STANBURY
TRAFFIC PLANNING
TRAFFIC, PARKING & TRANSPORT CONSULTANTS

PARKING & TRAFFIC IMPACT ASSESSMENT

PROPOSED ALTERATIONS AND ADDITIONS TO
ST IVES NORTH PUBLIC SCHOOL
87 MEMORIAL AVENUE
ST IVES

PREPARED FOR JDH ARCHITECTS
OUR REF: 18-024-2

SEPTEMBER 2018

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1. INTRODUCTION

1.1 Scope of Assessment

Stanbury Traffic Planning has been commissioned by JDH Architects to undertake a Parking & Traffic Impact Assessment to accompany a Development Application with respect to North Rocks Public School. The Application seeks consent for the following:

- The construction of a new three storey classroom building within the south western portion of the site containing 25 new permanent teaching spaces and new staff and administration area;
- The demolition of seven existing teaching spaces;
- The removal of 13 existing demountable buildings; and
- The upgrade of existing core facilities.

The works are proposed to facilitate:

- An increase in the student population from 899 to 1,000 students; and
- An increase the staff population from 60 to 65 employees.

The aim of this assessment is to investigate and report upon the potential parking and traffic consequences of the proposal and to recommend appropriate ameliorative measures where required. This report provides the following scope of assessment:

- Section 1 provides a summary of the site location, details, existing and surrounding land-uses;
- Section 2 describes the proposed development and operational characteristics;
- Section 3 assesses the parking considerations of the proposal with respect to the relevant Council specifications and the expected operational requirements;
- Section 4 assesses the traffic considerations of the proposal with respect to the projected traffic generating ability of the proposed development and the ability or otherwise of the surrounding road network to be capable of accommodating the altered demand in a safe and efficient manner; and
- Section 5 provides an indicative assessment of the traffic and pedestrian management measures likely to be implemented during the construction phases of the development.

The report has been prepared pursuant to State Environmental Planning Policy (Infrastructure) 2007.

1.2 Reference Documents

Reference is made to the following documents throughout this report:

- Ku-ring-gai Council's *Ku-ring-gai Development Control Plan* (Ku-ring-gai DCP);
- The Roads & Maritime Services' *Guide to Traffic Generating Developments*; and
- Transport for NSW's *Guide to Transport Impact Assessments*.

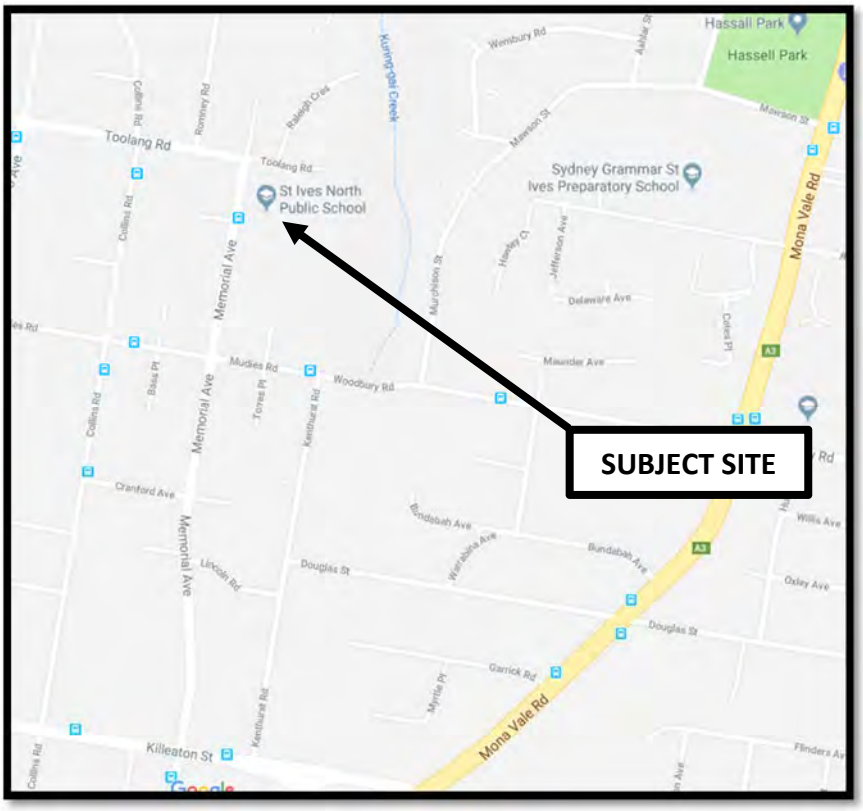
Architectural plans have been prepared by JDH Architects, reduced copies of a selection of which are attached as **Appendix 1**.

1.3 Site Details

1.3.1 Site Location

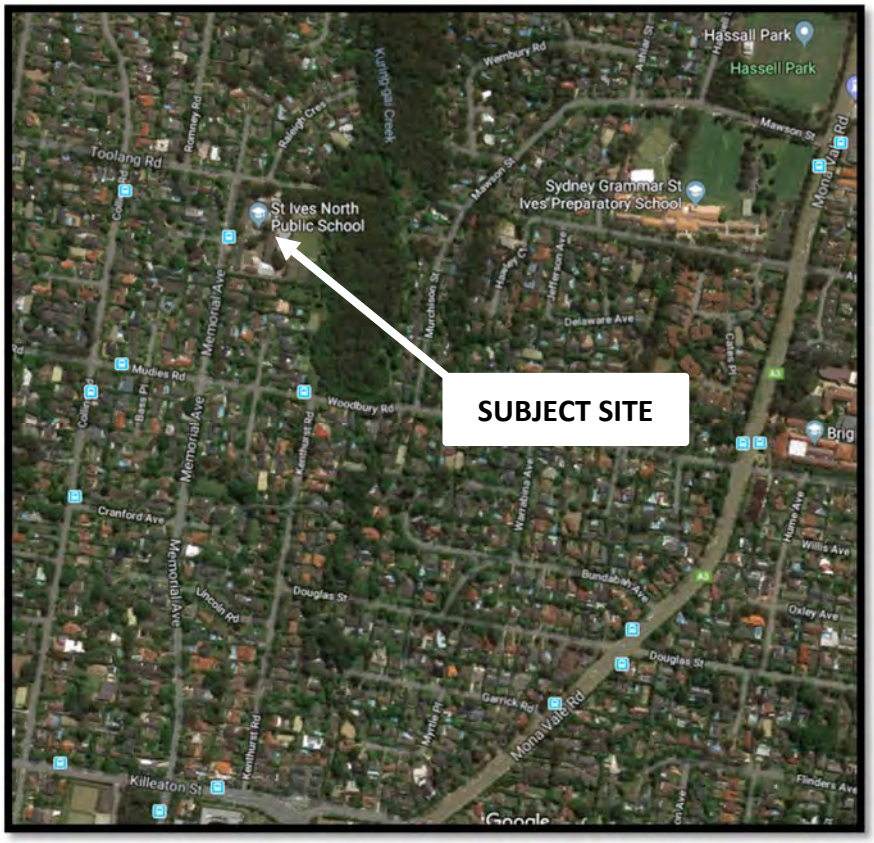
The site is located on the eastern side of Memorial Avenue, south of Toolang Road, St Ives. The site location is illustrated below and overleaf within a local and aerial context by **Figure 1** and **Figure 2**, respectively.

FIGURE 1
SITE LOCATION WITHIN A LOCAL CONTEXT



Source: Google Maps (accessed 12/06/18)

FIGURE 2
SITE LOCATION WITHIN AN AERIAL CONTEXT



Source: Google Maps (accessed 12/06/18)

1.3.2 Site Description

The site provides a street address of 87 Memorial Avenue, St Ives.

The site forms an irregularly shaped parcel of land, providing approximate frontages of 145m and 121m to Memorial Avenue and Toolang Road, respectively. The total site area is approximately 2.3 hectares.

1.3.3 Existing Use

The subject site currently accommodates St Ives North Public School accommodating a student population of 899 students between Kindergarten and Year 6 in conjunction with 60 staff (maximum on-site at any one time).

The school comprises a number of buildings largely situated within the western portion of the site including various classroom buildings, an administration building and a hall.

The school also comprises a series of paved and grassed play areas primarily situated within the eastern portion of the site.

The school is serviced by two separate on-site passenger vehicle parking areas as follows:

- A paved parking area is situated within the south-western portion of the site, capable of accommodating up to 17 passenger vehicles, four of which are provided in a stacked arrangement; and

- An informal parking area is situated within the north-western portion of the site, capable of accommodating up to 24 parked passenger vehicles.

The site therefore currently provides an on-site passenger vehicle parking capacity of 41 vehicles. All on-site passenger vehicle parking is specifically allocated to staff of the school.

No on-site parent vehicle parking is provided for student set-down / pick-up activity.

Vehicular access to the paved parking area in the south-western portion of the site is provided via a driveway connecting with Memorial Avenue in the south-western corner of the site.

Vehicular access to the informal parking area in the north-western portion of the site is provided via a driveway connecting with Toolang Road approximately 25m to the east of Memorial Avenue.

Pedestrian access to the site is provided via two gates connecting with the eastern Memorial Avenue footpath separate and to the north of the abovementioned vehicular access driveway. A further pedestrian access path provides connectivity between the school and the southern Toolang Road footpath immediately to the east and adjacent to the vehicular access driveway.

1.3.4 Surrounding Land Uses

The subject site is surrounded to the north, west and south by low density residential development whilst Ku-ring-gai Creek is situated to the east.

2. DESCRIPTION OF PROPOSAL

2.1 Built Form

The proposal seeks consent for the following:

- The construction of a new three storey classroom building within the south western portion of the site containing 25 new permanent teaching spaces and new staff and administration area;
- The demolition of seven existing teaching spaces;
- The removal of 13 existing demountable buildings; and
- The upgrade of existing core facilities.

2.2 Site Access

No changes are proposed to the existing pedestrian or vehicular access arrangements.

2.3 Internal Circulation, Servicing and Parking Provision

The proposed works involve the removal of an existing storage container situated within the southern paved parking area, which will result in an additional on-site parking capacity of five spaces. No other changes are proposed to the existing internal circulation and servicing arrangements within the site.

2.4 Site Population

The site works are proposed to facilitate:

- An increase in the student population from 899 to 1,000 students; and
- An increase the staff population from 60 to 65 employees (maximum on-site at any one time).

3. PARKING CONSIDERATIONS

3.1 Existing Parking & Student Set-Down / Pick-up Provision

3.1.1 On-Site Parking

The school is currently serviced by formal and informal off-street parking areas, collectively capable of accommodating up to 41 passenger vehicles, specifically allocated for staff use.

No on-site parking is provided for parents associated with student set-down or pick-up.

Secure bicycle parking is provided within the school, accessed via the northern Memorial Avenue pedestrian gate, capable of accommodating up to 20 bicycles.

3.1.2 Student Set-Down / Pick-Up

Ku-ring-gai Council has recently, in conjunction with the school, undertaken extensive modifications to the traffic and parking management within the surrounding public road network in order to accommodate student set-down / pick-up activity and minimise the impacts of this activity on adjoining through public traffic movements. These modifications have resulted in the following formal student set-down / pick-up areas being established in the immediate vicinity of the site:

- 'No Parking' restrictions apply along the eastern side of Memorial Avenue immediately to the south of Toolang Road during school start and finish periods, capable of accommodating up to six parent vehicles at any one time associated with student set-down / pick-up activity;

- Further 'No Parking' restrictions apply along the eastern side of Memorial Avenue approximately opposite Oxford Place during school start and finish periods, capable of accommodating two parent vehicles at any one time;

- 'No Parking' restrictions apply along the southern side of Toolang Road immediately to the east of Memorial Avenue during school start and finish periods, capable of accommodating up to four parent vehicles at any one time; and

- 'No Parking' restrictions apply along the northern side of Toolang Road between Memorial Avenue and Romney Road during school start and finish periods, capable of accommodating up to nine parent vehicles at any one time.

'No Stopping' (either part or full time) restrictions apply opposite the abovementioned formalised student set-down / pick-up areas to ensure two-way traffic flow is maintained within the public road carriageway, as follows:

- The western side of Memorial Avenue between Mudies Road and Toolang Road;
- The northern side of Toolang Road immediately to the east of Memorial Avenue; and
- The southern side of Toolang Road between Memorial Avenue and Collins Road.

3.1.3 Bus Set-Down / Pick-Up

A 'Bus Zone' is provided on the eastern side of Memorial Avenue to the south of Oxford Place, being applicable during school start and finish periods. The bus zone is capable of accommodating up to three buses at any one time.

3.1.4 On-Street Parking

On-street parking is available within the immediate vicinity of the school as follows:

- Unrestricted parking is available along the eastern side of Memorial Avenue between the abovementioned Bus Zone and Mudies Road, to the south of the school;
- Unrestricted parking is available along both sides of Memorial Avenue to the south of Mudies Road;
- Unrestricted parking is available along the northern side of Oxford Place, being assisted by 'No Parking' restrictions during school periods along the southern kerb alignment;
- Unrestricted parking is available along the eastern side of Memorial Avenue to the north of Toolang Road, being facilitated by 'No Stopping' restrictions during school start and finish periods along the western kerb alignment; and
- Unrestricted parking is available along both sides of Raleigh Crescent to the north of Toolang Road.

3.2 Existing Parking & Student Set-Down / Pick-up Demand

3.2.1 On-Site Parking

Observations have indicated that the on-site staff car parking areas are generally at or close to capacity during the operational periods of the school.

3.2.2 Student Set-Down / Pick-Up Areas

This Practice commissioned the surveys of the formalised on-street student set-down / pick-up areas presented within Section 3.1.2 of this report, as follows:

- Area 1 – the eastern side of Memorial Avenue to the south of Toolang Road;

- Area 2 – the eastern side of Memorial Avenue opposite Oxford Place;
- Area 3 – the southern side of Toolang Road to the east of Memorial Avenue; and
- Area 4 – the northern side of Toolang Road to the west of Memorial Avenue.

Surveys were undertaken between 7:30am – 9:30am as well as 2:30pm – 4:30pm on the 23rd of May 2018, in order to capture peak student set-down / pick-up activity.

Table 1 below provides a summary of the survey results, whilst full details are contained within **Appendix 2** for reference.

TABLE 1
EXISTING VEHICLES SETTING-DOWN / PICKING-UP STUDENTS

Area	AM Period			PM Period		
	7:30-8:30	8:30-9:30	Total	2:30-3:30	3:30-4:30	Total
1	46	150	196	59	14	73
2	8	1	9	3	9	12
3	25	19	44	2	11	13
4	0	1	1	0	0	0
Total	**79**	**171**	**250**	**64**	**34**	**98**

Table 1 indicates the following:

- The eastern side of Memorial Avenue to the south of Toolang Road was surveyed to accommodate the majority of the set-down / pick-up demand during both the morning and afternoon peak periods;
- Whilst set-down / pick-up activity was surveyed on the eastern side of Memorial Avenue opposite Oxford Place, the limited capacity of this area results in it not forming a particularly attractive location for this activity;
- The southern side of Toolang Road to the east of Memorial Avenue accommodated notable demand associated with student set-down / pick-up activity, particularly during the morning peak period; and
- The northern side of Toolang Road to the west of Memorial Avenue is virtually not utilised at all for student set-down / pick-up.

3.2.3 Bus Zone

Forest Coach Lines operate up to three school bus services to accommodate students of the school during peak periods. These services operate via the 'Bus Zone' on the eastern side of Memorial Avenue to the south of Oxford Place. The capacity of the 'Bus Zone' is capable of accommodating all three bus services simultaneously, which was observed to occur for a period of approximately 10 minutes following the completion of the school day.

3.2.4 On-Street Parking

The following was observed with respect to on-street parking demand within the immediate vicinity of the site during school start and finish periods:

- Parking demand along the eastern side of Memorial Avenue between the school and Mudies Avenue was observed to be at or near capacity, most likely comprising long term demand associated with school staff and surrounding residents;

- Parking demand along both sides of Memorial Avenue to the south of Mudies Road was reasonably low, with the exception of between 2:45pm and 3:15pm, associated with short term school parent parking;

- Parking demand along the northern side of Oxford Place was observed to be at or near capacity, most likely comprising long term demand associated with school staff and surrounding residents; and

- Parking demand within Raleigh Crescent was reasonably low, with the exception of between 2:45pm and 3:15pm, associated with short term school parent parking.

3.3 Council Parking Requirements

Ku-ring-gai Council relies on Ku-ring-gai DCP 2018 for locally sensitive parking requirements for the subject site. Ku-ring-gai DCP provides the following parking requirements for educational establishments relating to the subject proposal:

> *1 space per employee, plus*
> *1 space per 8 students year 12 students*
> *Provision for on-site set down / pick up of students and a set-down / pick-up management plan is required.*

Application of Ku-ring-gai DCP parking requirements to the existing school population of 60 employees and 899 students results in the following calculation:

(60 x 1) = 60 spaces plus provision for on-site student set-down / pick-up

The existing school, providing an on-site parking provision of 41 spaces therefore represents an existing staff parking shortfall of 19 spaces in accordance with Ku-ring-gai DCP. Further, the surrounding public road network is relied upon for parent set-down / pick-up activity. In this regard, the school currently implements a management plan during school finish period, whereby staff supervise the loading of students to parent vehicles within the formalised on-street set-down / pick-up area on the eastern side of Memorial Avenue immediately to the south of Toolang Road. Further, school staff supervise the loading of students to buses within the 'Bus Zone' within Memorial Avenue following school finish.

Application of the Ku-ring-gai DCP parking requirements to the proposed school population of 65 employees increases the existing on-site staff parking requirement to 65 spaces, or five spaces over and above that currently required.

The proposed works involve the removal of an existing storage container situated within the southern paved parking area, which will result in an additional on-site parking capacity of five spaces.

The proposal is therefore expected to result in a nett neutral staff parking arrangement, thereby not resulting in any additional staff generated demand for parking within the surrounding road network.

3.4 Discussion on Projected Parking & Set-Down / Pick-Up Conditions

3.4.1 On-Site Parking

It has previously been presented that the proposal generates a requirement for five additional on-site staff parking spaces. These required additional spaces are proposed to be facilitated by the removal of an existing storage container situated within the southern paved parking area, which will result in an additional on-site parking capacity of five spaces.

The proposal is therefore expected to result in a nett neutral staff parking arrangement, thereby not resulting in any additional staff generated demand for parking within the surrounding road network. Notwithstanding this, a discussion on the ability or otherwise of the surrounding on-street parking areas to accommodate additional demand, should it be required, is provided within subsequent sections of this report.

3.4.2 Student Set-Down / Pick-Up

Student set-down / pick-up activity has been presented to occur within a series of formalised on-street areas in the immediate vicinity of the school. Surveys of these areas have indicated that up to 171 and 64 parent vehicles set-down and pick-up students within these formalised areas during morning and afternoon peak hours, respectively.

The abovementioned student set-down / pick-up demand is expected to increase at a rate proportional to the number of students attending the school. In this regard, the proposal involves an increase in the student population from 899 to 1,000 over time, representing an increase of approximately 11%. It could therefore be expected that the number of parent vehicles setting-down students within the surrounding on-street set-down areas during the morning peak hour increasing from 171 to 190 vehicles. Similarly, the number of parent vehicles picking-up students during the afternoon peak hour is expected to increase from 64 to 71 vehicles.

The abovementioned projected increase in student set-down / pick-up demand is considered to be minor and accordingly, most unlikely to result in any unreasonable impacts on adjoining infrastructure capacity, over and above that which currently exists. Notwithstanding this, there are a number of initiatives

which should be considered to improve the overall level of safety and efficiency of the student set-down / pick-up activity, discussed within the following sub-sections of this report.

3.4.2.1 Oxford Place

Oxford Place provides a pavement width of 6m, accommodating unrestricted parking along the northern kerb alignment and 'No Parking' restrictions along the southern kerb alignment. The existence of high long term parking demand along the northern kerb alignment results in there not being adequate pavement width available for the accommodation of two-way traffic flow. The cul-de-sac nature of the street however results in two-way traffic demands and accordingly, traffic congestion was observed within Oxford Place during both the school set-down / pick-up periods.

The following is accordingly recommended for consideration:

- The existing 'No Parking' restrictions applying along the southern kerb alignment during school operational periods, be replaced with 'No Stopping'; and

- The existing unrestricted parking conditions along the northern kerb alignment of Oxford Place be replaced with 'No Parking' restrictions during prescribed school start and finish periods.

The implementation of the above altered parking arrangements is expected to reduce the potential for traffic congestion and improve the legitimacy of Oxford Place as a formalised student set-down / pick-up area, thereby increasing the overall capacity of the surrounding public road network to accommodate additional demand. It is noted that students are provided with safe and efficient connectivity between Oxford Place and the school grounds via the provision of a raised and marked pedestrian crossing over Memorial Avenue to the north of Oxford Place.

3.4.2.2 Toolang Road (west of Memorial Avenue)

Whilst the northern kerb alignment of Toolang Road to the west of Memorial Avenue is sign posted as a formalised student set-down / pick-up area, surveys have indicated that it is not utilised for this activity, in preference to the eastern side of Memorial Avenue, immediately adjacent to the school. This, in conjunction with the limited capacity of the formalised Memorial Avenue student set-down / pick-up area, results in eastbound vehicle queuing within Toolang Road on approach to Memorial Avenue, extending at times to Collins Road, particularly during the school finish period.

It is considered that the northern kerb alignment of Toolang Road would form an attractive location for the setting-down / picking-up of students if an off-set BB line was installed within Toolang Road, in a similar manner to that provided within Memorial Avenue adjacent to the school. The off-setting of the BB line to the south, would facilitate enough pavement width to accommodate parent

vehicle set-down / pick-up activity adjacent to the northern kerb alignment and an adjoining single lane of eastbound traffic flow.

Students are provided with safe and efficient connectivity between Toolang Road to the west of Memorial Avenue and the school grounds via the provision of marked pedestrian crossings over the northern and eastern approaches of the intersection of Memorial Avenue and Toolang Road.

3.4.2.3 School Set-Down / Pick-Up Management Plan

Should the recommended traffic and parking management measures within Oxford Place and / or Toolang Road be acceptable to Ku-ring-gai Council, it is considered that a School Set-Down / Pick-Up Management Plan could be formulated and implemented by the School in conjunction, which provides an objective of improving the safety and efficiency of the formalised on-street set-down / pick-up areas. This Plan could include, but not be limited to, the following:

- The expansion of the existing school staff supervision of the Memorial Avenue set-down / pick-up area to include Toolang Road and / or Oxford Place;
- The directing of parent vehicles to different formalised set-down / pick-up areas, depending on year groups of students; and
- The displaying of student names within parent vehicle windscreens during afternoon periods to improve the efficiency with which students can be loaded into parent vehicles.

It is expected that the implementation of a formalised School Set-Down / Pick-Up Management Plan, in conjunction with the recommended altered public road traffic and parking arrangements within Oxford Place and Toolang Road, would significantly improve the overall efficiency of student set-down / pick-up activity. This, in turn, would reduce the impact of student set-down / pick-up activity on adjoining public road traffic flow thereby increasing the capacity of the road network to accommodate additional demand.

3.4.3 Bus Zone

The existing bus servicing of the school was observed to operate in a safe and efficient manner. The proposed increase in student population is only expected to result in marginal increases to bus patronage and accordingly, noticeable impacts on existing bus operation and the impacts of which, are not expected.

3.4.4 On-Street Parking

The proposal is expected to result in net a neutral arrangement with respect to on-street parking demand generated by school staff. Notwithstanding this, , the increased student numbers associated with the proposal result in a potential for increased short term parking associated with parents who wish to enter the school grounds to supervise their children between the campus and their vehicles.

It has previously been presented that short term parking demand associated with parents during school start and finish times are generally accommodated within Memorial Avenue and Raleigh Avenue to the south and north of the school, respectively.

Recent observations have indicated that there is capacity within the surrounding public road network to accommodate the minor extent of additional parking which could be generated by the proposed increased school population during school start and finish periods. Notwithstanding this, the intention of the previously presented altered on-street traffic and parking management arrangements in conjunction with the School Set-Down / Pick-Up Management Plan, is to increase the capacity and thus use of the formalised student set-down / pick-up areas, thereby reducing the propensity of parents to park within surrounding streets and supervise their children between their vehicles and the campus. This is expected to result in reduced parking demand within Memorial Avenue and Raleigh Avenue to the south and north of the school respectively, thereby reducing the overall parking demands generated by the school and the impacts associated with which.

4. TRAFFIC CONSIDERATIONS

4.1 Surrounding Road Network Function and Controls

The following provides a description of the surrounding road network:

- **Memorial Avenue** performs a local access function, providing a connection between the St Ives town centre to the south and Toolang Road adjacent to the subject site.

  Memorial Avenue provides a 9m wide pavement, providing one through lane of traffic in each direction in conjunction with parallel parking along one or both kerb alignments. Traffic flow is primarily governed by a sign posted speed limit of 50km/h, however a 40km/h school zone speed limit applies in the vicinity of the site during prescribed school start and finish periods.

  Memorial Avenue intersects with Toolang Road to the north-west of the site, under Give Way control with the southern Memorial Avenue and western Toolang Road approaches forming the priority routes.

  Memorial Avenue forms a T-junction with Oxford Place to the west of the site, operating under major / minor priority control with Memorial Avenue performing the priority route.

  Memorial Avenue intersects with Mudies Road to the south of the site, under single lane circulating roundabout control. Further to the south, Memorial Avenue intersects with Killeaton Street and Mona Vale Road separately, with both intersections operating under traffic signal control.

- **Toolang Road** performs a local access function, providing an east-west connection primarily between Memorial Avenue in the east and Warrimoo Avenue in the west.

  Toolang Road provides a 9m wide pavement providing one through lane of traffic in each direction in conjunction with parallel parking along one or both kerb alignments. Traffic flow is primarily governed by a sign posted speed limit of 50km/h, however a 40km/h school zone speed limit applies on approach to Memorial Avenue during prescribed school start and finish periods.

  Toolang Road forms a T-junction with Romney Road to the west of Memorial Avenue, operating under major / minor priority control with Toolang Road performing the priority route. Further to the west, Toolang Road forms a partially off-set cross intersection with Collins Road, under stop signage control with Toolang Road again performing the priority route. To the west of Collins Road, Toolang Road forms an intersection with Warrimoo Avenue operating under single lane circulating roundabout control.

- **Oxford Place** performs a local access function, extending approximately 80m to the west of Memorial Avenue prior to forming a terminating cul-de-sac.

Oxford Place provides a 6m wide pavement providing one through lane of traffic in conjunction with parallel parking along the northern kerb alignment. Traffic flow is primarily governed by a continuation of the sign posted speed limit of 50km/h within Memorial Avenue, however a 40km/h school zone speed limit applies on approach to Memorial Avenue during prescribed school start and finish periods.

- **Mudies Road** performs a local access function providing a connection between Mona Vale Road in the east (with Woodbury Road), with which it intersects under traffic signal control, and Warrimoo Avenue in the west.

  Mudies Road provides an 8m wide pavement providing two through lanes of traffic in conjunction with parallel parking along both kerb alignments. Traffic flow is governed by a speed limit of 50km/h.

  Mudies Road intersects with Carbeen Avenue, Collins Road and Memorial Avenue under single lane circulating roundabout control.

- **Collins Road** performs a local access function, providing a connection between Dalton Road in the north and Killeaton Street in the south.

  Collins Road provides a 10m wide pavement providing two through lanes of traffic in conjunction with parallel parking along both kerb alignments. Traffic flow is governed by a speed limit of 50km/h.

4.2 Existing Traffic Volumes

This Practice has commissioned the undertaking of morning and afternoon peak period traffic surveys of the following intersections in order to accurately ascertain traffic existing demands within the immediate precinct:

- The intersection of Toolang Road and Collins Road;
- The junction of Toolang Road and Romney Road;
- The intersection of Toolang Road and Memorial Avenue;
- The junction of Memorial Avenue and Oxford Place;
- The intersection of Memorial Avenue and Mudies Road; and
- The intersection of Mudies Road and Collins Road.

Surveys were undertaken between 7:30am – 9:30am and 2:30pm – 4:30pm on the 23 May 2018 in order to capture the peak operational periods of the school.

Table 2 overleaf provides a summary of the surveyed peak hour traffic demands throughout the surrounding public road network, whilst more detailed summaries are provided as **Appendix 3**.

TABLE 2 EXISTING MORINING AND AFTERNOON PEAK HOUR TRAFFIC VOLUMES						
Road	**AM Peak Hour**			**PM Peak Hour**		
	North / East	**South / West**	**Total**	**North / East**	**South / West**	**Total**
Memorial Avenue						
North of Toolang Road	34	35	69	14	17	31
South of Toolang Avenue	167	288	455	141	175	316
North of Mudies Road	234	310	564	207	199	306
South of Mudies Road	272	407	679	295	242	537
Toolang Road						
West of Collins Road	331	170	501	170	214	384
East of Collins Road	190	71	261	104	89	193
West of Memorial Avenue	213	95	308	141	160	301
East of Memorial Avenue	71	73	144	31	47	78
Oxford Place	61	55	116	32	32	64
Mudies Road						
West of Collins Road	159	91	250	73	162	235
East of Collins Road	402	201	603	182	298	480
West of Memorial Avenue	405	190	595	154	296	450
East of Memorial Avenue	405	249	654	225	322	547
Collins Road						
North of Toolang Road	32	69	101	35	53	88
South of Toolang Road	132	298	430	198	157	355
North of Mudies Road	151	310	461	192	177	369
South of Mudies Road	94	120	214	75	87	162

Table 2 indicates the following approximate peak hour traffic demands:

- Memorial Avenue accommodates:

  - Two directional traffic demands of less than 100 vehicles to the north of Toolang Road;
  - Directional traffic demands of 150 – 300 vehicles adjacent to the school; and
  - Directional traffic demands of 250 – 400 vehicles to the south of Mudies Road.

- Toolang Road accommodates:

  - Directional traffic demands of less than 100 vehicles to the east of Memorial Avenue;
  - Directional traffic demands of 70 – 300 vehicles between Memorial Avenue and Collins Road; and
  - Directional traffic demands of 170 – 350 vehicles to the west of Collins Road.

- Oxford Place accommodates directional traffic demands of less than 100 vehicles;

- Mudies Road accommodates:

  - Directional traffic demands of 200 – 400 vehicles to the east of Collins Road; and
  - Directional traffic demands of 75 – 150 to the west of Collins Road.

- Collins Road accommodates:

  - Directional traffic demands of less than 100 vehicles to the north of Toolang Road and to the south of Mudies Road; and
  - Directional traffic demands of 150 – 300 vehicles between Toolang Road and Mudies Road.

It is evident from the above that through traffic flow between areas to the north-west and south-east of the subject site tend to utilise Collins Road and Mudies Road to bypass the section of Memorial Avenue adjacent to the school. This is discussed in more detail in subsequent sections of this report.

4.3 Existing Road Network Operation

4.3.1 Local Intersection Operation

The surveyed public road intersections have been analysed utilising the SIDRA computer intersection analysis program in order to objectively assess the operation of the nearby public road network.

SIDRA is a computerised traffic arrangement program which, when volume and geometrical configurations of an intersection are imputed, provides an objective assessment of the operation efficiency under varying types of control (i.e. signs, signal and roundabouts). Key indicators of SIDRA include level of service where results are placed on a continuum from A to F, with A providing the greatest intersection efficiency and therefore being the most desirable by the Roads and Maritime Services.

SIDRA uses detailed analytical traffic models coupled with an iterative approximation method to provide estimates of the abovementioned key indicators of capacity and performance statistics. Other key indicators provided by SIDRA are average vehicle delay, the number of stops per hour and the degree of saturation. Degree of saturation is the ratio of the arrival rate of vehicles to the capacity of the approach. Degree of saturation is a useful and professionally accepted measure of intersection performance.

SIDRA provides analysis of the operating conditions that can be compared to the performance criteria set out in **Table 3** overleaf (being the RMS NSW method of calculation of Level of Service).

TABLE 3 LEVEL OF SERVICE CRITERIA FOR INTERSECTIONS		
Level of Service	**Average Delay per Vehicle (secs/veh)**	**Expected Delay**
SIGNALISED INTERSECTIONS AND ROUNDABOUTS		
A	Less than 14	Little or no delay
B	15 to 28	Minimal delay and spare capacity
C	29 to 42	Satisfactory delays with spare capacity
D	43 to 56	Satisfactory but near capacity
E	57 to 70	At capacity, incidents will cause excessive delays
F	> 70	Extreme delay, unsatisfactory
PRIORITY CONTROLLED INTERSECTIONS		
A	Less than 14	Good
B	15 to 28	Acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Near capacity
E	57 to 70	At capacity and requires other control mode
F	> 70	Unsatisfactory and requires other control mode

The existing conditions have been modelled utilising the peak hour traffic volumes presented within **Appendix 3**.

Table 4 below provides a summary of the SIDRA output data whilst more detailed summaries are included as **Appendix 4**.

TABLE 4 SIDRA OUTPUT EXISTING WEEKDAY PEAK HOUR PERFORMANCE		
	AM	**PM**
Toolang Avenue & Collins Road		
Delay	11.5	10.7
Degree of Saturation	0.19	0.18
Level of Service	A	A
Memorial Avenue & Toolang Road		
Delay	13.1	10.3
Degree of Saturation	0.55	0.27
Level of Service	A	A
Memorial Avenue & Oxford Place		
Delay	7.7	6.9
Degree of Saturation	0.15	0.10
Level of Service	A	A
Memorial Avenue & Mudies Road		
Delay	7.9	6.9
Degree of Saturation	0.41	0.30
Level of Service	A	A
Mudies Road & Collins Road		
Delay	6.8	6.5
Degree of Saturation	0.30	0.24
Level of Service	A	A
Toolang Road & Romney Road		
Delay	6.6	6.6
Degree of Saturation	0.10	0.09
Level of Service	A	A

Table 4 indicates that the immediately surrounding public road intersections provide a level of service of A during peak commuter periods, representing good operation with spare capacity.

4.4 Public Transport

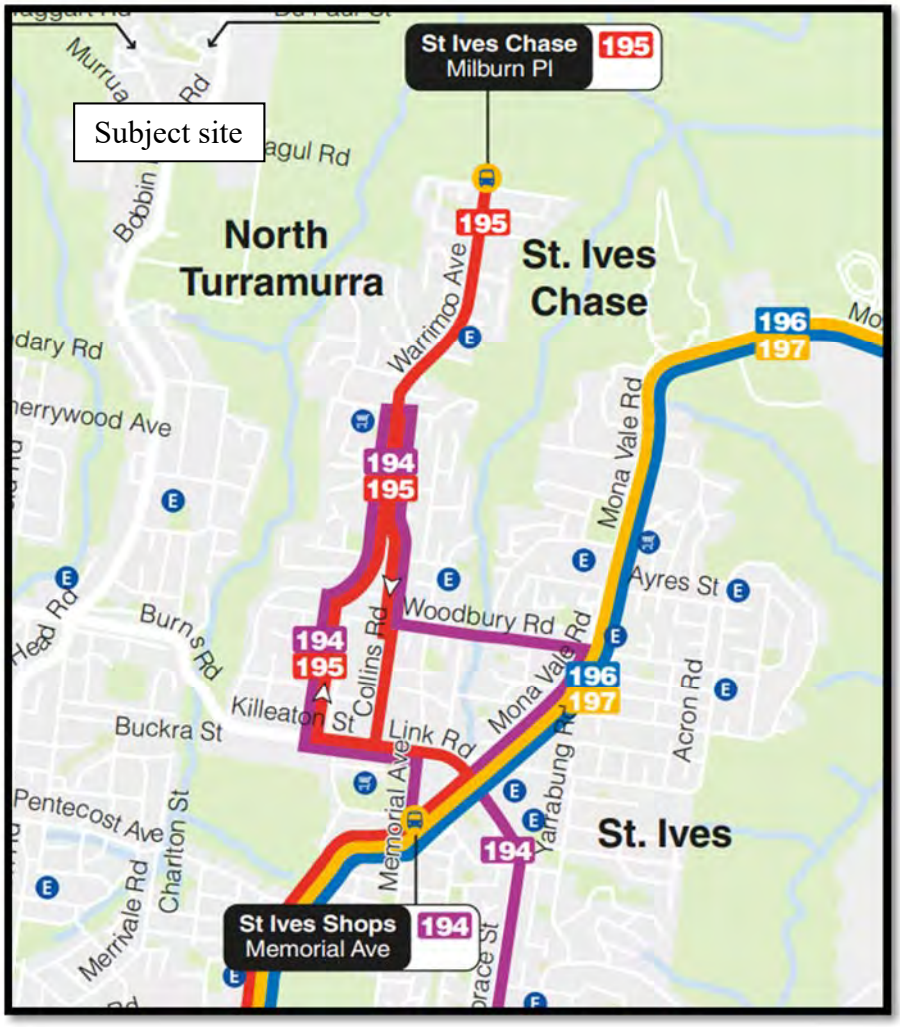
In conjunction with the special school bus services operating via the 'Bus Zone' within Memorial Avenue adjacent to the south-western corner of the site, Forest Coach Lines operates the following public services along Mudies Road and Collins Road:

- Route 194 between St Ives Chase to the City, providing a 15 minute service frequency during weekday commuter peaks, thence extending to 60 minutes during other weekday and weekend periods; and

- Route 195 between Gordon Station and St Ives Chase, providing a 60 minute service frequency during weekday commuter peaks, thence extending to 120 minutes during other weekday and weekend periods.

Figure 3 overleaf provides a graphical representation of the abovementioned bus services.

FIGURE 3
BUS ROUTES



Source: 131500 Region 4 Network Map (accessed 12/06/18)

4.4 Pedestrian Infrastructure

The following pedestrian access and mobility infrastructure surrounds the subject site:

- Footpaths are provided on both sides of Memorial Avenue and Toolang Road;
- A footpath is provided on the western side of Collins Road;
- A footpath is provided on the northern side of Mudies Road;
- A footpath is provided on the eastern side of Raleigh Avenue;
- Marked pedestrian crossings are provided over the northern and eastern approaches of the intersection of Memorial Avenue and Toolang Road; and

- A raised marked pedestrian crossing is provided over Memorial Avenue to the north of Oxford Place (which is supervised during school start and finish periods).

4.5 Traffic Generation

The traffic generating capacity of schools is most directly proportional to the number of students. The proposal involves an increase in the student numbers from 899 to 1,000 over time. This represents an increase of approximately 11%. The proposal therefore is expected to increase the traffic generating potential of the school by approximately 8% over and above that existing.

To quantify the above, reference is made to Transport for NSW's *Guide to Transport Impact Assessments*. This publication presents that primary school typically generate an average of 0.7 and 0.5 hourly vehicle trips per student during the morning and afternoon peak hours, respectively. Application of this rate results in approximately 70 and 50 additional vehicle trips to and from the precinct during weekday morning and afternoon peak hours respectively.

Given the high proportion of the above trips are likely to comprise student set-down and pick-up activity, it is projected that these trips will be evenly split between inbound and outbound movements. The proposal is therefore expected to generate in the order of 35 inbound and 35 outbound vehicle movements during the morning peak hour over and above that currently generated and 25 inbound and 25 outbound vehicle movements during the afternoon peak hour.

4.6 Traffic Impacts

The proposal has been estimated to generate up to 35 inbound and 35 outbound vehicle movements during peak operational periods of the school. Such a level of additional traffic represents, on average, approximately one additional inbound vehicle trip and one additional outbound vehicle trip per each two minutes during peak periods.

It could be expected that the above additional vehicle trips are to be spread throughout the surrounding road network associated with the numerous available student set-down / pick-up / parking areas, thereby not resulting in particularly noticeable impacts in any one location. Notwithstanding this, the intention of the previously presented recommended altered on-street traffic and parking management arrangements in conjunction with the School Set-Down / Pick-Up Management Plan, is to increase the efficiency of the existing formalised student set-down / pick-up areas, thereby reducing the impacts of school generated traffic on the surrounding road network and ensuring there is capacity to accommodate any minor increases in traffic demands associated with the proposal.

It has previously been presented that the frictional effect of the student set-down / pick-up activity on traffic flow currently results in some diversion of through traffic between Toolang Road and Memorial Avenue via Collins Road and Mudies Road. Observations, confirmed by SIDRA modelling presented within this report, indicates that the impacts of such traffic diversion on the safety and efficiency of

Mudies Road and Collins Road is minimal. Similarly to that stated above, it is expected that the implementation of the recommended altered on-street traffic and parking management arrangements in conjunction with the School Set-Down / Pick-Up Management Plan will minimise the frictional effect of school operation on adjoining public road traffic flow, minimising the propensity for this current traffic diversion.

5. PRELIMINARY CONSTRUCTION MANAGEMENT PLAN

5.1 Introductory Statement

This Section of the report constitutes a preliminary Construction Traffic Management Plan (CTMP) addressing the traffic access and safety issues associated with demolition and construction works associated with the proposal. CTMPs are generally prepared at Construction Certificate stage following the commissioning of a builder thereby allowing a greater appreciation of the likely construction methodology and therefore the required traffic management measures to be implemented.

The terms of the initiatives contained within the following subsections of this report are therefore somewhat generic and some modifications may be needed by or on behalf of the successful builder / civil contractor at Construction Certificate stage depending on their feasibility taking into consideration all project requirements.

5.2 Traffic Management During On-Site Works

The demolition and construction works are likely to be undertaken within two separate stages as follows:

- Stage 1 – demolition of existing site structures; and
- Stage 2 – construction of new site structures.

The scale of the development works are such that they are largely contained within the south-western corner of the site.

Construction vehicles are most likely not able to be wholly accommodated on-site and accordingly, construction vehicles servicing the site during the construction phases of the development will therefore need to be accommodated within the adjoining public road. It is accordingly expected that a Works Zone will be implemented along the eastern kerb alignment of Memorial Avenue in place of the existing 'No Parking' area opposite Oxford Place.

A crane located within the site will transport construction materials between the construction vehicles within the abovementioned Works Zone and the site.

Class B Hoarding will be required to be implemented within the eastern Memorial Avenue footway immediately adjacent to the Works Zone to protect pedestrians associated with this loading and unloading of materials.

Site sheds are proposed to be located on top of the Class B Hoarding within the eastern Memorial Avenue verge.

Class A Hoarding is required to define the northern, eastern and southern extents of the construction works within the school site, providing appropriate separation of construction activity from ongoing school operation.

Applications to Council will be required in relation to the Works Zone, hoarding and use of a crane, including the payment of appropriate fees.

5.3 Safe Ingress and Egress of Construction Traffic

It has previously been presented that construction vehicles will not access the subject site, rather all construction vehicles up will service the site via Works Zone within Memorial Avenue.

Vehicles accessing the Works Zone will do so via a simple forward movement from the southbound Memorial Avenue travel lane. Similarly, construction vehicles will exit the Works Zone via a simple forward movement back to the southbound Memorial Avenue travel lane.

All construction vehicle Works Zone access and egress movements are to be strictly controlled by appropriately qualified traffic controllers. Traffic controllers are not to stop traffic on the public street to allow trucks to enter or leave the Works Zone/s. They must wait until a suitable gap in traffic flows allows them to assist construction vehicles to enter or exit the Works Zone/s. The Roads Act does not give any special treatment for trucks leaving a Works Zone – the vehicles already on the road have right of way.

No queuing / marshalling of construction vehicles is to occur in any public road.

5.4 Construction Vehicle Transport Routes

Construction vehicles are to access and vacate the subject site utilising Mona Vale Road as the main approach / departure route. The following provides a description of the construction vehicle transit routes:

Inbound Route

Mona Vale Road, right or left turn into Woodbury Road, Mudies Road, right turn to Collins Road, right turn to Toolang Road, right turn to Memorial Avenue and thence a forward movement to the Memorial Avenue Works Zone.

Outbound Route

Forward movement from the Works Zone to Memorial Avenue, left into Mudies Road, Woodbury Road and thence a right or left turn to Mona Vale Road.

5.5 Parking Control

All construction employee / tradesperson passenger vehicle parking is to be accommodated off-site within the surrounding public road network. Construction workers / tradespersons will be encouraged to do either of the following when travelling to the site in order to minimise the extent of parking demand:

- Utilise public transport to the site (the site is well serviced by previously presented bus services operating within the subject vicinity); and / or

- Car pool with other construction workers.

The above transport options will form part of the conditions of commissioning when engaging the relevant site workers and as such form part of any site induction process.

5.6 Construction Traffic Generation

The construction works are likely to generate a maximum of four heavy vehicles servicing the site during peak periods, such as concrete pours. During these periods of heavy construction vehicle generation, drivers are to be instructed by radio when to arrive at the site to ensure that there is no vehicle queuing or parking within the adjoining road network. This is to be strictly adhered to.

5.7 Traffic Impact

The recent traffic investigations of the adjoining road network and the analysis contained within previous sections of this report have indicated that motorists are provided with a good level of service within the immediately adjoining public road network. It is therefore considered that the limited traffic generation associated with the construction activities can be accommodated without any unreasonable impacts on adjoining vehicle movements considering the previously mentioned maximum hourly traffic generation.

Notwithstanding the above, it is recommended that construction vehicle movements to and from the site be eliminated where possible during road peak school operational periods (7:30am – 9:30am and 2:30pm – 4:30pm).

5.8 Impacts on Pedestrians

Pedestrian demands along Memorial Avenue associated with the school operational are notable however pedestrian movements adjacent to the site are to occur in an unimpeded fashion during all periods of construction. This is to be achieved through the provision of B Class Hoarding associated with the Memorial Avenue Works Zone.

Unimpeded pedestrian access to adjoining developments and indeed, nearby bus stops, will be maintained at all times.

Boundary and internal site hoarding will protect pedestrians from dust and debris.

No unreasonable impacts on the safety or mobility of pedestrians are therefore anticipated during the construction works associated with the subject development.

6. CONCLUSION

This report assesses the potential parking and traffic implications associated with a Development Application seeking the undertaking of alterations and additions to St Ives North Public School located at 87 Memorial Avenue, St Ives. Based on this assessment, the following conclusions are now made:

- The proposal includes:
  - The construction of a new three storey classroom building within the south western portion of the site containing 25 new permanent teaching spaces and new staff and administration area;
  - The demolition of seven existing teaching spaces;
  - The removal of 13 existing demountable buildings; and
  - The upgrade of existing core facilities.

- The works are proposed to facilitate:
  - An increase in the student population from 899 to 1,000 students; and
  - An increase the staff population from 60 to 65 employees.

- The proposed works involve the removal of an existing storage container situated within the southern paved parking area, which will result in an additional on-site parking capacity of five spaces;

- Application of the Ku-ring-gai DCP parking requirements to the proposed increased school staff population results in a requirement for five additional parking spaces, over and above that currently required;

- The proposal is therefore expected to result in a nett neutral staff parking arrangement, thereby not resulting in any additional staff generated demand for parking within the surrounding road network;

- All on-site parking is currently (and is to continue to be) specifically allocated to staff, resulting in student set-down / pick-up activity occurring on the surrounding public streets;

- It is projected that proposal will also generate a minor level of additional parent vehicles to and from the school during school start and finish periods associated with student set-down / pick-up activity;

- The projected increase in student set-down / pick-up demand is considered to be minor and accordingly, most unlikely to result in any unreasonable impacts on adjoining infrastructure capacity, over and above that which currently exists;

- Notwithstanding the above, a number of initiatives are recommended for consideration in order to improve the overall level of safety and efficiency of the student set-down / pick-up activity, as follows:

- The existing 'No Parking' restrictions applying along the southern kerb alignment of Oxford Place during school operational periods, be replaced with 'No Stopping';
- The existing unrestricted parking conditions along the northern kerb alignment of Oxford Place be replaced with 'No Parking' restrictions during prescribed school start and finish periods; and
- The provision of an off-set BB line within Toolang Road to the west of Memorial Avenue, in a similar manner to that provided within Memorial Avenue adjacent to the school.

- Further, it is recommended that a School Set-Down / Pick-Up Management Plan be formulated and implemented by the School which includes, but is not be limited to, the following:

  - The expansion of the existing school staff supervision of the Memorial Avenue set-down / pick-up area to include Toolang Road and / or Oxford Place;
  - The directing of parent vehicles to different formalised set-down / pick-up areas, depending on year groups; and
  - The displaying of student names within parent vehicle windscreens during afternoon periods to improve the efficiency with which students can be loaded into parent vehicles.

- It is expected that the implementation of a formalised School Set-Down / Pick-Up Management Plan, in conjunction with the recommended altered public road traffic and parking arrangements within Oxford Place and Toolang Road, would significantly improve the overall efficiency of student set-down / pick-up activity;

- This, in turn, would reduce the impact of student set-down / pick-up activity on adjoining public road traffic flow and similarly, reduce the propensity of parents to park within surrounding streets and walk to and from the school, thereby increasing the capacity of the road network to accommodate additional demand;

- The surrounding road network currently operates with a good level of service during peak school start and finish periods with ample spare capacity;

- It is expected that the proposal will result in the generation of a low level of additional vehicle trips to and from the precinct during school start and finish periods;

- The surrounding road network is capable of accommodating the low level of additional traffic projected to be generated by the proposal in a safe and efficient manner; and

- Notwithstanding the above, it is expected that the implementation of a formalised School Set-Down / Pick-Up Management Plan, in conjunction with the recommended altered public road traffic and parking arrangements within Oxford Place and Toolang Road, would significantly improve the

overall level of safety and efficiency of the surrounding road network, ensuring that no unreasonable impacts from the proposal would eventuate.

It is considered, based on the contents of this report and the conclusions contained herein, there is no parking or traffic related issues that should prevent approval of the subject proposal. This action is therefore recommended.

APPENDIX 1

ST IVES NORTH PUBLIC SCHOOL, ST IVES

LOCATION MAP

PROJECT BRIEF:

CONSTRUCTION OF 25 PERMANENT HOMEBASES & NEW STAFF AND ADMINISTRATION

DEMOLITION OF 7 TEACHING SPACES

REMOVAL OF 13 EXISTING DEMOUNTABLE BUILDINGS

NET GAIN OF 19 NEW HOMEBASES

UPGRADE OF CORE FACILITIES TO CORE 35 (UP TO 1200 STUDENTS)

ENROLMENTS:

CURRENT ENROLMENTS:	899
PROJECTED ENROLMENTS:	1000

CORE FACILITIES:

NEW ADMIN & STAFF - 507 sqm

NEW CANTEEN - 67 sqm

SPECIAL PROGRAMS - 38 sqm

NEW STUDENT AMENITIES - ADDITIONAL REQUIRED 23 FEMALE WCs & MALE URINALS

OUTDOOR PLAY SPACE (10sqm per student)

FUTURE STUDENT ENROLMENTS:	1000
REQUIRED OPEN SPACE:	10,000 sqm
PROPOSED AT GRADE:	11,021 - 11,230 sqm

JDH architects

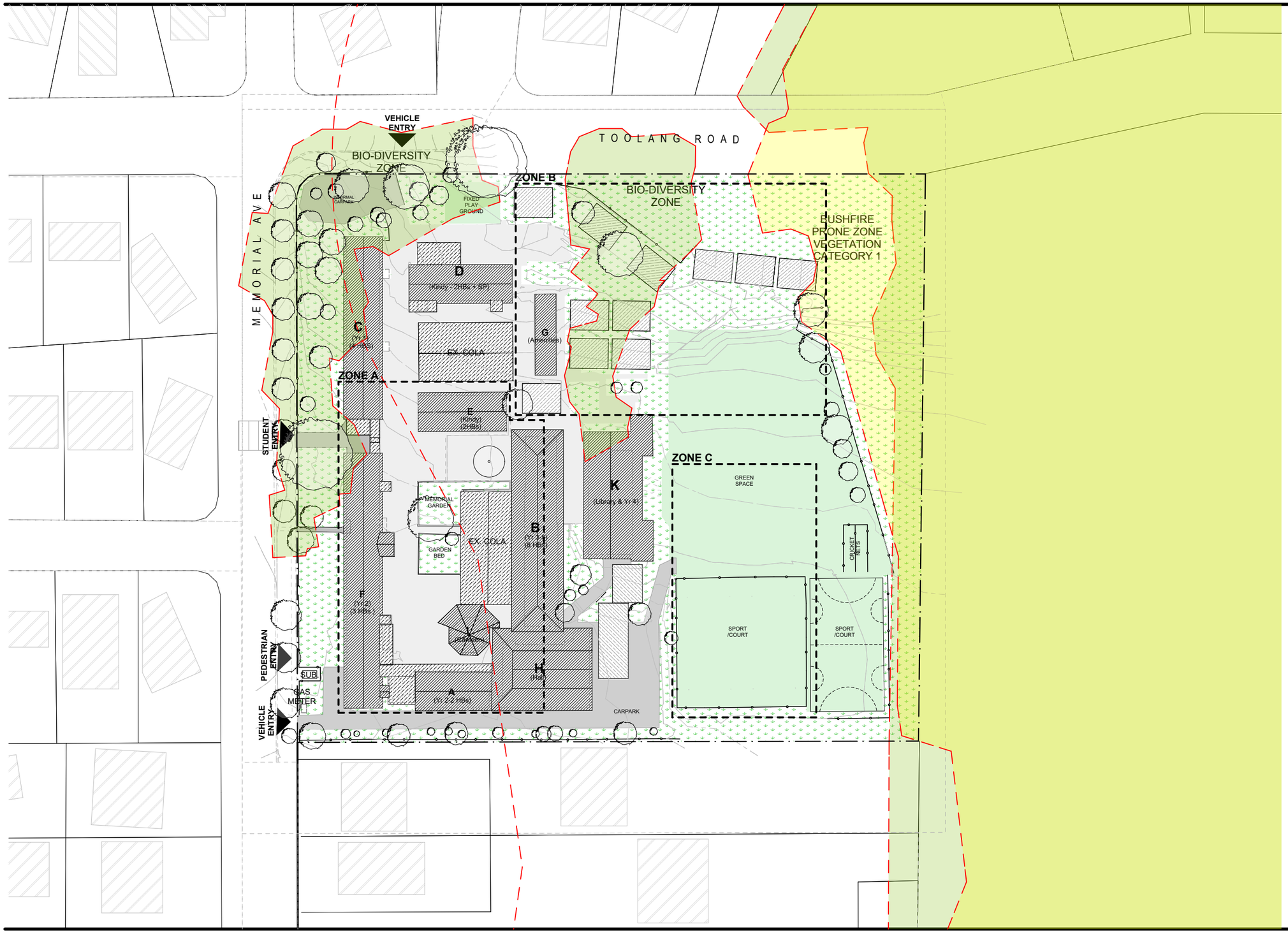
SCALE: 1:2.45 @A3

1029 - ST IVES NORTH PUBLIC SCHOOL

SCHEMATIC DESIGN S.1

PRELIMINARY 21/09/2018

EXISTING SITE PLAN



LEGEND

BUILDINGS

- GENERAL SCHOOL BUILDINGS
- EXISTING DEMOUNTABLES
- COLA (COVERED OUTDOOR LEARNING AREA)

LANDSCAPING

- EXISTING LANDSCAPING
- SPORTS FIELD
- GENERAL LANDSCAPE
- BIODIVERSITY ZONE
- BUSHFIRE PRONE ZONE VEGETATION CATEGORY 1
- CONCRETE PATHWAY
- CARPARK
- BOUNDARY
- SITE ENTRY

JDH architects

SCALE: 1:1000 @A3

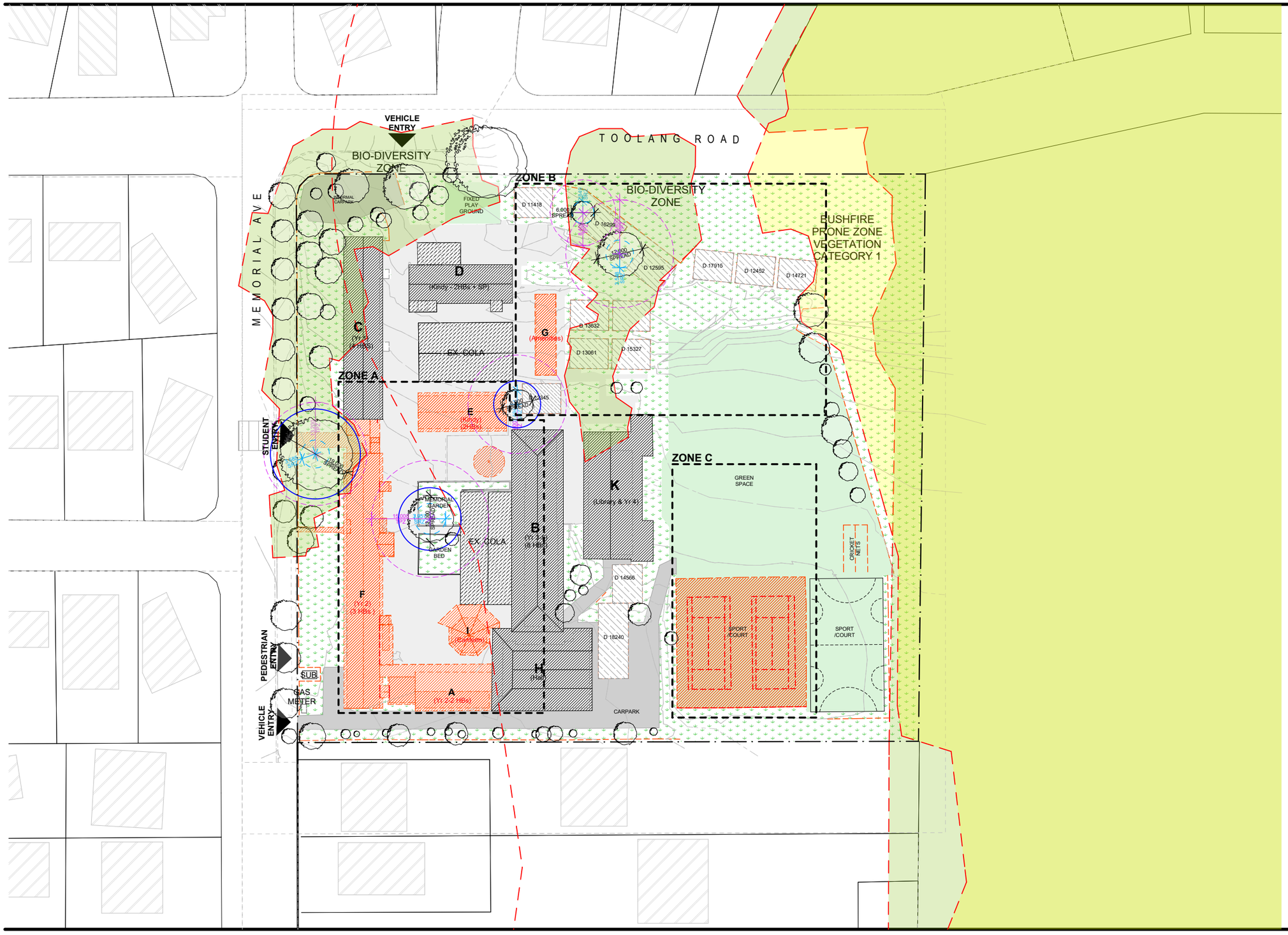
1029 - ST IVES NORTH PUBLIC SCHOOL

SCHEMATIC DESIGN S.1

PRELIMINARY

21/09/2018

DEMOLITION SITE PLAN



LEGEND

- EXISTING NEIGHBOURING BUILDINGS
- EXISTING BUILDINGS ON SITE TO BE RETAINED
- EXISTING BUILDING TO BE DEMOLISHED AS PART OF DA WORKS
- EXISTING WALL
- WALL TO BE DEMOLISHED
- SITE BOUNDARY
- INTERNAL LOT BOUNDARY
- NEIGHBOURING BOUNDARY
- EXISTING TREE TO BE RETAINED. INSTALL TREE PROTECTION FENCES TO ALL TREES AFFECTED BY THE WORKS
- DEMOLISHED TREE

JDH architects

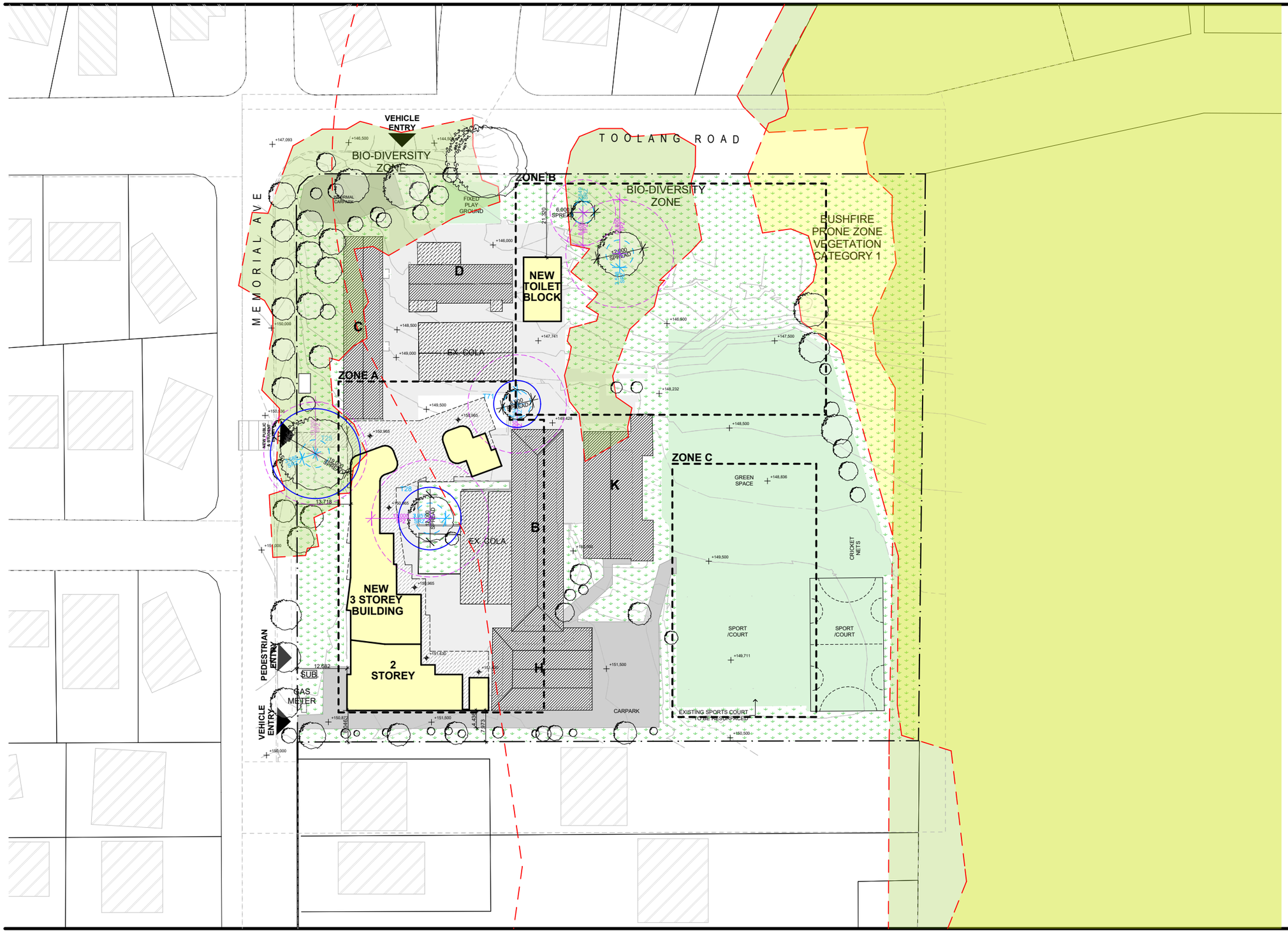
SCALE: 1:1000 @A3

1029 - ST IVES NORTH PUBLIC SCHOOL

SCHEMATIC DESIGN S.1

PRELIMINARY 21/09/2018

PROPOSED SITE PLAN



LEGEND

- EXISTING BUILDINGS
- EXISTING NEIGHBOURING BUILDINGS
- COLA
- EXISTING DEMOUNTABLES
- NEW BUILDING
- EX SOFT LANDSCAPE / GRASS
- BIODIVERSITY ZONE
- BUSHFIRE PRONE ZONE VEGETATION CATEGORY 1
- TEMPORARY DEMOUNTABLES DURING CONSTRUCTION
- SITE BOUNDARY
- EXTENT OF BUILDING ZONES

JDH architects

SCALE: 1:1000 @A3

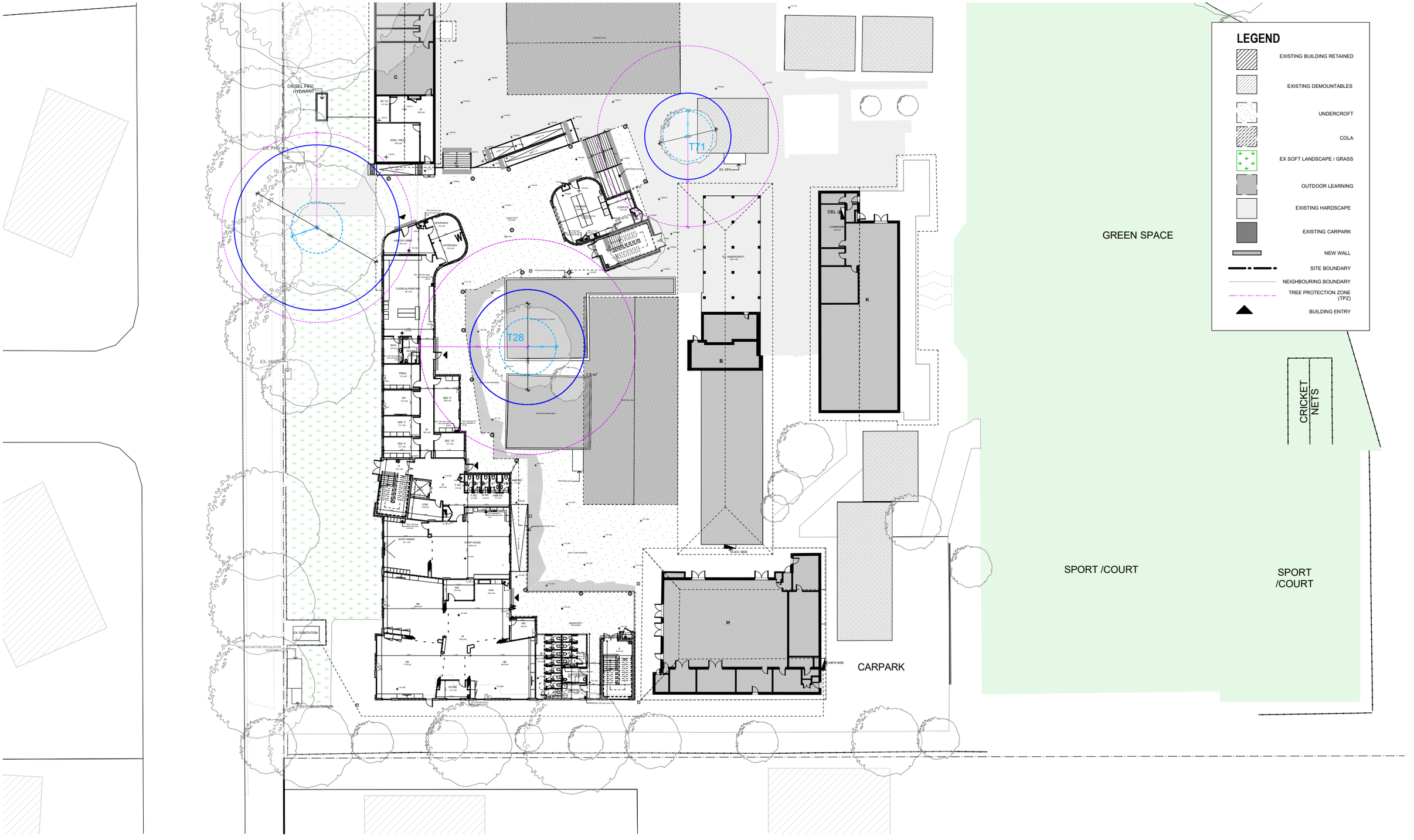
1029 - ST IVES NORTH PUBLIC SCHOOL

SCHEMATIC DESIGN S.1

PRELIMINARY

21/09/2018

GROUND FLOOR PLAN



JDH architects

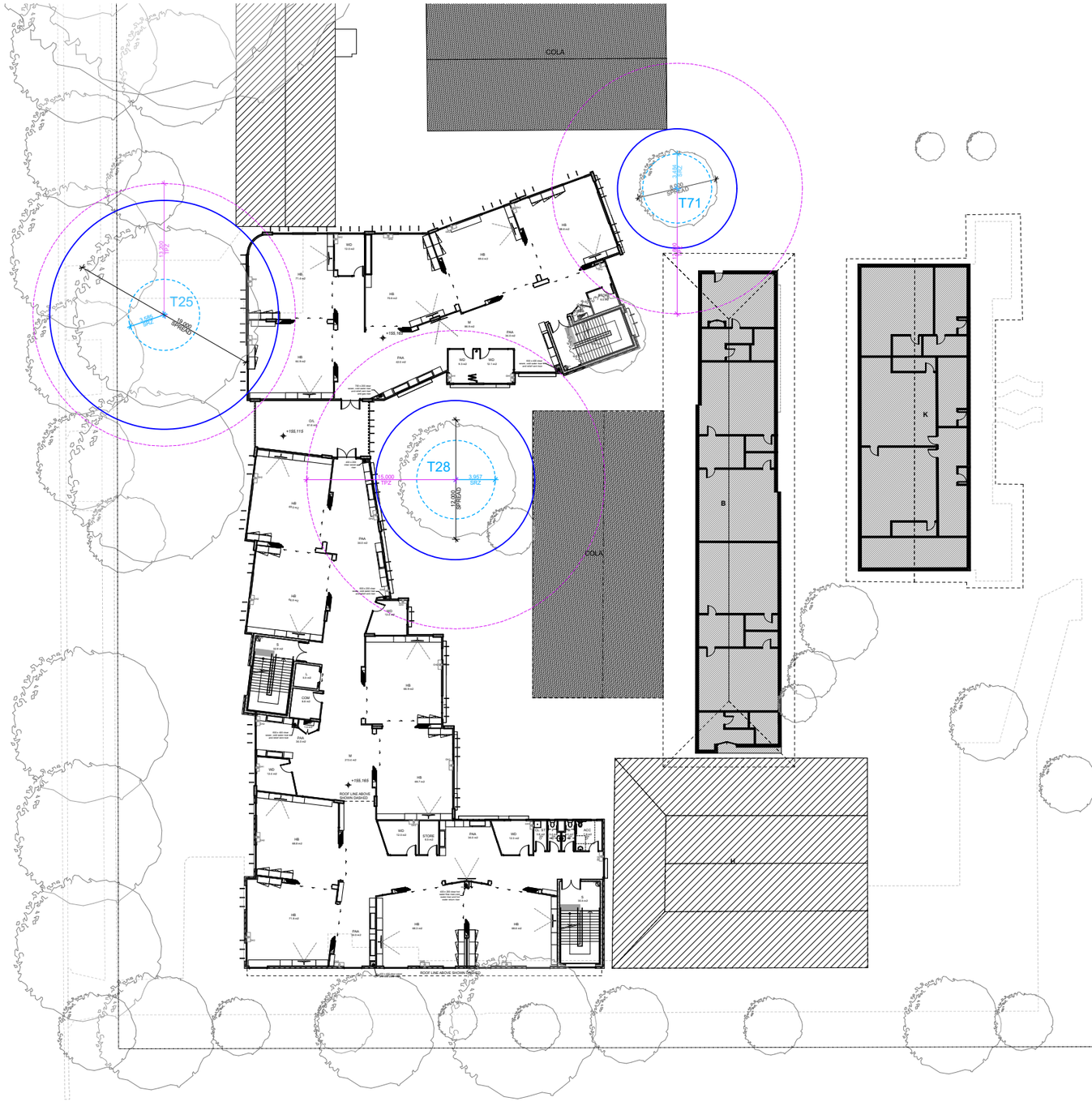
SCALE: 1:500 @A3

1029 - ST IVES NORTH PUBLIC SCHOOL

SCHEMATIC DESIGN S.1

PRELIMINARY 21/09/2018

FIRST FLOOR PLAN



LEGEND

- EXISTING BUILDING RETAINED
- EXISTING DEMOUNTABLES
- UNDERCROFT
- COLA
- EX SOFT LANDSCAPE / GRASS
- OUTDOOR LEARNING
- EXISTING HARDSCAPE
- EXISTING CARPARK
- NEW WALL
- SITE BOUNDARY
- NEIGHBOURING BOUNDARY
- TREE PROTECTION ZONE (TPZ)
- BUILDING ENTRY

JDH architects

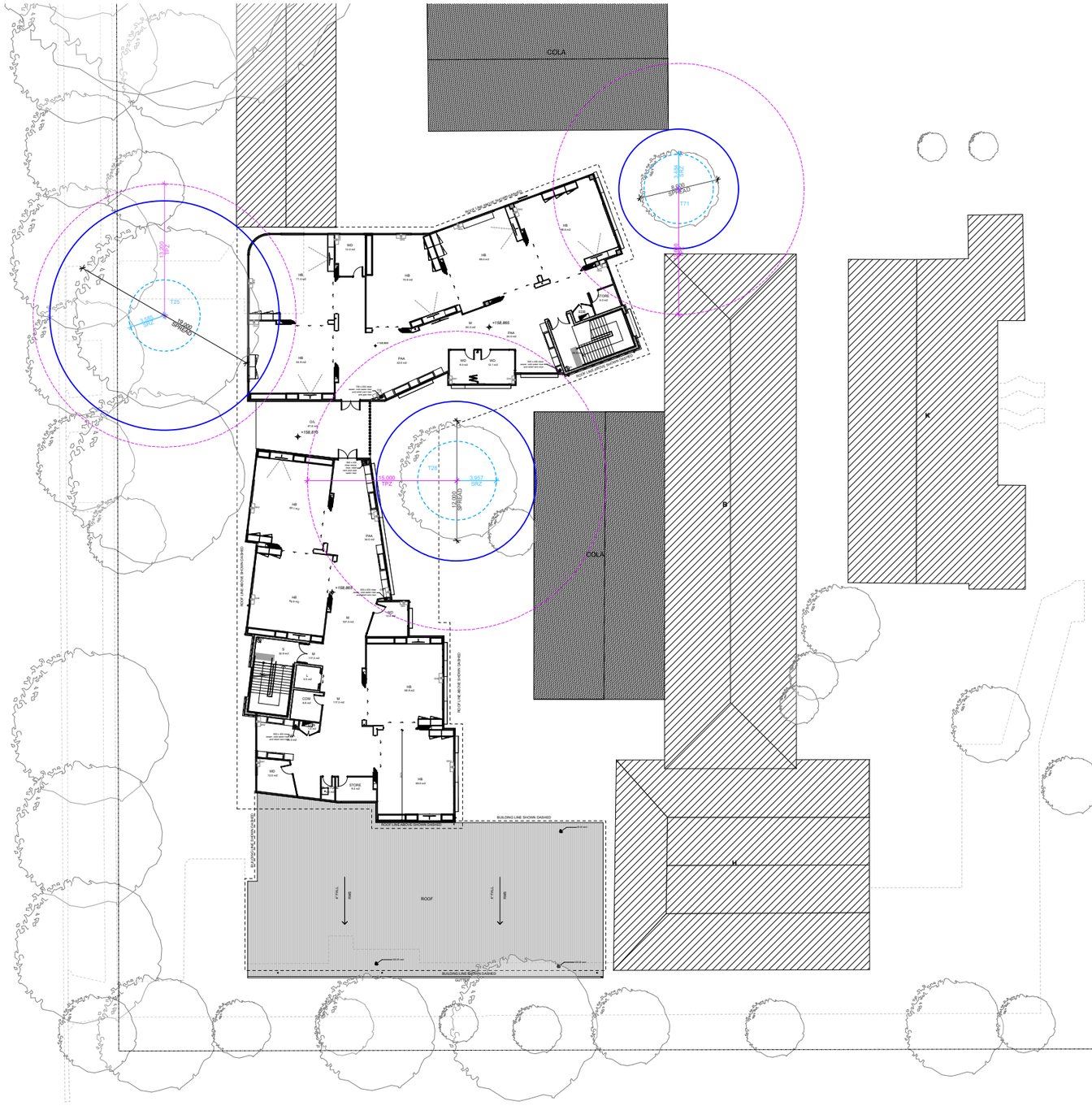
SCALE: 1:500 @A3

1029 - ST IVES NORTH PUBLIC SCHOOL

SCHEMATIC DESIGN S.1

PRELIMINARY 21/09/2018

SECOND FLOOR PLAN



LEGEND

- EXISTING BUILDING RETAINED
- EXISTING DEMOUNTABLES
- UNDERCROFT
- COLA
- EX SOFT LANDSCAPE / GRASS
- OUTDOOR LEARNING
- EXISTING HARDSCAPE
- EXISTING CARPARK
- NEW WALL
- SITE BOUNDARY
- NEIGHBOURING BOUNDARY
- TREE PROTECTION ZONE (TPZ)
- BUILDING ENTRY

JDH architects

SCALE: 1:500 @A3

1029 - ST IVES NORTH PUBLIC SCHOOL

SCHEMATIC DESIGN S.1

PRELIMINARY 21/09/2018

APPENDIX 2

Client	Stanbury Traffic Planning
Location	Toolang Rd / Memorial Ave
Survey Time	7:30-9:30 & 14:30-16:30 (4hrs)
Description	St Ives Parent Set Down / Children Pick-up Surveys

MATRIX Traffic and Transport Data

Client	Stanbury Traffic Planning
Location	Toolang Rd / Memorial Ave
Date	Wed, 23rd May 2017
Survey Time	7:30-9:30 & 14:30-16:30 (4hrs)
Description	St Ives Parent Set Down / Children Pick-up Surveys

MATRIX Traffic and Transport Data

AM			
Arrival Time	**Departure Time**	**Vehicle Type**	**Comments**
In at start time	7:31:25	Light	Drop off
In at start time	7:31:34	Light	Drop off
In at start time	7:31:53	Light	Drop off
7:31:40	7:33:37	Light	Drop off
7:32:37	7:34:54	Light	Drop off
7:36:23	7:39:38	Light	Drop off
7:37:42	7:39:54	Light	Drop off
7:38:00	7:40:12	Light	Drop off
7:40:58	7:44:39	Light	Drop off
7:43:53	7:48:01	Light	Drop off
7:47:21	7:49:45	Light	Drop off
7:48:09	7:49:10	Light	Drop off
7:48:51	7:51:19	Light	Drop off
7:49:35	7:52:07	Light	Drop off
7:50:09	7:52:18	Light	Drop off
7:50:43	7:52:25	Light	Drop off
7:51:52	7:54:27	Light	Drop off
7:57:01	8:04:12	Light	Drop off
7:58:27	8:00:31	Light	Drop off
8:03:59	8:09:27	Light	Drop off
8:06:05	8:10:10	Light	Drop off
8:14:12	8:15:04	Light	Drop off
8:18:39	8:28:49	Light	Drop off
8:23:53	8:26:08	Light	Drop off
8:25:59	8:27:29	Light	Drop off
8:31:10	8:32:50	Light	Drop off
8:34:56	8:36:05	Light	Drop off
8:35:48	8:37:43	Light	Drop off
8:37:16	8:37:45	Light	Drop off
8:39:50	8:39:59	Light	Drop off
8:40:51	8:41:28	Light	Drop off
8:43:39	8:43:55	Light	Drop off
8:44:53	8:45:38	Light	Drop off
8:50:23	8:51:31	Light	Drop off

PM			
Arrival Time	**Departure Time**	**Vehicle Type**	**Comments**
14:39:09	14:39:38	Light	Drop off
14:48:43	15:00:42	Light	Parking
14:58:59	15:01:15	Light	Parking
15:14:40	15:19:47	Light	Parking
15:21:00	15:32:14	Light	Pick-up
15:25:47	15:33:12	Light	Pick-up
15:38:11	16:02:24	Light	Pick-up
15:44:01	16:02:04	Light	Pick-up
15:51:20	15:54:44	Light	Pick-up
15:55:52	15:56:27	Light	Just stopped for a while & left
15:56:33	16:00:39	Light	Pick-up
16:02:30	16:06:41	Light	Pick-up
16:03:03	16:25:04	Light	Pick-up
16:03:40	16:07:12	Light	Pick-up
16:07:12	16:08:48	Light	Pick-up
16:08:26	16:16:08	Light	Pick-up
16:14:38	16:19:25	Light	Pick-up
16:23:03	16:28:40	Light	Pick-up
16:26:28	End of the survey time	Light	Parking
16:28:59	End of the survey time	Light	Parking

Client	Stanbury Traffic Planning
Location	Toolang Rd / Memorial Ave
Date	Wed, 23rd May 2017
Survey Time	7:30-9:30 & 14:30-16:30 (4hrs)
Description	St Ives Parent Set Down / Children Pick-up Surveys

MATRIX Traffic and Transport Data

AM			
Arrival Time	**Departure Time**	**Vehicle Type**	**Comments**
9:08:18	9:08:50	Light	Drop off

PM			
Arrival Time	**Departure Time**	**Vehicle Type**	**Comments**
16:16:45	16:16:58	Light	Parking

Client	Stanbury Traffic Planning
Location	Toolang Rd / Memorial Ave
Date	Tue, 3rd July 2018
Survey Time	7:30-9:30 & 14:30-16:30 (4hrs)
Description	St Ives Parent Set Down / Children Pick-up Surveys

MATRIX Traffic and Transport Data

AM			
Arrival Time	**Departure Time**	**Vehicle Type**	**Comments**
7:33:08	7:36:14	LV	Parking
7:37:32	7:41:54	LV	Drop off
7:41:16	7:43:12	LV	Parking
7:42:10	7:46:26	LV	Drop off
7:46:00	7:47:05	LV	Drop off
7:48:25	7:49:43	LV	Drop off
7:49:46	7:50:18	LV	Drop off
7:52:08	7:55:38	LV	Drop off
7:52:25	7:56:24	LV	Drop off
7:54:23	7:58:09	LV	Drop off
7:56:41	7:57:34	LV	Drop off
7:57:51	7:59:08	LV	Drop off
8:00:20	8:00:51	LV	Parking
8:00:33	8:01:03	LV	Drop off
8:00:42	8:01:05	LV	Drop off
8:00:45	8:01:09	LV	Drop off
8:01:25	8:04:21	LV	Drop off
8:01:58	8:02:40	LV	Drop off
8:02:03	8:05:50	LV	Drop off
8:02:41	8:02:52	LV	Drop off
8:05:21	8:05:42	LV	Drop off
8:05:30	8:06:01	LV	Drop off
8:06:16	8:06:45	LV	Drop off
8:06:19	8:07:02	LV	Drop off
8:07:46	8:08:02	LV	Drop off
8:11:10	8:11:34	LV	Drop off
8:19:10	8:20:09	LV	Drop off
8:19:40	8:20:11	LV	Drop off
8:19:53	8:20:44	LV	Drop off
8:22:33	8:23:10	LV	Drop off
8:23:24	8:24:04	LV	Drop off
8:23:28	8:24:04	LV	Drop off
8:24:38	8:25:12	LV	Drop off
8:24:40	8:25:09	LV	Drop off

PM			
Arrival Time	**Departure Time**	**Vehicle Type**	**Comments**
14:57:00	14:58:30	LV	Pickup
14:58:21	14:58:37	LV	Pickup
14:58:26	14:59:01	LV	Pickup
14:59:13	15:00:34	LV	Pickup
14:59:20	15:00:35	LV	Pickup
14:59:21	15:00:37	LV	Pickup
14:59:26	15:00:11	LV	Pickup
15:00:19	15:00:43	LV	Pickup
15:00:20	15:00:46	LV	Pickup
15:00:56	15:01:25	LV	Pickup
15:00:57	15:01:26	LV	Pickup
15:01:06	15:01:48	LV	Pickup
15:01:11	15:01:31	LV	Pickup
15:01:21	15:01:59	LV	Pickup
15:01:43	15:02:01	LV	Pickup
15:02:10	15:02:32	LV	Pickup
15:02:15	15:02:56	LV	Pickup
15:02:16	15:02:54	LV	Pickup
15:02:18	15:02:57	LV	Pickup
15:03:09	15:03:32	LV	Pickup
15:03:11	15:03:44	LV	Pickup
15:03:21	15:03:46	LV	Pickup
15:03:26	15:03:52	LV	Pickup
15:04:04	15:04:21	LV	Pickup
15:04:06	15:04:23	LV	Pickup
15:04:09	15:04:33	LV	Pickup
15:04:14	15:04:45	LV	Pickup
15:04:53	15:05:19	LV	Pickup
15:04:56	15:05:21	LV	Pickup
15:04:59	15:05:24	LV	Pickup
15:05:15	15:05:57	LV	Pickup
15:05:34	15:05:59	LV	Pickup
15:05:37	15:07:06	LV	Pickup
15:05:40	15:06:56	LV	Pickup

8:25:26	8:25:55	LV	Drop off
8:25:32	8:26:02	LV	Drop off
8:26:39	8:27:07	LV	Drop off
8:27:21	8:27:40	LV	Drop off
8:27:27	8:27:42	LV	Drop off
8:27:36	8:27:55	LV	Drop off
8:27:43	8:28:48	LV	Drop off
8:28:03	8:28:49	LV	Drop off
8:28:07	8:29:15	LV	Drop off
8:28:10	8:29:16	LV	Drop off
8:29:06	8:29:45	LV	Drop off
8:29:10	8:29:47	LV	Drop off
8:29:28	8:29:49	LV	Drop off
8:29:33	8:30:03	LV	Drop off
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8:30:15	8:30:53	LV	Drop off
8:30:17	8:30:58	LV	Drop off
8:30:23	8:31:01	LV	Drop off
8:30:33	8:31:02	LV	Drop off
8:31:09	8:31:30	LV	Drop off
8:31:12	8:31:45	LV	Drop off
8:31:14	8:32:20	LV	Drop off
8:31:16	8:31:54	LV	Drop off
8:31:20	8:31:54	LV	Drop off
8:32:00	8:32:32	LV	Drop off
8:32:02	8:32:34	LV	Drop off
8:32:05	8:33:02	LV	Drop off
8:32:07	8:32:36	LV	Drop off
8:32:48	8:33:37	LV	Drop off
8:32:50	8:35:20	LV	Drop off
8:32:54	8:33:45	LV	Drop off
8:32:57	8:33:45	LV	Drop off
8:33:24	8:34:15	LV	Drop off
8:33:55	8:34:23	LV	Drop off
8:33:58	8:34:23	LV	Drop off
8:34:01	8:34:25	LV	Parking
8:34:35	8:34:47	LV	Drop off
8:34:39	8:35:22	LV	Drop off
8:34:40	8:35:12	LV	Drop off
8:34:41	8:35:11	LV	Drop off
8:35:26	8:35:44	LV	Drop off
8:35:29	8:36:13	LV	Drop off
8:35:30	8:36:17	LV	Drop off
8:35:31	8:36:20	LV	Drop off

15:05:42	15:06:12	LV	Pickup
15:06:18	15:06:40	LV	Pickup
15:06:19	15:06:48	LV	Pickup
15:06:31	15:07:33	LV	Pickup
15:06:56	15:08:16	LV	Pickup
15:07:12	15:08:14	LV	Pickup
15:07:13	15:08:02	LV	Pickup
15:07:44	15:08:35	LV	Pickup
15:08:47	15:09:05	LV	Pickup
15:08:49	15:09:08	LV	Pickup
15:08:52	15:09:14	LV	Pickup
15:08:54	15:09:51	LV	Pickup
15:09:27	15:09:54	LV	Pickup
15:09:29	15:09:55	LV	Pickup
15:09:30	15:09:58	LV	Pickup
15:09:36	15:10:37	LV	Pickup
15:10:17	15:10:38	LV	Pickup
15:10:18	15:10:58	LV	Pickup
15:10:31	15:11:10	LV	Pickup
15:11:15	15:11:36	LV	Pickup
15:11:21	15:11:54	LV	Pickup
15:11:33	15:11:57	LV	Pickup
15:12:55	15:13:17	LV	Pickup
15:13:01	15:14:23	LV	Pickup
15:23:55	15:34:04	LV	Pickup
15:31:20	15:34:37	LV	Pickup
15:40:21	15:40:41	LV	Drop off
15:49:39	16:09:21	LV	Pickup
15:53:13	16:01:32	LV	Pickup
15:54:55	16:02:49	LV	Pickup
15:57:45	16:01:00	LV	Pickup
16:01:11	16:05:37	LV	Pickup
16:03:03	16:05:19	LV	Pickup
16:04:37	16:10:07	LV	Pickup
16:05:35	16:10:56	LV	Pickup
16:06:02	16:07:02	LV	Pickup
16:07:27	End of the survey time	LV	Parking
16:14:18	End of the survey time	LV	Parking
16:15:08	16:16:03	LV	Pickup
16:19:51	16:21:01	LV	Pickup
16:19:57	16:26:43	LV	Pickup
16:23:17	End of the survey time	LV	Parking
16:26:53	End of the survey time	LV	Parking

8:35:38	8:37:01	LV	Drop off
8:36:31	8:37:03	LV	Drop off
8:36:34	8:37:04	LV	Drop off
8:36:35	8:37:06	LV	Drop off
8:36:48	8:37:15	LV	Drop off
8:37:24	8:37:42	LV	Drop off
8:37:28	8:37:46	LV	Drop off
8:37:30	8:38:21	LV	Drop off
8:37:31	8:37:56	LV	Drop off
8:37:33	8:37:58	LV	Drop off
8:38:17	8:38:47	LV	Drop off
8:38:20	8:38:52	LV	Drop off
8:38:28	8:38:54	LV	Drop off
8:38:35	8:38:57	LV	Drop off
8:38:44	8:39:39	LV	Drop off
8:39:20	8:40:07	LV	Drop off
8:39:22	8:40:08	LV	Drop off
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8:40:36	8:40:59	LV	Drop off
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8:41:29	8:42:03	LV	Drop off
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8:44:12	8:45:04	LV	Drop off
8:44:16	8:45:28	LV	Drop off
8:44:24	8:45:44	LV	Drop off
8:45:16	8:45:50	LV	Drop off

8:45:19	8:45:36	LV	Drop off
8:45:21	8:45:42	LV	Drop off
8:45:57	8:46:05	LV	Drop off
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8:53:20	8:53:49	LV	Drop off
8:53:22	8:53:53	LV	Drop off
8:53:27	8:53:54	LV	Drop off
8:54:03	8:54:21	LV	Drop off
8:54:03	8:54:23	LV	Drop off

8:54:08	8:54:25	LV	Drop off
8:54:13	8:54:51	LV	Drop off
8:54:17	8:54:52	LV	Drop off
8:55:01	8:55:30	LV	Drop off
8:55:03	8:55:31	LV	Drop off
8:55:13	8:55:57	LV	Drop off
8:55:16	8:55:59	LV	Drop off
8:55:24	8:56:37	LV	Drop off
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8:56:48	8:57:30	LV	Drop off
8:56:56	8:57:32	LV	Drop off
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8:59:23	9:00:15	LV	Drop off
8:59:26	8:59:56	LV	Drop off
8:59:27	9:00:15	LV	Drop off
8:59:27	9:00:05	LV	Drop off
9:00:24	9:01:12	LV	Drop off
9:00:27	9:01:13	LV	Drop off
9:00:30	9:01:14	LV	Drop off
9:00:43	9:01:16	LV	Drop off
9:01:31	9:01:47	LV	Drop off
9:02:32	9:02:45	LV	Drop off
9:05:32	9:06:01	LV	Drop off
9:28:57	End of the survey time	LV	Parking

Client	Stanbury Traffic Planning
Location	Toolang Rd / Memorial Ave
Date	Wed, 23rd May 2017
Survey Time	7:30-9:30 & 14:30-16:30 (4hrs)
Description	St Ives Parent Set Down / Children Pick-up Surveys

MATRIX Traffic and Transport Data

AM			
Arrival Time	**Departure Time**	**Vehicle Type**	**Comments**
In at start time	7:31:47	Light	Drop off
7:35:00	7:35:39	Light	Drop off
7:35:53	7:38:13	Light	Drop off
7:40:49	7:44:50	Light	Drop off
7:45:09	7:45:43	Light	Drop off
7:47:43	7:55:47	Light	Drop off
7:51:13	7:52:06	Light	Drop off
7:58:00	7:59:00	Light	Drop off
8:46:37	8:47:53	Bus	Drop off & Pick-up
8:58:39	8:58:51	Bus	Drop off
9:28:48	End of the survey time	Light	Parking

PM			
Arrival Time	**Departure Time**	**Vehicle Type**	**Comments**
14:52:28	15:07:06	Bus	Pick-up
14:56:11	15:06:44	Bus	Pick-up
15:00:33	15:06:54	Bus	Pick-up
15:41:58	16:01:57	Light	Pick-up
15:44:17	16:03:27	Light	Pick-up
15:47:48	16:00:26	Light	Pick-up
15:50:02	End of the survey time	Light	Parking
15:50:26	16:02:28	Light	Pick-up
16:01:59	16:07:23	Light	Pick-up
16:02:20	16:05:34	Light	Pick-up
16:06:14	16:08:44	Light	Pick-up
16:07:34	16:15:32	Light	Pick-up
16:09:23	16:15:25	Light	Pick-up
16:19:12	End of the survey time	Light	Parking
16:20:48	End of the survey time	Bus	Parking

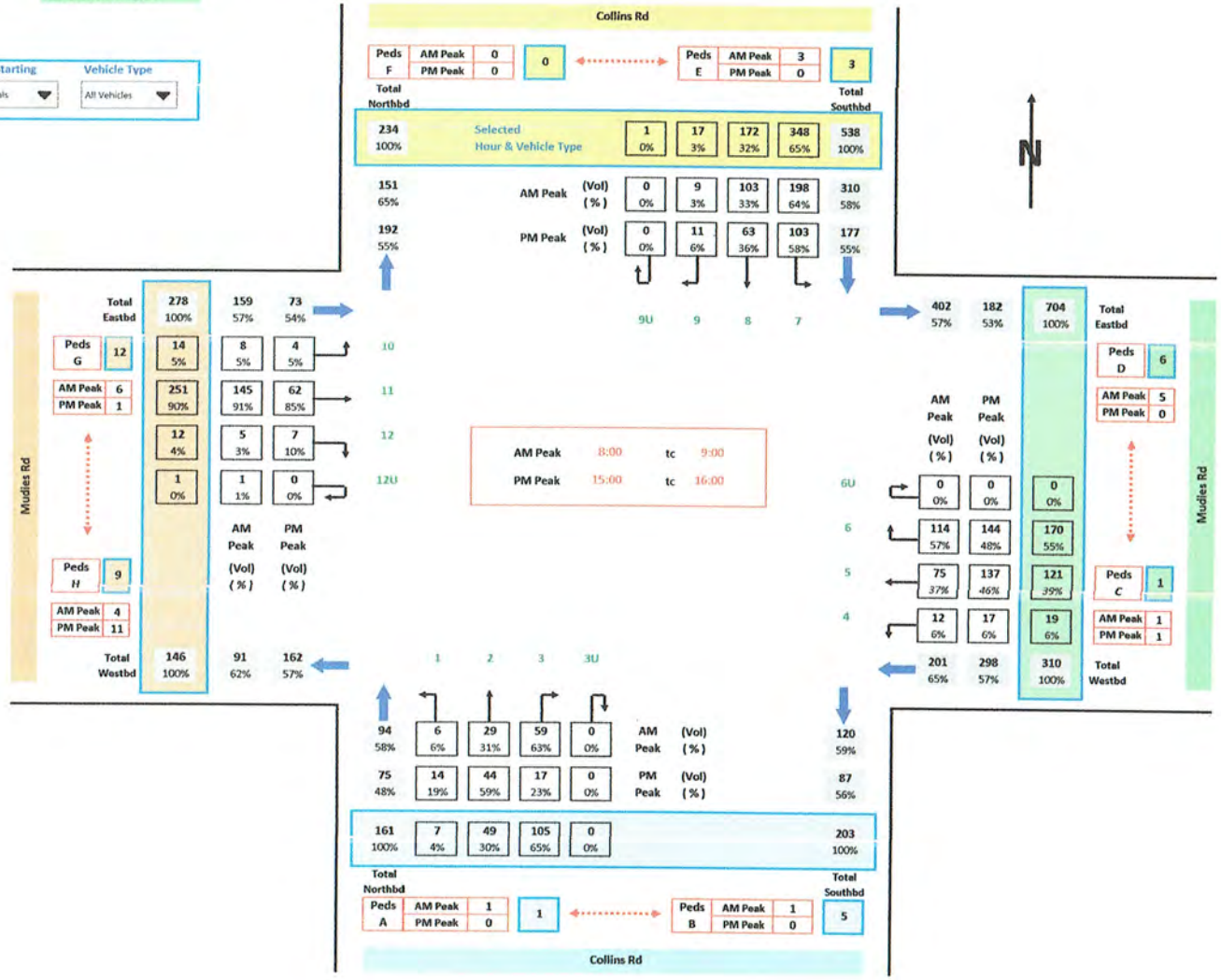
APPENDIX 3

Job No. : N4215
Client : Stanbury Traffic Planning
Suburb : St Ives
Location : 6. Mudies Rd / Collins Rd

Day/Date : Wed, 23rd May 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

Hour Starting: AM Totals
Vehicle Type: All Vehicles

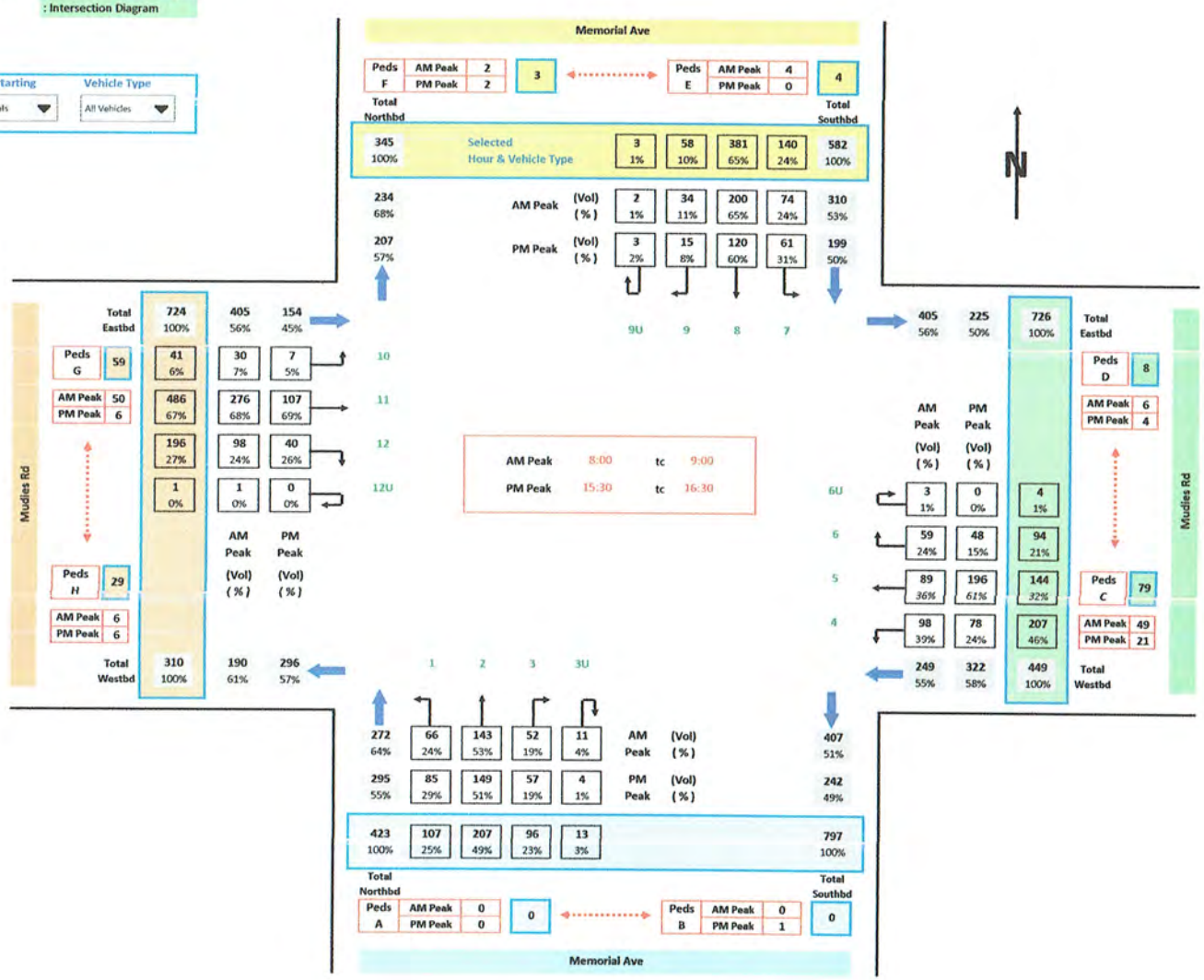


Job No. : N4215
Client : Stanbury Traffic Planning
Suburb : St Ives
Location : 5. Memorial Ave / Mudies Rd

Day/Date : Wed, 23rd May 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

Hour Starting: AM Totals
Vehicle Type: All Vehicles

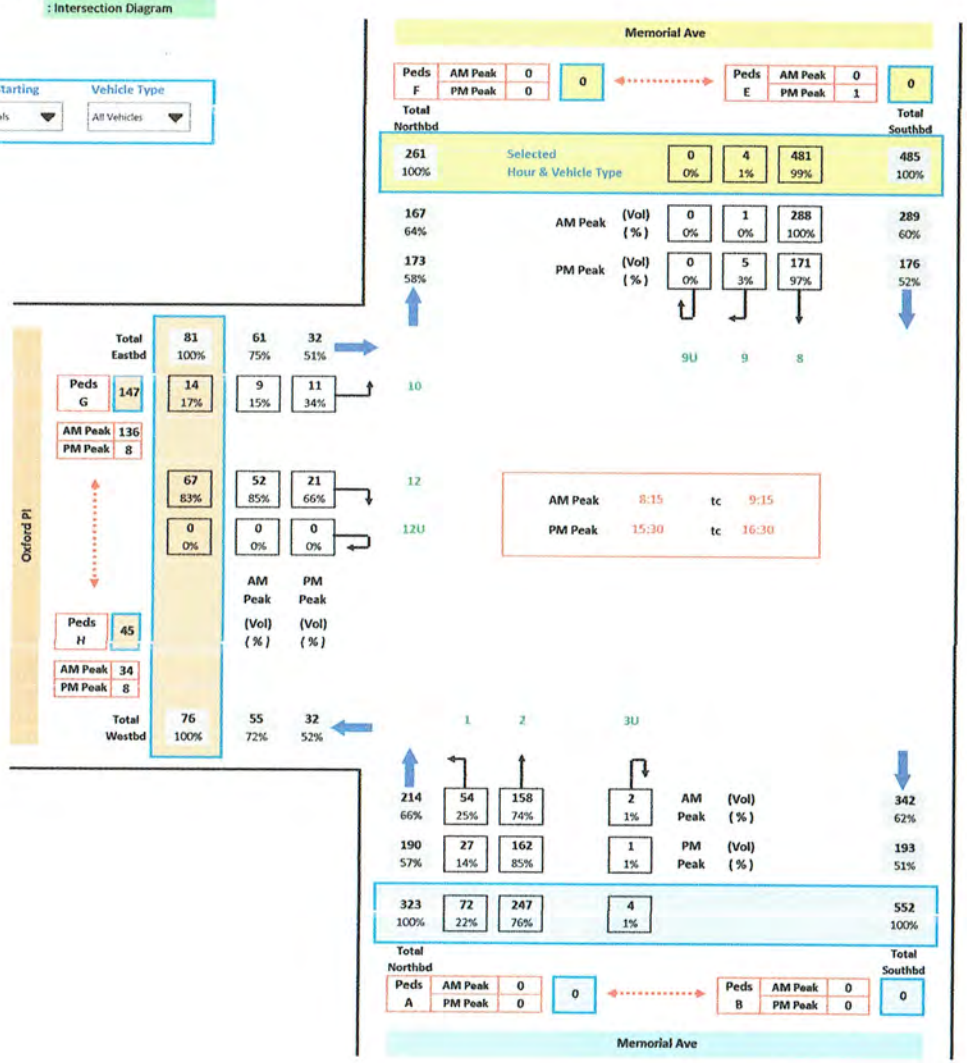


Job No. : N4215
Client : Stanbury Traffic Planning
Suburb : St Ives
Location : 4. Memorial Ave / Oxford Pl

Day/Date : Wed, 23rd May 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

Hour Starting: AM Totals
Vehicle Type: All Vehicles



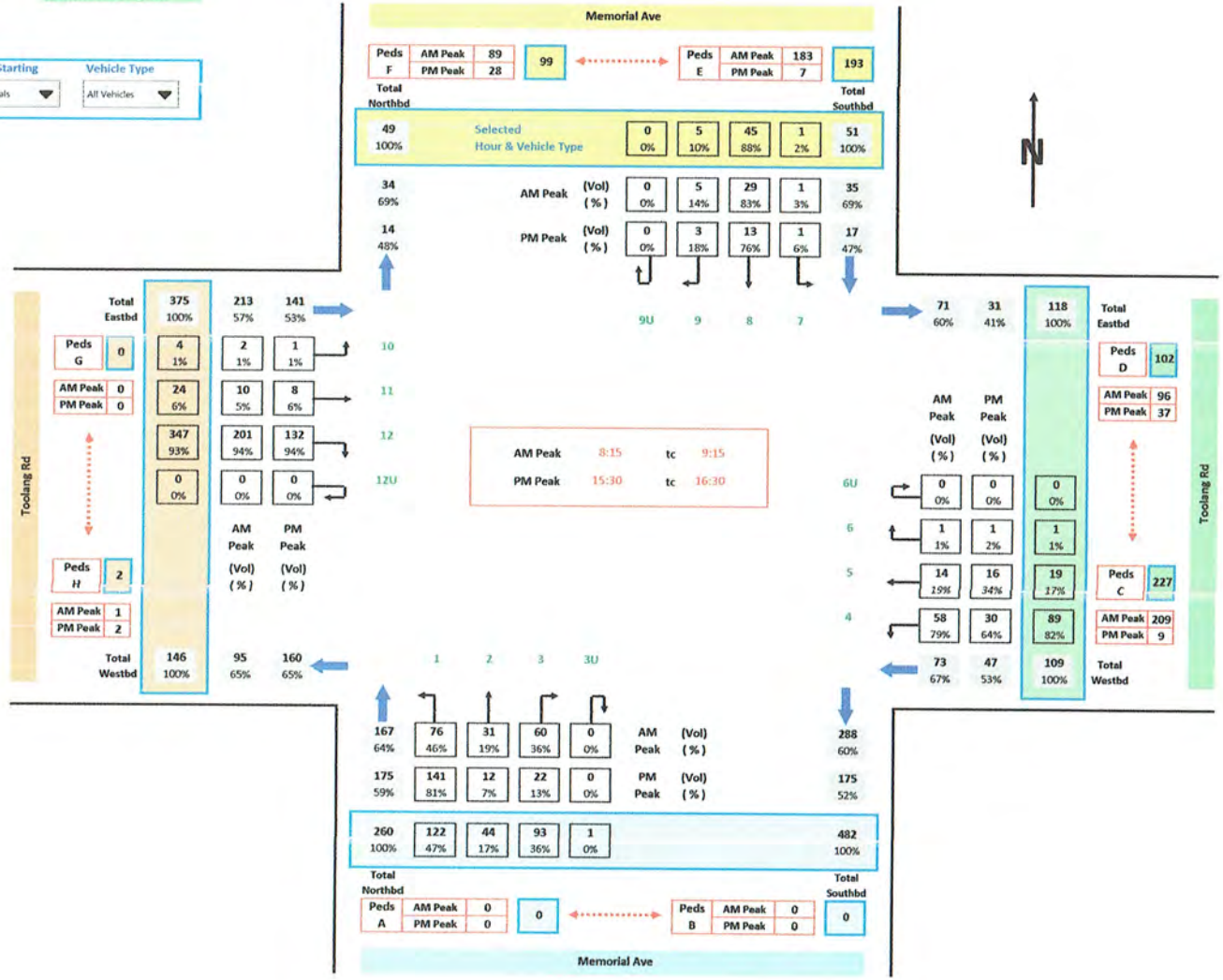
N

Job No. : N4215
Client : Stanbury Traffic Planning
Suburb : St Ives
Location : 3. Toolang Rd / Memorial Ave

Day/Date : Wed, 23rd May 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

Hour Starting: AM Totals | Vehicle Type: All Vehicles

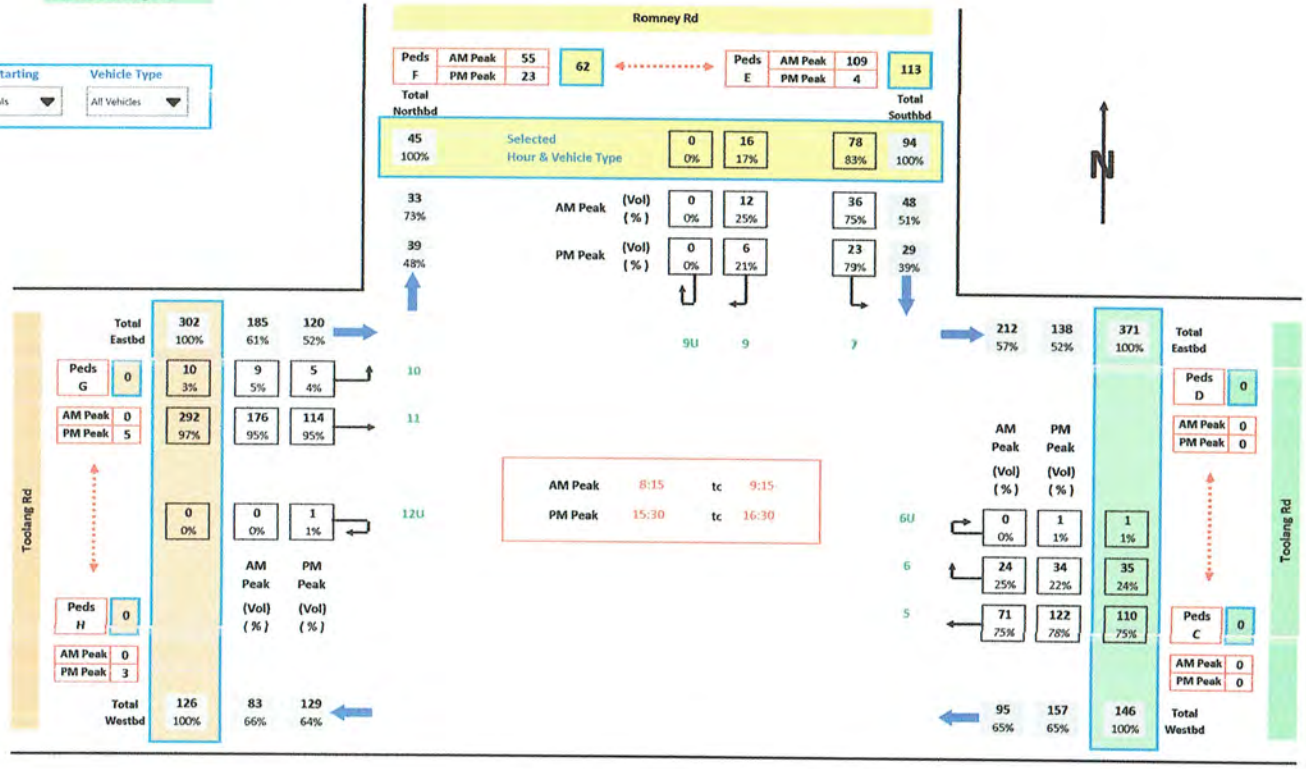


Job No. : N4215
Client : Stanbury Traffic Planning
Suburb : St Ives
Location : 2. Toolang Rd / Romney Rd

Day/Date : Wed, 23rd May 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

Hour Starting: AM Totals | Vehicle Type: All Vehicles

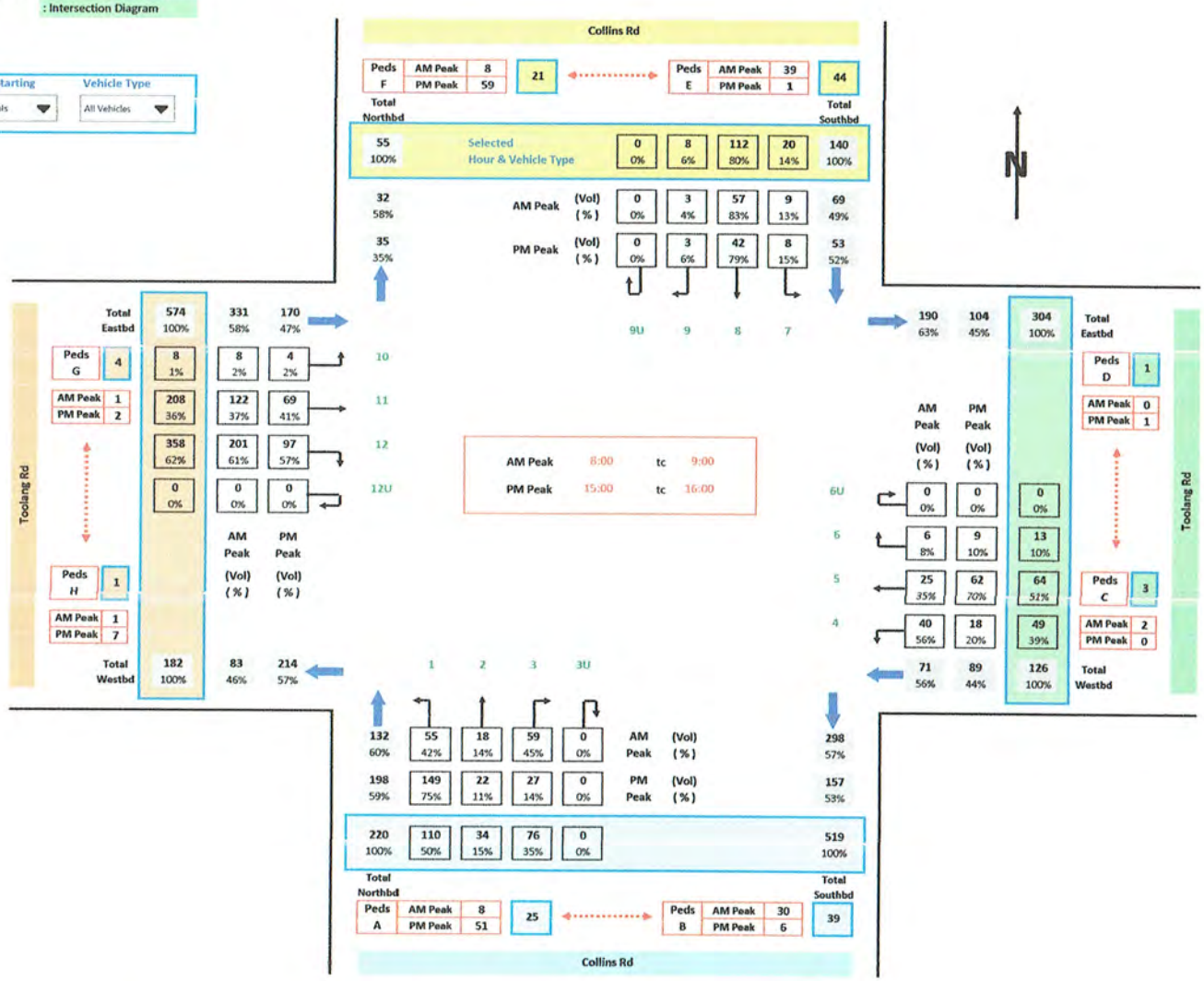


Job No. : N4215
Client : Stanbury Traffic Planning
Suburb : St Ives
Location : 1. Toolang Rd / Collins Rd

Day/Date : Wed, 23rd May 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

MATRIX Traffic and Transport Data

Hour Starting: AM Totals
Vehicle Type: All Vehicles



APPENDIX 4

MOVEMENT SUMMARY

Site: [Mudies Road & Collins Road]

Existing AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Collins Road South												
1	L2	6	5.0	0.091	6.2	LOS A	0.5	3.4	0.39	0.62	0.39	51.3
2	T1	29	5.0	0.091	6.0	LOS A	0.5	3.4	0.39	0.62	0.39	52.1
3	R2	59	5.0	0.091	8.9	LOS A	0.5	3.4	0.39	0.62	0.39	51.7
Approach		94	5.0	0.091	7.8	LOS A	0.5	3.4	0.39	0.62	0.39	51.8
East: Mudies Road East												
4	L2	12	5.0	0.177	5.8	LOS A	1.0	7.4	0.33	0.60	0.33	51.5
5	T1	75	5.0	0.177	5.6	LOS A	1.0	7.4	0.33	0.60	0.33	52.4
6	R2	114	5.0	0.177	8.5	LOS A	1.0	7.4	0.33	0.60	0.33	51.9
Approach		201	5.0	0.177	7.2	LOS A	1.0	7.4	0.33	0.60	0.33	52.1
North: Collins Road North												
7	L2	198	5.0	0.299	6.5	LOS A	1.8	13.3	0.47	0.61	0.47	52.0
8	T1	103	5.0	0.299	6.4	LOS A	1.8	13.3	0.47	0.61	0.47	52.9
9	R2	9	5.0	0.299	9.3	LOS A	1.8	13.3	0.47	0.61	0.47	52.4
Approach		310	5.0	0.299	6.6	LOS A	1.8	13.3	0.47	0.61	0.47	52.3
West: Mudies Road West												
10	L2	8	50.0	0.156	7.4	LOS A	0.8	6.1	0.40	0.57	0.40	50.3
11	T1	145	5.0	0.156	6.1	LOS A	0.8	6.1	0.40	0.57	0.40	53.0
12	R2	6	5.0	0.156	9.0	LOS A	0.8	6.1	0.40	0.57	0.40	52.5
Approach		159	7.3	0.156	6.3	LOS A	0.8	6.1	0.40	0.57	0.40	52.8
All Vehicles		764	5.5	0.299	6.8	LOS A	1.8	13.3	0.41	0.60	0.41	52.3

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Mudies Road & Collins Road]

Existing PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Collins Road South												
1	L2	14	5.0	0.079	6.7	LOS A	0.4	2.9	0.46	0.61	0.46	51.7
2	T1	44	5.0	0.079	6.6	LOS A	0.4	2.9	0.46	0.61	0.46	52.5
3	R2	17	5.0	0.079	9.5	LOS A	0.4	2.9	0.46	0.61	0.46	52.0
Approach		75	5.0	0.079	7.2	LOS A	0.4	2.9	0.46	0.61	0.46	52.2
East: Mudies Road East												
4	L2	17	5.0	0.240	5.5	LOS A	1.4	10.2	0.27	0.58	0.27	51.8
5	T1	137	5.0	0.240	5.4	LOS A	1.4	10.2	0.27	0.58	0.27	52.7
6	R2	144	5.0	0.240	8.3	LOS A	1.4	10.2	0.27	0.58	0.27	52.2
Approach		298	5.0	0.240	6.8	LOS A	1.4	10.2	0.27	0.58	0.27	52.4
North: Collins Road North												
7	L2	103	5.0	0.149	5.5	LOS A	0.8	5.9	0.26	0.53	0.26	52.6
8	T1	63	5.0	0.149	5.4	LOS A	0.8	5.9	0.26	0.53	0.26	53.5
9	R2	11	5.0	0.149	8.3	LOS A	0.8	5.9	0.26	0.53	0.26	53.0
Approach		177	5.0	0.149	5.6	LOS A	0.8	5.9	0.26	0.53	0.26	52.9
West: Mudies Road West												
10	L2	4	50.0	0.072	7.3	LOS A	0.4	2.6	0.38	0.55	0.38	50.3
11	T1	62	5.0	0.072	6.0	LOS A	0.4	2.6	0.38	0.55	0.38	53.0
12	R2	7	5.0	0.072	8.9	LOS A	0.4	2.6	0.38	0.55	0.38	52.5
Approach		73	7.5	0.072	6.4	LOS A	0.4	2.6	0.38	0.55	0.38	52.8
All Vehicles		623	5.3	0.240	6.5	LOS A	1.4	10.2	0.30	0.57	0.30	52.6

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Mudies Road & Memorial Avenue]

Existing AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Memorial Avenue South												
1	L2	66	5.0	0.259	6.1	LOS A	1.6	11.5	0.45	0.60	0.45	51.8
2	T1	143	5.0	0.259	6.1	LOS A	1.6	11.5	0.45	0.60	0.45	52.7
3	R2	52	5.0	0.259	9.1	LOS A	1.6	11.5	0.45	0.60	0.45	52.2
3u	U	11	5.0	0.259	10.7	LOS A	1.6	11.5	0.45	0.60	0.45	52.7
Approach		272	5.0	0.259	6.9	LOS A	1.6	11.5	0.45	0.60	0.45	52.4
East: Mudies Road East												
4	L2	98	5.0	0.278	7.3	LOS A	1.7	12.3	0.59	0.70	0.59	51.2
5	T1	89	5.0	0.278	7.3	LOS A	1.7	12.3	0.59	0.70	0.59	52.1
6	R2	59	5.0	0.278	10.3	LOS A	1.7	12.3	0.59	0.70	0.59	51.7
6u	U	3	5.0	0.278	11.9	LOS A	1.7	12.3	0.59	0.70	0.59	52.1
Approach		249	5.0	0.278	8.1	LOS A	1.7	12.3	0.59	0.70	0.59	51.7
North: Memorial Avenue North												
7	L2	74	5.0	0.378	8.3	LOS A	2.5	18.1	0.70	0.77	0.70	50.9
8	T1	200	5.0	0.378	8.3	LOS A	2.5	18.1	0.70	0.77	0.70	51.8
9	R2	34	5.0	0.378	11.3	LOS A	2.5	18.1	0.70	0.77	0.70	51.4
9u	U	2	5.0	0.378	12.8	LOS A	2.5	18.1	0.70	0.77	0.70	51.8
Approach		310	5.0	0.378	8.6	LOS A	2.5	18.1	0.70	0.77	0.70	51.5
West: Mudies Avenue West												
10	L2	30	5.0	0.412	7.0	LOS A	2.8	20.2	0.58	0.68	0.58	51.3
11	T1	276	5.0	0.412	7.0	LOS A	2.8	20.2	0.58	0.68	0.58	52.1
12	R2	98	5.0	0.412	10.0	LOS A	2.8	20.2	0.58	0.68	0.58	51.7
12u	U	1	5.0	0.412	11.6	LOS A	2.8	20.2	0.58	0.68	0.58	52.2
Approach		405	5.0	0.412	7.8	LOS A	2.8	20.2	0.58	0.68	0.58	52.0
All Vehicles		1236	5.0	0.412	7.9	LOS A	2.8	20.2	0.58	0.69	0.58	51.9

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Mudies Road & Memorial Avenue]

Existing PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Memorial Avenue South												
1	L2	85	5.0	0.303	6.8	LOS A	1.9	13.7	0.53	0.66	0.53	51.6
2	T1	149	5.0	0.303	6.8	LOS A	1.9	13.7	0.53	0.66	0.53	52.4
3	R2	57	5.0	0.303	9.8	LOS A	1.9	13.7	0.53	0.66	0.53	52.0
3u	U	4	5.0	0.303	11.3	LOS A	1.9	13.7	0.53	0.66	0.53	52.5
Approach		295	5.0	0.303	7.4	LOS A	1.9	13.7	0.53	0.66	0.53	52.1
East: Mudies Road East												
4	L2	78	5.0	0.299	6.1	LOS A	1.8	13.5	0.44	0.59	0.44	52.0
5	T1	196	5.0	0.299	6.1	LOS A	1.8	13.5	0.44	0.59	0.44	52.9
6	R2	48	5.0	0.299	9.1	LOS A	1.8	13.5	0.44	0.59	0.44	52.4
6u	U	1	5.0	0.299	10.7	LOS A	1.8	13.5	0.44	0.59	0.44	52.9
Approach		323	5.0	0.299	6.6	LOS A	1.8	13.5	0.44	0.59	0.44	52.6
North: Memorial Avenue North												
7	L2	61	5.0	0.194	6.2	LOS A	1.1	7.9	0.43	0.59	0.43	52.1
8	T1	120	5.0	0.194	6.2	LOS A	1.1	7.9	0.43	0.59	0.43	53.0
9	R2	15	5.0	0.194	9.2	LOS A	1.1	7.9	0.43	0.59	0.43	52.5
9u	U	3	5.0	0.194	10.8	LOS A	1.1	7.9	0.43	0.59	0.43	53.0
Approach		199	5.0	0.194	6.5	LOS A	1.1	7.9	0.43	0.59	0.43	52.7
West: Mudies Avenue West												
10	L2	7	5.0	0.159	6.5	LOS A	0.9	6.4	0.48	0.62	0.48	51.6
11	T1	107	5.0	0.159	6.5	LOS A	0.9	6.4	0.48	0.62	0.48	52.5
12	R2	40	5.0	0.159	9.5	LOS A	0.9	6.4	0.48	0.62	0.48	52.0
12u	U	1	5.0	0.159	11.1	LOS A	0.9	6.4	0.48	0.62	0.48	52.5
Approach		155	5.0	0.159	7.3	LOS A	0.9	6.4	0.48	0.62	0.48	52.3
All Vehicles		972	5.0	0.303	6.9	LOS A	1.9	13.7	0.47	0.62	0.47	52.4

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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Memorial Avenue & Oxford Place]

Existing AM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Memorial Avenue South												
1	L2	54	5.0	0.114	5.6	LOS A	0.0	0.0	0.00	0.15	0.00	56.8
2	T1	158	5.0	0.114	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	58.6
Approach		212	5.0	0.114	1.4	NA	0.0	0.0	0.00	0.15	0.00	58.1
North: Memorial Avenue North												
8	T1	288	5.0	0.153	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	60.0
9	R2	1	5.0	0.153	6.3	LOS A	0.0	0.1	0.00	0.00	0.00	57.4
Approach		289	5.0	0.153	0.0	NA	0.0	0.1	0.00	0.00	0.00	60.0
West: Oxford Place												
10	L2	9	5.0	0.073	6.1	LOS A	0.2	1.8	0.38	0.67	0.38	51.9
12	R2	52	5.0	0.073	7.7	LOS A	0.2	1.8	0.38	0.67	0.38	51.4
Approach		61	5.0	0.073	7.5	LOS A	0.2	1.8	0.38	0.67	0.38	51.5
All Vehicles		562	5.0	0.153	1.4	NA	0.2	1.8	0.04	0.13	0.04	58.2

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Memorial Avenue & Oxford Place]

Existing PM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Memorial Avenue South												
1	L2	27	5.0	0.101	5.6	LOS A	0.0	0.0	0.00	0.08	0.00	57.4
2	T1	162	5.0	0.101	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	59.2
Approach		189	5.0	0.101	0.8	NA	0.0	0.0	0.00	0.08	0.00	58.9
North: Memorial Avenue North												
8	T1	171	5.0	0.094	0.0	LOS A	0.0	0.3	0.02	0.02	0.02	59.8
9	R2	5	5.0	0.094	6.2	LOS A	0.0	0.3	0.02	0.02	0.02	57.2
Approach		176	5.0	0.094	0.2	NA	0.0	0.3	0.02	0.02	0.02	59.7
West: Oxford Place												
10	L2	11	5.0	0.031	6.1	LOS A	0.1	0.8	0.30	0.60	0.30	52.5
12	R2	21	5.0	0.031	6.9	LOS A	0.1	0.8	0.30	0.60	0.30	52.0
Approach		32	5.0	0.031	6.6	LOS A	0.1	0.8	0.30	0.60	0.30	52.2
All Vehicles		397	5.0	0.101	1.0	NA	0.1	0.8	0.03	0.10	0.03	58.6

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Memorial Avenue & Toolang Road]

Exisitng PM
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Memorial Avenue South												
1	L2	141	5.0	0.098	5.6	LOS A	0.2	1.1	0.02	0.53	0.02	53.7
2	T1	12	5.0	0.098	0.0	LOS A	0.2	1.1	0.02	0.53	0.02	55.3
3	R2	22	5.0	0.098	5.5	LOS A	0.2	1.1	0.02	0.53	0.02	53.1
Approach		175	5.0	0.098	5.2	NA	0.2	1.1	0.02	0.53	0.02	53.7
East: Toolang Road East												
4	L2	300	5.0	0.268	9.0	LOS A	1.3	9.3	0.31	0.88	0.31	51.4
5	T1	16	5.0	0.268	10.3	LOS A	1.3	9.3	0.31	0.88	0.31	51.2
6	R2	1	5.0	0.268	8.1	LOS A	1.3	9.3	0.31	0.88	0.31	50.9
Approach		317	5.0	0.268	9.1	LOS A	1.3	9.3	0.31	0.88	0.31	51.4
North: Memorial Avenue North												
7	L2	1	5.0	0.018	8.3	LOS A	0.1	0.5	0.23	0.95	0.23	51.5
8	T1	13	5.0	0.018	8.7	LOS A	0.1	0.5	0.23	0.95	0.23	51.2
9	R2	3	5.0	0.018	9.7	LOS A	0.1	0.5	0.23	0.95	0.23	51.0
Approach		17	5.0	0.018	8.8	LOS A	0.1	0.5	0.23	0.95	0.23	51.2
West: Toolang Road West												
10	L2	1	5.0	0.085	5.6	LOS A	0.4	3.0	0.11	0.54	0.11	53.4
11	T1	8	5.0	0.085	0.1	LOS A	0.4	3.0	0.11	0.54	0.11	55.0
12	R2	132	5.0	0.085	5.6	LOS A	0.4	3.0	0.11	0.54	0.11	52.9
Approach		141	5.0	0.085	5.3	NA	0.4	3.0	0.11	0.54	0.11	53.0
All Vehicles		650	5.0	0.268	7.2	NA	1.3	9.3	0.19	0.72	0.19	52.3

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Memorial Avenue & Toolang Road]

Exisitng AM
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Memorial Avenue South												
1	L2	76	5.0	0.094	5.6	LOS A	0.4	2.6	0.04	0.46	0.04	54.1
2	T1	31	5.0	0.094	0.0	LOS A	0.4	2.6	0.04	0.46	0.04	55.7
3	R2	60	5.0	0.094	5.5	LOS A	0.4	2.6	0.04	0.46	0.04	53.5
Approach		167	5.0	0.094	4.6	NA	0.4	2.6	0.04	0.46	0.04	54.2
East: Toolang Road East												
4	L2	580	5.0	0.545	10.9	LOS A	4.8	35.0	0.53	0.94	0.67	50.4
5	T1	14	5.0	0.545	13.1	LOS A	4.8	35.0	0.53	0.94	0.67	50.1
6	R2	1	5.0	0.545	10.0	LOS A	4.8	35.0	0.53	0.94	0.67	49.9
Approach		595	5.0	0.545	11.0	LOS A	4.8	35.0	0.53	0.94	0.67	50.4
North: Memorial Avenue North												
7	L2	1	5.0	0.042	8.5	LOS A	0.1	1.1	0.35	0.94	0.35	51.2
8	T1	29	5.0	0.042	9.4	LOS A	0.1	1.1	0.35	0.94	0.35	51.0
9	R2	5	5.0	0.042	10.0	LOS A	0.1	1.1	0.35	0.94	0.35	50.7
Approach		35	5.0	0.042	9.5	LOS A	0.1	1.1	0.35	0.94	0.35	50.9
West: Toolang Road West												
10	L2	2	5.0	0.135	5.7	LOS A	0.7	4.8	0.20	0.54	0.20	53.1
11	T1	10	5.0	0.135	0.2	LOS A	0.7	4.8	0.20	0.54	0.20	54.7
12	R2	201	5.0	0.135	5.8	LOS A	0.7	4.8	0.20	0.54	0.20	52.6
Approach		213	5.0	0.135	5.6	NA	0.7	4.8	0.20	0.54	0.20	52.7
All Vehicles		1010	5.0	0.545	8.7	NA	4.8	35.0	0.37	0.78	0.46	51.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Toolang Road & Romney Road]

Existing AM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Toolang Road East												
5	T1	71	5.0	0.054	0.2	LOS A	0.2	1.1	0.16	0.15	0.16	58.0
6	R2	24	5.0	0.054	6.1	LOS A	0.2	1.1	0.16	0.15	0.16	55.6
Approach		95	5.0	0.054	1.7	NA	0.2	1.1	0.16	0.15	0.16	57.4
North: Romney Road												
7	L2	36	5.0	0.039	6.2	LOS A	0.1	1.1	0.28	0.57	0.28	52.6
9	R2	12	5.0	0.039	6.6	LOS A	0.1	1.1	0.28	0.57	0.28	52.1
Approach		48	5.0	0.039	6.3	LOS A	0.1	1.1	0.28	0.57	0.28	52.4
West: Toolang Road West												
10	L2	9	5.0	0.098	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	57.8
11	T1	176	5.0	0.098	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.7
Approach		185	5.0	0.098	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.6
All Vehicles		328	5.0	0.098	1.6	NA	0.2	1.1	0.09	0.14	0.09	57.8

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Toolang Road & Romney Road]

Existing PM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Toolang Road East												
5	T1	122	5.0	0.088	0.1	LOS A	0.2	1.6	0.12	0.13	0.12	58.4
6	R2	35	5.0	0.088	5.9	LOS A	0.2	1.6	0.12	0.13	0.12	56.0
Approach		157	5.0	0.088	1.4	NA	0.2	1.6	0.12	0.13	0.12	57.8
North: Romney Road												
7	L2	23	5.0	0.022	5.9	LOS A	0.1	0.6	0.21	0.55	0.21	52.8
9	R2	6	5.0	0.022	6.6	LOS A	0.1	0.6	0.21	0.55	0.21	52.2
Approach		29	5.0	0.022	6.1	LOS A	0.1	0.6	0.21	0.55	0.21	52.7
West: Toolang Road West												
10	L2	5	5.0	0.064	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	57.9
11	T1	115	5.0	0.064	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	59.8
Approach		120	5.0	0.064	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.7
All Vehicles		306	5.0	0.088	1.4	NA	0.2	1.6	0.08	0.13	0.08	58.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Toolang Road & Collins Road]

Existing AM
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Collins Road South												
1	L2	55	5.0	0.167	8.3	LOS A	0.6	4.6	0.11	0.98	0.11	50.4
2	T1	18	5.0	0.167	10.6	LOS A	0.6	4.6	0.11	0.98	0.11	50.1
3	R2	59	5.0	0.167	11.5	LOS A	0.6	4.6	0.11	0.98	0.11	49.9
Approach		132	5.0	0.167	10.1	LOS A	0.6	4.6	0.11	0.98	0.11	50.1
East: Toolang Road East												
4	L2	40	5.0	0.039	5.7	LOS A	0.1	0.4	0.06	0.36	0.06	54.8
5	T1	25	5.0	0.039	0.1	LOS A	0.1	0.4	0.06	0.36	0.06	56.4
6	R2	6	5.0	0.039	5.9	LOS A	0.1	0.4	0.06	0.36	0.06	54.2
Approach		71	5.0	0.039	3.7	NA	0.1	0.4	0.06	0.36	0.06	55.3
North: Collins Road North												
7	L2	9	5.0	0.090	8.7	LOS A	0.3	2.4	0.40	0.97	0.40	50.7
8	T1	57	5.0	0.090	10.5	LOS A	0.3	2.4	0.40	0.97	0.40	50.5
9	R2	3	5.0	0.090	11.1	LOS A	0.3	2.4	0.40	0.97	0.40	50.2
Approach		69	5.0	0.090	10.3	LOS A	0.3	2.4	0.40	0.97	0.40	50.5
West: Toolang Road West												
10	L2	8	5.0	0.192	5.8	LOS A	1.0	7.3	0.18	0.36	0.18	54.5
11	T1	122	5.0	0.192	0.2	LOS A	1.0	7.3	0.18	0.36	0.18	56.2
12	R2	201	5.0	0.192	5.7	LOS A	1.0	7.3	0.18	0.36	0.18	54.0
Approach		331	5.0	0.192	3.7	NA	1.0	7.3	0.18	0.36	0.18	54.8
All Vehicles		603	5.0	0.192	5.9	NA	1.0	7.3	0.17	0.56	0.17	53.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Toolang Road & Collins Road]

Existing PM
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Collins Road South												
1	L2	149	5.0	0.176	8.5	LOS A	0.7	5.4	0.17	0.93	0.17	51.4
2	T1	22	5.0	0.176	9.5	LOS A	0.7	5.4	0.17	0.93	0.17	51.1
3	R2	27	5.0	0.176	10.0	LOS A	0.7	5.4	0.17	0.93	0.17	50.9
Approach		198	5.0	0.176	8.8	LOS A	0.7	5.4	0.17	0.93	0.17	51.3
East: Toolang Road East												
4	L2	18	5.0	0.049	5.7	LOS A	0.1	0.5	0.05	0.17	0.05	56.4
5	T1	62	5.0	0.049	0.0	LOS A	0.1	0.5	0.05	0.17	0.05	58.2
6	R2	9	5.0	0.049	5.7	LOS A	0.1	0.5	0.05	0.17	0.05	55.8
Approach		89	5.0	0.049	1.8	NA	0.1	0.5	0.05	0.17	0.05	57.6
North: Collins Road North												
7	L2	8	5.0	0.059	8.5	LOS A	0.2	1.5	0.29	0.96	0.29	51.3
8	T1	42	5.0	0.059	9.3	LOS A	0.2	1.5	0.29	0.96	0.29	51.0
9	R2	3	5.0	0.059	10.7	LOS A	0.2	1.5	0.29	0.96	0.29	50.7
Approach		53	5.0	0.059	9.3	LOS A	0.2	1.5	0.29	0.96	0.29	51.0
West: Toolang Road West												
10	L2	4	5.0	0.099	5.9	LOS A	0.5	3.4	0.18	0.34	0.18	54.7
11	T1	69	5.0	0.099	0.2	LOS A	0.5	3.4	0.18	0.34	0.18	56.3
12	R2	97	5.0	0.099	5.8	LOS A	0.5	3.4	0.18	0.34	0.18	54.1
Approach		170	5.0	0.099	3.5	NA	0.5	3.4	0.18	0.34	0.18	55.0
All Vehicles		510	5.0	0.176	5.9	NA	0.7	5.4	0.17	0.60	0.17	53.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.