TRAFFIC & PARKING ASSESSMENT

21-23 LEXINGTON DRIVE, BELLA VISTA - PLANNING PROPOSAL

PREPARED FOR CAPITAL CORPORATION

5 June 2020

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Capital Corporation

21-23 Lexington Drive, Bella Vista - Planning Proposal

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. Introduction

1.1 Background

Stantec has been engaged by Capital Corporation to prepare a Traffic & Parking Assessment which will be submitted as part of a Planning Proposal to The Hills Shire Council for the construction of a mixed-use development at 21-23 Lexington Drive, Bella Vista.

The development will have a total gross floor area (GFA) of 27,692m^2, comprising commercial/office spaces (23,541m^2), food and beverage premises (800m^2), gymnasium (251m^2) and serviced apartments (3,100m^2).

The development proposes to provide 635 parking spaces over five (5) levels.

It is noted that a Development Application has been submitted for this development which adopts the parking rates stipulated in The Hills Development Control Plan (DCP). This report has been prepared to address the Planning Proposal which proposes a reduced parking rate for office of 1 per 40 m^2 GFA.

1.2 Site Location

The subject site is located at 21-23 Lexington Drive, Bella Vista. The site location is shown in **Figure 1-1**.

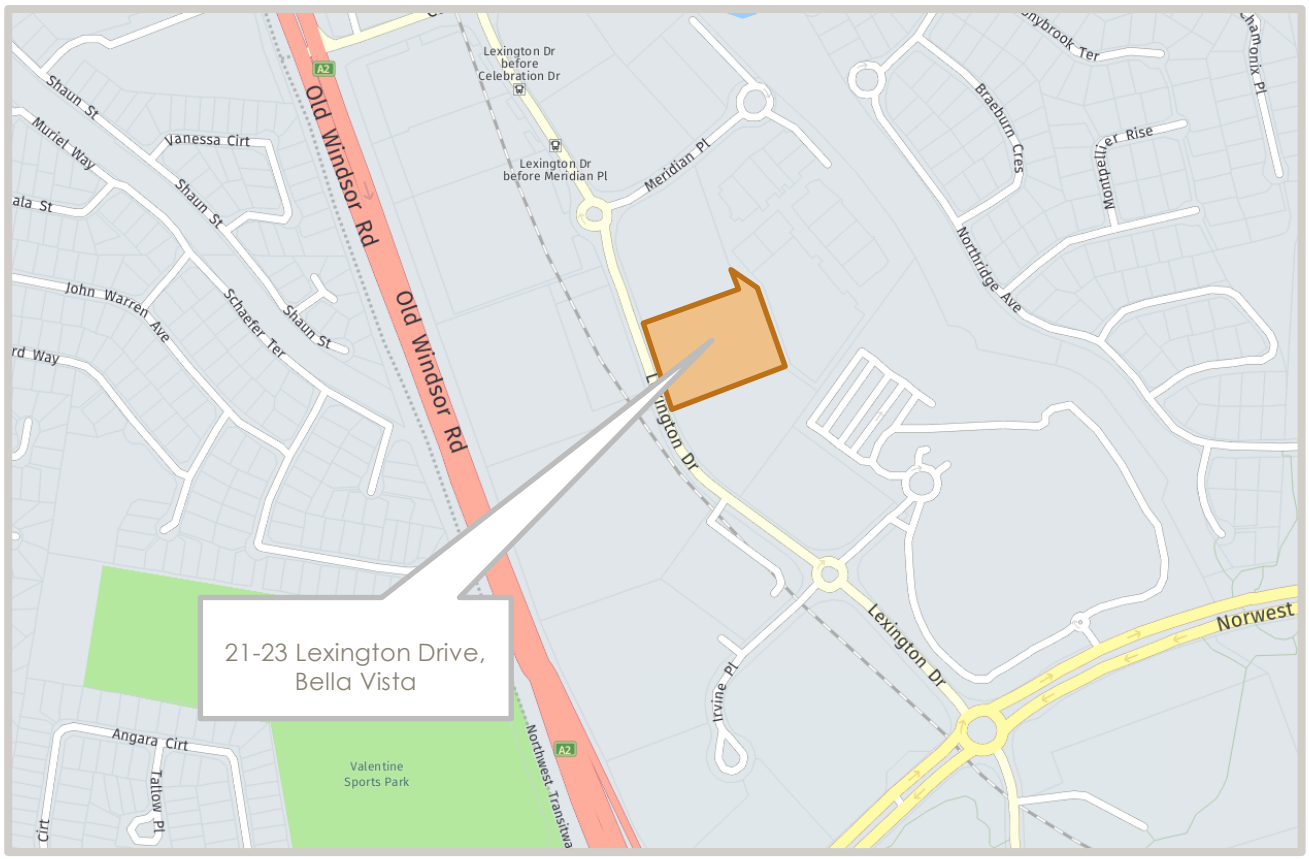

Figure 1-1: Site Location (Source: HERE WeGo)

The site is currently undeveloped and has a frontage onto Lexington Drive. An accessway is currently provided along its southern boundary which belongs to the subject property. However, this accessway is currently subject to a Right of Way (RoW) shared with 13-19 Lexington Drive, Bella Vista.

1.3 Site Context

Figure 1-2 below shows the land use zoning of the subject site in the context of adjacent sites and the surrounding area.

The site is located within a B7 Business Park Zone, with the land uses in the immediate vicinity of the site also within the zone. The zoning controls further out vary as follows:

- The Bella Vista Farm to the south-east of the site is zoned RE1 (Public Recreation); and
- The land to the east of the site is zoned R2 (Low Density Residential). Similar zoning applies to the land to the west of Old Windsor Road.

Council's *Local Environment Plan 2012* (LEP) lists the following relevant land uses that are permitted with consent in a B7 Business Park Zone, among other uses:

- Business premises;
- Food and drink premises;
- Office premises;
- Recreation facility (indoor); and
- Serviced apartments.

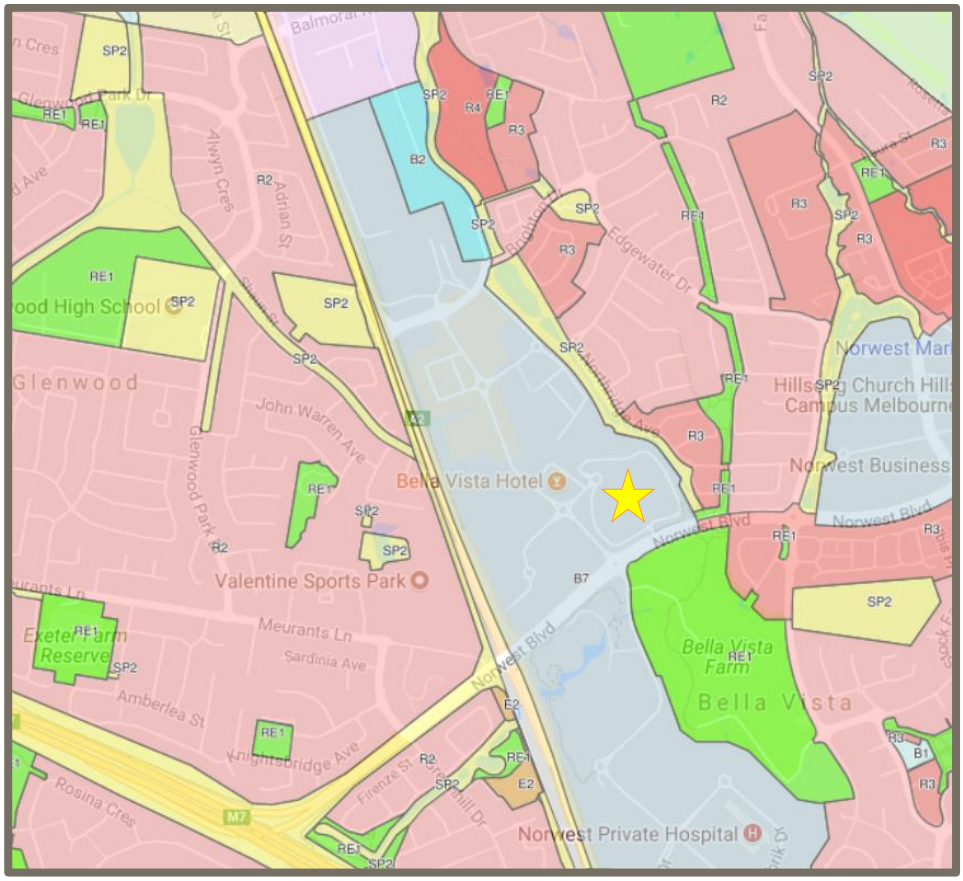

Figure 1-2: Land Zoning (Source: NSW Government ePlanning Spatial Viewer)

1.4 Scope of Report

This report includes an analysis of the capacity of the existing road network to accommodate the traffic generated by the proposed development.

The assessment documented in this report is based on on-site observations, aerial photography and surveys undertaken in the vicinity of the site.

2. Existing Road and Transport Network

2.1 Road Network

Vehicles accessing the site will generally approach the site via Norwest Boulevard or Celebration Drive, with some vehicles approaching from the south along Elizabeth MacArthur Drive. Old Windsor Road lies to the west of the site, and is grade separated at Norwest Boulevard.

Lexington Drive is a local road under the care and management of Council. It runs in a northwest to southeast alignment in the vicinity of the site and connects Celebration Drive in the north to Norwest Boulevarde to the south. Lexington Drive has a carriageway width of approximately 11 metres in the vicinity of the site, accommodating one lane of traffic in each direction, and kerbside parallel parking on either side of the road. Lexington Drive has a posted speed limit of 50 km/h. Lexington Drive is controlled by roundabouts at its intersections with Norwest Boulevarde, Woolworth Way and Meridian Place.

Celebration Drive is a local road under the care and management of Council. It runs in an east-west alignment at the northern end of Lexington Drive, at which the intersection has recently been upgraded to a signalised intersection. Celebration Drive forms another signalised intersection with Old Windsor Road and the North-West T-way at its western terminus. Celebration Drive has a posted speed limit of 50 km/hr and provides access to the Bella Vista Metro Station.

Norwest Boulevard is under the care and management of Transport for NSW (previously RMS). It runs in an east-west alignment at the southern end of Lexington Drive. The intersection is controlled by a signalised roundabout. At Old Windsor Road, Norwest Boulevard forms a raised interchange with Old Windsor Road, allowing all turning movements without disruption to through vehicles on Old Windsor Road.

2.2 Crash History Analysis

A search of Transport for New South Wales' (TfNSW) Crash and Casualty Statistics database has been undertaken for the most recent five-year period of available data, from 2014 to 2018. Crash statistics are confined to crashes that conform to the national guidelines for reporting and classifying road vehicle crashes. The guidelines include crashes that meet the following criteria:

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

The search area comprised Lexington Drive from Meridian Place to Norwest Boulevard, inclusive of the intersections at the end of this section of Lexington Drive.

Figure 2-1 shows the locations of the crashes that meet the above criteria, relative to the subject site.

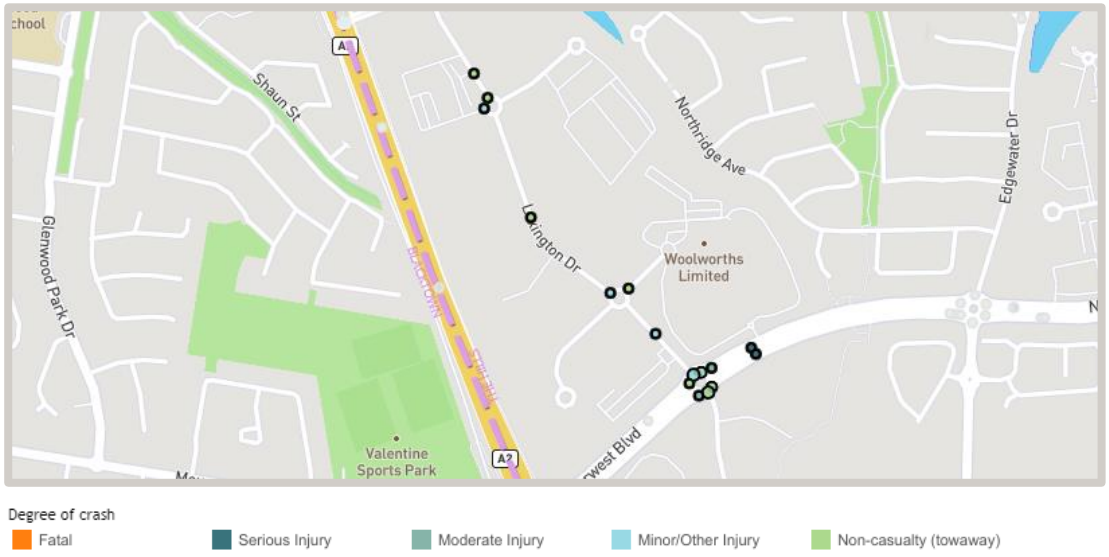

Figure 2-1: Crash Data (Source: TfNSW Centre for Road Safety)

A total of 22 crashes were recorded within the study area during the reporting period. These crashes are summarised as follows:

- 20 crashes occurred at one of the three roundabouts within the search area;
- Only one crash was recorded involving a vehicle leaving an access driveway;
- 13 crashes occurred at the Norwest Boulevard / Lexington Drive roundabout;
- Nine crashes resulted in no casualties;
- Six crashes resulted in a minor injury;
- Four crashes resulted in a moderate injury;
- Three crashes resulted in a serious injury; and
- No crashes resulted in a fatality.

2.3 Sustainable Transport

2.3.1 Sydney Metro

The Bella Vista Metro Station is located approximately 550 metres walking distance to the north of the site. The station serves the Sydney Metro Northwest line, which runs from Tallawong Station in the north west to Chatswood toward the south east. The line will eventually connect to the City and Southwest lines, understood to be operational in 2024. The Metro connects with the Sydney Rail Network via interchanges at both Epping and Chatswood. **Figure 2-2** shows the route of the Sydney Metro Northwest line:

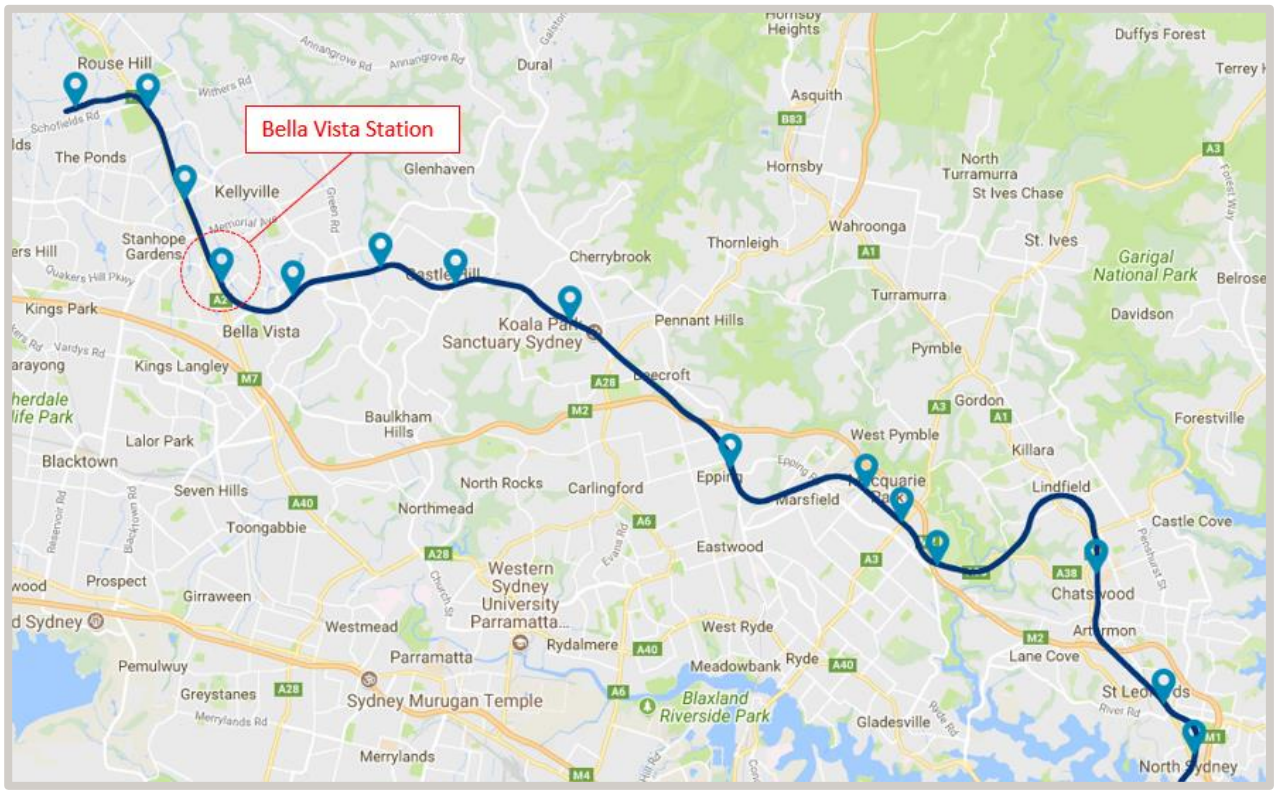

Figure 2-2: Sydney Metro Norwest Line

Key features of the Bella Vista Metro Station include:

- 800 commuter parking spaces;
- Bicycle parking and storage for 35 bicycles;
- 24 motorcycle spaces;
- Kiss and ride bays;
- A dedicated taxi rank; and
- Bus stops along Mawson Avenue directly in front of the station at the ground level.

2.3.2 Buses

The following bus routes that operate in the vicinity of the site are also illustrated in **Figure 2-3**:

- **Route 602X** – Bella Vista Station to North Sydney;
- **Route 607X** – Bella Vista Station to City QVB;
- **Route 607N** – Tallawong Station to City QVB via North West T-Way and M2 (Night service);
- **Route 664** – Rouse Hill Station to Parramatta via Kellyville;
- **Route 715** – Rouse Hill Station to Seven Hills via Kellyville and Norwest; and
- **Route 745** – Norwest Hospital to St Marys via Stanhope Gardens (**Figure 2-4**).

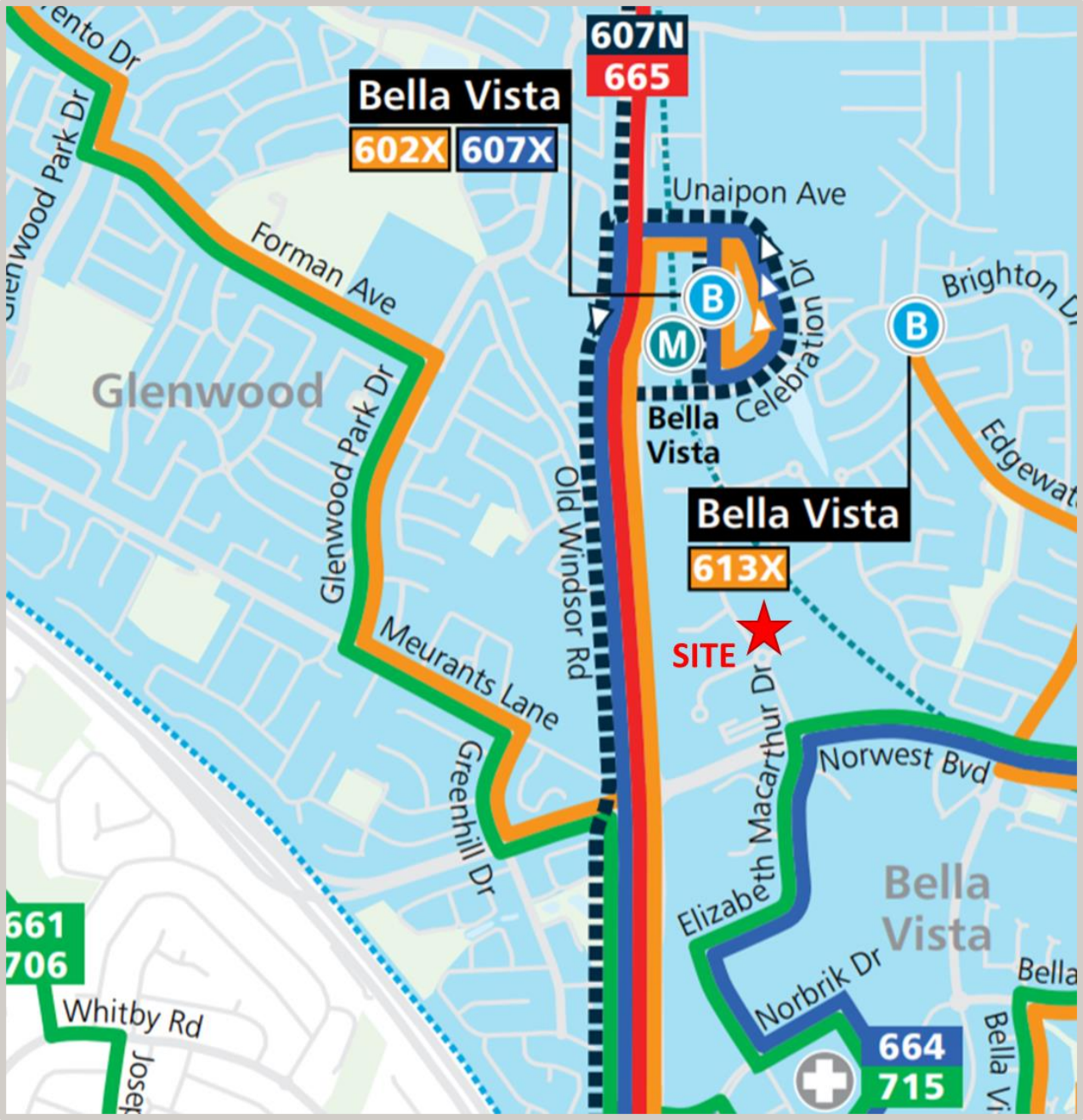

Figure 2-3: Bus Services Operating in Vicinity of Site

The site also lies within the metro-connect on demand area, which operates as follows:

- Patrons download an app and order an on-demand bus service which takes them from a virtual stop within the service to one of three metro stations (Bella Vista, Norwest or Hills Showground);

- The service operates between Monday to Friday from 6:00am to 10:00am, and from 4:00pm to 9:00pm; and
- The service is cheap, starting at just over $2 for a standard fare or just over $1 for a concession holder.

The metro-connect on demand area is shaded in light blue in **Figure 2-3**.

The closest bus stops are located on Lexington Drive along the site frontage, and services the 745 route illustrated in **Figure 2-4**.

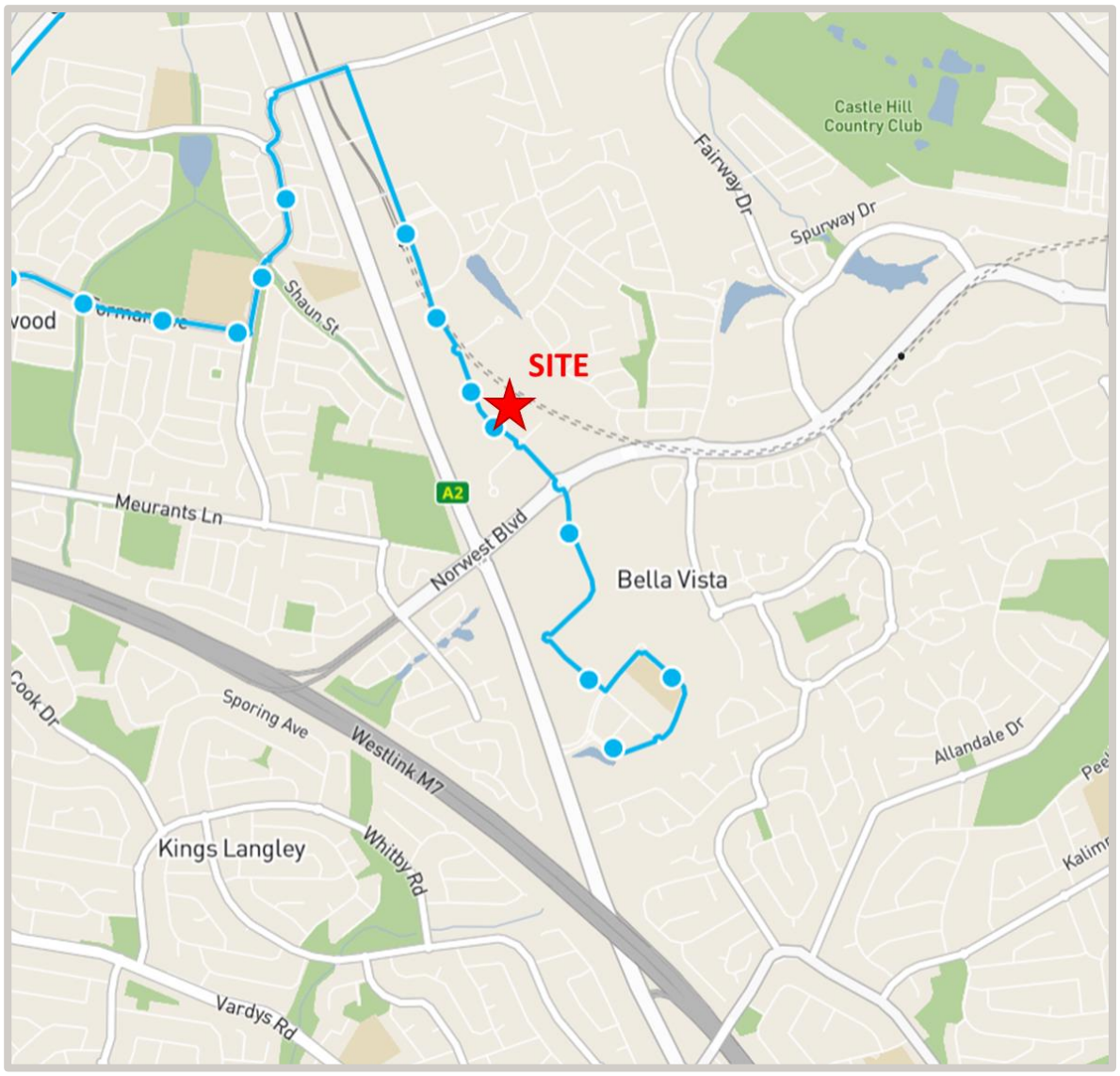

Figure 2-4: Bus Route 745

Bus stops are located on both sides of Norwest Boulevard to the southeast of the site, an approximate 300 metre walking distance from the site. The bus stops accessed by the buses servicing the Bella Vista Metro Station access the bus stops located within the station, approximately 550 metres walking distance from the site.

The timetables for each of these routes are constantly being reviewed, however it is understood that each of these services (except for the 607N night service) operate with regularity during both the AM and PM peak hours during the week.

The North West T-Way operates along the western side of Old Windsor Road, crossing to the eastern side to the north of Celebration Drive. The nearest T-Way bus stop to the site is located approximately 700 metres walking distance, opposite Celebration Drive.

2.3.3 Walking and Cycling

Pedestrian footpaths are located along both sides of Lexington Drive (**Figure 2-5**), Woolworths Way and Norwest Boulevard. No dedicated cycling paths are currently provided within the immediate vicinity of the site, however there is a shared path which runs along the eastern side of Old Windsor Road.

Figure 2-5: Pedestrian Footpath along Lexington Drive

3. Parking Assessment

3.1 Development Proposal

The proposal involves the construction of a 10-storey mixed-use development at 21-23 Lexington Drive, Bella Vista with a Gross Floor Area (GFA) of 27,692m^2. A breakdown of the proposed land uses is summarised in **Table 3-1.**

Table 3-1: Proposed Development Schedule

Land Use	Proposed GFA (m^2)	Notes
Commercial	23,541	
Food and beverage	800	Open to public
Serviced Apartments	3,100	58 units + 4 staff[1]
Gymnasium	251	Open to public
Total	**27,692**	

The development proposes to provide 635 car parking spaces within five (5) levels. Bicycle parking areas and end of trip facilities will also be provided.

Vehicular access into the site will be via two drive-way crossovers along Lexington Drive. The northern driveway will provide direct access to the Ground Floor, whilst the southern driveway will provide access to Level 1 car park level. The existing southern driveway is a designated Right of Way (ROW) with the adjacent development, 13-19 Lexington Drive.

The architectural plans are provided for reference in **Appendix A.**

3.2 Parking Requirements & Provisions

3.2.1 Car Parking Requirement & Provision

The following rates have been adopted to calculate the car parking requirements:

- **Commercial** – one space per 40m^2 of GFA;
- **Food & Beverage** – one space per 40m^2 GFA;
- **Serviced apartments**– one space per employee, plus one space per unit; and
- **Gymnasium** – one space per 40m^2 of GFA.

The reduced parking rate for the office, food & beverage and gymnasium is considered to be appropriate for the following reasons:

- The proximity of the site to the Bella Vista Metro Station is approximately 550m walking distance. This is well within the walking catchment for a rail station, typically 800m;
- The recommended rate for commercial premises is 1 space per 40m^2 GFA (Bella Vista Station Precinct Recommended Development Control Plan Amendments – The Hills);
- Over the next few years, with the level of potential growth in commercial, retail and residential developments within the Norwest Business Park and more particularly the Circa and Bella Vista Precincts following recent completion of Sydney Metro's Norwest line, the area will become considerably larger;

[1] It has been assumed that four staff will be sufficient to serve the needs to 58 serviced apartment units.

- A parking rate of 1 space per 25m^2 GFA will not encourage a mode shift away from private vehicles. It is important to encourage more sustainable modes of transport to and from the site; and
- A Green Travel Plan and Transport Access Guide has been prepared to highlight the alternative travel mode options available to new employees, visitors and guests of the development, with the aim to achieve sustainable travel mode shifts (see **Appendix B**).

Table 3-2 below outlines the overall parking requirement for the development proposal, according to the DCP.

Table 3-2: Car Parking Requirements

Land Use	Unit/ GFA	DCP Rate	Requirement
Commercial	23,541m^2	1 space per 40m^2	589
Food & Beverage	800m^2	1 space per 40m^2	20
Serviced Apartments	58 units	1 space per room	58
	4 staff	1 space per 2 staff	2
Gymnasium	251m^2	1 space per 40m^2	7
		Total	**676**

The development requires the provision of 676 spaces.

The proposed development will provide a total of 635 parking spaces over five (5) levels of car parking:

- Basement Floor: 170 spaces
- Ground Floor: 111 spaces
- Level 1: 93 spaces
- Level 2: 129 spaces
- Level 3: 132 spaces

It is acknowledged that the proposed provision does not meet the requirements, however, the development will provide six (6) car share spaces. This is considered a beneficial initiative to transition away from private vehicles and encourage alternative modes of transport. The Council DCP does not provide specific rates for car share allowance, a provision of 1 car share per 8 standard spaces is considered to be reasonable. This provision when added to the 635 spaces result in an equivalent of 675 spaces.

The food and beverage areas will include restaurants/cafes which may also operate during the evenings and weekends. A parking requirement of 21 spaces would be required during the day, as indicated in **Table 3-2**.

During the evening, Council's DCP requires the provision of 1 space per 5 seats (90 spaces for 450 seats) for restaurants, plus 12 spaces per 100m^2 of GFA (160 spaces). Thus, about 250 spaces would be required during the evenings and weekends. During the evenings and weekend, parking spaces associated with the office component of the development, would be mostly vacant. Patrons of the restaurants would then be allowed to use the car park at those times.

3.2.2 Accessible Parking Provisions

The DCP requirement for accessible parking has been summarised in Table 3.3. It is noted that the accessible parking numbers are included in the general car parking requirements above.

The development proposes to provide 15 accessible spaces which exceeds the minimum requirement.

Table 3-3: Accessible Parking Requirements

Land Use	No of spaces	DCP Rate	DCP Requirement (minimum)
Commercial/ Food & Beverage/ Serviced Apartments	669 car spaces	2% of total car parking provision	13
Gymnasium	7 car spaces	3% of total car parking provision	1
		Total	**14**

3.2.3 Bicycle Parking Requirement & Provision

The Bella Vista Station Precinct Recommended DCP Amendments recommends that the rates summarised in **Table 3-4** should be adopted to calculate the bicycle parking requirements.

Table 3-4: Bicycle Parking Requirements & Provision

Land Use	GFA	DCP Rate	DCP Requirement (minimum)
Commercial	23,541m^2	1 space per 600m^2	39
Food & Beverage	800m^2	1 space per 450m^2	2
Serviced Apartments	-	-	-
Gymnasium	251m^2	1 space per 4 employees + 1 space per 200m^2 GFA	2
		Total	**43**

The development proposes to provide 44 bicycle parking spaces which exceeds the minimum requirement. These spaces are provided in the Ground Floor.

3.2.4 Motorcycle Parking Requirement & Provision

The DCP requires all developments with more than 50 car parking spaces to provide motorcycle parking spaces. The requirements are summarised in **Table 3-5**. As the proposed development comprises 677 car parking spaces, 14 motorcycle spaces are required to be provided.

Table 3-5: Motorcycle Parking Requirements & Provision

Land Use	No. of spaces	DCP Rate	DCP Requirement (minimum)
Whole Development	676 car spaces	1 space per 50 car spaces	14

The development proposes to provide 18 motorcycle parking spaces within the car park which exceeds the minimum requirements. The locations of these spaces are as follows:

- Basement Floor: 6 spaces
- Level 1: 5 spaces
- Level 2: 2 spaces
- Level 3: 5 spaces

3.2.5 Service Vehicle Parking Requirement & Provision

The DCP requirement for service vehicle parking has been summarised in **Table 3-6**.

Table 3-6: Service Vehicle Parking Requirements & Provision

Land Use	Unit	DCP Rate	DCP Requirement (minimum)
Commercial	23,541m^2	1 space for the first 1.860m^2 1 space for the next 3,720m^2 1 space for the next 3,720m^2 1 space for each additional 9,250m^2	5

Accordingly, the proposed development is required to provide five loading bays.

A loading dock which can accommodate two (2) Medium Rigid Vehicles (MRV) will be provided. The loading dock will be accessed off the Right-of-Way connecting to Lexington Drive. This loading area can accommodate one Large Rigid Truck. Three (3) service bays will also be provided within the car park to accommodate smaller scale servicing requirements (e.g. maintenance vehicles, courier deliveries etc.).

It is considered that two MRVs would be an appropriate provision for the proposed development, for the following reasons:

- The serviced apartments will require little loading demands once the apartments have been furnished prior to opening;
- The Waste Management Plan has indicated that two MRVs will be adequate in removing waste of a development of this size;
- Peak loading demands and waste collection for the proposed developments on the site will occur outside of peak hours and will be scheduled such to avoid conflict with other loading vehicles. This can be managed via a scheduling system and/or regular delivery timetables;
- The proposed loading space accessed via Lexington Drive is considered satisfactory to cater for the loading and waste demands of the development;
- Any additional loading demands such as couriers or catering vehicles can easily be accommodated within either the loading areas, or the service bays within the car park; and
- A Loading Dock Management Plan can be prepared in the future to manage the operations of the loading dock and service bays.

3.2.6 Provision for Future Restaurants

It should be noted that there may be a possibility in the future to designate the café and retail area as "Future Food and Beverage / Ancillary Retail" with the possibility to be used as a restaurant during the evening. In the event the 679 m^2 GFA of café/retail is used for café/restaurant at a future time, a parking requirement of 17 spaces would be required during the day, that is less than the 26 spaces required in **Table 2**. Thus, during the day, the proposed parking supply would cater for these facilities. During the evening, Council's DCP requires the provision of 1 space per 5 seats (20 spaces for 100 seats) for restaurants, plus 12 spaces per 100m^2 of GFA (82 spaces). Thus, about 100 spaces would be required during the evenings and weekends. During the evenings and weekend, parking spaces would be mostly vacant. Patrons of the restaurants would then be allowed to use the car park at that time.

3.3 Access & Car Park Layout

The car park access and layouts have been assessed as part of the Development Application and were found to be generally compliant with the Australian Standards.

4. Traffic Assessment

4.1 Existing Traffic Assessment

4.1.1 Traffic Counts

Stantec commissioned traffic counts to be undertaken at the following intersections on Thursday 28 February 2019.

- Norwest Boulevard / Lexington Drive (signalised roundabout);
- Lexington Drive / Woolworths Way (roundabout);
- Lexington Drive / Meridian Place (roundabout); and
- Existing driveway into 21-23 Lexington Drive.

The surveys indicated that traffic volumes across the network collectively peaked between 8:15am and 9:15am, and 4:00pm and 5:00pm for the AM and PM peak hours respectively. These volumes are presented in **Figure 4-1**.

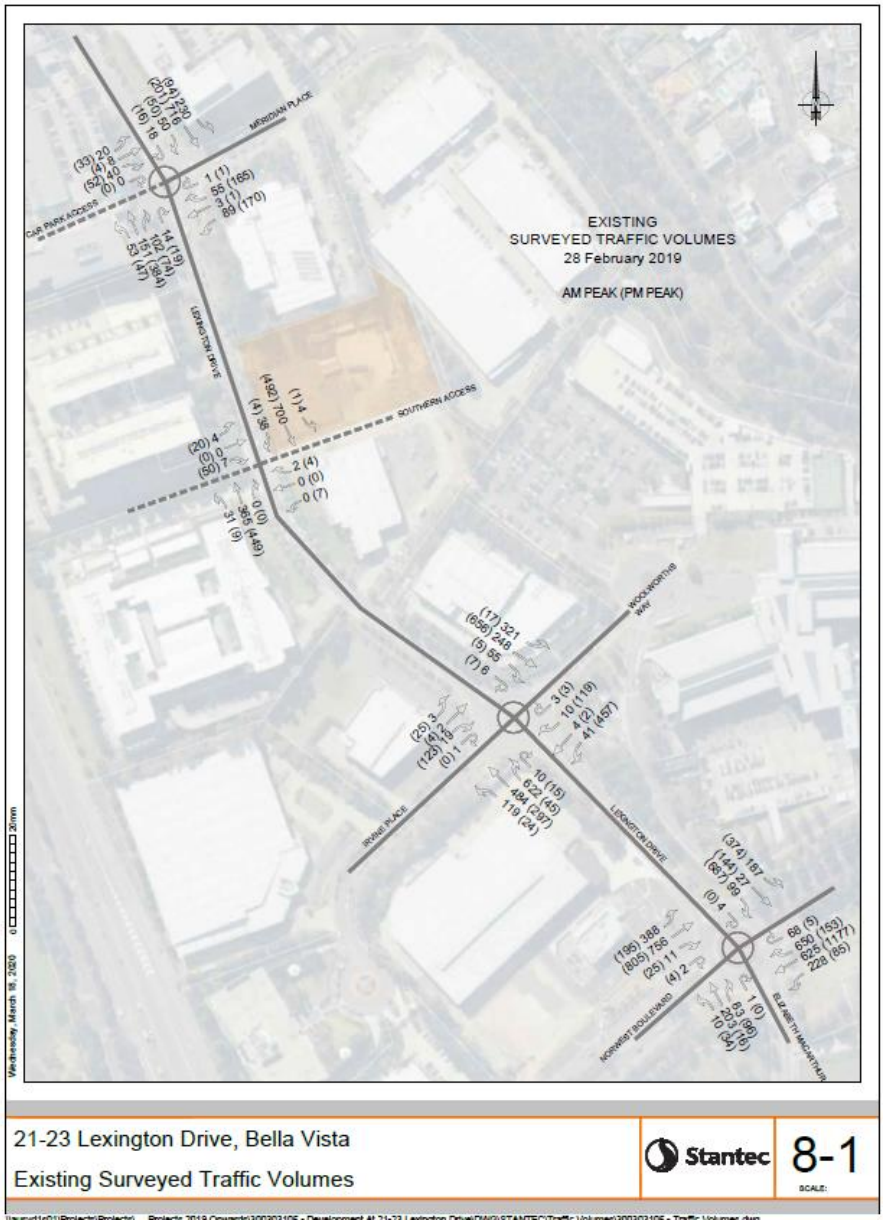

Figure 4-1: Existing Traffic Volumes

4.1.2 Existing Operation of Critical Intersections

The concepts of intersection capacity and Level of Service (LoS), as defined in the Guidelines published by the RMS (2002), are described in **Appendix B** together with the criteria for their assessment. The assessment of the LoS of roundabouts and signed controlled intersections is based on the average delay (seconds/vehicle) of the critical movement. The assessment of the LoS of signalised intersections is based on the evaluation of the average delay (seconds/vehicle) of vehicles on all approaches.

An analysis of the operation of the intersections in the vicinity of the site was carried out using SIDRA 8.0. The results of this analysis are summarised in **Table 4-1**.

Table 4-1: Existing Operation of Critical Intersections

Intersection	AM Peak		PM Peak	
	Average Delay (sec / veh)	Level of Service (LoS)	Average Delay (sec / veh)	Level of Service (LoS)
Lexington Dr / Meridian Pl	15.8	B	13.4	A
Lexington / Woolworths Way	37.5	C	11.9	A
Norwest Blvd/ Lexington Dr	65.7	E	65.5	E

As identified in **Table 4-1**, the following conclusions can be made from the above analysis:

- There are some existing capacity issues at the Norwest Boulevard and Lexington Drive intersection during both peak hours. It is understood that Council are aware of this issue and that the intersection has been designated for upgrade to a signalised intersection; and
- Other surrounding intersections are operating at acceptable level of service.

4.2 Development Traffic Assessment

4.2.1 Trip Generation

The trip generation of the proposed development were estimated based on the *RMS Technical Direction (TDT) 2013/04a* and the *RMS Guide to Traffic Generating Developments 2002 (RMS Guide)*:

- **Commercial/Office:**
  - AM peak hour: 1.6 trips per 100m^2 GFA
  - PM peak hour: 1.2 trips per 100m^2 GFA
- **Food & beverage:**
  - AM peak hour: 2.5 trips per 100m^2 GFA[2]
  - PM peak hour: 5 trips per 100m^2 GFA

[2] The RMS Guide does not stipulate any specific rates for restaurants during the morning peak hour. It is expected that restaurants will generate less traffic during the morning peak compared to the evening, and based on data gathered, as rate of 2.5 trips per 100m^2 GFA is considered to be appropriate. The food and beverage premises are also expected to primarily serve the tenants of the building and surrounding buildings during the AM peak. As such, external trips during the morning peak is expected to be low.

- **Serviced Apartments[3]:**
  - AM peak hour: 0.19 trips per unit
  - PM peak hour: 0.15 trips per unit
- **Gymnasium:**
  - AM peak hour: 9 trips per 100m^2 GFA[4]
  - PM peak hour: 9 trips per 100m^2 GFA

The estimated trip generation for the proposed development is summarised in **Table 4-1**.

Table 4.2: Peak Hour Trip Generation Rates for Proposed Development

Land Use	GFA/Units	AM Peak Hour	Trips	PM Peak Hour	Trips
Commercial[5]	23,541m^2	1.6 trips/ 100m^2 GFA	378	1.2 trips/ 100m^2 GFA	284
Food & Beverage	800m^2	2.5 trips/ 100m^2 GFA	21	5 trips/ 100m^2 GFA	42
Serviced Apartments	58 units	0.19 trips/ unit	12	0.15 trips/ unit	9
Gymnasium	251m^2	9 trips/ 100m^2 GFA	23	9 trips/ 100m^2 GFA	23
Total			**434**		**358**

As per Table 4.2, the development is estimated to generate about 440 trips and 380 trips in the AM and PM peaks respectively.

4.2.2 Trip Distribution and Assignment

The peak hour inbound and outbound traffic generated by each land use is summarised in **Table 4-3.** The percentages adopted for the purposes of this assessment have been based on previous traffic survey data and generally accepted values.

Table 4-3: Peak Hour Arrival & Departure Traffic Volumes

Land Use	AM Peak			PM Peak		
	Arrival	Departure	Total	Arrival	Departure	Total
Distribution %						
Commercial	80%	20%	100%	20%	80%	100%
Food & Beverage	50%	50%	100%	80%	20%	100%
Serviced Apartments	50%	50%	100%	70%	30%	100%

[3] Due to the close proximity of the site to the Bella Vista Metro Station, the peak hour trip generation rates for high-density residential flat dwellings has been adopted for the assessment of the serviced apartments, as the serviced apartments is unlikely to generate traffic volumes similar to motels. The presence of Bella Vista Metro Station will encourage the uptake of public transport and will not likely result in a high traffic generation typically seen with a motel.

[4] RMS Guide does not provide rates for the AM peak. In the absence of any other data, the evening rate has been adopted.

[5] Meeting rooms have been excluded from the calculations as they will not generate additional trips.

Land Use	AM Peak			PM Peak		
	Arrival	Departure	Total	Arrival	Departure	Total
Gymnasium	70%	30%	100%	50%	50%	100%
Trips						
Commercial	302	76	**378**	57	226	**283**
Food & Beverage	11	11	**22**	34	8	**42**
Serviced Apartments	6	6	**12**	6	3	**9**
Gymnasium	16	7	**23**	12	12	**24**
Total	**335**	**100**	**435**	**109**	**249**	**358**

The trip distribution has been broken down further to the two access points as shown in **Table 4-**. The following assumptions have been made for the purposes of the trip assignment:

- Level 1-3will use the southern access (**55%**)
- Basement and Ground Floor will use the northern access (**45%**)

Table 4-4: Peak Hour Arrival & Departure Traffic Volumes at each Access Point

Access	AM Peak		PM Peak	
	Arrival	Departure	Arrival	Departure
Northern Access	150	45	49	112
Southern Access	185	55	60	137
Total	**335**	**100**	**109**	**249**

The route distribution of these trips is summarised in **Table 4-2.** These splits are based on traffic survey data and Stantec's work with similar developments in the vicinity of the site.

Table 4-2: Trip Distribution

Approach Roads	To/From	AM Peak		PM Peak	
		Arrival	Departure	Arrival	Departure
Distribution %					
Old Windsor Rd/Celebration	North	50%	50%	50%	50%
Old Windsor Rd/Norwest Blvd	West	20%	20%	20%	20%
Old Windsor Rd/Elizabeth McArthur	South	5%	5%	5%	5%
Windsor Rd/ Norwest Blvd	East	25%	25%	25%	25%
	Total	**100%**	**100%**	**100%**	**100%**
Trips at Intersection					
Old Windsor Rd/Celebration	North	168	50	55	125
Old Windsor Rd/Norwest Blvd	West	67	20	22	50
Old Windsor Rd/Elizabeth McArthur	South	17	5	5	12
Windsor Rd/ Norwest Blvd	East	84	25	27	62
	Total	**336**	**100**	**109**	**249**

The trip distribution of the proposed development is noted in **Figure 4-2**.

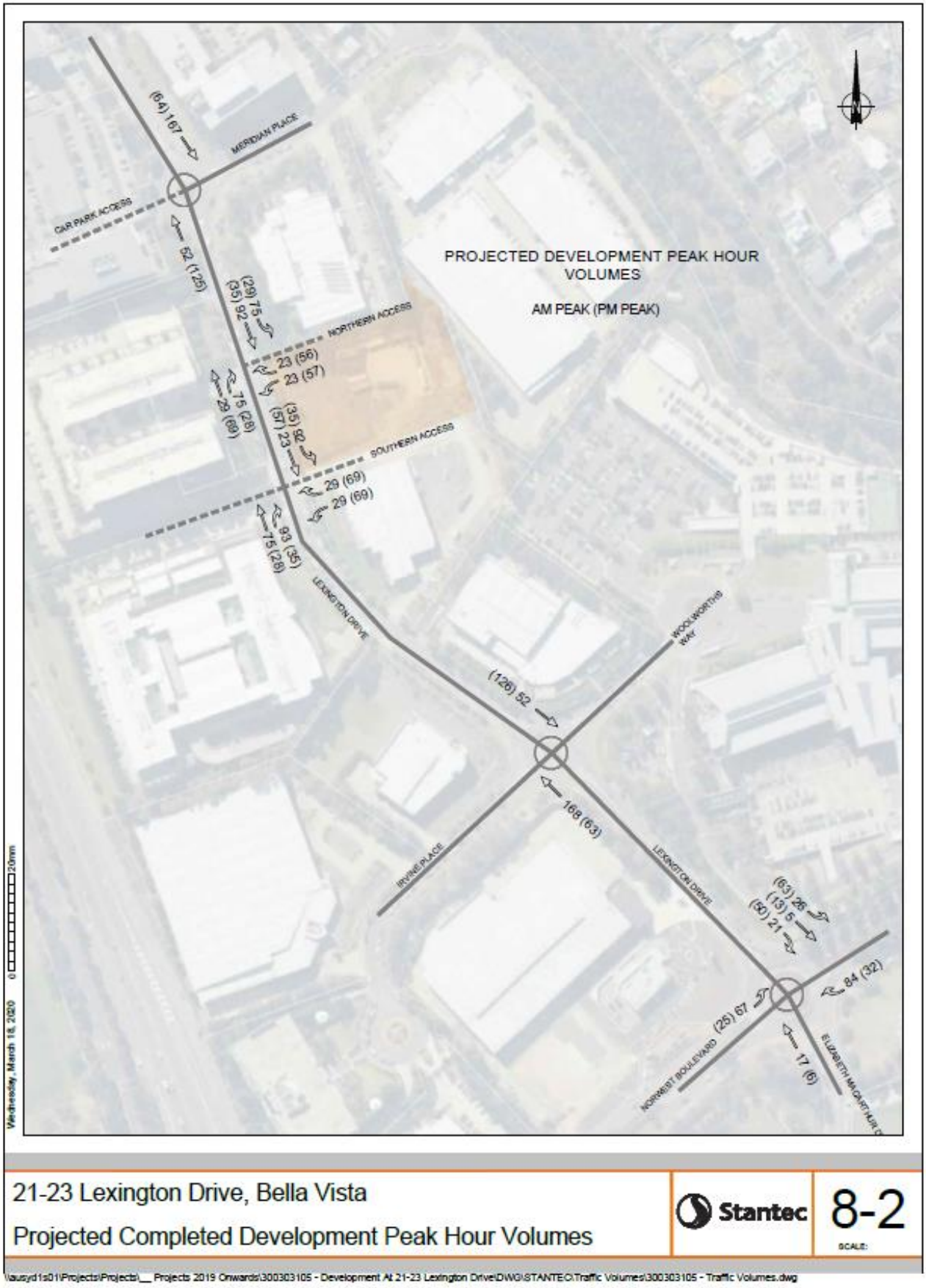

Figure 4-2: Proposed Development Peak Hour Traffic Volume

The total future volumes at the surrounding intersections are noted in **Figure 4-3**.

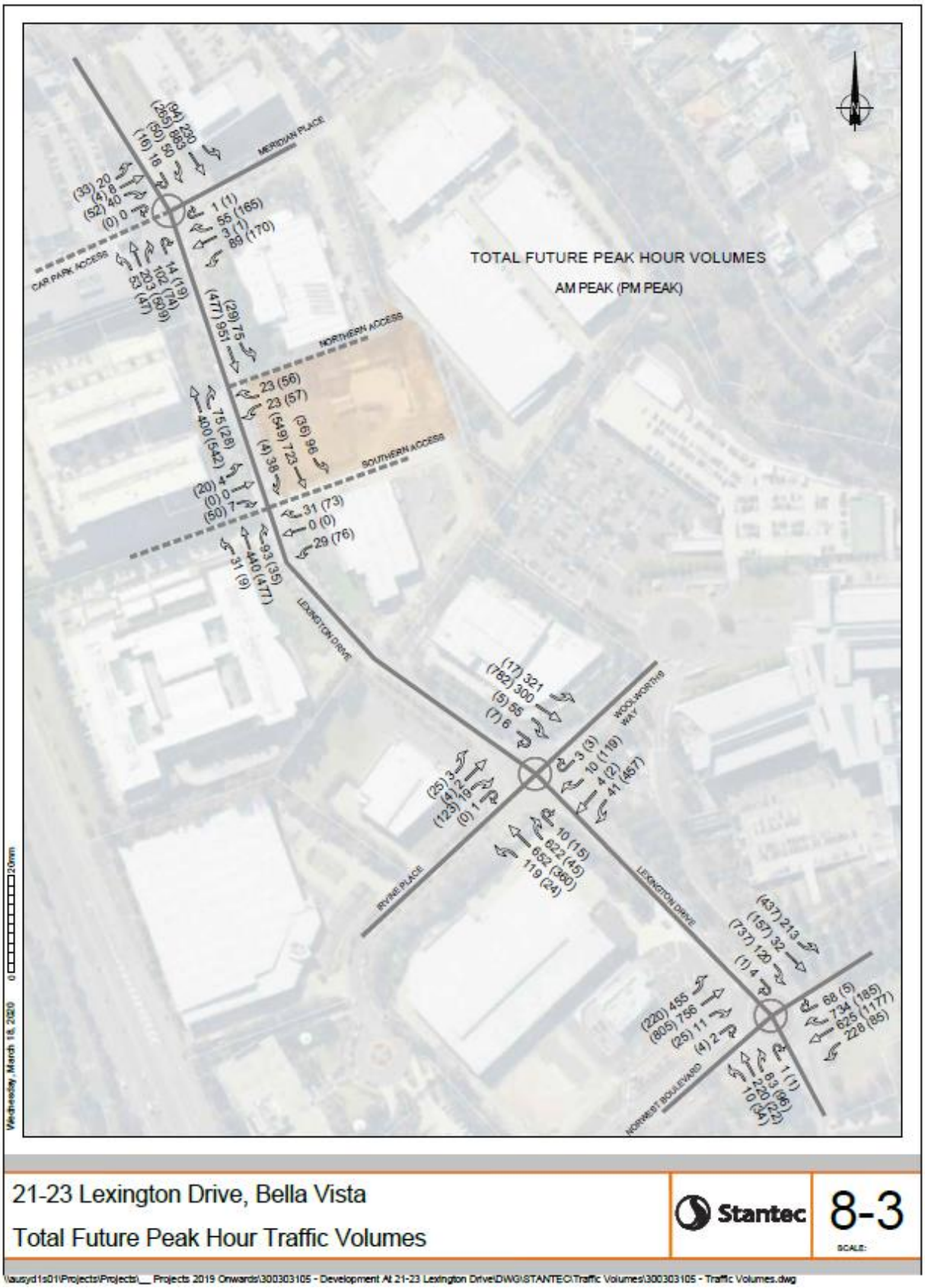

Figure 4-3: Total Future Peak Hour Traffic Volume

4.2.3 Future Operation of Critical Intersections

Stantec has assessed the future performance levels for the intersections likely to be impacted by the proposed development. The assessment has been undertaken using SIDRA 8.0 which modelled both the AM and PM peaks. The results of this analysis are included in **Appendix D** and summarised in **Table 4-3**.

Table 4-3: Future Operation of Critical Intersections

Intersection	AM Peak		PM Peak	
	Delay (sec/veh)	LoS	Delay (sec/ veh)	LoS
Lexington Drive/ Meridian Place	20.3	B	13.6	A
Lexington Drive/ Woolworths Way	51.0	D	20.7	B
Norwest Boulevard/ Lexington Drive	>70	F	>70	F

As can be seen from Table 4.5 , the completion of the proposed development will result in the intersection of Norwest Boulevard & Lexington Drive to a LoS 'F' in both the peak periods. However, this intersection is expected to be signalised in the next few years. The configuration of the signalised intersection is understood that the upgrade will accommodate traffic generated from future developments and background growth.

It is also evident from traffic surveys and on-site observations that there are capacity issues with the Lexington Drive corridor in its current state. It is understood that Council and RMS (now part of TfNSW) are aware of this. A traffic and transport study of the Norwest Business Park is currently underway on behalf of Council and State agencies to recommend suitable infrastructure upgrades to enable future developments and growth of the precinct.

Otherwise, it is expected that the proposed development will have minor impacts to the existing operations of surrounding intersections during weekday peak hours.

5. Assessment of Right of Way

The Right-of-Way (ROW) driveway to the south of the site will be shared between the proposed development and the adjacent development at 13-19 Lexington Drive. An assessment of the combined impact of both developments on the ROW's ability to provide good accessibility to and from Lexington Drive is provided in the following sections.

Council has previously raised concerns regarding the provision of two separate driveways to serve 21-23 Lexington Drive due to the aesthetic impact it may have on the existing streetscape. As such, two cases have been assessed as part of this traffic report:

- **Case 1:** Provision of two separate driveways (ROW and a northern driveway)
- **Case 2:** Provision of a single driveway (ROW only)

5.1 Expected Traffic Volume along ROW

The traffic volume expected to use the ROW is summarised in **Table 5-1** overleaf.

Table 5-1: Total Trips Along ROW Driveway

Development		AM Peak			PM PEAK		
		Arrival	Departure	Total	Arrival	Departure	Total
Case 1	13-19 Lexington Dr*	112	31	143	46	90	136
	21-23 Lexington Dr	185	55	241	60	137	208
Total		**297**	**86**	**384**	**106**	**227**	**344**
Case 2	13-19 Lexington Dr*	112	31	143	46	90	136
	21-23 Lexington Dr	335	100	435	109	249	358
Total		**447**	**131**	**578**	**155**	**339**	**494**

* Traffic volumes sourced from the 13-19 Lexington Drive Traffic Impact Assessment, prepared by Stantec.

The directional trip distribution at the ROW is summarised in **Table 5-2**. This is based on the trip distribution summarised in **Section 4.2.2** and those adopted in the 13-19 Lexington Drive Traffic Report.

Table 5-2: Directional Trip Distribution at ROW

			21-23 Lexington Drive		13-19 Lexington Drive		Both Developments	
			AM	PM	AM	PM	AM	PM
Case 1	Departure	To the north	29	69	15	45	44	114
		To the south	29	69	16	45	45	114
	Arrival	From the north	92	35	56	20	148	55
		From the south	93	35	56	20	149	55
Case 2	Departure	To the north	50	125	15	45	65	170
		To the south	50	125	16	45	66	170
	Arrival	From the north	168	55	56	20	224	75
		From the south	168	54	56	20	224	74

5.2 Basis of Assessment

The movement likely to experience the most difficulty and extensive delays at the driveway to the ROW is the right turning movement from the ROW onto Lexington Drive. Thus, it is proposed to have two dedicated exit lanes, one lane for the right turn and one lane for the left turn movement, and one entry lane.

In order to assess the adequacy of the exit from the proposed mixed development onto Lexington Drive, the following analysis was carried out to estimate:

- The practical absorption capacity of the major traffic flow along Lexington Drive in the southbound direction; this is the volume of traffic which can safely enter the major traffic stream along Lexington Drive;
- The probability of an exiting vehicle being delayed.

The practical absorption capacity per entering lane is given by $N_p = 0.8\ N$, where N is the absorption capacity of the major flow calculated from:

$$N = \frac{Qc \times exp(-Qc.T/3600)}{1 - exp(-Qc.To/3600)}$$

Where Qc = major stream volume

T = critical gap acceptance (sec)

T_o = follow up headway (sec)

exp = exponential function (e=2.7183)

The more conservative critical gap acceptance of T = 6 secs and follow up headway of T_o = 4 secs assume good sight distance and reasonable grades with speed limits of 50km/h.

The practical absorption capacity at Lexington Drive for vehicles turning right from the ROW, and travelling northbound, was estimated based on the traffic volumes in **Table 5-2**.

Furthermore, the probability of delay for a vehicle right turning into Lexington Drive from the ROW is derived using the formula:

$$P_r = 1 - \exp\left(-Qc.T/3600\right)$$

5.3 Analysis of ROW

As aforementioned, two separate cases have been assessed:

- **Case 1:** Provision of two separate driveways (ROW and a northern driveway)
- **Case 2:** Provision of a single driveway (ROW only)

The assessment is based on the future scenario when both developments (13-19 & 21-23 Lexington Drive) are completed.

The results of this analysis are included in **Table 5-3**. The results indicate that in both cases the vehicles turning right from the ROW will experience delays over 80% of the time.

In both cases, the ROW will easily accommodate the traffic generated from the two developments during the morning peak period.

Table 5-3: Practical Absorption Capacity for Lexington Drive

	Case 1: Two Driveways		Case 2: One Driveway	
Parameters	**AM**	**PM**	**AM**	**PM**
Q_C	1,324	1,187	1,302	1,131
T (secs)	6	6	6	6
T_o (secs)	4	4	4	4
N_p	151	179	155	192
Right-Turn Exiting Volume	43	114	65	170
Right-Turn Exiting Volume/ N_p (%)	28%	64%	42%	89%
Probability of being delayed	89%	86%	89%	85%

During the afternoon peak, with two driveways (Case 1), the volume of the right turning exiting vehicles will account for 64 percent of the practical absorption capacity.

However, with only one driveway accessing the proposed development at 21-23 Lexington Drive (Case 2), the volume of the right turning exiting vehicles will account for near 90% percent of the practical absorption capacity. This is not acceptable.

From a traffic perspective, the proposed two driveways should be retained.

6. Conclusions

The proposed development at 21-23 Lexington Drive, Bella Vista will involve the construction of a 10-storey mixed-use building with a Gross Floor Area (GFA) of approximately 27,692 m^2 GFA.

The mixed-use development will comprise of commercial/office spaces (23,541m^2), food and beverage premises (800m^2), gymnasium (251m^2) and serviced apartments (3,100m^2).

Stantec has reviewed the traffic and parking impacts of the proposed development, and based on the assessment the following conclusions can be made:

The proposed car parking provision of 635 spaces. The allocation of six car spaces as shared cars spaces each replacing 8 standard spaces results in an equivalent of 675 spaces.

- A loading dock will be provided which can accommodate up to two Medium Rigid Vehicles (MRVs) at any one time. Three (3) service bays will also be provided within the car park which can accommodate vans/utes. As such, servicing for the development can be accommodated on-site;
- The car park access and layouts have been assessed as part of the Development Application and were found to be generally compliant with the relevant Australian Standards;
- The proposed development is expected to generate approximately 434 trips in the AM peak and 358 trips in the PM peak:
- Existing traffic surveys and on-site observations indicate that there are capacity issues with the Lexington Drive corridor. A traffic and transport study of the area is expected to be undertaken by Council and RMS to investigate suitable infrastructure upgrades to enable future developments and growth of the precinct;
- The results from the SIDRA network model indicates that the performance level of the intersection between Norwest Boulevard & Lexington Drive will deteriorate to a LoS 'F' at the completion of the proposed development. It is understood that Council and RMS are aware of the existing performance issues at this intersection and proposing to upgrade it to a signalised intersection in the coming years; and
- Other than the Norwest Boulevard & Lexington Drive intersection, the proposed development is expected to have minor impacts to the other surrounding intersections which will operate at an acceptable level of service.

Appendices

Appendix A Architectural Plans

PROJECT SUMMARY

Address	**21-23 Lexington Drive, Bella Vista, NSW 2153** **Lot: 7081 DP 1037626**
Site Area	**10,200m²**
Land Use	Business Park (B7)

PROPOSAL SUMMARY / COUNCIL DCP & LEP CONTROLS

	RECOMMENDED CONTROL	PROPOSED
Floor Space Ratio	2 : 1	2.7 : 1
Gross Floor Area	20,400m²	27,769m²
Max Building Height (RL)	116m	116m
		Top of Parapet: RL 116m Top of Building Component: RL 120.15m
Max Excavation Depth (RL)	74.1m	74.1m
Setbacks	20m to Lexington Drive	20m to Lexington Drive
	10m to Side/Rear (5m for Parking Levels)	10-12.5m to Side/Rear (5m for Parking Levels to Rear)
Parking	682 Vehicle Spaces 14 Motorcycle Spaces 43 Bicycle Spaces	664 Vehicle Spaces 16 Motorcycle Spaces 44 Bicycle Spaces

GFA BREAKDOWN

	FOOD & BEVERAGE	OFFICE (incl. gym)	SERVICED APTS.	TOTAL
BASEMENT 01	-	46m²	-	46m²
GROUND FLOOR	800m²	400m²	-	1,200m²
LEVEL 01	-	46m²	-	46m²
LEVEL 02	-	1,241m²	-	1,241m²
LEVEL 03	-	183m²	-	183m²
LEVEL 04	-	3,646m²	-	3,646m²
LEVEL 05	-	3,646m²	-	3,646m²
LEVEL 06	-	3,646m²	-	3,646m²
LEVEL 07	-	3,646m²	-	3,646m²
LEVEL 08	-	3,646m²	-	3,646m²
LEVEL 09	-	3,646m²	-	3,646m²
LEVEL 10	-	-	3,100m²	3,100m²
TOTAL	**800m²**	**23,792m²** (23,541m² office, 251m² gym)	**3,100m²**	**27,692m²**

PARKING BREAKDOWN

	RECOMMENDED CONTROL	PROPOSED
FOOD & BEVERAGE	1 per 40m^2 GFA (20 spaces)	20 spaces
OFFICE + LOBBY	1 per 40m^2 GFA (589 spaces)	572 spaces (542 + 6 carshare spaces at an allowance of 5 per carshare space)
GYMNASIUM	1 per 40m^2 GFA (7 spaces)	7 spaces
SERVICED APARTMENTS	1 per apartment (58 spaces) plus 1 per 2 staff (2 spaces) = 60 spaces total	60 spaces
SUBTOTAL	676 spaces	659 spaces
SERVICE VEHICLES	5 spaces total	5 spaces (incl. 2 in Loading Dock)
TOTAL	681 spaces	664 spaces
BICYCLE	2 spaces plus 5% of total parking (43 spaces)	44 spaces (1 above control)
MOTORCYCLE	1 per 50 parking spaces (14 spaces)	16 spaces (2 above control)
CAR SHARE SPACES	-	6 spaces
ELECTRIC VEHICLE CHARGING BAYS	-	5 spaces
ACCESSIBLE	2% of parking provision (14 spaces)	14 spaces

NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

LEGEND

CLOUD LEGEND: REVISION, ON HOLD

KEY PLAN

CLIENT
Capital Corporation Pty Ltd
Level 1, 1 Jamison St
Sydney, NSW, 2000

ARCHITECT
Suite 41 & 42, Level 4
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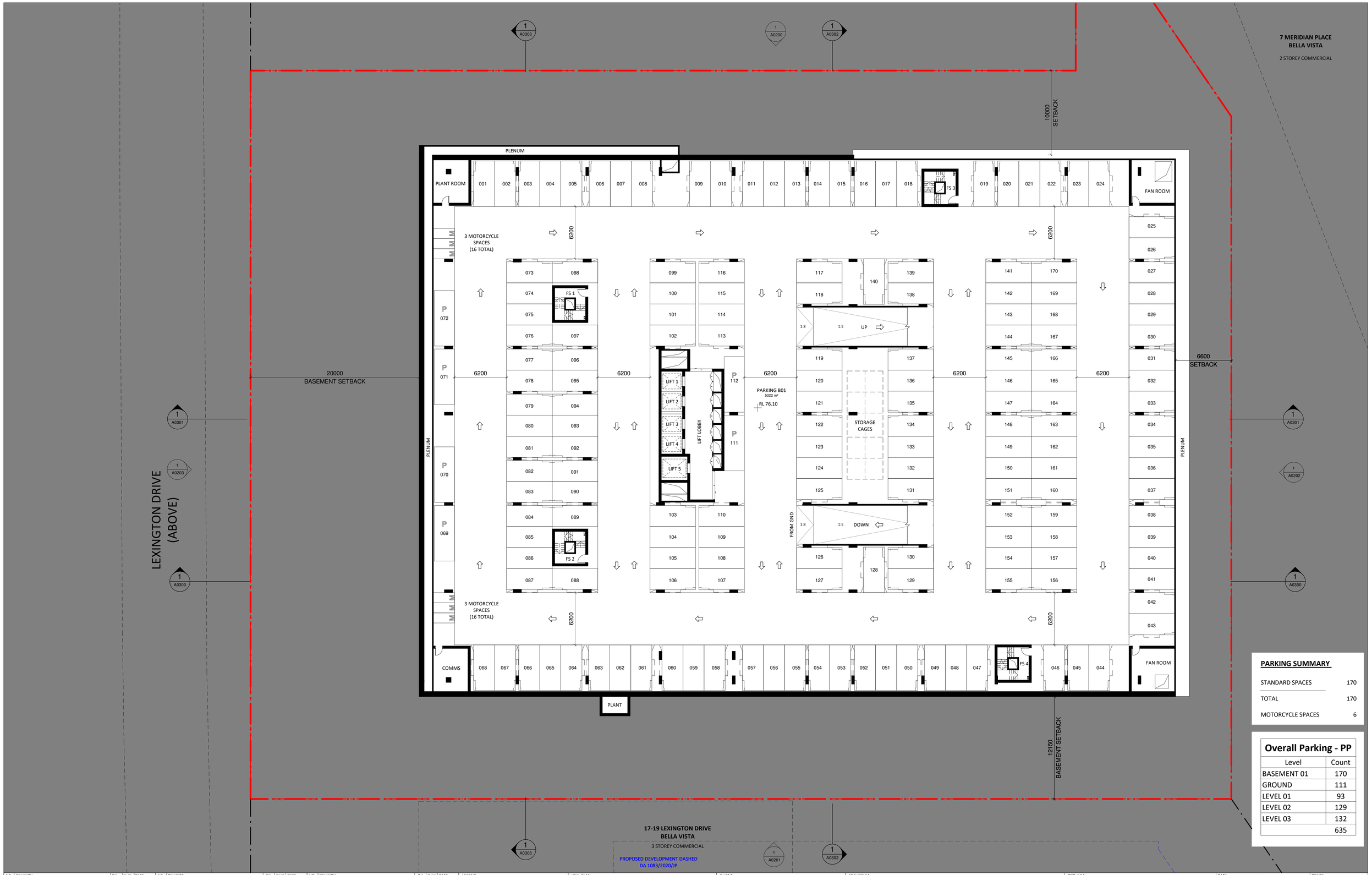
Surry Hills, NSW 2010
T 02 9698 8510
ABN 63 131 365 896
Nominated Architect:
Koichi Takada
NSW Architects 6901
VIC Architects 16179
www.koichitakada.com

PROJECT: 21-23 LEXINGTON DRIVE
BELLA VISTA NSW 2153

STATUS: PLANNING PROPOSAL

DWG TITLE: PROJECT SUMMARY

DATE: 09/04/20 | DRAWN: AP
SCALE: NOT TO SCALE | CHECKED: AC
PROJ NO.: 19434 | APPROVED:
DWG NO.: PP0001 | REVISION: A



PARKING SUMMARY

STANDARD SPACES	170
TOTAL	170
MOTORCYCLE SPACES	6

Overall Parking - PP

Level	Count
BASEMENT 01	170
GROUND	111
LEVEL 01	93
LEVEL 02	129
LEVEL 03	132
	635

NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

LEGEND

CLOUD LEGEND: REVISION, ON HOLD

KEY PLAN: 0, 10 m

CLIENT
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KOICHI TAKADA ARCHITECTS

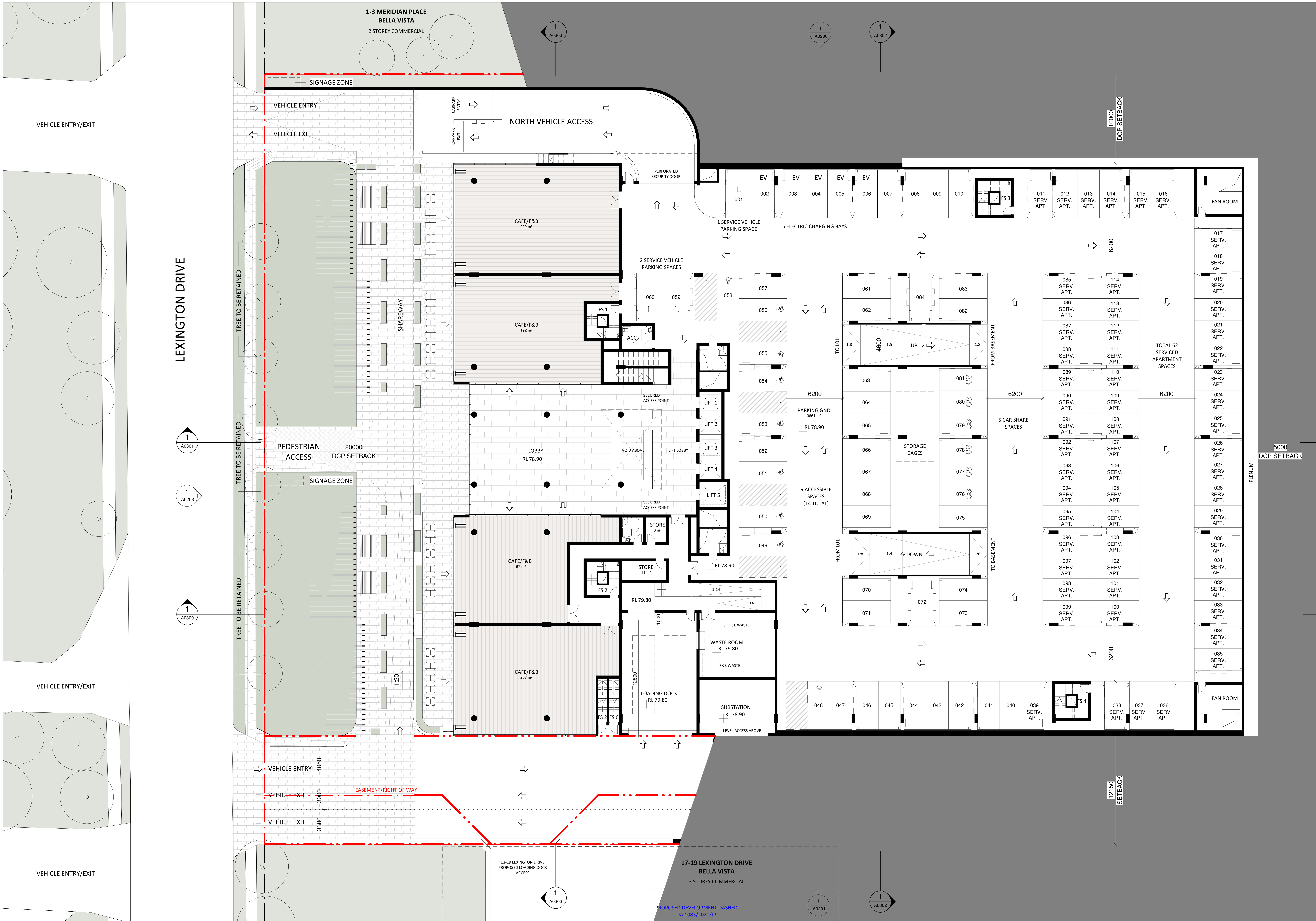
PROJECT
21-23 LEXINGTON DRIVE
BELLA VISTA NSW 2153

STATUS
PLANNING PROPOSAL

DWG TITLE
BASEMENT 01 PLAN

DATE	09/04/20
DRAWN	AP
SCALE	1:200@A1, 1:400@A3
CHECKED	AC
PROJ NO.	19434
APPROVED	
DWG NO.	PP0099
REVISION	A

NOTES:
DO NOT SCALE FROM DRAWINGS.
VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK.


1-3 MERIDIAN PLACE
BELLA VISTA
2 STOREY COMMERCIAL
7 MERIDIAN PLACE
BELLA VISTA
2 STOREY COMMERCIAL
SIGNAGE ZONE
VEHICLE ENTRY
VEHICLE EXIT
VEHICLE ENTRY/EXIT
CARPARK ENTRY
CARPARK EXIT
NORTH VEHICLE ACCESS
LEXINGTON DRIVE
TREE TO BE RETAINED
SHAREWAY
PEDESTRIAN ACCESS
20000 DCP SETBACK
10000 DCP SETBACK
5000 DCP SETBACK
12150 SETBACK
PERFORATED SECURITY DOOR
CAFE/F&B 222 m²
CAFE/F&B 192 m²
CAFE/F&B 167 m²
CAFE/F&B 207 m²
LOBBY RL 78.90
VOID ABOVE
LIFT LOBBY
SECURED ACCESS POINT
LIFT 1
LIFT 2
LIFT 3
LIFT 4
LIFT 5
FS 1
FS 2
FS 3
FS 4
FS 6
ACC
STORE 6 m²
STORE 11 m²
RL 78.90
RL 79.80
1:14
OFFICE WASTE
WASTE ROOM RL 79.80
F&B WASTE
LOADING DOCK RL 79.80
12800
1000
SUBSTATION RL 78.90
LEVEL ACCESS ABOVE
1 SERVICE VEHICLE PARKING SPACE
5 ELECTRIC CHARGING BAYS
2 SERVICE VEHICLE PARKING SPACES
EV
PARKING GND 3661 m²
RL 78.90
6200
4600
9 ACCESSIBLE SPACES (14 TOTAL)
STORAGE CAGES
5 CAR SHARE SPACES
TOTAL 62 SERVICED APARTMENT SPACES
TO L01
FROM BASEMENT
FROM L01
TO BASEMENT
UP
DOWN
1:8
1:5
1:4
1:20
FAN ROOM
PLENUM
SERV. APT.
EASEMENT/RIGHT OF WAY
4050
3000
3300
13-19 LEXINGTON DRIVE PROPOSED LOADING DOCK ACCESS
17-19 LEXINGTON DRIVE
BELLA VISTA
3 STOREY COMMERCIAL
PROPOSED DEVELOPMENT DASHED
DA 1083/2020/JP
A0300
A0301
A0302
A0303
A0200
A0201
A0202
A0203

LEGEND

SERV. APT.	SERVICED APARTMENT
EOT	END OF TRIP FACILITIES
F&B	FOOD & BEVERAGE
FS	FIRE STAIRS
ACC	ACCESSIBLE BATHROOM
L	SERVICE VEHICLE PARKING

* SIGNAGE ZONE INDICATIVE ONLY. SUBJECT TO FUTURE DETAIL DESIGN

PARKING SUMMARY

STANDARD SPACES	31
SERVICED APARTMENT SPACES	60
ACCESSIBLE SPACES	9
CAR SHARE SPACES	6
ELECTRIC CHARGING BAYS	5
TOTAL	111
SERVICE VEHICLE SPACES	3
LOADING BAYS	2

Overall Parking - PP

Level	Count
BASEMENT 01	170
GROUND	111
LEVEL 01	93
LEVEL 02	129
LEVEL 03	132
	635

NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

LEGEND

CLOUD LEGEND: REVISION / ON HOLD

KEY PLAN

0 10 m

CLIENT
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KOICHI TAKADA ARCHITECTS

PROJECT
21-23 LEXINGTON DRIVE
BELLA VISTA NSW 2153

STATUS
PLANNING PROPOSAL

DWG TITLE
GROUND FLOOR PLAN

DATE 09/04/20
DRAWN AP
SCALE 1:200@A1, 1:400@A3
CHECKED AC
PROJ NO. 19434
APPROVED
DWG NO. PP0100
REVISION A

NOTES:
DO NOT SCALE FROM DRAWINGS.
VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK.

1-3 MERIDIAN PLACE
BELLA VISTA
2 STOREY COMMERCIAL

7 MERIDIAN PLACE
BELLA VISTA
2 STOREY COMMERCIAL

NORTH VEHICLE ACCESS BELOW

10000 DCP SETBACK

LEXINGTON DRIVE

SHAREWAY BELOW

OUTDOOR DINING BELOW

20000 DCP SETBACK

5000 DCP SETBACK

12150 SETBACK

VOID TO BAR/F&B BELOW

VOID TO CAFE/F&B BELOW

VOID TO LOBBY BELOW

VOID TO CAFE/F&B BELOW

VOID TO BAR/F&B BELOW

VOID TO LOADING DOCK BELOW

VOID TO WASTE ROOM BELOW

VOID TO SUBSTATION BELOW

001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020 021 022 023 024 025 026 027 028 029 030 031 032 033 034 035 036 037

042 043 044 045 046 047 048 049 050 051 052 053 054 055 056 057 058 059 060 061 062 063 064 065 066 067 068 069 070 071 072 073 074 075 076 077 078 079 080 081 082 083 084 085 086 087 088 089 090 091 092 093

039 038

FS 1 FS 2 FS 3 FS 4 FS 5 FS 6 FS 8

FAN ROOM

3 MOTORCYCLE SPACES (16 TOTAL)

6200

LIFT 1 LIFT 2 LIFT 3 LIFT 4 LIFT 5 LIFT LOBBY

P 041 P 040

PARKING L01
3413 m²
RL 81.70

2 MOTORCYCLE SPACES (16 TOTAL)

5 ACCESSIBLE SPACES (14 TOTAL)

STORAGE CAGES

TO L02 1:8 1:5 UP FROM GROUND

FROM L02 1:8 1:5 DOWN TO GROUND

RL 81.70

44 BIKE SPACES TOTAL (STACKER SYSTEM)

PUMP ROOM

TURNING BAY

MALE EOT 58 m²

ACC 8 m²

FEMALE EOT 68 m²

SWITCH ROOM

CARPARK ENTRY 3000

CARPARK EXIT 3000

PERFORATED SECURITY DOOR

CARPARK ACCESS

PLENUM

17-19 LEXINGTON DRIVE
BELLA VISTA
3 STOREY COMMERCIAL

PROPOSED DEVELOPMENT DASHED
DA 1083/2020/JP

1 A0301 1 A0203 1 A0300 1 A0303 1 A0200 1 A0302 1 A0201 1 A0202

PARKING SUMMARY

STANDARD SPACES	88
ACCESSIBLE SPACES	5
TOTAL	93
MOTORCYCLE SPACES	4
BIKE SPACES	42

Overall Parking - PP

Level	Count
BASEMENT 01	170
GROUND	111
LEVEL 01	93
LEVEL 02	129
LEVEL 03	132
	635

NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

LEGEND

CLOUD LEGEND
REVISION ON HOLD

KEY PLAN
0 10 m

CLIENT
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KOICHI TAKADA ARCHITECTS

PROJECT
21-23 LEXINGTON DRIVE
BELLA VISTA NSW 2153

STATUS
PLANNING PROPOSAL

DWG TITLE
LEVEL 01 PLAN (PARKING)

DATE	09/04/20	DRAWN	AP
SCALE	1:200@A1, 1:400@A3	CHECKED	AC
PROJ NO.	19434	APPROVED	
DWG NO.	PP0101	REVISION	A

NOTES:
DO NOT SCALE FROM DRAWINGS.
VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK.

1-3 MERIDIAN PLACE
BELLA VISTA
2 STOREY COMMERCIAL

7 MERIDIAN PLACE
BELLA VISTA
2 STOREY COMMERCIAL

LEXINGTON DRIVE

10000 DCP SETBACK

PEDESTRIAN EGRESS

BALCONY
FUNCTION ROOM
251 m²

BALCONY
MEETING ROOM
113 m²

1985

BALCONY
FUNCTION ROOM
206 m²

BALCONY
MEETING ROOM
113 m²

BALCONY
GYM
251 m²

20000 DCP SETBACK

001 002 PLANT ROOM 003 004 005 006 007 008 009 010 011 012 013 014 015 016 FAN ROOM

FS 3 FS 7

5 ACCESSIBLE SPACES (14 TOTAL)

6200

017 018 019 020 021 022 023 024 025 026 027 028 029 030 031 032 033 034 035

075 074 073 072 071 070 069 068 067 066 065 064 063 062 061 060 059

FS 5

LIFT 1
LIFT 2
LIFT 3
LIFT 4
LIFT 5

LIFT LOBBY

VOID

PRE FUNCTION SPACE

FS 6

MALE WC
ACC
FEMALE WC

056 057 058

055 054 053 052 051 050 049 048 047 046 045 044 043 042 041 040 039

FS 8

038 037 036

FAN ROOM

6200

PARKING L02
3973 m²
RL 84.50

6200

6200

TO L03

FROM L01

1:8 1:4 UP 1:8

076 077 078 079 080 081 082 083 084 085 086

099 098 097 096 095 094 093 092 091 090 089 088 087

STORAGE CAGES

FROM L03

TO L01

1:8 1:4 DOWN 1:8

100 129 101 128 102 127 103 126 104 125 105 124 106 123 107 122 108 121 109 120 110 119 111 118 112 117 113 116 114 115

6200

5000 DCP SETBACK

12150 SETBACK

17-19 LEXINGTON DRIVE
BELLA VISTA
3 STOREY COMMERCIAL

PROPOSED DEVELOPMENT DASHED
DA 1083/2020/JP

CARPARK ENTRY TO 15-19 LEXINGTON DR.

PARKING SUMMARY

STANDARD SPACES	126
TOTAL	126
MOTORCYCLE SPACES	0

Overall Parking - PP

Level	Count
BASEMENT 01	170
GROUND	111
LEVEL 01	93
LEVEL 02	129
LEVEL 03	132
	635

NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

LEGEND

CLOUD LEGEND
REVISION
ON HOLD

KEY PLAN
0 10 m

CLIENT
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Sydney, NSW, 2000

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CAPITAL CORPORATION

KOICHI TAKADA ARCHITECTS

PROJECT
21-23 LEXINGTON DRIVE
BELLA VISTA NSW 2153

STATUS
PLANNING PROPOSAL

DWG TITLE
LEVEL 02 PLAN

DATE	09/04/20	DRAWN	AP
SCALE	1:200@A1, 1:400@A3	CHECKED	AC
PROJ NO.	19434	APPROVED	
DWG NO.	PP0102	REVISION	A

1-3 MERIDIAN PLACE
BELLA VISTA
2 STOREY COMMERCIAL

7 MERIDIAN PLACE
BELLA VISTA
2 STOREY COMMERCIAL

SITE BOUNDARY

LEXINGTON DRIVE

10000
DCP SETBACK

PEDESTRIAN EGRESS

001 002 003 004 005 006 007 008 009 010 011 012 013 FS 7 014 015 016 017 018 019 SERVICES

020 021 022 023 024 025 026 027 028 029 030 031 032 033 034 035 036 037 038

3 MOTORCYCLE SPACES (16 TOTAL)

6200

VOID TO MEETING ROOM BELOW

VOID TO MEETING ROOM BELOW

VOID TO SEMINAR / FUNCTION ROOM BELOW

VOID TO LEVEL BELOW

VOID TO MEETING ROOM BELOW

VOID TO GYM BELOW

FS 5

FS 6

FS 8

074 073 072

071 070 069 068

065 064 063 062

059 060 061

058 057 056 055 054 053 052 051 050 049 048 047 046 045 044 043 042

041 040 039 SERVICES

LIFT 1
LIFT 2
LIFT 3
LIFT 4
LIFT 5
LIFT LOBBY

P 067
P 066

6200

PARKING L03
3987 m²
RL 87.30

2 MOTORCYCLE SPACES (16 TOTAL)

075 076 077 078 079 080 081 082 083 084 085 086 087 088 089

102

UP
FROM L02

DOWN
TO L02

STORAGE CAGES

101 100 099 098 097 096 095 094 093 092 091 090

6200

103 104 105 106 107 108 109 110 111 113 114 115 116 117
132 131 130 129 128 127 126 125 124 122 121 120 119 118

6200

6200

20000
DCP SETBACK

5000
DCP SETBACK

12150
SETBACK

1 A0301
1 A0203
1 A0300
1 A0303
1 A0200
1 A0302
1 A0201
1 A0202

17-19 LEXINGTON DRIVE
BELLA VISTA
3 STOREY COMMERCIAL

PROPOSED DEVELOPMENT DASHED
DA 1083/2020/JP

CARPARK ENTRY
TO 15-19
LEXINGTON DR.

PARKING SUMMARY

STANDARD SPACES	132
TOTAL	132
MOTORCYCLE SPACES	5

Overall Parking - PP

Level	Count
BASEMENT 01	170
GROUND	111
LEVEL 01	93
LEVEL 02	129
LEVEL 03	132
	635

NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

LEGEND

CLOUD LEGEND
REVISION
ON HOLD

KEY PLAN
0 10 m

CLIENT
Capital Corporation Pty Ltd
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KOICHI TAKADA ARCHITECTS

PROJECT
21-23 LEXINGTON DRIVE
BELLA VISTA NSW 2153

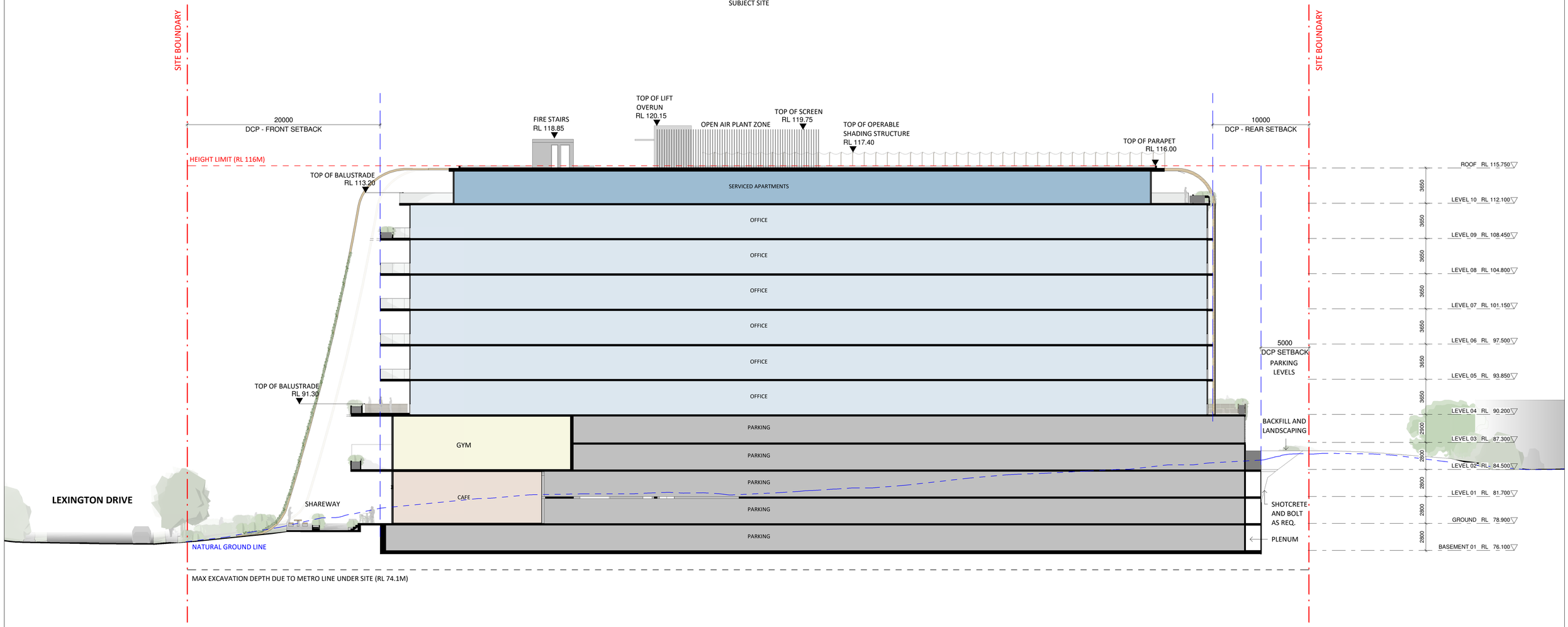
STATUS
PLANNING PROPOSAL

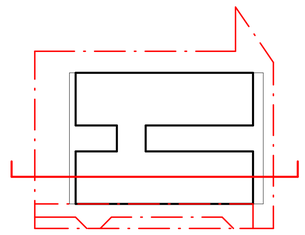
DWG TITLE
LEVEL 03 PLAN (PARKING)

DATE	09/04/20	DRAWN	AP
SCALE	1:200@A1, 1:400@A3	CHECKED	AC
PROJ NO.	19434	APPROVED	
DWG NO.	PP0103	REVISION	A

21-23 LEXINGTON DRIVE
SUBJECT SITE

7 MERIDIAN PLACE





NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

NO. | REVISION | BY | CHK | DATE | NO. | REVISION | BY | CHK | DATE | NO. | REVISION | BY | CHK | DATE

LEGEND

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REVISION
ON HOLD

KEY PLAN
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BELLA VISTA NSW 2153

STATUS
PLANNING PROPOSAL

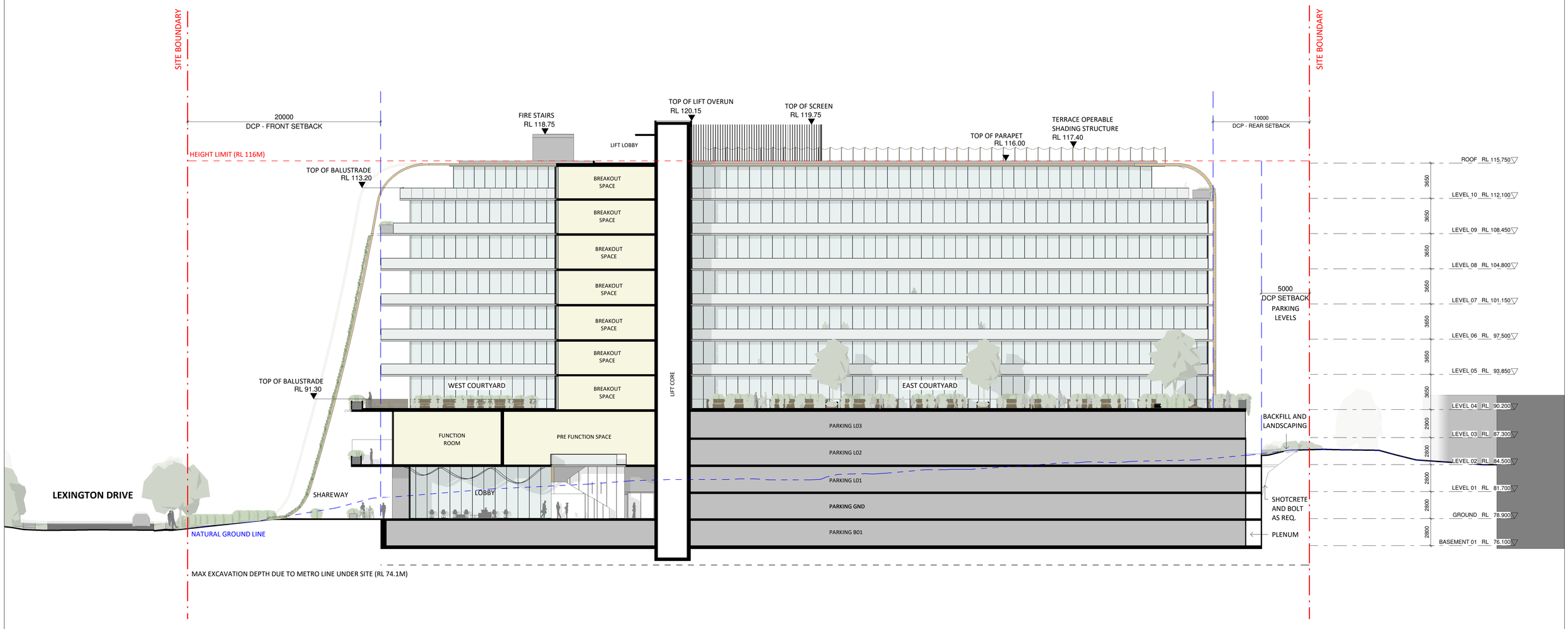
DWG TITLE
SECTION 01

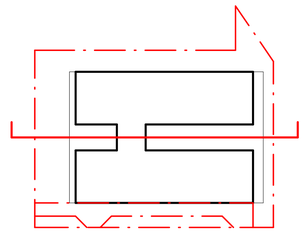
DATE	09/04/20	DRAWN	AP
SCALE	1:200@A1, 1:400@A3	CHECKED	AC
PROJ NO.	19434	APPROVED	
DWG NO.	PP0300	REVISION	A

NOTES:
DO NOT SCALE FROM DRAWINGS.
VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK.

21-23 LEXINGTON DRIVE
SUBJECT SITE

7 MERIDIAN PLACE





NO.	REVISION	BY	CHK	DATE
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STATUS
PLANNING PROPOSAL

DWG TITLE
SECTION 02

DATE	09/04/20	DRAWN	AP
SCALE	1:200@A1, 1:400@A3	CHECKED	AC
PROJ NO.	19434	APPROVED	
DWG NO.	PP0301	REVISION	A

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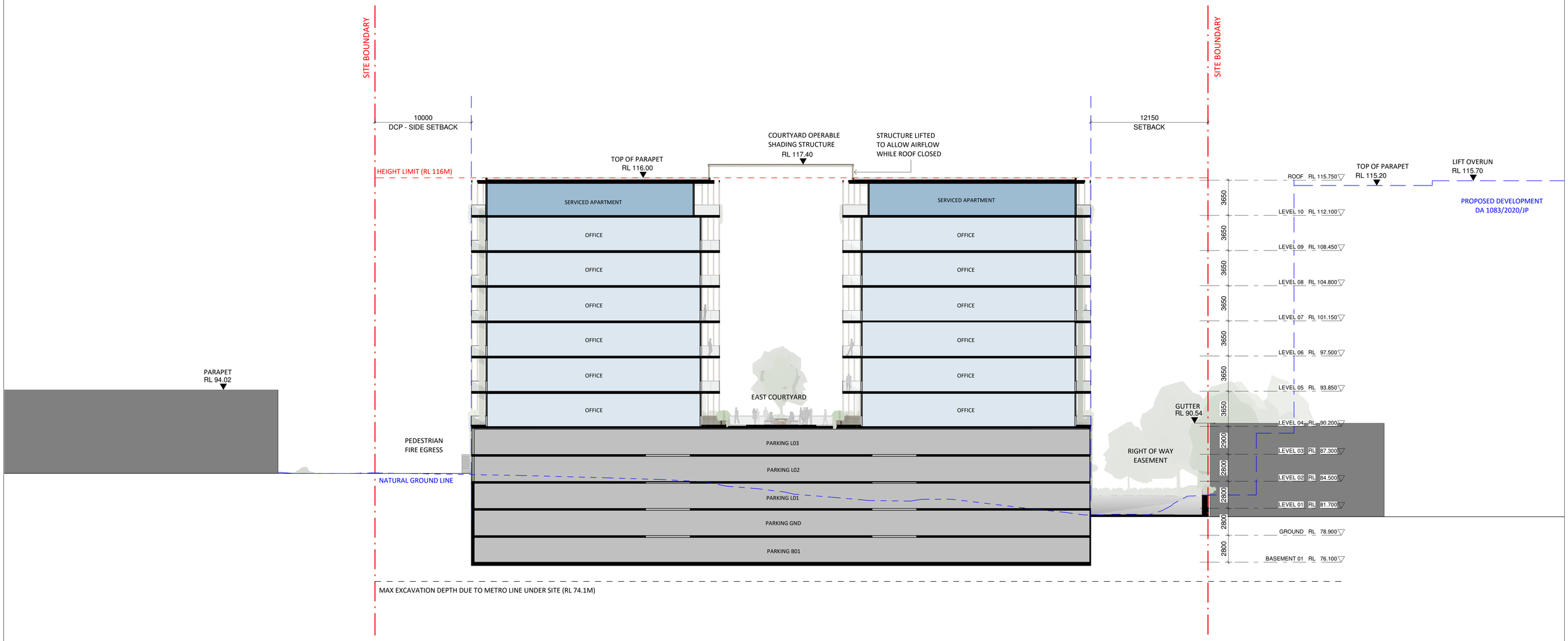
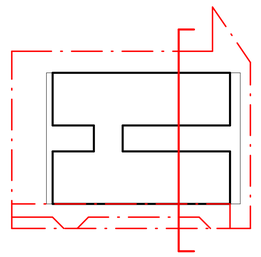
1-3 MERIDIAN PLACE

21-23 LEXINGTON DRIVE
SUBJECT SITE

15-19 LEXINGTON DRIVE





NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

LEGEND

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STATUS
PLANNING PROPOSAL

DWG TITLE
SECTION 03

DATE	09/04/20
DRAWN	AP
SCALE	1:200@A1, 1:400@A3
CHECKED	AC
PROJ NO.	19434
APPROVED	
DWG NO.	PP0302
REVISION	A

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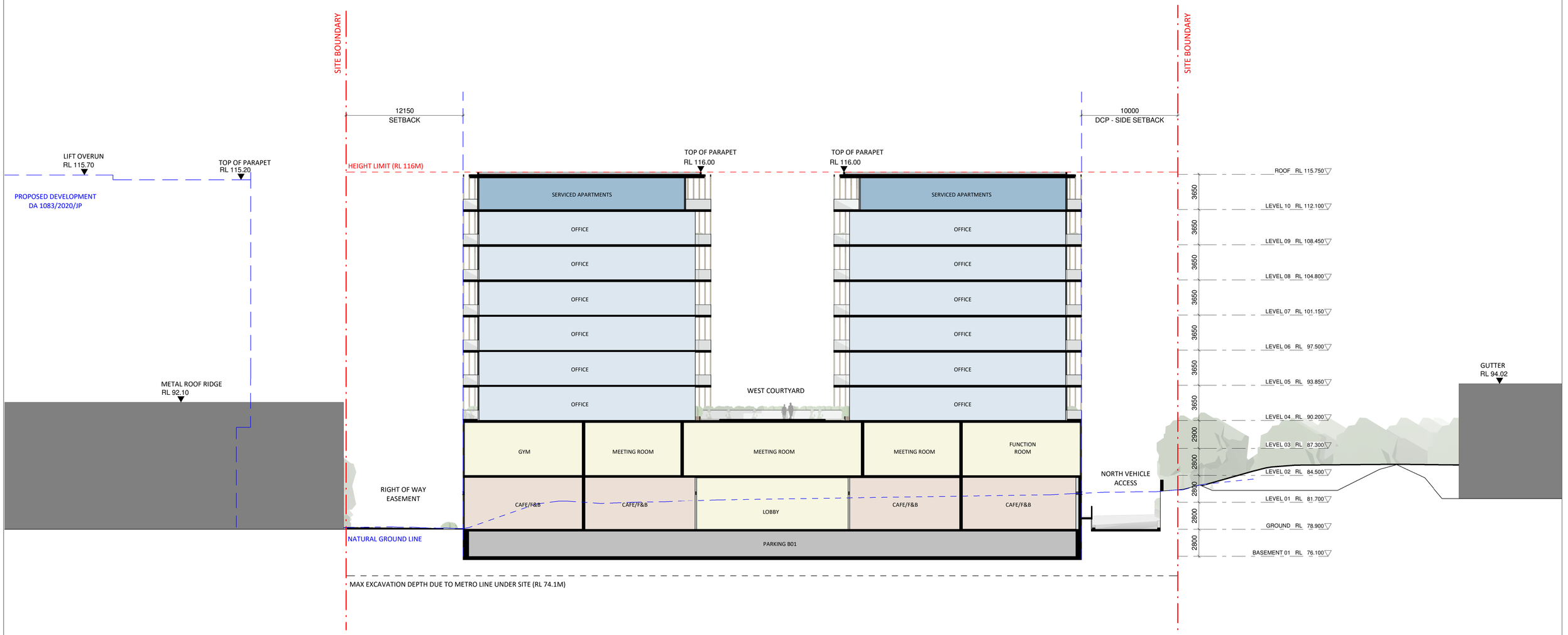
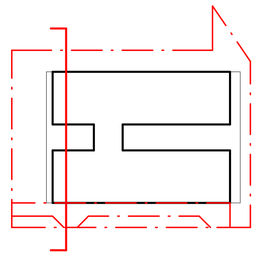
17-19 LEXINGTON DRIVE

21-23 LEXINGTON DRIVE
SUBJECT SITE

1-3 MERIDIAN PLACE





NO.	REVISION	BY	CHK	DATE
A	PLANNING PROPOSAL	AP	AC	09/04/20

LEGEND

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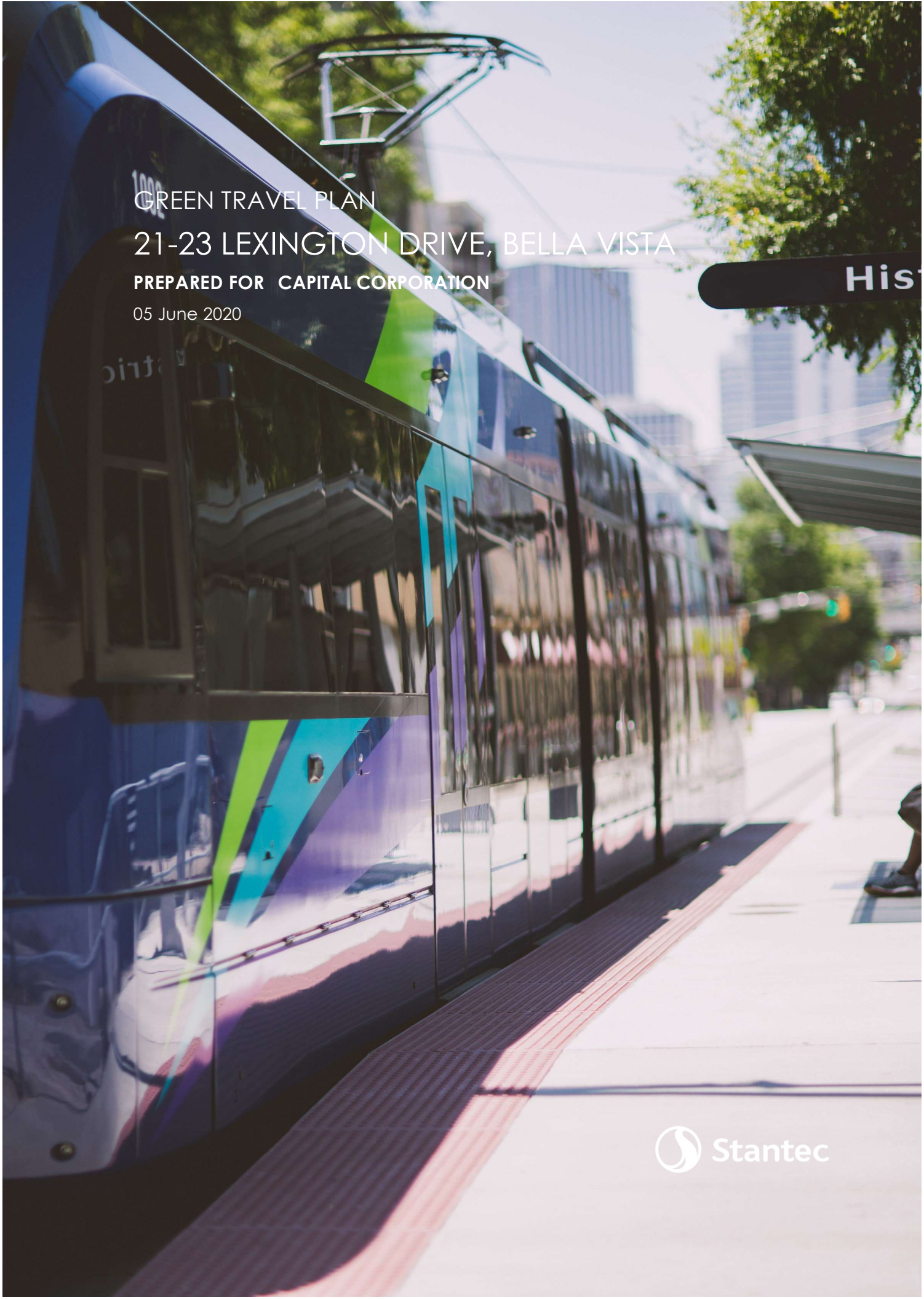
STATUS
PLANNING PROPOSAL

DWG TITLE
SECTION 04

DATE	09/04/20
DRAWN	AP
SCALE	1:200@A1, 1:400@A3
CHECKED	AC
PROJ NO.	19434
APPROVED	
DWG NO.	PP0303
REVISION	A

Appendix B Green Travel Plan



GREEN TRAVEL PLAN

21-23 LEXINGTON DRIVE, BELLA VISTA

PREPARED FOR CAPITAL CORPORATION

05 June 2020

Stantec

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

QUALITY STATEMENT

PROJECT MANAGER	PROJECT TECHNICAL LEAD
Manoj Sharma	Fred Gennaoui

PREPARED BY		
Sunny Hong		05/06/20
CHECKED BY		
Fred Gennaoui		05/06/20
REVIEWED BY		
Fred Gennaoui		05/06/20
APPROVED FOR ISSUE BY		
Fred Gennaoui		05/06/20

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
1.0	17/04/20	Final	SH	FG	FG	FG
2.0	21/04/20	Final 2	SH	FG	FG	FG
3.0	05/06/20	Final 3	SH	FG	FG	FG

Capital Corporation

21-23 Lexington Drive, Bella Vista

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. Introduction

Capital Corporation proposes to construct a 10-storey mixed use development at 21-23 Lexington Drive, Bella Vista. The proposal will have a total gross floor area (GFA) of 27,692m^2 as set out below in **Table 1-1** below:

Table 1-1: Proposed Yield Schedule

Land Use	Proposed GFA (m^2)	Notes
Commercial	23,541	
Food and beverage	800	Open to public
Serviced Apartments	3,100	58 units + 4 staff[1]
Gymnasium	251	Open to public
Total	**27,692**	

A seven-level car park is proposed on-site, accommodating a total of 635 car parking spaces. Vehicular access to the site is proposed to be provided via two separate driveways. A northern driveway will provide direct access to the Ground Floor, whilst the existing southern access will provide access to Level 1. This existing southern driveway will also be shared with the adjacent development (13-19 Lexington Drive). The car park will also accommodate a bicycle parking area.

A ground level pick-up / drop-off area will be provided along the front of the site, allowing a safe area for taxi services and emergency vehicles to access the site.

Loading and servicing areas will be provided on-site, and will be designed to allow for heavy vehicles to enter and exit the site in a forward direction via the existing vehicle access.

The purpose of this document is to establish the framework, objectives, targets, structure and systems for an operational Green Travel Plan for the site and associated development. The Green Travel Plan is structured as follows:

- Description of the existing sustainable transport facilities and services;
- The aim of the travel plan;
- Outlining of the targets;
- Actions to be implemented;
- Strategy for promoting and marketing the actions;
- Commitment and resources;
- Monitoring and review; and
- Governance and support.

The Green Travel Plan Initiatives are set out in the following sections.

[1] It has been assumed that four staff will be sufficient to serve the needs to 58 serviced apartment units.

2. Existing Sustainable Transport Options

The site has excellent access to sustainable transport facilities in the vicinity of the site, including bus services and walking and cycling facilities. The following discusses the existing facilities and services available to users of the site.

2.1 Sydney Metro

The Bella Vista Metro Station is located approximately 550 metres walking distance to the north of the site. The station serves the Sydney Metro Northwest line, which runs from Tallawong Station in the north west to Chatswood toward the south east. The line will eventually connect to the City and Southwest lines, understood to be operational in 2024. The Metro connects with the Sydney Rail Network via interchanges at both Epping and Chatswood. **Figure 2-1** shows the route of the Sydney Metro Northwest line:

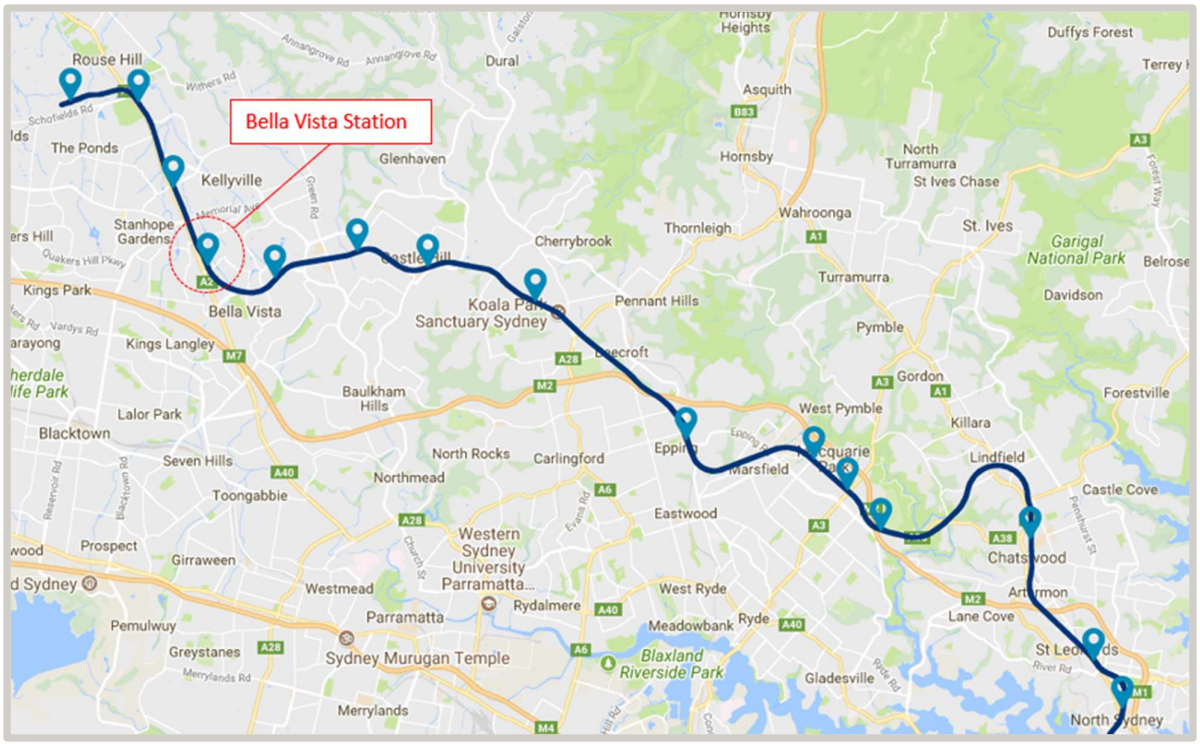

Figure 2-1: Sydney Metro Norwest Line

Key features of the Bella Vista Metro Station include:

- 800 commuter parking spaces;
- Bicycle parking and storage for 35 bicycles;
- 24 motorcycle spaces;
- Kiss and ride bays;
- A dedicated taxi rank; and
- Bus stops along Mawson Avenue directly in front of the station at the ground level.

2.2 Buses

The following bus routes that operate in the vicinity of the site are also illustrated in **Figure 2-2**:

- **Route 602X** – Bella Vista Station to North Sydney;
- **Route 607X** – Bella Vista Station to City QVB;
- **Route 607N** – Tallawong Station to City QVB via North West T-Way and M2 (Night service);
- **Route 664** – Rouse Hill Station to Parramatta via Kellyville;
- **Route 715** – Rouse Hill Station to Seven Hills via Kellyville and Norwest; and

- **Route 745** – Norwest Hospital to St Marys via Stanhope Gardens (**Figure 2-3**).

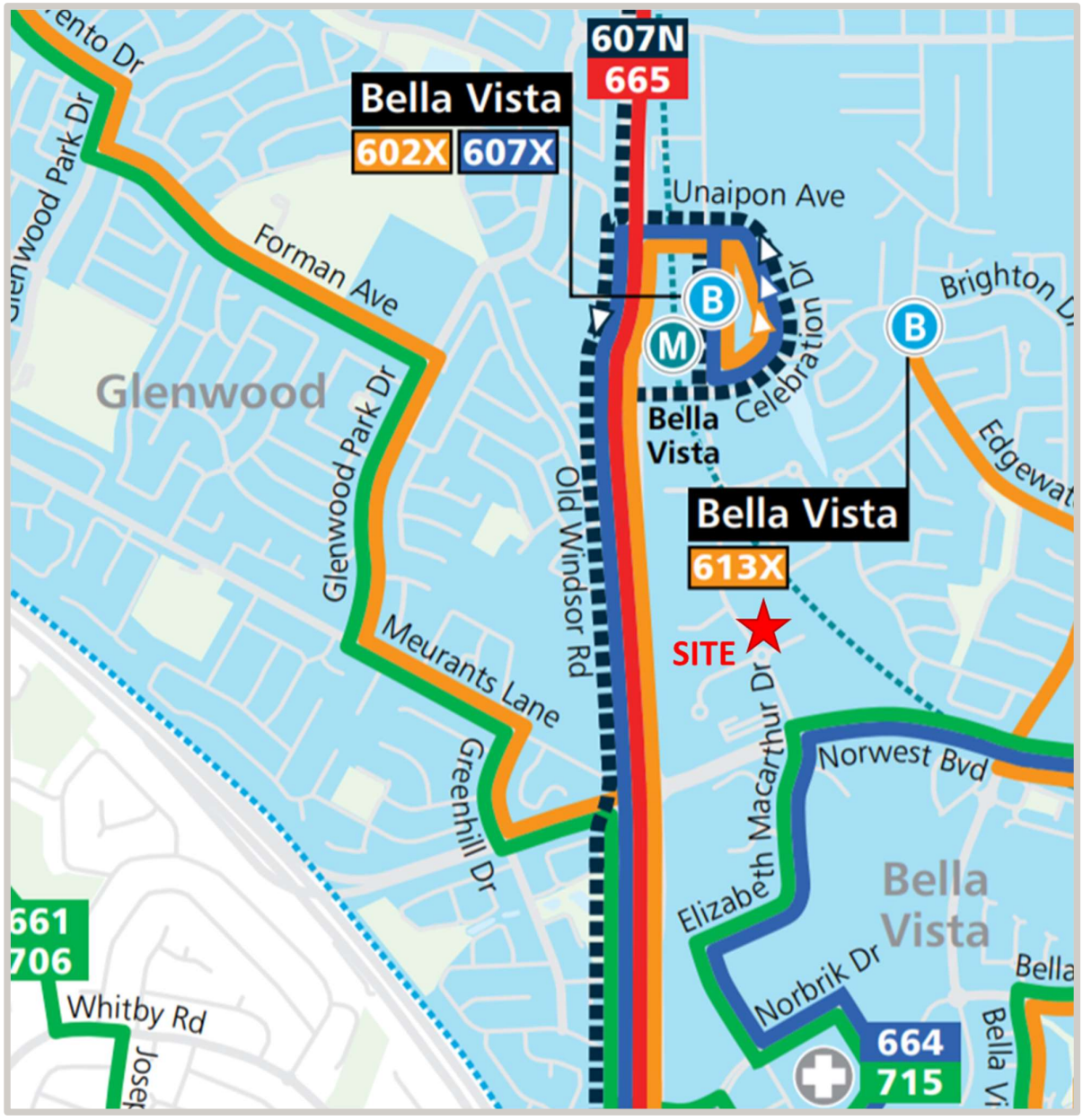

Figure 2-2: Bus Services Operating in Vicinity of Site

The site also lies within the metro-connect on demand area, which operates as follows:

- Patrons download an app and order an on-demand bus service which takes them from a virtual stop within the service to one of three metro stations (Bella Vista, Norwest or Hills Showground);
- The service operates between Monday to Friday from 6:00am to 10:00am, and from 4:00pm to 9:00pm; and
- The service is cheap, starting at just over $2 for a standard fare or just over $1 for a concession holder.

The metro-connect on demand area is shaded in light blue in **Figure 2-2**.

The closest bus stops are located on Lexington Drive along the site frontage, and services the 745 route illustrated in **Figure 2-3**.

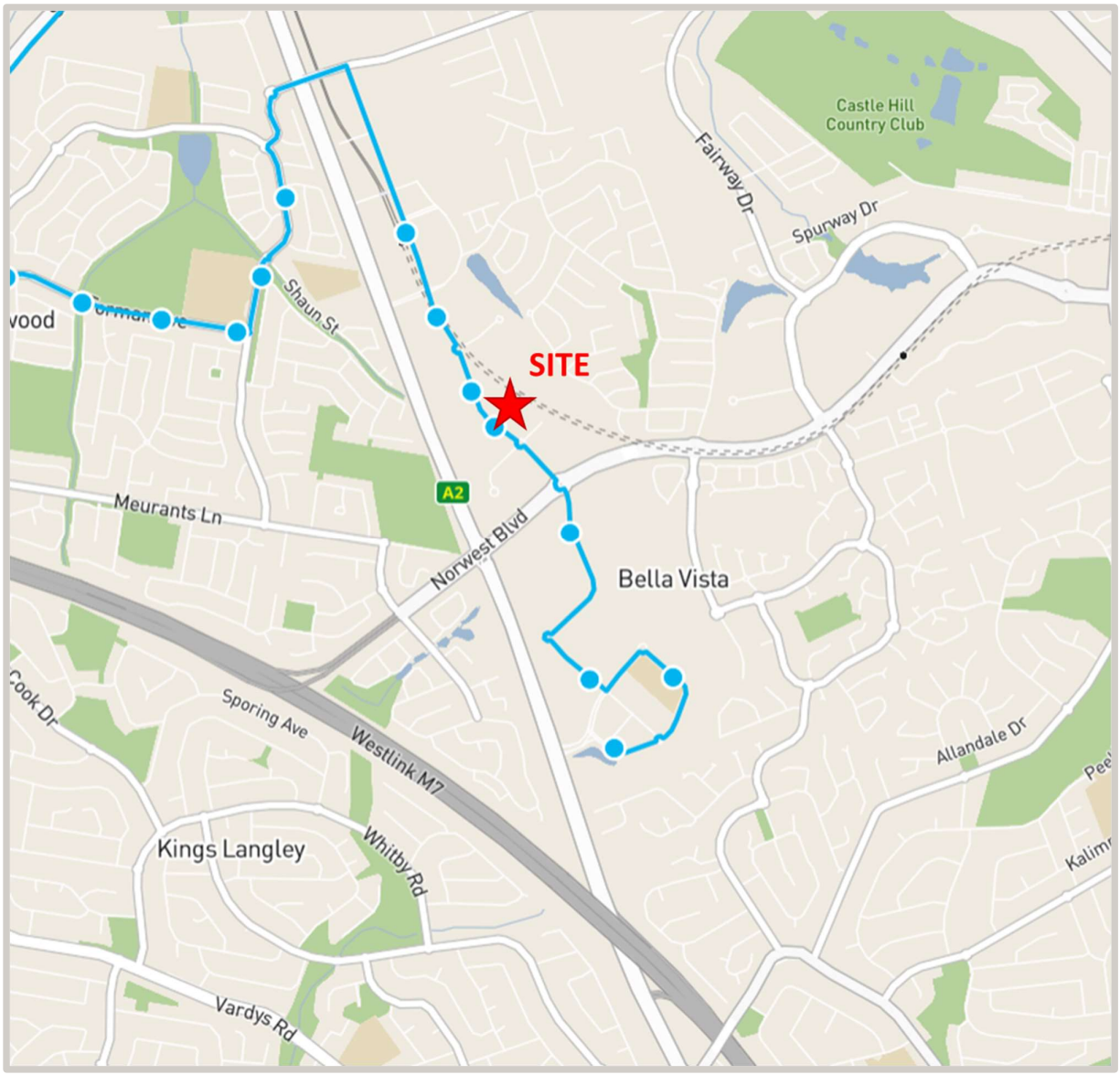

Figure 2-3: Bus Route 745

Bus stops are located on both sides of Norwest Boulevard to the southeast of the site, an approximate 300 metre walking distance from the site. The bus stops accessed by the buses servicing the Bella Vista Metro Station access the bus stops located within the station, approximately 550 metres walking distance from the site.

The timetables for each of these routes are constantly being reviewed, however it is understood that each of these services (except for the 607N night service) operate with regularity during both the AM and PM peak hours during the week.

The North West T-Way operates along the western side of Old Windsor Road, crossing to the eastern side to the north of Celebration Drive. The nearest T-Way bus stop to the site is located approximately 700 metres walking distance, opposite Celebration Drive.

2.3 Walking and Cycling

Pedestrian footpaths are located along Lexington Drive, Celebration Drive, Norwest Boulevarde, and the streets surrounding the site.

Designated bicycle routes are located in the nearby residential area along Northbridge Avenue, Brighton Drive and other local roads. The bicycle network map from RMS is shown below in **Figure 2-4**.

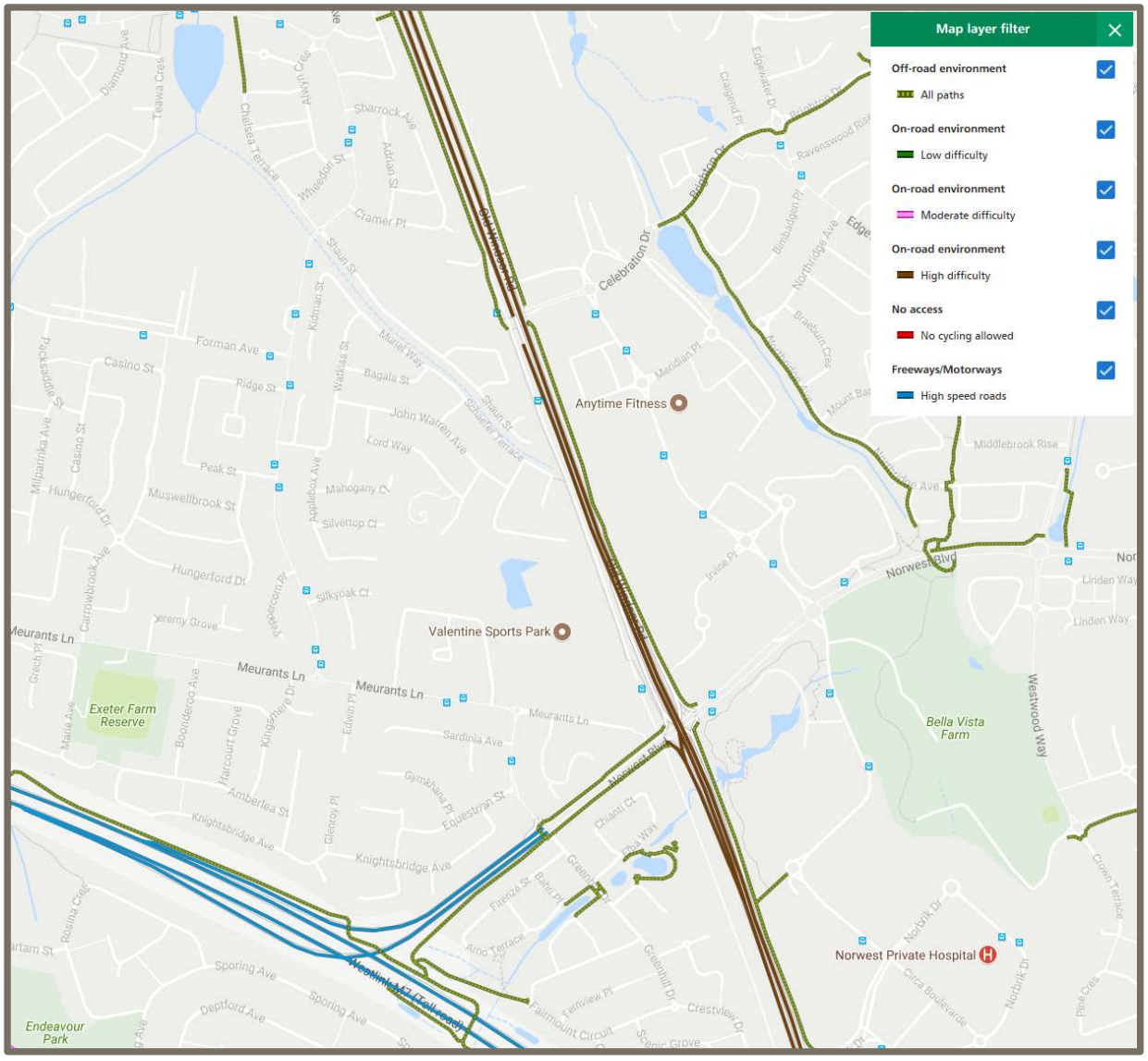

Figure 2-4: RMS Bicycle Network Map (Source: RMS Cycleway Finder)

3. Aim

The overall aim of the Green Travel Plan is to limit the number of staff who require access to their own private motor vehicle to travel to work by facilitating alternatives such as public transport, cycling, walking and car sharing.

Green Travel Plans have the potential to increase the use of walk, cycle and public transport modes for a range of trip types and can provide the following benefits:

- Reduce the need to provide parking (reducing costs associated with providing parking and helping to create more affordable housing outcomes);
- Contribute to corporate social responsibility relating to the triple bottom line, and improve corporate image as an innovative and environmentally-aware organisation;
- Help to attract and retain staff (reducing costs associated with staff turnover);
- Contribute to a healthier, happier and more active workplace (reducing costs associated with sick days and an unhealthy, unproductive workforce) by promote healthy forms of transport through walking and cycling trips;
- Create opportunities for healthier lifestyles and more vibrant, cohesive and accessible communities;
- Provide staff with potential travel cost savings;
- Help to appeal to a new generation of professionals who prioritise location and lifestyle over car ownership;
- Increase the potential market for the development by improving accessibility for those without access to a car;
- Reduce pressures on neighbourhoods through reduced congestion and on-street parking, ultimately improving amenity and the environment; and
- Reduce fuel costs and the reliance on fossil fuels, to reduce carbon emission and greenhouse gases.

The overall aim of the Green Travel Plan is to reduce the number of single occupancy private car trips to and from the site. The following specific objectives have been identified:

- Reduce the overall number of vehicle trips to and from the site;
- Increase carpooling where possible;
- Encourage the use of public transport to the site;
- Promote the use of walking and cycling modes; and
- Make visitors to the site aware of the sustainable transport alternative.

For this development, the targeted travel is that of staff commuting. As this is a daily journey that typically doesn't vary in its length or destination, it is easiest travel habit to change.

4. Targets

The existing travel mode share for the Norwest Business Park has been obtained from the Census data for 2011, which has been provided by the Bureau of Transports within their Journey to Work database. Where a journey to work is comprised of more than one mode, a priority mode is allocated to one of the following hierarchies, which is generally the mode with the largest likely (but not necessarily actual) duration of the trip. The database provided the following travel mode split.

Table 4-1: Existing Travel Mode Share

Mode	Employees	Existing Mode Share
Train	347	2%
Bus	381	2%
Vehicle Driver	14,129	90%
Vehicle Passenger	765	5%
Walked Only	98	0.5%
Other Mode	97	0.5%
Total	**15,717**	**100%**

Using this information as base data, the following targets are to be established for the site:

- Reduce the number of car trips associated with the site by 5% per annum for each year to Year 3 of implementing the Plan (starting when Metro is operational); and
- Increase the number of trips by sustainable transport modes (i.e. public transport, walk, and cycle) associated with the site by 5% per annum for each year to Year 3 of implementing the Plan.

The travel plan is intended to develop a package of site specific measures to promote and maximise the use of sustainable travel modes, including walking, cycling, public transport and car sharing. It will include a review of existing transport choices and sets targets so that the effective implementation of the plan can be assessed. These targets are to be realistic but ambitious enough to initiate substantial behavioural change to achieve the desired outcomes. The plan shall be reviewed regularly as part of an ongoing review to ensure it remains relevant and reflective of current conditions.

5. Green Travel Planning Initiatives

The following sections develop the Green Travel Plan for the site. The Plan is to establish a Travel Plan Management Group comprising at least the building owner, tenant representatives, and the activity operators who will meet regularly, adopting ownership and accountability for the actions, target setting and deliverables. The Plan is expected to be a living document, developed and progressed with the actual performance of the activities, measured and reviewed against the key targets.

5.1 Actions

The following actions are established to contribute achievement of the objectives. Actions are established to provide incentives for using sustainable transport modes.

Table 5-1: Travel Plan Actions

Strategy	Aim	Action
Public Transport Actions		
Travel pass loan schemes	Distribution of free or discounted public transport passes to encourage usage of public transport and help establish new transport habits amongst tenants/ staff	Subject to owner/tenant negotiations and incentives
Public transport for business travel	The commercial space organisation can promote public transport as the first preference for business travel. This should be supported by employees having access to travel passes	Subject to owner/tenant negotiations and incentives
Staff welcome packs	Train and bus timetables relevant to the local area must be included in the pack of information provided to staff upon commencing employment	Green Travel Plan Committee to prepare welcome packs and distribute
Education of available public transport services	Information about public transport routes provided within a prominent location on-site, including maps and timetables	Green Travel Plan Committee to provide on-site
Active Transport Actions		
Provide bicycle parking on-site	Provide bicycle parking on-site in a secure, prominent location, to encourage staff to cycle	Applicant to establish on-site
Provide end of journey facilities	Providing facilities such as showers, change rooms, lockers	Applicant to establish on-site
Education of nearby pedestrian and cyclist facilities	Put up a noticeboard with leaflets and maps showing the main pedestrian and cyclist routes to key destinations	Green Travel Plan Committee to provide on-site
Promote inclusion with advertised events	Promote sustainable transport events such as Ride to Work Day and Walk to Work Day	Green Travel Plan Committee to promote
Minimising Car Usage		
Car Sharing	Staff and visitors are encouraged to use a shared car (e.g. GoGet) to reduce the need for	Organise 'car sharing' arrangements with service providers

Strategy	Aim	Action
	individuals to own their own vehicle	Six (6) car share spaces will be provided on-site.
Carpooling	Establish a car pooling program to help people find someone to share in their daily commute	Prepare information sheets
Other Actions		
Flexible working hours	Allowing staff the flexibility to commute outside peak periods to reduce overall congestion and travel time	Manage staff rosters, and develop work-from-home policies and procedures, where possible

6. Monitoring and Review

6.1 Strategy for Promoting and Marketing the Actions

The Travel Plan Management Group appoints a Travel Plan Coordinator to prepare a promotional and marketing strategy, including actions to support and drive the Green Travel Plan. In particular, the key responsibilities of the Travel Plan Coordinator will include:

- Coordinating implementation efforts;
- Conducting surveys or other data collection processes to measure progress;
- Communicating the travel plan to stakeholders;
- Coordinating events to promote awareness of the plan and associated initiatives; and
- Coordinating marketing and promotional programs.

The Coordinator is also to be responsible for monitoring, reviewing and updating the travel plan over time. It is likely that coordinators will require assistance from 'champions' to promote specific actions and encourage the uptake of initiatives.

6.2 Commitment of Resources

The establishment of a Green Travel Plan is to include financial support and human resources to allow for implementation, monitoring, review and continual improvement of the Travel Plan.

The Travel Plan will require funding to support implementation. Relevant infrastructure, such as cycle parking and showers, are to be provided (if not already provided) through the development of Actions and their implementation. The Travel Plan should identify existing and additional resources required to successfully implement the plan.

The Travel Plan Coordinator is to prepare an annual plan of financial commitment and resource allocation to be reviewed, considered and adopted by the Green Travel Plan Committee.

6.3 Monitoring and Review

Monitoring and reviewing a travel plan is one of the most critical components of the process, and sets out a systematic approach to measuring the impact of the travel plan. It is crucial to understand whether and how the travel plan is having an impact on mode share. The travel plan will be reviewed yearly to track progress with regards to implementation of actions and achievement of goals.

An annual travel survey of staff and visitors will be undertaken to firstly establish a baseline level of performance. The results of successive surveys are to be maintained in the Appendices (Refer Appendix A example) to the Travel Plan for continued progress monitoring and evaluation.

The results of this survey will be published in an annual report to the Green Travel Plan Committee. It will detail progress against objectives and targets, and will seek to answer the following:

- Are the targets still realistic? Are they still ambitious? Should they be updated?
- Is the building struggling to achieve particular targets? What are the likely reasons for this?
- Are there any gaps with regards to actions?
- What is preventing further improvement on mode share, and how can this be addressed?

The annual report will identify any modifications to the travel plan that are needed, such as revision of objectives or targets, or the addition or alteration of measures.

Initially, the Travel Plan Coordinator will be responsible for implementing the survey however this will eventually become the responsibility of the Travel Plan Management Group.

The steps outlined above should not be considered as a linear process, but rather an on-going cycle. Travel planning requires regular review and adjustment – a review may reveal the need to reconsider objectives or targets, or to add new actions to create greater incentives for the uptake of sustainable transport choices.

6.4 Governance Support

Governance support for the Travel Plan Coordinator is to be provided by the Green Travel Plan Committee. The committee is in effect a "Board". It shall therefore comprise:

- Key persons with an interest in the business, its efficient and effective operation;
- To enable the implementation of measures that may require works on the site, the committee should also include representation from the landlord or property owner representative;
- To provide for the application of the Plan in an everyday operational sense, the Travel Plan Coordinator should ideally be a person with operational responsibility and/or interface; and
- Specialist expertise may be incorporated within the committee, seconded as required or engaged in relation to specific tasks or undertakings.

Responsibilities of the Green Travel Plan Coordinator will include:

- Coordinating implementation efforts;
- Conducting surveys or other data collection processes to measure progress;
- Communicating the travel plan to stakeholders;
- Coordinating events to promote awareness of the plan and associated initiatives; and
- Coordinating marketing and promotional programs.

The Green Travel Plan Coordinator or Management Group will be required to oversee the implementation of the actions of the Travel Plan. These might not all be implemented at the same time but may be staged over time as appropriate. There may be some crucial actions that are implemented immediately while others might take longer to plan and develop.

Before implementing actions, it is a key responsibility of the Green Travel Plan Coordinator to make sure relevant stakeholders are on board. For example, if the Green Travel Plan involves reviewing company policies and proposing changes, relevant members of the senior management team will need to be on board to sanction and approve such changes.

Appendices

Appendix A Annual and Progress Monitoring, Survey and Review Results (to be appended)

Appendix C Guidelines for Evaluation of Intersection Capacity

Guidelines for Evaluation of Intersection Operation

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

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

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

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

(d) Cycle length (traffic signals)

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

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

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

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

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

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

Table C3: Level of Service Criteria for Intersections

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

The figures in **Table C3** are intended as a guide only. Any particular assessment should take into account site-specific factors including 95th percentile queue lengths (and their effect on lane blocking), the influence of nearby intersections and the sensitivity of the location to delays. In many situations, a comparison of the current and future average delay provides a better appreciation of the impact of a proposal, and not simply the change in the level of service.

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

Although in some situations additional traffic does not alter the level of service, particularly where the level of service is 'E' or 'F', additional capacity may still be required. This is particularly appropriate for LoS 'F', where small increases in flow can cause disproportionately greater increases in delay. In this situation, it is advisable to consider means of control to maintain the existing level of absolute delay. Suggested criteria for the evaluation of the capacity of signalised intersections based on the DoS are summarised in **Table C4**.

Table C4: Criteria for Evaluating Capacity of Signalised Intersections

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

Appendix D SIDRA Outputs

MOVEMENT SUMMARY

Site: 101A [Existing - AM Peak - Lexington Drive & Meridian Place]

Network: N101 [Existing AM Peak]

Existing AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	56	0.0	55	0.0	0.258	6.6	LOS A	1.6	11.6	0.36	0.52	0.36	19.7
2	T1	159	5.3	156	5.3	0.258	3.6	LOS A	1.6	11.6	0.36	0.52	0.36	44.5
3	R2	107	2.0	105	2.0	0.258	8.0	LOS A	1.6	11.6	0.36	0.52	0.36	44.2
3u	U	15	21.4	14	21.5	0.258	10.2	LOS A	1.6	11.6	0.36	0.52	0.36	38.8
Approach		337	4.1	330 N1	4.1	0.258	5.8	LOS A	1.6	11.6	0.36	0.52	0.36	33.8
East: Meridian Place														
4	L2	94	1.1	94	1.1	0.275	9.2	LOS A	2.0	14.3	0.91	0.89	0.91	27.1
5	T1	3	0.0	3	0.0	0.275	15.8	LOS B	2.0	14.3	0.91	0.89	0.91	17.0
6	R2	58	1.8	58	1.8	0.275	13.7	LOS A	2.0	14.3	0.91	0.89	0.91	38.0
6u	U	1	0.0	1	0.0	0.275	15.5	LOS B	2.0	14.3	0.91	0.89	0.91	38.6
Approach		156	1.4	156	1.4	0.275	11.0	LOS A	2.0	14.3	0.91	0.89	0.91	31.0
North: Lexington Drive														
7	L2	242	0.0	242	0.0	0.803	5.6	LOS A	11.5	81.1	0.78	0.62	0.82	39.3
8	T1	754	1.3	754	1.3	0.803	5.6	LOS A	11.5	81.1	0.78	0.62	0.82	34.3
9	R2	53	0.0	53	0.0	0.803	15.4	LOS B	11.5	81.1	0.78	0.62	0.82	18.3
9u	U	19	11.1	19	11.1	0.803	12.3	LOS A	11.5	81.1	0.78	0.62	0.82	43.1
Approach		1067	1.1	1067	1.1	0.803	6.2	LOS A	11.5	81.1	0.78	0.62	0.82	32.2
West: 24-32 Lexington Drive														
10	L2	21	0.0	21	0.0	0.068	1.6	LOS A	0.4	2.5	0.48	0.32	0.48	18.1
11	T1	8	0.0	8	0.0	0.068	1.6	LOS A	0.4	2.5	0.48	0.32	0.48	17.5
12	R2	42	0.0	42	0.0	0.068	1.6	LOS A	0.4	2.5	0.48	0.32	0.48	14.8
12u	U	1	0.0	1	0.0	0.068	1.6	LOS A	0.4	2.5	0.48	0.32	0.48	22.8
Approach		73	0.0	73	0.0	0.068	1.6	LOS A	0.4	2.5	0.48	0.32	0.48	16.3
All Vehicles		1633	1.7	1626 N1	1.7	0.803	6.4	LOS A	11.5	81.1	0.70	0.62	0.72	30.3

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

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

MOVEMENT SUMMARY

Site: 104A [Existing - AM Peak - Lexington Drive & Woolworths Way]

Network: N101 [Existing AM Peak]

Existing AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	125	1.7	123	1.7	0.862	4.2	LOS A	18.7	133.0	0.81	0.51	0.81	38.5
2	T1	509	3.1	499	3.1	0.862	4.2	LOS A	18.7	133.0	0.81	0.51	0.81	31.4
3	R2	655	0.2	641	0.2	0.862	10.2	LOS A	18.7	133.0	0.81	0.51	0.81	26.9
3u	U	11	20.0	10	20.0	0.862	11.0	LOS A	18.7	133.0	0.81	0.51	0.81	31.4
Approach		1300	1.6	1273[N1]	1.6	0.862	7.3	LOS A	18.7	133.0	0.81	0.51	0.81	29.5
East: Woolworths Way														
4	L2	43	2.4	43	2.4	0.037	1.5	LOS A	0.2	1.8	0.57	0.33	0.57	17.8
5	T1	4	0.0	4	0.0	0.021	2.1	LOS A	0.1	0.9	0.59	0.36	0.59	29.5
6	R2	11	10.0	11	10.0	0.021	2.3	LOS A	0.1	0.9	0.59	0.36	0.59	18.3
6u	U	3	0.0	3	0.0	0.021	2.1	LOS A	0.1	0.9	0.59	0.36	0.59	23.1
Approach		61	3.4	61	3.4	0.037	1.7	LOS A	0.2	1.8	0.58	0.34	0.58	19.7
North: Lexington Drive														
7	L2	338	0.3	338	0.3	0.917	32.9	LOS C	21.3	152.5	1.00	1.65	2.39	13.7
8	T1	261	5.6	261	5.6	0.917	31.4	LOS C	21.3	152.5	1.00	1.65	2.39	11.3
9	R2	58	0.0	58	0.0	0.917	35.6	LOS C	21.3	152.5	1.00	1.65	2.39	22.1
9u	U	6	0.0	6	0.0	0.917	37.5	LOS C	21.3	152.5	1.00	1.65	2.39	11.3
Approach		663	2.4	663	2.4	0.917	32.6	LOS C	21.3	152.5	1.00	1.65	2.39	13.7
West: Irvine Place														
10	L2	3	0.0	3	0.0	0.079	13.7	LOS A	0.6	4.4	0.99	0.85	0.99	24.9
11	T1	2	0.0	2	0.0	0.079	17.8	LOS B	0.6	4.4	0.99	0.85	0.99	23.4
12	R2	20	10.5	20	10.5	0.079	18.8	LOS B	0.6	4.4	0.99	0.85	0.99	24.9
12u	U	1	0.0	1	0.0	0.079	20.0	LOS B	0.6	4.4	0.99	0.85	0.99	34.8
Approach		26	8.0	26	8.0	0.079	18.2	LOS B	0.6	4.4	0.99	0.85	0.99	25.2
All Vehicles		2051	2.0	2023[N1]	2.0	0.917	15.6	LOS B	21.3	152.5	0.87	0.89	1.32	22.5

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

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

MOVEMENT SUMMARY

Site: 105A [Existing - AM Peak - Norwest Boulevard & Lexington Drive]

Network: N101 [Existing AM Peak]

Existing AM Peak
Site Category: (None)
Roundabout Metering

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Elizabeth Macarthur Drive														
1	L2	11	10.0	11	10.0	0.024	8.9	LOS A	0.1	0.9	0.75	0.65	0.75	49.8
2	T1	214	0.5	214	0.5	0.441	9.0	LOS A	3.8	27.7	0.96	0.89	1.01	39.5
3	R2	87	12.0	87	12.0	0.441	15.0	LOS B	3.8	27.7	0.96	0.89	1.01	48.2
3u	U	1	0.0	1	0.0	0.441	16.5	LOS B	3.8	27.7	0.96	0.89	1.01	47.3
Approach		313	4.0	313	4.0	0.441	10.7	LOS A	3.8	27.7	0.95	0.88	1.00	43.2
East: Norwest Boulevard														
4	L2	240	2.2	240	2.2	0.878	26.0	LOS B	41.2	298.2	0.95	0.80	1.31	41.9
5	T1	658	4.6	658	4.6	0.878	26.3	LOS B	41.2	298.2	0.95	0.80	1.32	47.3
6	R2	684	1.7	684	1.7	0.878	34.2	LOS C	37.4	266.0	0.95	0.81	1.38	32.5
6u	U	72	1.5	72	1.5	0.878	36.8	LOS C	37.4	266.0	0.95	0.81	1.38	44.3
Approach		1654	2.9	1654	2.9	0.878	30.0	LOS C	41.2	298.2	0.95	0.81	1.35	41.0
North: Lexington Drive														
7	L2	197	5.3	197	5.3	0.234	4.4	LOS A	1.2	9.2	0.62	0.59	0.62	53.6
8	T1	28	7.4	28	7.4	0.234	4.0	LOS A	1.2	9.2	0.62	0.59	0.62	47.7
9	R2	104	3.0	104	3.0	0.146	9.9	LOS A	0.7	4.9	0.60	0.76	0.60	50.0
9u	U	4	25.0	4	25.0	0.146	12.4	LOS A	0.7	4.9	0.60	0.76	0.60	31.4
Approach		334	5.0	333[N1]	5.0	0.234	6.2	LOS A	1.2	9.2	0.62	0.65	0.62	51.7
West: Norwest Boulevard														
10	L2	408	1.5	408	1.5	1.072	148.7	LOS F	71.6	513.6	1.00	2.90	6.15	10.8
11	T1	796	4.9	796	4.9	1.072	142.7	LOS F	71.6	513.6	1.00	2.73	5.93	19.1
12	R2	12	0.0	12	0.0	1.072	144.8	LOS F	49.0	357.3	1.00	2.63	5.81	18.8
12u	U	2	0.0	2	0.0	1.072	147.5	LOS F	49.0	357.3	1.00	2.63	5.81	19.7
Approach		1218	3.7	1218	3.7	1.072	144.7	LOS F	71.6	513.6	1.00	2.79	6.01	16.5
All Vehicles		3518	3.5	3518	3.5	1.072	65.7	LOS E	71.6	513.6	0.94	1.48	2.86	27.0

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

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

MOVEMENT SUMMARY

Site: 103A [Existing - AM Peak - Southern Access]

Network: N101 [Existing AM Peak]

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

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	33	3.2	32	3.2	0.209	5.8	LOS A	0.0	0.2	0.01	0.05	0.01	56.4
2	T1	384	3.6	376	3.6	0.209	0.0	LOS A	0.0	0.2	0.01	0.05	0.01	56.1
3	R2	1	0.0	1	0.0	0.209	10.4	LOS A	0.0	0.2	0.01	0.05	0.01	56.1
Approach		418	3.5	409[N1]	3.5	0.209	0.5	NA	0.0	0.2	0.01	0.05	0.01	56.2
East: Southern Driveway														
4	L2	1	0.0	1	0.0	0.021	9.0	LOS A	0.1	0.5	0.84	0.86	0.84	33.0
6	R2	2	50.0	2	50.0	0.021	34.0	LOS C	0.1	0.5	0.84	0.86	0.84	33.0
Approach		3	33.3	3	33.3	0.021	25.7	LOS B	0.1	0.5	0.84	0.86	0.84	33.0
North: Lexington Drive														
7	L2	4	0.0	4	0.0	0.486	8.1	LOS A	0.8	5.4	0.09	0.04	0.12	57.0
8	T1	737	2.0	737	2.0	0.486	0.3	LOS A	0.8	5.4	0.09	0.04	0.12	57.5
9	R2	40	0.0	40	0.0	0.486	8.2	LOS A	0.8	5.4	0.09	0.04	0.12	57.1
Approach		781	1.9	781	1.9	0.486	0.8	NA	0.8	5.4	0.09	0.04	0.12	57.4
West: Private Access														
10	L2	4	0.0	4	0.0	0.004	6.8	LOS A	0.0	0.1	0.40	0.56	0.40	48.7
12	R2	7	14.3	7	14.3	0.050	23.3	LOS B	0.1	0.9	0.84	0.93	0.84	34.2
Approach		12	9.1	12	9.1	0.050	17.3	LOS B	0.1	0.9	0.68	0.80	0.68	38.4
All Vehicles		1214	2.6	1205[N1]	2.6	0.486	0.9	NA	0.8	5.4	0.07	0.05	0.09	56.5

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.

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

MOVEMENT SUMMARY

Site: 104B [Existing - PM Peak - Lexington Drive & Woolworths Way]

Network: N102 [Existing PM Peak]

Existing PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	25	0.0	25	0.0	0.310	3.6	LOS A	2.2	15.6	0.42	0.46	0.42	41.8
2	T1	313	0.3	311	0.3	0.310	3.6	LOS A	2.2	15.6	0.42	0.46	0.42	35.8
3	R2	47	2.2	47	2.2	0.310	9.6	LOS A	2.2	15.6	0.42	0.46	0.42	28.9
3u	U	16	0.0	16	0.0	0.310	10.0	LOS A	2.2	15.6	0.42	0.46	0.42	35.8
Approach		401	0.5	399[N1]	0.5	0.310	4.6	LOS A	2.2	15.6	0.42	0.46	0.42	35.1
East: Woolworths Way														
4	L2	481	0.0	481	0.0	0.605	10.7	LOS A	7.3	50.9	1.00	1.25	1.32	12.8
5	T1	2	0.0	2	0.0	0.245	7.7	LOS A	1.7	11.9	0.88	0.82	0.88	26.2
6	R2	125	0.8	125	0.8	0.245	7.7	LOS A	1.7	11.9	0.88	0.82	0.88	15.4
6u	U	3	0.0	3	0.0	0.245	7.7	LOS A	1.7	11.9	0.88	0.82	0.88	20.2
Approach		612	0.2	612	0.2	0.605	10.1	LOS A	7.3	50.9	0.97	1.16	1.23	13.5
North: Lexington Drive														
7	L2	18	0.0	18	0.0	0.576	6.1	LOS A	5.0	35.7	0.59	0.50	0.59	25.4
8	T1	691	2.0	690	2.0	0.576	4.4	LOS A	5.0	35.7	0.59	0.50	0.59	30.7
9	R2	5	0.0	5	0.0	0.576	8.8	LOS A	5.0	35.7	0.59	0.50	0.59	43.0
9u	U	7	0.0	7	0.0	0.576	10.7	LOS A	5.0	35.7	0.59	0.50	0.59	30.7
Approach		721	1.9	721	1.9	0.576	4.5	LOS A	5.0	35.7	0.59	0.50	0.59	30.6
West: Irvine Place														
10	L2	26	0.0	26	0.0	0.170	5.5	LOS A	1.0	6.9	0.61	0.71	0.61	32.9
11	T1	4	0.0	4	0.0	0.170	9.6	LOS A	1.0	6.9	0.61	0.71	0.61	28.1
12	R2	129	0.0	129	0.0	0.170	10.0	LOS A	1.0	6.9	0.61	0.71	0.61	32.9
12u	U	1	0.0	1	0.0	0.170	11.9	LOS A	1.0	6.9	0.61	0.71	0.61	43.0
Approach		161	0.0	161	0.0	0.170	9.3	LOS A	1.0	6.9	0.61	0.71	0.61	32.8
All Vehicles		1895	0.9	1892[N1]	0.9	0.605	6.7	LOS A	7.3	50.9	0.68	0.72	0.76	24.7

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

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

MOVEMENT SUMMARY

Site: 101B [Existing - PM Peak - Lexington Drive & Meridian Place]

Network: N102 [Existing PM Peak]

Existing PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	49	0.0	49	0.0	0.462	7.5	LOS A	3.5	24.2	0.57	0.56	0.57	19.7
2	T1	404	0.0	403	0.0	0.462	4.4	LOS A	3.5	24.2	0.57	0.56	0.57	44.3
3	R2	78	1.4	78	1.4	0.462	9.0	LOS A	3.5	24.2	0.57	0.56	0.57	44.0
3u	U	20	0.0	20	0.0	0.462	10.8	LOS A	3.5	24.2	0.57	0.56	0.57	38.4
Approach		552	0.2	550 N1	0.2	0.462	5.6	LOS A	3.5	24.2	0.57	0.56	0.57	37.6
East: Meridian Place														
4	L2	179	0.0	179	0.0	0.334	4.9	LOS A	2.1	15.0	0.58	0.67	0.58	32.1
5	T1	1	0.0	1	0.0	0.334	11.7	LOS A	2.1	15.0	0.58	0.67	0.58	17.5
6	R2	174	1.2	174	1.2	0.334	9.5	LOS A	2.1	15.0	0.58	0.67	0.58	42.3
6u	U	1	0.0	1	0.0	0.334	11.3	LOS A	2.1	15.0	0.58	0.67	0.58	43.8
Approach		355	0.6	355	0.6	0.334	7.2	LOS A	2.1	15.0	0.58	0.67	0.58	38.0
North: Lexington Drive														
7	L2	99	1.1	99	1.1	0.300	3.7	LOS A	1.9	13.7	0.39	0.52	0.39	40.8
8	T1	212	4.5	212	4.5	0.300	3.7	LOS A	1.9	13.7	0.39	0.52	0.39	36.3
9	R2	53	0.0	53	0.0	0.300	13.4	LOS A	1.9	13.7	0.39	0.52	0.39	18.5
9u	U	17	6.3	17	6.3	0.300	10.1	LOS A	1.9	13.7	0.39	0.52	0.39	45.4
Approach		380	3.0	380	3.0	0.300	5.3	LOS A	1.9	13.7	0.39	0.52	0.39	29.4
West: 24-32 Lexington Drive														
10	L2	35	0.0	35	0.0	0.119	3.9	LOS A	0.7	5.1	0.71	0.57	0.71	17.9
11	T1	4	0.0	4	0.0	0.119	3.9	LOS A	0.7	5.1	0.71	0.57	0.71	17.2
12	R2	55	0.0	55	0.0	0.119	3.9	LOS A	0.7	5.1	0.71	0.57	0.71	14.6
12u	U	1	0.0	1	0.0	0.119	3.9	LOS A	0.7	5.1	0.71	0.57	0.71	22.5
Approach		95	0.0	95	0.0	0.119	3.9	LOS A	0.7	5.1	0.71	0.57	0.71	16.1
All Vehicles		1381	1.1	1379 N1	1.1	0.462	5.8	LOS A	3.5	24.2	0.53	0.58	0.53	31.4

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

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

MOVEMENT SUMMARY

Site: 103B [Existing - PM Peak - Southern Access]

Network: N102 [Existing PM Peak]

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

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	9	22.2	9	22.3	0.241	6.0	LOS A	0.0	0.1	0.01	0.01	0.01	55.5
2	T1	473	0.7	471	0.7	0.241	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	59.0
3	R2	1	0.0	1	0.0	0.241	8.3	LOS A	0.0	0.1	0.01	0.01	0.01	56.6
Approach		483	1.1	481[N1]	1.1	0.241	0.1	NA	0.0	0.1	0.01	0.01	0.01	58.6
East: Southern Driveway														
4	L2	7	0.0	7	0.0	0.021	7.5	LOS A	0.1	0.5	0.56	0.71	0.56	45.2
6	R2	4	0.0	4	0.0	0.021	14.7	LOS B	0.1	0.5	0.56	0.71	0.56	45.2
Approach		12	0.0	12	0.0	0.021	10.1	LOS A	0.1	0.5	0.56	0.71	0.56	45.2
North: Lexington Drive														
7	L2	1	0.0	1	0.0	0.264	7.8	LOS A	0.1	0.4	0.01	0.01	0.01	57.8
8	T1	518	1.8	518	1.8	0.264	0.0	LOS A	0.1	0.4	0.01	0.01	0.01	59.6
9	R2	4	0.0	4	0.0	0.264	8.1	LOS A	0.1	0.4	0.01	0.01	0.01	57.8
Approach		523	1.8	523	1.8	0.264	0.1	NA	0.1	0.4	0.01	0.01	0.01	59.5
West: Private Access														
10	L2	21	0.0	21	0.0	0.020	7.3	LOS A	0.1	0.5	0.45	0.63	0.45	48.4
12	R2	53	4.0	53	4.0	0.173	16.0	LOS B	0.5	4.0	0.76	0.90	0.77	39.5
Approach		74	2.9	74	2.9	0.173	13.5	LOS A	0.5	4.0	0.67	0.83	0.68	41.7
All Vehicles		1092	1.5	1090[N1]	1.5	0.264	1.1	NA	0.5	4.0	0.06	0.07	0.06	55.5

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.

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

MOVEMENT SUMMARY

Site: 105B [Existing - PM Peak - Norwest Boulevard & Lexington Drive]

Network: N102 [Existing PM Peak]

Existing PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Elizabeth Macarthur Drive														
1	L2	34	0.0	34	0.0	0.121	14.8	LOS B	0.7	4.7	0.91	0.94	0.91	46.5
2	T1	16	0.0	16	0.0	0.301	12.6	LOS A	1.9	13.9	0.97	0.99	0.97	35.1
3	R2	96	3.1	96	3.1	0.301	18.2	LOS B	1.9	13.9	0.97	0.99	0.97	45.9
3u	U	1	0.0	1	0.0	0.301	20.0	LOS B	1.9	13.9	0.97	0.99	0.97	43.7
Approach		147	2.0	147	2.0	0.301	16.8	LOS B	1.9	13.9	0.96	0.98	0.96	45.1
East: Norwest Boulevard														
4	L2	89	11.8	89	11.8	1.015	53.6	LOS D	35.5	258.1	1.00	2.11	4.26	32.2
5	T1	1239	3.6	1239	3.6	1.015	55.0	LOS D	35.5	258.1	1.00	2.08	4.24	34.7
6	R2	161	0.0	161	0.0	1.015	62.8	LOS E	31.0	221.8	1.00	2.03	4.22	22.9
6u	U	5	0.0	5	0.0	1.015	65.5	LOS E	31.0	221.8	1.00	2.03	4.22	34.4
Approach		1495	3.7	1495	3.7	1.015	55.8	LOS D	35.5	258.1	1.00	2.08	4.24	33.5
North: Lexington Drive														
7	L2	394	2.7	394	2.7	0.761	11.3	LOS A	6.6	47.2	0.88	1.11	1.36	48.0
8	T1	152	0.7	152	0.7	0.761	10.7	LOS A	6.6	47.2	0.88	1.11	1.36	43.1
9	R2	723	0.4	723	0.4	0.791	15.1	LOS B	8.1	56.6	0.90	1.17	1.39	46.6
9u	U	1	0.0	1	0.0	0.791	17.1	LOS B	8.1	56.6	0.90	1.17	1.39	26.9
Approach		1269	1.2	1269	1.2	0.791	13.4	LOS A	8.1	56.6	0.89	1.14	1.38	46.6
West: Norwest Boulevard														
10	L2	205	1.0	205	1.0	0.413	5.9	LOS A	3.2	22.7	0.56	0.55	0.56	54.2
11	T1	847	1.7	847	1.7	0.413	6.3	LOS A	3.2	22.7	0.57	0.57	0.57	61.3
12	R2	26	4.0	26	4.0	0.413	12.3	LOS A	3.0	21.6	0.58	0.58	0.58	54.6
12u	U	4	0.0	4	0.0	0.413	14.9	LOS B	3.0	21.6	0.58	0.58	0.58	62.7
Approach		1083	1.7	1083	1.7	0.413	6.4	LOS A	3.2	22.7	0.57	0.56	0.57	60.2
All Vehicles		3994	2.3	3994	2.3	1.015	27.5	LOS B	35.5	258.1	0.85	1.33	2.21	42.4

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

MOVEMENT SUMMARY

Site: 301A [PP - AM Peak - Lexington Drive & Meridian Place]

Network: N301 [PP AM Peak]

PP AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	56	0.0	52	0.0	0.282	6.8	LOS A	1.8	13.3	0.37	0.52	0.37	18.2
2	T1	211	4.0	197	4.0	0.282	3.8	LOS A	1.8	13.3	0.37	0.52	0.37	44.4
3	R2	107	2.0	100	2.0	0.282	8.3	LOS A	1.8	13.3	0.37	0.52	0.37	43.4
3u	U	15	21.4	14	21.6	0.282	10.5	LOS A	1.8	13.3	0.37	0.52	0.37	35.6
Approach		388	3.5	362[N1]	3.5	0.282	5.7	LOS A	1.8	13.3	0.37	0.52	0.37	32.9
East: Meridian Place														
4	L2	94	1.1	94	1.1	0.399	13.6	LOS A	3.3	23.6	1.00	1.01	1.05	22.9
5	T1	3	0.0	3	0.0	0.399	20.3	LOS B	3.3	23.6	1.00	1.01	1.05	16.5
6	R2	58	1.8	58	1.8	0.399	18.2	LOS B	3.3	23.6	1.00	1.01	1.05	33.8
6u	U	1	0.0	1	0.0	0.399	19.9	LOS B	3.3	23.6	1.00	1.01	1.05	33.7
Approach		156	1.4	156	1.4	0.399	15.5	LOS B	3.3	23.6	1.00	1.01	1.05	27.1
North: Lexington Drive														
7	L2	242	0.0	242	0.0	0.918	9.4	LOS A	23.5	165.8	1.00	0.77	1.16	37.4
8	T1	924	1.0	924	1.0	0.918	9.5	LOS A	23.5	165.8	1.00	0.77	1.16	32.0
9	R2	53	0.0	53	0.0	0.918	19.2	LOS B	23.5	165.8	1.00	0.77	1.16	18.1
9u	U	19	11.1	19	11.1	0.918	16.3	LOS B	23.5	165.8	1.00	0.77	1.16	41.0
Approach		1238	0.9	1238	0.9	0.918	10.0	LOS A	23.5	165.8	1.00	0.77	1.16	30.7
West: 24-32 Lexington Drive														
10	L2	21	0.0	21	0.0	0.070	1.8	LOS A	0.4	2.6	0.51	0.34	0.51	18.1
11	T1	8	0.0	8	0.0	0.070	1.8	LOS A	0.4	2.6	0.51	0.34	0.51	17.5
12	R2	42	0.0	42	0.0	0.070	1.8	LOS A	0.4	2.6	0.51	0.34	0.51	14.8
12u	U	1	0.0	1	0.0	0.070	1.8	LOS A	0.4	2.6	0.51	0.34	0.51	22.8
Approach		73	0.0	73	0.0	0.070	1.8	LOS A	0.4	2.6	0.51	0.34	0.51	16.3
All Vehicles		1855	1.5	1828[N1]	1.5	0.918	9.3	LOS A	23.5	165.8	0.86	0.72	0.97	29.0

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

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

MOVEMENT SUMMARY

Site: 302A [PP - AM Peak - Northern Access]

Network: N301 [PP AM Peak]

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

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
2	T1	451	3.5	418	3.5	0.394	6.0	LOS A	3.3	23.6	0.54	0.13	0.75	28.2
3	R2	78	0.0	72	0.0	0.394	18.6	LOS B	3.3	23.6	0.54	0.13	0.75	47.3
Approach		528	3.0	489[N1]	3.0	0.394	7.9	NA	3.3	23.6	0.54	0.13	0.75	34.9
East: Northern Driveway														
4	L2	24	0.0	24	0.0	0.223	13.8	LOS A	0.7	4.7	0.87	0.96	0.93	35.1
6	R2	24	0.0	24	0.0	0.223	30.0	LOS C	0.7	4.7	0.87	0.96	0.93	35.1
Approach		48	0.0	48	0.0	0.223	21.9	LOS B	0.7	4.7	0.87	0.96	0.93	35.1
North: Lexington Drie														
7	L2	78	0.0	78	0.0	0.538	5.6	LOS A	0.0	0.0	0.00	0.04	0.00	56.9
8	T1	998	1.4	997	1.4	0.538	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	57.7
Approach		1076	1.3	1075[N1]	1.3	0.538	0.4	NA	0.0	0.0	0.00	0.04	0.00	57.6
All Vehicles		1653	1.8	1613[N1]	1.8	0.538	3.3	NA	3.3	23.6	0.19	0.10	0.26	47.4

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.
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.

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

MOVEMENT SUMMARY

Site: 303A [PP - AM Peak - Southern Access]

Network: N301 [PP AM Peak]

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

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	33	3.2	30	3.2	0.369	12.7	LOS A	2.5	18.1	0.46	0.15	0.62	50.4
2	T1	467	2.9	428	3.0	0.369	3.1	LOS A	2.5	18.1	0.46	0.15	0.62	34.7
3	R2	95	0.0	85	0.0	0.369	13.2	LOS A	2.5	18.1	0.46	0.15	0.62	50.2
Approach		595	2.5	543[N1]	2.5	0.369	5.2	NA	2.5	18.1	0.46	0.15	0.62	42.3
East: Southern Driveway														
4	L2	28	0.0	28	0.0	0.064	9.4	LOS A	0.1	1.0	0.59	0.78	0.59	46.0
6	R2	31	3.4	31	3.4	0.213	30.7	LOS C	0.6	4.6	0.90	0.97	0.95	30.0
Approach		59	1.8	59	1.8	0.213	20.4	LOS B	0.6	4.6	0.75	0.88	0.78	36.1
North: Lexington Drive														
7	L2	98	0.0	98	0.0	0.681	7.2	LOS A	1.5	10.5	0.12	0.09	0.21	54.9
8	T1	760	1.9	760	1.9	0.681	0.6	LOS A	1.5	10.5	0.12	0.09	0.21	48.4
9	R2	40	0.0	40	0.0	0.681	9.3	LOS A	1.5	10.5	0.12	0.09	0.21	55.0
Approach		898	1.6	898	1.6	0.681	1.7	NA	1.5	10.5	0.12	0.09	0.21	51.3
West: Private Access														
10	L2	4	0.0	4	0.0	0.004	7.0	LOS A	0.0	0.1	0.43	0.57	0.43	48.6
12	R2	7	14.3	7	14.3	0.088	30.9	LOS C	0.2	1.3	0.88	0.95	0.88	30.0
Approach		12	9.1	12	9.1	0.088	22.2	LOS B	0.2	1.3	0.72	0.81	0.72	34.9
All Vehicles		1563	2.0	1512[N1]	2.1	0.681	3.9	NA	2.5	18.1	0.27	0.15	0.38	45.7

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.

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

MOVEMENT SUMMARY

Site: 304A [PP - AM Peak - Lexington Drive & Woolworths Way]

Network: N301 [PP AM Peak]

PP AM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	125	1.7	115	1.7	0.909	4.7	LOS A	24.6	174.5	0.97	0.51	0.97	38.2
2	T1	680	2.3	620	2.3	0.909	4.7	LOS A	24.6	174.5	0.97	0.51	0.97	31.1
3	R2	655	0.2	601	0.2	0.909	10.7	LOS A	24.6	174.5	0.97	0.51	0.97	26.7
3u	U	11	20.0	10	20.0	0.909	11.6	LOS A	24.6	174.5	0.97	0.51	0.97	31.1
Approach		1471	1.4	1346[N1]	1.4	0.909	7.4	LOS A	24.6	174.5	0.97	0.51	0.97	29.4
East: Woolworths Way														
4	L2	43	2.4	43	2.4	0.039	1.7	LOS A	0.3	1.9	0.61	0.37	0.61	17.7
5	T1	4	0.0	4	0.0	0.022	2.4	LOS A	0.1	1.0	0.63	0.40	0.63	29.4
6	R2	11	10.0	11	10.0	0.022	2.6	LOS A	0.1	1.0	0.63	0.40	0.63	18.2
6u	U	3	0.0	3	0.0	0.022	2.4	LOS A	0.1	1.0	0.63	0.40	0.63	23.0
Approach		61	3.4	61	3.4	0.039	2.0	LOS A	0.3	1.9	0.62	0.38	0.62	19.6
North: Lexington Drive														
7	L2	338	0.3	338	0.3	0.974	46.4	LOS D	30.7	219.3	1.00	1.97	3.06	11.2
8	T1	312	4.7	312	4.7	0.974	44.8	LOS D	30.7	219.3	1.00	1.97	3.06	8.7
9	R2	58	0.0	58	0.0	0.974	49.1	LOS D	30.7	219.3	1.00	1.97	3.06	17.8
9u	U	6	0.0	6	0.0	0.974	51.0	LOS D	30.7	219.3	1.00	1.97	3.06	8.7
Approach		714	2.2	714	2.2	0.974	46.0	LOS D	30.7	219.3	1.00	1.97	3.06	10.8
West: Irvine Place														
10	L2	3	0.0	3	0.0	0.104	17.9	LOS B	0.8	6.0	1.00	0.89	1.00	22.2
11	T1	2	0.0	2	0.0	0.104	21.9	LOS B	0.8	6.0	1.00	0.89	1.00	21.6
12	R2	20	10.5	20	10.5	0.104	23.2	LOS B	0.8	6.0	1.00	0.89	1.00	22.2
12u	U	1	0.0	1	0.0	0.104	24.2	LOS B	0.8	6.0	1.00	0.89	1.00	31.9
Approach		26	8.0	26	8.0	0.104	22.5	LOS B	0.8	6.0	1.00	0.89	1.00	22.6
All Vehicles		2272	1.8	2147[N1]	1.9	0.974	20.3	LOS B	30.7	219.3	0.97	0.99	1.65	20.0

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

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

MOVEMENT SUMMARY

Site: 305A [PP - AM Peak - Norwest Boulevard & Lexington Drive]

Network: N301 [PP AM Peak]

PP AM Peak
Site Category: (None)
Roundabout Metering

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Elizabeth Macarthur Drive														
1	L2	11	10.0	11	10.0	0.026	9.8	LOS A	0.1	1.1	0.79	0.68	0.79	49.2
2	T1	231	0.5	231	0.5	0.533	13.8	LOS A	5.2	37.7	1.00	1.02	1.25	36.4
3	R2	87	12.0	87	12.0	0.533	19.8	LOS B	5.2	37.7	1.00	1.02	1.25	45.8
3u	U	1	0.0	1	0.0	0.533	21.2	LOS B	5.2	37.7	1.00	1.02	1.25	44.9
Approach		329	3.8	329	3.8	0.533	15.3	LOS B	5.2	37.7	0.99	1.01	1.23	40.2
East: Norwest Boulevard														
4	L2	240	2.2	240	2.2	0.879	27.1	LOS B	45.4	329.0	0.95	0.82	1.31	41.5
5	T1	658	4.6	658	4.6	0.879	27.3	LOS B	45.4	329.0	0.95	0.82	1.31	46.8
6	R2	769	1.5	769	1.5	0.966	63.9	LOS E	49.8	352.8	0.99	1.17	2.15	22.0
6u	U	72	1.5	72	1.5	0.966	66.5	LOS E	49.8	352.8	0.99	1.17	2.15	32.9
Approach		1739	2.8	1739	2.8	0.966	45.1	LOS D	49.8	352.8	0.97	0.99	1.72	33.7
North: Lexington Drive														
7	L2	222	4.7	222	4.7	0.259	4.7	LOS A	1.5	11.0	0.63	0.62	0.63	53.4
8	T1	34	6.3	34	6.2	0.259	4.3	LOS A	1.5	11.0	0.63	0.62	0.63	48.6
9	R2	124	2.5	124	2.5	0.165	10.1	LOS A	0.8	5.9	0.60	0.74	0.60	50.0
9u	U	4	25.0	4	24.9	0.165	12.7	LOS A	0.8	5.9	0.60	0.74	0.60	31.7
Approach		384	4.4	383 N1	4.4	0.259	6.5	LOS A	1.5	11.0	0.62	0.66	0.62	51.6
West: Norwest Boulevard														
10	L2	477	1.3	477	1.3	1.355	378.3	LOS F	108.8	772.6	1.00	4.33	10.89	4.6
11	T1	796	4.9	796	4.9	1.355	381.8	LOS F	155.4	1132.3	1.00	4.73	11.01	8.6
12	R2	12	0.0	12	0.0	1.355	387.8	LOS F	155.4	1132.3	1.00	4.76	11.02	8.4
12u	U	2	0.0	2	0.0	1.355	390.4	LOS F	155.4	1132.3	1.00	4.76	11.02	8.6
Approach		1286	3.5	1286	3.5	1.355	380.6	LOS F	155.4	1132.3	1.00	4.58	10.96	7.1
All Vehicles		3739	3.3	3738 N1	3.3	1.355	153.9	LOS F	155.4	1132.3	0.95	2.19	4.74	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.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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

MOVEMENT SUMMARY

Site: 301B [PP - PM Peak - Lexington Drive & Meridian Place]

Network: N302 [PP PM Peak]

PP PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	49	0.0	48	0.0	0.556	7.9	LOS A	4.6	32.6	0.63	0.58	0.63	18.1
2	T1	532	0.0	522	0.0	0.556	4.9	LOS A	4.6	32.6	0.63	0.58	0.63	43.6
3	R2	78	1.4	76	1.4	0.556	9.5	LOS A	4.6	32.6	0.63	0.58	0.63	42.6
3u	U	20	0.0	20	0.0	0.556	11.4	LOS A	4.6	32.6	0.63	0.58	0.63	34.6
Approach		679	0.2	666 N1	0.2	0.556	5.8	LOS A	4.6	32.6	0.63	0.58	0.63	37.0
East: Meridian Place														
4	L2	179	0.0	179	0.0	0.350	5.3	LOS A	2.3	16.0	0.63	0.70	0.63	31.7
5	T1	1	0.0	1	0.0	0.350	12.0	LOS A	2.3	16.0	0.63	0.70	0.63	17.5
6	R2	174	1.2	174	1.2	0.350	9.9	LOS A	2.3	16.0	0.63	0.70	0.63	42.0
6u	U	1	0.0	1	0.0	0.350	11.7	LOS A	2.3	16.0	0.63	0.70	0.63	43.4
Approach		355	0.6	355	0.6	0.350	7.6	LOS A	2.3	16.0	0.63	0.70	0.63	37.6
North: Lexington Drive														
7	L2	99	1.1	99	1.1	0.341	3.9	LOS A	2.3	16.3	0.41	0.52	0.41	41.2
8	T1	267	3.5	267	3.5	0.341	3.9	LOS A	2.3	16.3	0.41	0.52	0.41	36.8
9	R2	53	0.0	53	0.0	0.341	13.6	LOS A	2.3	16.3	0.41	0.52	0.41	18.5
9u	U	17	6.3	17	6.3	0.341	10.4	LOS A	2.3	16.3	0.41	0.52	0.41	45.9
Approach		436	2.7	436	2.7	0.341	5.3	LOS A	2.3	16.3	0.41	0.52	0.41	30.1
West: 24-32 Lexington Drive														
10	L2	35	0.0	35	0.0	0.136	5.0	LOS A	0.9	6.2	0.79	0.67	0.79	17.7
11	T1	4	0.0	4	0.0	0.136	5.0	LOS A	0.9	6.2	0.79	0.67	0.79	17.1
12	R2	55	0.0	55	0.0	0.136	5.0	LOS A	0.9	6.2	0.79	0.67	0.79	14.4
12u	U	1	0.0	1	0.0	0.136	5.0	LOS A	0.9	6.2	0.79	0.67	0.79	22.3
Approach		95	0.0	95	0.0	0.136	5.0	LOS A	0.9	6.2	0.79	0.67	0.79	15.9
All Vehicles		1564	0.9	1551 N1	1.0	0.556	6.0	LOS A	4.6	32.6	0.58	0.59	0.58	31.2

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

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

MOVEMENT SUMMARY

Site: 302B [PP - PM Peak - Northern Access]

Network: N302 [PP PM Peak]

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

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
2	T1	568	0.6	555	0.6	0.301	0.3	LOS A	0.4	2.7	0.08	0.03	0.09	55.0
3	R2	26	0.0	26	0.0	0.301	8.6	LOS A	0.4	2.7	0.08	0.03	0.09	55.9
Approach		595	0.5	581[N1]	0.5	0.301	0.6	NA	0.4	2.7	0.08	0.03	0.09	55.2
East: Northern Driveway														
4	L2	58	0.0	58	0.0	0.211	7.7	LOS A	0.7	5.1	0.61	0.81	0.62	44.4
6	R2	58	0.0	58	0.0	0.211	14.1	LOS A	0.7	5.1	0.61	0.81	0.62	44.4
Approach		116	0.0	116	0.0	0.211	10.9	LOS A	0.7	5.1	0.61	0.81	0.62	44.4
North: Lexington Drie														
7	L2	26	0.0	26	0.0	0.262	5.5	LOS A	0.0	0.0	0.00	0.03	0.00	57.2
8	T1	496	1.9	495	1.9	0.262	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	58.5
Approach		522	1.8	522	1.8	0.262	0.3	NA	0.0	0.0	0.00	0.03	0.00	58.2
All Vehicles		1233	1.0	1219[N1]	1.0	0.301	1.5	NA	0.7	5.1	0.10	0.10	0.10	53.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
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.

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

MOVEMENT SUMMARY

Site: 303B [PP - PM Peak - Southern Access]

Network: N302 [PP PM Peak]

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

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	9	22.2	9	22.7	0.279	8.9	LOS A	0.5	3.7	0.12	0.05	0.13	54.2
2	T1	498	0.6	484	0.7	0.279	0.4	LOS A	0.5	3.7	0.12	0.05	0.13	52.2
3	R2	32	0.0	30	0.0	0.279	9.2	LOS A	0.5	3.7	0.12	0.05	0.13	55.5
Approach		539	1.0	524[N1]	1.0	0.279	1.1	NA	0.5	3.7	0.12	0.05	0.13	53.1
East: Southern Driveway														
4	L2	77	0.0	77	0.0	0.085	8.0	LOS A	0.3	2.2	0.52	0.73	0.52	47.6
6	R2	75	0.0	75	0.0	0.288	19.9	LOS B	1.0	6.9	0.82	0.96	0.96	36.4
Approach		152	0.0	152	0.0	0.288	13.9	LOS A	1.0	6.9	0.67	0.84	0.74	41.4
North: Lexington Drive														
7	L2	32	0.0	32	0.0	0.308	6.0	LOS A	0.1	0.6	0.02	0.03	0.02	56.8
8	T1	575	1.6	575	1.6	0.308	0.0	LOS A	0.1	0.6	0.02	0.03	0.02	56.8
9	R2	4	0.0	4	0.0	0.308	8.4	LOS A	0.1	0.6	0.02	0.03	0.02	56.8
Approach		611	1.6	611	1.6	0.308	0.4	NA	0.1	0.6	0.02	0.03	0.02	56.8
West: Private Access														
10	L2	21	0.0	21	0.0	0.021	7.3	LOS A	0.1	0.5	0.46	0.63	0.46	48.4
12	R2	53	4.0	53	4.0	0.226	20.7	LOS B	0.7	5.3	0.83	0.95	0.90	35.9
Approach		74	2.9	74	2.9	0.226	16.9	LOS B	0.7	5.3	0.72	0.86	0.77	38.7
All Vehicles		1375	1.2	1359[N1]	1.2	0.308	3.1	NA	1.0	6.9	0.17	0.17	0.18	48.1

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.

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

MOVEMENT SUMMARY

Site: 304B [PP - PM Peak - Lexington Drive & Woolworths Way]

Network: N302 [PP PM Peak]

PP PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lexington Drive														
1	L2	25	0.0	24	0.0	0.340	3.7	LOS A	2.5	17.9	0.43	0.47	0.43	42.0
2	T1	368	0.3	353	0.3	0.340	3.8	LOS A	2.5	17.9	0.43	0.47	0.43	36.1
3	R2	47	2.2	46	2.3	0.340	9.9	LOS A	2.5	17.9	0.43	0.47	0.43	29.1
3u	U	16	0.0	15	0.0	0.340	10.2	LOS A	2.5	17.9	0.43	0.47	0.43	36.1
Approach		457	0.5	438 N1	0.5	0.340	4.6	LOS A	2.5	17.9	0.43	0.47	0.43	35.4
East: Woolworths Way														
4	L2	481	0.0	481	0.0	0.724	20.7	LOS B	11.2	78.2	1.00	1.67	1.70	9.6
5	T1	2	0.0	2	0.0	0.289	9.7	LOS A	2.1	14.8	0.95	0.91	0.95	25.1
6	R2	125	0.8	125	0.8	0.289	9.8	LOS A	2.1	14.8	0.95	0.91	0.95	14.6
6u	U	3	0.0	3	0.0	0.289	9.7	LOS A	2.1	14.8	0.95	0.91	0.95	19.2
Approach		612	0.2	612	0.2	0.724	18.4	LOS B	11.2	78.2	0.99	1.51	1.54	10.6
North: Lexington Drive														
7	L2	18	0.0	18	0.0	0.670	6.5	LOS A	6.7	47.7	0.67	0.54	0.67	25.1
8	T1	817	1.7	817	1.7	0.670	4.8	LOS A	6.7	47.7	0.67	0.54	0.67	30.0
9	R2	5	0.0	5	0.0	0.670	9.3	LOS A	6.7	47.7	0.67	0.54	0.67	42.4
9u	U	7	0.0	7	0.0	0.670	11.2	LOS A	6.7	47.7	0.67	0.54	0.67	30.0
Approach		847	1.6	847	1.6	0.670	4.9	LOS A	6.7	47.7	0.67	0.54	0.67	29.9
West: Irvine Place														
10	L2	26	0.0	26	0.0	0.176	5.8	LOS A	1.0	7.3	0.64	0.73	0.64	32.6
11	T1	4	0.0	4	0.0	0.176	9.9	LOS A	1.0	7.3	0.64	0.73	0.64	27.9
12	R2	129	0.0	129	0.0	0.176	10.3	LOS A	1.0	7.3	0.64	0.73	0.64	32.6
12u	U	1	0.0	1	0.0	0.176	12.1	LOS A	1.0	7.3	0.64	0.73	0.64	42.7
Approach		161	0.0	161	0.0	0.176	9.5	LOS A	1.0	7.3	0.64	0.73	0.64	32.5
All Vehicles		2077	0.8	2058 N1	0.8	0.724	9.2	LOS A	11.2	78.2	0.71	0.82	0.88	22.6

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

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

MOVEMENT SUMMARY

Site: 305B [PP - PM Peak - Norwest Boulevard & Lexington Drive]

Network: N302 [PP PM Peak]

PP PM Peak
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Elizabeth Macarthur Drive														
1	L2	36	0.0	36	0.0	0.123	14.5	LOS B	0.7	4.7	0.91	0.94	0.91	46.6
2	T1	22	0.0	22	0.0	0.320	12.7	LOS A	2.1	14.7	0.97	0.99	0.98	35.4
3	R2	101	3.1	101	3.1	0.320	18.3	LOS B	2.1	14.7	0.97	0.99	0.98	46.1
3u	U	1	0.0	1	0.0	0.320	20.2	LOS B	2.1	14.7	0.97	0.99	0.98	43.9
Approach		160	2.0	160	2.0	0.320	16.7	LOS B	2.1	14.7	0.96	0.98	0.97	45.1
East: Norwest Boulevard														
4	L2	89	11.8	89	11.8	1.111	123.4	LOS F	70.4	511.7	1.00	3.36	8.04	20.1
5	T1	1239	3.6	1239	3.6	1.111	124.4	LOS F	70.4	511.7	1.00	3.26	7.86	21.1
6	R2	189	0.0	189	0.0	1.111	131.7	LOS F	58.9	421.5	1.00	3.10	7.60	12.7
6u	U	5	0.0	5	0.0	1.111	134.3	LOS F	58.9	421.5	1.00	3.10	7.60	21.1
Approach		1523	3.6	1523	3.6	1.111	125.3	LOS F	70.4	511.7	1.00	3.24	7.84	20.1
North: Lexington Drive														
7	L2	457	2.3	457	2.3	0.870	16.3	LOS B	10.2	72.8	0.94	1.31	1.84	43.8
8	T1	164	0.6	164	0.6	0.870	15.8	LOS B	10.2	72.8	0.94	1.31	1.84	40.2
9	R2	774	0.4	773	0.4	0.858	17.9	LOS B	10.6	74.4	0.94	1.29	1.68	44.5
9u	U	1	0.0	1	0.0	0.858	19.9	LOS B	10.6	74.4	0.94	1.29	1.68	25.0
Approach		1396	1.1	1395[N1]	1.1	0.870	17.1	LOS B	10.6	74.4	0.94	1.30	1.75	43.7
West: Norwest Boulevard														
10	L2	227	0.9	227	0.9	0.429	5.9	LOS A	3.4	23.9	0.58	0.56	0.58	53.8
11	T1	847	1.7	847	1.7	0.429	6.4	LOS A	3.4	23.9	0.60	0.58	0.60	61.1
12	R2	26	4.0	26	4.0	0.429	12.5	LOS A	3.2	22.6	0.61	0.59	0.61	54.5
12u	U	4	0.0	4	0.0	0.429	15.0	LOS B	3.2	22.6	0.61	0.59	0.61	62.5
Approach		1105	1.6	1105	1.6	0.429	6.5	LOS A	3.4	23.9	0.59	0.58	0.59	59.9
All Vehicles		4184	2.2	4184	2.2	1.111	53.7	LOS D	70.4	511.7	0.87	1.80	3.63	31.3

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

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