Traffic Impact Assessment

Planning Proposal
Lakes Business Park – Southern Precinct
11-13 Lord Street, Botany

Reference: 15.094r01v02 TRAFFIX TIA Report
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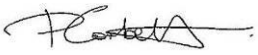
	Checked by:	PC	04-05-2015	
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Appendices

1. Introduction

TRAFFIX has been commissioned by Dexus Property Group to undertake a traffic impact assessment in support of a planning proposal relating to the existing Lakes Business Park (LBP) site at 11-13 Lord Street, Botany. The LBP consists of separate Northern and Southern Precincts however, the subject planning proposal relates to the Southern Precinct (subject site) only.

The subject site is currently zoned as B7 Business Park, which permits commercial land uses only. The subject planning proposal seeks approval for the rezoning of the subject site to Mixed-Use (residential and commercial), which would permit the construction of nine (9) buildings comprising total of 658 residential apartments and 1,174m^2 of commercial floor space.

The subject site is located within the City of Botany Bay Local Government Area and has been assessed under that Council's controls. The application proposes in excess of 300 residential apartments, with access onto a local road. Accordingly, the planning proposal is required to be referred to the Roads and Maritime Services (RMS) under the provisions of the Infrastructure SEPP 2007.

The report is structured as follows:

- Section 2: Provides an understanding of the existing development approvals on the site
- Section 3: Describes the site and its location
- Section 4: Documents existing traffic conditions
- Section 5: Describes the proposed development
- Section 6: Assesses the parking requirements
- Section 7: Assesses traffic impacts
- Section 8: Discusses access and internal design aspects
- Section 9: Presents the overall study conclusions

2. Existing Approvals

The LBP site has an approved master plan which provides for the substantial expansion and development of both the Northern and Southern Precincts for commercial uses.

The Northern Precinct has consent for the construction of seven commercial buildings ranging from 5-6 stories in height, with an indicative total Gross Floor Area (GFA) of 48,840m^2. The Southern Precinct has consent for the construction of four commercial buildings ranging from 3-6 stories in height, with an indicative total GFA of 29,770sqm.

The DA was approved in January 2009 and has been preserved due to construction of footings.

3. Location and Site

The LBP lies approximately 2 kilometres south-east of Sydney Domestic Airport and approximately 10 kilometres south of the Sydney CBD. More specifically, it is situated on Lord Street in the suburb of Botany and is comprised of two (2) separate Precincts which lie on the northern side of Lord Street (Northern Precinct) and the southern side of Lord Street (Southern Precinct). As discussed above, this application relates solely to the Southern Precinct at 11-13 Lord Street, Botany, which is also legally described as Lot 2 of DP 717692.

The subject site is rectangular in configuration and has a total area of 29,769m^2. It accommodates two (2) commercial buildings with a total Net Lettable Area of 14,185m^2 including both commercial and warehouse floor space.

It has a northern frontage of approximately 230 metres to Lord Street, an eastern boundary of 130 metres to Booralee Park, a southern boundary of approximately 230 metres to neighbouring residential developments and a western boundary of approximately 130 metres to a neighbouring commercial development.

Vehicular access to the site is currently provided via three (3) separate entry / exit driveways onto Lord Street. These driveways serve at-grade loading and car parking areas, with a total of approximately 400 car parking spaces provided on-site.

A Location Plan is presented in **Figure 1**, with a Site Plan presented in **Figure 2**.

Figure 1: Location Plan

Figure 2: Site Plan

4. Existing Traffic Conditions

4.1 Road Network

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

- Southern Cross Drive: an RMS State Road (MR 593) that generally runs in a north-south direction between General Holmes Drive in the south and Todman Avenue in the north. Southern Cross Drive carries 130,000 vpd (2008 AADT) near Gardeners Road. It is generally subject to a 70km/h speed zoning in the vicinity of the site and carries three lanes of traffic in either direction within a separated carriageway of width 26.0 metres.

- Botany Road: an RMS State Road (MR 170) that generally runs in a north-south direction between Bunnerong Road in the south and Boundary Street in the north. Botany Road carries 24,000 vpd (2005 AADT) in the vicinity of the site. It is generally subject to a 60km/h speed zoning in the vicinity of the site and generally carries two lanes of traffic in either direction within a separated carriageway of width 18.0 metres.

- Lord Street: a local road that runs in an east-west direction between Botany Road in the west and extending 500 metres west, forming a cul de sac at its eastern end. It carries a single lane of traffic in both direction and permits parallel parking on both sides.

In addition, it can be seen from Figure 3 that the site is conveniently located with respect to the arterial road network serving the region.

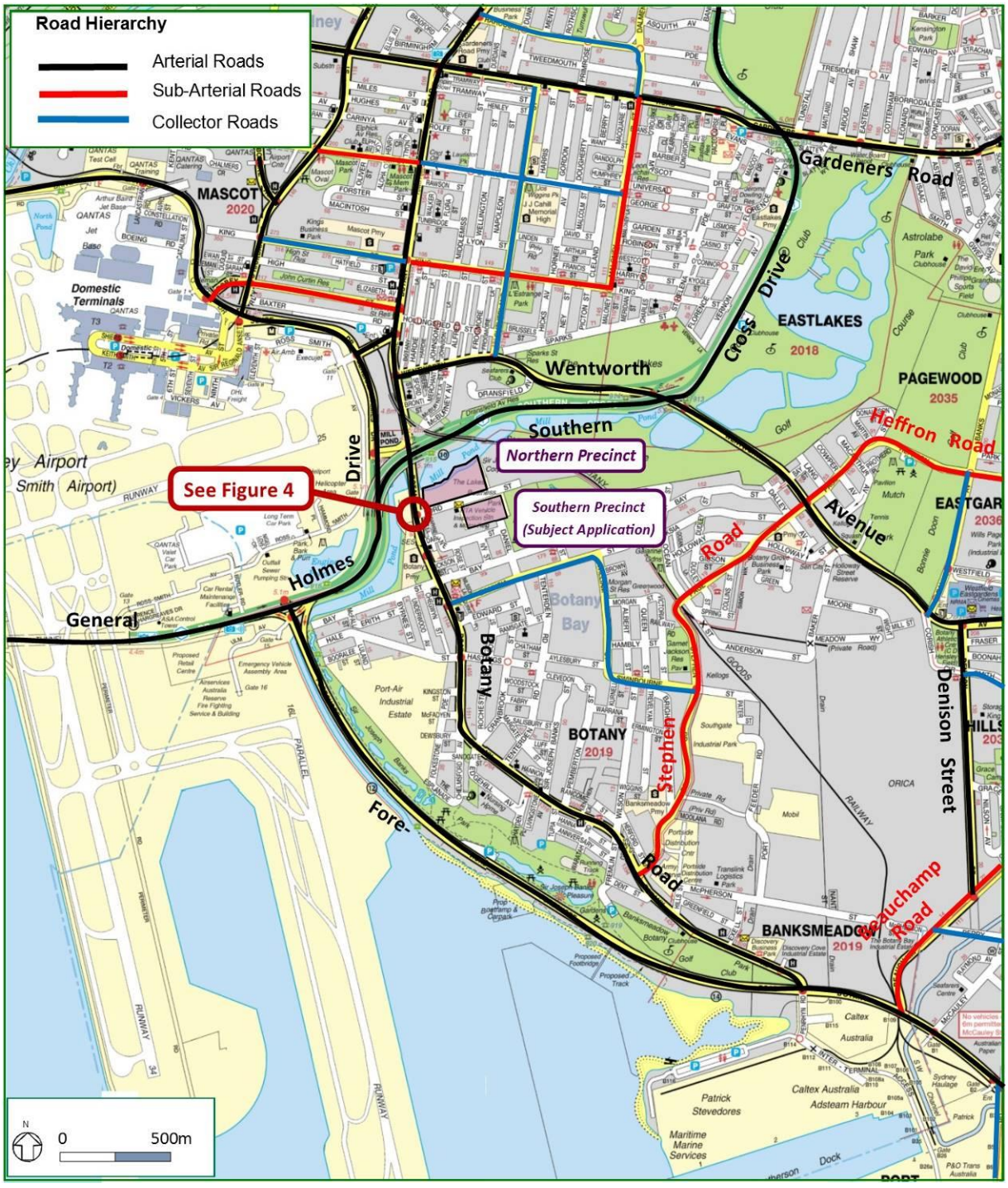


Figure 3: Road Hierarchy

4.2 Key Intersections

The key intersection in the vicinity of the site is shown below and provides an understanding of the existing road geometry and alignment:

Source: Near Map

Figure 4: Intersection of Botany Road and Lord Street

It can be seen from Figure 4 that Botany Road and Lord Street form a signalised T-junction to the west of the site. This intersection permits all turning movements and also allows 'Left Turn on Red after Stopping' on the Lord Street approach. A dedicated pedestrian crossing is provided on the southern approach of Botany Road and on the Lord Street approach.

4.3 Public Transport

The existing bus services that operate in the locality are shown in **Figure 5**. It can be seen from Figure 5 that the closest bus stops are located on Botany Road, approximately 450 metres walking distance (6 minute walk) from the site. These stops service a number of bus routes, namely Sydney Buses Routes 309, 310, L09, M20, X09 and X10, which provide connections to such centres as Mascot Railway Station, Banksmeadow, Redfern, Eastgardens and the Sydney CBD.

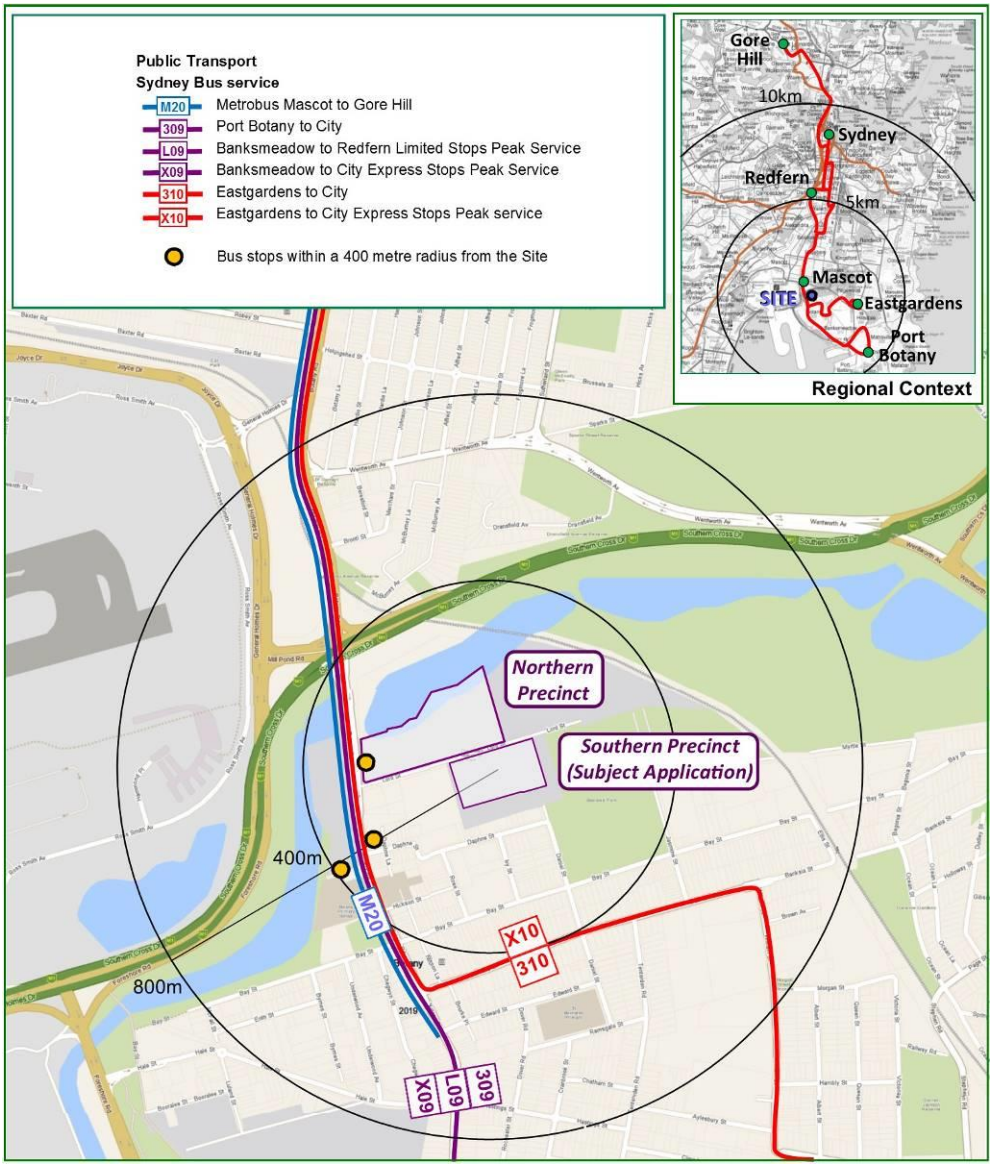


Figure 5: Existing Public Transport Services

4.4 Existing Site Generation

The existing development at the subject site consists of the following:

- 7,905m^2 of office use
- 6,280m^2 of warehouse use
- Approximately 400 car parking spaces for tenants and visitors

TRAFFIX has undertaken traffic surveys of the vehicular access driveways to the subject site, to obtain the traffic generation of the existing development during peak periods. These surveys were undertaken on a typical weekday being Wednesday 1st April 2015, during the following periods:

- 7:00am to 9:00am
- 4:00pm to 6:00pm

The peak hour traffic generation of the existing development was found to be as follows:

- 94 veh/hr (79 in, 15 out), which occurred between 7:45am and 8:45am
- 82 veh/hr (7 in, 75 out), which occurred between 4:45pm and 5:45pm

The above volumes were used to calculate the net increase in traffic generation as a result of the proposed development, which is discussed in further detail in Section 7.

4.5 Existing Intersection Performance

The peak traffic generating periods of the proposed development are expected to occur between 7:00-9:00am (AM) and 4:00-6:00pm (PM). Accordingly, a traffic survey was undertaken of the key intersection in the vicinity of the site, being Botany Road / Lord Street. This survey was undertaken on Wednesday 1st April 2015 during the abovementioned AM and PM peak periods. The results of the surveys were analysed using the SIDRA computer program to determine the intersection performance characteristics, 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:

Level of Service	Average Delay per Vehicle (secs/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 1** below. Reference should also be made to the SIDRA outputs provided in **Appendix A**, which provide detailed results for individual lanes and approaches.

Table 1: Existing Intersection Performance

Intersection Description	Control Type	Period	Degree of Saturation	Average Delay	Level of Service
Botany Road / Lord Street	signals	AM	0.503	10.1	A
		PM	0.463	19.4	**B**

It can be seen from Table 1 that the intersection of Botany Road / Lord Street operates satisfactorily under the existing 'base case' scenario, with Level of Service of A and with acceptable delays, during both the AM peak period. The intersection also operates satisfactorily during the PM peak period, with a Level of Service B and acceptable delays.

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 7.

5. Description of Proposed Subdivision

A detailed description of the proposed development is provided in the Statement of Environmental Effects prepared separately. In summary, the application for which approval is now sought comprises the following components:

- Rezoning of the subject site from B7 Business to Mixed-Use to permit the following development:
    - 658 residential apartments comprising
        - 51 x studio apartments
        - 165 x one bedroom apartments
        - 371 x two bedroom apartments
        - 71 x three bedroom apartments
    - 1,174m^2 GFA of commercial floor space
- Provision of three (3) separate driveways onto Lord Street, comprising a single entry–only driveway, adjacent to the eastern property boundary and two (2) exit-only driveways, which are centrally located.
- Provision of three (3) separate two (2) basement level car parks, as well as at-grade car parking for visitors only, with a total of 1,344 car parking spaces.
- Provision of an at-grade one-way (anti-clockwise) internal road network, which provides access to the following:
    - Basement car parking
    - At-grade service vehicle bays
    - At-grade parallel visitor parking spaces along the internal road network

The parking and traffic impacts arising from the development are discussed in Sections 6 and 7. Reference should be made to the plan submitted separately to Council which is presented at reduced scale in **Appendix B**.

6. Parking Requirements

6.1 Council Controls

Council's DCP 2013 Part 3A requires car parking for mixed-use developments to be determined in accordance with the parking rates outlined in **Table 2** below.

Table 2: DCP Parking Rates and Provision

Type	No. / Area	DCP Parking Rates	DCP Requirement	Spaces Provided
Residential				
studio	51	1 space / unit	1,100	1,182
1 bedroom	165	1 space / unit		
2 bedroom	371	2 spaces / unit		
3 bedroom	71	2 spaces / unit		
visitors	658	1 space / 5 units	132	132
Commercial				
commercial	1,174m^2	1 space / 40m^2 GFA	30	30
		Totals	1,262	1,344

It can be seen from Table 2 that the proposed development requires a minimum of 1,262 car parking spaces comprising 1,100 spaces for residents, 132 spaces for residential visitors and 30 spaces for commercial tenants / visitors. In response, the development proposes a total of 1,344 spaces within three (3) separate basement level car parks and at-grade car parking comprising 1,182 spaces for residents, 132 spaces for residential visitors and 30 spaces for commercial tenants / visitors.

Accordingly, the proposed car parking provision and allocation satisfies the minimum requirements of Council's DCP and is considered acceptable.

6.2 Accessible Car Parking

Council's DCP 2013 Part 3C requires accessible parking to be provided at a rate of 10% of all residential spaces, for residents and a minimum of 1 accessible space, for the commercial use. In this regard, the development requires the provision of a minimum of 118 accessible parking spaces for residents and 1 accessible space for the commercial use.

Accessible parking shall be provided in accordance with the above and designed in accordance with AS 2890.6 (2009) and AS 4299 as appropriate.

6.3 Servicing

Council's DCP 2013 Part 3A requires the development to accommodate on-site waste collection by Council's standard 9.48 metre garbage collection vehicle. In addition, it is noted that Council's DCP 2013 Part 4C requires the development accommodate furniture removalist vehicles, up to and including an 8.8m medium rigid vehicle (MRV).

In response, the development proposes a total of three (3) service vehicle bays at Ground Level, which will be designed to accommodate Council's 9.48 metre garbage collection vehicle (largest vehicle to be accommodated on-site), as demonstrated by the plans included in Appendix A. These bays can be used for both garbage collection, as well as general servicing. In addition, it is noted that service vehicles would be able to utilise vacant at-grade visitor spaces for loading / unloading.

In summary, the proposed three (3) service vehicle bays are considered an acceptable level of provision and will ensure that all garbage collection and general servicing is undertaken on-site, in accordance with Council's DCP. The proposed service vehicle parking arrangements are therefore considered acceptable.

7. Traffic Impacts

7.1 Traffic Generation

7.1.1 Residential

The development falls between a medium-density and high-density residential development noting that it comprises more than 20 apartments and building heights range from 5-8 stories. Accordingly, the applicable peak period traffic generation rates under the RMS *Guide to Traffic Generating Developments* and Technical Direction (TDT 2013/04a) also vary substantially from 0.19 trips / apartment (high density) to approximately 0.5 trips / apartment (medium density).

Having regard for the above, it is considered appropriate to adopt an 'averaged' traffic generation rate of 0.35 trips / apartment, for both the AM and PM peak periods, with this approach being consistent with numerous other traffic studies undertaken by TRAFFIX. It will also ensure that a conservative approach is undertaken in assessing the traffic impacts of the proposed development.

Application of the above traffic generation rate of 0.35 trips / apartment to the proposed 658 apartments and adoption of an 80/20 directional split, results in the following:

- 230 veh/hr (46 in, 184 out), during the AM Peak
- 230 veh/hr (184 in, 46 out), during the PM Peak

7.1.2 Commercial

The RMS Technical Direction (TDT 2013/04a) recommends application of a traffic generation rate of 1.6 trips / 100m^2 GFA and 1.2 trips / 100m^2 GFA, during the AM and PM peak periods respectively, for commercial developments. Application of the above traffic generation rates to the proposed 1,174m^2 GFA and adoption of a 20/80 directional split, results in the following:

- 19 veh/hr (15 in, 4 out), during the AM Peak
- 14 veh/hr (3 in, 11 out), during the PM Peak

7.1.3 Combined Traffic Generation

Having regard for the above, it is evident that the proposed development is expected to generate the following:

- 249 veh/hr (61 in, 188 out), during the AM Peak
- 244 veh/hr (187 in, 57 out), during the PM Peak

The above generation does not however take into account the generation of the existing development as discussed in Section 4.4. Accordingly, the net change in traffic generation as a result of the proposed development would be as follows:

- 155 veh/hr (-18 in, 173 out), during the AM Peak
- 162 veh/hr (180 in, -18 out), during the PM Peak

It is therefore evident that the proposed development is expected to result in a net increase of 155 vehicles per hour during the AM peak period however, this includes a net reduction of 18 vehicle arrivals. It is also evident that the proposed development is expected to result in a net increase of 162 vehicles per hour during the PM peak period however, this includes a net reduction of 18 vehicle departures.

The expected distribution of the above net change in traffic volumes and the impact on the operation of the key intersection of Botany Road / Lord Street is discussed separately below.

7.2 Distribution of Development Traffic

In assessing the expected distribution of the development traffic, a review of the 2011 Journey to Work Data and Botany Road / Lord Street intersection survey results was undertaken. The outcome of this review was that the development traffic is expected to be distributed as follows:

Residential

- AM & PM Peaks: 75% expected to arrive from / depart to the north along Botany Road
  25% expected to arrive from / depart to the south along Botany Road

Commercial

- AM & PM Peaks: 80% expected to arrive from / depart to the north along Botany Road
  20% expected to arrive from / depart to the south along Botany Road

The expected net change in traffic volumes as a result of the proposed development was then distributed as per the above and analysed using SIDRA, as discussed below.

7.3 Peak Period Intersection Performances

As discussed above, the expected net change in traffic volumes as a result of the proposed development was distributed as per the above and analysed using SIDRA, with a summary of the modelling results provided in **Table 3** below. Reference should also be made to the detailed SIDRA outputs which are provided in Appendix A.

Table 3: Intersection Performances - Existing & Future Scenario

Intersection Description	Scenario	Control Type	Period	Degree of Saturation	Average Delay	Level of Service
Botany Road / Lord Street	existing	signals	AM	0.503	10.1	A
	existing + development	signals	AM	0.521	15.2	B
	existing	signals	PM	0.463	19.4	B
	existing + development	signals	PM	0.488	18.6	B

It can be seen from Table 3 that the proposed development will have a minimal impact on the operation of the key intersection of Botany Road / Lord Street during the AM peak period, with only minor increases to intersection delays and the degree of saturation. Whilst the Level of Service will change from A to B, this level of performance is still considered good under the RMS Guidelines, noting that it operates with acceptable delays and has spare capacity to accommodate additional volumes.

It is also evident that the proposed development will have a minimal impact on the operation of the Botany Road / Lord Street intersection during the PM peak period, with only a minor increase to the degree of saturation and no change to the existing Level of Service B. It will however, result in a slight reduction in average delays, as a result of the reduction in the number of vehicles exiting the site and being required to queue on the Lord Street intersection approach.

Accordingly, the traffic impacts of the proposed development will be accommodated by the existing intersection arrangements, with no external improvements required. The traffic impacts of the development are therefore considered acceptable.

8. Access & Internal Design Aspects

8.1 Access

The development nominally requires a Category 4 Driveway under AS 2890.1 (2004) being separate entry-only and exit-only driveways of 6.0 to 8.0 metres in width, with a 1.0 to 3.0 metre wide separating median. In response, the development proposes three (3) separate driveways onto Lord Street comprising a single entry-only driveway adjacent to the eastern property boundary and two (2) exit-only driveways which are centrally located. Given that all entry and exit movements will occur to the west of the site via Botany Road, multi-lane entry-only and exit-only driveways are not required and hence, it is proposed that each driveway be provided with only a single lane.

Having regard for the above, it is proposed that the entry-only driveway be provided with a width of 6.0 metres and the exit-only driveways be provided with a width of 4.0 metres. These entry and exit widths are sufficient to accommodate Council's standard 9.48 metre garbage collection vehicle and are considered to comply with the requirements of AS 2890.1 (2004), having regard for the above.

8.2 Internal Design

The internal traffic circulation, car parking and loading arrangements of the development shall comply with the requirements of AS 2890.1 (2004), AS 2890.2 (2002) and AS 2890.6 (2009). The following characteristics are considered noteworthy:

8.2.1 Parking Modules

- All angled car parking spaces shall be designed in accordance with a Class 1A User being 2.4 metres wide, 5.4 metres long and provided with a an aisle width of 5.8m.
- All parallel parking spaces shall be designed in accordance with Figure 2.5 of AS 2890.1 (2004).
- All disabled parking spaces shall be designed in accordance with either AS 2890.6 or AS 4299.

- All spaces located adjacent to obstructions of greater than 150mm in height shall be provided with an additional width of 300mm.

- Dead-end aisles shall be provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.

8.2.2 Ramps

- All ramps shall be provided in accordance with the requirements of both AS 2890.1 (2004) and AS 2890.2 (2002) as appropriate.

8.2.3 Internal Road Network

- The one-way internal road network shall be provided with a minimum width of 3.5 metres in accordance with AS 2890.2 (2002).

- The dimensions of all at-grade parallel car parking spaces and service vehicle bays along the internal road network shall be provided in accordance with AS 2890.1 (2004) and AS 2890.2 (2002) as appropriate.

8.2.4 Clear Head heights

- A minimum clear head height of 2.2m shall be provided for all areas within the basement car parks as required by AS 2890.1 (2004).

- A clear head height of 2.5m shall be provided above all disabled spaces and shared areas as required by AS 2890.6 (2009).

8.2.5 Other Considerations

- All columns shall be located outside of the parking space design envelope shown in Figure 5.2 of AS 2890.1 (2004).

- Appropriate visual splays shall be provided in accordance with the requirements of Figure 3.3 of AS 2890.1 (2004) at the exit-only driveways.

8.2.6 Service Area Design

- The internal design of the service area shall be designed in accordance with the requirements of AS 2890.2 (2002), for a 12.5 metre heavy rigid vehicle.

- A minimum clear head height of 4.5m shall be provided above all areas to be traversed by service vehicles.

In summary the internal configuration of the traffic circulation, car parking and loading arrangements of the development shall comply with the requirements of AS 2890.1 (2004), AS 2890.2 (2002) and AS 2890.6 (2009).

9. Conclusions

In summary:

- The subject application proposes rezoning of the subject site from B7 Business to Mixed-Use, to permit a 658 residential apartment and 1,174m^2 GFA commercial development.

- The traffic generation arising from the proposed development has been assessed as a net increase of 155 veh/hr and 162 veh/hr, during the AM and PM peak periods respectively. SIDRA modelling has been undertaken of the key intersection of Botany Road / Lord Street, with the results demonstrating that these additional trips will result in only minor increases in intersection delays and the degree of saturation during both peak periods. The additional traffic volumes will not result in any change to the existing Level of Service B during the PM peak period however, the Level of Service will change from A to B during the AM peak period. Notwithstanding, this level of performance is still considered good under the RMS Guidelines, noting that it operates with acceptable delays and has spare capacity to accommodate additional volumes. Accordingly, the additional vehicle trips resulting from the proposed development can be readily accommodated, with no external improvements required. The traffic impacts of the development are therefore considered acceptable.

- Council's DCP 2013 requires the development to provide a minimum of 1,262 car parking spaces. In response, the development proposes a total of 1,344 spaces comprising three (3) basement levels of car parking, as well as at-grade car parking for visitors. Accordingly, the proposed car parking provision and allocation satisfies the requirements of Council's DCP and is considered acceptable.

- The proposed access and internal car parking arrangements shall satisfy the requirements of AS 2890.1, AS 2890.2 and AS 4299 and will provide a satisfactory standard of safety and efficiency.

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

Appendix A

SIDRA Results

Appendix A-1

SIDRA Results - Existing

MOVEMENT SUMMARY

Site: Botany Rd x Lord St EX - AM Peak

Scenario: Existing
Period: AM Peak
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Botany Rd											
2	T1	1028	3.8	0.381	4.7	LOS A	10.5	75.6	0.35	0.31	43.2
3	R2	87	1.2	0.286	12.6	LOS A	1.5	10.3	0.54	0.68	38.9
Approach		1116	3.6	0.381	5.3	LOS A	10.5	75.6	0.36	0.34	42.6
East: Lord St											
4	L2	37	0.0	0.243	32.1	LOS C	2.5	17.6	0.89	0.75	29.3
6	R2	89	4.7	0.243	47.6	LOS D	3.1	22.8	0.92	0.75	26.9
Approach		126	3.3	0.243	43.1	LOS D	3.1	22.8	0.91	0.75	27.5
North: Botany Rd											
7	L2	494	0.6	0.503	12.5	LOS A	16.9	120.2	0.48	0.64	41.2
8	T1	803	5.4	0.503	10.0	LOS A	18.2	133.2	0.53	0.53	36.8
Approach		1297	3.6	0.503	11.0	LOS A	18.2	133.2	0.51	0.57	39.0
All Vehicles		2539	3.6	0.503	10.1	LOS A	18.2	133.2	0.47	0.48	39.1

Level of Service (LOS) Method: Delay (RTA NSW).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	10.4	LOS B	0.1	0.1	0.42	0.42
All Pedestrians		105	32.4	LOS D			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: Botany Rd x Lord St EX - PM Peak

Scenario: Existing
Period: PM Peak
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Botany Rd											
2	T1	1006	2.7	0.463	13.8	LOS A	17.0	121.5	0.59	0.52	34.3
3	R2	31	0.0	0.112	24.9	LOS B	1.0	7.3	0.60	0.68	32.2
Approach		1037	2.6	0.463	14.1	LOS A	17.0	121.5	0.59	0.53	34.2
East: Lord St											
4	L2	43	0.0	0.455	41.4	LOS C	11.8	82.3	0.86	0.83	26.2
6	R2	466	0.0	0.455	41.3	LOS C	12.0	84.1	0.86	0.81	28.7
Approach		509	0.0	0.455	41.3	LOS C	12.0	84.1	0.86	0.81	28.5
North: Botany Rd											
7	L2	64	0.0	0.444	18.0	LOS B	15.7	111.8	0.58	0.56	39.6
8	T1	957	2.5	0.444	13.7	LOS A	16.0	114.4	0.59	0.54	34.1
Approach		1021	2.4	0.444	13.9	LOS A	16.0	114.4	0.59	0.54	34.7
All Vehicles		2567	2.0	0.463	19.4	LOS B	17.0	121.5	0.64	0.59	32.4

Level of Service (LOS) Method: Delay (RTA NSW).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	40.1	LOS E	0.1	0.1	0.82	0.82
P2	East Full Crossing	53	14.0	LOS B	0.1	0.1	0.48	0.48
All Pedestrians		105	27.1	LOS C			0.65	0.65

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

Appendix A-2

SIDRA Results – Existing + Development

MOVEMENT SUMMARY

Site: Botany Rd x Lord St EX + DEV - AM Peak

Scenario: Existing + Development (658 Residential Units & 1,174m2 GFA of Commercial)
Period: AM Peak
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Botany Rd											
2	T1	1028	3.8	0.518	11.9	LOS A	19.6	141.4	0.55	0.50	35.8
3	R2	91	1.2	0.444	29.6	LOS C	3.8	26.8	0.72	0.76	30.3
Approach		1119	3.6	0.518	13.4	LOS A	19.6	141.4	0.57	0.52	35.0
East: Lord St											
4	L2	82	0.0	0.306	30.4	LOS C	5.5	39.0	0.83	0.81	29.9
6	R2	227	1.9	0.306	38.3	LOS C	7.0	49.7	0.84	0.78	29.6
Approach		309	1.4	0.306	36.2	LOS C	7.0	49.7	0.84	0.79	29.6
North: Botany Rd											
7	L2	473	0.7	0.521	11.8	LOS A	15.5	110.2	0.54	0.66	41.6
8	T1	803	5.4	0.521	11.5	LOS A	19.6	143.3	0.58	0.56	35.5
Approach		1276	3.6	0.521	11.6	LOS A	19.6	143.3	0.56	0.60	38.5
All Vehicles		2704	3.4	0.521	15.2	LOS B	19.6	143.3	0.60	0.59	35.5

Level of Service (LOS) Method: Delay (RTA NSW).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	43.4	LOS E	0.2	0.2	0.85	0.85
P2	East Full Crossing	53	12.2	LOS B	0.1	0.1	0.45	0.45
All Pedestrians		105	27.8	LOS C			0.65	0.65

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: Botany Rd x Lord St EX + DEV - PM Peak

Scenario: Existing + Development (658 Residential Units & 1,174m2 GFA of Commercial)
Period: PM Peak
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Botany Rd											
2	T1	1006	2.7	0.488	12.2	LOS A	18.1	130.0	0.56	0.50	35.5
3	R2	78	0.0	0.327	27.1	LOS B	3.0	20.9	0.67	0.73	31.3
Approach		1084	2.5	0.488	13.3	LOS A	18.1	130.0	0.56	0.51	35.0
East: Lord St											
4	L2	51	0.0	0.478	43.6	LOS D	11.6	81.5	0.88	0.84	25.6
6	R2	441	0.0	0.478	43.7	LOS D	12.0	83.7	0.88	0.82	28.0
Approach		492	0.0	0.478	43.7	LOS D	12.0	83.7	0.88	0.82	27.8
North: Botany Rd											
7	L2	207	0.0	0.485	15.8	LOS B	16.8	118.9	0.57	0.60	40.3
8	T1	957	2.5	0.485	12.2	LOS A	18.0	128.6	0.58	0.56	35.0
Approach		1164	2.1	0.485	12.8	LOS A	18.0	128.6	0.58	0.56	36.4
All Vehicles		2740	1.9	0.488	18.6	LOS B	18.1	130.0	0.63	0.59	33.2

Level of Service (LOS) Method: Delay (RTA NSW).
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.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	42.6	LOS E	0.2	0.2	0.84	0.84
P2	East Full Crossing	53	12.6	LOS B	0.1	0.1	0.46	0.46
All Pedestrians		105	27.6	LOS C			0.65	0.65

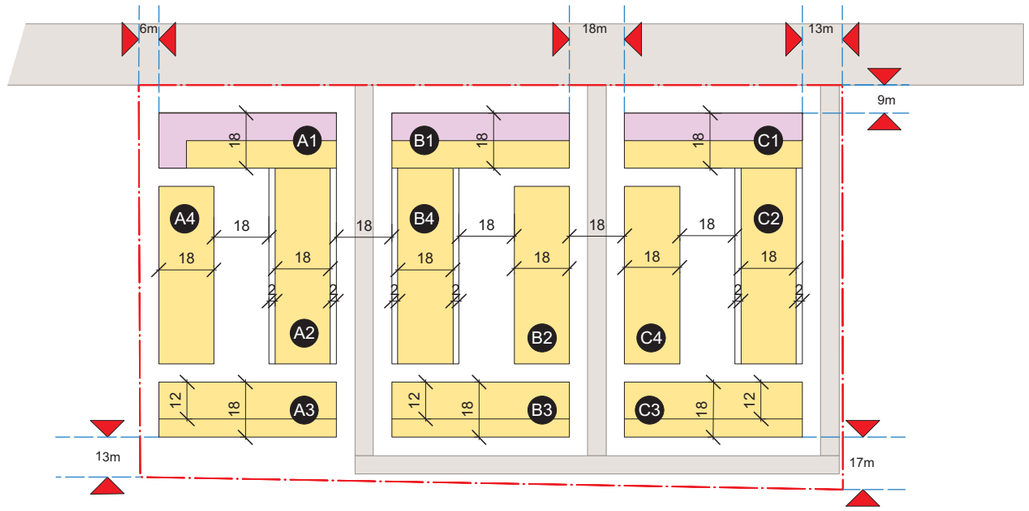
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix B

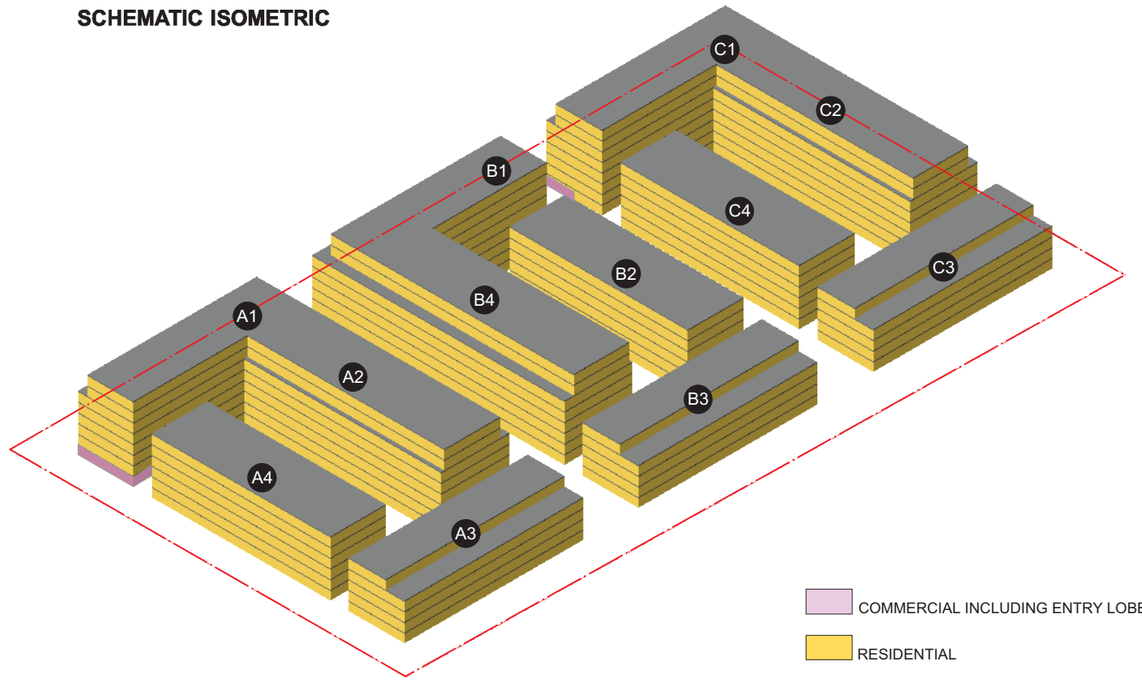
Reduced Plans

PLANNING PROPOSAL MASTERPLAN (12/05/2015)

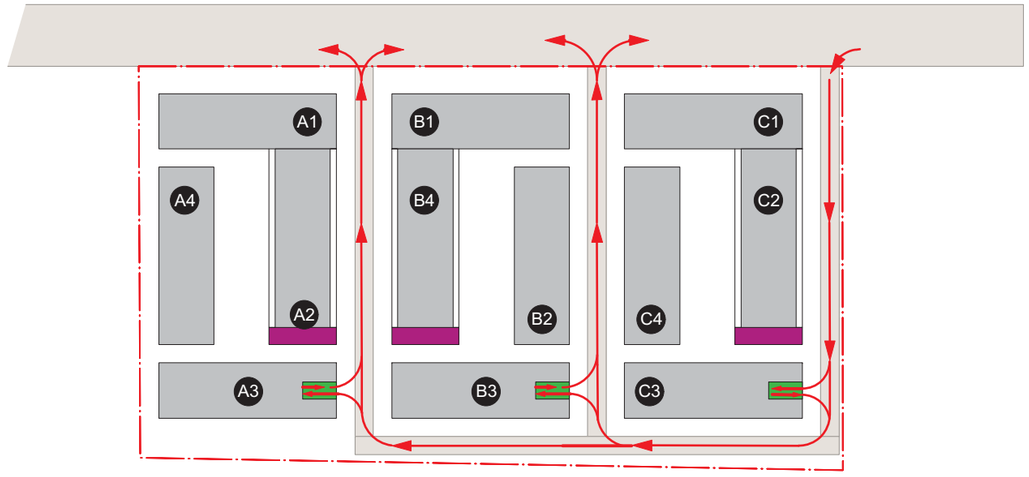
SCHEMATIC CONCEPT PLAN



SCHEMATIC ISOMETRIC



VEHICULAR CIRCULATION DIAGRAM



MASTERPLAN DETAILS

TOTAL GFA: 62,912 m^2

SITE AREA: 29,770 m^2

FSR: 2.11:1

NOTES

- MIXED USE
- CASA HEIGHT COMPLIANT
- BUILDING HEIGHTS COMPLY WITH MAX RL=AHD 33.00

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LAKES BUSINESS PARK SOUTH PRECINCT

DEXUS

PLANNING PROPOSAL MASTERPLAN

DWG NO.	**SK_002**
PROJECT No.	**1503**
PLOT DATE	**12/5/15**
SCALE	**1:2000 @ A3**

PLANNING PROPOSAL MASTERPLAN (12/05/2015)

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SOUTH PRECINCT

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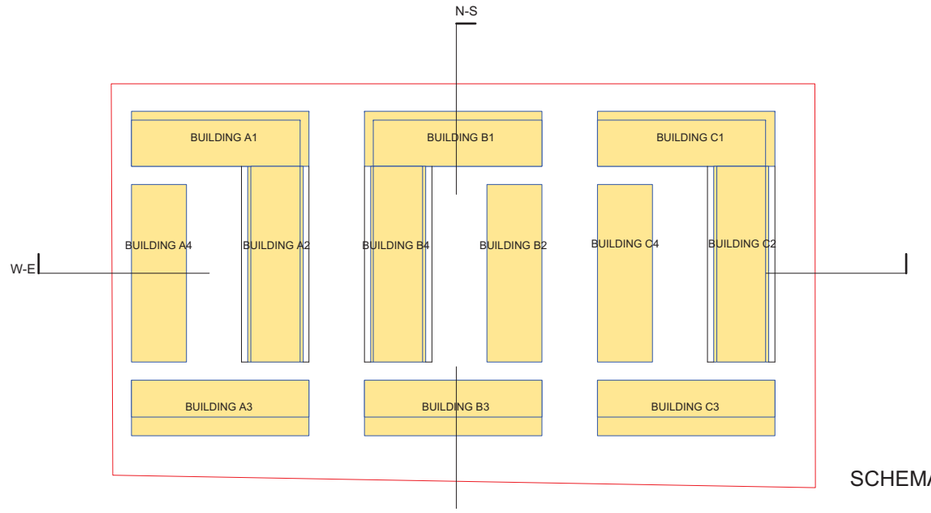
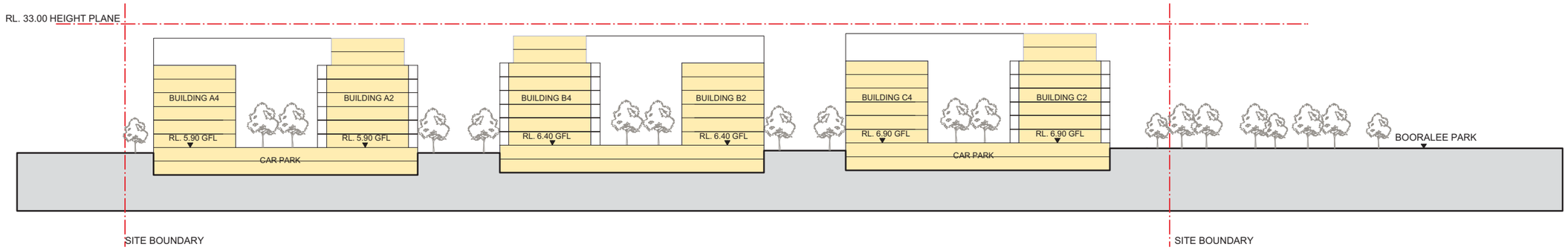
GROUND FLOOR PLAN

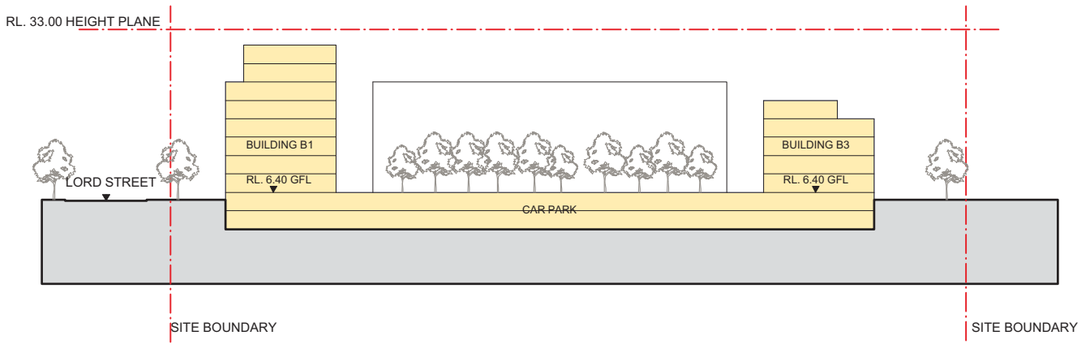
DWG NO.	**SK_003**
PROJECT No.	**1503**
PLOT DATE	**12/5/15**
SCALE	**1:1000**

PLANNING PROPOSAL MASTERPLAN (12/05/2015)



SCHEMATIC PLAN 1:2000





SECTION NORTH-SOUTH 1:1000

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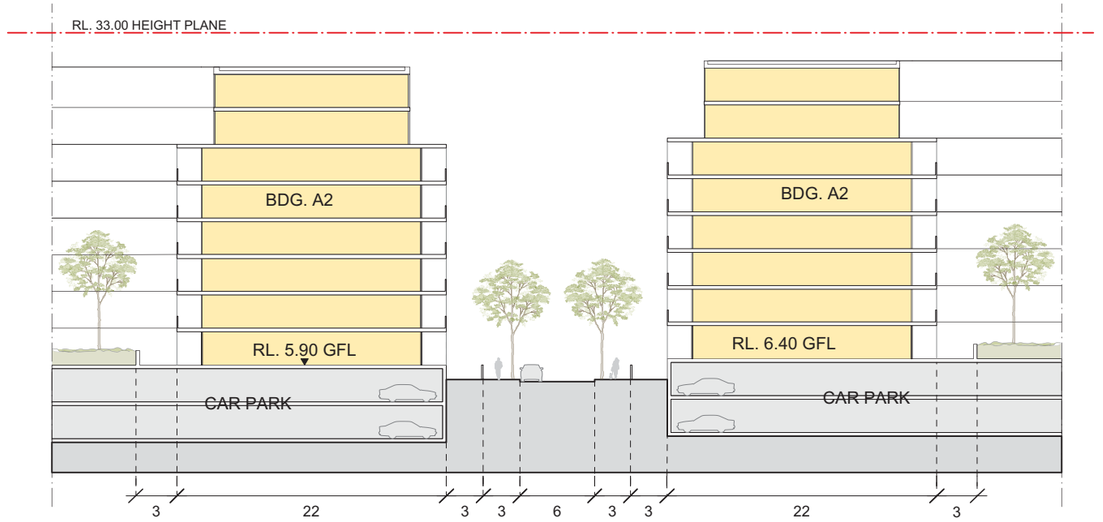
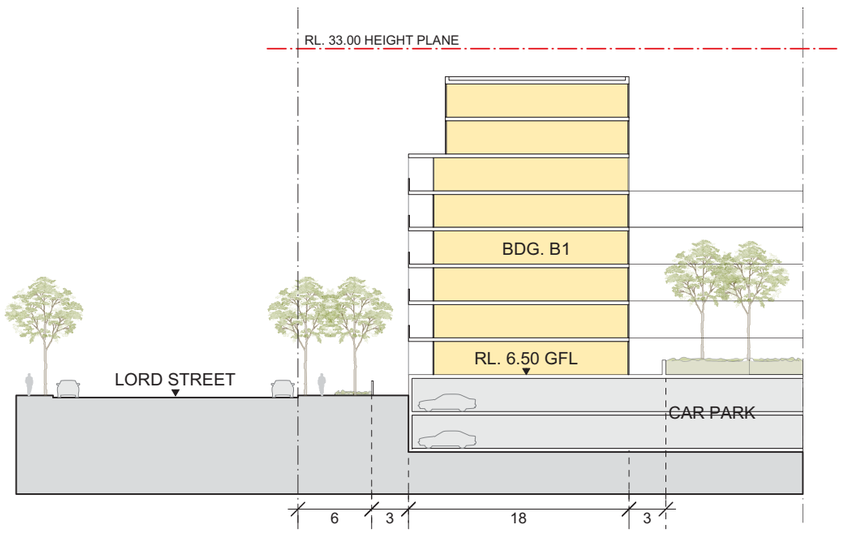
SECTIONS

DWG NO.	**SK_005**
PROJECT No.	**1503**
PLOT DATE	**12/5/15**
SCALE	**1:1000 @ A3**

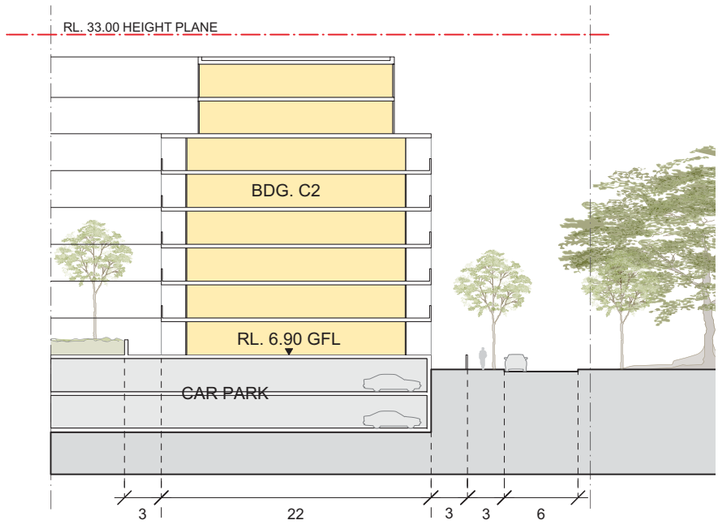
PLANNING PROPOSAL MASTERPLAN(12/05/2015)



SECTION WEST-EAST ON INTERNAL STREET



SECTION NORTH-SOUTH ON LORD STREET



SECTION WEST-EAST BETWEEN PROPOSED SCHEME AND BOORALEE PARK

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TYPICAL STREET SECTIONS

DWG NO.	**SK_006**
PROJECT No.	**1503**
PLOT DATE	**12/5/15**
SCALE	**1:500 @ A3**