Traffic Impact Assessment

Proposed Mixed Use Development
76-58 Stanmore Road, Stanmore

Reference: 16.256r01v02
Date: December 2016

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Document Verification

Job Number:	16.256
Project:	58 – 76 Stanmore Road, Stanmore
Client:	Planning Ingenuity

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Appendices

1. Introduction

TRAFFIX has been commissioned by Planning Ingenuity to undertake a Traffic Impact Assessment for a proposed mixed use development at 58-76 Stanmore Road, Stanmore. Approval is sought to convert the existing mixed use site into a mixed used development with club, commercial office and residential uses on the land. The proposed development is situated within the Marrickville Council Local Government Area and has been assessed under that council's controls.

This report documents the findings of our investigations and should be read in the context of the application for a Planning Proposal prepared separately. The development is a major development and will require referral to the RMS under the provisions of SEPP (Infrastructure) 2007.

The report is structured as follows:

Section 2: Describes the site and its location

Section 3: Documents existing traffic conditions

Section 4: Describes the proposed development

Section 5: Assesses the parking requirements

Section 6: Assesses traffic impacts

Section 7: Presents the overall study conclusions.

2. Location and Site

The subject site is located at 58 - 78 Stanmore Road, Stanmore and is situated on the southern side of Stanmore Road. It is bounded by Tupper Street on the east side, Alma Avenue on the west side and an adjacent residential property to the south.

The site has a rectangular configuration with a site area of 9,299m^2. It has a northern frontage of approximately 69 metres to Stanmore Road, an eastern frontage to Tupper Street and western frontage to Alma Avenue of approximately 142 metres, with a southern side boundary of approximately 65 metres to neighbouring residential properties.

A Location Plan is presented in **Figure 1** with a Site Plan presented in **Figure 2**. Reference should also be made to the Photographic Record presented in **Appendix A**, which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

Figure 1: Location Plan

Figure 2: Site Plan

3. Existing Traffic Conditions

3.1 Road Network

The road hierarchy in the vicinity of the site is shown in **Figure 3** with the following roads of particular interest:

- Stanmore Road: is a classified main traffic route (MR167) that runs in an east-west direction to the north of the site. Stanmore Road is generally subject to a 60km/h speed zoning in the vicinity of the site and carries two (2) lanes of traffic in either direction, within a carriageway width of 13 metres. Stanmore Road carries approx. 14.649 vpd in the vicinity of the site and provided direct access to Tupper Street and Alma Avenue. Kerbside parking is available on both sides of the carriageway outside of the clearway hours.

- Tupper Street: is a local road that runs in a north-south direction to the east of the site. Tupper Street is constructed with a 7.5 metre wide carriageway and accommodates vehicular traffic and pedestrian footpaths. Access to Tupper Street can be reached from Stanmore Road from the north and Newington Road from the south. Non-Restricted Kerbside parking is available on both sides of the carriageway.

- Newington Road: is a collector road that runs in an east-west direction to the south of the site. Newington Road is constructed with 6 metres wide carriageway and accommodates vehicular traffic and pedestrian footpaths on both sides. Newington Road is bounded by Enmore Road in the East and Albert Street in the west. Non-Restricted Kerbside parking is available on both sides of the carriageway.

It can be seen from **Figure 3** that the site is conveniently located with respect to the arterial and local road systems serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts.

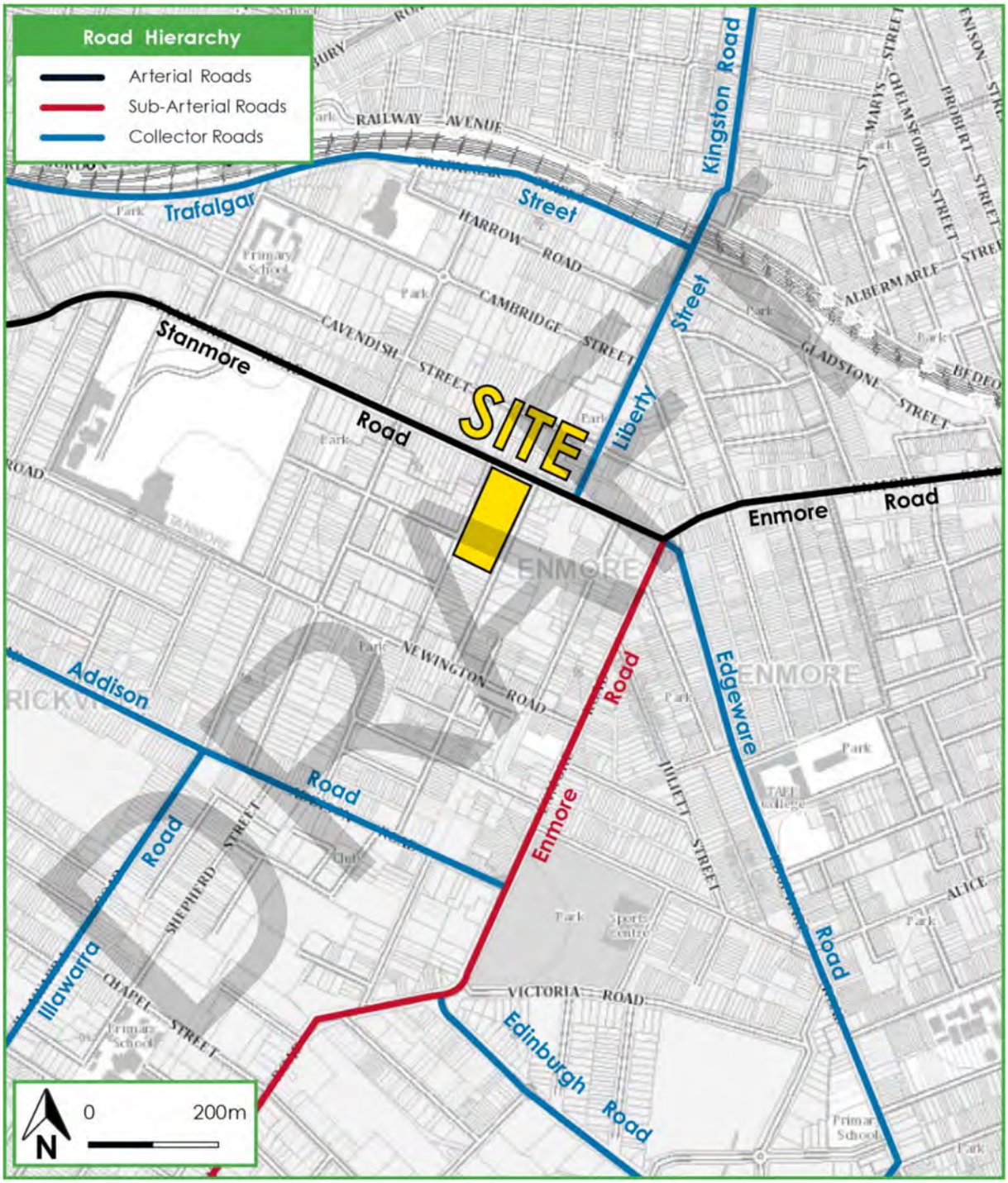


Figure 3: Road Hierarchy

3.2 Key Intersections

The key intersections in the vicinity of the site are shown below and provide an understanding of the existing road geometry and alignment:

Figure 4: Aerial image of intersection of Stanmore Road and Alma Avenue, Stanmore

It can be seen from **Figure 4** that Stanmore Road and Alma Avenue form a give way T - intersection. Alma Avenue is a one way local street and connects Stanmore Road and Newington Road. It is noted that Alma Avenue is the only access to the site's existing carpark. It is evident that a pedestrian footpath is provided along both sides of Stanmore Road.

Figure 5: Aerial image of intersection of Stanmore Road and Tupper Street, Stanmore

It can be seen from **Figure 5** that Stanmore Road and Tupper Street form a give way T - intersection east of the site. It is evident that pedestrian footpath is provided along both sides of Tupper Street. It is noted that Tupper Street provides access to the existing service bay on site.

Figure 6: Aerial image of intersection of Stanmore Road and Liberty Street, Stanmore

It can be seen from **Figure 6** that Stanmore Road and Liberty Street form a 3 way signal intersection. It is evident that pedestrian footpaths are provided along both sides of Liberty Street and Stanmore Road. Pedestrian crossing is also provided between eastern and western side of Liberty Street and northern and southern of Stanmore Road.

Figure 7: Aerial image of intersection of Enmore Road and Edgeware Road, Stanmore

It can be seen from **Figure 7** that Enmore Road and Edgeware Road forms a four way signal intersection approximately 238 metres east of the subject site. It is evident that pedestrian footpaths are provided along Stanmore Road, Enmore Road and Edgeware Road. Pedestrian crossings are provided across all approaches to the intersection.

3.3 Existing Intersection Performance

To assess the performance of the localised road network and site accesses, surveys were undertaken at the following intersections as detailed above on Thursday 13th October between 7:00 – 9:00 and 16:00 – 18:00:

- Newington Road / Alma Avenue
- Alma Avenue / Stanmore Road
- Enmore Road / Stanmore Road

- Newington Road / Tupper Street
- Tupper Street / Stanmore Road
- Liberty Street / Stanmore Road

All surveys accounted for the typical weekday peak periods. These volumes have been adopted as baseline volumes and modelled using SIDRA Intersection 7.0 to determine the performance characteristics of these key intersections operating as a network under existing traffic conditions.

The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below in **Table 1**:

Table 1: Intersection Performance Characteristics

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided in **Table 2** for the morning (AM) and afternoon (PM) peak hours. Reference should also be made to the SIDRA outputs provided in **Appendix B**, which provide detailed results for individual lanes and approaches

Table 2: Existing Intersection Performance –SIDRA Network

Intersection	Control Type	Period	Intersection Degree of Saturation (DOS)	Average Delay (AVD)	Level of Service (LOS)
Enmore Road & Edgeware Road & Stanmore Road	Signals	AM	1.177	188.4	F
		PM	0.964	42.6	D
Stanmore Road & Liberty Street	Signals	AM	0.895	37.3	C
		PM	0.903	28.0	B
Tupper Street & Stanmore Road	Give way	AM	0.603	29.9	C
		PM	0.448	28.4	C

It can be seen from **Table 2** that the key intersections generally operate satisfactorily under the existing 'base case' scenario, with a level of service D or better during both peak periods and with moderate delays. Although the priority intersection of Enmore Road / Edgeware Road / Stanmore Road is subject to delays of up to 188.4 seconds in the AM peak with a level of service F.

Nevertheless, it is stressed that the most relevant use of this analysis is to compare the relative change in the performance parameters as a result of the proposed development. This is discussed further in Section 6.

3.4 Public Transport

The site is well located to take advantage of the numerous public transport services that serve the local area. The existing train and bus services that operate in the locality are shown in **Figure 8**.

Standard transport planning guidelines state that a development is advantageously located to benefit from rail if it is within 800 metres walking distance of a train station. In this regard, the site is just 620 metres walking distance from Stanmore Station to the north west of the site. Stanmore station is served by the T2 Inner West & South Line

Current transport planning guidelines also state that a development is advantageously located to benefit from bus services if it is within 400 metres walking distance of a bus stop. As Figure 5 shows, there are numerous bus stops within 400 metres walk of the site, providing access to the L23, L28, 423, 426,355 and M30 services along Enmore Road. These services connect the subject site to Kingsgrove, Sydenham, Spit Junction and CBD. L28 and 428 route connects Canterbury to CBD bypassing Chippendale and Ultimo before reaching Martin Place. 423, L23 and 426 route connects Kingsgrove and CBD Martin Place bypassing Dulwich Hill, Stanmore and Newtown. M30 route is a metro bus service that connects Sydenham to Spit Junction via City. M30 metro bus operates approximately every 10 minutes during the peak period, every 15 minutes throughout the day and every 20 minutes during the weekend. Sydney Buses provide the flexibility and high level connectivity within the Sydney Region where train services are not available.

In summary, the subject site is ideally situated around public transportation and provide opportunities for future residents and visitors to use alternative transport meant to access the site.

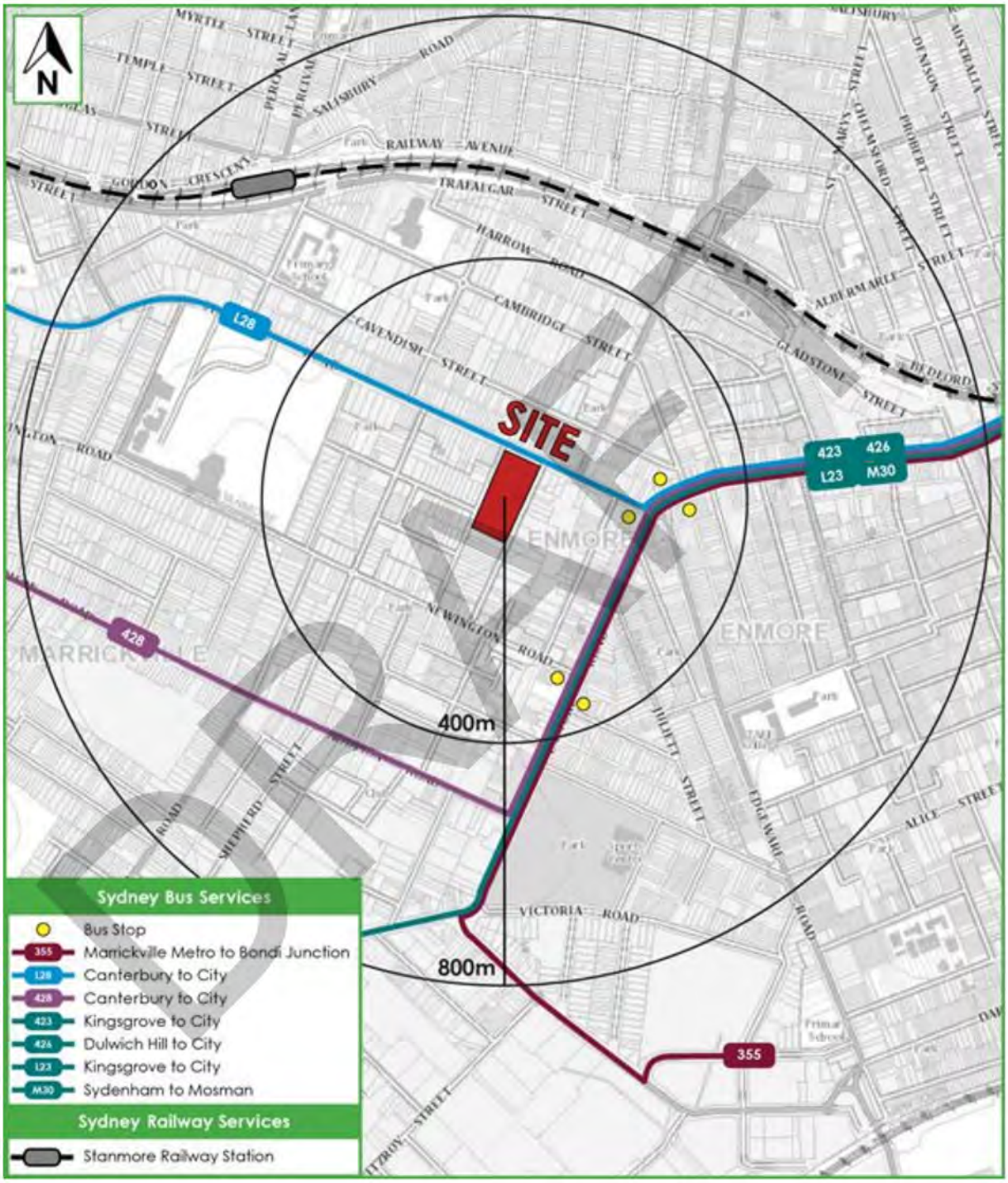


Figure 8: Public Transport Network

3.5 Existing Site Generation

The existing site accommodates the Cyprus club building, six (6) residential houses and one (1) electric substation (public infrastructure). The existing Cyprus Club has a gross floor area (GFA) of approximately 1,765m^2 and a total internal floor area of approximately 1,650 m^2. The existing site has provision for 186 parking spaces for the Cyprus club and an estimated 12 parking spaces for the six (6) residential houses within the original parking bays on the site.

The RMS *Technical Direction TDT 2013/04a* provides traffic generation rates for low density residential dwellings of 0.99 vehicles per dwelling during AM peak hour and 0.95 vehicles per dwelling during PM peak hour. In 2009, a traffic report was produced in support of a proposed expansion at the club. Surveys were undertaken at the intersection of Alma Avenue and Stanmore Road, which showed that of the 43 vehicles that turned into Alma Avenue in the PM peak hour, 11 vehicles accessed the club. This represents approximately 26% of all traffic using Alma Avenue during the PM peak is vehicles accessing the club car park. The survey also surveyed the vehicles exiting the club during the same time period, which was approximately 30% of all traffic travelling south on Alma Avenue. The same intersection was survey on 13 October 2016 and based on these percentages, and a trip generation of 19 vehicles per hour during the PM peak (15 in, 4 out) has been established. Based on these rates, the existing trip generation for the site is as follows:

Residential dwellings:

- 6 vehicle trips per hour during the AM peak period (1 in, 5 out); and
- 6 vehicle trips per hour during the PM peak period (5 in, 1 out)

Sports Club (only operate after AM peak hours):

- 19 vehicle trips per hour during the PM peak period (15 in, 4 out)

Combined Trip Generation:

- 6 combined vehicle trips per hour during the AM peak period (1 in, 5 out); and
- 25 combined vehicle trips per hour during the PM peak period (20 in, 5 out).

4. Proposed Development

A detail description of the proposed development is provided in the application for a Planning Proposal prepared separately. In summary, the development concept supporting the Planning Proposal comprises of four (4) building concepts which represent a possible future redevelopment scenario of:

- Building A: 1 or 2 x one bedroom apartments, 8 x two bedrooms apartments, 1 x three bedroom apartment and the Cyprus club with approximate floor space of 960 m2;
- Building B: 3 x one bedroom apartments, 15 x two bedroom apartments and 1 x three bedroom apartment and commercial space of approximately 467 m2 ;
- Building C: 11 x one bedroom apartments, 59 x two bedroom apartments and 2 x three bedroom apartments;
- Building D: 6 x one bedroom apartments, 31 x two bedrooms apartments and 2 x three bedroom apartments;
- 14 or 15 Terrace Houses.

The potential GFA of the concept is approximately 14,640 m^2 and the proposed floor space ratio (FSR) fits within the proposed FSR of 1.8:1. The parking and traffic impacts arising from the development concept are discussed in Sections 5 and 6 respectively. Reference should be made to the Urban Design Study submitted separately to Council which are presented at a reduced scale in **Appendix D**.

5. Parking Requirements

5.1 Council Controls

The *ADG* (gazetted in June 2015) is a resource to improve the planning and design of residential apartment development in NSW. It updates and replaces the *Residential Flat Design Code* introduced in 2002. The *ADG* is to be used in conjunction with *SEPP 65 (Amendment No. 3)* which sets out the NSW Government's policy direction for residential apartment development in NSW. In this regard, it is noted that the *ADG* outlines requirements for the provision of car parking for residential apartments, with Objective 3J-1 of the *ADG* being that *'car parking is provided based on proximity to public transport in metropolitan Sydney and centres in regional areas'*. Specifically, the design criteria under Objective 3J 1 of the *ADG* is as follows:

For development in the following locations:

- on sites that are within 800 metres of a railway station or light rail stop in the Sydney Metropolitan Area; or
- on land zoned, and sites within 400 metres of land zoned, B3 Commercial Core, B4 Mixed Use or equivalent in a nominated regional centre the minimum car parking requirement for residents and visitors is set out in the Guide to Traffic Generating Developments, or the car parking requirement prescribed by the relevant council, whichever is less

In addition, the car parking needs for a development must be provided off street.

As discussed previously, the site is located approximately 620 metres from Stanmore Railway Station and therefore satisfies the above design criteria of Objective 3J-1 of the *ADG*. Accordingly, the car parking requirement for the proposed residential dwellings is required to be assessed having regard for both Council's DCP and the RMS Guide. The lesser requirement equates to the minimum number of spaces that the development is required to provide under the *ADG* or *SEPP 65 (Amendment No. 3)*.

The proposed residential flat buildings are six (6) storeys in height and comprise of more than 20 residential apartments. As such, it is defined as a 'high density residential flat building' under the RMS

Guideline. Schedule 2.10.5 of the MDCP shows the car parking provision rates for the main land uses within the Marrickville LGA. Parking requirements for the respective uses of the site are anticipated to be provided in accordance with the rates shown in **Table 3**, noting that the site has been classified as a moderately accessible area (Parking Area 2).

Table 3: Council and RMS Parking Rates and Provision

Type	Number	Council Parking Rates	RMS Parking Rates	Spaces Required – DCP	Spaces Required - RMS
1 bedroom	22	0.5 per 1 bedroom unit	0.6 spaces per unit	11	6.6
2 bedrooms	113	1 per 2 bedroom unit	0.9 spaces per unit	113	101.7
3 Bedrooms	6	1.2 per 3+ bedroom	1.4 spaces per unit	7.2	8.4
Visitor	141	0.1 per unit for visitors	0.2 spaces per unit	14	28.2
Business premises; retail premises; shops	467	1 per 80 m^2 GFA for customers & staff		6	6
Dewelling houses (incl.attached , semi-detached and secondary dwellings)	14-15	1 per dwelling house or 1 per principal dwelling and secondary dwelling combined		15	15
Registered Clubs	?	1 per 5 staff		??	??
	?	1 per 30 patrons (as per patron limit on license) for Patrons			
			Total	**166 + Club**	**166 + Club**

It can be seen from **Table 3** that the development concept would be required to provide 166 parking spaces off-street in addition to the parking requirement generated by the club. It is proposed that the off-street car parking provision will be in compliance with the above parking requirements.

5.2 Accessible parking

The MDCP does not stipulate a requirement for accessible parking to be provided for club, business premises, retail premises or shops. It does however include the following requirement for adaptable dwellings in developments with 7 or more units:

1 mobility space per studio, 1br, 2br or 3+br unit for residents + 0.25 visitor mobility spaces per unit

Any future development will be designed to comply.

5.3 Motorcycle parking spaces

Schedule 2.10.15 of the MDCP states the following with regard to motorcycle parking:

'Motorcycle parking shall be provided at a rate of 5% of the car parking required under Table 1 rounded up or down to the nearest whole figure'

Any future development will be designed to comply.

5.4 Bicycle facilities

Section 2.10.14 of the MDCP requires bicycle parking and facilities to be provided in accordance with the minimum rates specified in **Table 4**:

Table 4: MDCP 2011 Bicycle Parking Rates and Provision

Type	Number/GFA	Council Parking Rates	Space Required
Registered Clubs	966	1 per 25m2 GFA bar area for staff, 1 per 100m2 GFA other areas for patrons	
Residential flat buildings	140	1 per 2 units for residential and 1 per 10 for visitors	84
Commercial	467	1 per 80 m^2 GFA for customers & staff	6
Dewelling houses (incl.attached, semi-detached and secondary dwellings)	15	N/A	N/A
Total			N/A

[1]Parking spaces rounded to the nearest whole number in accordance with MDCP.

It can be seen from **Table 4** that the development concept would be required to provide at least 90 bicycle spaces for the residential and commercial components of the development. The detailed floor area of the club for bar and patrons has not been developed and will be subject to future plans and provision made for the bicycles spaces. In addition to this, the MDCP also states that clothes lockers are to be provided at the rate of one (1) per three (3) staff spaces, and a minimum of one (1) shower, with additional showers favourable for the club bicycle spaces.

Any future development will be designed to provide bicycle parking spaces and appropriate end of journey facilities and amenities.

5.5 Servicing

Schedule 2.10.16 of the MDCP requires service vehicle parking for to be provided in accordance with the rates specified in **Table 5**.

Table 5: Service Vehicle Parking Rates and Provision

Use	Number / GFA	Minimum Parking Rate	Spaces Required
Commercial Premises	467m2	One truck space per 4000m2 GFA up to 20,000m2 GFA plus one truck space per 8,000m2 thereafter (50% of space adequate for trucks)	N/A
Residential Flat building and residential component of mixed use development	Building A: 10/11	One service vehicle space per 50 apartments (above first 50) up to 200 apartments plus one space per 100 apartments thereafter	N/A
	Building B: 19		N/A
	Building C: 72		1
	Building D: 39		N/A
Club (Other uses)	966	One service vehicle space per 2,000m2 (50% of spaces adequate for trucks)	N/A
Total			1

Any future development will be designed to comply, and service vehicle loading and unloading areas can be contained within the development site and suitably visually screened from public places as well as separated from neighbouring and nearby dwellings.

6. Traffic Impacts

6.1 Trip Generation

6.1.1 Residential Trip Generation

The *Guide to Traffic Generating Developments* provides traffic generation rates for medium density residential developments, which it defines as containing at least two (2) but less than 20 dwellings and high density residential developments. Concept buildings A and B will be assessed as medium density developments and concept buildings C and D as high density developments due to their individual unit schedules. For medium density developments it recommends an hourly trip generation rate during both the AM and PM peak periods of between 0.4 to 0.5 vehicle trips per dwelling containing up to two bedrooms and between 0.5 to 0.65 vehicle trips per dwelling containing three or greater bedrooms. For high density developments it recommends an AM peak of 0.09 vehicle trips per bedroom and a PM peak of 0.07 vehicle trips per bedroom. Application of the upper rate of these ranges to the Urban Design Concept for residential apartments results in the following traffic generation:

- 46 vehicle trips per hour during the AM peak period (9 in, 37 out); and
- 41 vehicle trips per hour during the PM peak period (33 in, 8 out).

6.1.2 Club Trip Generation

The Roads and Maritime Service's *Guide to Traffic Generating Development* provides the following advice regarding traffic generation at 'Clubs':

'Surveys of licensed clubs conducted by the RTA in 1978 indicate that it is difficult to generalise on their traffic generation because of the diversified nature of clubs. Traffic generation is affected by such factors as the provision of live entertainment, gambling facilities, number of members and club location. Behavioural changes since 1978, such as the introduction of random breath testing, also make such generalisations more difficult.'

Traffic generation rates are therefore not specified in the RMS Guide for this type of development and in any event, such a rate would not be as reliable as a survey based assessment, which is the preferred methodology in the RMS Guideline.

Based on the traffic count surveys undertaken in 2009 and 2016, an operational traffic generation rate of 1.1 vehicles per 100m^2 of GFA has been established, based on 19 vehicles per hour arriving at a club with 1,765m^2 GFA. Application of this rate to the new club with a possible GFA of 966m^2, it is assumed that the club is likely to generate approximately 10 vehicle trips during the peak hour (8 in, 2 out based on an 80% in 20% split), being Friday between 17:00 and 18:00 based as a 'worst case' assessment.

6.1.3 Retail Trip Generation

The commercial component of this development has been assumed as a retail development for the purposes of these calculations. Peak period traffic generation is provided by the RMS *Guide to traffic Generating Developments* by using the rates of 56 vehicle trips per 1000m^2 for the Friday PM Peak. GLFA for commercial premises indicated in the design concept is 467m^2, so application of this trip rate equates to:

- 26 vehicle trips per hour during the Friday PM peak period (13 in, 13 out).

6.1.4 Net Trip Generation

In terms of total vehicle trips, the above analysis forecasts the future traffic generating potential of the concept development to be:

- 46 vehicle trips per hour during the AM peak period (9 in, 37 out); and
- 77 vehicle trips per hour during the PM peak period (54 in, 23 out).

Taking into account the current trip generation of the current site as assess in Section 3.6 the net trip generation for the overall Urban Design Concept is expected to be:

- 40 vehicle trips per hour during the AM peak period (8 in, 32 out); and
- 52 vehicle trips per hour during the PM peak period (34 in, 18 out).

6.2 Trip Distributions

In order to assess the traffic impacts that the concept development will have on the surrounding road networks, the above net volumes will need to be distributed across the key intersections nominated in Section 3.2.

The Journey to Work data was used to distribute the increase in residential and commercial traffic in the AM and PM Peaks. The distributions from this data are shown in **Table 6**.

Table 6: Trip Distribution

Roads	In	Out
Edgeware Road	63%	16%
Enmore Road (North of Stanmore Road)	14%	0%
Liberty Street	7%	50%
Stanmore Road (West of Alma Avenue)	17%	34%

When applying the trip distributions in **Table 6** to the development volumes, the additional traffic generated by the concept development will be dispersed as shown in the diagrammatic representations in **Figure 9** and **Figure 10** for the AM peak period and PM peak period, respectively.

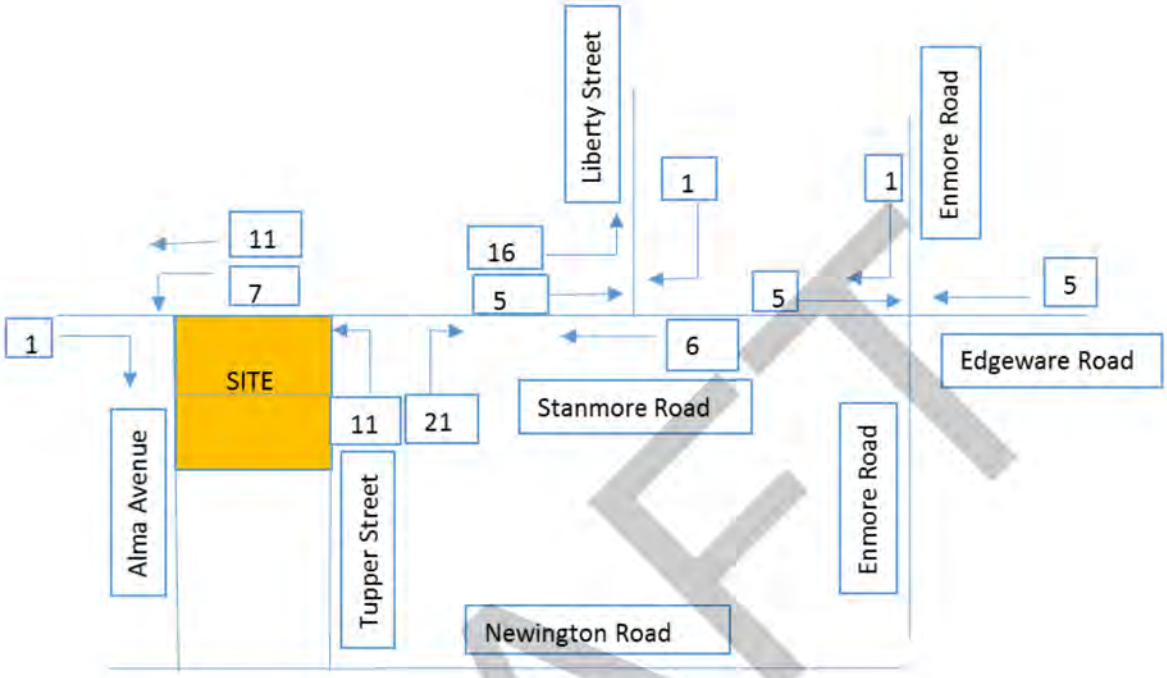


Figure 9: AM Peak Period Trip Distribution

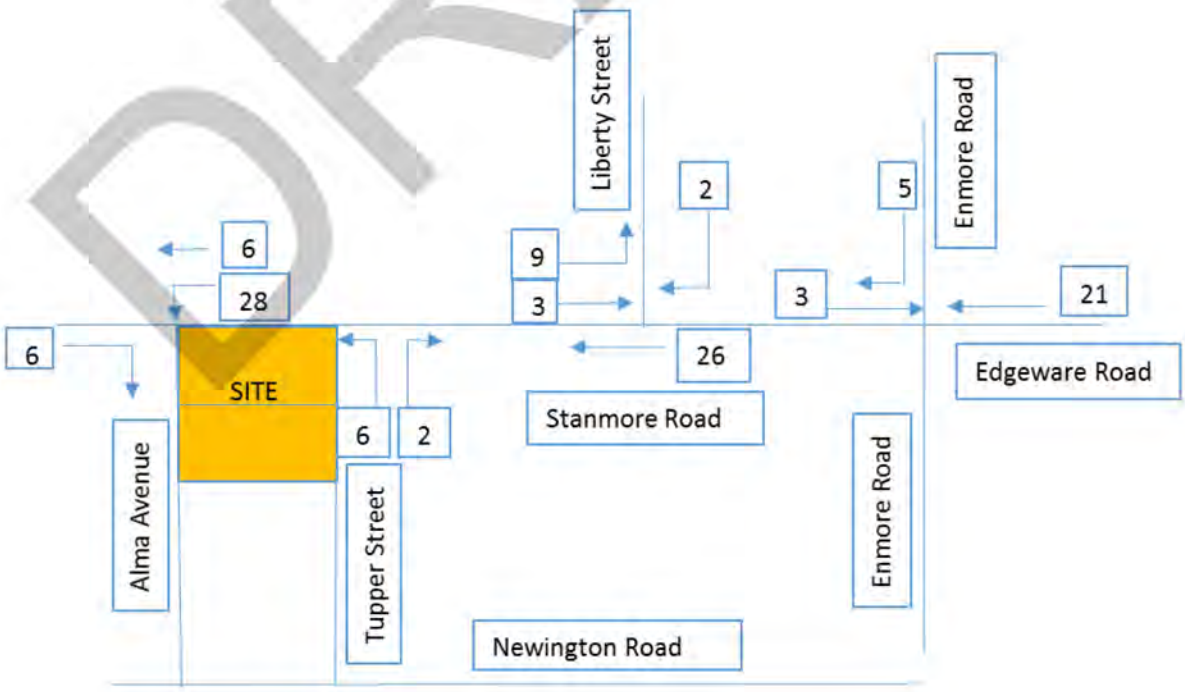


Figure 10: PM Peak Period Trip Distribution

6.3 Peak Period Intersection Performances

The performance of the nominated critical intersections under existing conditions and with the addition of net concept development volumes has been modelled using SIDRA Intersection 7.0. A summary of the results, which adopt baseline traffic volumes from the traffic surveys described in Section 3, is presented in **Table 7**. Reference should also be made to the detailed SIDRA outputs presented in **Appendix B**.

Table 7: Intersection Performance

Intersection	Control Type	Scenario	Period	Intersection Degree of Saturation	Average Delay (s)	Level of Service (LoS)
Enmore Road & Edgeware Road & Stanmore Road	Signals	Existing	AM	1.177	188.4	F
			PM	0.964	42.6	D
		Future	AM	1.177	191.0	F
			PM	0.968	43.6	D
Stanmore Road & Liberty Street	Signals	Existing	AM	0.895	37.3	C
			PM	0.903	28.0	B
		Future	AM	0.900	38.0	C
			PM	0.919	29.9	C
Tupper Street & Stanmore Road	Give way	Existing	AM	0.603	29.9	C
			PM	0.448	28.4	C
		Future	AM	0.773	41.4	C
			PM	0.572	32.8	C

It can be seen from **Table 7** that the Stanmore Road / Liberty Street and Stanmore Road / Tupper Street intersections generally continue to operate satisfactorily under the conceptual future 'with development' scenario in the AM and PM peak periods, with a level of service C. Negligible delays of under two (2) seconds are expected at the Stanmore Road / Liberty Street across both peak periods, and up to approximately 12 seconds in the AM peak period at the intersection of Stanmore Road / Tupper Street. This is however expected as these movements are related to the right turn movements from Tupper Street onto Stanmore Road.

The intersection of Enmore Road / Edgeware Road / Stanmore Road generally continues to operate at a level of service F in the AM peak. However, although the intersection continues to operate unsatisfactorily, it should be noted that the potential development only contributes an additional three (3) second delay to this intersection, which is a negligible impact.

It is therefore concluded that the proposed development will contribute minimal additional delays to the surrounding critical intersections, and they will continue to operate at the same level of service.

7. Access and Internal Design Aspects

7.1 Access

The access facility category for the concept development cannot be determined as yet under AS 2890.1 (2004), because the number of parking spaces provided has yet to be determined. The accesses should be designed to satisfy the minimum requirements of AS 2890.1 (2004).

7.2 Internal Design

The internal basement car park concept should be designed to comply with the requirements of AS 2890.1 (2004) and the following characteristics are noteworthy:

7.2.1 Parking Modules

- All retail parking spaces should be designed in accordance with a Class 3 user and provided with a minimum space length of 5.4m a minimum width of 2.6m and a minimum aisle width of 5.8m.
- All club parking spaces should be designed in accordance with a Class 2 user and provided with a minimum space length of 5.4m a minimum width of 2.5m and a minimum aisle width of 5.8m.
- All residential parking spaces should be designed in accordance with a Class 1A user and provided with a minimum space length of 5.4m a minimum width of 2.4m and a minimum aisle width of 5.8m.
- All spaces located adjacent to obstructions of greater than 150mm in height should be provided with an additional width of 300mm.
- Dead-end aisles should be provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.
- All disabled parking spaces should be designed in accordance with AS2890.6. Spaces should be provided with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.

7.2.2 Ramps

- All ramps accessing the non-residential basement car park should be designed with a maximum gradient of 20% (1 in 5) with transitions of 10% (1 in 10).
- Ramps associated with the residential basement car park should be designed with a maximum gradient of 25% (1 in 4) with transitions of 12.5% (1 in 8). These provisions should satisfy the requirements of AS 2890.1 (2004) for the car park;

7.2.3 Clear Head heights

- A minimum clear head height of 2.2m should be provided for all areas within the basement car park as required by AS2890.1. A clear head height of 2.5m should be provided above all disabled spaces as required by AS2890.6.

7.2.4 Other Considerations

- All columns should be located outside of the parking space design envelope shown in Figure 5.2 of AS 2890.1 (2004).
- Appropriate visual splays should be provided in accordance with the requirements of Figure 3.3 of AS2890.1 at all accesses.
- The internal design should comply with the Section 3.4 of AS2890.1 with appropriate queuing areas provided. Furthermore the max gradient of 1:10 for not less than 80% of the queuing length should be achieved.

7.2.5 Service Area Design

- The internal design of the service area should be undertaken in accordance with the requirements of AS28090.2 for the maximum length vehicle permissible on-site, which has yet to be determined.
- A minimum clear head height of 3.5m for SRV's and 4.5m for MRV's and HRV's should be provided within the service area
- All ramps should be designed in accordance with Table 3.2 of AS2890.2 with a maximum grade not in excess of 1:6.5 (15.4%).
- A minimum bay width of 3.5m should be provided for all service bays.

8. Conclusions

In summary:

- The Cyprus Club development forms part of the overall Urban Design Study submitted to Council. The development is currently in the master planning phase
- As part of the above planning, an indicative development yield was established for the subject site which included a total of 141 residential units, 14-15 terrace houses, 467m^2 of floor area for retail tenancies and 960m^2 of floor area for the Cyprus Club. The potential GFA of the concept is approximately 14,640 m^2 and the proposed floor space ratio (FSR) fits within the proposed FSR of 1.8:1.
- The above indicative development yield will generate in the order of 46 and 77 veh/hr during the AM and PM peak periods, respectively. This represents a net increase of 40 veh/hr during the AM peak and 52 veh/hr in the PM peak. Sidra intersection analysis has been undertaken for the surrounding critical intersections, and the results show a negligible increase in traffic delays across the network.
- Initial concept plans have been provided for the basement car parking layout. These initial concept designs generally encompass the design requirements outlined in AS2890.1, AS2890.2 and AS2890.6.

It is therefore concluded that the proposed development is supportable on traffic planning grounds and will operate satisfactorily.

Appendix A

Photographic Record

View looking east on Stanmore Road at the intersection of Alma Avenue.

View looking west along Stanmore Road at the intersection of Alma Avenue.

View looking east along Stanmore Road at the intersection of Tupper St.

View on Alma Avenue looking south at current site access.

View looking west on Edgeware Road at the intersection of Stanmore Road and Enmore Road.

View looking west across Enmore Road towards its intersection with Stanmore Road .

View looking west across Enmore Road towards its intersection with Stanmore Road .

Appendix B

SIDRA Results

MOVEMENT SUMMARY

Site: 1 [Enmore Road & Edgeware Road & Stanmore AM EX]

Network: N101 [Network AM EX]

Enmore Road / Edgeware Road / Stanmore
Time Period: AM Peak
Traffic condition: Existing and Future
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Edgeware Road SE													
21	L2	6	0.0	6	0.0	0.428	25.0	LOS B	12.1	88.3	0.72	0.63	37.9
22	T1	731	5.1	731	5.1	0.428	19.4	LOS B	12.1	88.3	0.72	0.63	29.6
Approach		737	5.0	737	5.0	0.428	19.5	LOS B	12.1	88.3	0.72	0.63	29.7
NorthEast: Enmore Road NE													
24	L2	45	4.4	45	4.4	0.217	29.7	LOS C	6.2	45.0	0.67	0.67	31.5
25	T1	299	5.0	299	5.0	0.879	41.1	LOS C	19.9	145.0	0.86	0.99	25.2
26	R2	226	4.9	226	4.9	0.879	57.5	LOS E	19.9	145.0	1.00	1.23	14.5
Approach		570	4.9	570	4.9	0.879	46.7	LOS D	19.9	145.0	0.90	1.06	21.6
NorthWest: Stanmore Road NW													
27	L2	514	5.1	514	5.1	0.478	12.5	LOS A	10.7	78.0	0.54	0.74	39.2
28	T1	1000	5.0	1000	5.0	1.165	340.4	LOS F	31.3	228.5	1.00	3.11	4.5
Approach		1514	5.0	1514	5.0	1.165	229.1	LOS F	31.3	228.5	0.84	2.31	6.4
SouthWest: Enmore Road SW													
30	L2	72	5.6	72	5.6	1.177	390.7	LOS F	65.7	480.2	1.00	2.67	2.7
31	T1	658	5.0	658	5.0	1.177	384.9	LOS F	68.2	498.3	1.00	2.68	5.2
Approach		730	5.1	730	5.1	1.177	385.5	LOS F	68.2	498.3	1.00	2.68	4.9
All Vehicles		3551	5.0	3551	5.0	1.177	188.4	LOS F	68.2	498.3	0.86	1.83	7.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 2.5 %
Number of Iterations: 10 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Pedestrian Back of Queue	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P5	SouthEast Full Crossing	50	23.2	LOS C	0.1	0.1	0.68	0.68
P6	NorthEast Full Crossing	50	20.5	LOS C	0.1	0.1	0.64	0.64
P7	NorthWest Full Crossing	50	43.3	LOS E	0.1	0.1	0.93	0.93
P8	SouthWest Full Crossing	50	20.5	LOS C	0.1	0.1	0.64	0.64
All Pedestrians		200	26.9	LOS C			0.72	0.72

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

MOVEMENT SUMMARY

Site: 1 [Enmore Road & Edgeware Road & Stanmore AM EX + FU] **Network: N201 [Network AM EX + FU]**

Enmore Road / Edgeware Road / Stanmore
Time Period: AM Peak
Traffic condition: Existing and Future
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Edgeware Road SE													
21	L2	6	0.0	6	0.0	0.431	25.0	LOS B	12.2	89.0	0.72	0.63	37.9
22	T1	736	5.0	736	5.0	0.431	19.4	LOS B	12.2	89.0	0.72	0.63	29.6
Approach		742	5.0	742	5.0	0.431	19.5	LOS B	12.2	89.0	0.72	0.63	29.7
NorthEast: Enmore Road NE													
24	L2	45	4.4	45	4.4	0.217	29.7	LOS C	6.2	45.1	0.67	0.67	31.4
25	T1	299	5.0	299	5.0	0.881	41.3	LOS C	20.0	145.8	0.86	0.99	25.1
26	R2	227	4.8	227	4.8	0.881	57.9	LOS E	20.0	145.8	1.00	1.23	14.5
Approach		571	4.9	571	4.9	0.881	47.0	LOS D	20.0	145.8	0.90	1.06	21.5
NorthWest: Stanmore Road NW													
27	L2	514	5.1	514	5.1	0.480	12.6	LOS A	10.8	78.6	0.54	0.74	39.2
28	T1	1005	5.0	1005	5.0	1.170	349.3	LOS F	31.3	228.5	1.00	3.16	4.4
Approach		1519	5.0	1519	5.0	1.170	235.4	LOS F	31.3	228.5	0.84	2.34	6.2
SouthWest: Enmore Road SW													
30	L2	72	5.6	72	5.6	1.177	390.7	LOS F	65.7	480.2	1.00	2.67	2.7
31	T1	658	5.0	658	5.0	1.177	384.9	LOS F	68.2	498.3	1.00	2.68	5.2
Approach		730	5.1	730	5.1	1.177	385.5	LOS F	68.2	498.3	1.00	2.68	4.9
All Vehicles		3562	5.0	3562	5.0	1.177	191.0	LOS F	68.2	498.3	0.86	1.85	7.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 4.5 %
Number of Iterations: 10 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Pedestrian Back of Queue	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P5	SouthEast Full Crossing	50	23.2	LOS C	0.1	0.1	0.68	0.68
P6	NorthEast Full Crossing	50	20.5	LOS C	0.1	0.1	0.64	0.64
P7	NorthWest Full Crossing	50	43.3	LOS E	0.1	0.1	0.93	0.93
P8	SouthWest Full Crossing	50	20.5	LOS C	0.1	0.1	0.64	0.64
All Pedestrians		200	26.9	LOS C			0.72	0.72

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

MOVEMENT SUMMARY

Site: 1 [Enmore Road & Edgeware Road & Stanmore PM EX] **Network: N102 [Network PM EX]**

Enmore Road / Edgeware Road / Stanmore
Time Period: PM Peak
Traffic condition: Existing and Future
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Edgeware Road SE													
21	L2	14	5.0	14	5.0	0.531	30.4	LOS C	11.8	85.8	0.81	0.71	34.1
22	T1	693	5.0	693	5.0	0.531	24.6	LOS B	14.6	106.4	0.81	0.71	26.0
Approach		707	5.0	707	5.0	0.531	24.8	LOS B	14.6	106.4	0.81	0.71	26.2
NorthEast: Enmore Road NE													
24	L2	546	5.0	546	5.0	0.689	24.7	LOS B	19.9	145.5	0.80	0.93	32.6
25	T1	483	5.0	483	5.0	0.689	27.0	LOS B	19.9	145.5	0.88	0.94	30.3
26	R2	86	5.0	86	5.0	0.689	33.4	LOS C	17.5	128.1	0.90	0.94	21.7
Approach		1115	5.0	1115	5.0	0.689	26.4	LOS B	19.9	145.5	0.84	0.93	30.9
NorthWest: Stanmore Road NW													
27	L2	316	5.0	316	5.0	0.396	15.1	LOS B	8.0	58.5	0.69	0.75	37.5
28	T1	758	5.0	758	5.0	0.964	66.9	LOS E	31.3	228.5	0.98	1.23	17.4
Approach		1074	5.0	1074	5.0	0.964	51.6	LOS D	31.3	228.5	0.90	1.09	20.6
SouthWest: Enmore Road SW													
30	L2	133	5.0	133	5.0	0.964	89.4	LOS F	17.2	125.6	1.00	1.32	10.5
31	T1	383	5.0	383	5.0	0.964	81.6	LOS F	19.4	141.6	0.99	1.31	18.4
Approach		516	5.0	516	5.0	0.964	83.6	LOS F	19.4	141.6	0.99	1.31	16.5
All Vehicles		3412	5.0	3412	5.0	0.964	42.6	LOS D	31.3	228.5	0.88	0.99	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 2.5 %
Number of Iterations: 10 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Pedestrian	Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P5	SouthEast Full Crossing	50	19.3	LOS B	0.1	0.1	0.62	0.62
P6	NorthEast Full Crossing	50	24.6	LOS C	0.1	0.1	0.70	0.70
P7	NorthWest Full Crossing	50	39.7	LOS D	0.1	0.1	0.89	0.89
P8	SouthWest Full Crossing	50	24.6	LOS C	0.1	0.1	0.70	0.70
All Pedestrians		200	27.0	LOS C			0.73	0.73

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

MOVEMENT SUMMARY

Site: 1 [Enmore Road & Edgeware Road & Stanmore PM EX + FU] **Network: N202 [Network PM EX + FU]**

Enmore Road / Edgeware Road / Stanmore
Time Period: PM Peak
Traffic condition: Existing and Future
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
SouthEast: Edgeware Road SE													
21	L2	14	5.0	14	5.0	0.610	31.6	LOS C	12.4	90.4	0.85	0.74	33.5
22	T1	714	4.9	714	4.9	0.610	25.3	LOS B	15.5	113.0	0.83	0.73	25.6
Approach		728	4.9	728	4.9	0.610	25.5	LOS B	15.5	113.0	0.83	0.73	25.8
NorthEast: Enmore Road NE													
24	L2	546	5.0	546	5.0	0.710	25.3	LOS B	21.2	154.9	0.82	0.93	32.4
25	T1	483	5.0	483	5.0	0.710	28.1	LOS B	21.2	154.9	0.89	0.96	29.8
26	R2	91	4.7	91	4.7	0.710	35.2	LOS C	17.4	127.0	0.92	0.96	21.0
Approach		1120	5.0	1120	5.0	0.710	27.3	LOS B	21.2	154.9	0.86	0.95	30.5
NorthWest: Stanmore Road NW													
27	L2	316	5.0	316	5.0	0.397	15.9	LOS B	8.7	63.2	0.72	0.76	36.8
28	T1	761	5.0	761	5.0	0.968	69.9	LOS E	31.3	228.5	0.98	1.25	16.8
Approach		1077	5.0	1077	5.0	0.968	54.0	LOS D	31.3	228.5	0.91	1.10	20.0
SouthWest: Enmore Road SW													
30	L2	133	5.0	133	5.0	0.961	89.1	LOS F	16.9	123.0	1.00	1.32	10.5
31	T1	383	5.0	383	5.0	0.961	80.2	LOS F	19.6	142.9	0.98	1.30	18.6
Approach		516	5.0	516	5.0	0.961	82.5	LOS F	19.6	142.9	0.99	1.30	16.7
All Vehicles		3441	5.0	3441	5.0	0.968	43.6	LOS D	31.3	228.5	0.89	1.00	23.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 4.0 %
Number of Iterations: 10 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P5	SouthEast Full Crossing	50	19.3	LOS B	0.1	0.1	0.62	0.62
P6	NorthEast Full Crossing	50	24.6	LOS C	0.1	0.1	0.70	0.70
P7	NorthWest Full Crossing	50	38.8	LOS D	0.1	0.1	0.88	0.88
P8	SouthWest Full Crossing	50	24.6	LOS C	0.1	0.1	0.70	0.70
All Pedestrians		200	26.8	LOS C			0.73	0.73

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

MOVEMENT SUMMARY

Site: S1 [Stanmore Road/ Liberty Street EX AM]

Network: N101 [Network AM EX]

New Site
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Stanmore Road E													
5	T1	549	5.0	543	5.0	0.374	2.6	LOS A	5.1	37.2	0.21	0.19	46.7
6	R2	358	5.0	354	5.0	0.703	50.4	LOS D	15.1	110.4	1.00	1.02	20.5
Approach		907	5.0	897 N1	5.0	0.703	21.5	LOS B	15.1	110.4	0.52	0.52	25.4
North: Liberty Street N													
7	L2	613	5.0	613	5.0	0.877	46.6	LOS D	33.1	241.5	1.00	0.98	17.4
9	R2	144	5.0	144	5.0	0.754	57.0	LOS E	7.5	54.4	1.00	0.87	14.9
Approach		757	5.0	757	5.0	0.877	48.6	LOS D	33.1	241.5	1.00	0.96	16.8
West: Stanmore Road W													
10	L2	107	5.0	107	5.0	0.895	41.2	LOS C	11.2	81.6	0.96	1.01	21.2
11	T1	1100	5.0	1100	5.0	0.895	42.2	LOS C	11.2	81.6	0.97	1.06	4.9
Approach		1207	5.0	1207	5.0	0.895	42.1	LOS C	11.2	81.6	0.97	1.06	6.7
All Vehicles		2871	5.0	2861 N1	5.0	0.895	37.3	LOS C	33.1	241.5	0.83	0.86	14.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 2.5 %
Number of Iterations: 10 (maximum specified: 10)

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	50	44.3	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	50	8.4	LOS A	0.1	0.1	0.41	0.41
All Pedestrians		100	26.3	LOS C			0.68	0.68

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

MOVEMENT SUMMARY

Site: S1 [Stanmore Road/ Liberty Street EX AM + FU]

Network: N201 [Network AM EX + FU]

New Site
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Stanmore Road E													
5	T1	555	4.9	549	4.9	0.378	2.6	LOS A	5.1	37.4	0.21	0.19	46.8
6	R2	358	5.0	354	5.0	0.727	51.8	LOS D	15.4	112.3	1.00	1.03	20.2
Approach		913	5.0	903 N1	5.0	0.727	21.9	LOS B	15.4	112.3	0.52	0.52	25.0
North: Liberty Street N													
7	L2	613	5.0	613	5.0	0.900	52.0	LOS D	35.4	258.1	1.00	1.00	16.0
9	R2	145	5.0	145	5.0	0.759	57.1	LOS E	7.5	54.9	1.00	0.88	14.9
Approach		758	5.0	758	5.0	0.900	52.9	LOS D	35.4	258.1	1.00	0.98	15.8
West: Stanmore Road W													
10	L2	123	4.3	123	4.3	0.892	39.8	LOS C	11.2	81.6	0.95	1.00	21.7
11	T1	1105	5.0	1105	5.0	0.892	40.8	LOS C	11.2	81.6	0.96	1.05	5.0
Approach		1228	4.9	1228	4.9	0.892	40.7	LOS C	11.2	81.6	0.96	1.04	7.2
All Vehicles		2899	5.0	2889 N1	5.0	0.900	38.0	LOS C	35.4	258.1	0.83	0.86	14.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 4.5 %
Number of Iterations: 10 (maximum specified: 10)

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian Back of Queue ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	50	44.3	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	50	8.0	LOS A	0.1	0.1	0.40	0.40
All Pedestrians		100	26.1	LOS C			0.67	0.67

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

MOVEMENT SUMMARY

Site: S1 [Stanmore Road/ Liberty Street EX PM]

Network: N102 [Network PM EX]

New Site
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Stanmore Road E													
5	T1	917	5.0	917	5.0	0.773	10.7	LOS A	24.5	178.9	0.62	0.58	27.5
6	R2	421	5.0	421	5.0	0.773	22.9	LOS B	14.0	102.1	0.81	0.87	31.5
Approach		1338	5.0	1338	5.0	0.773	14.5	LOS A	24.5	178.9	0.68	0.67	29.7
North: Liberty Street N													
7	L2	452	5.0	452	5.0	0.554	18.4	LOS B	12.5	91.3	0.61	0.77	30.5
9	R2	243	5.0	243	5.0	0.518	39.4	LOS C	10.2	74.5	0.90	0.82	19.4
Approach		695	5.0	695	5.0	0.554	25.7	LOS B	12.5	91.3	0.71	0.78	25.4
West: Stanmore Road W													
10	L2	68	5.0	68	5.0	0.903	57.0	LOS E	11.2	81.6	1.00	1.12	16.9
11	T1	613	5.0	613	5.0	0.903	56.8	LOS E	11.2	81.6	1.00	1.14	3.7
Approach		681	5.0	681	5.0	0.903	56.8	LOS E	11.2	81.6	1.00	1.14	5.3
All Vehicles		2714	5.0	2714	5.0	0.903	28.0	LOS B	24.5	178.9	0.77	0.82	19.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 2.5 %
Number of Iterations: 10 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P2	East Full Crossing	50	34.5	LOS D	0.1	0.1	0.83	0.83
P3	North Full Crossing	50	11.3	LOS B	0.1	0.1	0.58	0.58
All Pedestrians		100	22.9	LOS C			0.71	0.71

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

MOVEMENT SUMMARY

Site: S1 [Stanmore Road/ Liberty Street EX PM + FU]

Network: N202 [Network PM EX + FU]

New Site
Signals - Fixed Time Coordinated Cycle Time = 100 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Stanmore Road E													
5	T1	943	4.9	943	4.9	0.790	12.0	LOS A	27.2	198.3	0.68	0.63	25.7
6	R2	421	5.0	421	5.0	0.790	24.8	LOS B	15.2	110.7	0.84	0.88	30.5
Approach		1364	4.9	1364	4.9	0.790	15.9	LOS B	27.2	198.3	0.73	0.71	28.2
North: Liberty Street N													
7	L2	452	5.0	452	5.0	0.559	18.5	LOS B	12.6	91.7	0.62	0.77	30.4
9	R2	245	5.0	245	5.0	0.522	39.4	LOS C	10.3	75.2	0.90	0.82	19.4
Approach		697	5.0	697	5.0	0.559	25.8	LOS B	12.6	91.7	0.72	0.78	25.4
West: Stanmore Road W													
10	L2	77	4.4	77	4.4	0.919	61.0	LOS E	11.2	81.6	1.00	1.17	16.0
11	T1	616	5.0	616	5.0	0.919	61.4	LOS E	11.2	81.6	1.00	1.18	3.4
Approach		693	4.9	693	4.9	0.919	61.4	LOS E	11.2	81.6	1.00	1.18	5.1
All Vehicles		2754	4.9	2754	4.9	0.919	29.9	LOS C	27.2	198.3	0.79	0.85	18.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 4.0 %
Number of Iterations: 10 (maximum specified: 10)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P2	East Full Crossing	50	34.5	LOS D	0.1	0.1	0.83	0.83
P3	North Full Crossing	50	11.3	LOS B	0.1	0.1	0.58	0.58
All Pedestrians		100	22.9	LOS C			0.71	0.71

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

MOVEMENT SUMMARY

Site: 2 [Tupper Street & Stanmore Road EX AM]

Network: N101 [Network AM EX]

Tupper Street / Stanmore Road
Time Period: AM Peak
Traffic condition: Existing and Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Tupper Street South													
1	L2	21	5.0	21	5.0	0.603	17.0	LOS B	1.6	11.5	0.76	1.00	21.1
3	R2	69	5.0	69	5.0	0.603	33.9	LOS C	1.6	11.5	0.76	1.00	21.1
Approach		90	5.0	90	5.0	0.603	29.9	LOS C	1.6	11.5	0.76	1.00	21.1
East: Stanmore Road East													
4	L2	25	5.0	25	5.0	0.179	3.9	LOS A	0.0	0.0	0.00	0.04	55.5
5	T1	650	5.0	645	5.0	0.179	0.0	LOS A	0.0	0.0	0.00	0.02	57.7
Approach		675	5.0	669 N1	5.0	0.179	0.1	NA	0.0	0.0	0.00	0.02	57.7
West: Stanmore Road West													
11	T1	1006	5.0	1006	5.0	0.536	0.0	LOS A	20.4	149.1	0.00	0.00	59.5
12	R2	1	5.0	1	5.0	0.536	7.9	LOS A	17.1	124.9	0.00	0.00	59.5
Approach		1007	5.0	1007	5.0	0.536	0.0	NA	20.4	149.1	0.00	0.00	59.5
All Vehicles		1772	5.0	1766 N1	5.0	0.603	1.6	NA	20.4	149.1	0.04	0.06	43.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 2.5 %
Number of Iterations: 10 (maximum specified: 10)

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 2 [Tupper Street & Stanmore Road EX AM + FU]

Network: N201 [Network AM EX + FU]

Tupper Street / Stanmore Road
Time Period: AM Peak
Traffic condition: Existing and Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Tupper Street South													
1	L2	32	3.3	32	3.3	0.773	28.7	LOS C	2.7	19.6	0.76	1.16	17.3
3	R2	90	3.8	90	3.8	0.773	45.9	LOS D	2.7	19.6	0.76	1.16	17.3
Approach		122	3.7	122	3.7	0.773	41.4	LOS C	2.7	19.6	0.76	1.16	17.3
East: Stanmore Road East													
4	L2	25	5.0	25	5.0	0.181	3.9	LOS A	0.0	0.0	0.00	0.04	55.6
5	T1	657	4.9	652	4.9	0.181	0.0	LOS A	0.0	0.0	0.00	0.02	57.8
Approach		682	4.9	676 N1	4.9	0.181	0.1	NA	0.0	0.0	0.00	0.02	57.7
West: Stanmore Road West													
11	T1	1006	5.0	1006	5.0	0.536	0.0	LOS A	20.4	149.1	0.00	0.00	59.5
12	R2	1	5.0	1	5.0	0.536	7.9	LOS A	18.5	135.2	0.00	0.00	59.5
Approach		1007	5.0	1007	5.0	0.536	0.0	NA	20.4	149.1	0.00	0.00	59.5
All Vehicles		1811	4.9	1805 N1	4.9	0.773	2.9	NA	20.4	149.1	0.05	0.09	36.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 4.5 %
Number of Iterations: 10 (maximum specified: 10)

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

▽ Site: 2 [Tupper Street & Stanmore Road EX PM]

⊕⊕ Network: N102 [Network PM EX]

Tupper Street / Stanmore Road
Time Period: PM Peak
Traffic condition: Existing and Future
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Tupper Street South													
1	L2	11	5.0	11	5.0	0.448	14.2	LOS A	1.0	7.0	0.84	0.99	21.8
3	R2	44	5.0	44	5.0	0.448	31.9	LOS C	1.0	7.0	0.84	0.99	21.8
Approach		55	5.0	55	5.0	0.448	28.4	LOS B	1.0	7.0	0.84	0.99	21.8
East: Stanmore Road East													
4	L2	38	5.0	38	5.0	0.316	3.9	LOS A	0.0	0.0	0.00	0.04	56.0
5	T1	1144	5.0	1144	5.0	0.316	0.0	LOS A	0.0	0.0	0.00	0.02	58.0
Approach		1182	5.0	1182	5.0	0.316	0.1	NA	0.0	0.0	0.00	0.02	57.9
West: Stanmore Road West													
11	T1	676	5.0	676	5.0	0.377	0.4	LOS A	20.4	149.1	0.05	0.01	53.3
12	R2	12	5.0	12	5.0	0.377	11.3	LOS A	5.9	43.1	0.10	0.02	47.5
Approach		688	5.0	688	5.0	0.377	0.5	NA	20.4	149.1	0.05	0.01	53.2
All Vehicles		1925	5.0	1925	5.0	0.448	1.1	NA	20.4	149.1	0.04	0.04	46.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 2.5 %
Number of Iterations: 10 (maximum specified: 10)

MOVEMENT SUMMARY

▽ Site: 2 [Tupper Street & Stanmore Road EX PM + FU]

⊕⊕ Network: N202 [Network PM EX + FU]

Tupper Street / Stanmore Road
Time Period: PM Peak
Traffic condition: Existing and Future
Giveway / Yield (Two-Way)

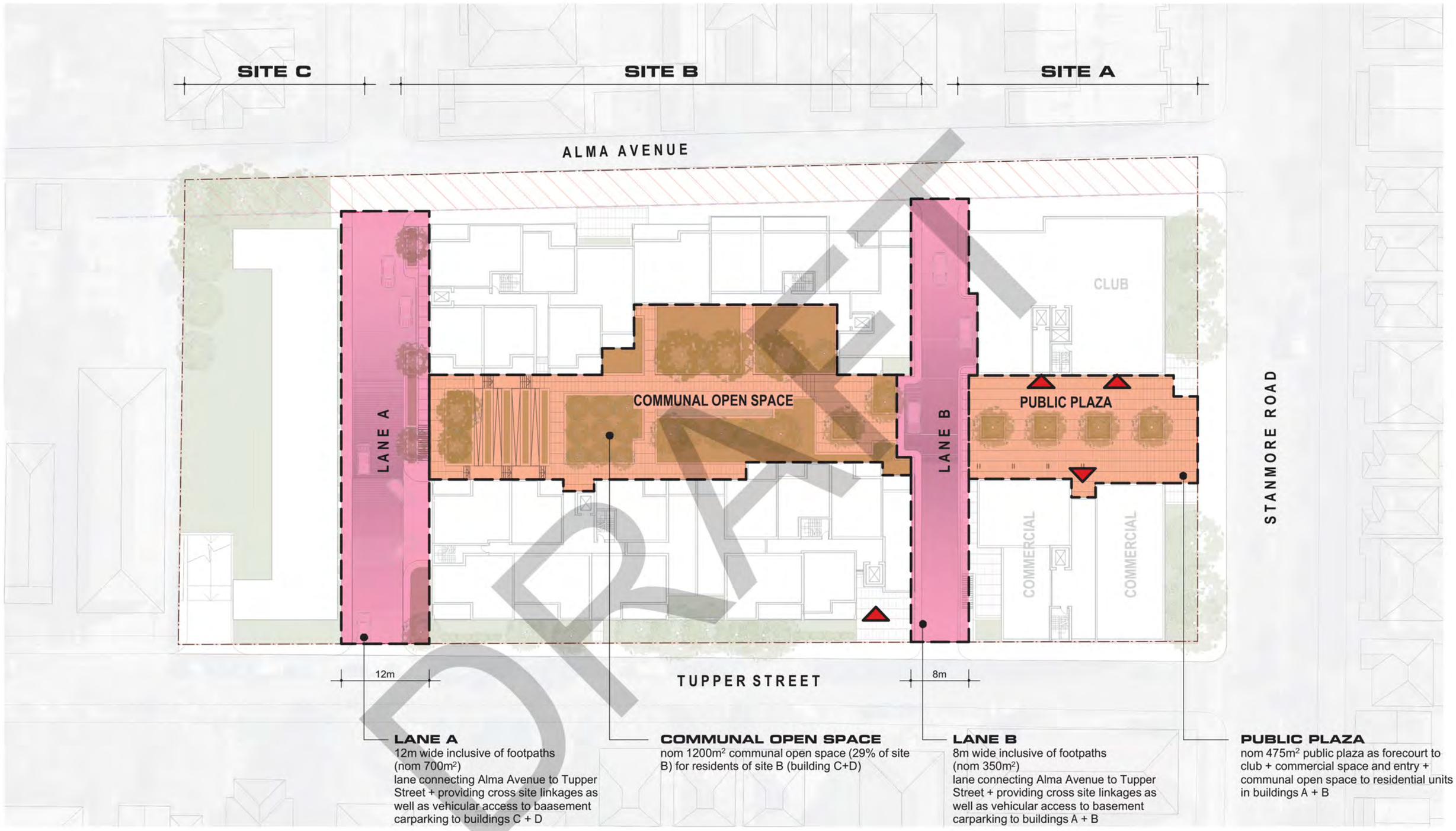
Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Tupper Street South													
1	L2	17	3.2	17	3.2	0.572	18.8	LOS B	1.4	9.9	0.84	1.05	20.0
3	R2	56	3.9	56	3.9	0.572	37.1	LOS C	1.4	9.9	0.84	1.05	20.0
Approach		73	3.8	73	3.8	0.572	32.8	LOS C	1.4	9.9	0.84	1.05	20.0
East: Stanmore Road East													
4	L2	38	5.0	38	5.0	0.323	3.9	LOS A	0.0	0.0	0.00	0.04	56.1
5	T1	1172	4.9	1172	4.9	0.323	0.0	LOS A	0.0	0.0	0.00	0.02	58.0
Approach		1210	4.9	1210	4.9	0.323	0.1	NA	0.0	0.0	0.00	0.02	58.0
West: Stanmore Road West													
11	T1	676	5.0	676	5.0	0.378	0.4	LOS A	20.4	149.1	0.05	0.01	53.0
12	R2	12	5.0	12	5.0	0.378	11.5	LOS A	7.1	51.5	0.10	0.02	47.1
Approach		688	5.0	688	5.0	0.378	0.6	NA	20.4	149.1	0.05	0.01	52.9
All Vehicles		1971	4.9	1971	4.9	0.572	1.5	NA	20.4	149.1	0.05	0.05	43.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
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.
Network Model Accuracy Level (largest change in degree of saturation for any lane): 4.0 %
Number of Iterations: 10 (maximum specified: 10)

Appendix C

Reduced Plans



scheme - site plan - lanes / open space

urban design study / planning proposal for proposed redevelopment of:

58-76 stanmore road, STANMORE

1446 – PP 405

kennedy associates architects level 3 / 1 booth street annandale 2038 p + 61 2 9557 6466 f + 61 2 9557 6477 nominated architect - steve kennedy - registration no. 5828

April 2016

ALMA AVENUE

LANE

STANMORE ROAD

TUPPER STREET

indicates low point on site

indicates location of vehicular entry

indicates location of pedestrian entry

studio

1 bedroom unit

1 bedroom + study unit

2 bedroom unit

3 bedroom unit

0 5 10 25m

scale 1:500 @A3

scheme - lower ground level 03

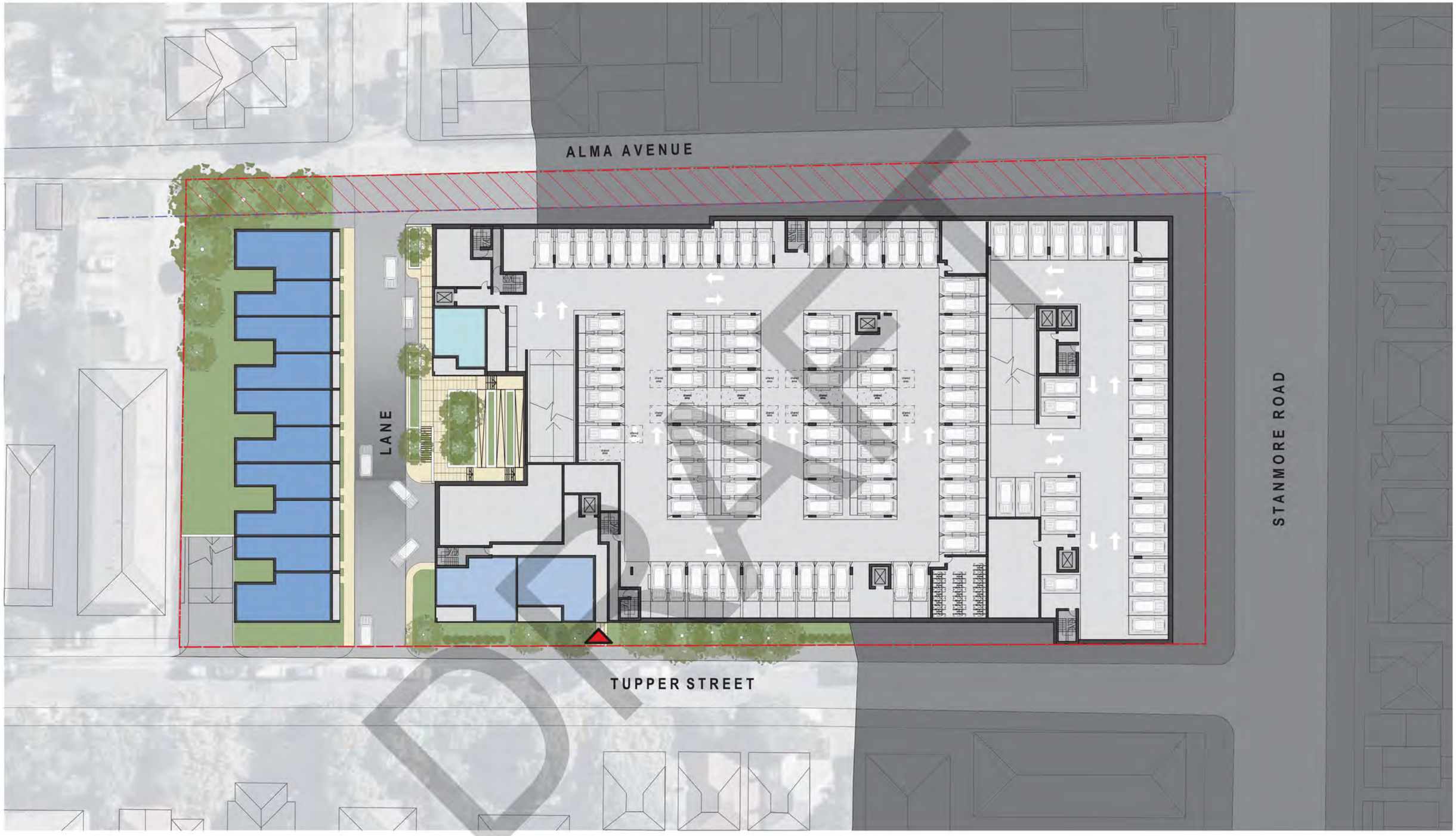
urban design study / planning proposal for proposed redevelopment of:

58-76 stanmore road, STANMORE

1446 – PP 407

kennedy associates architects level 3 / 1 booth street annandale 2038 p + 61 2 9557 6466 f + 61 2 9557 6477 nominated architect - steve kennedy - registration no. 5828

April 2016



- indicates low point on site
- indicates location of vehicular entry
- indicates location of pedestrian entry

- studio
- 1 bedroom unit
- 1 bedroom + study unit
- 2 bedroom unit
- 3 bedroom unit

0 5 10 25m

scale 1:500 @A3

scheme - lower ground level 02

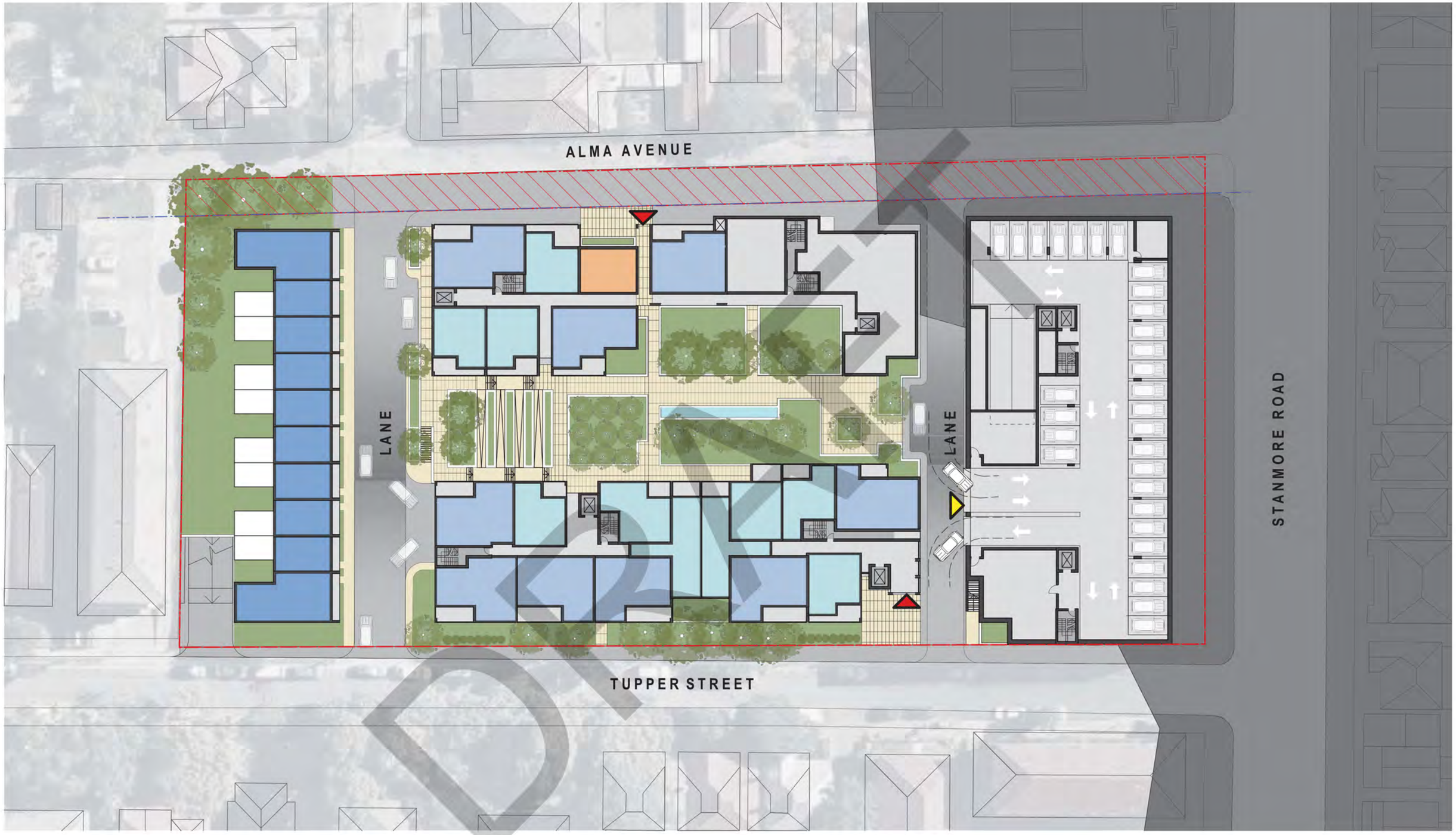
urban design study / planning proposal for proposed redevelopment of:

58-76 stanmore road, STANMORE

1446 – PP 408

kennedy associates architects level 3 / 1 booth street annandale 2038 p + 61 2 9557 6466 f + 61 2 9557 6477 nominated architect - steve kennedy - registration no. 5828

April 2016



indicates low point on site

indicates location of vehicular entry

indicates location of pedestrian entry

studio

1 bedroom unit

1 bedroom + study unit

2 bedroom unit

3 bedroom unit

0 5 10 25m

scale 1:500 @A3

scheme - lower ground level 01

urban design study / planning proposal for proposed redevelopment of:

58-76 stanmore road, STANMORE

1446 – PP 409

kennedy associates architects level 3 / 1 booth street annandale 2038 p + 61 2 9557 6466 f + 61 2 9557 6477 nominated architect - steve kennedy - registration no. 5828

April 2016

indicates low point on site

indicates location of vehicular entry

indicates location of pedestrian entry

studio

1 bedroom unit

1 bedroom + study unit

2 bedroom unit

3 bedroom unit

0 5 10 25m

scale 1:500 @A3

scheme - ground level - stanmore road

urban design study / planning proposal for proposed redevelopment of:

58-76 stanmore road, STANMORE

1446 – PP 410

kennedy associates architects level 3 / 1 booth street annandale 2038 p + 61 2 9557 6466 f + 61 2 9557 6477 nominated architect - steve kennedy - registration no. 5828

April 2016