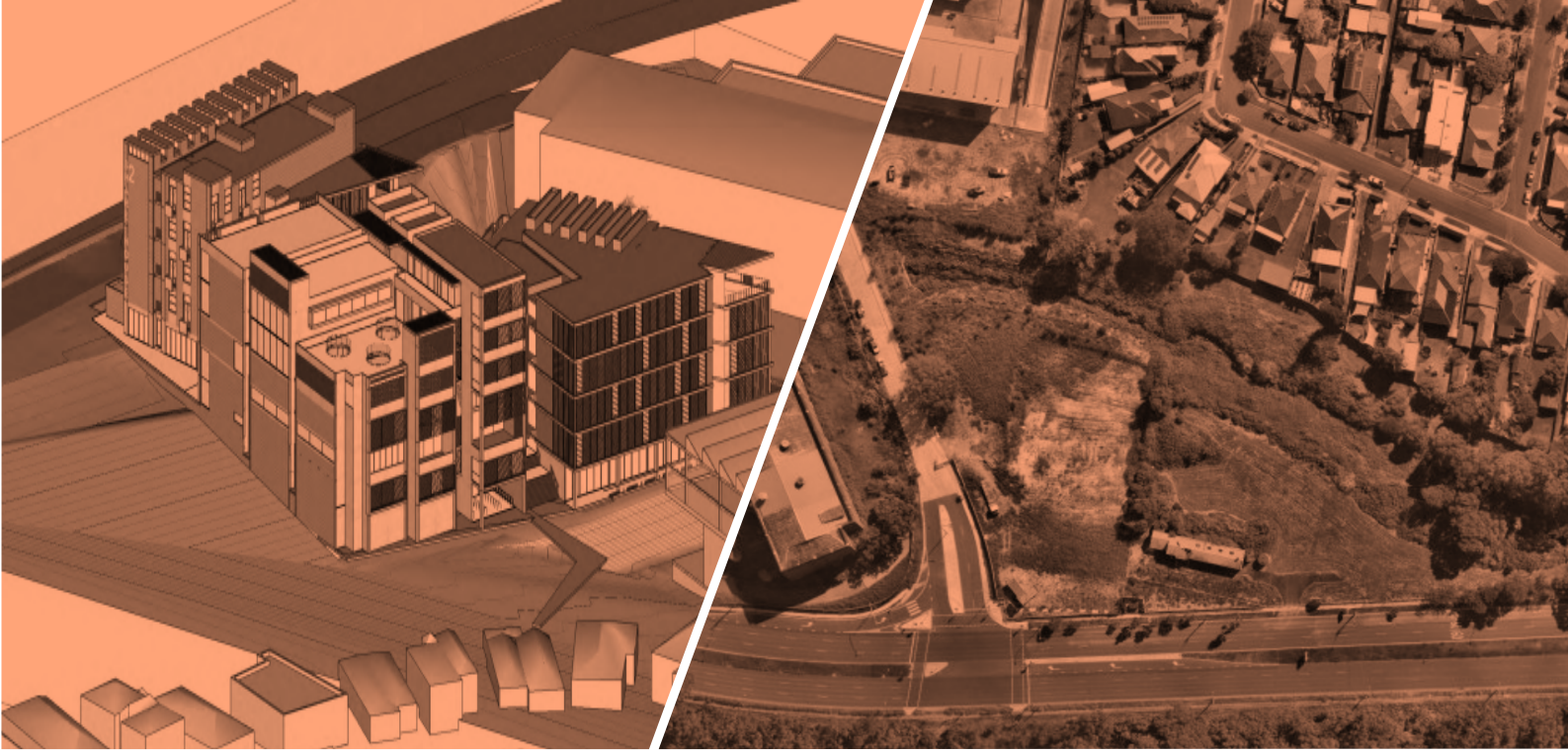

PROPOSED MIXED USE DEVELOPMENT
2-6 GIRAWAH PLACE, MATRAVILLE

TRAFFIC IMPACT ASSESSMENT REPORT

PROPOSED MIXED USE DEVELOPMENT 2-6 GIRAWAH PLACE, MATRAVILLE
Client: Horme Group Pty Ltd
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1 INTRODUCTION

SALT has been engaged by Horme Group Pty Ltd to undertake Traffic Impact Assessment of the proposed mixed-use development to be located at 2-6 Girawah Place in Matraville.

In the course of preparing this report:

- The development plans and relevant background information have been reviewed;
- A desktop investigation of the subject site and surrounding environs has been conducted;
- Design input and advice regarding parking and access has been provided to the project team; and
- The parking and traffic implications of the proposal have been assessed.

The following sets out SALT's findings with respect to the traffic engineering matters of the proposed development.

2 EXISTING CONDITIONS

2.1 LOCATION AND LAND USE

The subject site encompasses 2, 4 and 6 Girawah Place, Matraville, on the north-eastern corner of Botany Road and Girawah Place. The site is currently vacant and has a total area of approximately 8,060m^2.

The surrounding land is largely industrial in nature, with residential areas to the north and east of the site. To the north of the site is 10-12 Girawah Place (The Borough Zone 1901), an industrial / business development currently under construction.

Bunnerong Creek runs in a generally east-west alignment within the site land, towards the northern boundary.

The intersection of Botany Road and Girawah Place has recently been upgraded to a signalised T-intersection, completed in 2021.

The location of the subject site with respect to the surrounding road network is depicted in **Figure 1**. An aerial view of the subject site is provided in **Figure 2.**

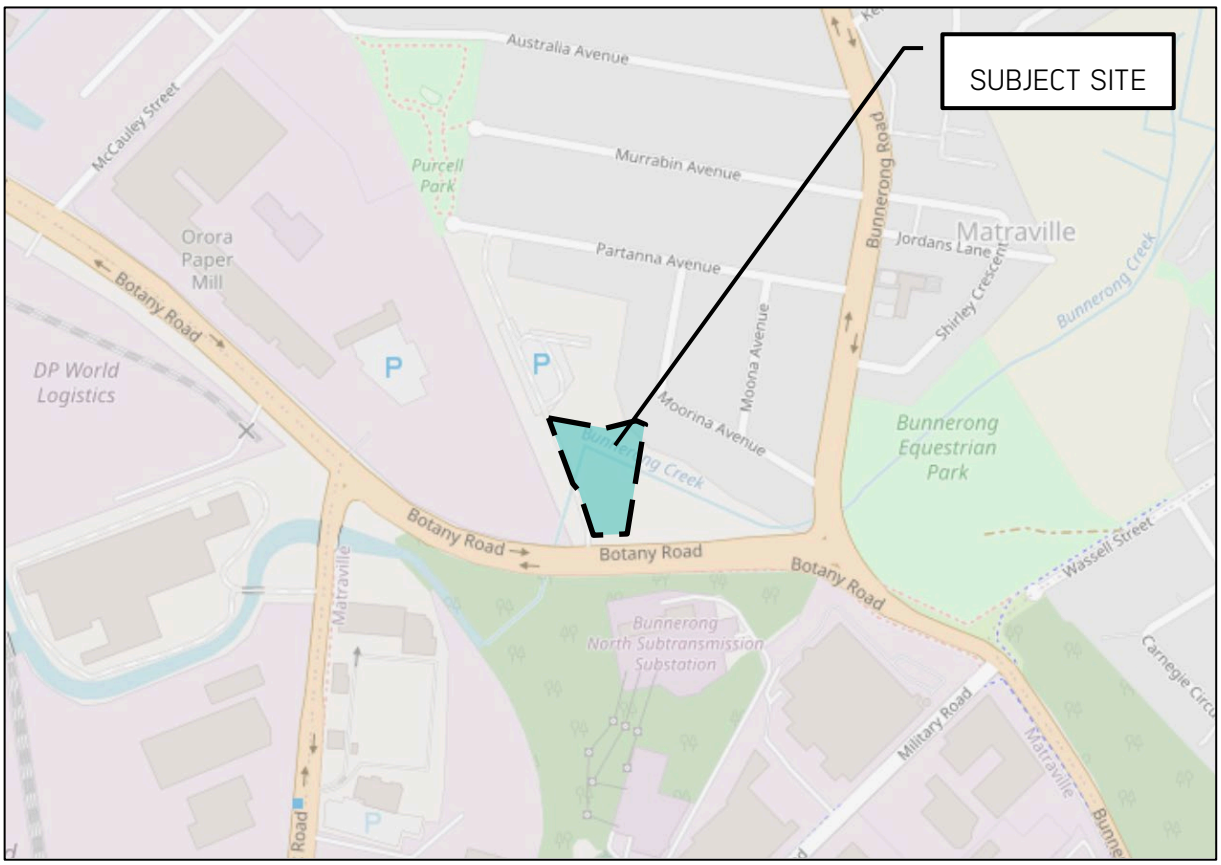


Figure 1 Subject site locality

Figure 2 Aerial view of subject site

2.2 ZONING AND POLICY

The subject site is located within both a General Industrial (IN1) and Private Recreation (RE2) land zones. Numbers 2 and 6 Girawah Place are zoned as IN1 and 4 Girawah Place is zoned as RE2, as can be seen in **Figure 3**.

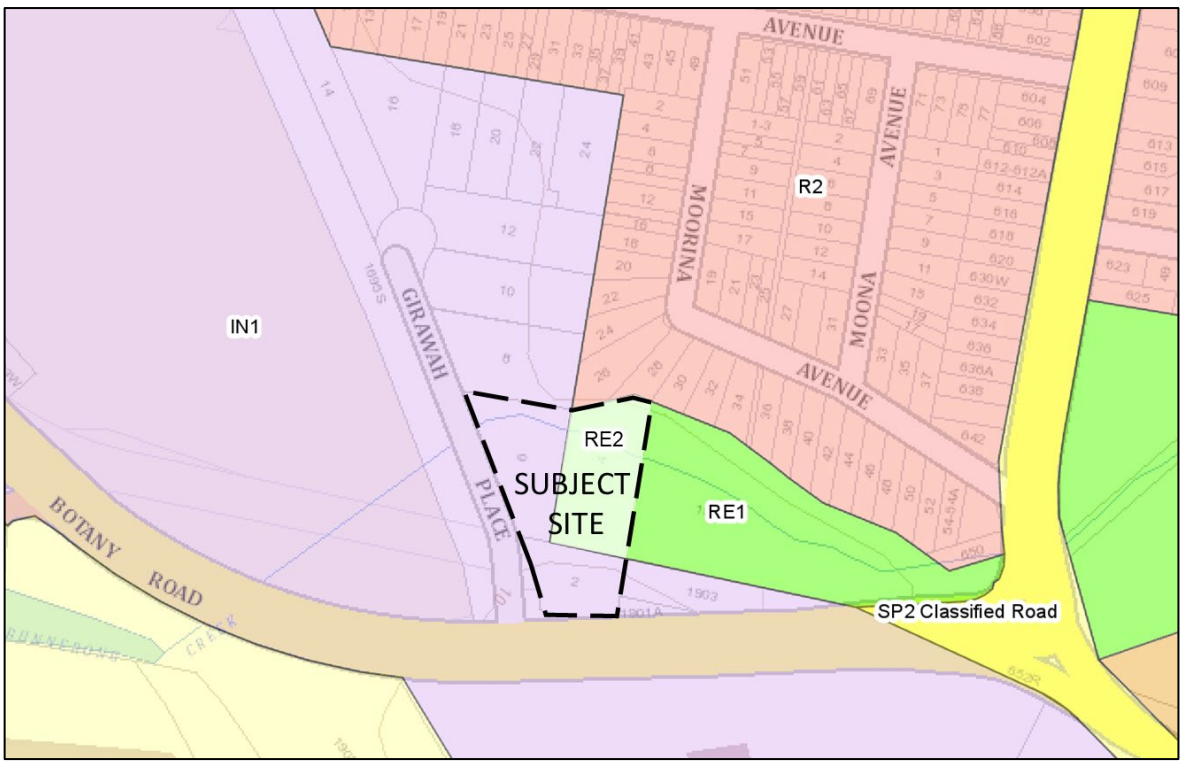


Figure 3 Subject site zoning

2.3 ROAD NETWORK

2.3.1 GIRAWAH PLACE

Girawah Place is a private access road running in a generally north-south alignment from Botany Road and extending approximately 200m before terminating. It has been recently constructed, completed in March 2021.

Girawah Place has a carriageway width of approximately 6.8m, allowing two-way vehicle access, including that for heavy vehicles.

The intersection of Girawah Place and Botany Road has recently been upgraded to a signalised intersection. A median is located along the southern part of the site frontage to Girawah Place. A pedestrian footpath is provided along the eastern side of Girawah Place.

There are signs erected to restrict parking along the length of Girawah Place. The default speed limit of 50km/hr applies.

2.3.2 BOTANY ROAD

Botany Road is an arterial road, extending in an east-west orientation in the vicinity of the site. It provides three traffic lanes in each direction, separated by a median. An additional left and right turn lane into Girawah Place are provided.

On-street parking is not permitted on either side of Botany Road. Pedestrian footpaths are provided on both sides of Botany Road in the vicinity of the site.

The speed limit on Botany Road is 70km/hr at the site frontage, reducing to 60km/hr just east of the site.

2.4 SUSTAINABLE TRANSPORT

2.4.1 PUBLIC TRANSPORT

The site is accessible by public transport, with bus route 309 servicing the area. The closest bus stop to the site is located on Bunnerong Road at Moorina Avenue, approximately 350m (4-minute walk) to the east of the site. Bus route 309 operates between Port Botany and Redfern. This provides connection to key destinations and the greater public transport network including multiple schools, gardens, Green Square Station and Redfern Station. Figure 4 shows the surrounding public transport network.

There are no train stations located within a convenient distance to the subject site.

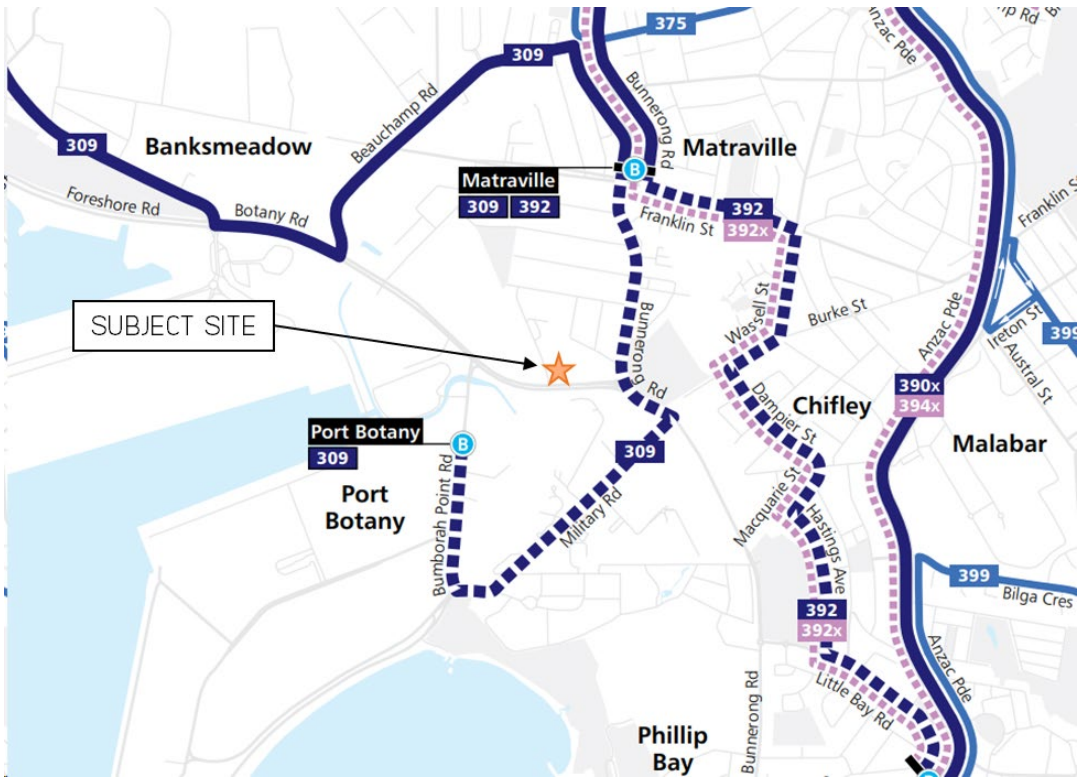


Figure 4 Public transport network

2.4.2 WALKING

The site has good walking facilities in place, with pedestrian footpaths provided along both sides of Botany Road and along the site frontage on Girawah Place. Pedestrian crossing facilities are provided at the intersection of Girawah Place and Botany Road, allowing safe and convenient pedestrian access to the site.

The site is within convenient walking distance to the residential precinct to the north of the site.

2.4.3 CYCLING

There are no on- or off-road bicycle paths provided in close proximity to the site. The nearest bike track is along the length of Military Road to the south of the site. **Figure 5** shows the nearby bicycle network.

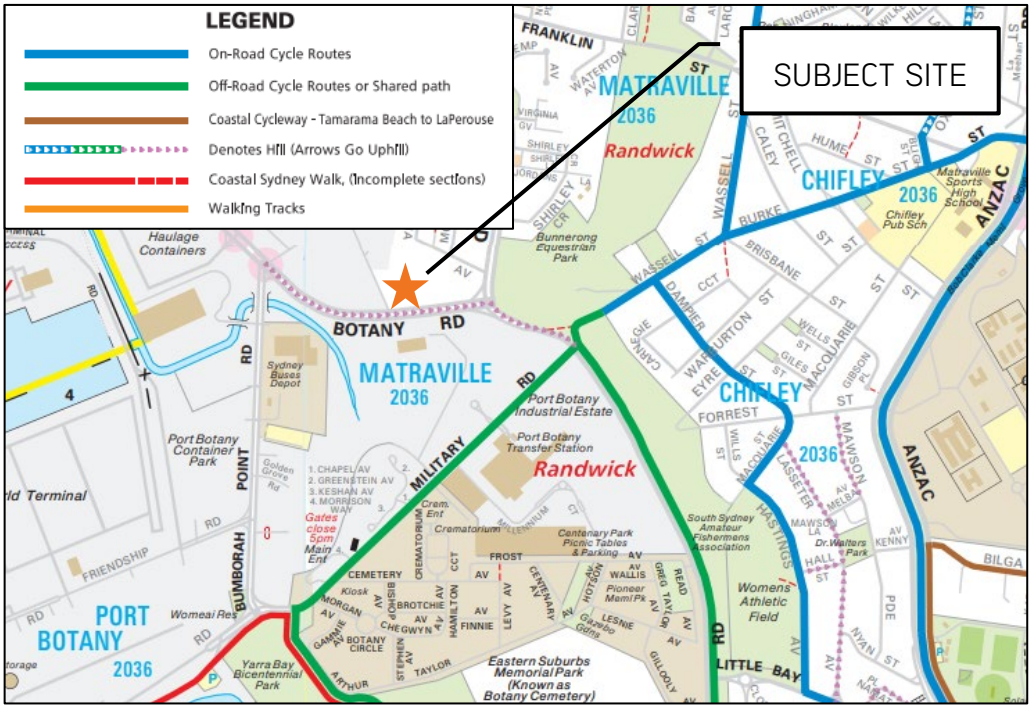


Figure 5 Bicycle network

2.5 TRAFFIC VOLUMES

In order to ascertain the existing level of traffic at the adjacent intersection of Botany Road and Girawah Place, SCATS data has been sourced from Transport for NSW.

The traffic volume data was provided for each loop detector in 15-minute intervals over the course of 24 hours on Wednesday 29 March 2023. This represents a typical weekday not impacted by school holidays or public holidays.

By review of the data, the peak hours of activity at the intersection occurred between 8:00am-9:00am and 5:00pm-6:00pm. The traffic volumes during these peak hours are presented in **Figure 6**.

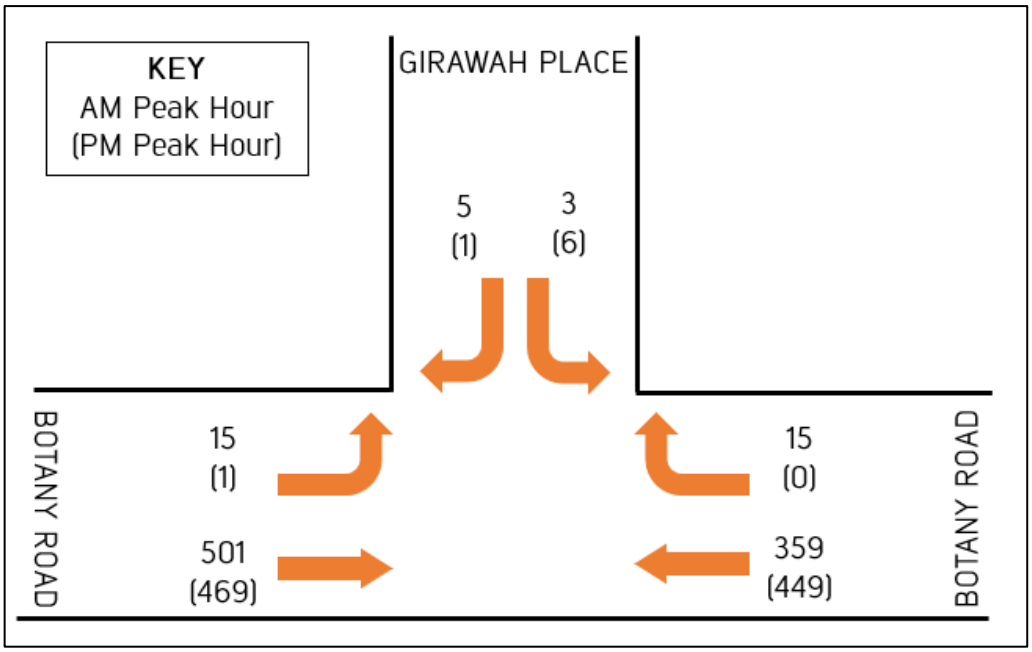


Figure 6 Existing peak hour traffic volumes

From **Figure 6**, it is observed that traffic volumes currently entering and exiting Girawah Place are low even during peak hours. The intersection of Botany Road and Girawah Place was recently upgraded to a signalised intersection in anticipation of development at the subject site and surrounding lots.

3 PROPOSAL

3.1 LAND USES

The proposal involves the development of three mixed-use buildings across the site, providing a variety of land uses. This includes a number of hi-tech workspaces, aquatic centre, gymnasium, childcare centre, as well as food and beverage, cafes / restaurant and common areas.

The high-tech workspaces are intended to service e-commerce operators and the like. They are generally small-scale businesses/ workshops to get products on the line and out to purchasers using the services of courier vans.

Following comments received from Council and subsequent correspondence the project team has worked proactively to address the comments raised. As a result, development scheme has been modified with significant changes to the basement layout including provision of additional on site parking to meet the overall Council parking requirements.

A schedule of the proposed areas is provided in **Table 1**.

Table 1 Proposed schedule of areas

Land Use	Size
Industrial Zone	
Hi Tech Workspaces[1]	4,880.6m^2
Food and Beverage	561.9m^2
Recreation Zone	
Childcare Centre	79 children, 15 staff (455.8m^2 internal)
Aquatic Centre	1,070.6m^2
Gymnasium	825.6m^2
Indoor Recreation Space	335.7m^2
Cafés / Restaurants	234.2m^2

[1] The Hi-Tech workspaces only considers the leasable spaces available and excludes the shared areas, which is made up of connecting corridors, meeting rooms and lounge areas available for use by all individual tenants. The shared areas include a total of 1,324.9m^2.

3.2 PARKING AND ACCESS

Car parking is proposed to be provided on-site over three basement levels, with separated parking facilities for the industrial and recreational zoned lots. A total of 109 parking spaces are proposed to be provided to the industrial portion, including three (3) accessible spaces. A total of 112 parking spaces are proposed to be provided to the recreational portion, including three (3) accessible spaces.

Vehicle access to the site is proposed via two new crossovers to Girawah Place, with separate access points for the industrial and recreation sections of the development.

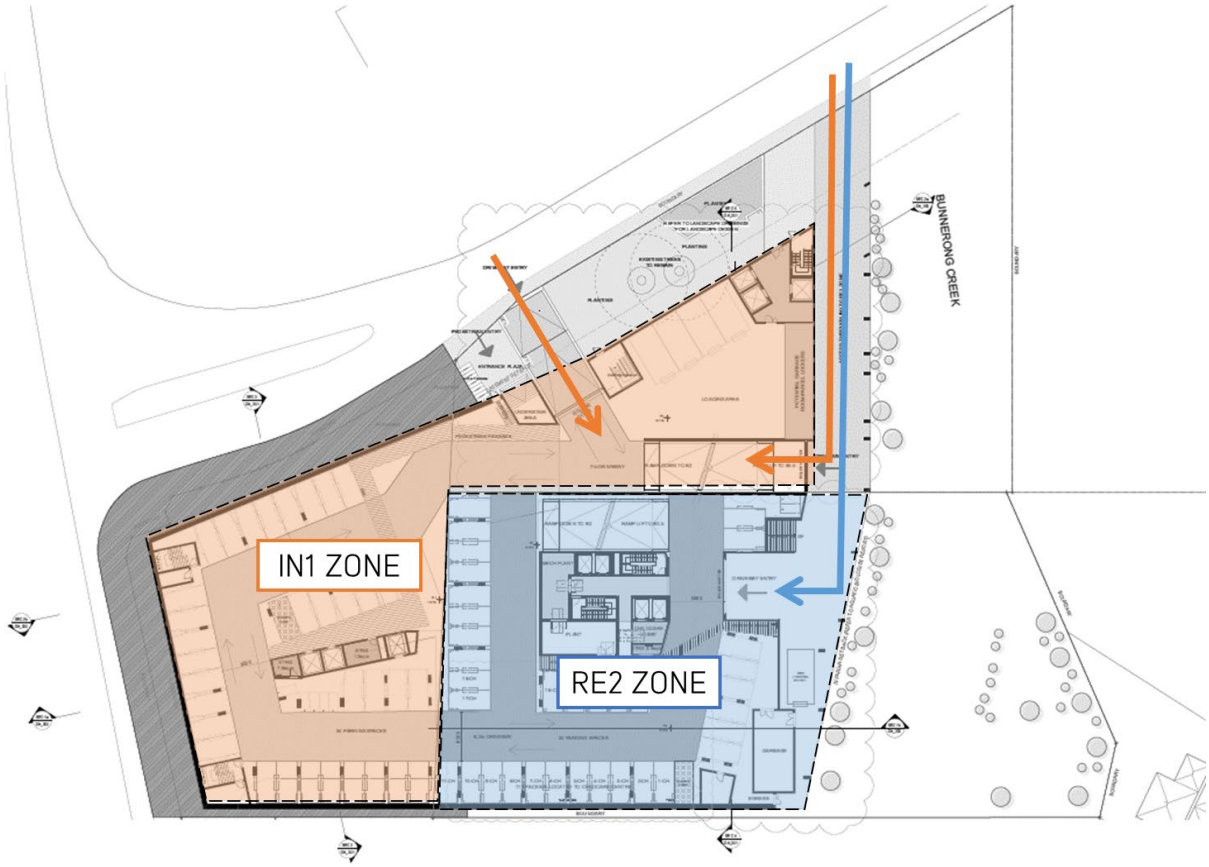
Pedestrian access to the ground level shared Plaza is proposed from Girawah Place. The shared Plaza provides pedestrian access to the lobbies and receptions areas for all three buildings.

A total of 37 bicycle parking spaces are proposed, including bicycle rails adjacent the industrial lobby and secure spaces within Basement 1 and 2. A total of 25 motorcycle parking spaces are proposed over the basement levels.

A main loading area is proposed within Basement 2 of the industrial portion, providing four (4) loading bays. This basement level is intended to house delivery lockers to provide handoff between tenants of the high-tech workshops and courier vehicles. Additionally, three (3) dedicated loading parking spaces are provided adjacent to the southern building lift core to further support servicing of industrial zone, and in particular the southern building.

A second loading area is proposed within the recreational portion, providing one (1) loading bay.

A diagram of the zoning and access arrangement is provided in **Figure 7**.



Base Source: Drawing DA_101 Revision N prepared by Bennett Murada dated 20 October 2023

Figure 7 Zoning and access diagram

4 CAR PARKING

4.1 STATUTORY REQUIREMENTS

Table 1 of B7 Section 3.2 of the Randwick Development Control Plan (DCP) 2013 specifies the number of car parking spaces required for various land uses.

The proposal includes separated parking facilities for the industrial and recreational zones on the site, thus the parking requirements are calculated for the two zones as summarised in **Table 2** and **Table 3**.

It is noted that there is no parking requirement specified in the DCP that is exactly relevant to the high-tech workshops and their intended operation. Having regard to operation at similar e-commerce developments, such as 76A Edinburgh Street, Marrickville, the rate for 'light industry' has been adopted.

Table 2 Car parking statutory requirements – Industrial zone

Land Use	Area	DCP 2013 Car Parking Rate	No. Spaces Required[1]
Hi-Tech Workspaces	4,880.6m^2	1 space per 80m^2	61 spaces
Food and Beverage	561.9m^2	1 space per 40m^2 GFA for the first 80m^2 GFA, the 1 space per 20m^2 GFA thereafter	26 spaces
		TOTAL PARKING REQUIRED	87 spaces
		PROPOSED PARKING PROVISION	109 spaces
		PARKING SHORTFALL / SURPLUS	+ 22 spaces

[1] *Rounded to the nearest whole number as per the Randwick DCP*

Table 2 shows based on the DCP 2013 parking requirements the industrial land uses require a total of 87 parking spaces. A total of 109 parking spaces are proposed within the industrial zone of the development, resulting in a surplus of 22 spaces.

Table 3 Car parking statutory requirements – Recreational zone

Land Use	Area	DCP 2013 Car Parking Rate	No. Spaces Required[1]
Childcare Centre (79 children, 15 staff)	455.8m^2	1 space per 8 children for drop off and pick up; and 1 space per 2 staff	18 spaces
Aquatic Centre[2]	1,070.6m^2	1 space per 25m2 GFA	43 spaces
Gymnasium[2]	825.6m^2		33 spaces
Indoor Recreation Space	335.7m^2		13 spaces
Cafés / Restaurants	234.2m^2	1 space per 40m^2 GFA for the first 80m^2 GFA, then 1 space per 20m^2 GFA thereafter	10 spaces
		TOTAL PARKING REQUIRED	117 spaces
		PROPOSED PARKING PROVISION	112 spaces
		PARKING SHORTFALL / SURPLUS	- 5 spaces

[1] *Rounded to the nearest whole number as per the Randwick DCP*
[2] *Indoor recreation facility rate has been applied to the aquatic centre and gymnasium.*

Table 3 shows based on the DCP 2013 parking requirements the recreational land uses require a total of 117 parking spaces. A total of 112 parking spaces are proposed within the recreational zone of the development, resulting in a shortfall of five (5) spaces against the DCP.

The DCP parking rates consider the parking requirement for standalone uses. Considering the mixed-use nature of the land uses the development is highly likely to attract multi-purpose trips, with users of the aquatic centre, gymnasium and café and restaurants likely to also be associated with the Hi-Tech Workspaces. Therefore, the actual parking demand for the development is likely to be reduced.

Additionally, the different uses are expected to generate peak parking demands at various times of the day, with the peak requirements of each use not necessarily overlapping. This further reduces the overall parking demand as discussed below.

In summary, the parking requirement for the industrial zone is exceeded by 22 spaces, with a shortfall of parking within the recreational zone of five spaces. Therefore, the overall development has a parking surplus of 17 spaces.

4.2 TEMPORAL DEMAND ASSESSMENT

Considering the nature of the proposal, many of the parking demands are likely to overlap due to the variance in peak usage across the day and week. To account for this, a temporal demand assessment has been undertaken which involves placing a demand percentage on car parking for each land use at various typical peak days and times throughout the week to determine peak time / day for parking demands of the entire site.

The temporal demand assessment is provided in **Table 4**.

Table 4 Temporal parking demand assessment

Land Use	Spaces Required	Temporal Demand Assessment							
		Weekday Lunchtime	Demand	Friday Evening (5-7pm)	Demand	Friday Evening (7-9pm)	Demand	Saturday Morning / Lunchtime	Demand
Hi-Tech Workspaces	61	80%	49	30%	18	10%	6	30%	18
Food and Beverage	26	80%	21	100%	26	80%	21	100%	26
Industrial Sub-Total	87	-	**70**	-	44	-	27	-	44
Industrial Parking Provision	109	-	**109**	-	109	-	109	-	109
Industrial Parking Surplus/ Shortfall	+22	-	**+39**	-	+65	-	+82	-	+65
Childcare Centre	18	30%	5	90%	16	10%	2	0%	0
Aquatic Centre	43	20%	9	70%	30	30%	13	80%	34
Gymnasium	33	20%	7	70%	23	30%	10	80%	26
Indoor Recreation Space	13	20%	3	70%	9	50%	7	80%	10
Cafes / Restaurant	10	80%	8	100%	10	80%	8	100%	10
Recreational Sub-Total	117	-	32	-	**88**	-	40	-	80
Recreational Parking Provision	106	-	106	-	**106**	-	106	-	106
Recreational Parking Surplus/ Shortfall	-5	-	+80	-	**+24**	-	+72	-	+32
TOTAL PARKING REQUIRED	**204**	**-**	**102**	**-**	**132**	**-**	**67**	**-**	**124**
PROPOSED PARKING PROVISION	**221**	**-**	**215**	**-**	**215**	**-**	**215**	**-**	**215**
PARKING SURPLUS / SHORTFALL	**+17**	**-**	**+119**	**-**	**+89**	**-**	**+154**	**-**	**+97**

Based on the above, the temporal demand assessment indicates that the peak parking demand for the site is expected to occur on a Friday evening from 5:00pm-7:00pm at which there is an anticipated site parking demand of 132 spaces.

The peak parking demand for the industrial zone is expected to occur on a Weekday Lunchtime, with an anticipated parking demand of 70 spaces. The peak parking for the recreational zone is expected to occur on a Friday evening from 5:00-7:00pm, with an anticipated peak parking demand of 88 spaces.

4.3 ADEQUACY OF CAR PARKING PROVISION

There is a statutory requirement to provide 204 parking spaces as per the Randwick DCP 2013 requirements. This is exceeded by the proposal which includes a total of 221 car parking spaces.

Considering the site as a whole the proposed provision of 221 car parking spaces will adequately accommodate the demands at all times and days of the week. Even during the expected peak period on a Friday 5:00pm–7:00pm the anticipated peak parking demand of 132 can be accommodated with a surplus of 89 spaces.

Looking at the individual zones, the peak usage within each zone do not overlap and the temporal assessment demonstrates that the proposed industrial and recreational parking provisions are adequate for all periods.

The peak peaking demand for the industrial zone is expected to occur on a Weekday Lunchtime, with an anticipated demand of 70 spaces. With an industrial parking provision of 109 spaces this results in a surplus of 39 industrial zone parking spaces during its peak usage.

The peak parking demand for the recreational zone is expected to occur on a Friday evening from 5:00–7:00pm, with an anticipated demand of 88 spaces. This can be accommodated in the recreational parking provision of 112 spaces and results in a surplus of 24 recreational zone parking spaces.

Furthermore, multi-purpose trips to the site are highly expected given the large variety of facilities available. For example, employees of the Hi-Tech Workspaces are likely to make use of the other facilities including the gymnasium, aquatic centre, childcare centre, restaurant etc. The above assessment assumes that all land uses would attract individual trips, so the occurrence of multi-purpose trips further reduces the car parking demands.

Therefore, the parking demands generated by the proposal can be easily accommodated on-site.

4.4 ACCESSIBLE PARKING

The Building Code of Australia (BCA) specify the number of accessible parking spaces required for various building types. The site would fall under the Class 9b – Other assembly building. This has a requirement to provide 1 DDA space for every 50 car parking spaces.

The development as a whole proposes 221 car parking spaces, this results in a requirement for five (5) DDA spaces.

The proposal includes 109 and 112 car parking spaces in the industrial and recreational zones respectively. Applying the BCA requirement to each zone results in a need for three (3) DDA spaces per zone.

This is met by the proposal which includes six (6) DDA spaces, to be located across the basement levels. Three (3) are provisioned within the industrial zone and the remaining three (3) in the recreational zone.

5 BICYCLE PARKING

5.1 STATUTORY REQUIREMENTS

Table 3 of B7 Section 4.2 DCP 2013 specifies the number of bicycle parking spaces required for various land uses.

All of the land uses included within the proposal fall under the category for 'All other development' including commercial, retail, industrial, community, educational and recreational tenancies. These all have a requirement for 1 bike space per 10 car parking spaces.

With respective parking provisions of 109 and 112 car parking spaces for the industrial and recreational zones, the proposal generates a requirement for 11 and 12 bicycle parking spaces for the industrial and recreational zones respectively (23 total).

5.2 ADEQUACY OF BICYCLE PARKING PROVISION

The proposal includes the provision of 28 bicycle parking spaces, exceeding the requirement for 23 spaces.

Eight (8) floor mounted spaces are located within Basement 2 of the industrial zone, with a further six (6) floor mounted spaces located on the ground floor adjacent to Girawah Place. Therefore, the bicycle parking provision for the industrial zone is exceeded.

Within the recreational zone a total of nine (9) wall mounted spaces are proposed within Basement 1 and five (5) floor mounted spaces are proposed within Basement 2. Therefore, the bicycle parking provision for the recreational zone is exceeded.

This arrangement meets the requirement of Australian Standard AS2890.3 for a minimum of 20% of bicycle parking to be provided as ground level (horizontal) spaces to ensure accessibility for users.

6 MOTORCYCLE PARKING

6.1 STATUTORY REQUIREMENTS

The required number of motorcycle parking spaces for various land uses are included within Table 1 of B7 Section 3.2 DCP 2013.

Applied to the proposal, the motorcycle parking requirements are as summarised in **Table 5**.

Table 5 Motorcycle parking requirements

Land Use	Area / No. People	DCP Motorcycle Parking Rate	Car Parking Requirement	No. Motorcycle Spaces Required[1]
Hi-Tech Workspaces	4,880.6m^2	5% of the car parking rate	61 spaces	3 spaces
Food and Beverage	561.9m^2	N/A	26 spaces	0 spaces
			Industrial Zone Sub-Total	**3 spaces**
Childcare Centre	455.8m^2	N/A	18 spaces	0 spaces
Aquatic Centre[2]	1,070.6m^2	5% of the car parking rate	43 spaces	2 spaces
Gymnasium[2]	825.6m^2	5% of the car parking rate	33 spaces	2 spaces
Indoor Recreation Space	335.7m^2	5% of the car parking rate	13 spaces	1 space
Restaurant	234.2m^2	N/A	10 spaces	0 spaces
			Recreational Zone Sub-Total	**5 spaces**
			TOTAL	**8 spaces**

[1] *Rounded to the nearest whole number as per the Randwick DCP*
[2] *Indoor recreation facility rate has been applied to the aquatic centre and gymnasium.*

As shown in **Table 5**, there is a requirement to provide eight (8) motorcycle parking spaces to the proposal, three (3) within the industrial zone and five (5) within the recreational zone.

6.2 ADEQUACY OF MOTORCYCLE PARKING PROVISION

The proposal includes the provision of 25 motorcycle parking spaces to be located over all basement levels, exceeding the requirement for eight (8) spaces. Seven (7) spaces are located within the recreational zone, with the balance located in the industrial zone, meeting the zonal requirements for motorcycle parking.

The motorcycle parking spaces are shown to be 1.2m wide and 2.5m long, at a 90-degree angle to the accessway. These dimensions comply with B7 Section 3.7 of DCP 2013.

7 LOADING FACILITIES

7.1 STATUTORY REQUIREMENTS

The required number of loading bays has been determined utilising the rates provided in the DCP based on the types of land uses proposed. The statutory loading bay requirements are calculated in **Table 6.**

SALT has been advised by the client the hi-tech workspaces are not intended to function as full-scale warehouses. They are generally small-scale workshops to accommodate e-commerce business who typically use courier vans. Notwithstanding the above, the service and delivery rates for industrial premises has been applied. The classifications of the proposed uses applied for the loading requirements match the same as those applied to the parking requirements for the site.

The loading facilities were designed by the project team having regard to loading activity at similar e-commerce developments such as 76A Edinburgh Street, Marrickville.

Table 6 Loading bay requirements

Land Use Type	Total Area	Loading Bay Requirement	No. Loading Bays Required[1]
Hi-Tech Workspaces	4,880.6m^2	1 space per 800m^2 GFA up to 8,000m^2 GFA plus 1 space per 1,000m^2 thereafter	6 bays
Food and **Beverage**	561.9m^2	1 space per 400m^2 GFA up to 2,000m^2 GFA plus one space per 1,000m^2 thereafter	2 bays
Cafés / Restaurants	234.2m^2		
Childcare Centre (**79** children, 15 staff)	455.8m^2	1 space per 4,000m^2 GFA up to 20,000m^2 GFA plus 1 space per 8,000m^2 thereafter	0 bays
Aquatic Centre	1,070.6m^2	1 space per 2,000m^2 GFA	1 bay
Gymnasium	825.6m^2		
Indoor Recreation Space	335.7m^2		
		TOTAL	**9 bays**

[1] *Rounded to the nearest whole number*

Based on the above, there is a statutory requirement to provide nine (9) loading bays to the proposed development.

7.2 ADEQUACY OF LOADING BAY PROVISIONS

Basement level 2 is proposed to provide a total of four (4) loading bays suitable for use by vehicles up to 6.4m Small Rigid Vehicles (SRV) trucks located within the industrial zone. Three dedicated loading spaces for use by couriers and vans are proposed in Basement level 2 adjacent to the southern lift core to service the food and beverage premises and Hi-Tech Workspaces in this area. An additional SRV loading bay is to be provided towards the north-east of the site within the recreational zone. Therefore, a total of eight (8) loadings bays are to be provided, with five (5) of these suitable for SRV access.

Based on operations of similar e-commerce developments, it is understood that majority of deliveries and servicing will be undertaken by couriers and vans. The proposed loading bays are deemed suitable to accommodate each of the proposed land uses and likely loading activity. The SRV loading bays are measured at 3.5m wide and 7.0m long, exceeding the statutory dimension requirements of Australian Standard AS2890.2.

There is a technical shortfall of loading bays provided against the DCP requirement. The DCP requirement considers the loading bay requirement for standalone uses. As such, strict application of the rates for a mixed use development may be considered excessive. The loading and servicing profiles for each of the proposed land uses do not necessarily overlap, and the technical shortfall of one (1) loading bay is anticipated to have a negligible impact on the development. Notwithstanding, a Loading Management Plan is recommended to be developed for the site to ensure safe, efficient and appropriate use of the loading areas across the site.

8 DESIGN CONSIDERATIONS

8.1 ACCESS ARRANGEMENTS

Vehicular access to the site is proposed to occur via two new crossovers to Girawah Place of approximately 7m wide and 8.4m wide. These meet the relevant requirements of Australian Standard AS2890.1 for access to car parking facilities of this size and nature. The proposed crossovers will adequately accommodate two-way vehicle movements and access for waste vehicles as seen in the swept path diagrams provided in **APPENDIX 1**.

The crossovers are to be located approximately 60m and 100m from the intersection with Botany Road and past the median, allowing fully directional entry and exit for vehicles.

Access to the car parks is to include roller shutters with swipe access. The driveways have been designed to accommodation swipe card access with 7.5m wide driveways provided. The roller doors will be open on a time basis and the users will be given remote control access to the basement outside of these hours.

A pedestrian sight triangle 2.5m by 2.0m is to be provided at the exit lane of the accessways with planting in this area to be kept below 900mm in height, ensuring exiting drivers can observe any pedestrians at the site frontage.

Pedestrian access is proposed via the plaza entrance from Girawah Place. Stairs and ramps are provided up to the plaza level, leading to the lobbies and reception points of the various buildings.

8.2 CAR PARKING LAYOUT

All parking spaces are shown to be 2.6m wide and 5.4m long, accessed from a minimum 6.2m wide accessway. This complies with the requirements of the DCP and Australian Standard AS2890.1.

DDA parking is also shown to be 2.6m wide and 5.4m long, with shared spaces of the same dimensions, exceeding the requirements of AS2890.6.

Columns are located such that the required clearances to parking spaces have been provided, allowing for access and door opening, as per AS2890.1.

Parking spaces at dead end aisles have been provided with additional aisle length of minimum 1.0m, allowing adequate space for vehicles to comfortably enter and exit these spaces. Dead-end parking aisles are proposed to be provided with turn-around bays, allowing vehicles to exit in a forward direction, should all spaces be occupied on their arrival.

Access to key parking spaces can be seen by swept path analysis in **APPENDIX 1**.

8.3 RAMPS AND GRADIENTS

The ramp from Girawah Place to Basement 1 in the industrial zone provides access to the site for all vehicles, including a Small Rigid Vehicle (SRV) waste truck. This requires the ramp to have a maximum grade of 1:6.5 and ramp grade transitions to not exceed 1:12 in 4.0m of travel, as specified by AS2890.2 for commercial vehicles. The ramp is proposed to have a grade of 1:20 for a length of 6.0m from the road frontage and a grade of 1:8 for a length of 8.5m to the basement level.

These grades allow safe access for all vehicles and minimise the risk of scraping or bottoming, with appropriate transitions provided for the SRV trucks. The 1:20 section ensures pedestrian safety at the top of the ramp, in line with AS2890.1.

The ramps between basement levels are proposed to a gradient of 1:5 for varying lengths dependent on the ramp, with 2m transitions at 1:8 at either end. This complies with the requirements of AS2890.1 which specifies a maximum gradient of 1 in 5 for a straight ramp in a public car park. The transitions provided will create a comfortable ramp and reduce the chance of scraping or bottoming from occurring.

8.4 HEADROOM

Basement 1 is proposed to have a headroom of 2.3m, which exceeds the requirements of AS2890.1 for a minimum 2.2m headroom.

Basement 2 is proposed to have a headroom of 3.0m which exceeds the requirement of AS2890.1 for a minimum 2.2m headroom. This will adequately accommodate the vehicles expected to require access to this level including

a small waste truck and SRV service vehicles. Additional height clearance is provided above the Loading Dock and access route to accommodate loading and servicing vehicles.

Basement 3 is proposed to have a headroom of 2.4m, which exceeds the requirements of AS2890.1 for a minimum 2.2m headroom.

Additional height clearance is to be provided above the proposed accessible parking spaces to comply with the requirements of AS2890.6, which requires a height clearance of 2.5m above accessible spaces.

8.5 LOADING PROVISIONS

AS2890.2 stipulates the loading and servicing areas are to be designed for the largest vehicle likely to use the facility and for any specialist vehicles. As detailed above, the site is to largely be serviced by couriers and vans, with the largest vehicle anticipated to access the site a 6.4m low profile vehicle for waste collection. As such the loading and servicing areas of the site have been designed to accommodate 6.4m SRVs.

As discussed in **Section 7**, the proposal includes two loading docks, providing a total of five SRV (5) loading bays. Each loading bay is proposed to be 3.5m wide and 7.0m long, exceeding the statutory dimension requirements of Australian Standard AS2890.2 for access for an SRV.

Access and circulation by loading vehicles is demonstrated by swept path analysis, with diagrams provided in **APPENDIX 1**. Loading and servicing vehicles can enter and exit the site in a forward direction, and manoeuvre within the loading areas.

8.6 WASTE COLLECTION

Waste collection is to occur via a 6.4m truck by a private contractor, with separate waste storage areas for the industrial and recreational zones. A 6.4m waste collection vehicle has been determined suitable to accommodate the waste generated by the proposed development. Refer to the Waste Management Plan prepared by SALT for further information.

The waste truck can suitably enter and exit the site in a forward direction and manoeuvre within the loading areas. Waste collection is intended to occur, outside of the peak operating hours of the development, reducing the risk of conflict between the waste vehicle movements and other staff or visitors.

9 TRAFFIC CONSIDERATIONS

9.1 TRAFFIC GENERATION

The traffic generated by the development is anticipated to peak during the Friday evening 5:00pm–7:00pm period, aligning with the site peak parking demand. This is when the childcare pick-up time, peak gym, pool and restaurant usage occur as well as a large proportion of employees (warehouses, office spaces) will leave the site.

The RTA Guide to Traffic Generating Developments specifies the rate of trips generated for various land uses. These are applied to the proposal as summarised in **Table 7** under the following assumptions:

- The aquatic centre and indoor recreational space will generate traffic at a similar rate to the gymnasium, as no rate is specified for these uses;
- The Hi Tech Workspaces will generate evening peak traffic at the rate of 1 trip per parking space, considering there is no relevant rate provided for such a land use;

The proportion of inbound and outbound trips has also been estimated based on the expected activity for each land use during the peak hour on a Friday evening.

Table 7 Traffic generation as per RTA Guide

Land Use	Area / Size	Peak Hour Trip Generation Rate	Peak Hour Trips
Hi Tech Workspaces	4,880.6m²	0.5 trips / 100m² GFA	24 trips
Food and Beverage	561.9m²	5 trips / 100m² GFA	28 trips
Childcare Centre	79 children	0.7 trips per child	55 trips
Aquatic Centre	1,070.6m²	9 trips / 100m² GFA in sub-regional areas	96 trips
Gymnasium	825.6m²	9 trips / 100m² GFA in sub-regional areas	74 trips
Indoor Recreation Space	335.7m²	9 trips / 100m² GFA in sub-regional areas	30 trips
Cafes / Restaurant	234.2m²	5 trips / 100m² GFA	12 trips
		TOTAL	319 trips

Table 7 indicates the proposed development could be expected to generate up to 319 vehicle trips during the Friday evening peak hour. This estimate assumes each land use will generate independent trips whereas multi-purpose trips are highly likely in this case, with users of the Hi-Tech Workspaces likely to also use the childcare centre, aquatic centre of gymnasium.

To account for the multi-purpose trips, an empirical demand assessment has been undertaken based on the car parking requirements previously determined in **Table 4** and the expected activity at each of the land uses at this time.

This is considered a more realistic assessment of trips generated given the likelihood of multi-purpose trips. **Table 8** summarises the empirical trip generation calculations for the site.

Table 8 Empirical traffic generation assessment

Land Use	No. Parking Spaces Required	Activity/Demand on Friday 5-7pm	PM Peak Hour Trips Generated	Arrivals / Departures	Trips In	Trips Out
Hi Tech Industrial	61 spaces	80% of employees leave for the day	49 trips	0% / 100%	0 trips	49 trips
Food and Beverage	26 spaces	100% patrons arriving and leaving	52 trips	50% / 50%	26 trips	26 trips
Childcare Centre	18 spaces	Peak pick up period, arrive and depart in the same hour	36 trips	50% / 50%	18 trips	18 trips
Aquatic Centre	43 spaces	70% demand	30 trips	50% / 50%	15 trips	15 trips
Gymnasium	33 spaces	70% demand	23 trips	50% / 50%	12 trips	11 trips
Indoor Recreation Space	13 spaces	70% demand	9 trips	50% / 50%	5 trips	4 trips
Cafes / Restaurant	10 spaces	100% patrons arriving and leaving	20 trips	50% / 50%	10 trips	10 trips
				TOTAL	86 trips	133 trips
					219 trips	

As shown in **Table 8** the proposed development is anticipated to generated a total of 219 trips, 86 inbound and 133 outbound, in the PM peak period.

9.2 TRAFFIC DISTRIBUTION

The distribution of the traffic generated by the proposal is determined by analysis of the surrounding road network and key destinations.

Girawah Place terminates to the north of the site, thus it is assumed that all traffic to and from the site will be distributed to and from Botany Road to the south.

By review of the existing traffic volume data at Botany Road / Girawah Place, it is concluded that during the PM peak hour, traffic is generally evenly distributed to the east and west. Therefore, the traffic generated by the proposal is estimated to be distributed 50% eastbound and 50% westbound.

The estimated traffic distribution is shown diagrammatically in **Figure 8**. The resulting total traffic at Botany Road / Girawah Place post development in the critical PM peak hour period is depicted in Figure 9.

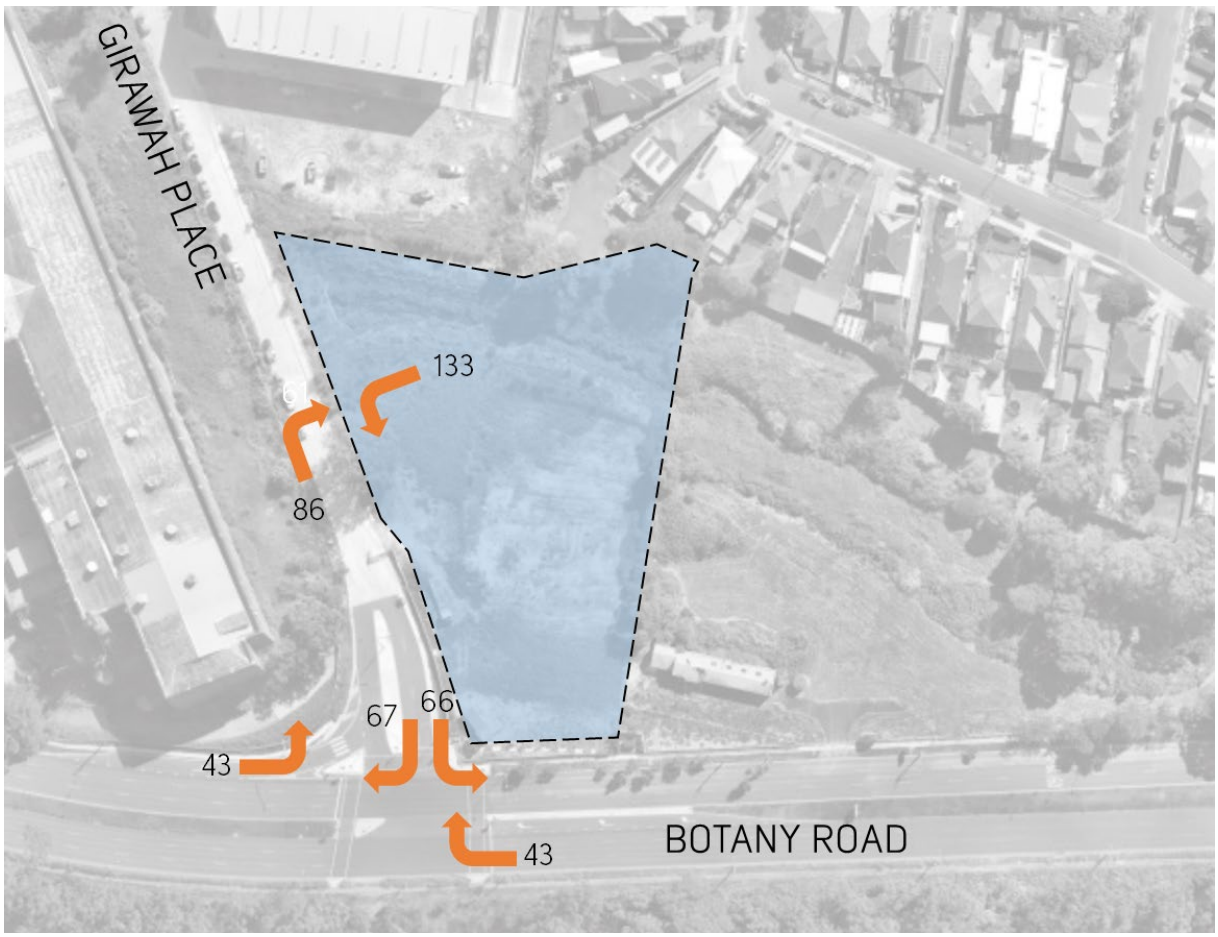


Figure 8 Estimated traffic distribution

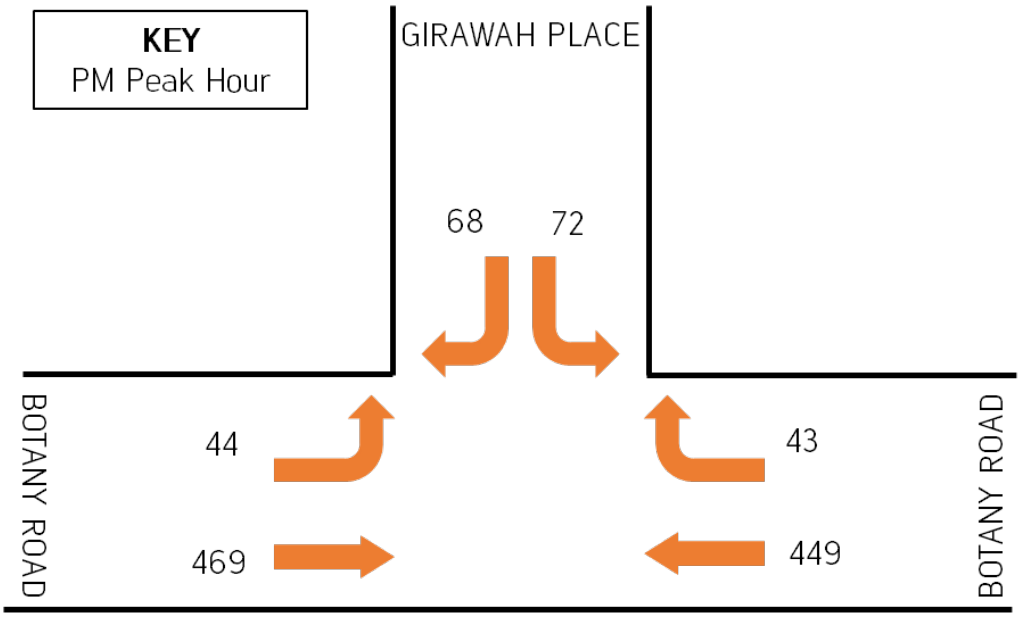


Figure 9 Post development PM peak hour volumes

9.3 SIDRA ANALYSIS

To quantify the impact of the additional traffic on the operation of the intersection of Botany Road and Girawah Place during the critical weekday PM peak hours, the intersection has been modelled using SIDRA Intersection v9.1.

SIDRA is an advanced micro-analytical traffic evaluation tool that provides estimates of capacity and performance statistics (delay, queue lengths etc) on a lane-by-lane basis.

Key performance criteria include:

Degree of Saturation (DOS): This represents the ratio of traffic volume to capacity. Generally speaking, a DOS of below 0.9 indicates acceptable performance. A DOS of over 1.0 indicates that capacity has been exceeded.

Level of Service (LOS): An index of the operational performance of traffic based on service measures such as delay, degree of saturation, density and speed during a given flow period. A guide to LOS ratings is provided in **Table 9.**

Average Delay: The average delay time that can be expected for a given movement.

95th Percentile Queue: The maximum queue length that can be expected in 95% of all observed queue lengths during the hour.

Table 9 Control delay for vehicle LoS calculations (RTA NSW Method)

Level of Service	Control delay per vehicle in seconds (d) (including geometric delay)	Traffic Signals, Roundabout	Give Way and Stop Signs Good operation
	All intersection types		
A	d < 14	Good operation	Good operation
B	d < 15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	d < 29 to 42	Satisfactory	Satisfactory, but accident study required
D	d < 43 to 56	Operating near capacity	Near capacity & accident study required
E	d ≤ 57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	d > 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

Adopted settings are summarised as follows:

- The RTA NSW method has been adopted with Delay determining the LOS (refer **Table 9**);
- Extra bunching set to 15% on both legs of Botany Road to account for the nearby signals approximately 170m to the west and east; and
- A compounding annual growth rate of 2% has been estimated for the Botany Road through volumes.

The intersection has been modelled under existing conditions with the volumes of **Figure 6**, post-development conditions with the traffic volumes of **Figure 9** and in the 10-year scenario. The SIDRA layout of the intersection is provided in **Figure 10** with lane geometry measured from aerial imagery.

The key SIDRA outputs during the critical weekday PM peak hour are summarised in **Table 10**, with the SIDRA outputs provided in **APPENDIX 2**.

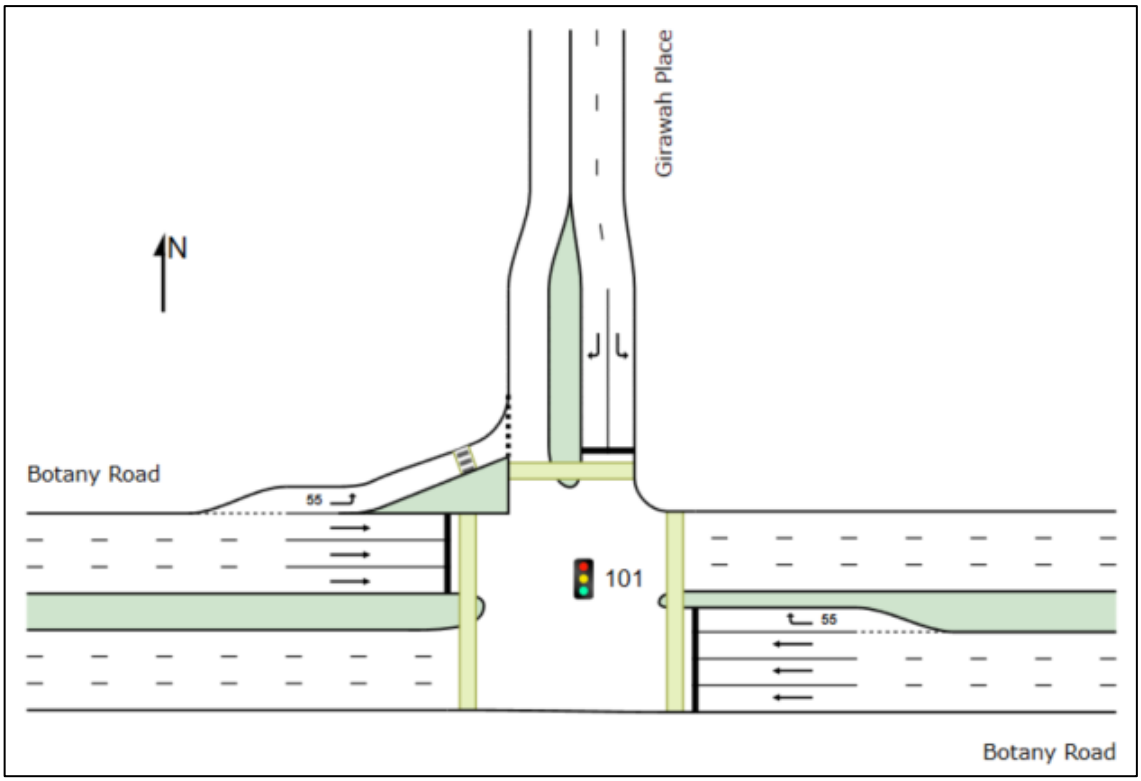


Figure 10 SIDRA intersection layout

Table 10 PM peak hour SIDRA results

Leg	Turn	Existing Conditions				Post Development				10-years Post Development			
		DOS	LOS	Delay (s)	Queue (m)	DOS	LOS	Delay (s)	Queue (m)	DOS	LOS	Delay (s)	Queue (m)
Botany Road (east)	T	0.168	A	10.3	22.9	0.168	A	10.3	22.9	0.204	A	10.8	29.3
	R	0.004	B	20.5	0.1	0.158	B	21.5	6.4	0.162	B	22.1	6.6
Girawah Place	L	0.005	A	10.4	0.6	0.065	A	10.7	7.2	0.066	A	10.9	7.5
	R	0.002	B	24.2	0.2	0.128	B	25.5	13.7	0.126	B	25.7	13.9
Botany Road (west)	L	0.001	A	6.3	0.0	0.031	A	6.4	1.2	0.031	A	6.4	1.2
	T	0.475	C	29.9	41.8	0.475	C	29.9	41.8	0.555	C	30.7	52.8

From **Table 10**, it is concluded that the intersection of Botany Road and Girawah Place can adequately accommodate the traffic generated by the proposed development.

The Level of Service remains within acceptable limits for all movements on each leg of the intersection post development and in the 10-year scenario. The critical movement is the through movement on the western leg of Botany Road for which a LOS C is achieved.

The additional traffic due to the proposal has minimal impact on the intersection operation with marginal increases to delays (no more than 2 seconds added to any movement) and queues (no more than 13.5m or two vehicles added to any movement). No 95th percentile queue length is found to exceed the actual length of the lanes.

Based on the above, whilst the development is anticipated to generate a moderate amount of traffic, this can be suitably accommodated by the surrounding road network and intersections. The proposal is not expected to have any major adverse impact on the operation of the existing road network.

10 CONCLUSIONS

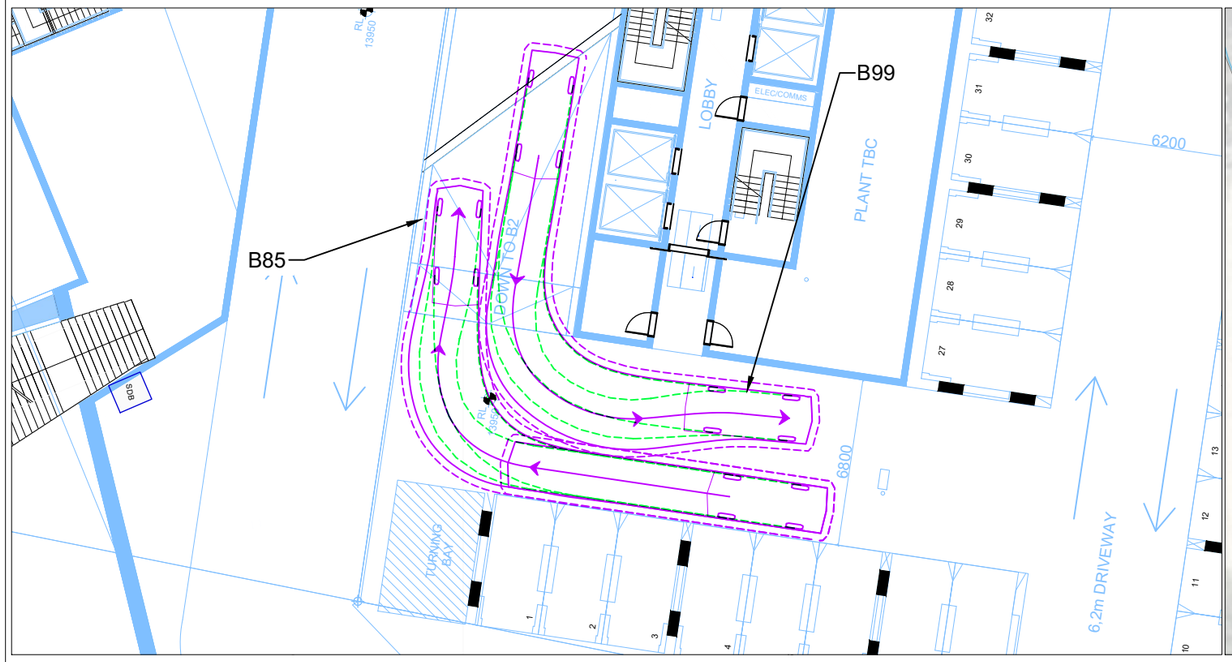
Based on the preceding analysis, the following is concluded:

- It is proposed to develop the site into three buildings of mixed-use nature comprising of a childcare centre, gymnasium, aquatic centre, hi-tech workspaces, food and beverage, cafes / restaurant and common areas.
- There is a statutory requirement to provide 204 parking spaces as per the Randwick DCP 2013 requirements. This is exceeded by the proposal which includes 221 spaces.
- The peak parking demand for the industrial zone of the site is expected to occur at weekday lunchtime, with a parking demand of 70 spaces, which results in a surplus of 39 spaces.
- The peak parking demand for the recreational zone of the site is expected to occur on Friday evenings between 5:00-7:00pm with an anticipated parking demand of 88 spaces, this results in a surplus of 24 parking spaces.
- A total of 28 bicycle parking is proposed to be provided, exceeding the DCP requirement for 23 spaces and the requirements across both land use zones.
- 25 motorcycle parking spaces are proposed, exceeding the requirement for 8 spaces as per the DCP and the requirements across both land use zones.
- The car parking layout and dimensions generally comply with the requirements of the DCP and Australian Standards.
- Adequate provisions have been made for loading and waste collection with consideration of the development being a mixed-use site, a loading management plan should be implemented to ensure safe and efficient operation of loading and servicing for the site.
- The traffic generated by the proposal is not anticipated to cause any significant adverse impacts on the surrounding intersections or road network.

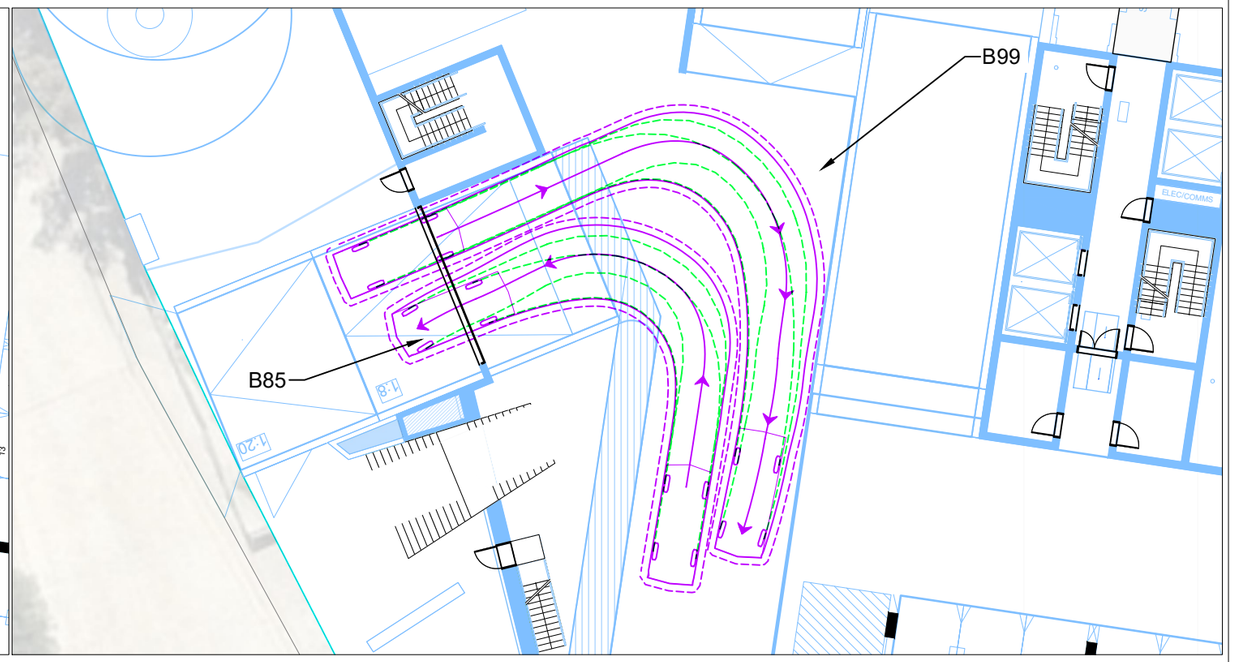
Therefore, the proposal is supported from a traffic engineering perspective.

APPENDIX 1 SWEPT PATH DIAGRAMS

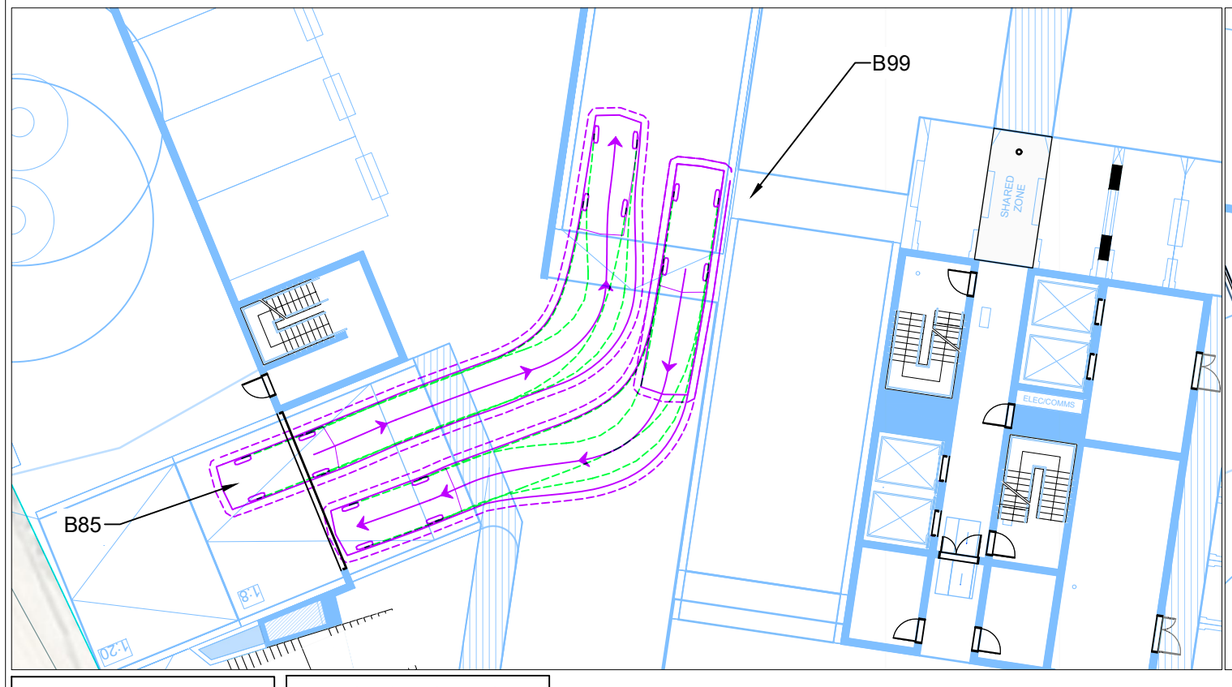
BASEMENT LEVEL 1 - PASSING ALONG RAMP



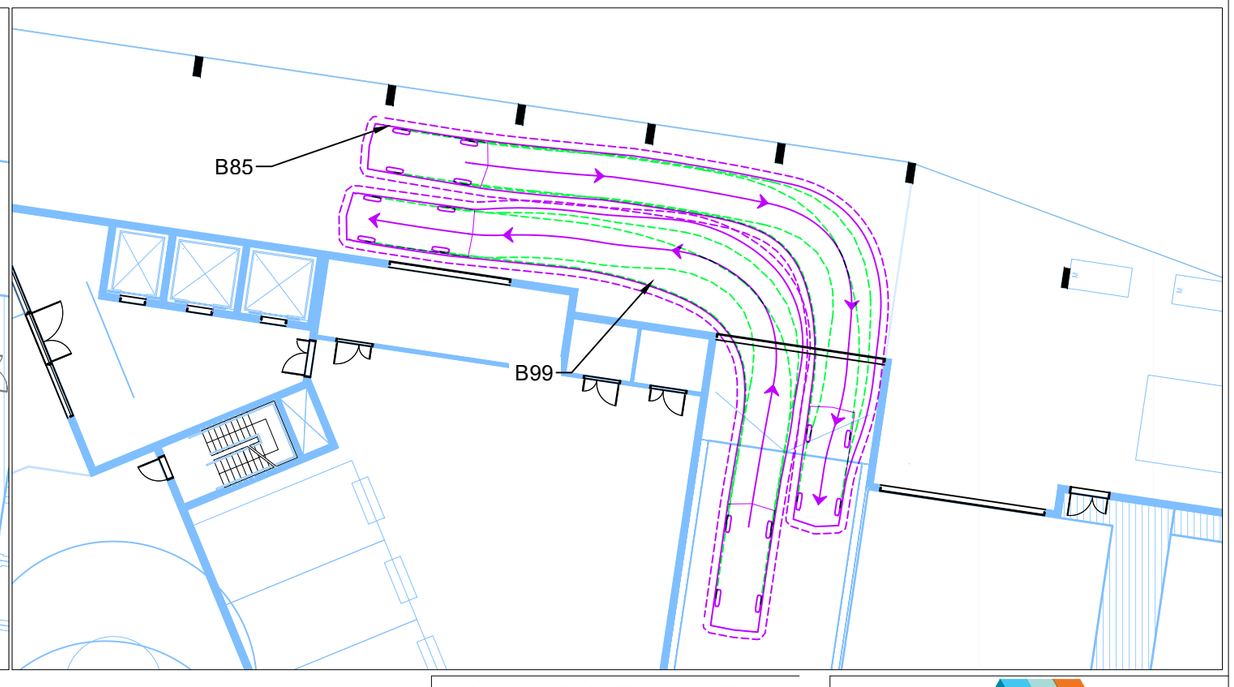
BASEMENT LEVEL 2 - PASSING ALONG RAMP



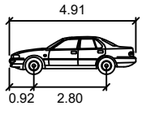
BASEMENT LEVEL 2 - PASSING ALONG RAMP



BASEMENT LEVEL 2 - PASSING ALONG RAMP



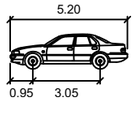
VEHICLE USED IN SIMULATION



Width	:	1.87m
Track	:	1.77m
TURNING CIRCLE (K-K)	:	11.5m

300MM BODY CLEARANCE ADOPTED.

VEHICLE USED IN SIMULATION



Width	:	1.94
Track	:	1.84
TURNING CIRCLE (K-K)	:	12.5m

300MM BODY CLEARANCE ADOPTED.

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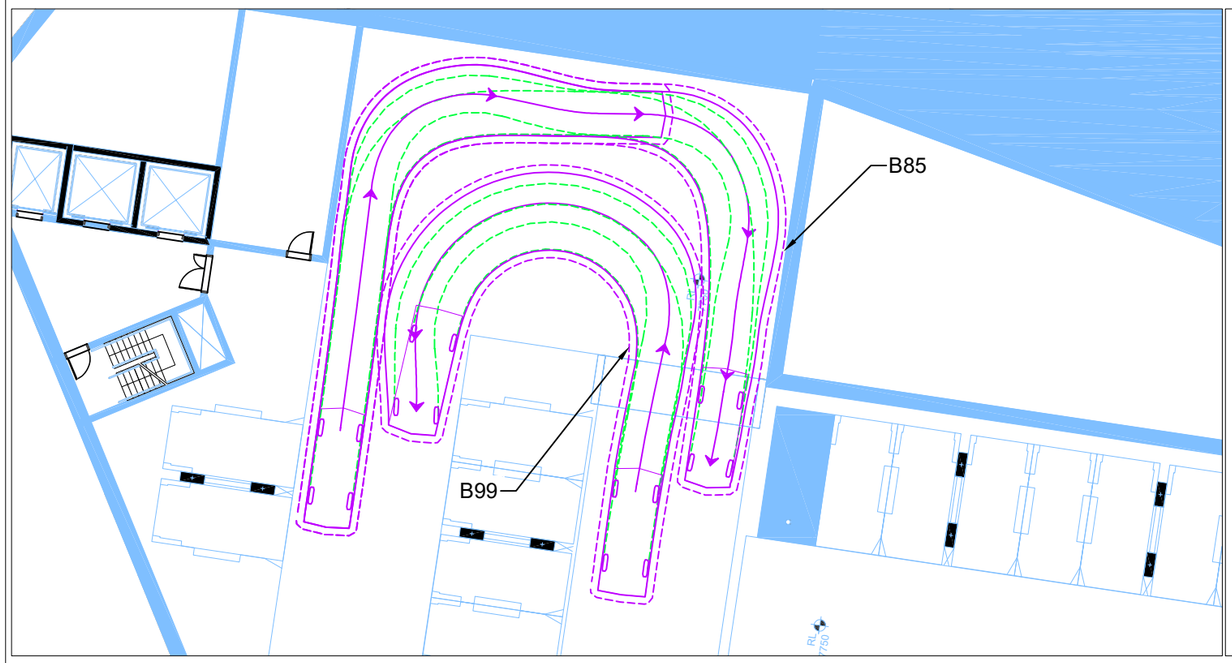
22031-SK01-001		2

BASEMENT LEVEL 3 - PASSING ALONG RAMP



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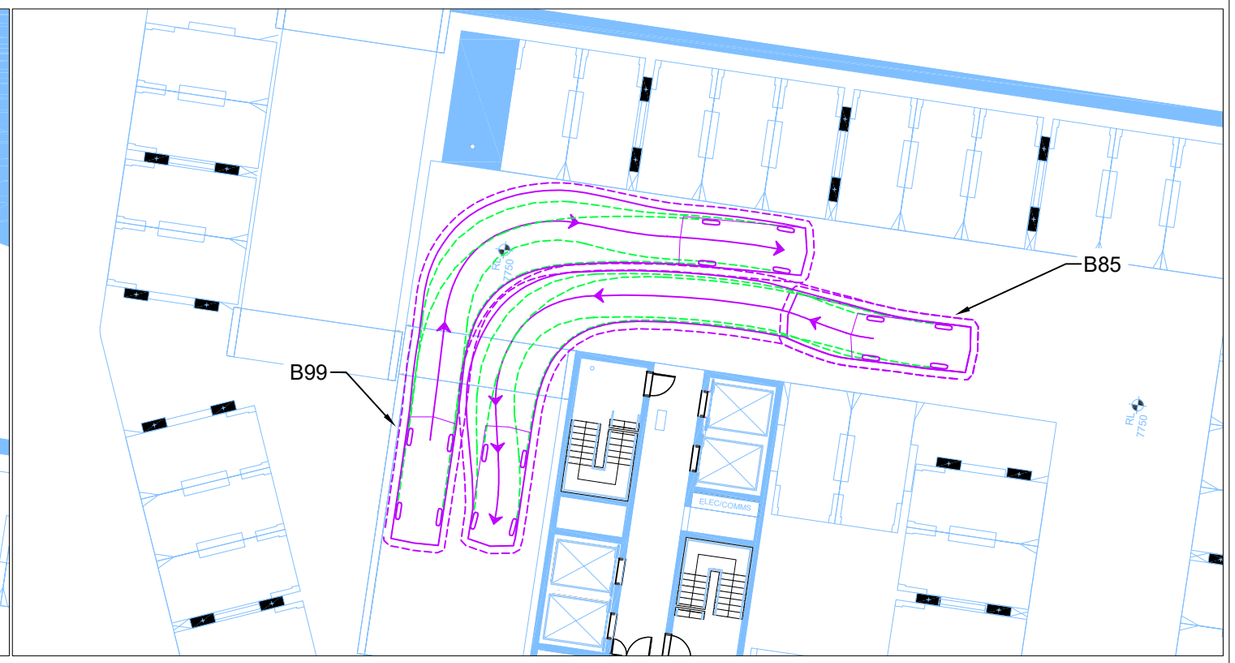
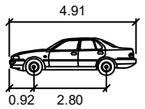


VEHICLE USED IN SIMULATION

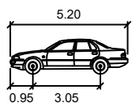


B85 DESIGN VEHICLE
(AS/NZS 2890.1:2004)

Width	:	1.87m
Track	:	1.77m
TURNING CIRCLE (K-K)	:	11.5m

300MM BODY CLEARANCE ADOPTED.

VEHICLE USED IN SIMULATION



B99 DESIGN VEHICLE
(AS/NZS 2890.1:2004)

Width	:	1.94
Track	:	1.84
TURNING CIRCLE (K-K)	:	12.5m

300MM BODY CLEARANCE ADOPTED.

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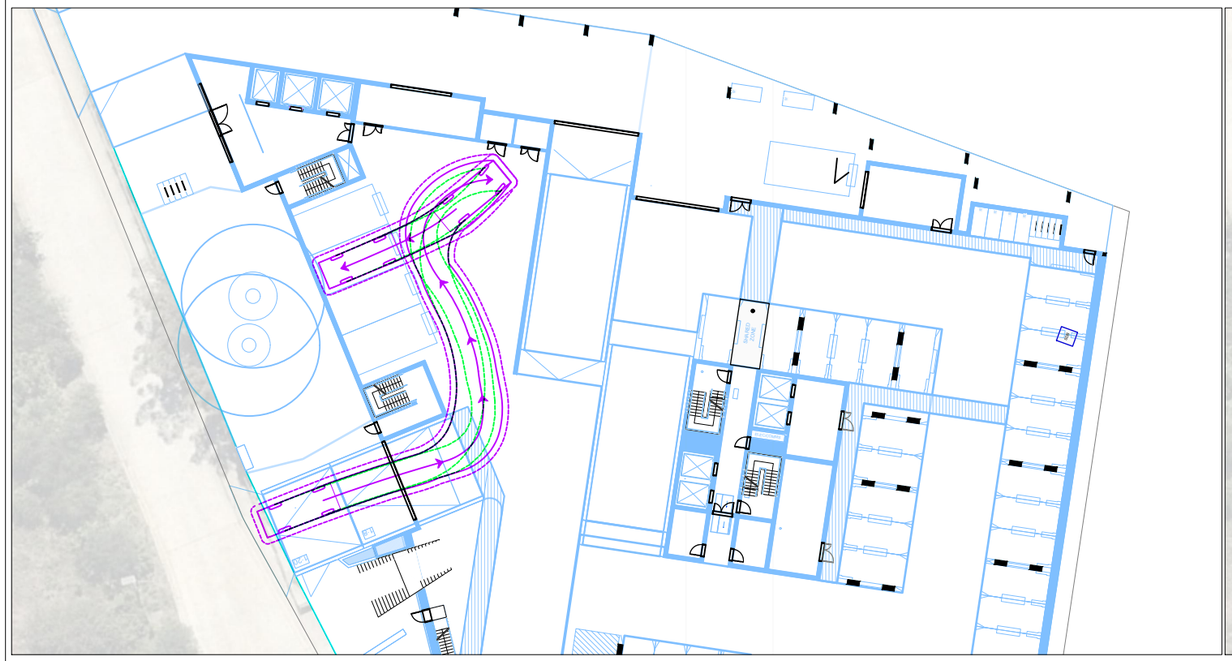
22031-SK01-002		1

LOADING BAY 3 - INGRESS



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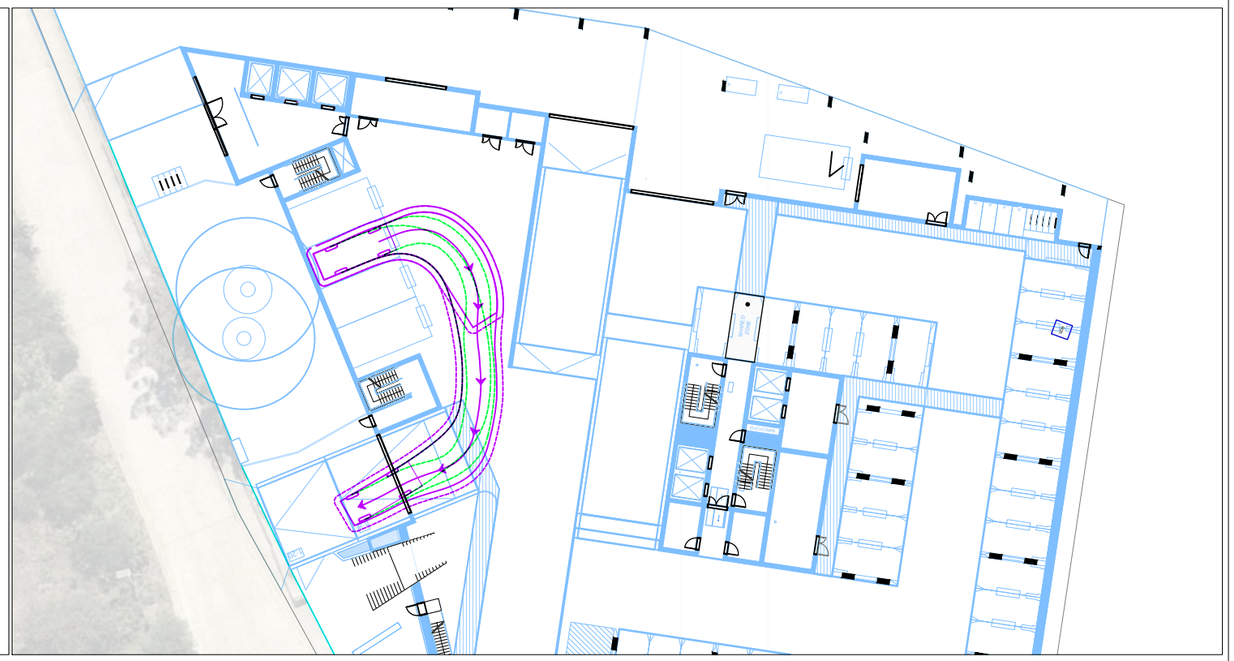

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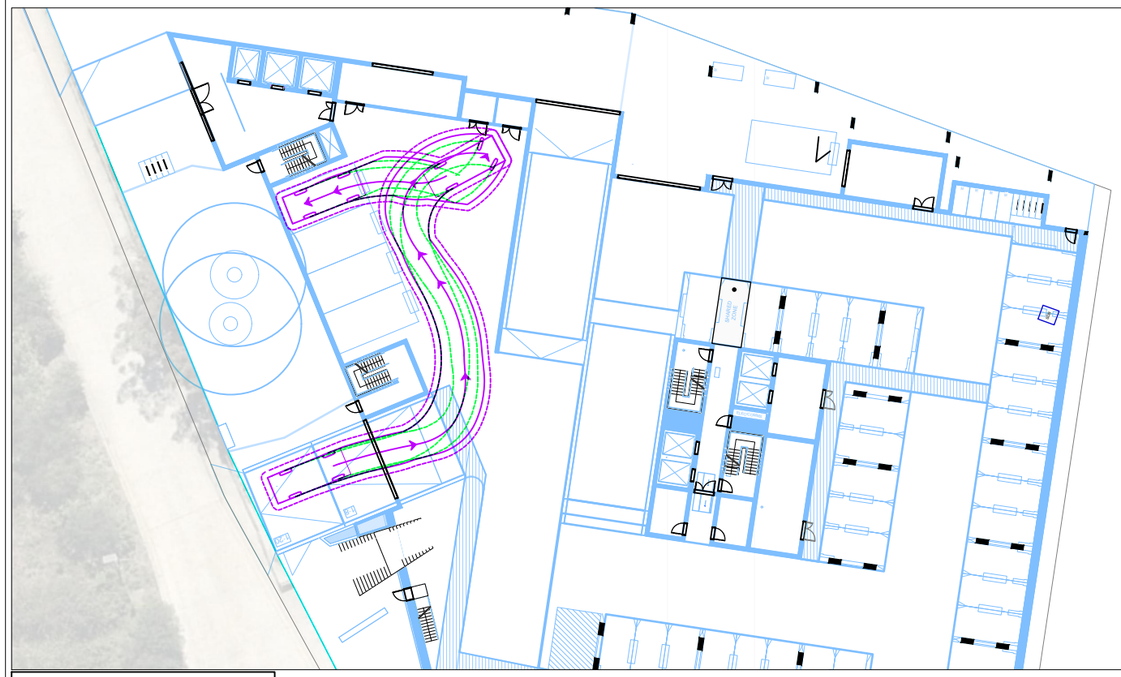

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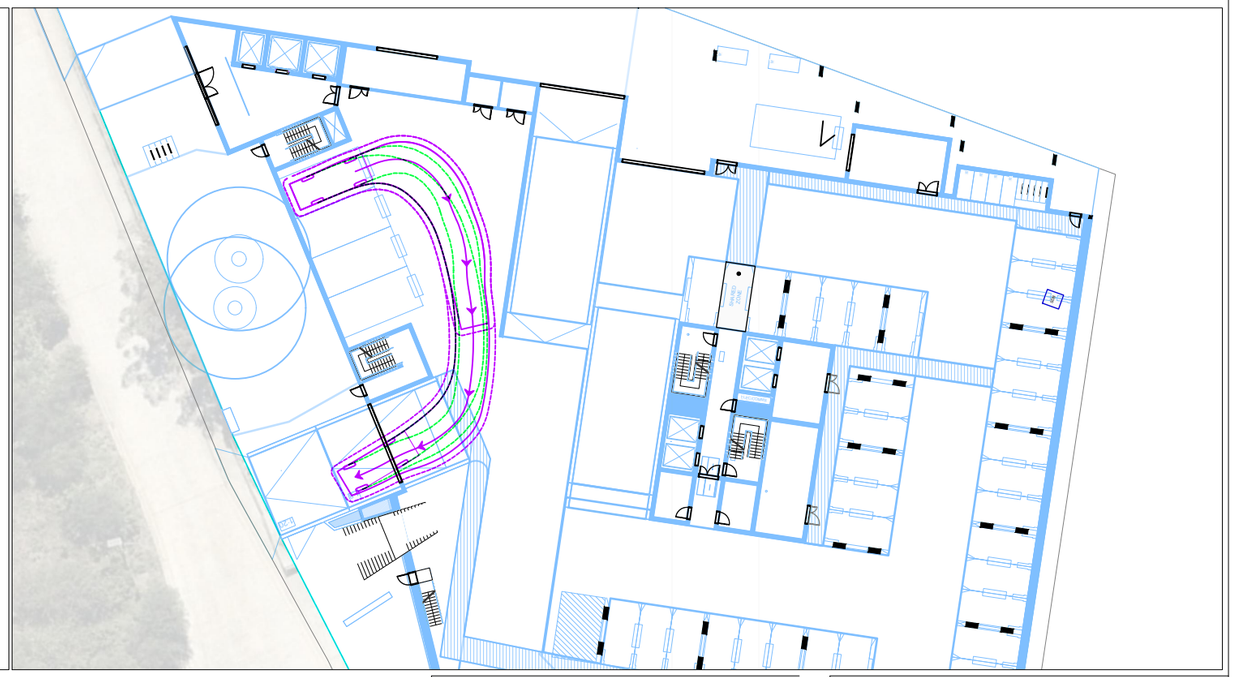
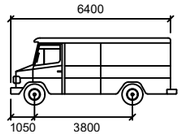


VEHICLE USED IN SIMULATION



SRV (AS 2890.2) mm

Width	:	2300
Track	:	2300
Lock to Lock Time	:	6.0
Steering Angle	:	38.0

500MM BODY CLEARANCE ADOPTED.

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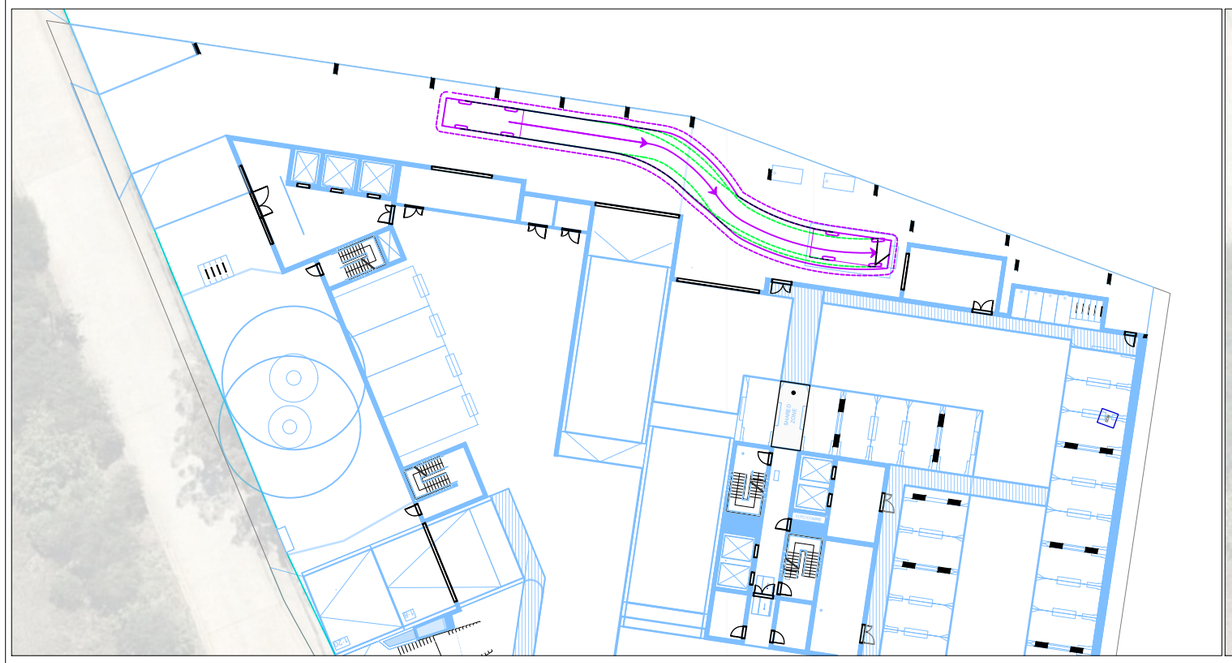
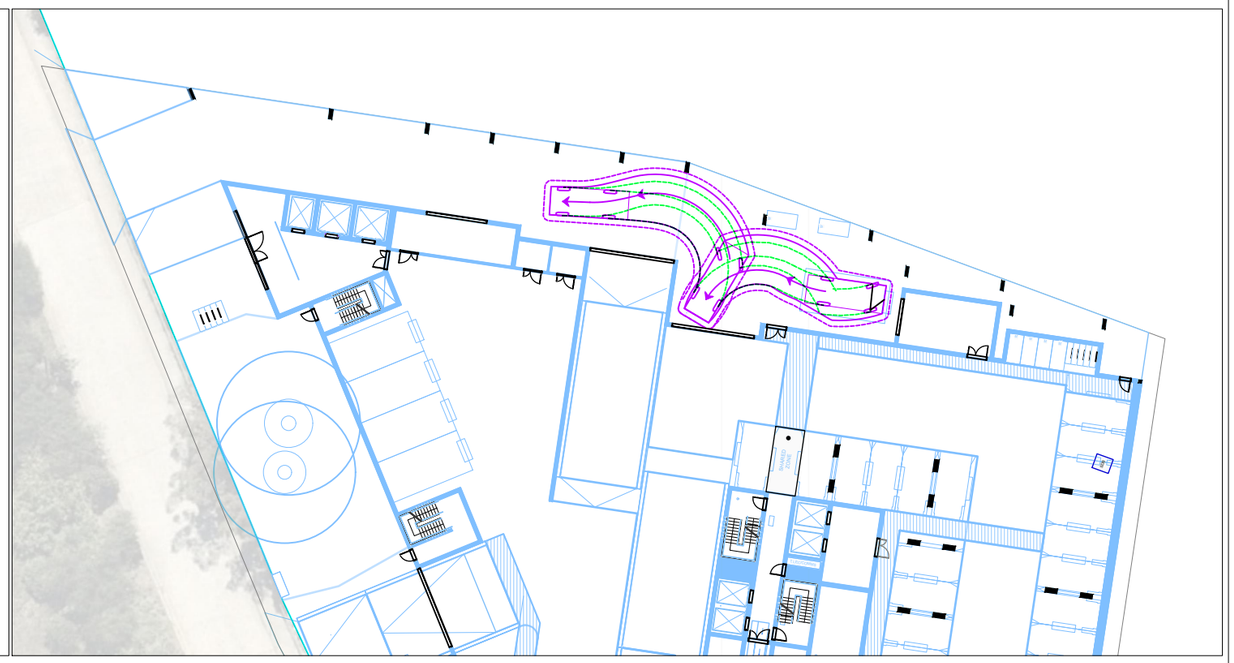
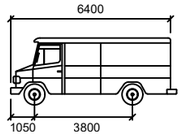
EXTERNAL LOADING BAY 1 - INGRESS



EXTERNAL LOADING BAY 1 - EGRESS



VEHICLE USED IN SIMULATION



SRV (AS 2890.2) mm

Width	:	2300
Track	:	2300
Lock to Lock Time	:	6.0
Steering Angle	:	38.0

500MM BODY CLEARANCE ADOPTED.

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SCALE: 1:500 @ A3

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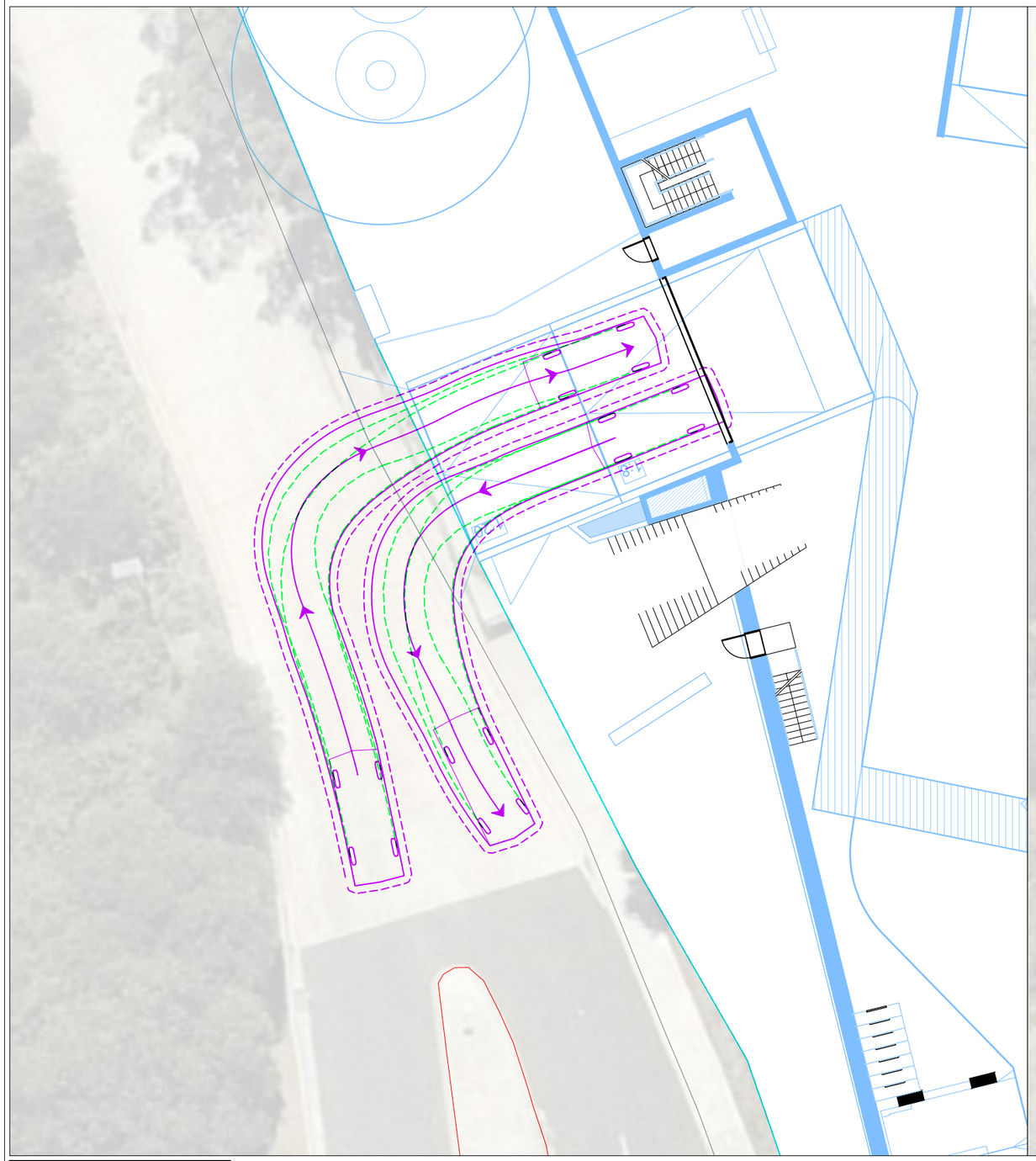
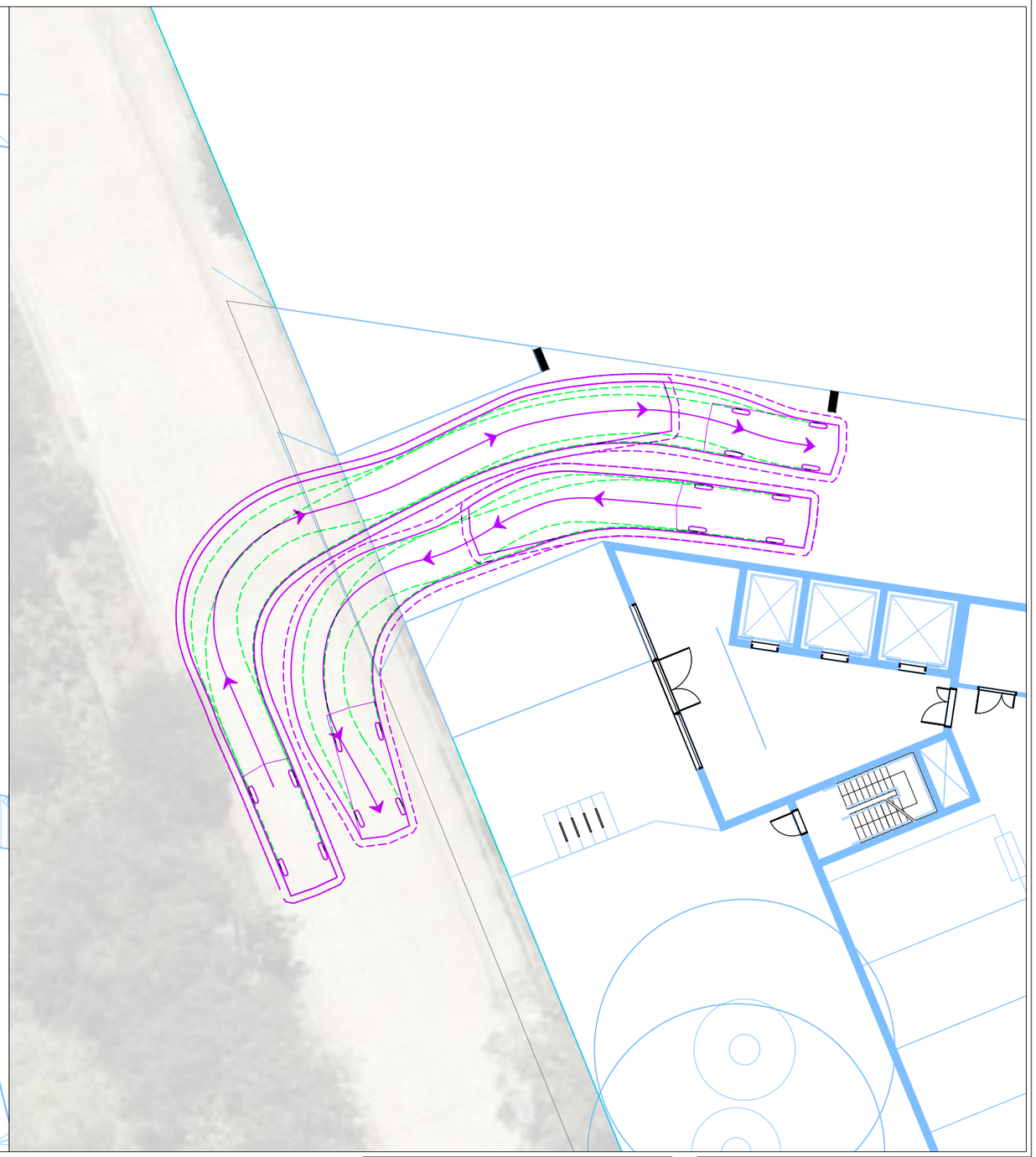
22031-SK01-004	2

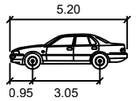
INDUSTRIAL ZONE CAR PARK ENTRANCE



RECREATIONAL ZONE CAR PARK ENTRANCE



VEHICLE USED IN SIMULATION



Width	: 1.94
Track	: 1.84
TURNING CIRCLE (K-K)	: 12.5m

300MM BODY CLEARANCE ADOPTED.

HORNE GROUP PTY LTD

PROPOSED MIXED USE DEVELOPMENT

2-6 GIRAWAH PLACE

MATRAVILLE

B99 DESIGN VEHICLE SWEPT PATHS

0 1.25 2.5 5

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DRAWN / CHECKED	DATE	SIZE
CG / CB	03/11/2023	A3

DRAWING NUMBER	REVISION
22031-SK01-005	1

APPENDIX 2 SIDRA RESULTS

MOVEMENT SUMMARY

Site: 101 [Botany / Girawah - PM - Existing (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 74 seconds (Minimum Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Botany Road															
5	T1	All MCs	473	10.0	473	10.0	0.168	10.3	LOS A	3.0	22.9	0.56	0.46	0.56	51.4
6	R2	All MCs	1	5.0	1	5.0	* 0.004	20.5	LOS B	0.0	0.1	0.85	0.58	0.85	43.7
Approach			474	10.0	474	10.0	0.168	10.3	LOS A	3.0	22.9	0.56	0.46	0.56	51.4
North: Girawah Place															
7	L2	All MCs	6	5.0	6	5.0	0.005	10.4	LOS A	0.1	0.6	0.36	0.61	0.36	49.3
9	R2	All MCs	1	5.0	1	5.0	0.002	24.2	LOS B	0.0	0.2	0.70	0.58	0.70	42.0
Approach			7	5.0	7	5.0	0.005	12.4	LOS A	0.1	0.6	0.41	0.61	0.41	48.1
West: Botany Road															
10	L2	All MCs	1	5.0	1	5.0	0.001	6.3	LOS A	0.0	0.0	0.17	0.56	0.17	52.4
11	T1	All MCs	494	10.0	494	10.0	* 0.475	29.9	LOS C	5.5	41.8	0.94	0.76	0.94	40.3
Approach			495	10.0	495	10.0	0.475	29.8	LOS C	5.5	41.8	0.94	0.76	0.94	40.3
All Vehicles			976	10.0	976	10.0	0.475	20.2	LOS B	5.5	41.8	0.75	0.61	0.75	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Botany Road												
P2	Full	50	53	31.3	LOS D	0.1	0.1	0.92	0.92	185.2	200.0	1.08
North: Girawah Place												
P3	Full	50	53	31.3	LOS D	0.1	0.1	0.92	0.92	185.2	200.0	1.08
West: Botany Road												
P4	Full	50	53	31.3	LOS D	0.1	0.1	0.92	0.92	185.2	200.0	1.08
All Pedestrians		150	158	31.3	LOS D	0.1	0.1	0.92	0.92	185.2	200.0	1.08

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.

PHASING SUMMARY

Site: 101 [Botany / Girawah - PM - Existing (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 74 seconds (Minimum Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: SCATS
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D
Reference Phase: Phase A

Phase Timing Summary

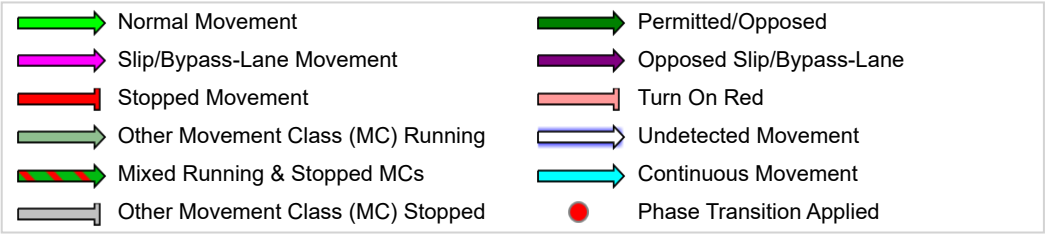
Phase	A	B	C	D
Phase Change Time (sec)	0	20	32	62
Green Time (sec)	14	6	24	6
Phase Time (sec)	20	12	30	12
Phase Split	27%	16%	41%	16%
Phase Frequency (%)	100.0	100.0	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

REF: Reference Phase

VAR: Variable Phase



MOVEMENT SUMMARY

Site: 101 [Botany / Girawah - PM - Post Development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 74 seconds (Minimum Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Botany Road															
5	T1	All MCs	473	10.0	473	10.0	0.168	10.3	LOS A	3.0	22.9	0.56	0.46	0.56	51.4
6	R2	All MCs	45	5.0	45	5.0	* 0.158	21.5	LOS B	0.9	6.4	0.89	0.72	0.89	43.2
Approach			518	9.6	518	9.6	0.168	11.2	LOS A	3.0	22.9	0.59	0.49	0.59	50.5
North: Girawah Place															
7	L2	All MCs	76	5.0	76	5.0	0.065	10.7	LOS A	1.0	7.2	0.39	0.66	0.39	49.1
9	R2	All MCs	72	5.0	72	5.0	* 0.128	25.5	LOS B	1.9	13.7	0.75	0.72	0.75	41.4
Approach			147	5.0	147	5.0	0.128	17.9	LOS B	1.9	13.7	0.56	0.69	0.56	45.0
West: Botany Road															
10	L2	All MCs	46	5.0	46	5.0	0.031	6.4	LOS A	0.2	1.2	0.19	0.59	0.19	52.4
11	T1	All MCs	494	10.0	494	10.0	* 0.475	29.9	LOS C	5.5	41.8	0.94	0.76	0.94	40.3
Approach			540	9.6	540	9.6	0.475	27.9	LOS B	5.5	41.8	0.87	0.74	0.87	41.1
All Vehicles			1205	9.0	1205	9.0	0.475	19.5	LOS B	5.5	41.8	0.71	0.63	0.71	45.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Botany Road												
P2	Full	50	53	31.3	LOS D	0.1	0.1	0.92	0.92	185.2	200.0	1.08
North: Girawah Place												
P3	Full	50	53	31.3	LOS D	0.1	0.1	0.92	0.92	185.2	200.0	1.08
West: Botany Road												
P4	Full	50	53	31.3	LOS D	0.1	0.1	0.92	0.92	185.2	200.0	1.08
All Pedestrians		150	158	31.3	LOS D	0.1	0.1	0.92	0.92	185.2	200.0	1.08

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.

PHASING SUMMARY

Site: 101 [Botany / Girawah - PM - Post Development (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 74 seconds (Minimum Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: SCATS
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D
Reference Phase: Phase A

Phase Timing Summary

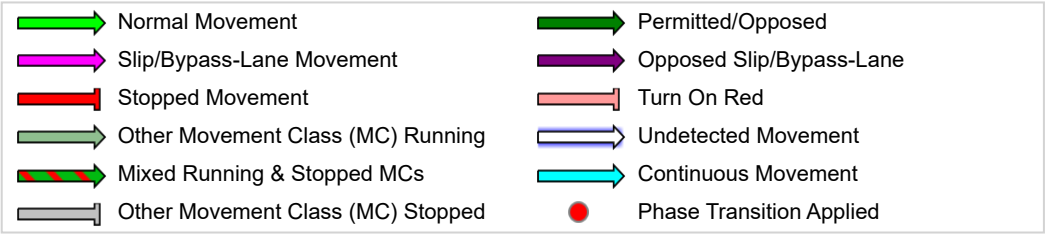
Phase	A	B	C	D
Phase Change Time (sec)	0	20	32	62
Green Time (sec)	14	6	24	6
Phase Time (sec)	20	12	30	12
Phase Split	27%	16%	41%	16%
Phase Frequency (%)	100.0	100.0	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

REF: Reference Phase

VAR: Variable Phase



MOVEMENT SUMMARY

Site: 101 [Botany / Girawah - PM - Post Development - 10 years (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 76 seconds (Minimum Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Botany Road															
5	T1	All MCs	576	10.0	576	10.0	0.204	10.8	LOS A	3.9	29.3	0.58	0.48	0.58	51.0
6	R2	All MCs	45	5.0	45	5.0	* 0.162	22.1	LOS B	0.9	6.6	0.90	0.72	0.90	42.9
Approach			621	9.6	621	9.6	0.204	11.6	LOS A	3.9	29.3	0.60	0.50	0.60	50.3
North: Girawah Place															
7	L2	All MCs	76	5.0	76	5.0	0.066	10.9	LOS A	1.0	7.5	0.39	0.66	0.39	48.9
9	R2	All MCs	72	5.0	72	5.0	* 0.126	25.7	LOS B	1.9	13.9	0.75	0.72	0.75	41.3
Approach			147	5.0	147	5.0	0.126	18.1	LOS B	1.9	13.9	0.56	0.69	0.56	44.9
West: Botany Road															
10	L2	All MCs	46	5.0	46	5.0	0.031	6.4	LOS A	0.2	1.2	0.18	0.59	0.18	52.4
11	T1	All MCs	602	10.0	602	10.0	* 0.555	30.7	LOS C	7.0	52.8	0.95	0.78	0.95	39.9
Approach			648	9.6	648	9.6	0.555	28.9	LOS C	7.0	52.8	0.90	0.77	0.90	40.6
All Vehicles			1417	9.2	1417	9.2	0.555	20.2	LOS B	7.0	52.8	0.73	0.64	0.73	44.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Botany Road												
P2	Full	50	64	32.3	LOS D	0.1	0.1	0.92	0.92	186.2	200.0	1.07
North: Girawah Place												
P3	Full	50	64	32.3	LOS D	0.1	0.1	0.92	0.92	186.2	200.0	1.07
West: Botany Road												
P4	Full	50	64	32.3	LOS D	0.1	0.1	0.92	0.92	186.2	200.0	1.07
All Pedestrians		150	192	32.3	LOS D	0.1	0.1	0.92	0.92	186.2	200.0	1.07

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.

PHASING SUMMARY

Site: 101 [Botany / Girawah - PM - Post Development - 10 years (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 76 seconds (Minimum Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: SCATS
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D
Reference Phase: Phase A

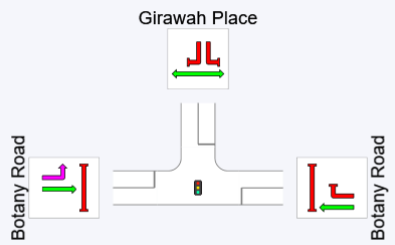
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	0	21	33	64
Green Time (sec)	15	6	25	6
Phase Time (sec)	21	12	31	12
Phase Split	28%	16%	41%	16%
Phase Frequency (%)	100.0	100.0	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

Phase A **REF**



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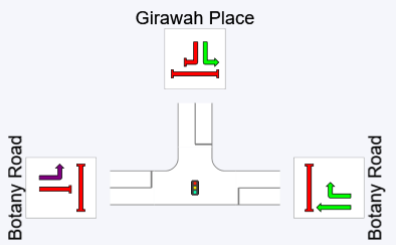

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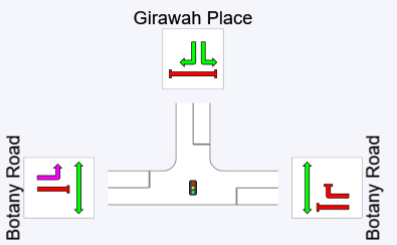
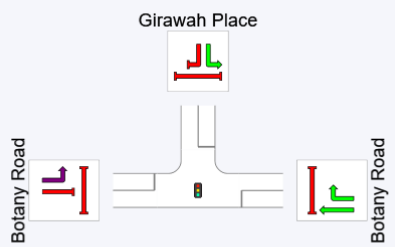
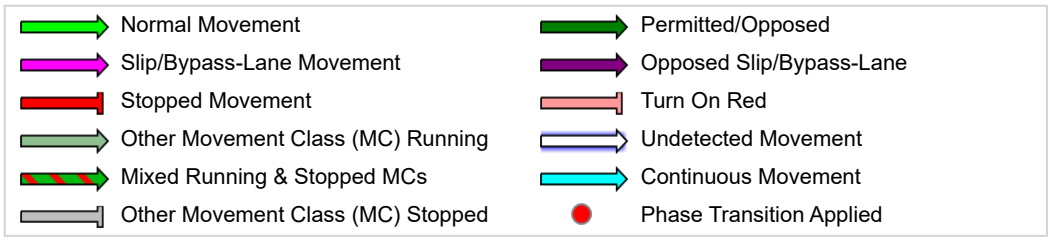


Phase D



REF: Reference Phase
VAR: Variable Phase



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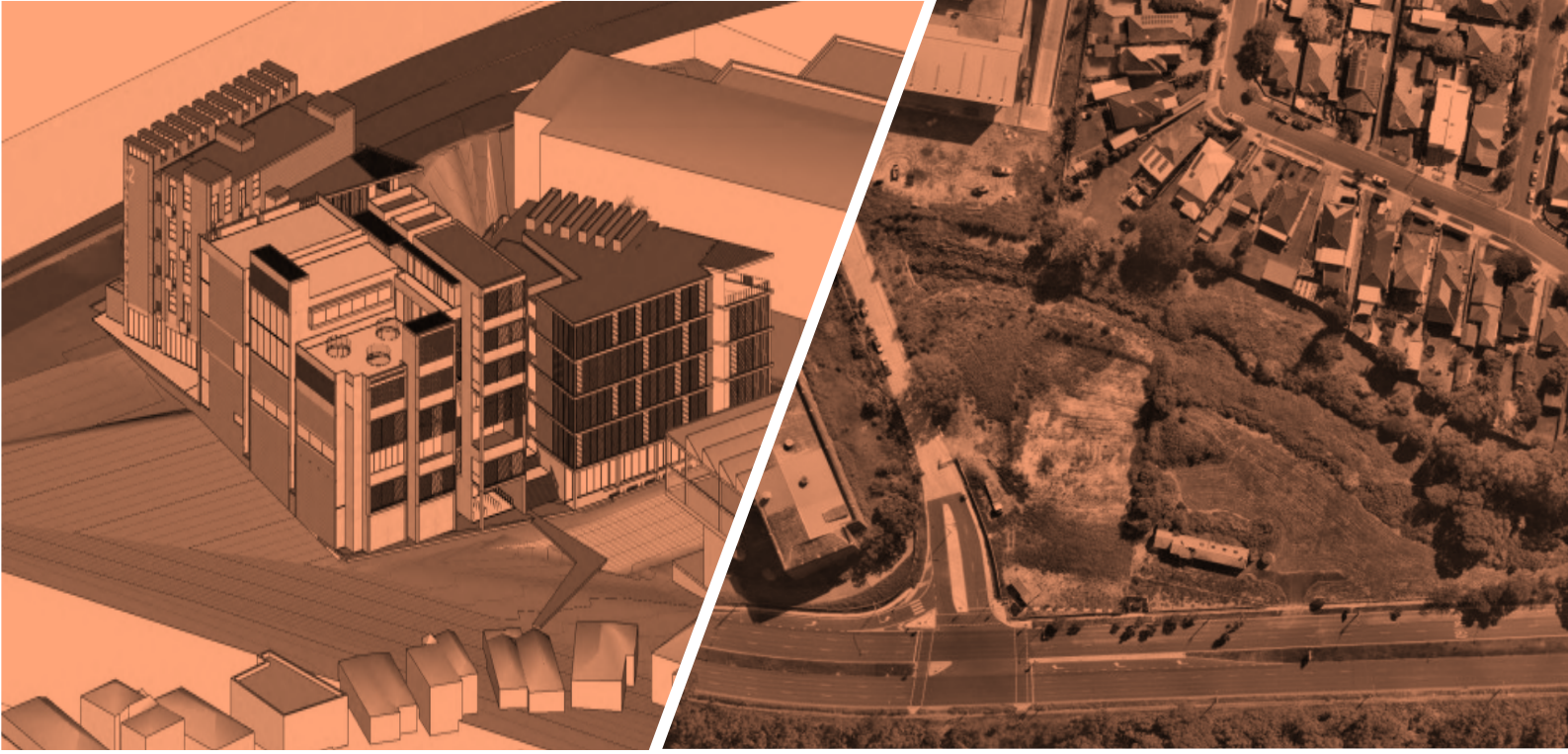

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