

# Technical Memorandum

<b>Title</b>	Lindfield Village Green SIDRA Assessment		
<b>Client</b>	Ku-ring-gai Council	<b>Project No</b>	80016098
<b>Date</b>	06/11/2017	<b>Status</b>	Final
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<b>Reviewer</b>	Ivo Pais	<b>Office</b>	Sydney

## 1 Introduction

### 1.1 Background

This Technical Memorandum is an addendum to the existing Lindfield Village Green Traffic Impact Assessment (Cardno, 2016). The original report proposed a two level basement car park and Ku-ring-gai Council wish to investigate the opportunity to increase the parking quantum by providing an additional level.

Cardno (NSW / ACT) Pty Ltd was commissioned to undertake an assessment of the impacts that a third basement level would have on the surrounding intersection performance. Ku-ring-gai Council wish to increase the originally proposed 80 short-term public spaces and 100 long-term commuter car parking spaces two (2) level basement car park to a newly proposed 135 short-term public spaces and 104 long-term commuter car parking spaces three (3) level basement car park. The proposed plans are attached in **Appendix A**.

## 2 Traffic Assessment

The proposed third basement level of LVG is likely to attract additional vehicle trips during the peak hours. To account for the increase in traffic development, the following methodology was adopted in order to update the existing spreadsheet model to incorporate the additional traffic generation.

### 2.1 Assessment Methodology

The original traffic assessment relied on a spreadsheet model developed in the Lindfield Local Centre Transport Network Model Study Supplementary Report prepared by PeopleTrans in 2015/2016 which took into account all committed developments, as well as the following network changes:

- > The widening proposals at Grosvenor Road.
- > Intersection investigations at Havilah Road / Lindfield Avenue.
- > The widening and one-way operation of Bent Lane.

Further to the above, the Lindfield Village Green Traffic Impact Assessment (Cardno, 2016) redistributed the turning flows based on the following assumptions:

- > All vehicles entering Havilah Lane via Havilah Road in the PeopleTrans network model have been redistributed to turn into the LVG site via Milray Street.
- > There is a total of 7 car ports / garages fronting Chapman Lane, it has assumed that all 7 cars will depart in the AM peak hour and return in the PM peak hour.
- > All vehicles entering Chapman Lane via Tryon Road in the People Trans network model have been redistributed to turn into the LVG site via Milray Street (except any traffic associated with the existing properties fronting Chapman Lane).

The assessment described in this technical memorandum updated the traffic generation assumptions by increasing the volumes entering and exiting the car park during the AM and PM peak period. The original assessment assumed the total number of spaces to be 180. The plans illustrating the proposed “three level configuration” show 239 spaces in total. This consists of an increase of approximately 33%. The traffic demands (in and out in each peak period) were increased by the same factor and distributed to the external road network in accordance with the spreadsheet model assumptions. The turn volumes summarising the above are illustrated in **Figure 1** and **Figure 2**.

Figure 1 Redistributed AM Peak Hour Traffic Flows

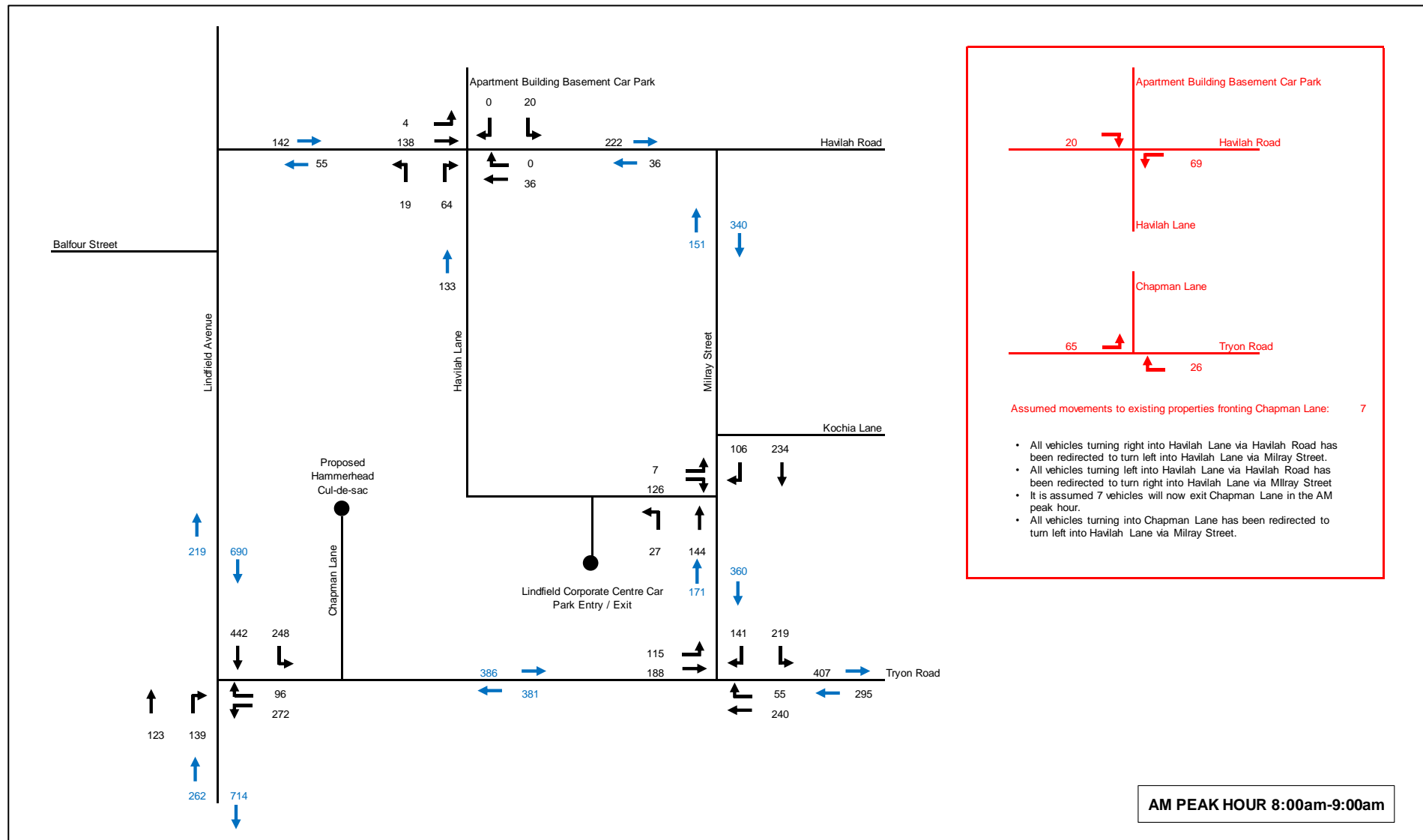
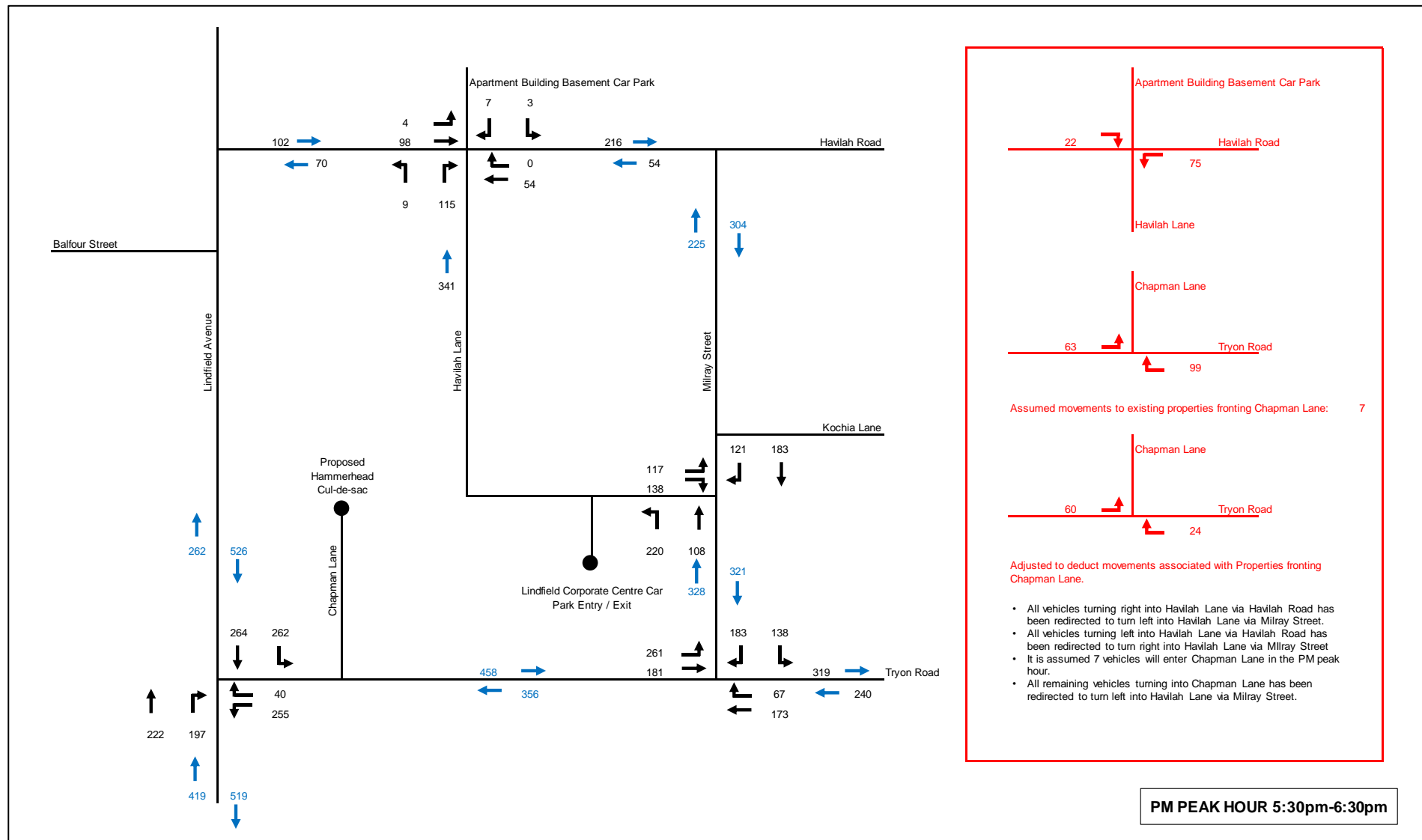


Figure 2 Redistributed PM Peak Hour Traffic Flows



## 2.2 Level of Service Criteria for Intersections

The key indicator of intersection performance is typically the Level of Service (LoS), where results are placed on a scale from 'A' to 'F', outlined in **Table 1**.

Table 1 Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Giveway & Stop Signs
<b>A</b>	< 14	Good Operation	Good Operation
<b>B</b>	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
<b>C</b>	29 to 42	Satisfactory	Satisfactory, but accident study required
<b>D</b>	43 to 56	Operating near capacity	Near Capacity & accident study required
<b>E</b>	57 to 70	At Capacity, at signals incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
<b>F</b>	> 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires additional capacity.

The Average Vehicle Delay (AVD) provides a measure of the operational performance of an intersection and determines the LoS when applying the Roads and Maritime method. It should be noted that the AVD's should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route). For traffic signals, the weighted average delay over all movements should be utilised. For roundabouts and priority control intersections (sign control) the critical movement for assessing LoS should be the movement with the highest average delay.

The Degree of Saturation (DoS) is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals, both queue length and delay increase rapidly as DOS approaches 1.0. It is usual to attempt to keep DOS to less than 0.9. Degrees of Saturation in the order of 0.7 generally represent satisfactory intersection operation. When DOS exceed 0.9 queues can be anticipated.

## 2.3 Lindfield Avenue / Tryon Road Intersection

### Exiting Intersection Configuration – Priority Controlled

The operation of the Lindfield Avenue / Tryon Road intersection under its existing configuration has been assessed in SIDRA 7 with the revised vehicle turning flows illustrated in **Figure 1** and **Figure 2**.

The performance of the intersection is summarised in **Table 2** and the SIDRA turning movement summaries output are reproduced in full in **Appendix B**.

Table 2 Lindfield Avenue / Tryon Road Intersection (Priority Controlled) Operation

	Approach	2 Basement Levels			3 Basement Levels		
		Degree of Saturation	Average Delay (Sec)	Level of Service	Degree of Saturation	Average Delay (Sec)	Level of Service
AM Peak	Lindfield Avenue (South)	0.243	6.6	A	0.245	6.6	A
	Tryon Road (East)	0.262	7.7	A	0.270	7.8	A
	Lindfield Avenue (North)	0.409	1.8	A	0.411	1.9	A
	All Vehicles	0.409	4.4	A	0.411	4.5	A
PM Peak	Lindfield Avenue (South)	0.292	4.7	A	0.318	5.2	A
	Tryon Road (East)	0.194	6.2	A	0.207	6.3	A
	Lindfield Avenue (North)	0.311	2.4	A	0.329	2.5	A
	All Vehicles	0.311	4.1	A	0.329	4.3	A

On the basis of the above SIDRA assessment, the intersection is expected to continue to operate satisfactorily at a LoS A in both the AM and PM peak hour.

#### Future Intersection Configuration – Signalised

The operation of the Lindfield Avenue / Tryon Road intersection under the future signalised configuration has been assessed in SIDRA 7 with the revised vehicle turning flows illustrated in **Figure 1** and **Figure 2**.

The future signal phasing on the upgraded Lindfield Avenue / Tryon Road intersection was not available at the time of this assessment, therefore the three-phase signal phasing suggested in Lindfield Village Green Traffic Impact Assessment (Cardno, 2016) was adopted for the purposes of this assessment as illustrated in **Figure 3** modelled with an optimal cycle time between 100-150 seconds at increments of 5 seconds.

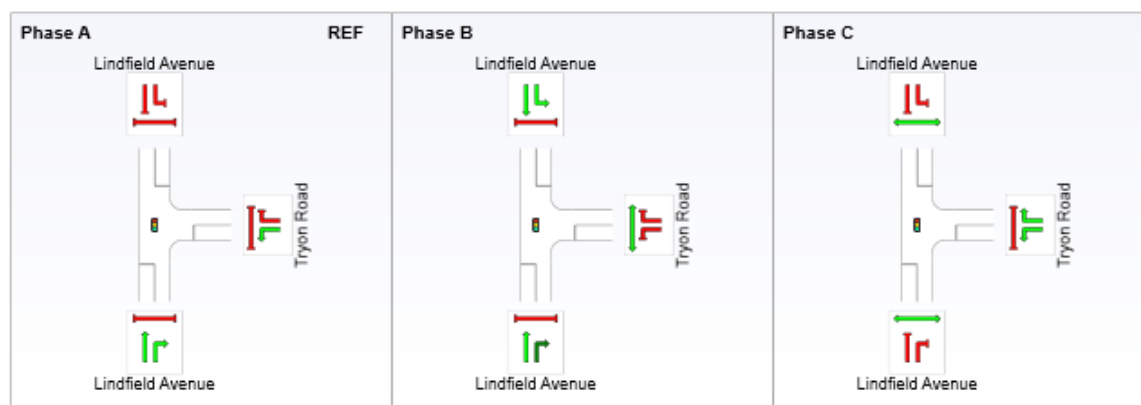


Figure 3 Assumed Signal Phasing

The performance of the intersection is summarised in **Table 3** and the SIDRA turning movement summaries output are reproduced in full in **Appendix B**.

**Table 3 Lindfield Avenue / Tryon Road Intersection (Signalised) Operation**

	Approach	2 Basement Levels			3 Basement Levels		
		Degree of Saturation	Average Delay (Sec)	Level of Service	Degree of Saturation	Average Delay (Sec)	Level of Service
AM Peak	Lindfield Avenue (South)	0.250	7.5	A	0.252	7.5	A
	Tryon Road (East)	0.508	38.0	C	0.528	38.2	C
	Lindfield Avenue (North)	0.519	13.8	A	0.520	13.8	A
	All Vehicles	0.519	19.2	B	0.528	19.4	B
PM Peak	Lindfield Avenue (South)	0.236	6.6	A	0.271	7.2	A
	Tryon Road (East)	0.329	30.0	C	0.343	29.4	C
	Lindfield Avenue (North)	0.328	18.1	B	0.355	19.0	B
	All Vehicles	0.329	17.0	B	0.355	17.5	B

On the basis of the above SIDRA assessment, the intersection is expected to continue to operate satisfactorily with a LoS B in both the AM and PM peak hour.

## 2.4 Tryon Road / Milray Street Intersection

The operation of the Tryon Road / Milray Street intersection has been assessed in SIDRA 7 with the revised vehicle turning flows illustrated in **Figure 1** and **Figure 2**.

The performance of the intersection is summarised in **Table 4** and the SIDRA turning movement summaries output are reproduced in full in **Appendix B**.

**Table 4 Tryon Road / Milray Street Intersection Operation**

	Approach	2 Basement Levels			3 Basement Levels		
		Degree of Saturation	Average Delay (Sec)	Level of Service	Degree of Saturation	Average Delay (Sec)	Level of Service
AM Peak	Tryon Road (East)	0.164	1.3	A	0.165	1.4	A
	Milray Street (North)	0.313	6.2	A	0.340	6.4	A
	Tryon Road (West)	0.157	1.7	A	0.159	1.8	A
	All Vehicles	0.313	3.2	A	0.340	3.4	A
PM Peak	Tryon Road (East)	0.136	2.0	A	0.148	2.4	A
	Milray Street (North)	0.295	6.5	A	0.340	6.9	A
	Tryon Road (West)	0.210	2.5	A	0.234	2.7	A
	All Vehicles	0.295	3.6	A	0.340	4.0	A

On the basis of the above SIDRA assessment, the intersection is expected to continue to operate satisfactorily with a LoS A in both the AM and PM peak hour.

## 2.5 Havilah Road / Havilah Lane Intersection

The operation of the Havilah Road / Havilah Lane intersection has been assessed in SIDRA 7 with revised vehicle turning flows illustrated in **Figure 1** and **Figure 2**.

The performance of the intersection is summarised in **Table 5** and the SIDRA turning movement summaries output are reproduced in full in **Appendix B**.

Table 5 Havilah Road / Havilah Lane Intersection Operation

	Approach	2 Basement Levels			3 Basement Levels		
		Degree of Saturation	Average Delay (Sec)	Level of Service	Degree of Saturation	Average Delay (Sec)	Level of Service
AM Peak	Havilah Lane (South)	0.082	5.6	A	0.082	5.6	A
	Havilah Road (East)	0.019	0.2	A	0.019	0.2	A
	Car Park Entry/Exit (North)	0.015	5.9	A	0.015	5.9	A
	Havilah Road (West)	0.073	0.2	A	0.073	0.2	A
	All Vehicles	0.082	2.2	A	0.082	2.2	A
PM Peak	Havilah Lane (South)	0.126	5.6	A	0.126	5.6	A
	Havilah Road (East)	0.028	0.1	A	0.028	0.1	A
	Car Park Entry/Exit (North)	0.009	6.1	A	0.009	6.1	A
	Havilah Road (West)	0.052	0.2	A	0.052	0.2	A
	All Vehicles	0.126	2.7	A	0.126	2.7	A

On the basis of the above SIDRA assessment, the intersection is expected to continue to operate satisfactorily with a LoS A in both the AM and PM peak hour.

## 2.6 Milray Street / Proposed LVG Access Intersection

The operation of the Milray Street / Proposed LVG Access intersection has been assessed in SIDRA 7 with the revised vehicle turning flows illustrated in **Figure 1** and **Figure 2**.

The performance of the intersection is summarised in **Table 6** and the SIDRA turning movement summaries output are reproduced in full in **Appendix B**.



Table 6 Milray Street / Proposed LVG Access Intersection Operation

	Approach	2 Basement Levels			3 Basement Levels		
		Degree of Saturation	Average Delay (Sec)	Level of Service	Degree of Saturation	Average Delay (Sec)	Level of Service
AM Peak	Milray Street (South)	0.085	0.6	A	0.088	0.7	A
	Milray Street (North)	0.173	1.5	A	0.190	1.8	A
	LVG Access (West)	0.118	2.6	A	0.162	2.9	A
	All Vehicles	0.173	1.4	A	0.190	1.7	A
PM Peak	Milray Street (South)	0.145	2.8	A	0.174	3.1	A
	Milray Street (North)	0.161	2.2	A	0.187	2.9	A
	LVG Access (West)	0.183	1.7	A	0.255	2.0	A
	All Vehicles	0.183	2.3	A	0.255	2.7	A

On the basis of the above SIDRA assessment, the intersection is expected to continue to operate satisfactorily with a LoS A in both the AM and PM peak.

### 3 Conclusion

The LVG project seeks to assess the traffic impacts of a third basement level of parking spaces. Based on the analysis presented in this Technical Memorandum, the following conclusions are made:

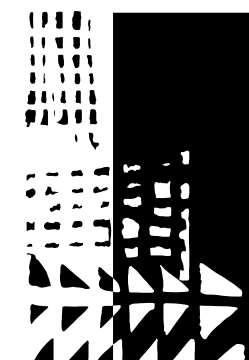
- > The proposed additional basement level will result in a total increase in the number of spaces from 180 to 239 (circa 33%);
- > Based on the SIDRA assessment, it can be concluded that all four intersections in the vicinity of the LVG project are expected to continue operating at the same satisfactory LoS as the scenario with two (2) basement levels.

Lindfield Village Green

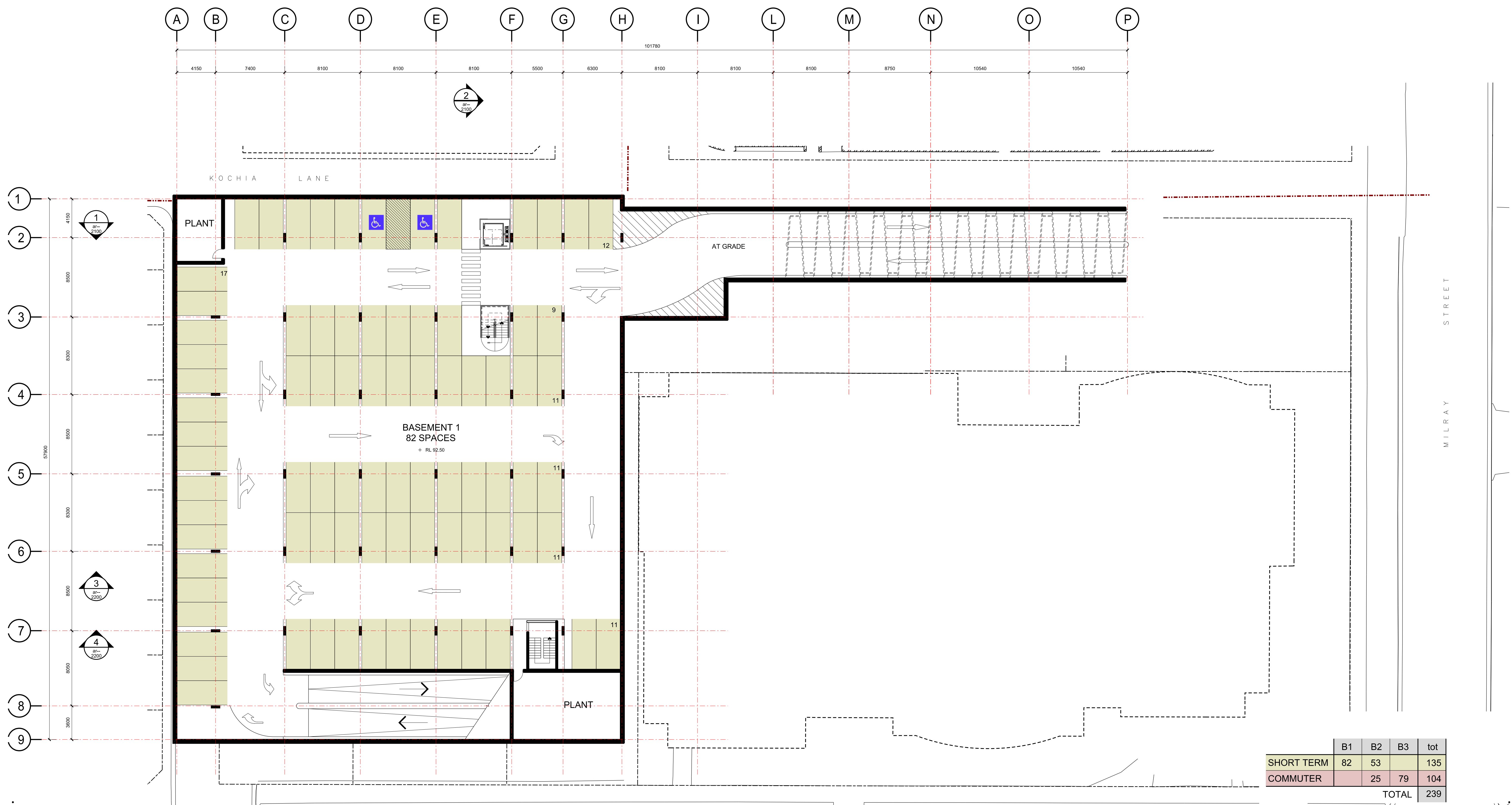
## APPENDIX

# A

## CAR PARK LAYOUT PLANS



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## Lindfield Village Green

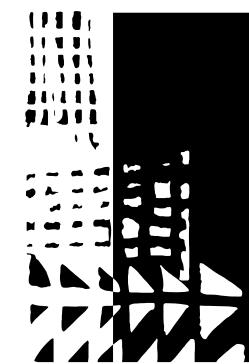
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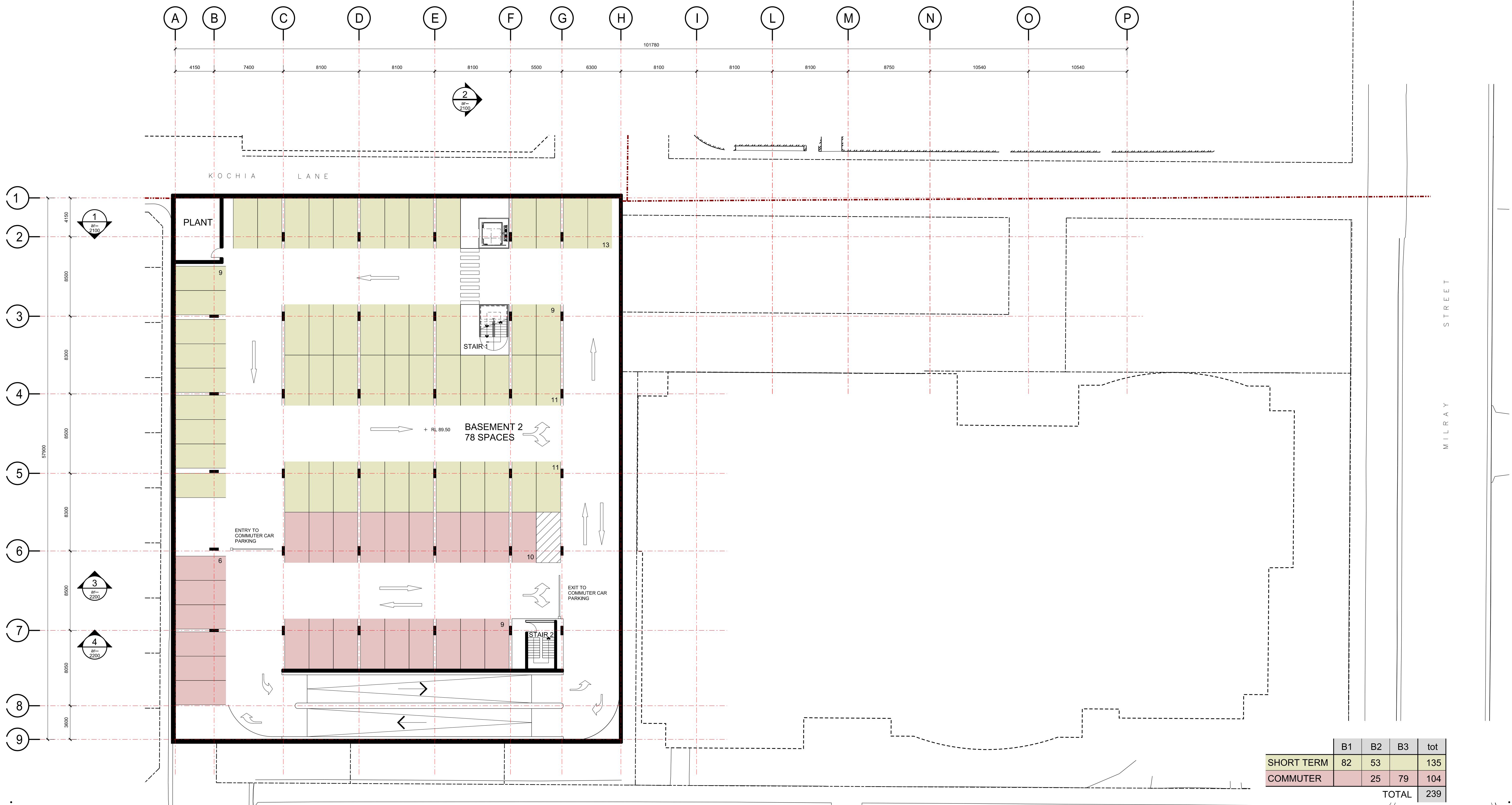
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rev no. -01

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landscape architecture, interior design  
level 8 15 help street chatswood nsw 2067  
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## Lindfield Village Green

Basement 2  
Option 3 Levels Car Park

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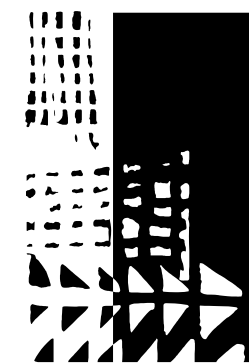
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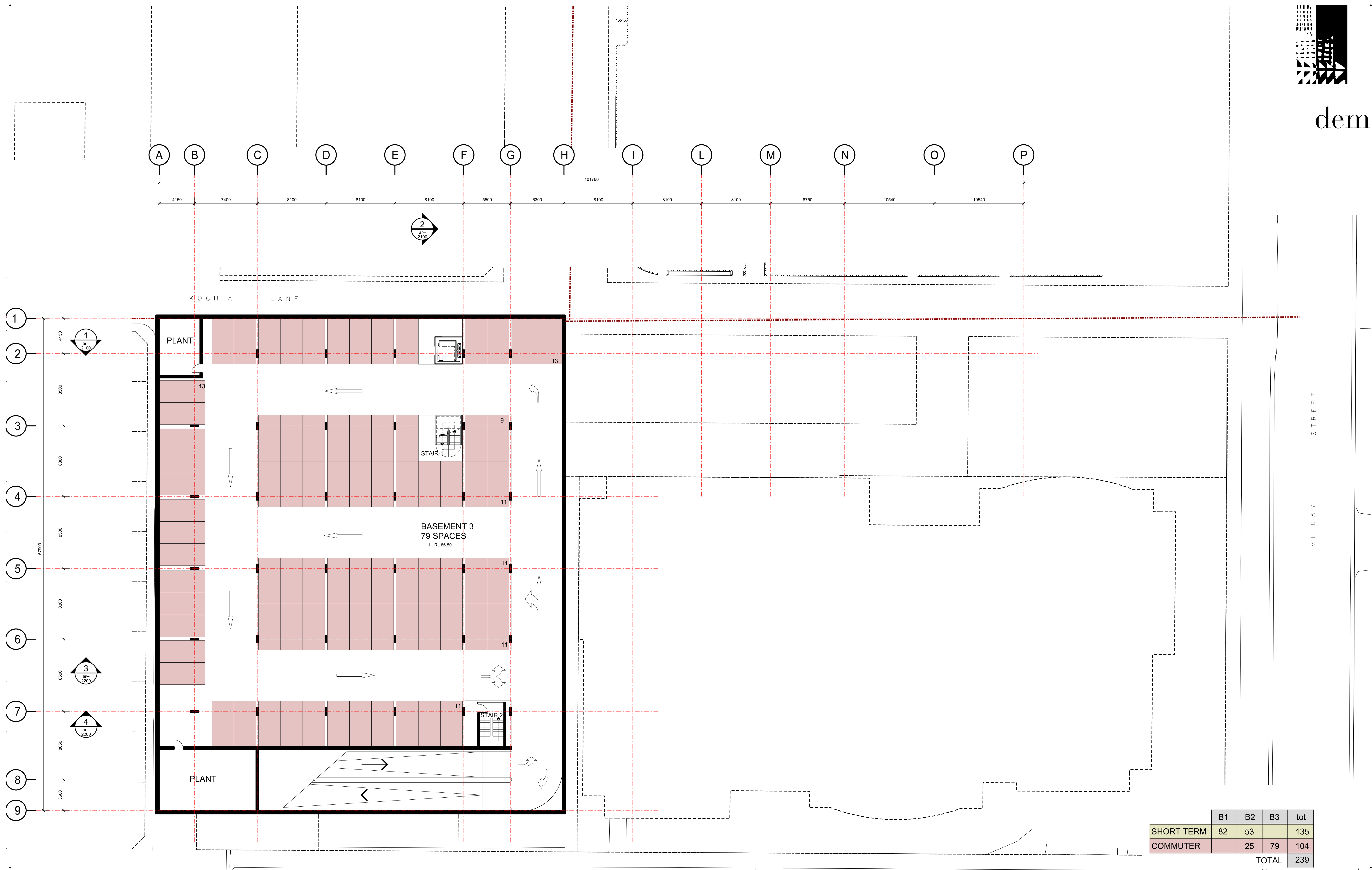
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## Lindfield Village Green

Basement 3  
Option 3 Levels Car Park

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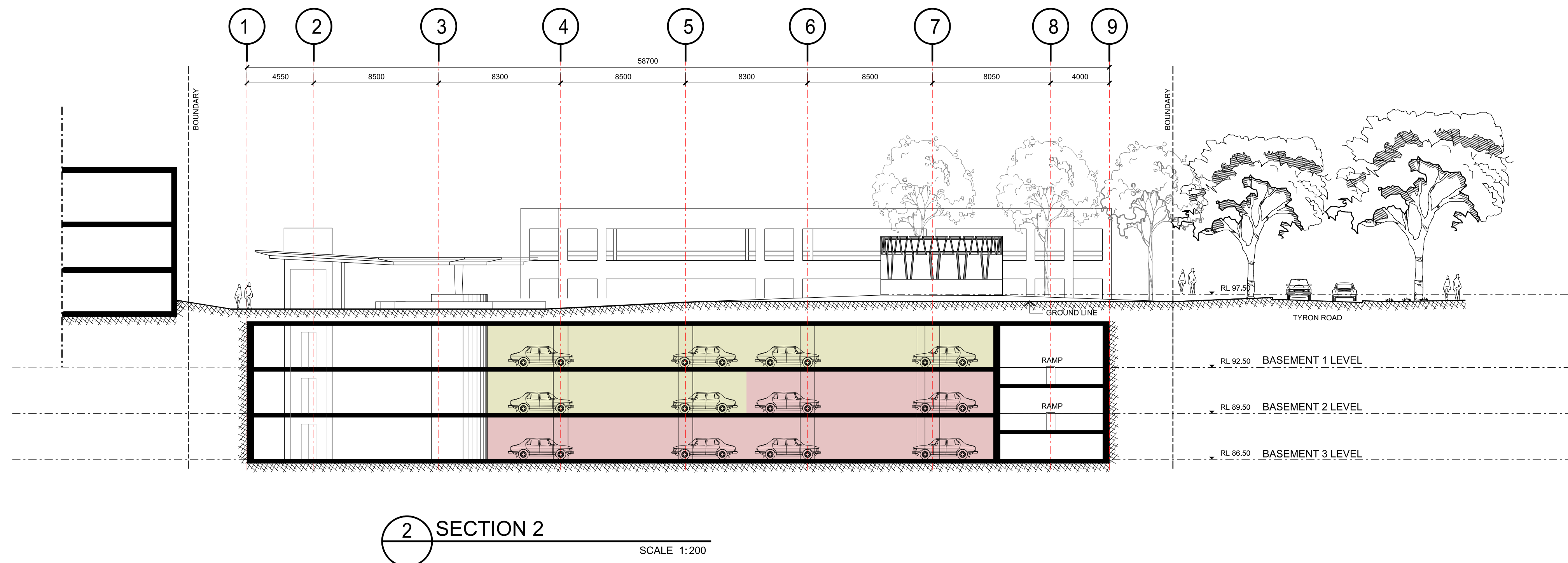
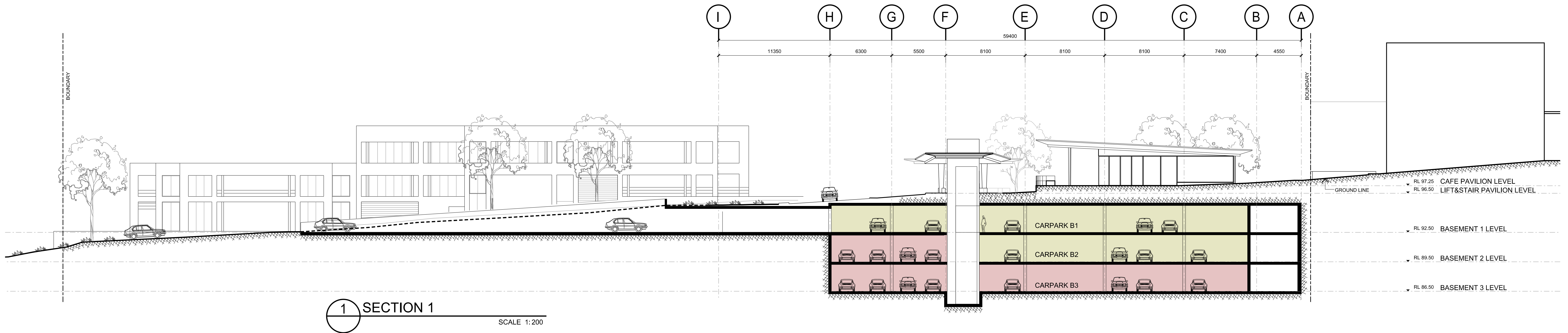
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## Lindfield Village Green

Sections  
Option 3 Levels Car Park

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Lindfield Village Green

APPENDIX

B

SIDRA MOVEMENT SUMMARIES



# MOVEMENT SUMMARY

## ▽ Site: 101 [AM Peak]

Lindfield Avenue & Tryon Road Intersection (Priority Controlled)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lindfield Avenue											
2	T1	123	0.0	0.245	3.9	LOS A	1.4	10.0	0.63	0.45	45.8
3	R2	139	0.0	0.245	9.0	LOS A	1.4	10.0	0.63	0.45	45.2
Approach		262	0.0	0.245	6.6	NA	1.4	10.0	0.63	0.45	45.5
East: Tryon Road											
4	L2	272	0.0	0.270	6.9	LOS A	1.2	8.1	0.53	0.74	45.3
6	R2	96	0.0	0.194	10.3	LOS A	0.6	4.4	0.66	0.86	43.0
Approach		368	0.0	0.270	7.8	LOS A	1.2	8.1	0.57	0.77	44.7
North: Lindfield Avenue											
7	L2	248	0.0	0.411	4.9	LOS A	2.1	15.0	0.14	0.19	48.1
8	T1	442	0.0	0.411	0.2	LOS A	2.1	15.0	0.14	0.19	48.5
Approach		690	0.0	0.411	1.9	NA	2.1	15.0	0.14	0.19	48.4
All Vehicles		1320	0.0	0.411	4.5	NA	2.1	15.0	0.35	0.40	46.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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.

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# MOVEMENT SUMMARY

## Site: 101 [PM Peak]

Lindfield Avenue & Tryon Road Intersection (Priority Controlled)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lindfield Avenue											
2	T1	222	0.0	0.318	2.7	LOS A	2.1	14.6	0.57	0.38	46.7
3	R2	197	0.0	0.318	8.0	LOS A	2.1	14.6	0.57	0.38	46.1
Approach		419	0.0	0.318	5.2	NA	2.1	14.6	0.57	0.38	46.4
East: Tryon Road											
4	L2	255	0.0	0.207	5.8	LOS A	0.9	6.3	0.41	0.61	45.7
6	R2	40	0.0	0.076	9.5	LOS A	0.2	1.7	0.61	0.83	43.5
Approach		295	0.0	0.207	6.3	LOS A	0.9	6.3	0.44	0.64	45.4
North: Lindfield Avenue											
7	L2	262	0.0	0.329	4.8	LOS A	1.8	12.6	0.15	0.26	47.6
8	T1	264	0.0	0.329	0.2	LOS A	1.8	12.6	0.15	0.26	48.1
Approach		526	0.0	0.329	2.5	NA	1.8	12.6	0.15	0.26	47.9
All Vehicles		1240	0.0	0.329	4.3	NA	2.1	14.6	0.36	0.39	46.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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.

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# MOVEMENT SUMMARY

## Site: 101 [AM Peak]

Lindfield Avenue & Tryon Road Intersection (Signalised)

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lindfield Avenue											
2	T1	123	0.0	0.085	3.8	LOS A	1.6	11.4	0.29	0.24	47.5
3	R2	139	0.0	0.252	10.9	LOS A	2.0	14.0	0.53	0.69	43.0
Approach		262	0.0	0.252	7.5	LOS A	2.0	14.0	0.42	0.48	45.0
East: Tryon Road											
4	L2	272	0.0	0.528	34.8	LOS C	10.8	75.5	0.86	0.80	33.7
6	R2	96	0.0	0.369	47.9	LOS D	4.4	30.7	0.95	0.77	29.9
Approach		368	0.0	0.528	38.2	LOS C	10.8	75.5	0.88	0.79	32.6
North: Lindfield Avenue											
7	L2	248	0.0	0.234	15.9	LOS B	5.9	41.4	0.53	0.70	40.8
8	T1	442	0.0	0.520	12.7	LOS A	11.8	82.8	0.60	0.52	42.6
Approach		690	0.0	0.520	13.8	LOS A	11.8	82.8	0.57	0.59	41.9
All Vehicles		1320	0.0	0.528	19.4	LOS B	11.8	82.8	0.63	0.62	39.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	43.3	LOS E	0.1	0.1	0.93	0.93	
P2	East Full Crossing	50	12.5	LOS B	0.1	0.1	0.50	0.50	
P3	North Full Crossing	50	43.3	LOS E	0.1	0.1	0.93	0.93	
All Pedestrians		150	33.1	LOS D			0.79	0.79	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

## Site: 101 [PM Peak]

Lindfield Avenue & Tryon Road Intersection (Signalised)

Signals - Fixed Time Isolated Cycle Time = 100 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Lindfield Avenue											
2	T1	222	0.0	0.156	4.3	LOS A	3.2	22.6	0.32	0.28	47.2
3	R2	197	0.0	0.271	10.4	LOS A	3.0	20.8	0.51	0.69	43.2
Approach		419	0.0	0.271	7.2	LOS A	3.2	22.6	0.41	0.47	45.2
East: Tryon Road											
4	L2	255	0.0	0.343	26.9	LOS B	8.6	60.3	0.74	0.77	36.3
6	R2	40	0.0	0.144	45.1	LOS D	1.7	12.1	0.90	0.73	30.6
Approach		295	0.0	0.343	29.4	LOS C	8.6	60.3	0.76	0.76	35.4
North: Lindfield Avenue											
7	L2	262	0.0	0.355	21.3	LOS B	7.7	53.7	0.64	0.74	38.4
8	T1	264	0.0	0.346	16.6	LOS B	7.7	53.6	0.64	0.54	40.7
Approach		526	0.0	0.355	19.0	LOS B	7.7	53.7	0.64	0.64	39.5
All Vehicles		1240	0.0	0.355	17.5	LOS B	8.6	60.3	0.59	0.61	40.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	50	42.4	LOS E	0.1	0.1	0.92	0.92	
P2	East Full Crossing	50	17.4	LOS B	0.1	0.1	0.59	0.59	
P3	North Full Crossing	50	42.4	LOS E	0.1	0.1	0.92	0.92	
All Pedestrians		150	34.1	LOS D			0.81	0.81	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

## ▽ Site: 101 [AM Peak]

Tryon Road & Milray Street Intersection  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Tryon Road											
5	T1	240	0.0	0.165	0.4	LOS A	0.5	3.2	0.18	0.11	48.9
6	R2	55	0.0	0.165	5.8	LOS A	0.5	3.2	0.18	0.11	48.0
Approach		295	0.0	0.165	1.4	NA	0.5	3.2	0.18	0.11	48.8
North: Milray Street											
7	L2	219	0.0	0.340	5.4	LOS A	1.6	11.0	0.37	0.63	45.6
9	R2	141	0.0	0.340	7.9	LOS A	1.6	11.0	0.37	0.63	45.2
Approach		360	0.0	0.340	6.4	LOS A	1.6	11.0	0.37	0.63	45.4
West: Tryon Road											
10	L2	116	0.0	0.159	4.6	LOS A	0.0	0.0	0.00	0.21	48.3
11	T1	188	0.0	0.159	0.0	LOS A	0.0	0.0	0.00	0.21	48.8
Approach		304	0.0	0.159	1.8	NA	0.0	0.0	0.00	0.21	48.6
All Vehicles		959	0.0	0.340	3.4	NA	1.6	11.0	0.20	0.34	47.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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.

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# MOVEMENT SUMMARY

▽ Site: 101 [PM Peak]

Tryon Road & Milray Street Intersection  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Tryon Road											
5	T1	173	0.0	0.148	0.9	LOS A	0.6	4.1	0.32	0.18	48.3
6	R2	67	0.0	0.148	6.4	LOS A	0.6	4.1	0.32	0.18	47.4
Approach		240	0.0	0.148	2.4	NA	0.6	4.1	0.32	0.18	48.0
North: Milray Street											
7	L2	138	0.0	0.340	5.5	LOS A	1.6	11.0	0.40	0.68	45.3
9	R2	184	0.0	0.340	8.0	LOS A	1.6	11.0	0.40	0.68	44.8
Approach		322	0.0	0.340	6.9	LOS A	1.6	11.0	0.40	0.68	45.0
West: Tryon Road											
10	L2	262	0.0	0.234	4.6	LOS A	0.0	0.0	0.00	0.32	47.7
11	T1	181	0.0	0.234	0.0	LOS A	0.0	0.0	0.00	0.32	48.2
Approach		443	0.0	0.234	2.7	NA	0.0	0.0	0.00	0.32	47.9
All Vehicles		1005	0.0	0.340	4.0	NA	1.6	11.0	0.20	0.40	47.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## ▽ Site: 101 [AM Peak]

Havilah Road & Havilah Lane Intersection  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Havilah Lane											
1	L2	19	0.0	0.082	4.7	LOS A	0.3	2.0	0.17	0.58	46.1
2	T1	1	0.0	0.082	3.9	LOS A	0.3	2.0	0.17	0.58	49.3
3	R2	64	0.0	0.082	5.9	LOS A	0.3	2.0	0.17	0.58	45.5
Approach		84	0.0	0.082	5.6	LOS A	0.3	2.0	0.17	0.58	45.7
East: Havilah Road											
5	T1	36	0.0	0.019	0.0	LOS A	0.0	0.0	0.02	0.02	50.0
6	R2	1	0.0	0.019	5.0	LOS A	0.0	0.0	0.02	0.02	52.6
Approach		37	0.0	0.019	0.2	NA	0.0	0.0	0.02	0.02	50.1
North: Basement Car Park Entry/Exit											
7	L2	20	0.0	0.015	5.9	LOS A	0.1	0.4	0.23	0.54	52.9
9	R2	1	0.0	0.015	6.3	LOS A	0.1	0.4	0.23	0.54	52.4
Approach		21	0.0	0.015	5.9	LOS A	0.1	0.4	0.23	0.54	52.9
West: Havilah Road											
10	L2	4	0.0	0.073	4.6	LOS A	0.0	0.0	0.00	0.02	49.7
11	T1	138	0.0	0.073	0.0	LOS A	0.0	0.0	0.00	0.02	50.7
Approach		142	0.0	0.073	0.2	NA	0.0	0.0	0.00	0.02	50.6
All Vehicles		284	0.0	0.082	2.2	NA	0.3	2.0	0.07	0.22	49.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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.

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# MOVEMENT SUMMARY

## ▽ Site: 101 [PM Peak]

Havilah Road & Havilah Lane Intersection  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Havilah Lane											
1	L2	9	0.0	0.126	4.7	LOS A	0.5	3.2	0.24	0.59	46.0
2	T1	1	0.0	0.126	3.8	LOS A	0.5	3.2	0.24	0.59	49.3
3	R2	115	0.0	0.126	5.7	LOS A	0.5	3.2	0.24	0.59	45.4
Approach		125	0.0	0.126	5.6	LOS A	0.5	3.2	0.24	0.59	45.5
East: Havilah Road											
5	T1	54	0.0	0.028	0.0	LOS A	0.0	0.0	0.01	0.01	50.0
6	R2	1	0.0	0.028	4.9	LOS A	0.0	0.0	0.01	0.01	52.6
Approach		55	0.0	0.028	0.1	NA	0.0	0.0	0.01	0.01	50.0
North: Basement Car Park Entry/Exit											
7	L2	3	0.0	0.009	5.8	LOS A	0.0	0.2	0.22	0.56	53.0
9	R2	7	0.0	0.009	6.2	LOS A	0.0	0.2	0.22	0.56	52.5
Approach		10	0.0	0.009	6.1	LOS A	0.0	0.2	0.22	0.56	52.7
West: Havilah Road											
10	L2	4	0.0	0.052	4.6	LOS A	0.0	0.0	0.00	0.03	49.7
11	T1	98	0.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.03	50.7
Approach		102	0.0	0.052	0.2	NA	0.0	0.0	0.00	0.03	50.7
All Vehicles		292	0.0	0.126	2.7	NA	0.5	3.2	0.11	0.28	48.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## ▽ Site: 101 [AM Peak]

Milray Street & Proposed LVG Access  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milray Street											
1	L2	27	0.0	0.088	4.6	LOS A	0.0	0.0	0.00	0.09	49.0
2	T1	144	0.0	0.088	0.0	LOS A	0.0	0.0	0.00	0.09	49.5
Approach		171	0.0	0.088	0.7	NA	0.0	0.0	0.00	0.09	49.4
North: Milray Street											
8	T1	234	0.0	0.190	0.3	LOS A	0.7	5.0	0.20	0.18	48.5
9	R2	106	0.0	0.190	5.2	LOS A	0.7	5.0	0.20	0.18	28.6
Approach		340	0.0	0.190	1.8	NA	0.7	5.0	0.20	0.18	39.9
West: Site Access											
10	L2	7	0.0	0.162	0.5	LOS A	0.6	3.9	0.44	0.47	27.7
12	R2	126	0.0	0.162	3.0	LOS A	0.6	3.9	0.44	0.47	27.5
Approach		133	0.0	0.162	2.9	LOS A	0.6	3.9	0.44	0.47	27.5
All Vehicles		644	0.0	0.190	1.7	NA	0.7	5.0	0.20	0.21	38.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

▽ Site: 101 [PM Peak]

Milray Street & Proposed LVG Access  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Milray Street											
1	L2	220	0.0	0.174	4.6	LOS A	0.0	0.0	0.00	0.36	47.5
2	T1	108	0.0	0.174	0.0	LOS A	0.0	0.0	0.00	0.36	48.0
Approach		328	0.0	0.174	3.1	NA	0.0	0.0	0.00	0.36	47.6
North: Milray Street											
8	T1	183	0.0	0.187	0.8	LOS A	0.9	6.1	0.35	0.25	47.9
9	R2	121	0.0	0.187	5.9	LOS A	0.9	6.1	0.35	0.25	28.4
Approach		304	0.0	0.187	2.9	NA	0.9	6.1	0.35	0.25	37.6
West: Site Access											
10	L2	117	0.0	0.255	0.4	LOS A	1.0	7.1	0.28	0.26	27.8
12	R2	139	0.0	0.255	3.4	LOS A	1.0	7.1	0.28	0.26	27.7
Approach		256	0.0	0.255	2.0	LOS A	1.0	7.1	0.28	0.26	27.7
All Vehicles		888	0.0	0.255	2.7	NA	1.0	7.1	0.20	0.29	36.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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.

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