Grey House Precinct
Transport Impact Assessment

PREPARED FOR PYMBLE LADIES' COLLEGE | AUGUST 2021

We design with community in mind

Revision Schedule

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
1	20/08/21	Draft for client comments	SH	DA	AW	AW
2	26/08/21	Final for SSDA submission	SH	DA	AW	AW

Quality Statement

This document has been prepared for the benefit of Pymble Ladies' College. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to Pymble Ladies' College and other persons for an application for permission or approval to fulfil a legal requirement.

PROJECT MANAGER	PROJECT TECHNICAL LEAD
Theodore Mirabile	Anna Wilkins

PREPARED BY

Sunny Hong ..... 26 / 08 / 21

CHECKED BY

Anna Wilkins ..... 26 / 08 / 21

REVIEWED BY

Anna Wilkins ..... 26 / 08 / 21

APPROVED FOR ISSUE BY

Anna Wilkins ..... 26 / 08 / 21

SYDNEY
Level 4, 99 Walker Street, North Sydney, NSW 2060
ABN: 17 007 820 322
TEL +61 2 9493 9700

STATUS Final | Project No 301350239

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

Stantec has been engaged by Pymble Ladies' College (PLC), herein referred to as 'the College', to prepare a Transport Impact Assessment (TIA) for a proposed development of new learning spaces as part of the Grey House Precinct (GHP) within the College grounds.

The location of the GHP in relation to the overall College is shown in Figure 1.

Figure 1: GHP location (Source: BVN 2021)

1.2 LOCAL CONTEXT

The site is located in the Ku-ring-gai Local Government Area (LGA) and the surrounding land uses are predominantly low density residential, as shown in Figure 2.

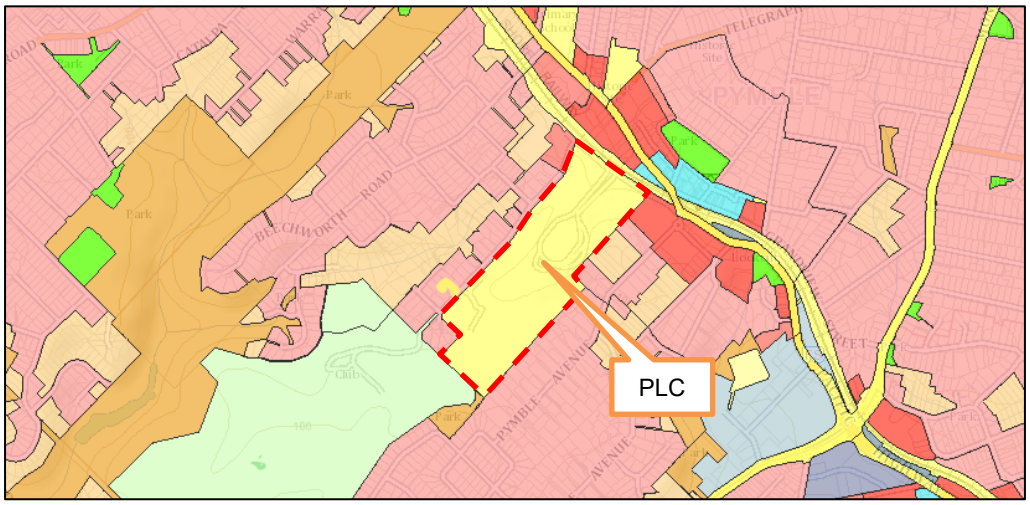


Figure 2: Local Context (Source: ePlanning Spatial Viewer)

The following key features of the surrounds are as follows:

- Pymble Train Station is located approximately 350m walking distance to the south-east;
- Pymble Town Centre is located approximately 400m walking distance to the east; and
- Avondale Golf Course is located approximately 500m walking distance to the south-west.

This is shown in Figure 3.

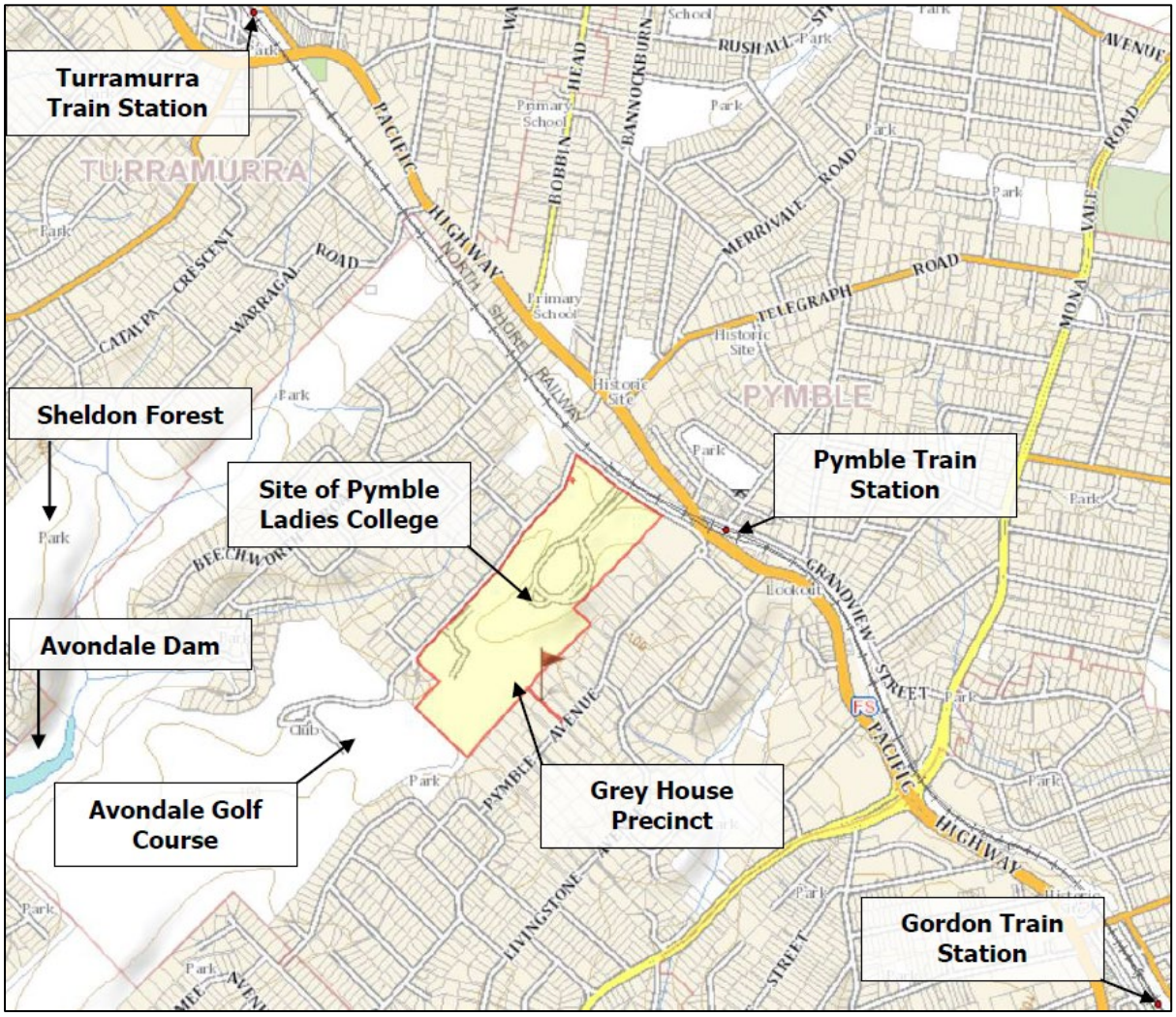


Figure 3: Surrounding features (Source: SIX Maps 2021)

1.3 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEAR)

This TIA has been prepared in response to the Secretary's Environmental Assessment Requirements (SEARs) issued for this State Significant Development Application (SSDA-17424905), dated 17 May 2021. The requirements pertaining to this TIA are repeated below:

Provide a transport and accessibility impact assessment, which includes, but is not limited to the following:

- *Analysis of the existing transport network to at least the existing or proposed enrolment boundary, including:*
  - *Road hierarchy*
  - *Pedestrian, cycle and public transport infrastructure*

- *Details of current daily and peak hour vehicle movements based on traffic surveys and/ or existing traffic studies relevant to the locality*
- *Existing transport operation for 1hr before and after (existing or proposed) bell times such as span of service, frequency for public transport and school buses, pedestrian phasing for signals*
- *Existing performance levels of nearby intersections utilising appropriate traffic modelling methods (such as SIDRA network modelling).*

- *Details of the proposed development, including:*
  - *A map of the proposed access which identifies public roads, bus routes, footpaths and cycleways.*
  - *Pedestrian site access and vehicular access arrangements, including for service and emergency vehicles and loading/unloading, including swept path analysis demonstrating the largest design vehicle entering and leaving the site and moving in each direction through intersections along the proposed transport routes*
  - *Car and motorcycle parking, bicycle parking and end-of-trip facilities*
  - *Drop-off/ pick-up zone(s) and arrival/departure bus bay(s)*
  - *Pedestrian, public transport or road infrastructure improvements or safety measures*
- *Analysis of the impacts due to the operation of the proposed development, including:*
  - *Proposed modal split for all users of the development including vehicle, pedestrian, bicycle riders, public transport, school buses and other sustainable travel modes*
  - *Estimate total daily and peak hour vehicular trip generation*
  - *A clear explanation and justification of the:*
    - *Assumed growth rate applied*
    - *Volume and distribution of proposed trips to be generated*
    - *Type and frequency of design vehicles accessing the site:*
      - *An assessment of the forecast impacts on traffic volume generated on road safety and capacity of road network including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model as prescribed by TfNSW. The traffic modelling should consider the ultimate development year plus 10 year growth of at least the following intersections (but not limited to): Pacific Highway/ Livingstone Avenue and Pacific Highway/ Beechwood Road.*
      - *Details of performance of nearby intersections and/ or level crossings with the additional traffic generated by the development both at the commencement of operation and in a 10-year time period (using SIDRA network modelling).*
      - *Cumulative traffic impacts from any surrounding approved development(s).*
      - *Adequacy of pedestrian, bicycle and public transport infrastructure and operations to accommodate the development.*
      - *Adequacy of car and motorcycle parking and bicycle parking provisions when assessed against the relevant car/ bicycle parking codes and standards.*
      - *Adequacy of the drop-off/ pick-up zone(s) and bus bay(s), including assessment of any related queuing during peak-hour access.*
      - *Adequacy of the existing/ proposed pedestrian infrastructure to enable convenient and safe access to and from the site for all users*
- *Measures to ameliorate any adverse traffic and transport impacts due to the development based on the above analysis, including:*

  - *Travel demand management programs to increase sustainable transport (such as a Green Travel Plan/ School Travel Plan)*
  - *Arrangements for the Travel Coordinator roles*
  - *Governance arrangements or relationships with state and local government transport providers to update roads safety*
  - *Infrastructure improvements or protection measures, including details of timing and method of delivery*
- *A preliminary school transport plan detailing a operational traffic and access management plan for the site, pedestrian entries, the drop-off/ pick-up zone(s) and bus bay(s)*
- *Analysis of the impacts of the traffic generated during construction of the proposed development, including:*
  - *Construction vehicle routes, types and volumes*
  - *Construction program (duration and milestones)*
  - *On-site car parking and access arrangements for construction, emergency and construction worker vehicles*
  - *Cumulative impacts associated with other construction activities in the locality (if any)*
  - *Road safety at identified intersections and level crossings near the site due to the conflicts between construction vehicles and existing traffic in the locality*
  - *Measures to mitigate impacts, including to ensure the safety of pedestrian and cyclists during construction*
- *Analysis of the impacts of construction works on the adjoining rail corridor prepared in consultation with the relevant rail infrastructure authority*
- *A preliminary Construction Traffic and Pedestrian Management Plan*

1.4 AIM OF THIS TRANSPORT IMPACT ASSESSMENT

The primary objectives of this Transport Impact Assessment (TIA) are as follows:

- Ensure the safety of students, parents and staff during the College's hours of operation;
- Ensure that surrounding road users are aware of any proposed changed traffic conditions and that risks are identified and mitigated; and
- Ensure that the impact on the local road network can be minimised through efficient and safe management.

2.0 PYMBLE LADIES' COLLEGE

2.1 EXISTING USE AND POPULATION

The College is a non-selective, independent school for girls from Kindergarten to Year 12, with Boarding available from Year 7.

The College currently accommodates a population of 2,259 students, 120 boarders and 400 staff.

The standard operating hours of the College are 7:30am to 5:30pm Monday to Friday, and standard teaching hours are 8:15am to 3:20pm Monday to Friday.

Co-curricular activities within the College grounds take place between 6:30am to 8:00am and 3:00pm to 6:30pm Monday to Friday and 7:00am – 12:00pm Saturdays, with no activities on Sundays. Examples of co-curricular activities include band, instrument lessons, choir, drama, art, robotics, dance, rowing, tennis, athletics, swimming, diving, gymnastics, and over 50 choices of activities in addition to seasonal sports including hockey, netball, basketball, rugby and soccer.

Boarding occurs on a 24/7 basis.

2.2 EXISTING ACCESSES

General vehicle, bus, service vehicle and emergency vehicle access is via Gates 1 (Marden Gates), 2 and 3, as shown in Figure 4 and the street view imageries shown in Figure 5 to Figure 7.

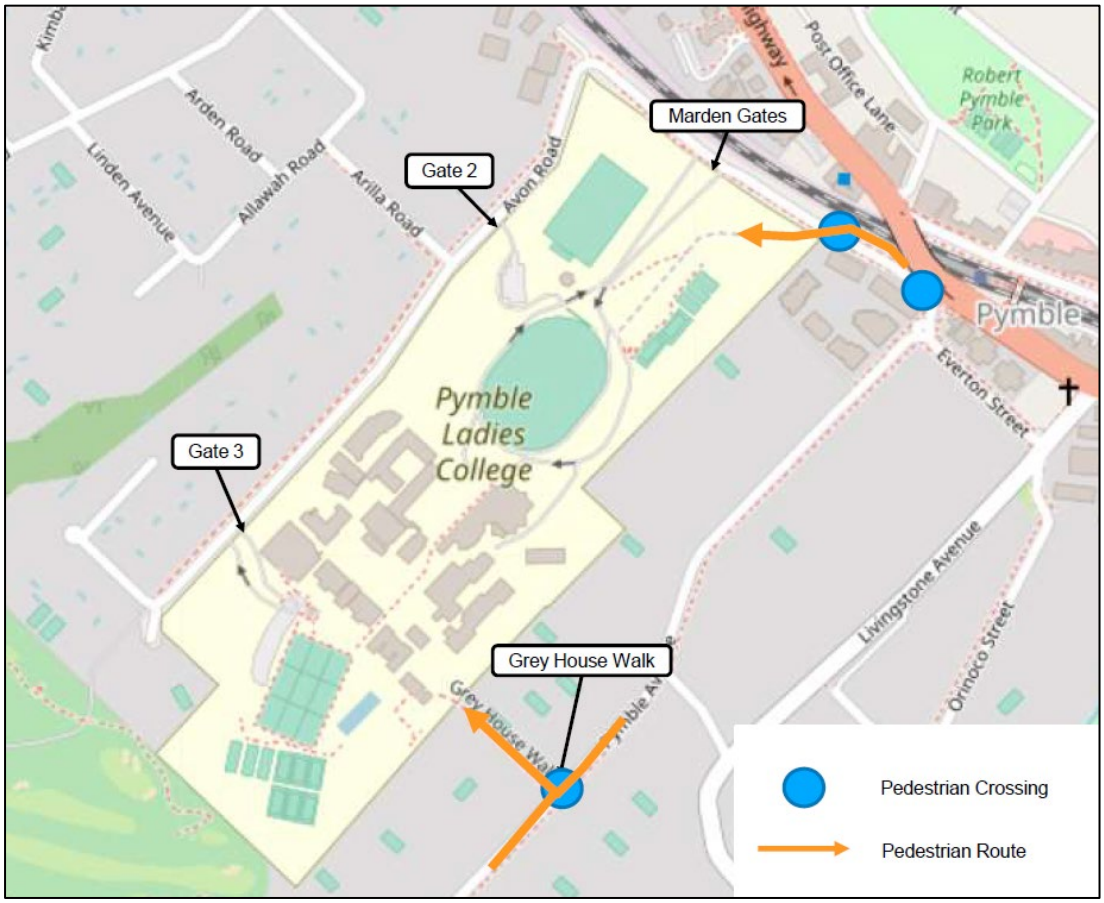


Figure 4: Existing College Access

Figure 5: Gate 1 (Source: Google Maps)

Figure 6: Gate 2 (Source: Google Maps)

Figure 7: Gate 3 (Source: Google Maps)

Pedestrian access is through the main pedestrian entry along Avon Road, adjacent to Gate 1 (Marden Gates). This access is directly off the raised pedestrian crossing along Avon Road, as shown in Figure 8, and provides connection between the College and the pedestrian tunnel leading to Pymble Train Station.

Figure 8: Main pedestrian access (Source: Google Maps)

A pedestrian access, called the Grey House Walk, is also provided along Pymble Avenue which is located between 57 and 59 Pymble Avenue. This pathway is also directly off a raised pedestrian crossing.

Figure 9: Grey House Walk (Source: Google Maps)

2.3 COMMUNITY USES OF THE COLLEGE

As well as providing academic and co-curricular activities for students and boarders, the College includes facilities and services that are accessible to the broader community. These include the following:

- Swimming centre, including swimming carnivals for other local school, learn-to-swim for the broader community, and water polo competitions;
- Sports facilities for local sports groups, including the gymnasium for indoor netball and basketball;
- Sports fields;
- Chapel, for special services;
- Theatre, extended to the local community for events; and
- The College also serves as a host venue for a number of interschool competitions such as debating.

3.0 PROPOSED DEVELOPMENT

The proposal includes the redevelopment of the GHP within the grounds of the established College. The GHP is proposed to incorporate the following:

- Junior School classrooms (Years 5 and 6)
- Science, Technology Engineering and Mathematics (STEM) labs;
- Health and wellbeing facilities (consulting rooms and wards);
- Dance academy;
- Out of School Hours Care (OSHC) facilities;
- Early Learning Centre (ELC); and
- Outdoor learning spaces.

The architectural plans can be seen in Appendix A.

The proposed development would replace existing temporary (demountable) teaching spaces, providing a better environment for both students and teachers.

The facilities will primarily be utilised by the **existing** students and staff, however, the intention would be for the ELC to be available for enrolment by the broader community. The dance academy and the OSHC holiday care program will also be available for use by the broader community.

This SSDA is not seeking to increase the existing student or staff numbers for Kindergarten to Year 12.

The proposed ELC will, however, accommodate a new pre-Kindergarten stream with capacity for 90 children. The OSHC size will also increase by a further 30 places (from 120 to 150 places), but these new places would be used during the school holiday period and will not increase enrolments.

The intention of the ELC is to provide a pre-Kindergarten stream of children who will ultimately proceed onto joining the Kindergarten stream and continue as students at the College. The primary objective of the ELC stemmed from the College's desire to provide an early learning/child care service for its staff members, particularly for those who would find it difficult to return to work after maternity/ parental leave. A staff survey was undertaken by the College in June 2021 to collect data on the staff's desire for an ELC. The results are summarised as follows:

- 32 staff members would enroll their children in the ELC, if available, with a further 42 staff members who would consider enrolling their children; and
- 64 staff members have indicated that an ELC on campus, would make it easier for them to return to work after maternity/ parental leave.

Detailed survey results can be seen in Appendix B.

4.0 EXISTING ROAD NETWORK

4.1 SURROUNDING ROAD CHARACTERISTICS

The following table summarises the characteristics of the roads surrounding the College.

Table 1: Surrounding road characteristics

Road Name	Speed Limit	Lanes	Road Type	Road Authority
Avon Road	• 40km/h (school zone speed limit) • 50m/h	1 lane in each direction	Local	Ku-ring-gai Council
Pymble Avenue	• 40km/h (school zone speed limit) • 50km/h	1 lane in each direction	Local	Ku-ring-gai Council
Everton Street	• 40km/h (school zone speed limit) • 50m/h	1 lane in each direction	Local	Ku-ring-gai Council
Livingston Avenue (between Pacific Highway & Everton Street)	• 50km/h	2 lanes in each direction	Local	Ku-ring-gai Council
Beechworth Road (between Pacific Highway & Mayfield Avenue)	• 50km/h	1 lane in each direction	Local	Ku-ring-gai Council
Pacific Highway (between Livingston Avenue & Beechworth Road)	• 60km/h	2-3 lanes in each direction	State	TfNSW

4.2 CRASH HISTORY

Transport for New South Wales (TfNSW) Centre for Road Safety provides a database which records crashes for the most recent five-year period of available data (i.e. 2015 to 2019). Crash statistics are confined to crashes that conform to the national guidelines for reporting and classifying road vehicle crashes. The guidelines include crashes that meet the following criteria:

- Were reported to the police;
- Occurred on a road open to the general public;
- Involved at least one moving road vehicle; and
- Involved at least one person being injured, killed or at least one motor vehicle being towed away.

Figure 10 overleaf, shows the locations of the crashes that meet the above criteria.

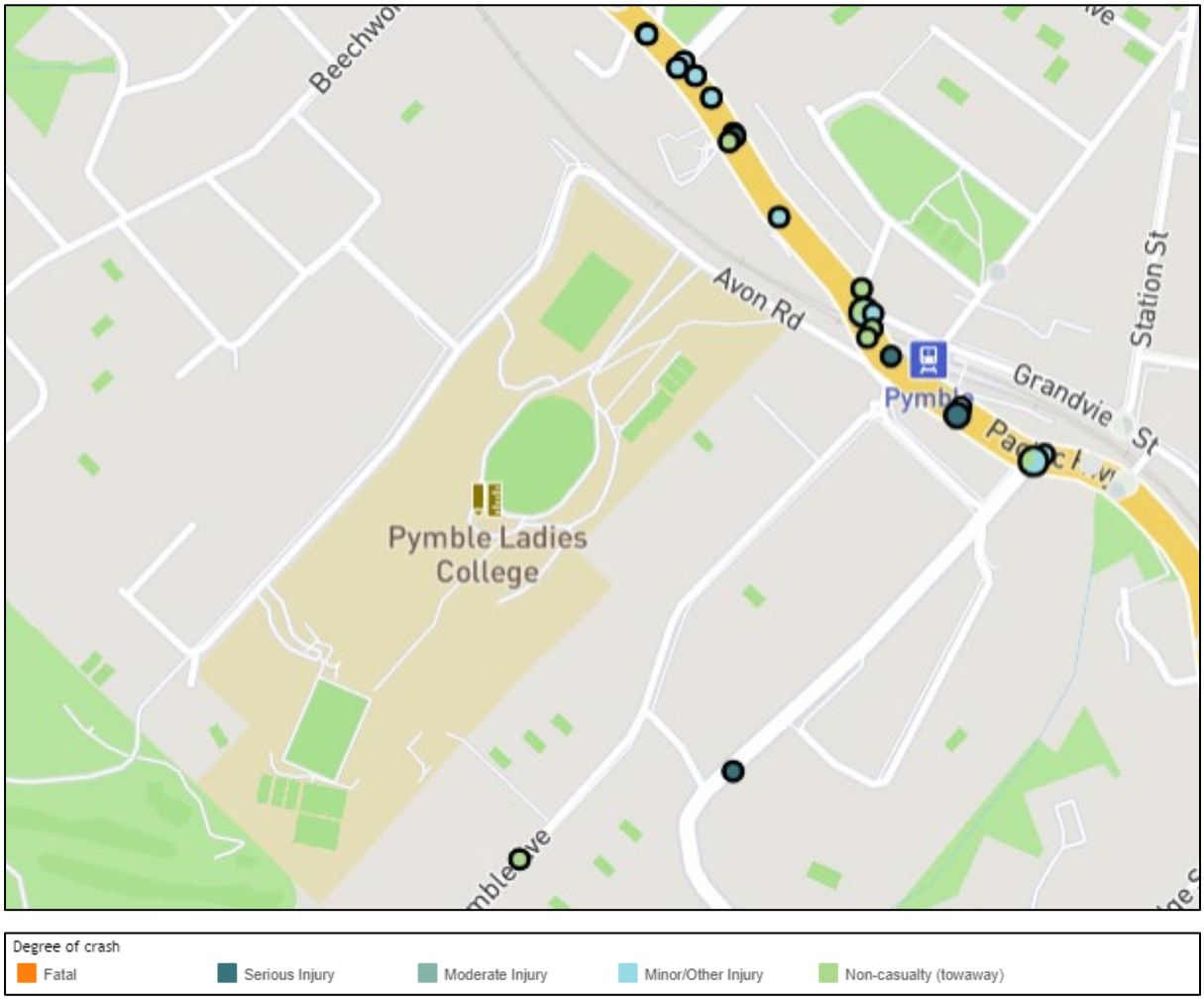


Figure 10: Crashes on surrounding roads (Source: TfNSW Centre for Road Safety)

A total of 48 crashes have been recorded along Pacific Highway between Livingston Avenue and Telegraph Road:

- No fatal crashes recorded;
- 13 crashes resulted in moderate to serious injuries;
- 2 crashes involved pedestrians; and
- Majority of crash types were 'same direction', with rear ending being the common cause of crashes.

A crash was identified along Pymble Avenue, near the entry into Grey House Walk. This crash occurred in 2019 and involved a vehicle veering off to the side of the road and crashing into an object or parked car. The crash did not result in injuries or casualties. The crash occurred in hours of darkness and there are no indications suggesting that the crash involved students or staff from the College.

5.0 EXISTING PARKING CONDITIONS

5.1 ON-SITE PARKING

Arup was engaged by the College in 2019 to prepare a Traffic, Transport and Parking Assessment Report to inform the new master plan for the College, and as part of the assessment undertook a parking audit of the site to verify the survey numbers reported by the College. The audit indicated that the College currently provides a total of 548 on-site parking spaces, distributed throughout the College grounds. These parking spaces are available for staff, visitors, contractors, and visitors attending the swim school. The College does not allow students to park within the College grounds. The breakdown is summarised in Table 2.

Table 2: Existing on-site parking supply

Category	No. of Spaces
Staff	255
Shared Visitor/Staff	239
Contractor	8
Accessible	8
Swim School	38
TOTAL	**548***

** This includes 45 informal parking spaces in the area called 'Under the Pines' which does not meet the requirements of the Australian Standards.*

The College also provides an additional four (4) parking spaces for its private buses.

An indicative location of all on-site parking spaces can be seen in Appendix C.

5.2 ON-STREET PARKING

Table 3 summaries the parking controls that currently apply to roads around the College.

Table 3: On-street parking summary

Road Name	Parking
Avon Road along Gate 1	No Stopping Unrestricted Parking
Avon Road along Gate 2 & 3	No Stopping 8:00am-6:00pm School Days No Parking 8:00am-6:00pm School Days Unrestricted Parking
Pymble Avenue	No Parking 6:30am-9:30am School Days No Stopping 7:00-9:30am & 2:30-4:00pm School Days Unrestricted Parking

Road Name	Parking
Everton Street	No Stopping No Parking
Livingston Avenue (between Pacific Highway & Everton Street)	No Stopping 6:00am-9:00am 2P 9:00am-6:00pm Mon-Fri & 8:30am-12:30pm Sat

6.0 EXISTING DROP-OFF & PICK-UP

The majority of drop-off and pick-up activities occur within the College grounds, as shown in Figure 11.

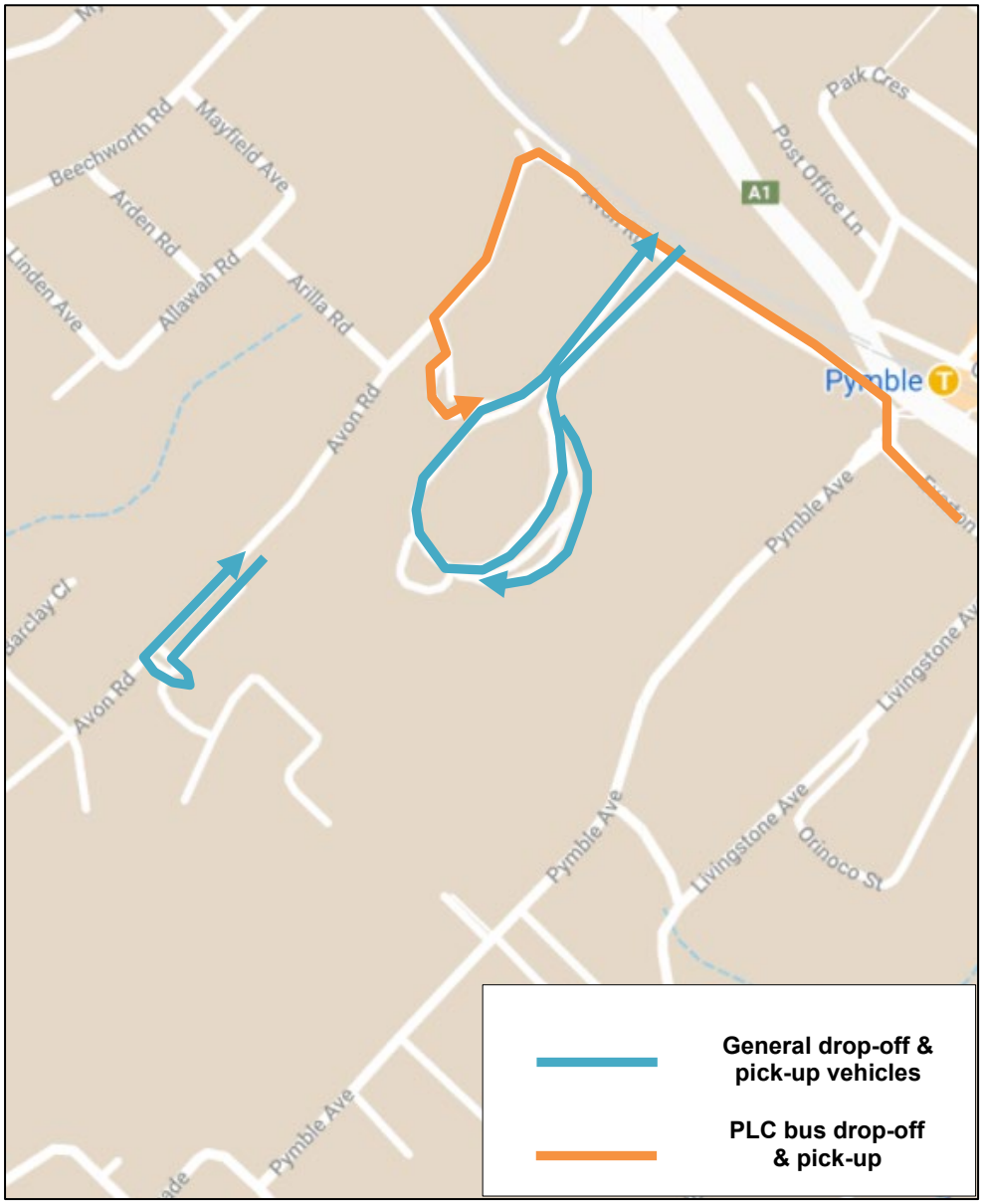


Figure 11: Existing drop-off and pick-up arrangement

The majority of on-site drop-off and pick-ups occur via Gate 1 (Marden Gates) as shown in the figure above. Vehicles will queue along the internal roadway and make their way around the frontage oval and back out onto Avon Road through Gate 1. This is shown in Figure 12 overleaf.

Figure 12: Drop-off and pick-up queue around frontage oval

Vehicles dropping off or picking up kindergartens also enter via Gate 1, but veer off to the left, as shown in Figure 11 to a dedicated drop-off and pick-up zone for kindergartens (see Figure 13). These vehicles later join back up with the main traffic stream and make their way around the frontage oval and back towards Gate 1.

Figure 13: Kindergarten drop-off and pick-up queue

Some on-site drop-off and pick-up also occur via Gate 3 as shown in Figure 11.

PLC private bus drop-off and pick-up also occur on-site, with buses entering via Gate 2 and exiting onto Avon Road via Gate 1. Dedicated bus zones are provided on-site as shown in Figure 14.

Figure 14: On-site bus zones

Some drop-off and pick-up also occurs outside of College grounds, within the surrounding streets such as Avon Road and Pymble Avenue.

It is also noted that drop-off and pick-ups also occur on the other side of the rail line, near Pymble Train Station, in dedicated 'kiss and drop' car spaces. This allows reduction of College traffic in the immediate surrounding road network.

As aforementioned, the SSDA does not seek to change the existing operations of the College and will not alter the current drop-off and pick-up arrangements.

7.0 EXISTING SUSTAINABLE TRANSPORT NETWORK

7.1 TRAIN

Pymble Train Station is located approximately 350m walking distance from the front gates along Avon Road, as seen in Figure 15.

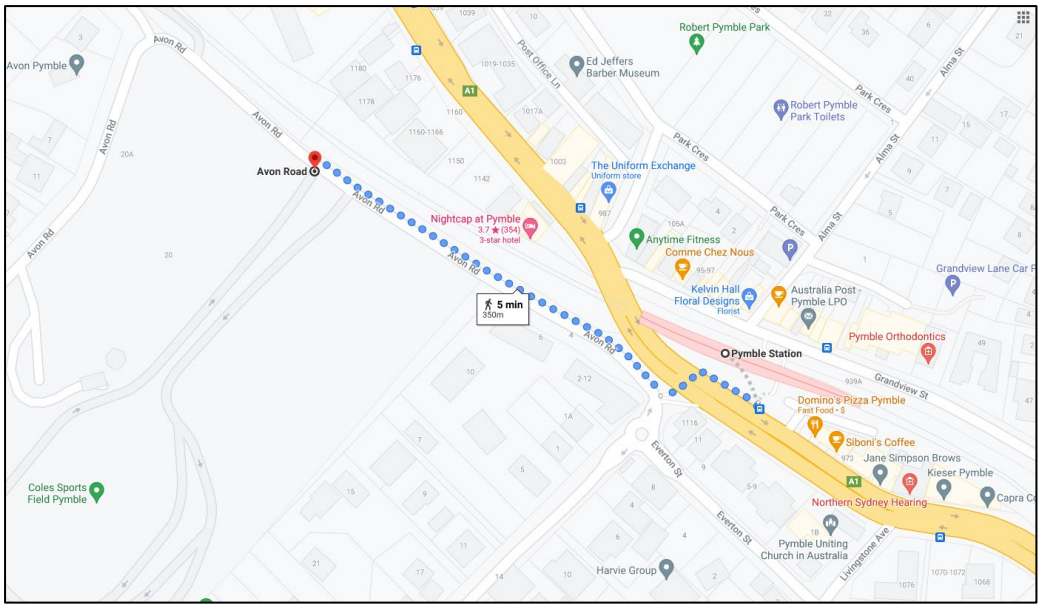


Figure 15: Walking distance to Pymble Train Station (Source: Google Maps)

This station is located on the T1 North Shore, Northern & Western Line which provides connection to Hornsby in the north and Central via Chatswood in the south, as shown in Figure 16.

Figure 16: Sydney train network (Source: TfNSW)

Services through Pymble Train Station are frequent with approximately one service every 5-10 minutes during the typical commuter peak periods and one service every 15 minutes outside of commuter peak periods.

7.2 BUS

7.2.1 Private Bus Services

The College provides five privately operated bus services for students. The bus services drop off the students by 9:00am and depart in the afternoon at 3:30pm. The bus routes are shown in Figure 17 and include:

- **Route 1:** Hunters Hill via Lane Cove, Longueville, Gladesville, Ryde, Macquarie
- **Route 2:** Lower North Shore via Neutral Bay, Northbridge, Castlecrag, Castle Cove, Roseville, Killara
- **Route 3:** North West via Dural, Glenhaven, West Pennant Hills, Beecroft, Epping, Marsfield, Macquarie
- **Route 4:** Northern Beaches via Avalon, Newport, Mona Vale, Ingleside, Terrey Hills, St Ives
- **Route 5:** Lower Northern Beaches via North Curl Curl, South Curl Curl, Freshwater, Manly, Balgowlah, Seaforth, Wakehurst Parkway, Frenchs Forest, Belrose

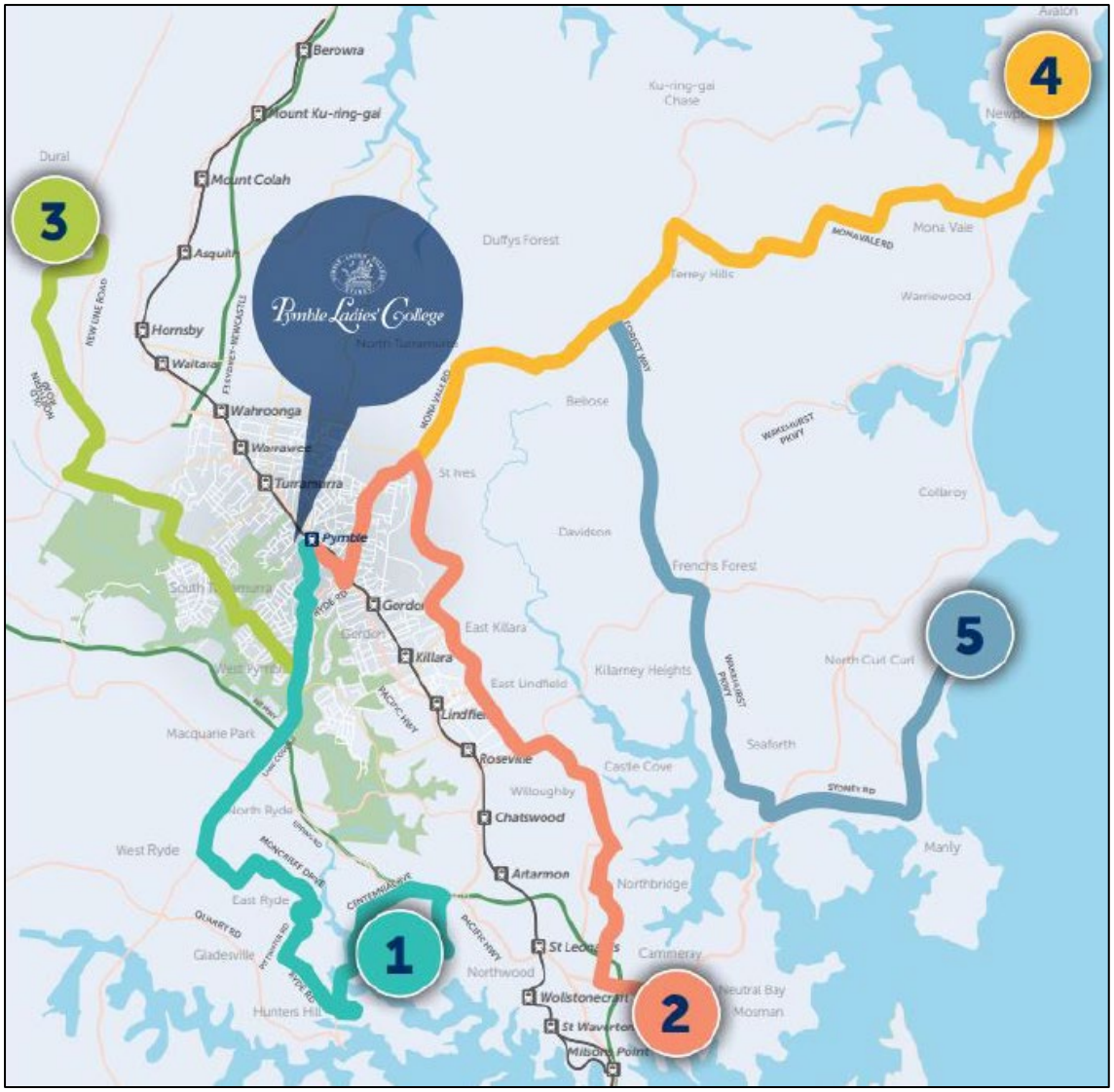


Figure 17: PLC bus routes

7.2.2 Public Bus Services

TransDev also operates routes 575 and 579 along Pacific Highway and provides opportunities for students to alight outside of Pymble Train Station.

- Route 575: Hornsby to Macquarie University – service runs approximately every half an hour on weekdays

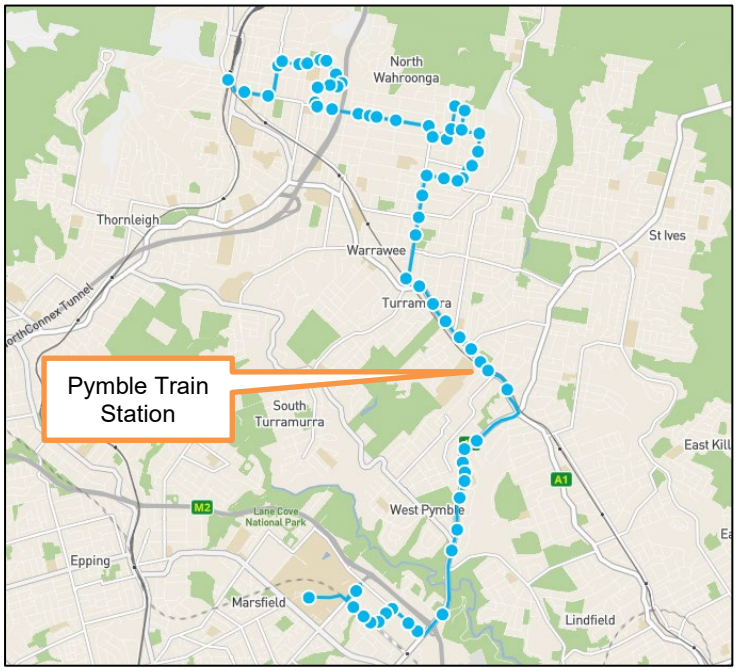


Figure 18: Route 575 (Source: TfNSW)

- Route 579: Pymble to East Turramurra – limited morning peak services with services approximately every half an hour in the afternoon peak

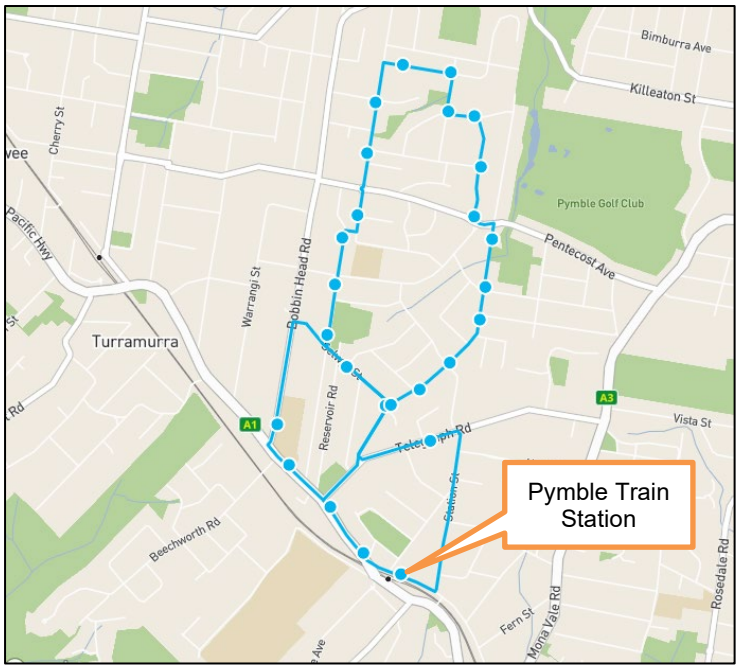


Figure 19: Route 579 (Source: TfNSW)

7.3 PEDESTRIAN INFRASTRUCTURE

There are several access points to the College grounds on foot. These access points have been identified in Figure 20.

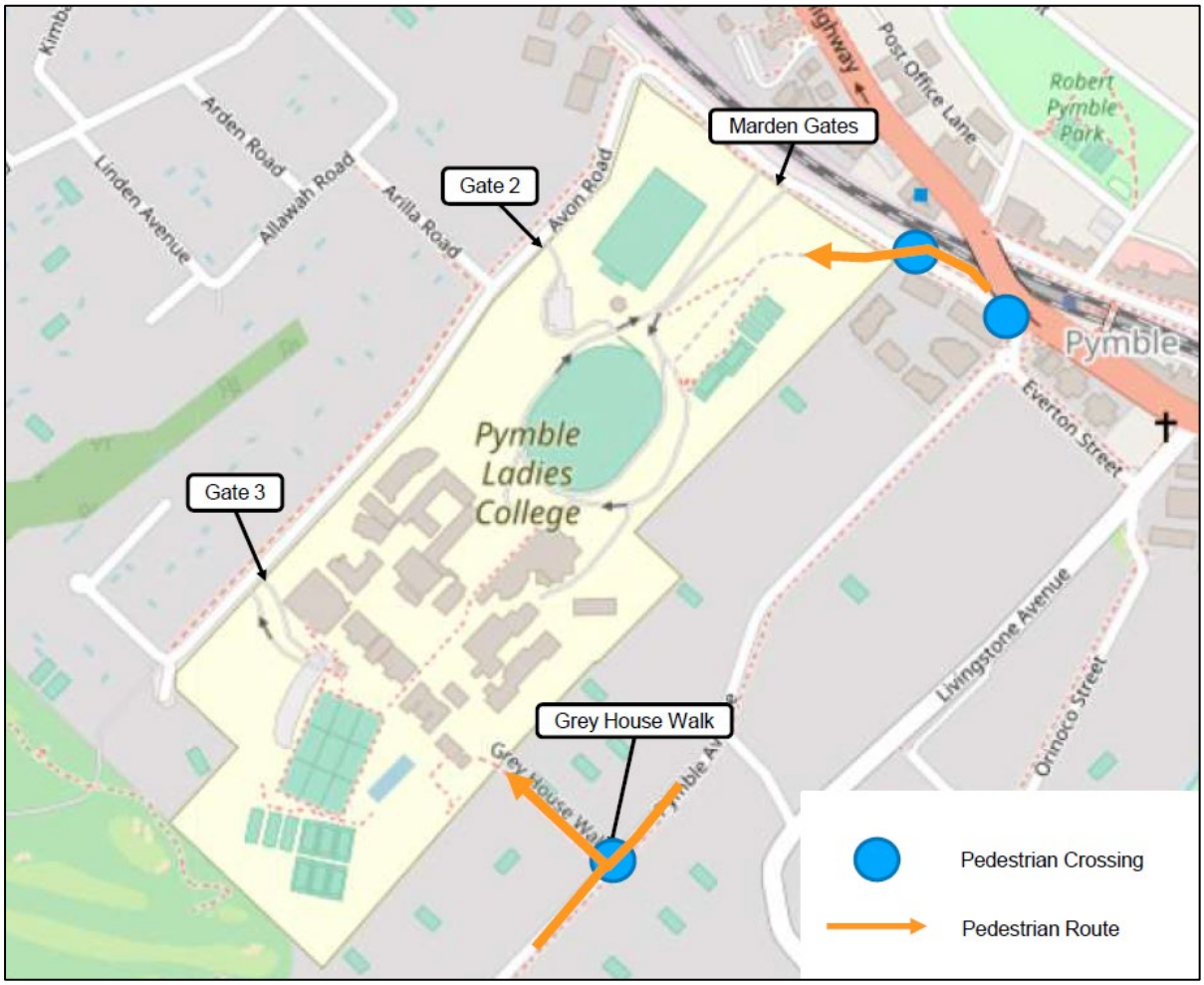


Figure 20: Pedestrian access locations

The primary walking route is to and from Pymble Train Station via the Marden Gates. There is a pedestrian tunnel near the roundabout between Avon Road, Pymble Avenue and Everton Street which provides connection under Pacific Highway and directly to Pymble Train Station.

A zebra crossing is provided in front of the pedestrian tunnel to provide a crossroad connection at Avon Road, and a raised pedestrian crossing is provided closer to Marden Gates. A traffic controller is stationed at the raised pedestrian crossing during drop-off and pick-up hours.

Pedestrian access is also available through the Grey House Walk via Pymble Avenue.

7.4 CYCLING INFRASTRUCTURE

TfNSW Cycleway Finder indicates that there are no cycleways within the vicinity of the College and no connections to the wider cycle network. This can be seen in Figure 21 overleaf.

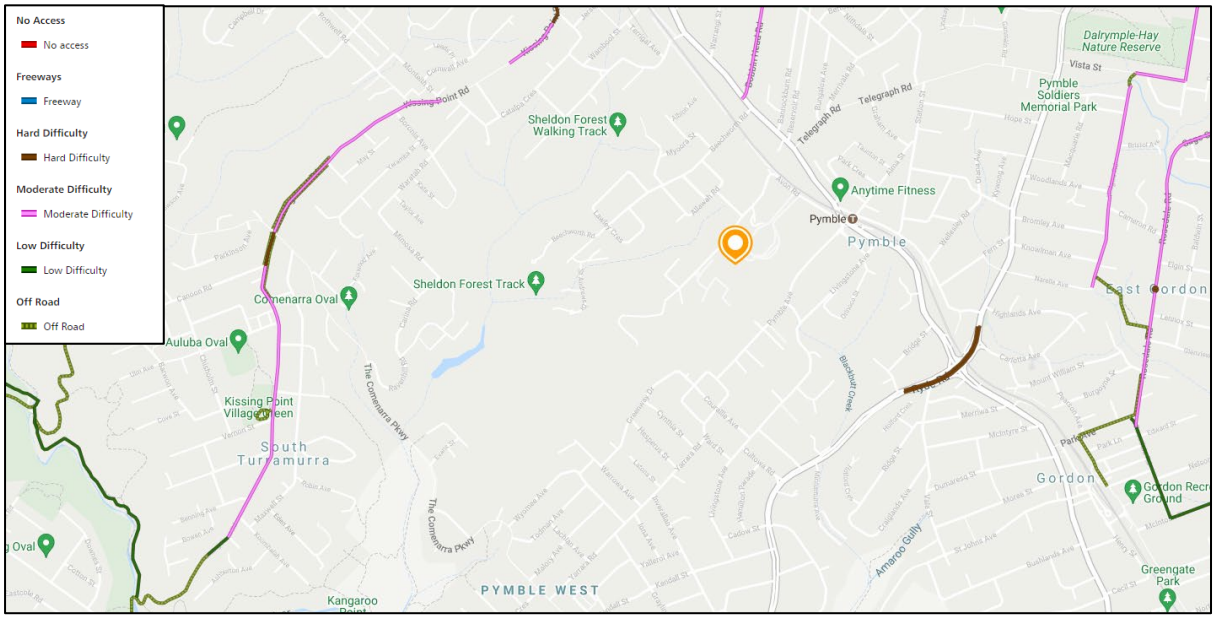


Figure 21: Surrounding cycle network (Source: TfNSW Cycleway Finder)

Currently, the College does not permit students to cycle to/from the College campus for safety reasons.

8.0 POST-DEVELOPMENT PARKING IMPACT

8.1 PARKING REQUIREMENT

The parking requirements for the GHP have been determined based on the rates stipulated in Ku-ring-gai Development Control Plan (DCP) Section C Part 22 – General Access and Parking.

The ELC is the only component of the GHP that will generate additional parking demand.

The rates and requirements are summarised in Table 4.

Table 4: ELC Parking Requirements

Type	Rate	Minimum Requirement
General Car Parking	1 space per 4 children in care (rates include staff parking)	23 spaces
Accessible Parking (included in general car parking)	2-3% of total spaces	1 space (included in 23 spaces)
Bicycle Parking	No rates for bicycle parking	N/A
Motorcycle Parking	No rates for motorcycle parking	N/A
Service Vehicle Parking	No rates for service vehicle parking	Servicing demand for the ELC is expected to be minor. There are a number of loading docks and service bays within the College campus that can be used to accommodate the servicing demands of the ELC. No additional service vehicle bays are required.
Bus parking	No rates for bus parking	Children attending the ELC are not expected to travel to/from the College via buses No additional bus bays are required.

8.2 PROPOSED PARKING PROVISION

The College proposes to utilise the existing swim school spaces located in the Centenary Car Park. In order to accommodate an accessible space and its adjacent shared bay, two existing spaces will need to be replaced and result in a total of 37 parking spaces. This will provide 37 parking spaces (including one accessible space) for the ELC to be used during drop-off and pick-up.

Drop-off for the ELC is expected to be between 7:00-7:30am whilst pick-up will be between 6:00-6:30pm. This will allow the ELC to operate in parallel with the OSHC and allow for working parents to drop-off/ pick-up their children before/ after work. However, it is noted that drop-off and pick-up for ELCs are typically spread throughout several hours, particularly in the afternoon where there is an after-school and after-work peak.

The swim school will not require the use of these spaces during ELC drop-off and pick-up periods, and as such, the shared use of these spaces is considered appropriate and meets the minimum requirements. The Learn to Swim school is used from 9:30am in the morning so there will be no clash with use from the ELC and no impact on existing car spaces.

8.3 PROPOSED ACCESS

The 38 parking spaces in the Centenary Car Park will be accessible via Gate 3, along Avon Road. This access is separated into two separate gates: one for entry and the other for exit. A boom gate is currently installed to separate these swim school spaces from the rest of the car park, to restrict use. This boom gate will continue to operate which continue to allow the College to restrict these spaces to ELC use only.

8.4 OVERALL PARKING IMPACT

Considering that the proposed parking provision will adequately meet the requirements of the Council DCP, there are no concerns around the lack of parking on-site, as a result of the GHP development.

Concerns have been raised regarding the parking and traffic impact the development will have on the adjacent streets, particularly Pymble Avenue. It is noted that although the majority of parent drop-off and pick-up occurs within the College grounds, there are a number drop-off and pick-up activities occurring along the adjacent streets, including Pymble Avenue (largely due to the presence of Grey House Walk). It is also noted that students who drive to the College are not allowed to park within the College grounds, and therefore park along the adjacent streets. This has ultimately led to an increase in traffic and parking demand along Avon Road and Pymble Avenue.

Due to the direct connection between the GHP and Grey House Walk, concerns have been raised from residents that parents will opt to park their vehicles along Pymble Avenue and walk their children to the ELC using the Grey House Walk, rather than parking their vehicles in the Centenary Car Park. Although a valid concern, it is expected that majority of parents dropping off and picking up their children from the ELC will opt to use the Centenary Car Park due to the following reasons:

- The shortest walking distance from the Centenary Car Park entrance to the ELC has been measured to be approximately 73.3 metres and an alternative path around Goodlet House was also measured to be approximately 119.5 metres. This is considerably shorter than the 210 metres walking distance from Pymble Avenue to the ELC, via the Grey House Walk;
- The Grey House Walk is a narrow pathway which has sections with uneven surfaces and narrower widths due to overgrown vegetation. As such, it is not considered an ideal walking pathway for parents with young children or prams;
- Pymble Avenue, between Rand Avenue and Golfers Parade, is quite steep and will not be ideal for parents with prams;
- The Centenary Car Park is located below the aquatic centre, and as such, provides all-weather parking spaces for ELC drop-off and pick-up;
- The ELC parking area, within the Centenary Car Park, will be closed off with boom gates and access will only be given to ELC parents and staff. The ELC parking area will provide 37 dedicated parking spaces (including one accessible space);
- An accessible path is provided between the Centenary Car Park and the ELC. A lift is provided within the Centenary Car Park which will allow wheelchair/ pram users to travel to/from the car park level and the GHP level; and
- Parents will be informed of the Centenary Car Park location, through the orientation process, through information packages and the College website. The College will also encourage drop-off and pick-up to occur in the car park.

In light of the above, the ELC is not expected to have an adverse impact on the existing parking conditions along Pymble Avenue or other adjacent streets.

9.0 POST-DEVELOPMENT TRAFFIC IMPACT

9.1 TRAFFIC GENERATION

As aforementioned, the SSDA is not seeking to increase the existing enrolment capacity for Kindergarten to Year 12, and as such, the ELC is the only component of the GHP that will generate additional traffic volumes.

The operating hours of the ELC will be 7:00am to 6:30pm to parallel the operations of the OSHC and allow for working parents to drop-off and pick-up their children before/after work. Peak drop-off and pick-up for the ELC is expected to be between 7:00-7:30am and 6:00-6:30pm.

The RMS Guide to Traffic Generating Developments (2002) provides rates to estimate the traffic generated by a number of different land uses. Section 3.11.3 of the guide outlines rates for different child care centre types:

- Pre-school
- Long-day care; and
- Before/after care

The rates for a long-day care have been adopted:

Long-Day Care Trip Generation Rates:

- 7:00-9:00am: 0.8 trips/ child
- 2:00-4:00pm: 0.3 trips/ child
- 4:00-6:00pm: 0.7 trips/ child

Based on an enrolment number of 90 children, the estimated trip generation is summarised in Table 5.

Table 5: Development Traffic Generation

No of children	7:00-9:00am	2:00-4:00pm	4:00-6:00pm
90 children	72 trips	27 trips	63 trips

It is noted, however, the number of children enrolled at the ELC who would contribute to additional traffic is expected to be less than 90 children. This is due to the following reasons:

- The primary intention of the ELC is to provide an on-campus early learning/ child care centre for the staff members and allow the College to retain valuable staff members who would otherwise find it difficult to return to work after maternal/parental leave. As outlined in Section 3.0, the staff survey results indicated that approximately 32 staff would enrol their children in an on-campus ELC, whilst 42 staff members would consider enrolling their children in an on-campus ELC. Assuming that 32 staff members enrol their children at the ELC, this portion is not expected to contribute to generating additional traffic;
- Many children who enrol in ELCs which are associated with private schools such as PLC, typically have siblings attending the school. A survey result undertaken by the College in July 2021, found that approximately 18% of the parents who responded (total of 441 responses) had two or more children attending the College.

Based on the assumption above, the total number of children who would contribute to generating additional traffic is estimated to be approximately 42 children.

Table 6: Reduced Development Traffic Generation

No of children	7:00-9:00am	2:00-4:00pm	4:00-6:00pm
42	34 trips	13 trips	29 trips

Additionally, some trips made to the ELC by people not directly associated with the College will be drawn from existing traffic flows in the area, particularly on arterial routes. For example, people who commute along Pacific

Highway and call in to the ELC before and after work do not increase the demand on Pacific Highway. Nevertheless, it is acknowledged that this will vary each year, and as such, the additional trips in Table 5 have been adopted for the SIDRA analysis in Section 9.3.

9.2 TRAFFIC DISTRIBUTION

The College is located within a road network where there are a limited number of approach and departure routes. This is summarised in Table 7 and Table 8. It is noted that vehicles traveling to/from South Turramurra and West Pymble region will most likely travel via the residential streets. However this volume is expected to be minor. The travel survey also gathered postcode data of participants which provides an indication of the origin/destination for students and staff. This is also shown in the following tables.

Table 7: Approach routes to PLC

Approach Route	
From	**Approach Route**
North-West	Southbound along Pacific Highway and turn right into Livingstone Avenue
South-West	Northbound along Ryde Road, left into Cultowa Road and towards Livingstone Avenue or Pymble Avenue
North-East	Southbound along Mona Vale Road, right onto Pacific Highway and left into Livingstone Avenue
South-East	Northbound along Pacific Highway and left into Livingstone Avenue

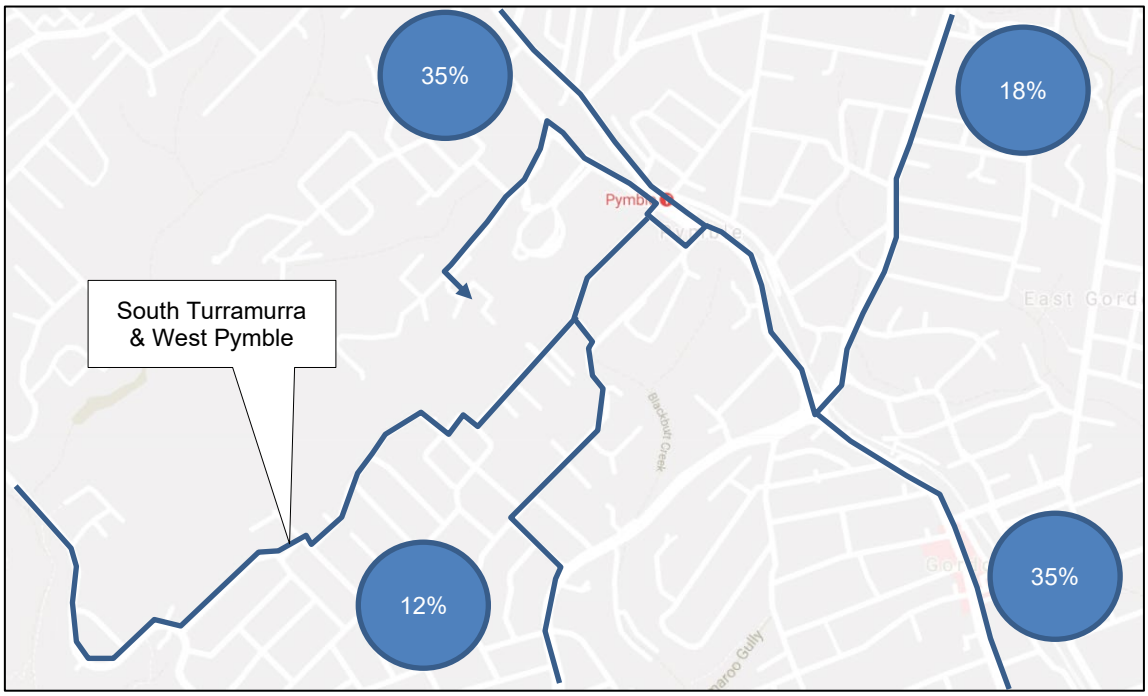


Figure 22: Distribution for Arrival

Table 8: Departure routes from PLC

Approach Route	
To	**Approach Route**
North-West	Northbound along Pacific Highway via Beechworth Road
South-West	Northbound along Ryde Road, left into Cultowa Road and towards Livingstone Avenue or Pymble Avenue
North-East	Southbound along Mona Vale Road, right onto Pacific Highway and left into Livingstone Avenue
South-East	Northbound along Pacific Highway and left into Livingstone Avenue

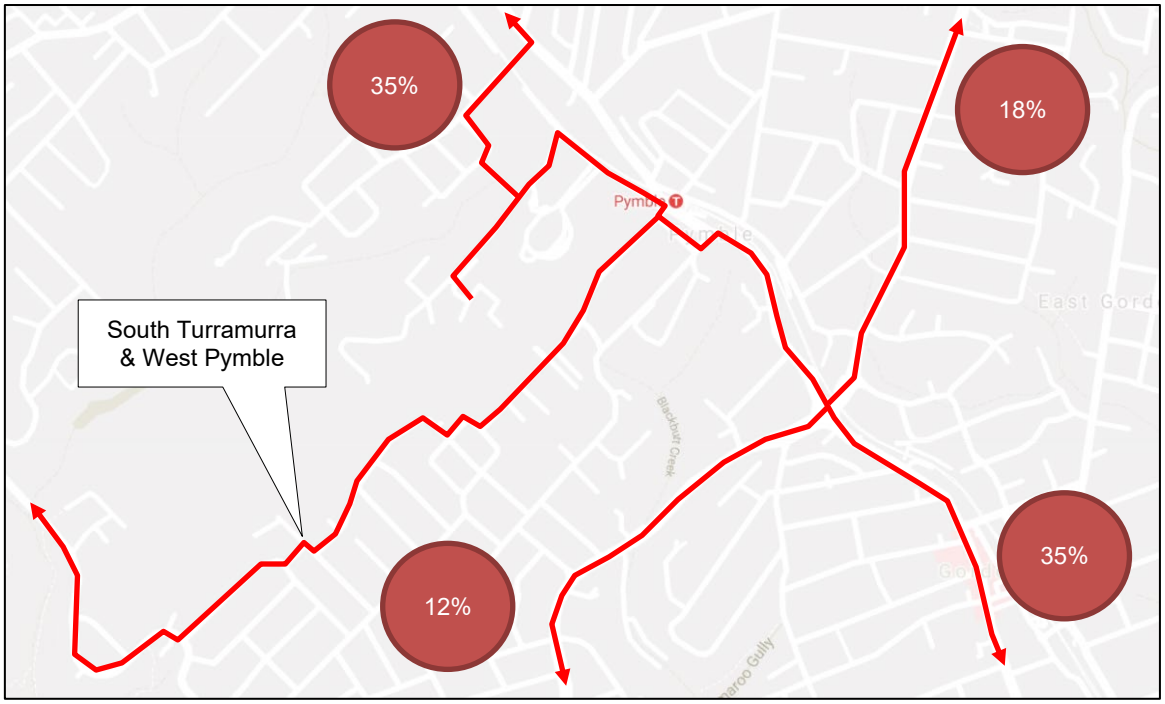


Figure 23: Distribution for Departure

9.3 SIDRA ASSESSMENT

The concepts of intersection capacity and Level of Service (LoS) as defined in the RMS Guidelines (2002), are described in Appendix D together with the criteria for their assessment. The assessment of the LoS of signalized intersections is based on the evaluation of the average delay (seconds/vehicle) of all approaches.

The following scenarios have been modelled using SIDRA 9.0:

- Scenario 1 – Base Case
- Scenario 2 – Post-development

The following intersections were modelled as part of the assessment:

- Pacific Highway & Livingstone Avenue (signalised)
- Pacific Highway & Beechworth Road (signalised)

9.3.1 Scenario 1 – Base case

During the preparation of this traffic assessment, the Greater Sydney Area was subjected to lockdown (due to the Covid-19 pandemic) and traffic counts were unable to be gathered as they will not accurately reflect normal peak hour traffic conditions.

As a result, the turning movements used for the base case scenario are based on the 2012 traffic counts (used in a previous SSDA submitted by PLC) which were factored up to the SCATS data provided by TfNSW. The 2012 traffic counts can be seen in Appendix F. The SCATS data used were the traffic volumes gathered on Tuesday 9th March 2021, which coincides with the same day the 2012 traffic counts were collected (Tuesday 17 July 2012), during a typical school day and outside any COVID-19 lockdowns.

The results from the model are shown in Table 9.

Detailed SIDRA results can be seen in Appendix G.

Table 9: Scenario 1 SIDRA Results

Intersection	AM Peak		PM Peak	
	Average Delay (seconds/vehicle)	Level of Service (LoS)	Average Delay (seconds/vehicle)	Level of Service (LoS)
Pacific Highway & Livingstone Avenue	18.4	B	>70	F
Pacific Highway & Beechworth Road	>70	F	>70	F

9.3.2 Scenario 2 – Post-development

The post-development scenario was modelled by adding the estimated development traffic onto the base case model.

The results from the model are shown in Table 10 overleaf. Detailed SIDRA results can be seen in Appendix H.

Table 10: Scenario 2 SIDRA Results

Intersection	AM Peak		PM Peak	
	Average Delay (seconds/vehicle)	Level of Service (LoS)	Average Delay (seconds/vehicle)	Level of Service (LoS)
Pacific Highway & Livingstone Avenue	19.4	B	>70	F
Pacific Highway & Beechworth Road	>70	F	>70	F

The comparison between the base case and post-development scenario indicates that the proposed development will have minor impact to the existing conditions of the two intersections.

The proposed ELC is expected to add 25 trips to the Pacific Highway/ Beechworth Road intersection and 63 trips to the Pacific Highway/ Livingstone Avenue intersection. This is equivalent to approximately 1 trip every 2.5 minutes and 1 trip every minute for each intersection which is considered a minor increment in the overall traffic.

9.3.3 10-Year Horizon

It is acknowledged that TfNSW have requested that the ultimate development year plus 10 years growth is modelled as part of the assessment. A meeting was held with TfNSW on Wednesday 7 July 2021, where the modelling requirements were discussed. It was agreed that the ultimate development year plus 10 years growth will not be modelled as part of the assessment as long as it was justifiable (see email correspondence in Appendix E). Justification for omitting this scenario is as follows:

- As indicated within Section 9.1, the ELC is expected to have a peak generation of approximately 72 trips. When factoring in the trip distribution, this will result in approximately 25 additional trips through the Pacific Highway/ Beechworth Road intersection and 63 additional trips through the Pacific Highway/ Livingstone Avenue intersection. This is equivalent to approximately 1 trip per 2.5 minutes and 1 trip per minute respectively which is considered a minor increment in traffic;
- Trips associated with ELCs are generally spread throughout the peak hours, particularly in the afternoon where some children may be picked up during the after-school peak, and others may be picked-up during after-work peak (i.e. working parents picking up their children). As such, due to the spreading out of trips, the overall impact that the ELC will have on the wider road network will not be as significant, when comparing additional trips generated by the increase in student numbers for Kindergarten-Year 12; and
- As mentioned in Section 9.1, the peak trips generated by the ELC is expected to be lower than 72 trips and is anticipated to reflect the volumes summarised in Table 6; and
- The SIDRA results indicates that the proposed ELC will not have any adverse impacts to the existing conditions along Pacific Highway. It is noted that the SIDRA models have adopted the additional traffic volumes calculated using RMS rates.

9.4 OVERALL TRAFFIC IMPACT

In summary, the overall traffic impact from the proposed development is expected to be minor based on the following considerations:

- The ELC is estimated to generate approximately 72 trips in the AM peak and 63 trips in the PM peak (when adopting RMS rates). However, in reality, the additional trips are expected to be less as many of the children enrolled in the ELC will have parents who are staff members at the College or have siblings already attending, and as such, will not contribute to generating additional trips; and
- As aforementioned, the ELC is expected to add, at its peak, 25 trips to the Pacific Highway/ Beechworth Road intersection and 63 trips to the Pacific Highway/ Livingstone Avenue intersection. This is equivalent to approximately 1 trip every 2.5 minutes and 1 trip every minute for each intersection which is considered a minor increment in the overall traffic and will not have an adverse impact to the existing conditions along Pacific Highway, as evident in the SIDRA results.

As aforementioned in Section 8.4, concerns have been raised by residents regarding the current traffic and parking conditions along Pymble Avenue. Similarly to the overall parking impact, the proposed GHP is not expected to have an adverse impact on the current conditions along Pymble Avenue, based on the considerations summarised in Section 8.4.

10.0 RECOMMENDATIONS TO REDUCE IMPACT ON PYMBLE AVENUE

As aforementioned, concerns have been raised regarding the current safety concerns along Pymble Avenue as a result of increased traffic during drop-off and pick-up hours.

It has been demonstrated that the proposed GHP will have a minor impact on the surrounding road network and will not have an adverse impact on the existing traffic and parking conditions along Pymble Avenue.

The following recommendations can be implemented by the College to reduce and alleviate the current parking and traffic conditions along Pymble Avenue:

- Install gate at Grey House Walk which can only be opened using a keycard, which can be distributed to local students (College to determine definition of 'local' students). This will reduce College traffic along Pymble Avenue;
- Investigate feasibility of providing remote drop-off and pick-up area (e.g. nearby park). It is understood that the College has worked closely with Ku-ring-gai Council to allow drop-off and pick-up of students along Grandview Street which has been effective and reduced traffic within the College's immediate surrounding road network;
- Work closely with Ku-ring-gai Council to implement timed parking along Pymble Avenue, with exception to permit holders. Permits can be made available to residents;
- Work closely with Ku-ring-gai Council and Hornsby Police Station to get rangers/ police to closely monitor operations along Pymble Avenue and Avon Road during peak drop-off and pick-up hours; and
- Encourage students and parents to use alternative modes of transport.

It is noted that to reduce overall traffic and parking impact in the long term, students and staff will need to make greater use of sustainable travel options (public and active transport). Measures to achieve this are discussed in the Green Travel Plan.

11.0 GREEN TRAVEL PLAN

A Green Travel Plan (GTP) has been prepared in response to the following item in the SEARs:

Measures to ameliorate any adverse traffic and transport impacts due to the development based on the above analysis, including:

- *Travel demand management programs to increase sustainable transport (such as a Green Travel Plan/ School Travel Plan)*
  - *Arrangements for the Travel Coordinator roles*
  - *Governance arrangements or relationships with state and local government transport providers to update roads safety*
  - *Infrastructure improvements or protection measures, including details of timing and method of delivery*

The GTP will be submitted with the TIA as part of the SSDA submission.

12.0 PRELIMINARY OPERATIONAL TRANSPORT & ACCESS MANAGEMENT PLAN

A preliminary Operational Transport & Access Management Plan (OTAMP) is to be prepared in response to the following items in the SEARs:

- *A preliminary school transport plan detailing a operational traffic and access management plan for the site, pedestrian entries, the drop-off/ pick-up zone(s) and bus bay(s)*

This SSDA will not be seeking to increase the existing student and staff numbers for Kindergarten – Year 12, and the GHP will not be altering the existing traffic operations of the College. As such, a separate preliminary OTAMP is not considered necessary at this stage as the development will not be changing the status quo. A detailed OTAMP can be prepared as part of the SSDA Conditions of Consent. Details of the existing pedestrian entries, drop-off/ pick-up zone(s) and bus bay(s) have already been detailed in this TIA.

In summary:

- The facilities within the GHP will largely be used by the existing students and staff, with the exception of the new ELC which will have an enrolment capacity of 90 children;
- Transport and access operations for the existing students and staff will not change as part of the GHP development;
- The operating hours of the ELC will be 7:00am to 6:30pm, to parallel with OHSC. As such, drop-off and pick-up hours will occur outside of general College drop-off and pick-up hours. This will also cater for parents who need to drop-off and pick-up their child before and after work;
- The College will provide 37 parking spaces in the existing Centenary Car Park which will be restricted by existing boomgates;
- An accessible path is provided from the Centenary Car Park to the ELC which has a total walking distance of approximately 73.3 metres, with an alternative path around Goodlet House which has a walking distance of approximately 119.3 metres;
- No changes are expected to the bus operations as part of this SSDA. Children dropped-off or picked-up at the ELC are not expected to use the private bus services; and
- Concerns have been raised by residents regarding the traffic and parking impacts the GHP will have on Pymble Avenue. These concerns have been addressed in Section 8.4, 9.4 and 10.0.

A detailed OTAMP can be prepared as part of the SSDA Conditions of Consent if required.

13.0 PRELIMINARY CONSTRUCTION TRAFFIC AND PEDESTRIAN MANAGEMENT PLAN

A preliminary Construction Traffic and Pedestrian Management Plan (CTPMP) has been prepared in response to the following items in the SEARs:

- *Analysis of the impacts of the traffic generated during construction of the proposed development, including:*
  - *Construction vehicle routes, types and volumes*
  - *Construction program (duration and milestones)*
  - *On-site car parking and access arrangements for construction, emergency and construction worker vehicles*
  - *Cumulative impacts associated with other construction activities in the locality (if any)*
  - *Road safety at identified intersections and level crossings near the site due to the conflicts between construction vehicles and existing traffic in the locality*
  - *Measures to mitigate impacts, including to ensure the safety of pedestrian and cyclists during construction*
- *Analysis of the impacts of construction works on the adjoining rail corridor prepared in consultation with the relevant rail infrastructure authority*
- *A preliminary Construction Traffic and Pedestrian Management Plan*

A Preliminary CTPMP will be submitted with the TIA as part of the SSDA submission.

14.0 CONCLUSION

Stantec has been engaged by Pymble Ladies' College (PLC) to prepare a Transport Impact Assessment (TIA), which will be submitted as part of the State Significant Development Application (SSDA), for the redevelopment of the Grey House Precinct (GHP).

The redevelopment will include the construction of a new building, which will replace existing demountables, and will provide new facilities such as Junior School classrooms, STEM labs, health and wellbeing facilities, dance academy, Out of School Hours Care, a new Early Learning Centre (ELC) and outdoor learning spaces.

The new facilities will be for the use of existing students and staff, and the SSDA will not be seeking to increase Kindergarten-Year 12 student numbers.

The new ELC, however, will have an enrolment capacity of 90 children.

The development proposes to provide 37 parking spaces within the Centenary Car Park, which satisfies the Council's Development Control Plan minimum requirements. These parking spaces will be shared with the aquatic centre which will not require the use of these spaces during ELC drop-off and pick-up hours.

Based on the long day care rates provided in the RMS Guidelines (2002), the ELC will generate approximately 72 trips in the AM peak and 63 trips in the PM peak. However, in reality, the additional traffic is expected to be lower considering that many of the children attending the ELC will have parents who are staff members of the College or have siblings who are already attending the College. As such, it is unlikely that all 90 children will contribute to generating additional traffic. Nevertheless, the additional traffic calculated based on the RMS rates have been adopted for the SIDRA model which indicates that the proposed development will have no adverse impact on the existing performance levels of Pacific Highway/ Livingstone Avenue and Pacific Highway/Beechworth Road intersections.

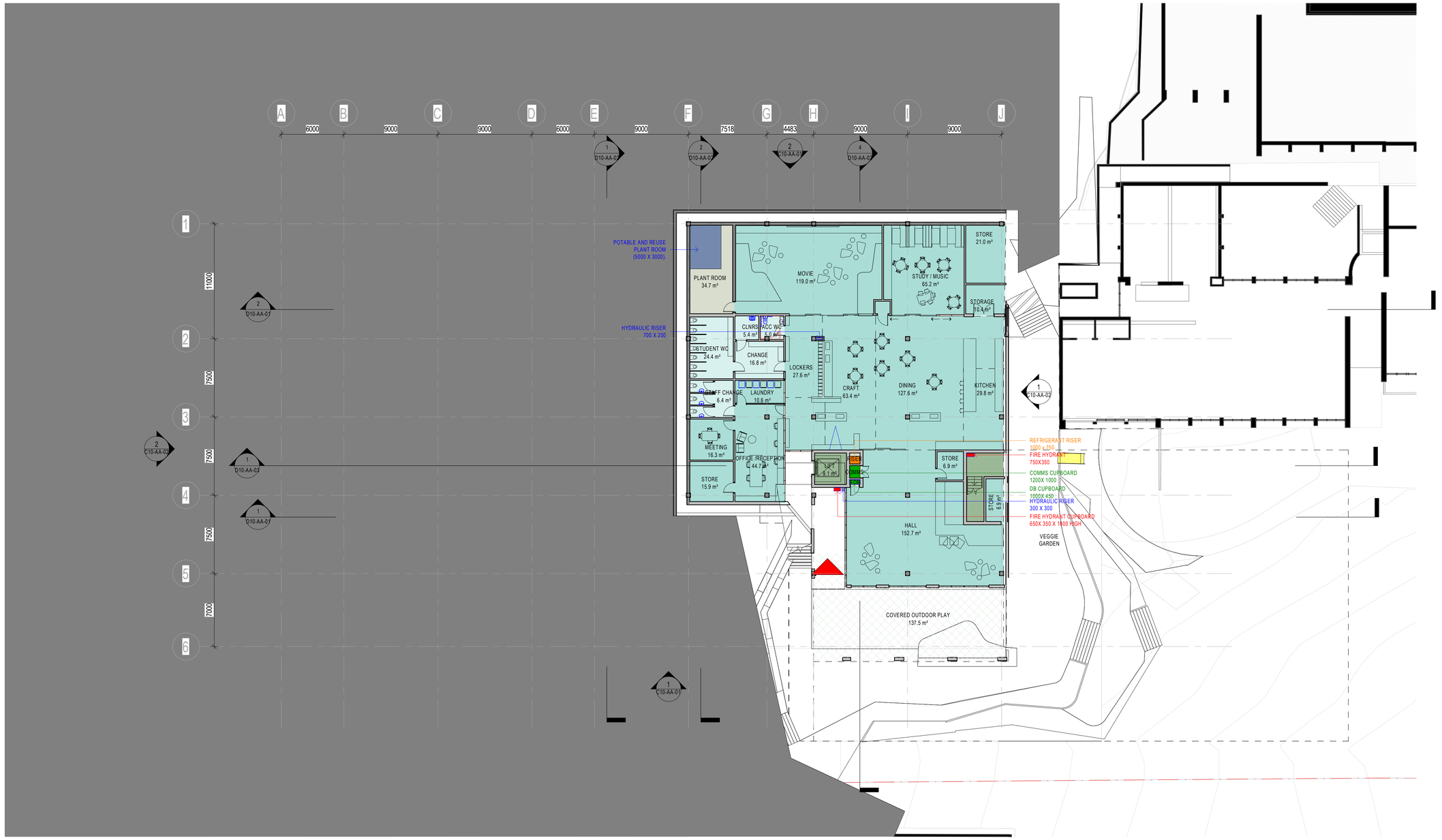
Concerns have been raised by residents regarding the existing safety, traffic congestion and parking issues along Pymble Avenue, during peak drop-off and pick-up hours, and the impact the proposed development may have on the existing conditions. The proposed development is not expected to have an adverse impact on the existing conditions along Pymble Avenue based on the following considerations:

- The shortest walking distance from the Centenary Car Park entrance to the ELC has been measured to be approximately 73.3 metres and an alternative path around Goodlet House was also measured to be approximately 119.5 metres. This is considerably shorter than the 210 metres walking distance from Pymble Avenue to the ELC, via the Grey House Walk;
- The Grey House Walk is a narrow pathway which has sections with uneven surfaces and narrower widths due to overgrown vegetation. As such, it is not considered an ideal walking pathway for parents with young children or prams;
- Pymble Avenue, between Rand Avenue and Golfers Parade, is quite steep and will not be ideal for parents with prams;
- The Centenary Car Park is located below the aquatic centre, and as such, provides all-weather parking spaces for ELC drop-off and pick-up;
- The ELC parking area, within the Centenary Car Park, will be closed off with boom gates and access will only be given to ELC parents and staff. The ELC parking area will provide 37 dedicated parking spaces (including one accessible space);
- An accessible path is provided between the Centenary Car Park and the ELC. A lift is provided within the Centenary Car Park which will allow wheelchair/ pram users to travel to/from the car park level and the GHP level; and
- Parents will be informed of the Centenary Car Park location, through the orientation process, through information packages and the College website. The College will also encourage drop-off and pick-up to occur in the car park.

Whilst it is acknowledged that the proposed development is not expected to have any adverse impact on the existing conditions along Pymble Avenue, recommendations have been provided in Section 10.0 of this report, to alleviate the existing conditions along the roadway.

Appendices

Appendix A ARCHITECTURAL PLANS



BVN

ARCHITECTS REGISTRATION BOARD / NOMINATED ARCHITECTS

NSW
8356 NINOTSCHKA TITCHKOSKY
4837 JAMES GROSE
7115 JULIAN ASHTON
7053 MATTHEW BLAIR
7151 PHILLIP ROSSINGTON
7439 PETER TITMUSS
10447 ALISON BOUNDS

QLD
5527 NEIL LOGAN
2709 BRIAN DONOVAN
1595 MARK GRIMMER
5028 DAVID KELLY
5517 CATHERINE SKINNER
3866 KEVIN O'BRIEN

Telephone +61 7 3852 2525
Facsimile +61 7 3852 2544
www.bvn.com.au

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
1	18/03/21	Issue to Town Planner
2	14/04/21	For Information
3	28/05/21	For Information
4	02/06/21	For Information
5	07/06/21	For Information
6	25/06/21	Issued for Schematic Design
7	07/07/21	For Information

CONSULTANT

STANTEC
TEL 02 9493 9700
CONSULTANT

TTW
TEL 02 9439 7288
CONSULTANT

PROCLUS ADVISORY
CONSULTANT

WILLOW TREE PLANNING
TEL 02 9929 6974
PROJECT MANAGER

KATE BIMSON
TEL 02 9855 7628
CLIENT

PYMBLE LADIES COLLEGE
PROJECT

PYMBLE LADIES COLLEGE
GREY HOUSE PRECINCT
BVN PROJECT NUMBER

2010018
DRAWING KEY

TRUE NORTH PROJECT NORTH

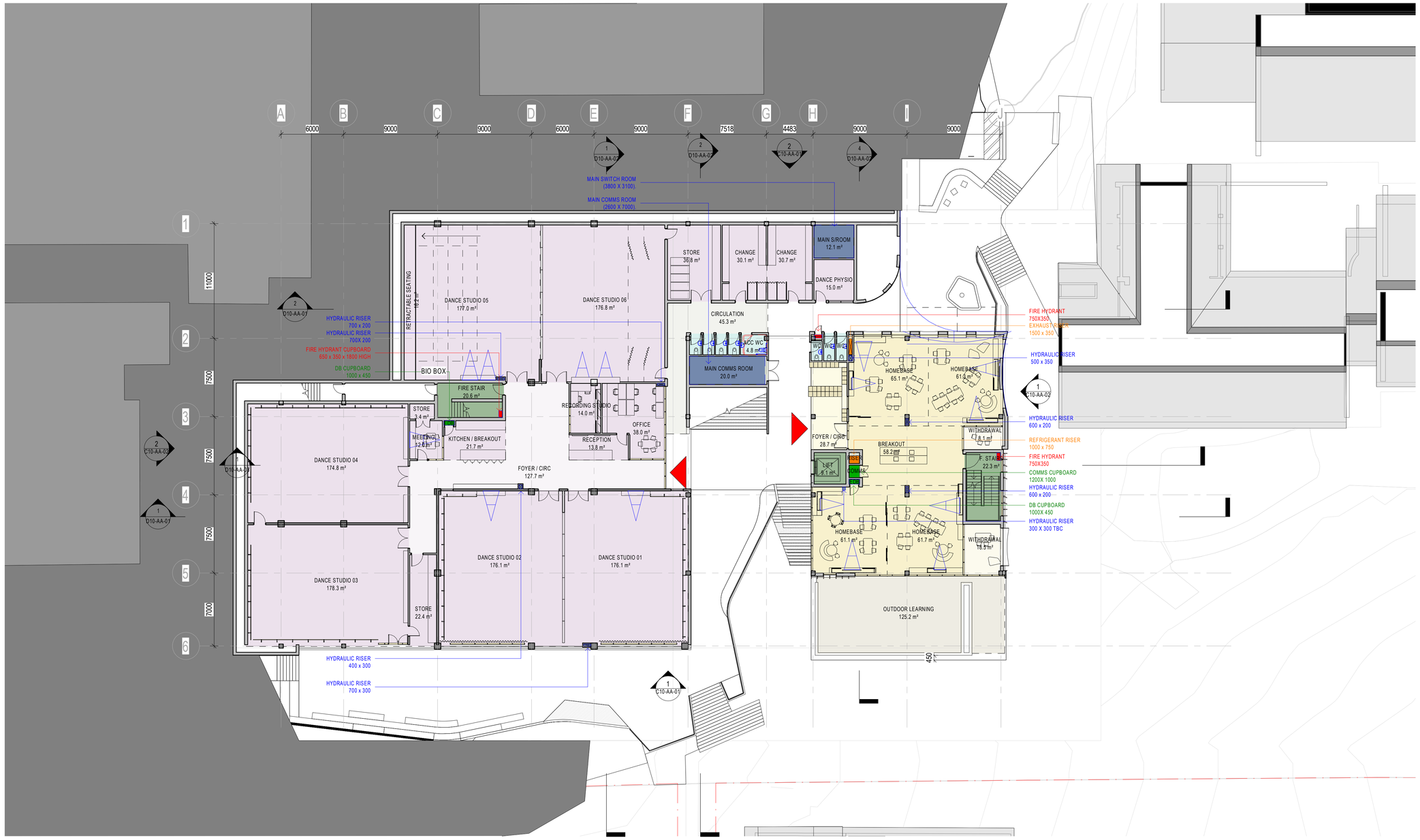
GRAPHIC SCALE
0 2000 5000
SCALE

1 : 200@A1
STATUS

SCHEMATIC DESIGN
DRAWING

GENERAL ARRANGEMENT PLAN - LEVEL 00

AR-B10-00-01 | ISSUE 7



AMENITIES
CIRC
COLA
DANCE
ELC
HEALTH
JUNIOR SCHOOL
JUNIOR SCHOOL BREAKOUT
OSHC
OUTDOORS
SERVICES
STAFF
STEM

C:\Users\hmccabe\REVIT_LOCAL\2020\2010018-AR-PLC-BASE_Heather_McCabe@bvn.com.au.rvt 7/07/2021 8:32:44 PM

BVN

ARCHITECTS REGISTRATION BOARD / NOMINATED ARCHITECTS

NSW
8356 NINOTSCHKA TITCHKOSKY
4837 JAMES GROSE
7115 JULIAN ASHTON
7053 MATTHEW BLAIR
7151 PHILLIP ROSSINGTON
7439 PETER TITMUSS
10447 ALISON BOUNDS

QLD
5527 NEIL LOGAN
2709 BRIAN DONOVAN
1595 MARK GRIMMER
5028 DAVID KELLY
5517 CATHERINE SKINNER
3866 KEVIN O'BRIEN

Telephone +61 7 3852 2525
Facsimile +61 7 3852 2544
www.bvn.com.au

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
1	18/03/21	Issue to Town Planner
2	14/04/21	For Information
3	28/05/21	For Information
4	02/06/21	For Information
5	07/06/21	For Information
6	25/06/21	Issued for Schematic Design
7	07/07/21	For Information

CONSULTANT

STANTEC
TEL 02 9493 9700
CONSULTANT

TTW
TEL 02 9439 7288
CONSULTANT

PROCLUS ADVISORY
CONSULTANT

WILLOW TREE PLANNING
TEL 02 9929 6974
PROJECT MANAGER

KATE BIMSON
TEL 02 9855 7628
CLIENT

PYMBLE LADIES COLLEGE
PROJECT

PYMBLE LADIES COLLEGE
GREY HOUSE PRECINCT
BVN PROJECT NUMBER

2010018
DRAWING KEY

TRUE NORTH
PROJECT NORTH

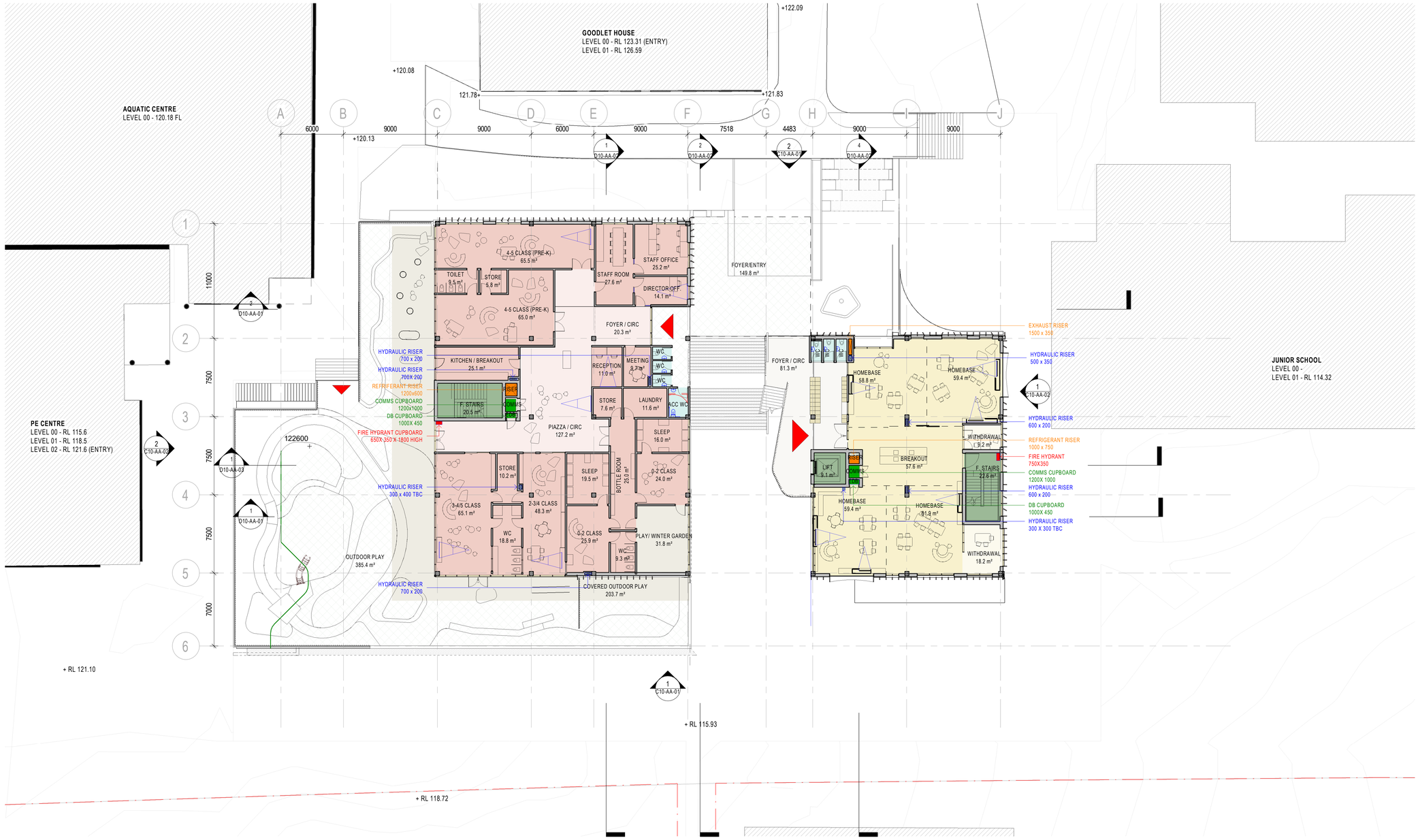
GRAPHIC SCALE
0 2000 5000
SCALE

1 : 200@A1
STATUS

SCHEMATIC DESIGN
DRAWING

GENERAL ARRANGEMENT PLAN - LEVEL 01

AR-B10-01-01
ISSUE 7



AMENITIES
CIRC
COLA
DANCE
ELC
HEALTH
JUNIOR SCHOOL
JUNIOR SCHOOL BREAKOUT
OSHC
OUTDOORS
SERVICES
STAFF
STEM

C:\Users\hmccabe\REVIT_LOCAL\20202010018-AR-PLC-BASE_Heather_McCabe@bvn.com.au.rvt 7/07/2021 8:33:49 PM

BVN

ARCHITECTS REGISTRATION BOARD / NOMINATED ARCHITECTS

NSW
8356 NINOTSCHKA TITCHKOSKY
4837 JAMES GROSE
7115 JULIAN ASHTON
7053 MATTHEW BLAIR
7151 PHILLIP ROSSINGTON
7439 PETER TITMUSS
10447 ALISON BOUNDS

QLD
5527 NEIL LOGAN
2709 BRIAN DONOVAN
1595 MARK GRIMMER
5028 DAVID KELLY
5517 CATHERINE SKINNER
3866 KEVIN O'BRIEN

Telephone +61 7 3852 2525
Facsimile +61 7 3852 2544
www.bvn.com.au

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
1	18/03/21	Issue to Town Planner
2	14/04/21	For Information
3	28/05/21	For Information
4	02/06/21	For Information
5	07/06/21	For Information
6	25/06/21	Issued for Schematic Design
7	07/07/21	For Information

CONSULTANT

STANTEC
TEL 02 9493 9700

CONSULTANT

TTW
TEL 02 9439 7288

CONSULTANT

PROCLUS ADVISORY

CONSULTANT

WILLOW TREE PLANNING
TEL 02 9929 6974

PROJECT MANAGER

KATE BIMSON
TEL 02 9855 7628

CLIENT

PYMBLE LADIES COLLEGE

PROJECT

PYMBLE LADIES COLLEGE
GREY HOUSE PRECINCT

BVN PROJECT NUMBER

2010018

DRAWING KEY

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 2000 5000

SCALE

1 : 200@A1

STATUS

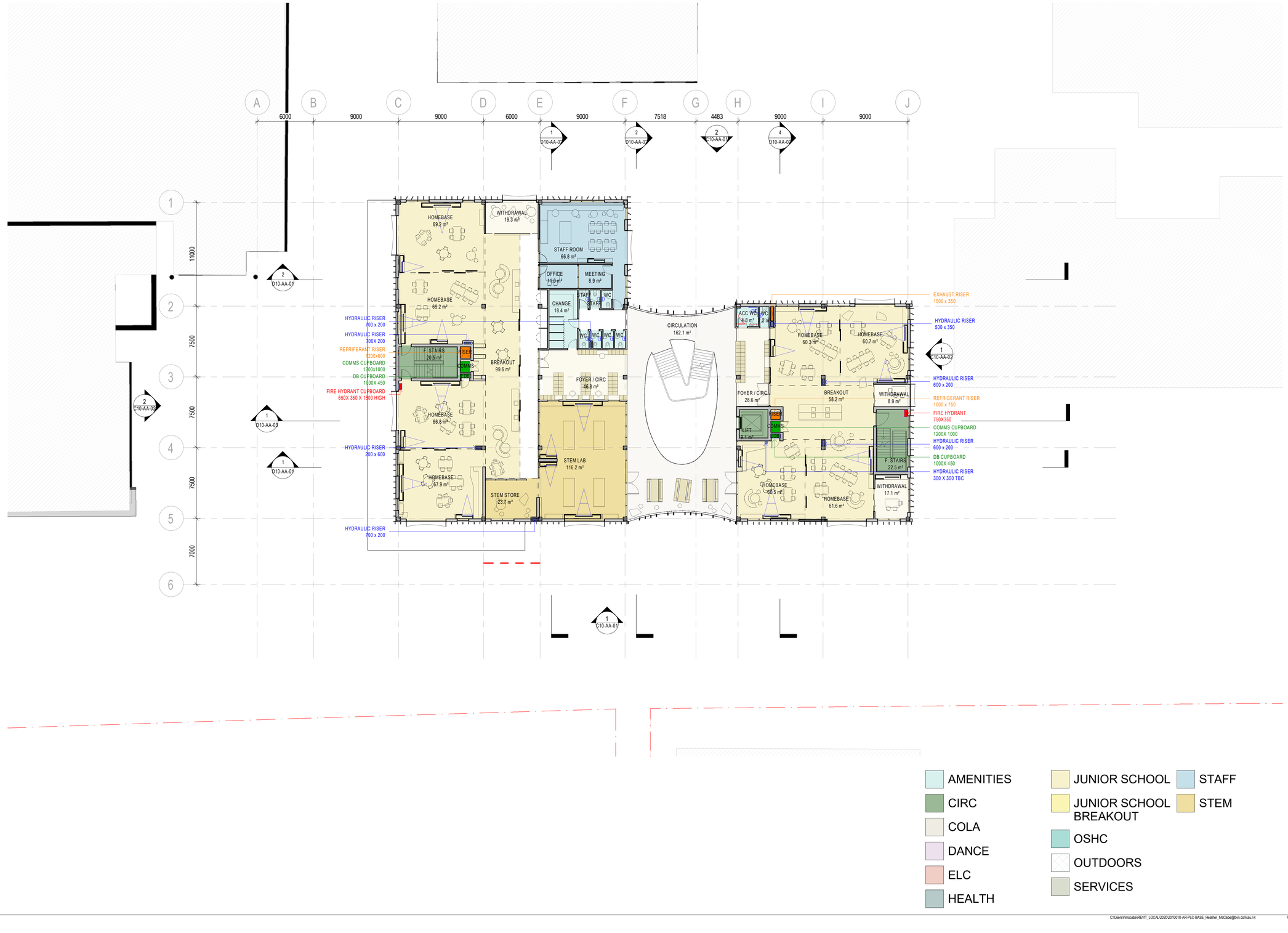
SCHEMATIC DESIGN

DRAWING

GENERAL ARRANGEMENT PLAN - LEVEL 02

AR-B10-02-01

ISSUE 7



BVN

ARCHITECTS REGISTRATION BOARD / NOMINATED ARCHITECTS

NSW
8356 NINOTSCHKA TITCHKOSKY
4837 JAMES GROSE
7115 JULIAN ASHTON
7053 MATTHEW BLAIR
7151 PHILLIP ROSSINGTON
7439 PETER TITMUSS
10447 ALISON BOUNDS

QLD
5527 NEIL LOGAN
2709 BRIAN DONOVAN
1595 MARK GRIMMER
5028 DAVID KELLY
5517 CATHERINE SKINNER
3866 KEVIN O'BRIEN

Telephone +61 7 3852 2525
Facsimile +61 7 3852 2544
www.bvn.com.au

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
1	18/03/21	Issue to Town Planner
2	14/04/21	For Information
3	28/05/21	For Information
4	02/06/21	For Information
5	07/06/21	For Information
6	25/06/21	Issued for Schematic Design
7	07/07/21	For Information

CONSULTANT

STANTEC
TEL 02 9493 9700
CONSULTANT

TTW
TEL 02 9439 7288
CONSULTANT

PROCLUS ADVISORY
CONSULTANT

WILLOW TREE PLANNING
TEL 02 9929 6974
PROJECT MANAGER

KATE BIMSON
TEL 02 9855 7628
CLIENT

PYMBLE LADIES COLLEGE
PROJECT

PYMBLE LADIES COLLEGE
GREY HOUSE PRECINCT
BVN PROJECT NUMBER

2010018
DRAWING KEY

TRUE NORTH PROJECT NORTH

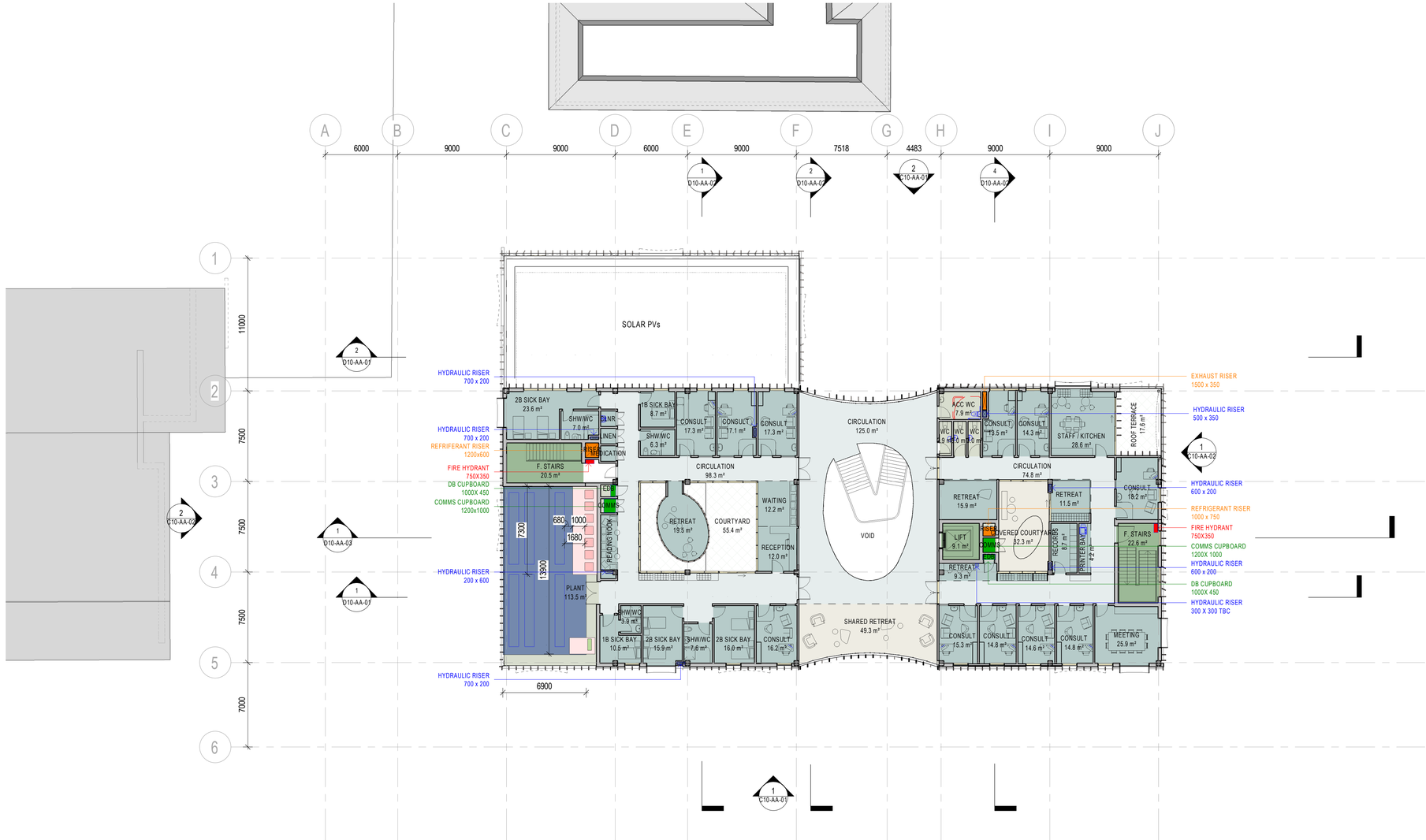
GRAPHIC SCALE
0 2000 5000
SCALE

1 : 200@A1
STATUS

SCHEMATIC DESIGN
DRAWING

GENERAL ARRANGEMENT PLAN - LEVEL 03

AR-B10-03-01 | ISSUE 7



AMENITIES
CIRC
COLA
DANCE
ELC
HEALTH
JUNIOR SCHOOL
JUNIOR SCHOOL BREAKOUT
OSHC
OUTDOORS
SERVICES
STAFF
STEM

C:\Users\hmccabe\REVIT_LOCAL\2020\2010018-AR-PLC-BASE_Heather_McCabe@bvn.com.au.rvt 7/07/2021 8:37:09 PM

BVN

ARCHITECTS REGISTRATION BOARD / NOMINATED ARCHITECTS

NSW
8356 NINOTSCHKA TITCHKOSKY
4837 JAMES GROSE
7115 JULIAN ASHTON
7053 MATTHEW BLAIR
7151 PHILLIP ROSSINGTON
7439 PETER TITMUSS
10447 ALISON BOUNDS

QLD
5527 NEIL LOGAN
2709 BRIAN DONOVAN
1595 MARK GRIMMER
5028 DAVID KELLY
5517 CATHERINE SKINNER
3866 KEVIN O'BRIEN

Telephone +61 7 3852 2525
Facsimile +61 7 3852 2544
www.bvn.com.au

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
1	18/03/21	Issue to Town Planner
2	14/04/21	For Information
3	28/05/21	For Information
4	02/06/21	For Information
5	07/06/21	For Information
6	25/06/21	Issued for Schematic Design
7	07/07/21	For Information

CONSULTANT

STANTEC
TEL 02 9493 9700
CONSULTANT

TTW
TEL 02 9439 7288
CONSULTANT

PROCLUS ADVISORY
CONSULTANT

WILLOW TREE PLANNING
TEL 02 9929 6974
PROJECT MANAGER

KATE BIMSON
TEL 02 9855 7628
CLIENT

PYMBLE LADIES COLLEGE
PROJECT

PYMBLE LADIES COLLEGE
GREY HOUSE PRECINCT
BVN PROJECT NUMBER

2010018
DRAWING KEY

TRUE NORTH PROJECT NORTH

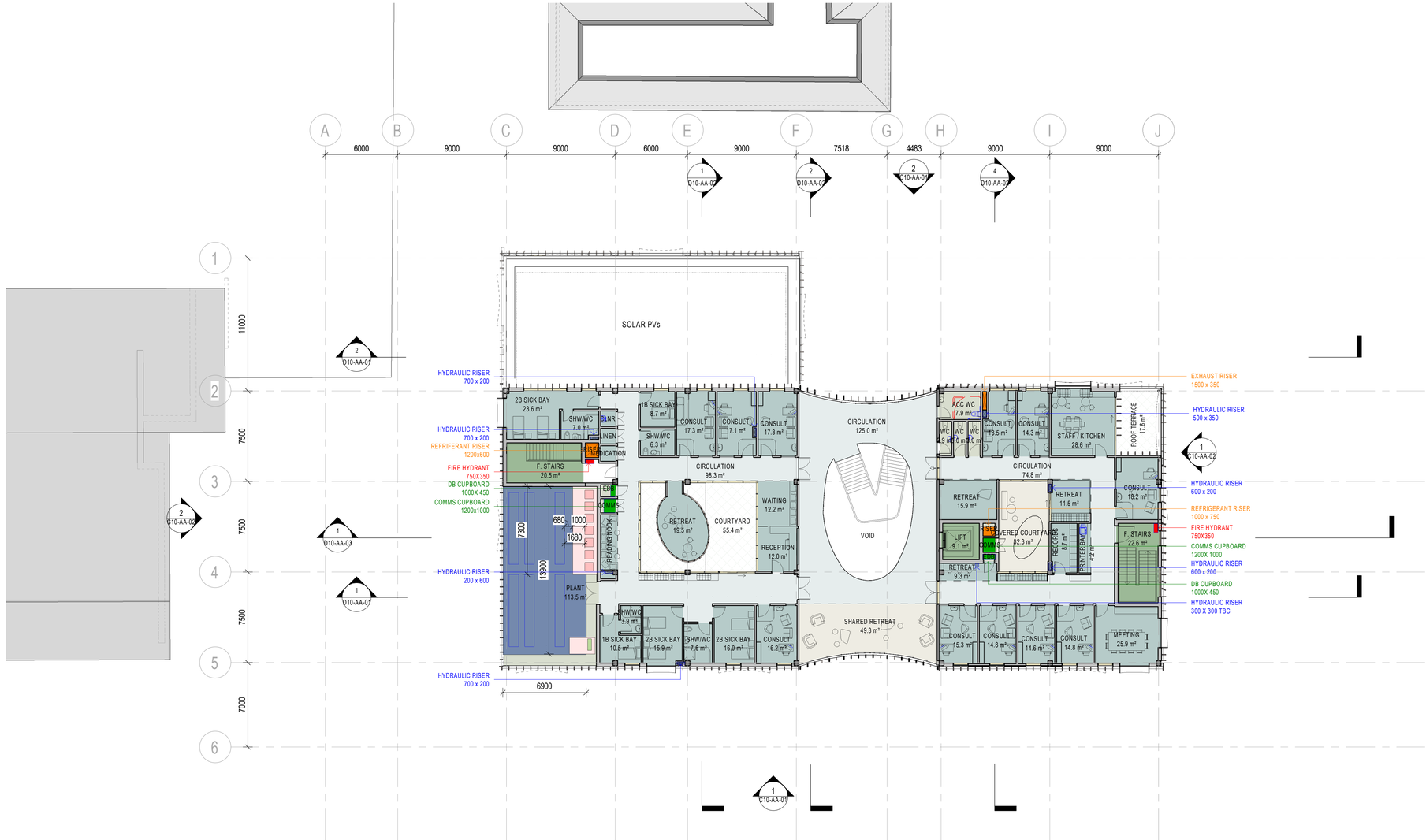
GRAPHIC SCALE
0 2000 5000
SCALE

1 : 200@A1
STATUS

SCHEMATIC DESIGN
DRAWING

GENERAL ARRANGEMENT PLAN - LEVEL 04

AR-B10-04-01 | ISSUE 7



AMENITIES
CIRC
COLA
DANCE
ELC
HEALTH
JUNIOR SCHOOL
JUNIOR SCHOOL BREAKOUT
OSHC
OUTDOORS
SERVICES
STAFF
STEM

C:\Users\hmccabe\REVIT_LOCAL\2020\2010018-AR-PLC-BASE_Heather_McCabe@bvn.com.au.rvt 7/07/2021 8:37:09 PM

BVN

ARCHITECTS REGISTRATION BOARD / NOMINATED ARCHITECTS

NSW
8356 NINOTSCHKA TITCHKOSKY
4837 JAMES GROSE
7115 JULIAN ASHTON
7053 MATTHEW BLAIR
7151 PHILLIP ROSSINGTON
7439 PETER TITMUSS
10447 ALISON BOUNDS

QLD
5527 NEIL LOGAN
2709 BRIAN DONOVAN
1595 MARK GRIMMER
5028 DAVID KELLY
5517 CATHERINE SKINNER
3866 KEVIN O'BRIEN

Telephone +61 7 3852 2525
Facsimile +61 7 3852 2544
www.bvn.com.au

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
1	18/03/21	Issue to Town Planner
2	14/04/21	For Information
3	28/05/21	For Information
4	02/06/21	For Information
5	07/06/21	For Information
6	25/06/21	Issued for Schematic Design
7	07/07/21	For Information

CONSULTANT

STANTEC
TEL 02 9493 9700
CONSULTANT

TTW
TEL 02 9439 7288
CONSULTANT

PROCLUS ADVISORY
CONSULTANT

WILLOW TREE PLANNING
TEL 02 9929 6974
PROJECT MANAGER

KATE BIMSON
TEL 02 9855 7628
CLIENT

PYMBLE LADIES COLLEGE
PROJECT

PYMBLE LADIES COLLEGE
GREY HOUSE PRECINCT
BVN PROJECT NUMBER

2010018
DRAWING KEY

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 2000 5000
SCALE

1 : 200@A1
STATUS

SCHEMATIC DESIGN
DRAWING

GENERAL ARRANGEMENT PLAN - LEVEL 04

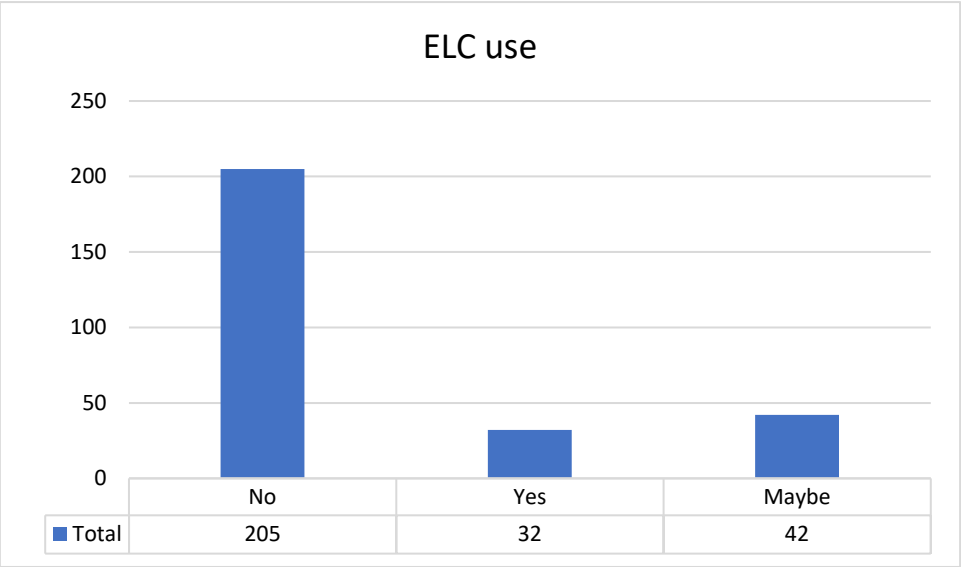
AR-B10-04-01 | ISSUE 7

Appendix B STAFF SURVEY RESULTS - ELC

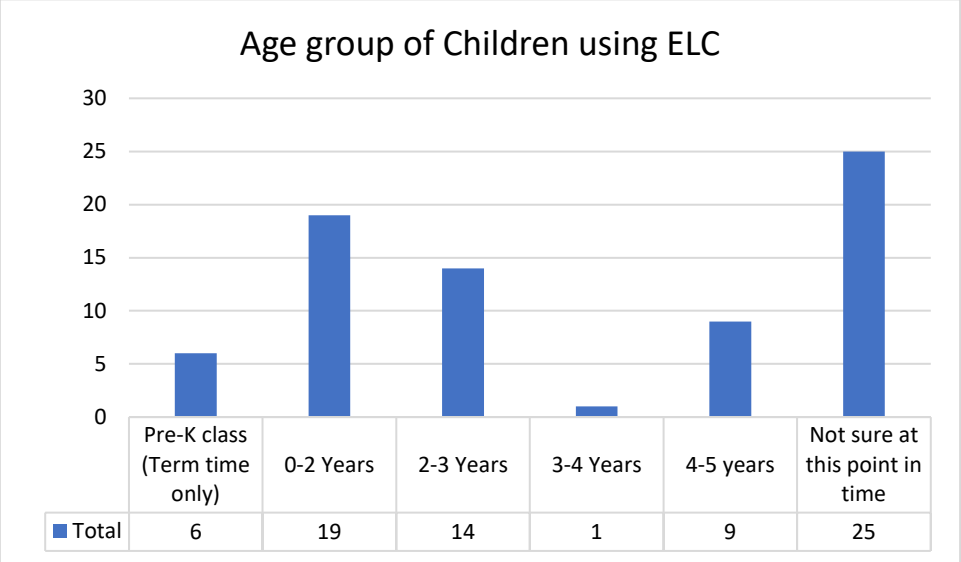
Staff Survey – Early Learning Centre (ELC) Responses (June 2021)

Questions 2 – 5 based on 74 responses.

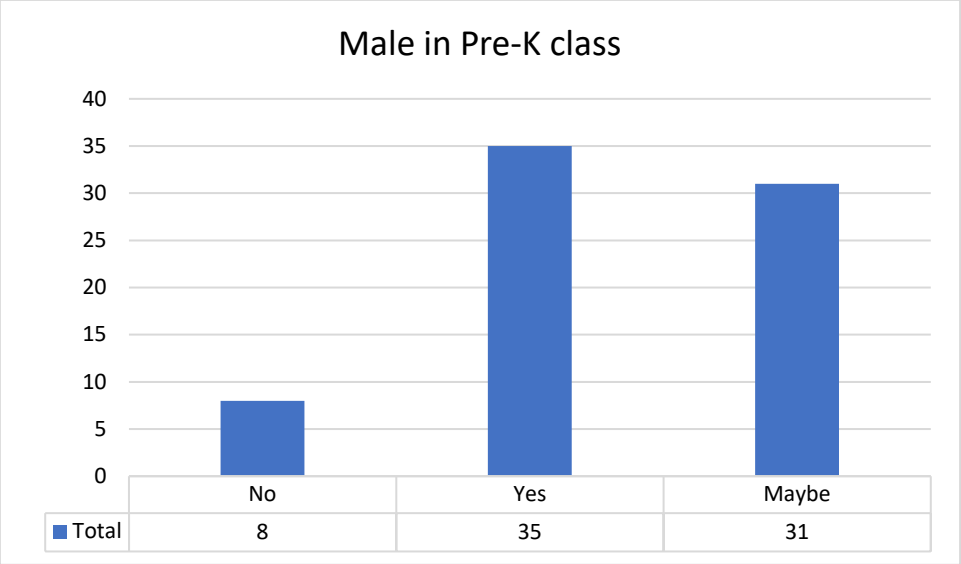
1. **As a staff member, do you think that you will use the Early Learning Centre for your own Children in the near future? (being the next 5 years)**



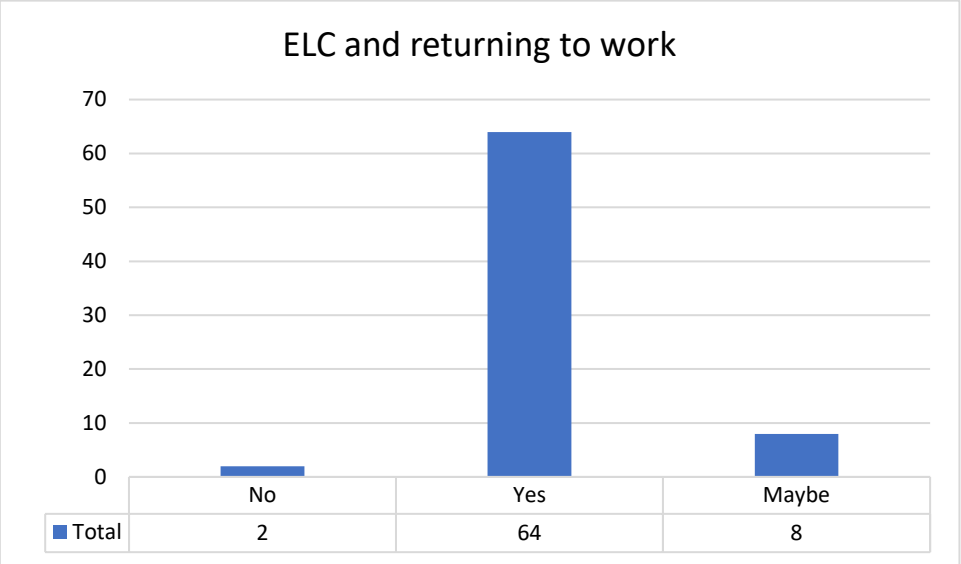
2. **What age group would your children most probably be placed?**



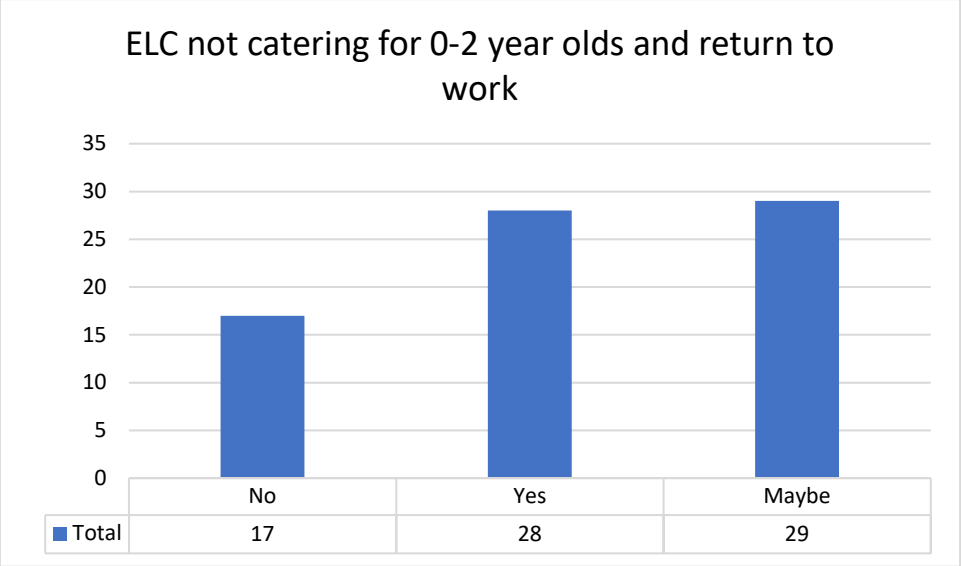
3. **If your child is male, would you consider enrolling him in the Pre-K class?**



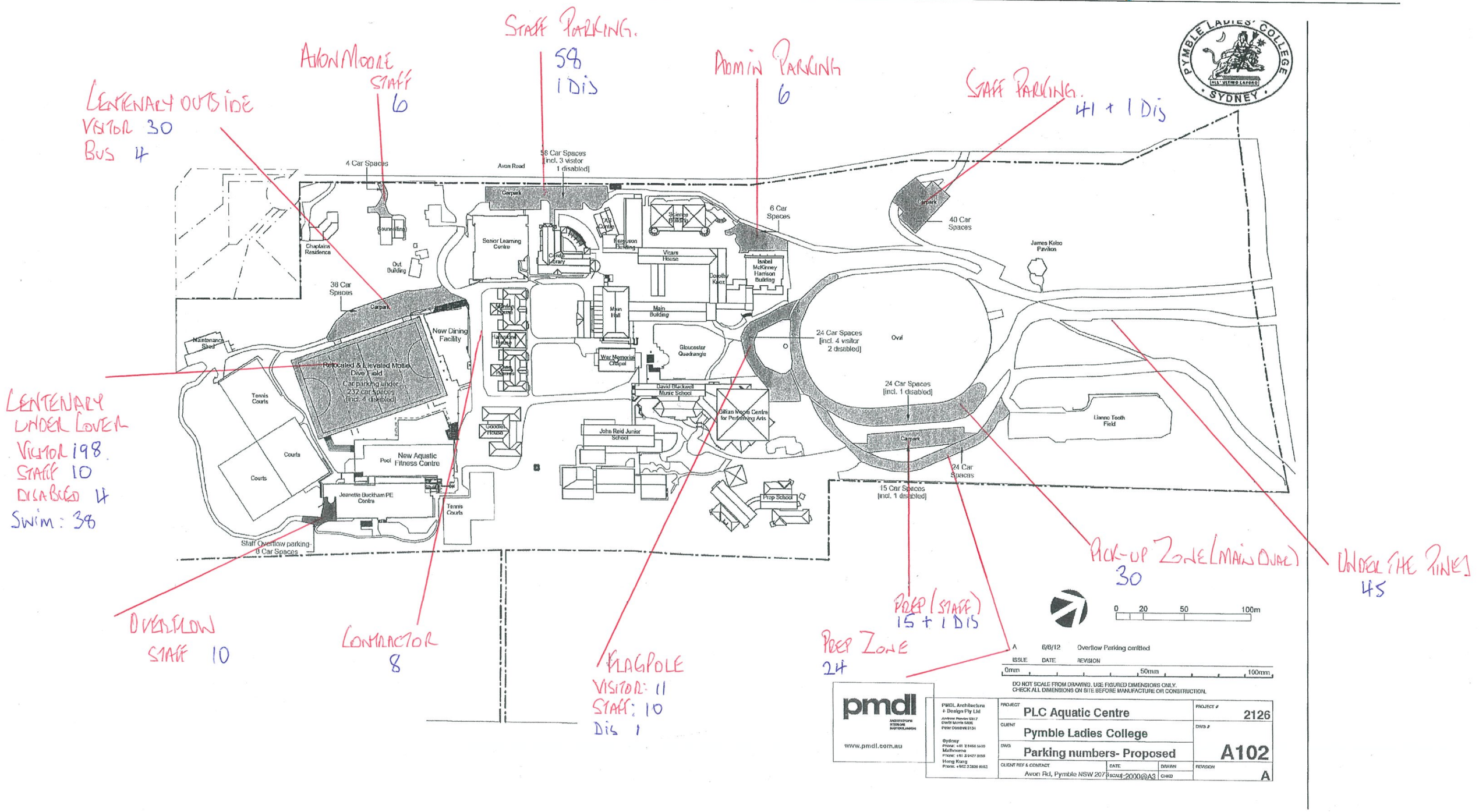
4. **Will having an ELC on Campus make it easier for you to return back to work after maternity/parental leave?**



5. **If the ELC did not cater for 0-2 year olds, would this significantly impact your return to work, i.e., would you look at work elsewhere that catered for this age group or was more conveniently located for you to access childcare?**



Appendix C ON-SITE PARKING LOCATIONS



Proposed College Parking

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_ho Ref: 8531 17 August 2012

Figure 5

Appendix D GUIDELINES FOR EVALUATION OF INTERSECTION CAPACITY

Guidelines for Evaluation of Intersection Operation

The *RTA Guide to Traffic Generating Developments (October 2002, Issue 2.2)*, details the assessment of intersections. The assessment of the level of service of an intersection is based on the evaluation of the following Measures of Effectiveness:

(a) Average delay (seconds/veh) (all forms of control)

(b) Delay to critical movement (seconds/veh) (all forms of control)

(c) Degree of saturation (traffic signals and roundabouts)

(d) Cycle length (traffic signals)

SIDRA was used to calculate the relevant intersection parameters. The SIDRA software is an advanced lane-based micro-analytical tool for design and evaluation of individual intersections and networks of intersections including modelling of separate movement classes (light vehicles, heavy vehicles, buses, cyclists, large trucks, light rail / trams and so on). It provides estimates of capacity, level of service and a wide range of performance measures, including; delay, queue length and stops for vehicles and pedestrians, as well as fuel consumption, pollution emissions and operating costs.

It can be used to analyse signalised intersections (fixed-time / pretimed and actuated), signalised and unsignalised pedestrian crossings, roundabouts (unsignalised), roundabouts with metering signals, fully-signalised roundabouts, two-way stop sign and give-way / yield sign control, all-way stop sign control, single point interchanges (signalised), freeway diamond interchanges (signalised, roundabout, sign control), diverging diamond interchanges and other alternative intersections and interchanges. It can also be used for uninterrupted traffic flow conditions and merge analysis.

The best indicator of the level of service at an intersection is the average delay experienced by vehicles at that intersection. For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (with Stop and Give Way signs or operating under the T- junction rule), the critical movement for level of service assessment should be that with the highest average delay.

With traffic signals, delays per approach tend to be equalised, subject to any over-riding requirements of signal co-ordination as well as to variations within individual movements. With roundabouts and priority-controlled intersections, the critical criterion for assessment is the movement with the highest delay per vehicle. With this type of control, the volume balance might be such that some movements suffer high levels of delay while other movements have minimal delay. An overall average delay for the intersection of 25 seconds might not be satisfactory if the average delay on one movement is 60 seconds.

The average delay for LoS 'E' should be no more than 70 seconds. The accepted maximum practical cycle length for traffic signals under saturated conditions is 120 - 140 seconds. Under these conditions 120 seconds is near maximum for two and three phase intersections and 140 seconds near maximum for more complex phase designs. Drivers and pedestrians expect cycle lengths of these magnitudes and their inherent delays in peak hours. A cycle length of 140 seconds for an intersection which is almost saturated has an average vehicle delay of about 70 seconds, although this can vary. If the average vehicle delay is more than 70 seconds, the intersection is assumed to be at LoS 'F'.

Table D3 sets out average delays for different levels of service. There is no consistent correlation between definitions of levels of service for road links as defined elsewhere in this section, and the ranges set out in **Table D3**. In assigning a level of service, the average delay to the motoring public needs to be considered, keeping in mind the location of the intersection. For example, drivers in inner urban areas of Sydney have a higher tolerance of delay than drivers in country areas. **Table C3** provides a recommended baseline for assessment.

Table D3: Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals	Priority Controlled
A	0 < x < 14	Good operation	Good operation
B	14 < x < 28	Good operation with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	28 < x < 42	Satisfactory operation	Satisfactory operation, but crash history study required
D	42 < x < 56	Operating near capacity	Operating near capacity and crash history study required
E	56 < x < 70	At capacity, incidents will cause excessive delays	At capacity, requires other control mode
F	70 < x	Requires further study	Requires other control mode

The figures in **Table D3** are intended as a guide only. Any particular assessment should take into account site-specific factors including 95th percentile queue lengths (and their effect on lane blocking), the influence of nearby intersections and the sensitivity of the location to delays. In many situations, a comparison of the current and future average delay provides a better appreciation of the impact of a proposal, and not simply the change in the level of service.

The intersection degree of saturation (DoS) can also be used to measure the performance of isolated intersections. The DoS value can be determined by computer-based assessment programs. At intersections controlled by traffic signals, both queue length and delays increase rapidly as DoS approaches 1.000. An upper limit of 0.900 is appropriate, however when DoS exceeds 0.850, overflow queues start to become a problem. Satisfactory intersection operation is generally achieved with a DoS of about 0.700 - 0.800. (Note that these figures are based on isolated signalised intersections with cycle lengths of 120 seconds. In coordinated signal systems DoS might be actively maximised at key intersections).

Although in some situations additional traffic does not alter the level of service, particularly where the level of service is 'E' or 'F', additional capacity may still be required. This is particularly appropriate for LoS 'F', where small increases in flow can cause disproportionately greater increases in delay. In this situation, it is advisable to consider means of control to maintain the existing level of absolute delay. Suggested criteria for the evaluation of the capacity of signalised intersections based on the DoS are summarised in **Table D4**.

Table D4: Criteria for Evaluating Capacity of Signalised Intersections

Level of Service	Optimum Cycle Length (seconds)	Movement Degree of Saturation (DoS)	Intersection Degree of Saturation (DoS)
A – Excellent	< 90	< 0.700	< 0.700
B – Very good	< 90	< 0.700	< 0.700
C – Good	90 - 120	0.700 – 0.800	0.700 – 0.850
D – Satisfactory	120 - 140	0.800 – 0.850	0.850 – 0.900
E – Poor	> 140	> 0.850	> 0.900
F – Extra capacity required	> 140	> 0.850	> 0.900

Appendix E TFNSW CONSULTATION

Hong, Sunny

From: Laura Van putten <Laura.VAN.PUTTEN@transport.nsw.gov.au>
Sent: Thursday, July 8, 2021 9:20 AM
To: Hong, Sunny; kbimson@pymblelc.nsw.edu.au
Cc: Solon Ghosh; Zhaleh Najari alamouti
Subject: FW: SSD-17424905 Pymble Ladies' College Grey House Precinct

Hi Sunny & Kate

As per discussion in the meeting, please find the meeting summary below:

- Sunny & Kate provided detail on the development proposal and the expected traffic generation from the site. Sunny raised the question as to whether the below requirements provided in TfNSW key issues were required due to the low numbers:
    - Modelling of key intersections using SIDRA and
    - Modelling of the ultimate development year plus 10 years growth.
- In order to understand the impacts to the surrounding network TfNSW informed that the following is to be provided (but not limited to):
    - Traffic assignment diagram
    - Base model + development outputs
    - Justification as to why the dev +10 years growth is not required.

I hope this has been of assistance.

Kind regards,

Laura van Putten

T 02 8849 2480 | **M** 0429 505 961

From: Hong, Sunny [mailto:Sunny.Hong@stantec.com]
Sent: Wednesday, 16 June 2021 11:00 AM
To: Development Sydney <Development.Sydney@transport.nsw.gov.au>
Cc: Pahee Rathan <Pahee.RATHAN@transport.nsw.gov.au>; Carlaw, Chris <Chris.Carlaw@stantec.com>; Mirabile, Theodore <theodore.mirabile@stantec.com>; Kate Bimson <kbimson@pymblelc.nsw.edu.au>
Subject: SSD-17424905 Pymble Ladies' College Grey House Precinct

Good morning Laura,

We are assisting Pymble Ladies' College with the preparation of a Transport and Accessibility Impact Assessment which will be submitted as part of the SSDA for the proposed Grey House Precinct (GHP).

TfNSW provided details of key issues and assessment requirements within a letter dated 4 May 2021, for inclusion in the SEARs. We want to discuss TfNSW's request regarding:

- Modelling of key intersections using SIDRA and
- Modelling of the ultimate development year plus 10 years growth.

The development proposal will provide improved facilities for the College and support the existing staff and students. The SSDA is not seeking to increase the enrolment capacity for Kindergarten – Year 12. The only component of the GHP which will generate additional traffic will be the new Early Learning Centre (ELC) which will have an enrolment capacity of 90 children. The traffic generated by the ELC is expected to be low based on the following considerations:

- Many of the children enrolled at ELCs associated with private schools have siblings already attending the school
- Many of the children enrolled at ELCs associated with private schools have parents who are staff members at the school
- Not all children will be driven to the College

We will be providing data shortly supporting these assumptions. When considering the above, we do not believe that the trip numbers generated by the GHP will be high enough to require traffic modelling of key intersections or to assess the ultimate development year plus 10 years of growth. The impact the GHP will have on the surrounding road network is expected to be minor.

Based on the above comments and the review of data supporting our assumptions, would TfNSW be able to reconsider their request for SIDRA modelling at key intersections and the modelling of the ultimate development plus 10 years growth?

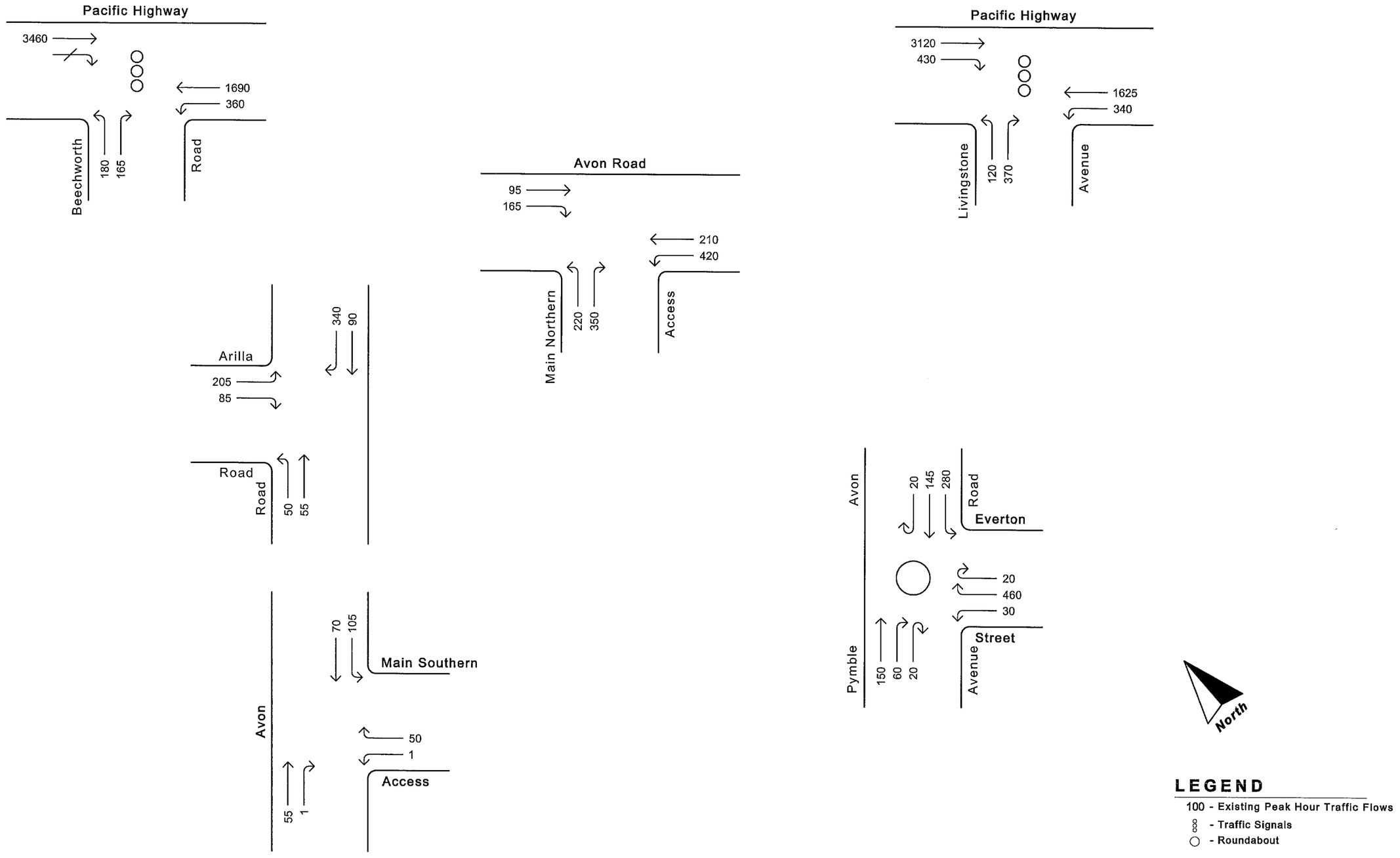
Regards,

Sunny Hong
Intermediate Traffic Engineer

Direct: +61 2 9493 9741
Sunny.Hong@stantec.com

Stantec
Level 4, 99 Walker Street
NORTH SYDNEY NSW 2060

Appendix F 2012 TRAFFIC COUNTS

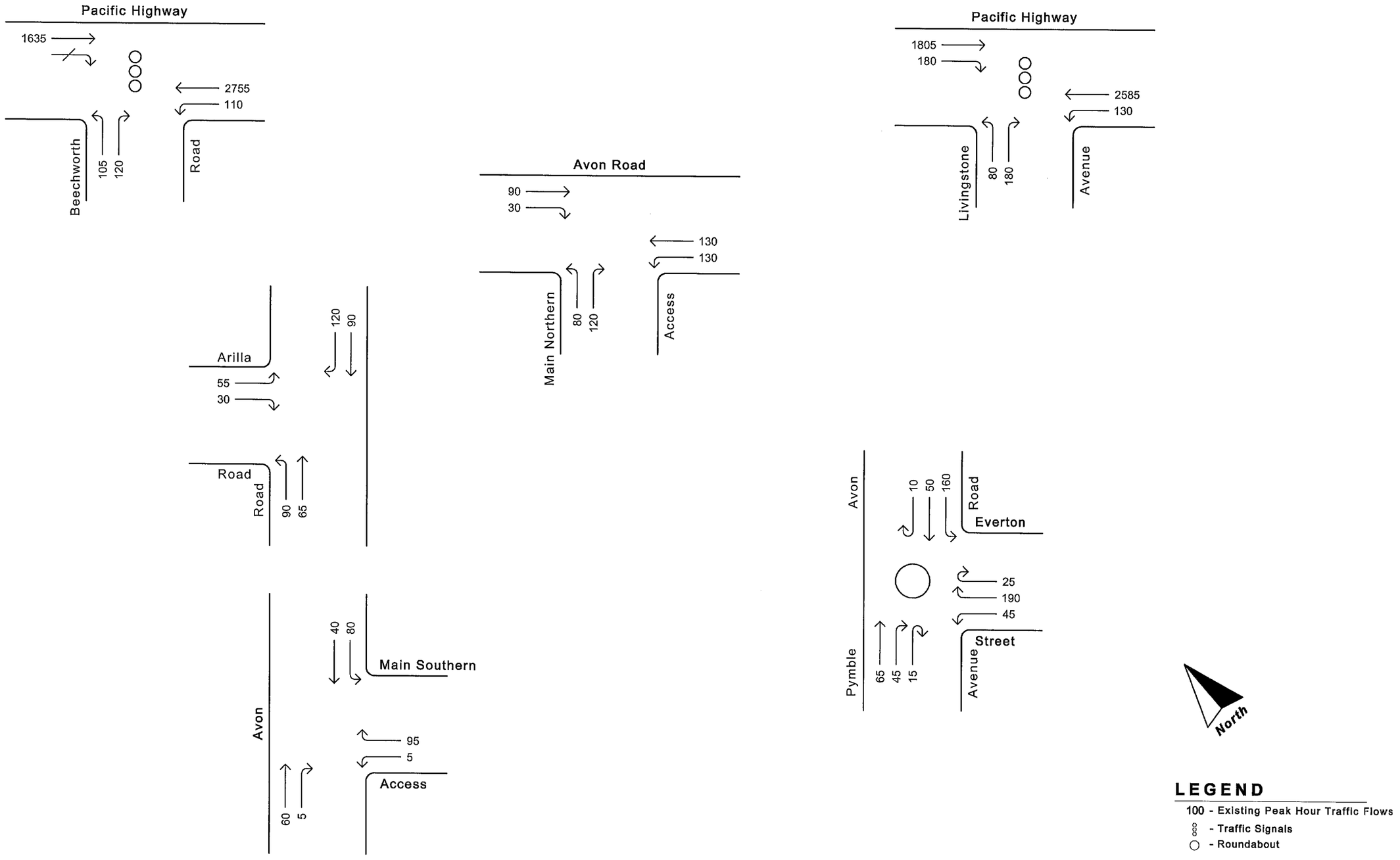


Existing weekday morning peak hour traffic flows

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_ho Ref: 8531 17 August 2012

Figure 2



Existing afternoon morning peak hour traffic flows

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_ho Ref: 8531 17 August 2012

Figure 3

Appendix G SCENARIO 1 SIDRA RESULTS

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [TCS 914]

Network: N101A [Base Case - Pacific Highway & Beechworth Road & Bobbin Head Road AM Peak (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (CCG Practical Cycle Time)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 102A [Base Case - Pacific Highway & Bobbin Head Road AM Peak]														
SouthEast: Pacific Highway (SE)														
22	T1	1771	0.0	1077	0.0	0.467	6.1	LOS A	9.3	65.3	0.26	0.24	0.26	50.7
23	R2	293	0.0	178	0.0	* 0.958	59.6	LOS E	8.5	59.6	1.00	1.03	1.61	21.4
Approach		2063	0.0	1255 N1	0.0	0.958	13.7	LOS A	9.3	65.3	0.37	0.35	0.45	42.4
NorthEast: Bobbin Head Road														
24	L2	133	0.0	133	0.0	0.191	22.7	LOS B	4.2	29.3	0.58	0.72	0.58	34.6
26	R2	212	0.0	212	0.0	0.185	38.1	LOS C	4.5	31.6	0.77	0.75	0.77	36.3
Approach		344	0.0	344	0.0	0.191	32.1	LOS C	4.5	31.6	0.70	0.74	0.70	35.9
NorthWest: Pacific Highway (NW)														
27	L2	501	0.0	501	0.0	1.278	313.5	LOS F	134.2	939.7	1.00	1.96	2.84	9.6
28	T1	2281	0.0	2281	0.0	1.278	306.1	LOS F	156.9	1098.3	1.00	2.31	2.82	5.4
Approach		2782	0.0	2782	0.0	1.278	307.4	LOS F	156.9	1098.3	1.00	2.25	2.82	6.2
All Vehicles		5189	0.0	4381 N1	0.0	1.278	201.7	LOS F	156.9	1098.3	0.80	1.58	1.98	9.0
Site: 103A [Base Case - Pacific Highway & Beechworth Road AM Peak]														
SouthEast: Pacific Highway (SE)														
21	L2	435	0.0	435	0.0	* 1.675	657.4	LOS F	227.5	1592.3	1.00	2.58	4.16	4.9
22	T1	1982	0.0	1982	0.0	1.675	661.5	LOS F	227.5	1592.3	1.00	2.97	4.18	2.6
Approach		2417	0.0	2417	0.0	1.675	660.7	LOS F	227.5	1592.3	1.00	2.90	4.18	3.0
NorthWest: Pacific Highway (NW)														
28	T1	2414	0.0	1919	0.0	* 0.539	1.6	LOS A	7.2	50.6	0.14	0.12	0.14	57.3
Approach		2414	0.0	1919 N1	0.0	0.539	1.6	LOS A	7.2	50.6	0.14	0.12	0.14	57.3
SouthWest: Beechworth Road														
30	L2	94	0.0	94	0.0	0.247	31.0	LOS C	3.7	25.6	0.70	0.75	0.70	30.0
32	R2	107	0.0	107	0.0	* 0.302	33.6	LOS C	4.0	28.3	0.90	0.77	0.90	38.0
Approach		201	0.0	201	0.0	0.302	32.4	LOS C	4.0	28.3	0.80	0.76	0.80	35.1
All Vehicles		5032	0.0	4537 N1	0.0	1.675	354.1	LOS F	227.5	1592.3	0.63	1.63	2.32	5.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 102A [Base Case - Pacific Highway & Bobbin Head Road AM Peak]											
NorthEast: Bobbin Head Road											
P6	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
All Pedestrians		53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
Site: 103A [Base Case - Pacific Highway & Beechworth Road AM Peak]											
SouthEast: Pacific Highway (SE)											
P5	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
SouthWest: Beechworth Road											
P8	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		105	54.3	LOS E	0.2	0.2	0.95	0.95	221.5	217.4	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [TCS 914]

Network: N101B [Base Case - Pacific Highway & Beechworth Road & Bobbin Head Road PM Peak (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (CCG Practical Cycle Time)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 102B [Base Case - Pacific Highway & Bobbin Head Road PM Peak]														
SouthEast: Pacific Highway (SE)														
22	T1	2923	0.0	1655	0.0	0.697	7.1	LOS A	9.3	65.3	0.37	0.34	0.37	49.5
23	R2	121	0.0	69	0.0	* 0.369	33.5	LOS C	2.3	16.0	0.97	0.75	0.97	29.6
Approach		3044	0.0	1723 N1	0.0	0.697	8.2	LOS A	9.3	65.3	0.39	0.36	0.39	48.2
NorthEast: Bobbin Head Road														
24	L2	117	0.0	117	0.0	0.146	23.2	LOS B	3.7	25.8	0.58	0.72	0.58	34.3
26	R2	215	0.0	215	0.0	0.198	39.8	LOS C	4.7	32.9	0.79	0.76	0.79	35.7
Approach		332	0.0	332	0.0	0.198	33.9	LOS C	4.7	32.9	0.72	0.74	0.72	35.4
NorthWest: Pacific Highway (NW)														
27	L2	75	0.0	75	0.0	0.811	42.3	LOS C	31.0	217.2	0.95	0.90	1.00	36.5
28	T1	1787	0.0	1787	0.0	0.811	36.0	LOS C	34.4	241.1	0.95	0.89	0.99	27.7
Approach		1862	0.0	1862	0.0	0.811	36.2	LOS C	34.4	241.1	0.95	0.89	0.99	28.2
All Vehicles		5238	0.0	3917 N1	0.0	0.811	23.7	LOS B	34.4	241.1	0.69	0.64	0.71	35.4
Site: 103B [Base Case - Pacific Highway & Beechworth Road PM Peak]														
SouthEast: Pacific Highway (SE)														
21	L2	121	0.0	121	0.0	* 1.860	827.5	LOS F	242.8	1699.3	1.00	3.06	4.60	4.0
22	T1	2902	0.0	2902	0.0	1.860	826.9	LOS F	332.6	2328.4	1.00	3.47	4.60	2.1
Approach		3023	0.0	3023	0.0	1.860	826.9	LOS F	332.6	2328.4	1.00	3.46	4.60	2.2
NorthWest: Pacific Highway (NW)														
28	T1	1904	0.0	1904	0.0	* 0.535	1.6	LOS A	6.2	43.5	0.13	0.13	0.13	57.3
Approach		1904	0.0	1904	0.0	0.535	1.6	LOS A	6.2	43.5	0.13	0.13	0.13	57.3
SouthWest: Beechworth Road														
30	L2	148	0.0	148	0.0	0.408	34.5	LOS C	6.4	44.8	0.77	0.78	0.77	28.4
32	R2	112	0.0	112	0.0	* 0.313	34.6	LOS C	4.3	30.3	0.90	0.77	0.90	37.7
Approach		260	0.0	260	0.0	0.408	34.5	LOS C	6.4	44.8	0.83	0.78	0.83	33.3
All Vehicles		5187	0.0	5187	0.0	1.860	484.2	LOS F	332.6	2328.4	0.67	2.10	2.77	3.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance (CCG)

Mov	Dem.	Aver.	Level of	AVERAGE BACK OF	Prop.	Effective	Travel	Travel	Aver.

ID	Crossing	Flow	Delay	Service	QUEUE [Ped	Dist]	Que	Stop Rate	Time	Dist.	Speed
		ped/h	sec		ped	m			sec	m	m/sec
Site: 102B [Base Case - Pacific Highway & Bobbin Head Road PM Peak]											
NorthEast: Bobbin Head Road											
P6	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
All Pedestrians		53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
Site: 103B [Base Case - Pacific Highway & Beechworth Road PM Peak]											
SouthEast: Pacific Highway (SE)											
P5	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
SouthWest: Beechworth Road											
P8	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		105	54.3	LOS E	0.2	0.2	0.95	0.95	221.5	217.4	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101A [Base Case - Pacific Highway & Livingstone Avenue AM Peak (Site Folder: Base Case)]

Base Case AM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Pacific Highway (SE)														
21	L2	343	0.0	361	0.0	0.369	21.7	LOS B	11.2	78.5	0.63	0.76	0.63	35.3
22	T1	1525	0.0	1605	0.0	* 0.868	30.0	LOS C	45.9	321.0	0.88	0.88	0.98	40.2
Approach		1868	0.0	1966	0.0	0.868	28.5	LOS B	45.9	321.0	0.84	0.86	0.91	39.6
NorthWest: Pacific Highway (NW)														
28	T1	2789	0.0	2936	0.0	0.673	7.6	LOS A	26.3	184.3	0.56	0.52	0.56	53.4
29	R2	89	0.0	94	0.0	* 0.462	37.3	LOS C	3.7	25.6	0.98	0.77	0.98	27.9
Approach		2878	0.0	3029	0.0	0.673	8.5	LOS A	26.3	184.3	0.57	0.53	0.57	52.5
SouthWest: Livingstone Avenue														
30	L2	77	0.0	81	0.0	0.543	49.3	LOS D	8.8	61.6	0.96	0.81	0.96	24.2
32	R2	230	0.0	242	0.0	* 0.543	51.3	LOS D	8.8	61.6	0.97	0.80	0.97	23.7
Approach		307	0.0	323	0.0	0.543	50.8	LOS D	8.8	61.6	0.97	0.81	0.97	23.8
All Vehicles		5053	0.0	5319	0.0	0.868	18.4	LOS B	45.9	321.0	0.69	0.67	0.72	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthWest: Pacific Highway (NW)												
P7	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	220.7	222.8	1.01
SouthWest: Livingstone Avenue												
P8	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	212.3	211.9	1.00
All Pedestrians		100	105	49.3	LOS E	0.2	0.2	0.95	0.95	216.5	217.4	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101B [Base Case - Pacific Highway & Livingstone Avenue PM Peak (Site Folder: Base Case)]

Base Case PM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Pacific Highway (SE)														
21	L2	360	0.0	379	0.0	0.365	21.1	LOS B	12.1	84.7	0.60	0.76	0.60	35.6
22	T1	2153	0.0	2266	0.0	* 1.160	200.9	LOS F	167.7	1173.6	1.00	1.93	2.25	13.7
Approach		2513	0.0	2645	0.0	1.160	175.1	LOS F	167.7	1173.6	0.94	1.76	2.01	14.5
NorthWest: Pacific Highway (NW)														
28	T1	1575	0.0	1658	0.0	0.374	5.1	LOS A	10.6	74.5	0.36	0.33	0.36	55.3
29	R2	62	0.0	65	0.0	* 0.351	41.1	LOS C	2.8	19.7	0.97	0.75	0.97	26.5
Approach		1637	0.0	1723	0.0	0.374	6.5	LOS A	10.6	74.5	0.39	0.34	0.39	54.0
SouthWest: Livingstone Avenue														
30	L2	90	0.0	95	0.0	0.512	51.9	LOS D	9.2	64.1	0.95	0.81	0.95	23.5
32	R2	201	0.0	212	0.0	* 0.512	55.1	LOS D	9.2	64.1	0.96	0.80	0.96	22.7
Approach		291	0.0	306	0.0	0.512	54.1	LOS D	9.2	64.1	0.96	0.80	0.96	23.0
All Vehicles		4441	0.0	4675	0.0	1.160	105.0	LOS F	167.7	1173.6	0.74	1.18	1.35	20.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthWest: Pacific Highway (NW)												
P7	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
SouthWest: Livingstone Avenue												
P8	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		100	105	54.3	LOS E	0.2	0.2	0.95	0.95	221.5	217.4	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix H SCENARIO 2 SIDRA RESULTS

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [TCS 914]

Network: N101C [Post-development - Pacific Highway & Beechworth Road & Bobbin Head Road AM Peak (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (CCG Practical Cycle Time)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 102C [Post-development - Pacific Highway & Bobbin Head Road AM Peak]														
SouthEast: Pacific Highway (SE)														
22	T1	1797	0.0	1107	0.0	0.480	6.9	LOS A	9.3	65.3	0.30	0.27	0.30	49.8
23	R2	293	0.0	179	0.0	* 0.962	60.9	LOS E	8.7	60.6	1.00	1.04	1.62	21.1
Approach		2089	0.0	1286 N1	0.0	0.962	14.4	LOS A	9.3	65.3	0.39	0.37	0.48	41.8
NorthEast: Bobbin Head Road														
24	L2	133	0.0	133	0.0	0.191	22.7	LOS B	4.2	29.3	0.58	0.72	0.58	34.6
26	R2	212	0.0	212	0.0	0.185	38.1	LOS C	4.5	31.6	0.77	0.75	0.77	36.3
Approach		344	0.0	344	0.0	0.191	32.1	LOS C	4.5	31.6	0.70	0.74	0.70	35.9
NorthWest: Pacific Highway (NW)														
27	L2	501	0.0	501	0.0	1.291	324.8	LOS F	137.8	964.7	1.00	2.00	2.89	9.3
28	T1	2307	0.0	2307	0.0	1.291	317.3	LOS F	161.5	1130.4	1.00	2.35	2.88	5.2
Approach		2808	0.0	2808	0.0	1.291	318.7	LOS F	161.5	1130.4	1.00	2.29	2.88	6.0
All Vehicles		5242	0.0	4438 N1	0.0	1.291	208.3	LOS F	161.5	1130.4	0.80	1.61	2.02	8.7
Site: 103C [Post-development - Pacific Highway & Beechworth Road AM Peak]														
SouthEast: Pacific Highway (SE)														
21	L2	435	0.0	435	0.0	* 1.685	667.0	LOS F	230.1	1610.9	1.00	2.59	4.19	4.8
22	T1	1982	0.0	1982	0.0	1.685	671.0	LOS F	230.1	1610.9	1.00	2.98	4.21	2.6
Approach		2417	0.0	2417	0.0	1.685	670.3	LOS F	230.1	1610.9	1.00	2.91	4.20	3.0
NorthWest: Pacific Highway (NW)														
28	T1	2440	0.0	1926	0.0	* 0.541	1.6	LOS A	7.2	50.7	0.14	0.12	0.14	57.3
Approach		2440	0.0	1926 N1	0.0	0.541	1.6	LOS A	7.2	50.7	0.14	0.12	0.14	57.3
SouthWest: Beechworth Road														
30	L2	120	0.0	120	0.0	0.316	31.9	LOS C	4.8	33.9	0.72	0.76	0.72	29.6
32	R2	107	0.0	107	0.0	* 0.302	33.6	LOS C	4.0	28.3	0.90	0.77	0.90	38.0
Approach		227	0.0	227	0.0	0.316	32.7	LOS C	4.8	33.9	0.80	0.77	0.80	34.5
All Vehicles		5084	0.0	4570 N1	0.0	1.685	356.8	LOS F	230.1	1610.9	0.63	1.63	2.32	5.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance (CCG)											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [Ped	Dist]	Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		ped	m			sec	m	m/sec
Site: 102C [Post-development - Pacific Highway & Bobbin Head Road AM Peak]											
NorthEast: Bobbin Head Road											
P6	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
All Pedestrians		53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
Site: 103C [Post-development - Pacific Highway & Beechworth Road AM Peak]											
SouthEast: Pacific Highway (SE)											
P5	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
SouthWest: Beechworth Road											
P8	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		105	54.3	LOS E	0.2	0.2	0.95	0.95	221.5	217.4	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [TCS 914]

Network: N101D [Post-development - Pacific Highway & Beechworth Road & Bobbin Head Road PM Peak (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (CCG Practical Cycle Time)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 102D [Post-development - Pacific Highway & Bobbin Head Road PM Peak]														
SouthEast: Pacific Highway (SE)														
22	T1	2946	0.0	1673	0.0	0.705	7.7	LOS A	9.3	65.3	0.40	0.37	0.40	48.8
23	R2	121	0.0	68	0.0	* 0.368	33.5	LOS C	2.3	16.0	0.97	0.75	0.97	29.6
Approach		3067	0.0	1741 N1	0.0	0.705	8.7	LOS A	9.3	65.3	0.42	0.38	0.42	47.6
NorthEast: Bobbin Head Road														
24	L2	117	0.0	117	0.0	0.147	23.3	LOS B	3.7	25.8	0.58	0.72	0.58	34.3
26	R2	215	0.0	215	0.0	0.198	39.8	LOS C	4.7	32.9	0.79	0.76	0.79	35.7
Approach		332	0.0	332	0.0	0.198	33.9	LOS C	4.7	32.9	0.72	0.74	0.72	35.4
NorthWest: Pacific Highway (NW)														
27	L2	75	0.0	75	0.0	0.822	43.5	LOS D	31.9	223.6	0.96	0.91	1.02	36.1
28	T1	1811	0.0	1811	0.0	0.822	37.0	LOS C	35.6	249.1	0.96	0.90	1.01	27.3
Approach		1885	0.0	1885	0.0	0.822	37.2	LOS C	35.6	249.1	0.96	0.90	1.01	27.8
All Vehicles		5284	0.0	3958 N1	0.0	0.822	24.4	LOS B	35.6	249.1	0.70	0.66	0.73	35.0
Site: 103D [Post-development - Pacific Highway & Beechworth Road PM Peak]														
SouthEast: Pacific Highway (SE)														
21	L2	121	0.0	121	0.0	* 1.864	831.1	LOS F	243.7	1705.9	1.00	3.06	4.61	4.0
22	T1	2902	0.0	2902	0.0	1.864	830.5	LOS F	340.8	2385.6	1.00	3.47	4.60	2.1
Approach		3023	0.0	3023	0.0	1.864	830.5	LOS F	340.8	2385.6	1.00	3.46	4.60	2.2
NorthWest: Pacific Highway (NW)														
28	T1	1927	0.0	1927	0.0	* 0.542	1.6	LOS A	6.2	43.7	0.13	0.13	0.13	57.2
Approach		1927	0.0	1927	0.0	0.542	1.6	LOS A	6.2	43.7	0.13	0.13	0.13	57.2
SouthWest: Beechworth Road														
30	L2	172	0.0	172	0.0	0.472	35.4	LOS C	7.6	53.5	0.79	0.80	0.79	28.0
32	R2	112	0.0	112	0.0	* 0.313	34.6	LOS C	4.3	30.3	0.90	0.77	0.90	37.7
Approach		283	0.0	283	0.0	0.472	35.1	LOS C	7.6	53.5	0.84	0.79	0.84	32.7
All Vehicles		5234	0.0	5234	0.0	1.864	482.2	LOS F	340.8	2385.6	0.67	2.09	2.75	3.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 102D [Post-development - Pacific Highway & Bobbin Head Road PM Peak]											
NorthEast: Bobbin Head Road											
P6	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
All Pedestrians		53	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
Site: 103D [Post-development - Pacific Highway & Beechworth Road PM Peak]											
SouthEast: Pacific Highway (SE)											
P5	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
SouthWest: Beechworth Road											
P8	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		105	54.3	LOS E	0.2	0.2	0.95	0.95	221.5	217.4	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101C [Post-development - Pacific Highway & Livingstone Avenue AM Peak (Site Folder: Post-Development)]

Post-development AM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Pacific Highway (SE)														
21	L2	381	0	401	0.0	0.410	22.2	LOS B	12.8	89.7	0.65	0.77	0.65	35.0
22	T1	1525	0	1605	0.0	* 0.877	31.5	LOS C	47.6	333.1	0.89	0.90	1.00	39.5
Approach		1906	0	2006	0.0	0.877	29.7	LOS C	47.6	333.1	0.84	0.87	0.93	38.9
NorthWest: Pacific Highway (NW)														
28	T1	2789	0	2936	0.0	0.673	7.6	LOS A	26.3	184.3	0.56	0.52	0.56	53.4
29	R2	114	0	120	0.0	* 0.592	38.0	LOS C	4.8	33.5	1.00	0.78	1.01	27.6
Approach		2903	0	3056	0.0	0.673	8.8	LOS A	26.3	184.3	0.57	0.53	0.57	52.3
SouthWest: Livingstone Avenue														
30	L2	77	0	81	0.0	0.637	50.4	LOS D	10.2	71.6	0.98	0.82	0.98	23.9
32	R2	277	0	292	0.0	* 0.637	52.4	LOS D	10.2	71.6	0.99	0.82	1.00	23.4
Approach		354	0	373	0.0	0.637	51.9	LOS D	10.2	71.6	0.98	0.82	1.00	23.5
All Vehicles		5163	0	5435	0.0	0.877	19.4	LOS B	47.6	333.1	0.70	0.68	0.73	44.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthWest: Pacific Highway (NW)												
P7	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	220.7	222.8	1.01
SouthWest: Livingstone Avenue												
P8	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	212.3	211.9	1.00
All Pedestrians		100	105	49.3	LOS E	0.2	0.2	0.95	0.95	216.5	217.4	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101D [Post-development - Pacific Highway & Livingstone Avenue PM Peak (Site Folder: Post-Development)]

Post-development PM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Pacific Highway (SE)														
21	L2	393	0	414	0.0	0.399	21.5	LOS B	13.5	94.8	0.61	0.76	0.61	35.4
22	T1	2153	0	2266	0.0	* 1.170	209.1	LOS F	172.4	1206.7	1.00	1.97	2.30	13.3
Approach		2546	0	2680	0.0	1.170	180.2	LOS F	172.4	1206.7	0.94	1.78	2.04	14.1
NorthWest: Pacific Highway (NW)														
28	T1	1575	0	1658	0.0	0.374	5.1	LOS A	10.6	74.5	0.36	0.33	0.36	55.3
29	R2	84	0	88	0.0	* 0.476	41.7	LOS C	3.9	27.2	0.99	0.76	0.99	26.3
Approach		1659	0	1746	0.0	0.476	7.0	LOS A	10.6	74.5	0.40	0.35	0.40	53.6
SouthWest: Livingstone Avenue														
30	L2	90	0	95	0.0	0.599	54.4	LOS D	10.6	74.0	0.97	0.82	0.97	22.9
32	R2	242	0	255	0.0	* 0.599	56.5	LOS D	10.6	74.0	0.98	0.81	0.98	22.4
Approach		332	0	349	0.0	0.599	55.9	LOS D	10.6	74.0	0.98	0.81	0.98	22.5
All Vehicles		4537	0	4776	0.0	1.170	107.7	LOS F	172.4	1206.7	0.74	1.19	1.36	20.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthWest: Pacific Highway (NW)												
P7	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	225.7	222.8	0.99
SouthWest: Livingstone Avenue												
P8	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		100	105	54.3	LOS E	0.2	0.2	0.95	0.95	221.5	217.4	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CREATING COMMUNITIES

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of belonging. That's why at Stantec, we always **design with community in mind**.

We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Australian offices:
Adelaide, Albany, Brisbane, Busselton, Gold Coast, Melbourne, Perth, Rockhampton, Sydney

Stantec
Level 4, 99 Walker Street, North Sydney,
ABN: 17 007 820 322
Australia: +61 9493 9700 | www.stantec.com