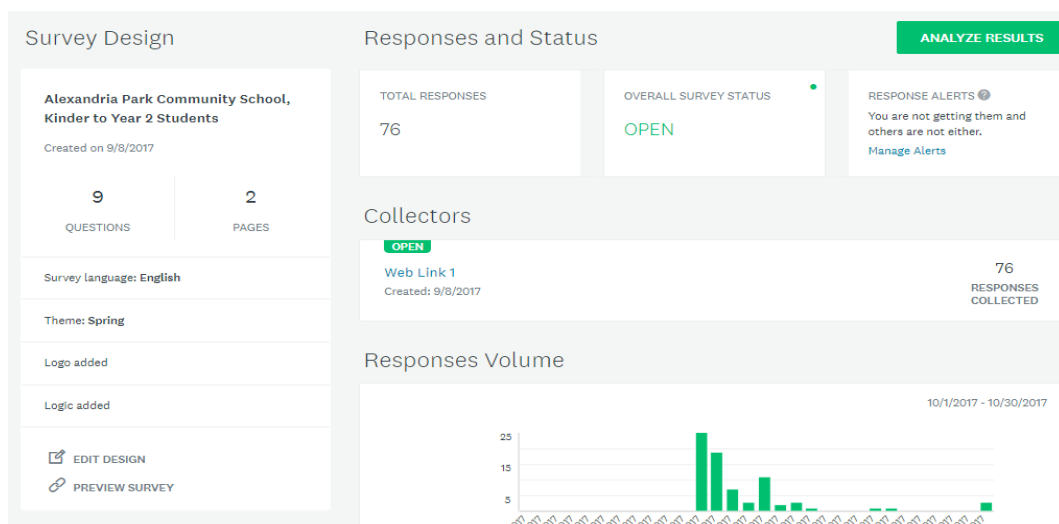


Figure 20: Survey monkey travel survey recently conducted for a school by Arup

6.8.2 Mode split

The school should strive to achieve a healthy mode split for Phase 1 students. The recommendations from the previous transport study is shown in Figure 21. Transport strategies should be constantly adjusted to achieve these splits.

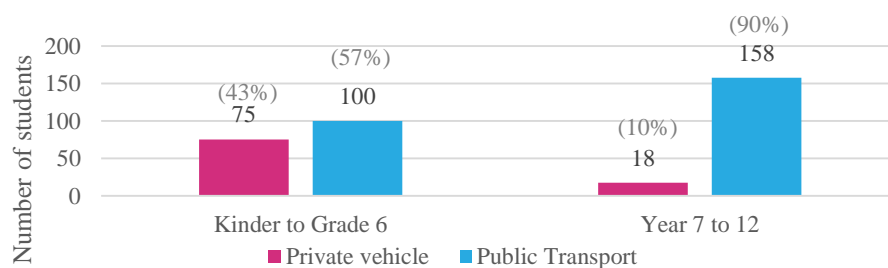


Figure 21: Recommended target mode split

7 Traffic Impacts

7.1 Mode share

The Killara High School surveys have shown that with effective travel strategies (school buses and walking), reliance on private vehicle use can be considerably reduced. For the later phases of the schools development, it is anticipated that good public transport and active transport mode shares will be achieved as outlined in the Traffic and Transport Assessment for the 2,100 student school (Arup 13 June 2017).

For the Phase 1 school, a balance between private car and bus/ walk/cycle access has been assigned for each age group as outlined in Table 4 in Section 6.2 of this report. This will enable bus services to be developed and for travel habits to develop as the catchment for the school settles in.

The adopted traffic generation rates and car occupancies are shown in Table 6.

Table 6: Adopted traffic generation rates

| Table colour | % using private vehicles | Car occupancy |
|------------------|--------------------------|--------------------------|
| Kinder to Year 3 | 90% | 1.6 per car |
| Year 4 to Year 6 | 70% | 1.6 per car |
| Secondary school | 40% | 1.4 per car |
| Staff | 100% (conservative) | 1 per car (conservative) |

7.2 Traffic generated

The estimated traffic generated by 350 students and 30-50 staff is estimated to be 189 cars per hour, with the results shown in Table 7.

Table 7: Estimated traffic generated

| Table colour | Students using private vehicles | Vehicle trips generated from Phase 1 |
|------------------|---------------------------------|--------------------------------------|
| Kinder to Year 3 | 92 | 58 cars per hour |
| Year 4 to Year 6 | 88 | 55 cars per hour |
| Secondary school | 50 | 36 cars per hour |
| Staff | 40 | 40 cars per hour |
| Total | | 189 cars per hour |

7.3 Traffic distribution

Based on the indicative school catchment and the relative area of residential dwellings within it, a proportional split of enrollments are derived. The vehicular routes and proportion of each area relative to the school (see Figure 22).

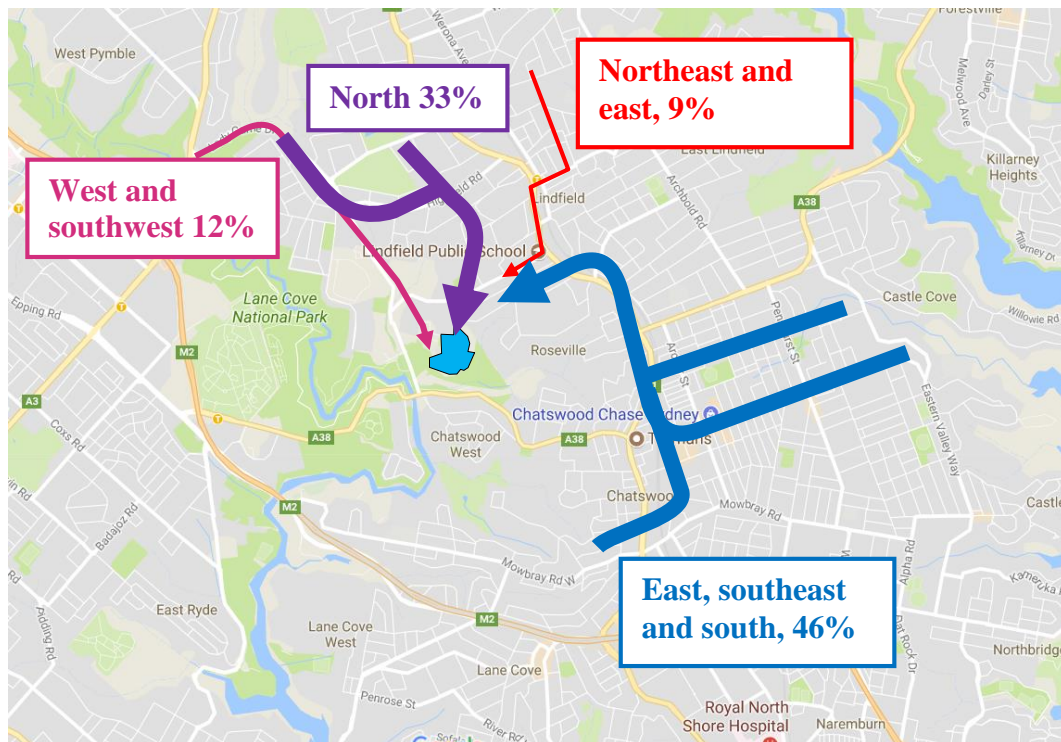


Figure 22: Approximate proportional splits of enrolments based on the indicative school catchment

East, south and southeast (46%) – A majority of the enrolments and hence traffic would arrive east and south of the school. Vehicles from the southeast area would make right turns onto the Pacific Highway via various intersections such as William Street, Ashley Street and Boundary Street. Vehicles located nearer to Clanville Road would use the right turn at the Pacific Highway / Clanville Road intersection, to get onto the Pacific Highway. All the vehicles would then turn left onto Eton Road or Westbourne Road from the Pacific Highway.

North (33%) – The next largest proportion of enrolments would come from the north of the school, west of the Pacific Highway. Access to Grosvenor Road consists of a permeable local road network, using Bent Street, Highfield Road, Cook Road and Beaconsfield Parade. Most of the routes consist of priority controlled intersections and local roads with low levels of traffic.

West and southwest (12%) – Enrolments from the west and southwest are estimated to be 12%. These vehicles would use Lady Game Drive.

Northeast and East (9%) – This consists of the smallest proportions of enrolments, with an estimated 9% coming from this area. Vehicles coming from this area would turn left from Strickland Avenue onto the Pacific Highway southbound. They would then proceed to utilise the right turn bay at the Pacific Highway / Grosvenor Road intersection.

7.4 Traffic modelling

7.4.1 Modelling assessment criteria

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

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

In urban areas, the traffic capacity of the major road network is generally a function of the performance of key intersections. This performance is quantified in terms of Level of Service (LoS), is based on the average delay per vehicle. LoS ranges from A = very good to F = unsatisfactory (see Table 8).

Table 8: Level of service criteria for intersections

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

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

The existing scenario SIDRA models were calibrated to match existing queue lengths observed during the site visit on 7 May 2015. These observations were made during the same periods when traffic surveys were conducted.

7.4.2 Previous modelling results

Previous modelling results using final built form numbers have indicated that the AM peak hour period from 8:00am to 9:00am, which coincides with the morning commuter peak is the critical period. All the intersections operated with a satisfactory level of service with exception to Grosvenor Road / Pacific Highway / Burleigh Street.

This however was subject to various different assumptions and mode splits used. For the purpose of this Phase 1 assessment, only the AM peak hour for the Grosvenor Road / Pacific Highway / Burleigh Street intersection will be assessed.

8 Conclusion

In order to address bushfire related matters, the proposal has been amended to permit a school for 350 students to be opened for Term 1, 2019. This report has assessed the traffic and transport impacts as well as the required mitigation measures needed for the Phase 1 school.

- The drop-off arrangement is shown in Figure 5, and allows for 10 vehicles to queue at the drop-off bay at any one time. This would require 22 spaces to be converted into drop off bays during the morning peak. These bays can then function as parking spaces for visitors, outside of the school peak hours.
- The number of school buses serving the school in Phase 1 is subject to school bus strategy to be developed in consultation with TfNSW.
- Phase 1 would utilise the upper level car park, and part of the on-street parking outside the roundabout. There will be a total of 65 car parking spaces which meets the DCP parking requirements.
- Establishing sustainable transport habits to and from the school, at early inception stages, will be crucial to the success of the school both in early and later stages. Providing highly efficient public transport for students from opening day, would attract cultivate sustainable public transport based commuting habits.
- The school shall provide travel surveys to students and parents at 3, 6 and 12 months upon opening of the school.
- The questionnaire surveys should be aimed at understanding how students are travelling to school. It should also assess the reason for not taking public transport. Based on the findings, the transport strategies should be improved and customised to suit the needs of these students.
- The estimated traffic generated by 350 students and 30-50 staff is estimated to be 189 cars per hour
- The modelling results shows that Phase 1 of the school's opening results in a slight increase in average delay of two seconds. The 70 metre right turn bay from Pacific Highway into Grosvenor Road is not expected to experience a spillover in traffic. This 95%ile queue is predicted to increase from 57 metres to 62 metres. The overall intersection performance is predicted to perform at an efficient level of service C.
- Future options for separating public and school bus operations have been investigated and further consultation will be undertaken with Transport for NSW regarding a suitable outcome.