Genesis Traffic

Traffic Impact Assessment

190 Waterloo Road, Greenacre

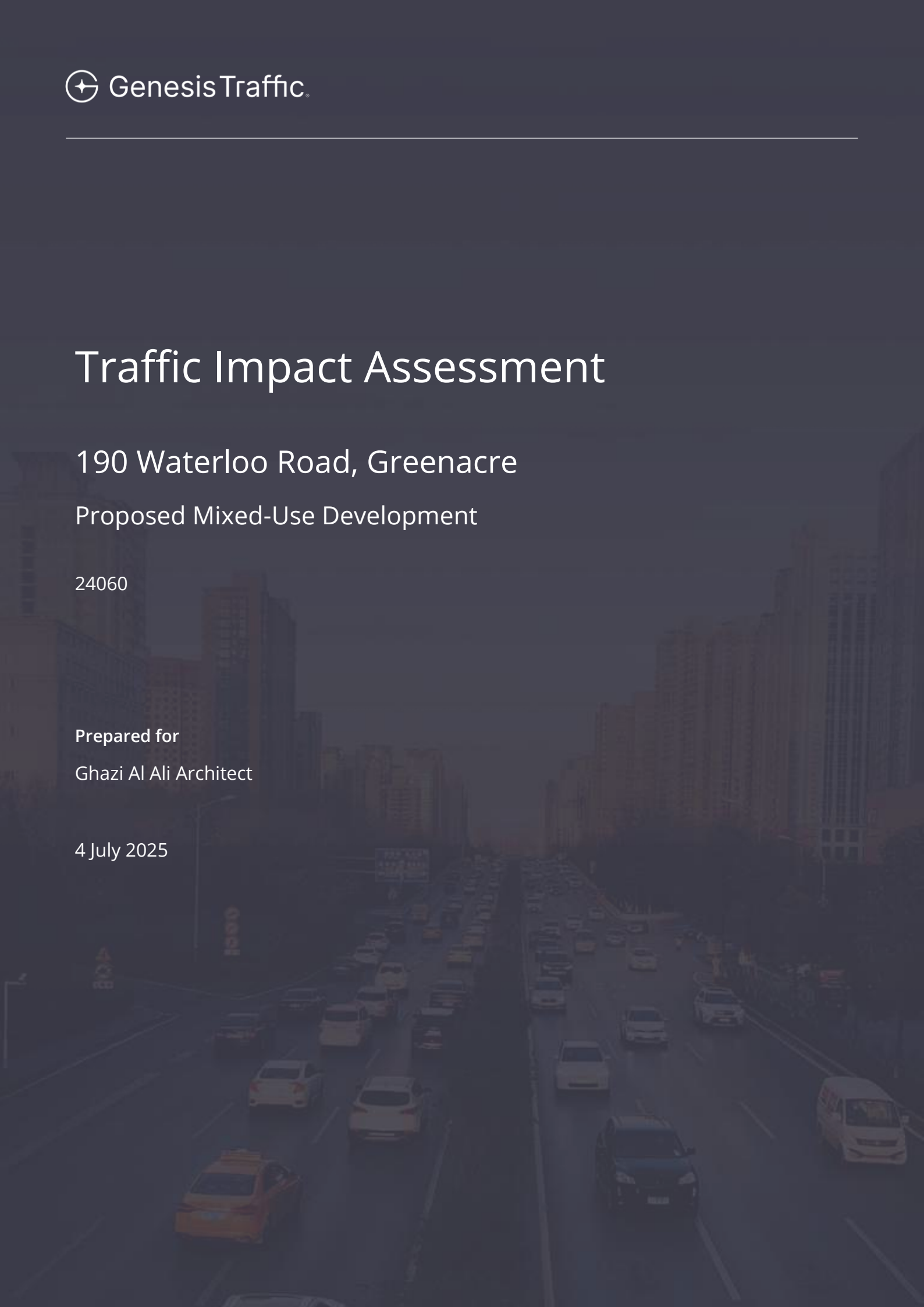
Proposed Mixed-Use Development

24060

Prepared for

Ghazi Al Ali Architect

4 July 2025



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Document Information

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Proposal	Proposed Mixed-Use Development
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Project Location	190 Waterloo Road, Greenacre
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Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
1	11/02/2025	Draft	BB, LN	BL
2	18/02/2025	Final Draft	LN	BL
3	5/03/2025	Final	LN	BL
4	3/07/2025	Final (Response to Council's RFI	LN	BL

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Attachments

Tables

Figures

1 Introduction

1.1 Background

This report has been prepared to accompany a Development Application to Canterbury Bankstown Council for a Proposed Mixed-Use Development at 190 Waterloo Road, Greenacre (Figure 1-1).

Figure 1-1 Site

Source: Mecone (Modified by Genesis Traffic)

1.2 Scope of Works

The purpose of this report is to:

- describe the proposed development scheme
- describe the existing site, road network serving the site and the prevailing traffic conditions
- assess the adequacy of the proposed parking provision
- assess the potential traffic implications
- assess the suitability of the proposed vehicle access, internal circulation and servicing arrangements

1.3 Reference Documents

Reference has been made to the following documents when preparing this report:

- Australian Standard Part 1: Off-Street Car Parking (AS2890.1:2004)
- Australian Standard Part 2: Off-street Commercial Vehicle Facilities (AS2890.2:2018)
- Australian Standard Part 3: Bicycle Parking (AS2890.3:2015)
- Australian Standard Part 6: Off-street Parking for People with Disabilities (AS2890.6:2022)
- Development Control Plan (Canterbury Bankstown Council)
- Guide to Transport Impact Assessment, NSW Government, 2024
- State Environmental Planning Policy (Housing) 2021, NSW

1.4 Response to Pre-DA Lodgement Advice

Our response to the Council Pre-DA Lodgement Advice (PRE-DA-35/2024) are outlined in Table 1-1.

Table 1-1 Pre-DA Lodgement Advice

Council Comment	Our Response
This Development Application will be referred to TfNSW due to one of its frontages (Boronia) being on a State Road. Waterloo is also a regional road.	Noted.
There will need to be a detailed Traffic and Parking Impact Assessment (T&PIA) taking in account all the traffic impact that might result from the traffic being generated by the development. The T&PIA, will need to model the intersection of Boronia and Waterloo in light of the proposed development as well as address traffic distribution and model the intersection of Chiswick and Waterloo Road to identify if there is impact from the development.	Refer to Section 6.
For the retail component on Waterloo/Boronia Road, please be advised that Council had received representation from the shop owners that are located across the road at 171A Hijab house of many near misses and cars crashing into these retail shops, whereby Council had to install crash bollards. The applicant's T&PIA will need to address the likelihood of similar crashes occurring at the proposed new retail shops and will need to provide protection measures against crashes at the intersection.	Crash bollards are provided. Refer to **Attachment 1**.
Basement height clearance have been designed to only be 2.9m in the submitted pre-da plan, this means that they are relying on, on– street waste collection from Boronia Road as stated in the written statement and as anticipated from the location of their waste bin room. As advised above Boronia Road is a State Road and Council doubts that this will be permissible especially that there is currently No Stopping restriction all along Boronia Road to facilitate flow of traffic and capacity at the traffic lights. It is recommended that this design is therefore discussed with TfNSW prior to lodgement. If the proposed design cannot be accommodated, further discussion will need to occur with Council's Waste Services	Waste collection will now occur onsite.

for more advise in regard to if waste collection can be facilitated on site, and if so, then the height clearance will need to be 4.5m minimum.	
Likewise Loading zones for developments must be accommodated on the property, Traffic unit will not support for loading zones for the retail component of the development to be facilitated on street.	Noted.
It is also worth noting that the location of the site can cause issues with an appropriate works zone for construction vehicles.	Noted.

1.5 Response to Council RFI

Our response to the Council RFI (DA-289/2025) are outlined in Table 1-1

Table 1-2 Council RFI

Council Comment	Our Response
2. Transport for NSW TfNSW has refused concurrence for the proposal due to the potential impacts on the 'no stopping' zone along Waterloo Road. They have provided the following comments: <u>Impact on No Stopping area</u> The existing 50m No Stopping area along Waterloo Rd is provided for safety purposes related to the traffic signals and ability for two lanes of traffic to zipper merge back into one from the traffic signals. In 2019/2020, there was a 20m No Parking which was then expanded to 20-25m, which due to safety concerns was further changed to a 50m No Stopping area. Figure 4.1 of the traffic report indicates that this is being proposed to be reduced again to 20m which will allow for a 15m Loading Zone. Unfortunately, this will result in vehicles having a shorter length to zipper merge and therefore impact on road safety. TfNSW do not support the reduction of the existing No Stopping zone under safety grounds, especially as it was purposely extended recently. The developer will have to find alternatives for waste collection and for loading/servicing requirements noting that any impact to the state road network will not be supported. <u>Other comments for consideration</u> · TfNSW requests that location of the driveway be as close to the northern boundary on Waterloo Road · The existing No Stopping area along Boronia Road is to be retained and not altered by the Applicant. · While the planter box at the driveway will be restricted to 1.1m in height, consideration of sight distances to pedestrians from the driveway needs to be considered and any vegetation must not impede upon this.	On-street loading is no longer applicable. The loading and servicing activities will be undertaken on-site at-grade within a loading facility designed for a 12.5m, HRV (with 4.5m headroom clearance).

· Any kerb and gutter works on Boronia Road must ensure that road signage and pavement markings (such as the yellow No Stopping line marking beside the kerb) are to be maintained/rectified at no cost to TfNSW. It is recommended the proposal be modified to ensure waste collection and any servicing functions (including load and unloading for commercial premises) are accommodated on-site. In order for Council to be able to service the waste collection for the site, the route from the street to the collection area must be designed to accommodate an HRV with a clearance height of at least 4.5m.	
9. Basement Carpark a. All proposed 74 car spaces are allocated for user class 1 & 1A with 2.4m wide and 5.5m long which, however, 12 of the total car spaces are for visitors where user class 2 shall be adopted with 2.5m width in accordance with Table 1.1 & Figure 2.2 of AS2890.1. b. Car spaces No 31 & 35 basement 1 AND spaces 70 & 71 basement 2 are all located at the end of a 5.8m wide blind aisle, swept path assessment found that drivers can only park in forward direction (can't do reverse parking as an option) and then must make a 6-point back and forth manoeuvring to eventually exist.	a. Visitor car spaces have been widened to 2.5m. b. These car spaces comply with the design requirements set out in AS2890.1:2004. Swept path analysis has been undertaken to demonstrate satisfactory vehicle manoeuvres (**Attachment 2**).
Traffic: **21.** Council's Standard Drawing (S-004) states the following which need to be addressed and clearly labelled from the plan: a. A 1m offset from the side boundary to the VFC is required for multi-dwellings is to be shown on the architectural plan - dimension to be shown on the drawing and resubmitted. b. Sight triangles are to be shown on the exit side of the driveway, in accordance with AS 2890.1:2004 Figure 3.3 – Minimum Sight Lines for Pedestrian Safety. The sight triangles shall extend 2m from the driveway edge along the front boundary and 2.5m from the boundary along the driveway and is to be kept clear of any obstructions on either side of the driveway. Pedestrian sight triangle to be fully within the property boundary. Driveway to be adjusted such that the sight triangle is fully within the boundary. Landscaping is not to obstruct the sightlines. c. 300-1000mm clearance to adjoining VFC wing – Dimension to be shown on the plan and resubmitted. d. Loading Zone	a. Provided. Refer to **Attachment 1**. b. Sight triangles are provided at the access driveway. c. Refer to **Attachment 1**. d. On-street loading is no longer applicable.

Under Canterbury-Bankstown 2023 DCP: "3.13 Mixed use development must provide appropriate loading/unloading or furniture pick-up spaces. If no provision is made for the facilities, applications must provide justification why they are not necessary."

No attempt has been made by the applicant to justify why an on-street loading zone is required.

"3.1 Development must not locate entries to car parking or delivery areas:

(a) close to intersections and signalised junctions;

(b) on crests or curves;

(c) where adequate sight distance is not available;

(d) opposite parking entries of other buildings that generate a large amount of traffic (unless separated by a raised median island);

(e) where right turning traffic entering may obstruct through traffic;

(f) where vehicles entering might interfere with operations of bus stops, taxi ranks, loading zones or pedestrian crossings; or

(g) where there are obstructions which may prevent drivers from having a clear view of pedestrians and vehicles."

From the above, the on-street loading zone will affect sight distance for vehicles exiting the basement carpark, as shown in the provided sight distance diagram. The Loading Zone being on-street will result in other businesses within the area utilizing it, causing further safety issues being on a regional road and close to an intersection with a State Road.

Traffic does not support the installation of an on-street Loading Zone on Waterloo Road. On-site loading zone(s) are to be provided.

2 Proposed Development

The proposal seeks consent for a development outcome that involves:

- 60 apartments (under SEPP provisions) in the following composition:
    - 11 x affordable unit(s)
        - 1 x one-bedroom apartment(s)
        - 8 x two-bedroom apartment(s)
        - 2 x three-bedroom apartment(s)
    - 49 x non-affordable unit(s)
        - 7 x one-bedroom apartment(s)
        - 38 x two-bedroom apartment(s)
        - 4 x three-bedroom apartment(s)
- Ground level retail floor space (401.3m^2 floor area)
- Basement carpark - 76 car spaces

Vehicle access will be provided at Waterloo Road.

Details of the proposal are indicated in the architectural plans prepared by Ghazi Al Ali Architect which accompany the submission and are reproduced in part in **Attachment 1**.

3 Existing Conditions

3.1 Site and Surrounding Context

The development site (Figure 3-1) is legally known as Lot 21 in DP624967, located at 190 Waterloo Road, Greenacre. The site occupies an area of 1,782m² and has frontages to Waterloo Road and Boronia Road.

Figure 3-1 Site Context

Source: Metromap and Google Map (Modified by Genesis Traffic)

The site is occupied by a service station and a car wash station at present (see inset above), with vehicle access points located at Waterloo Road and Boronia Road.

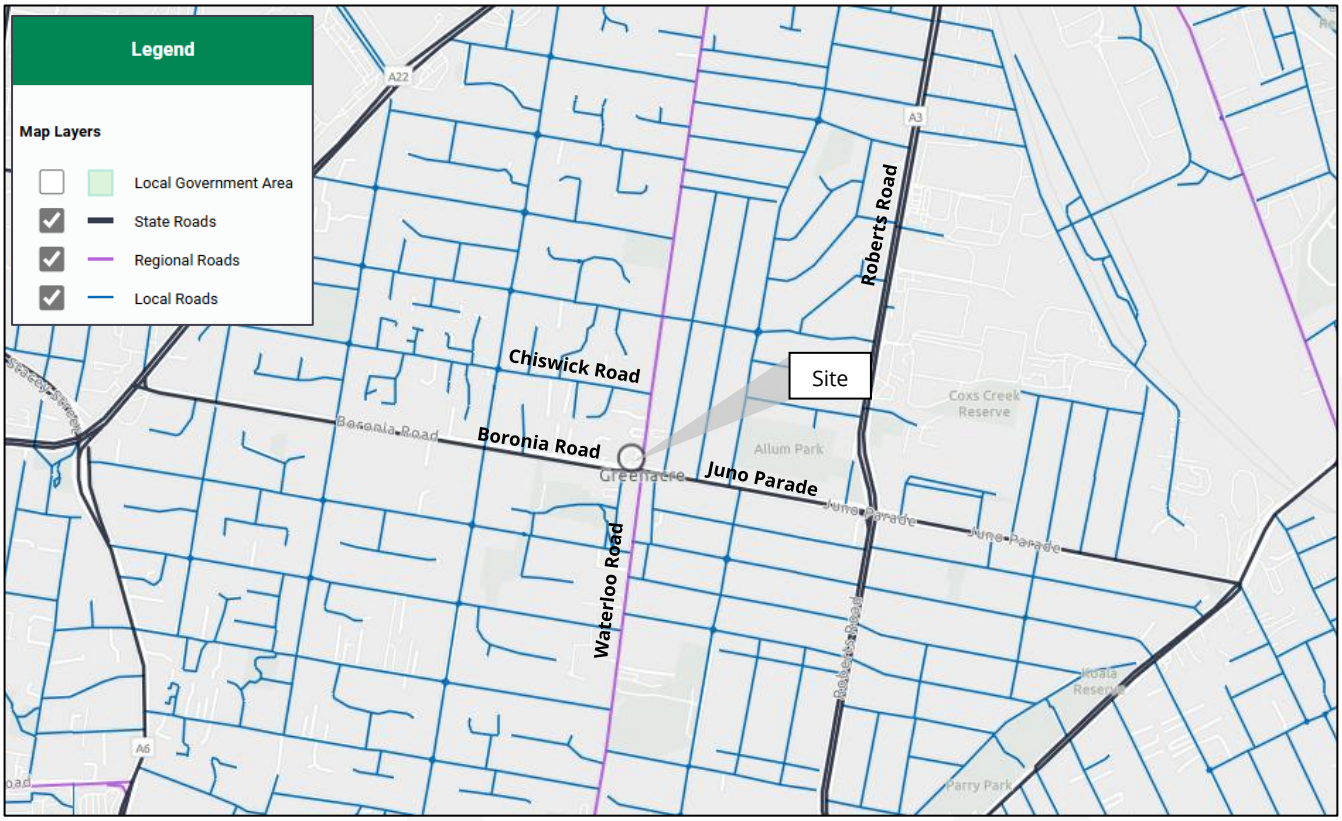
The adjoining and surrounding land uses include:

- Retail premises along Waterloo Road
- Residential development to the north and west

3.2 Road Network

The existing road network serving the site area (Figure 3-2) are detailed in Table 3-1:

Figure 3-2 Road Network



Source: TfNSW (modified by Genesis Traffic)

Table 3-1 Surrounding Road Network

Road Name	Description
Juno Parade / Boronia Road	· State Road · Speed limit 60 km/h · 2 lane(s) in each direction · No Stopping restriction along both sides of the street within the site vicinity
Waterloo Road	· Regional Road · Speed limit 60 km/h, 40 km/h along the retail premises within the site vicinity · 1 lane(s) in each direction · Unrestricted on-street parking generally along both sides of the street, time-restricted on-street parking along both sides of street within the site vicinity

Chiswick Road	· Local Road · Speed limit 50 km/h · 1 lane(s) in each direction · Unrestricted on-street parking along both sides of the street

3.3 Traffic Controls

The traffic controls on the road system in the vicinity of the site comprise (Table 3-2):

Table 3-2 Surrounding Traffic Controls

Traffic Control	Location
Traffic Signal	· Intersection(s) of: o Boronia Road and Waterloo Road
Roundabout	· Intersection(s) of: o Chiswick Road and Noble Avenue
Give-way / Stop Control	· Intersection(s) of: o Waterloo Road and Chiswick Road
School Zone	· Along part(s) of o Waterloo Road
Pedestrian Crossing	· Along part(s) of o Waterloo Road

3.4 Public Transport Services

The local public transport services are illustrated in Figure 3-3.

Figure 3-3 Local Public Transport Locations

Source: Metromap (Modified by Genesis Traffic)

Bus

Local bus services are within walking distance of the site. The nearest bus stop is located opposite the site on Boronia Road. Table 3-3 outlines the surrounding available bus services.

Table 3-3 Bus Services Provision

Bus Line	Bus Route	Peak Frequency
914	Greenacre to Strathfield	2 trips per hour
939	Greenacre to Bankstown	2 trips per hour
941	Bankstown to Hurstville via Greenacre	2 trips per hour
946	Roselands to Bankstown via Lakemba & Greenacre	2 trips per hour
M90	Burwood to Liverpool	4 trips per hour

3.5 Crash History

Transport for NSW (TfNSW) provides a history of recorded crash data between 2019 and 2023 (data for 2024 is not available at the time of this assessment). The data reveal the following recorded crashes at the intersection of Boronia Road and Waterloo Road (Table 3-4).

Table 3-4 Crash Data Record

Date of Crash	RUM Code	RUM Description	Number Killed	Number Injured	Degree of Cash
2019	10	Cross traffic	-	-	Non-casualty (towaway)
2019	32	Right rear	-	1	Minor/Other Injury
2019	2	Ped far side	-	1	Serious Injury
2019	10	Cross traffic	-	-	Non-casualty (towaway)
2019	10	Cross traffic	-	3	Serious Injury
2019	37	Left turn sideswipe	-	1	Minor/Other Injury
2020	2	Ped far side	-	1	Serious Injury
2020	2	Ped far side	-	3	Moderate Injury
2020	21	Right through	-	-	Non-casualty (towaway)
2020	36	Right turn sideswipe	-	2	Minor/Other Injury
2021	21	Right through	-	1	Minor/Other Injury
2022	21	Right through	-	1	Moderate Injury
2022	21	Right through	-	2	Moderate Injury
2023	31	Left rear	-	1	Minor/Other Injury
2023	34	Lane change right	-	1	Minor/Other Injury

Source: TfNSW

The data reveal 15 crashes at the intersection of Boronia Road and Waterloo Road over the most recent 5-year period. Amongst these, the most common crash type was 'Right-through', occurring 4 times in the 5-year period. However, the number of incidents has gradually decreased over the past 5 years.

The assessment notes that the Council has concerns regarding road safety near the site. Accordingly, crash barriers will be provided in the proposed scheme.

4 Parking Assessment

4.1 Car Parking Requirement

The applicable car parking rates (Table 4-1) are provided in the SEPP (Housing) 2021 and Council DCP.

Table 4-1 SEPP and DCP Car Parking Rates

Land Use	Source	Element	Minimum Parking Rates
Affordable Housing	Section 19, Chapter 2, Part 2 (In-fill Affordable Housing) SEPP (Housing) 2021	1-bed	0.4 space(s) per dwelling
		2-bed	0.5 space(s) per dwelling
		3-bed	1.0 space(s) per dwelling
Non-Affordable Housing		1-bed	0.5 space(s) per dwelling
		2-bed	1.0 space(s) per dwelling
		3-bed	1.5 space(s) per dwelling
Visitor	Chapter 3.2 (Parking)		1.0 space(s) per 5 dwellings
Retail	DCP		1.0 spaces(s) per 40m^2 GFA

Application of the proposal using the above criteria would indicate the following requirement(s) in Table 4-2.

Table 4-2 Required Car Parking Spaces

Element		Unit/GFA	Minimum Requirement	Provision
Affordable Housing	1-bed	1 unit(s)	0.4	54
	2-bed	8 unit(s)	4	
	3-bed	2 unit(s)	2	
Non-Affordable Housing	1-bed	7 unit(s)	3.5	
	2-bed	38 unit(s)	38	
	3-bed	4 unit(s)	6	
			Total = 54 spaces	
Visitor		60 unit(s)	12	12
Retail		401.3m^2 GFA	10	10
	Total		**76 spaces**	**76 spaces**

Accordingly, the proposed indicates a minimum requirement of 76 car spaces. It is proposed to provide 76 parking spaces to comply with the above criteria. These spaces will include:

- 54 x Residents
- 12 x Visitors
- 10 x Retail (Staff only)

4.2 Bicycle Parking and End of Trip Facility Requirement

The applicable bicycle parking rates (Table 4-3) are provided in Chapter 3.2 of Council's DCP.

Table 4-3 Bicycle Parking Rates

Development Type	Element	Parking Rates
Residential Flat Building	Visitor	1 space per 10 dwellings
Retail	Staff	1 space per 300m^2 GFA
	Visitor	1 space per 500m^2 GFA over 1000m^2

Application of the above rates to the proposal indicates the following parking requirement(s) (Table 4-4).

Table 4-4 Required Bicycle Storage/Parking Spaces

Element	Unit/GFA	Requirement		Provision
		Visitor	Staff	
Residential	60 unit(s)	6	0	7
Retail	401.3m^2 GFA	0	1	
Total		**7 spaces**		**7 spaces**

It is proposed to provide 7 bicycle spaces to comply with the DCP requirement, in the following composition:

- 6 x Visitor (residential)
- 1 x Retail

4.3 Loading and Servicing Requirement & Arrangement

The largest service vehicle that will serve the site is a 12.5m long Heavy Rigid Vehicle (HRV). A suitably sized loading bay will be provided on Ground Level and the truck will access the site via Waterloo Road.

The assessment notes that all trucks accessing the Ground Level loading bay will be restricted to right-in and left-out arrangements due to an existing power pole located at the site frontage. Accordingly, the assessment recommends a consent condition requiring documentation of a Loading Dock Management Plan prior to the building's occupation. This plan should detail the truck operation measures and access restrictions to ensure safe and efficient servicing.

5 Access and Circulation Design

5.1 Access

The proposed access driveway will be located at Waterloo Road, setback 1.5m from the northern boundary.

Details of the access design and geometry are discussed in Section 5.2.

5.2 Design Assessment and Internal Circulation

A detailed review of the carpark has been undertaken to assess its conformance with the relevant AS2890 design criteria. The assessment outcome is tabulated below for ease of reference.

Table 5-1 Off-street Car Parking (AS2890.1:2004) Criteria

Features	Requirement	Provision	Compliance	Notes
Access Driveways				
Access Driveway Location	6m clear from intersection	>6.0m	Yes	
Access Width	(Category 1) 3.0m – 6.0m	6.5m	Yes	
Sight Triangle (Pedestrian)	2.5m long x 2.0m wide	Provided	Yes	
First 6m Ramp Grade	Max 5% (1:20) down Max 12.5% (1:8) up	Level	Yes	
Straight Ramp / Driveway				
Ramp Grade	Private Carpark: Max 25% (1:4)	1:4	Yes	
Transitions	Min 2.0m	2.0m	Yes	
Grade Transitions	Max 12.5% (1:8)	1:8	Yes	
Roadways Width (Two-way)	Min 5.5m	>5.5m	Yes	
Vertical Obstruction Clearance / Kerbs	300mm on both sides	Provided	Yes	
Headroom Clearance	Min 2.2m	Provided	Yes	
Parking Modules				
Car Space Dimension for Residents and Retail Staff	**User Class 1A** 5.4m long x 2.4m wide	Provided	Yes	
Car Space Dimension for Visitor	**User Class 2** 5.4m long x 2.5m wide	Provided	Yes	
Aisle Width	5.8m (+ 300mm from wall)	5.1m - 6.8m	Satisfactory	

Door Clearance	300mm	Provided	Yes	
Blind Aisle	Min 1.0m	Provided	Yes	
Headroom Clearance	Min 2.2m	>2.2m	Yes	
Gradient	Max 5% (1:20)	Level	Yes	

Table 5-2 Off-street Commercial Vehicle Facilities (AS2890.2:2018) Criteria

Features	Requirement	Provision	Compliance	Notes
Parking Modules				
Space Dimension	12.5m long x 3.5m wide	Provided	Yes	
Headroom Clearance	Min 4.5m	>4.5m	Yes	
Gradient	Max 4% (1:25)	Level	Yes	

Table 5-3 Bicycle Parking (AS2890.3:2015) Criteria

Features	Requirement	Provision	Compliance	Notes
Vertical Bicycle Parking				
Space Dimension	1.2m long x 0.5m wide	Provided	Yes	
Aisle	1.5m	Provided	Yes	
Gradient	Max 5% (1:20)	Provided	Yes	
Height Clearance	Min 2.2m	>2.2m	Yes	

Table 5-4 Off-street Parking for People with Disabilities (AS2890.6:2022) Criteria

Features	Requirement	Provision	Compliance	Notes
Space Dimension	5.4m long x 2.4m wide	5.4m long x 2.4m wide	Yes	
Shared Zone + Bollard	5.4m long x 2.4m wide	5.4m long x 2.4m wide	Yes	
Height Clearance	Min 2.5m	>2.5m	Yes	
Gradient	Max 2.5% (1:40)	Level	Yes	

In summary, the assessment confirms that the design provisions in relation to the access, car parking circulation and arrangement in respect to the proposal generally comply with the AS2890 design criteria.

5.3 Loading and Servicing Circulation

The proposed loading arrangement complies with the requirements of AS2890.2:2018 as demonstrated in Table 5-2. As discussed in Section 4.3, the designated service vehicle (12.5m HRV) will enter the site via right-hand turn and depart via left-hand turn, both in a forward manner (refer to Section 5.4: Swept Path Analysis).

5.4 Swept Path Analysis

All critical vehicle movements in the proposed car parking facility have been assessed using Autoturn. Details of the assessment outcome, which demonstrate a satisfactory design provision, are provided in **Attachment 2**.

6 Traffic Assessment

6.1 Existing Traffic Conditions

Traffic surveys were commissioned as part of this assessment to record the AM peak and PM peak traffic flows at the intersection of Waterloo Road / Boronia Road and Waterloo Road / Chiswick Road.

The traffic survey data is reproduced in **Attachment 3**.

The existing intersection operation has been assessed using SIDRA traffic modelling program. SIDRA is a micro-analytical tool for individual and network intersection modelling based on collected traffic survey data. SIDRA provides a few performance indicators, as follows:

- Degree of Saturation – the total usage of the intersection expressed as a factor of 1, with 1 representing 100% use/saturation.
- Average Delay – the average delay encountered by all vehicles passing through the intersection.
- 95% Queue Length (Q95) – is defined to be the queue length in metres that has only a 5% probability of being exceeded during the analysis period. It transforms the average delays into measurable distance units.
- Level of Service (LOS) – this is a categorisation of average delay, intended for simple reference. The RMS adopts the following bands (Table 6-1)

Table 6-1 Intersection Performance – Levels of Service

Level of Service	Average Delay (s/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & Spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity. At signals, incidents would cause excessive delays. Roundabouts require other control mode	At capacity and requires other mode of control
F	> 70	Extra capacity required	Extreme delay, major treatment required

An indication of the prevailing traffic operations at the intersections is provided in the SIDRA assessment (Table 6-2).

Table 6-2 Existing Intersection Traffic Circumstance

Intersection	AM Peak			PM Peak		
	LOS	AVD	DOS	LOS	AVD	DOS
Waterloo Road and Boronia Road	D	49.1s	0.681	D	47.7s	0.548
Waterloo Road and Chiswick Road	A (WRT)	13.7s	0.257	A (WRT)	13.9s	0.269

Abbreviation:
WRT = West Right Turn

Details of SIDRA results are reproduced in **Attachment 4**.

The assessment found the local road network operating with ample spare capacity under existing traffic demand (including the existing site's traffic movements).

6.2 Existing Traffic Generation

Service Station

The most recently published Guide to Transport Impact Assessment 2024 (GTIA) provides average peak hour traffic generation rates for service stations. The relevant rates are below:

- AM peak hour = $0.2815(N)^2 + 14.047(N) + 16.715$
- PM peak hour = $0.0205(S) + 88.52$

Where N is the number of service channels and S is the total site area in square metres.

On the basis of the above, the peak hour traffic generated from the existing service station with a site area of 1,782 m^2 and 8 service channels are:

AM peak hour = $(0.2815*8^2) + (14.047*8) + 16.715$ = 147 vtph

PM peak hour = (0.0205*1782) + 88.52 = 125 vtph

A 15-minute survey was conducted at the subject site in the AM and PM peak periods to estimate the total trips generated over a 1-hour period at the existing driveways. Table 6-3 below presents the existing site trip movements during peak periods.

Table 6-3 Service Station Traffic Survey Data

Periods	Time	15-minute Total Trips	Estimated 1-hour Total Trips
AM Peak	8:45am – 9:00am	24 trips	96 trips
PM Peak	4:45pm – 5:00pm	30 trips	120 trips

The above information confirms that the site-surveyed trip movement is generally consistent with trips derived from the GTIA.

Nevertheless, the assessment will not discount the existing service station trips as a conservative approach.

6.3 Development Traffic Generation

Medium Density Residential Building

The GTIA specifies average peak hour traffic generation rates for medium-density residential development in Sydney areas, as follows:

- 0.39 vehicle trips per hour (vtph) per unit during AM peak
- 0.37 vehicle trips per hour (vtph) per unit during PM peak

Based on the above, the proposed 60 residential units would generate 24 vtph and 23 vtph during AM and PM peak periods respectively.

Retail Premises

The assessment adopts the highest shopping centre rates in Sydney areas from GTIA. The relevant rates are as follows:

- 1.78 vtph / 100m^2 GLFA during AM peak
- 3.71 vtph / 100 m^2 GLFA during PM peak

Applying these rates to the retail premises of 401.3m^2 would generate 8 vtph and 15 vtph during AM and PM peak respectively.

6.4 Overall Traffic Generation and Distribution

The expected overall net traffic generation outcome is tabulated in Table 6-4 as follows:

Table 6-4 Total Peak Hour Traffic Generation

	AM Peak (vtph)		PM Peak (vtph)	
Period	In	Out	In	Out
Residential	4	20	19	4

Retail	4	4	7	8
Total Traffic	**8**	**24**	**26**	**12**

The development traffic is evenly distributed on the road network as shown in Table 6-5.

Table 6-5 Proportion of Inbound and Outbound Traffic

Direction	Proportion	
	Residential	Retail
North	25%	25%
East	25%	25%
South	25%	25%
West	25%	25%

Source: Australian Bureau of Statistics

The nominal route choices from/to each direction are illustrated in Figure 6-1.

Figure 6-1 Approach and Depart Route Distribution

Source: Mecone (modified by Genesis Traffic)

On this basis, the resulting traffic generation from each direction is illustrated in Figure 6-2 and Figure 6-3.

Figure 6-2 Inbound and Outbound Traffic during AM Peak

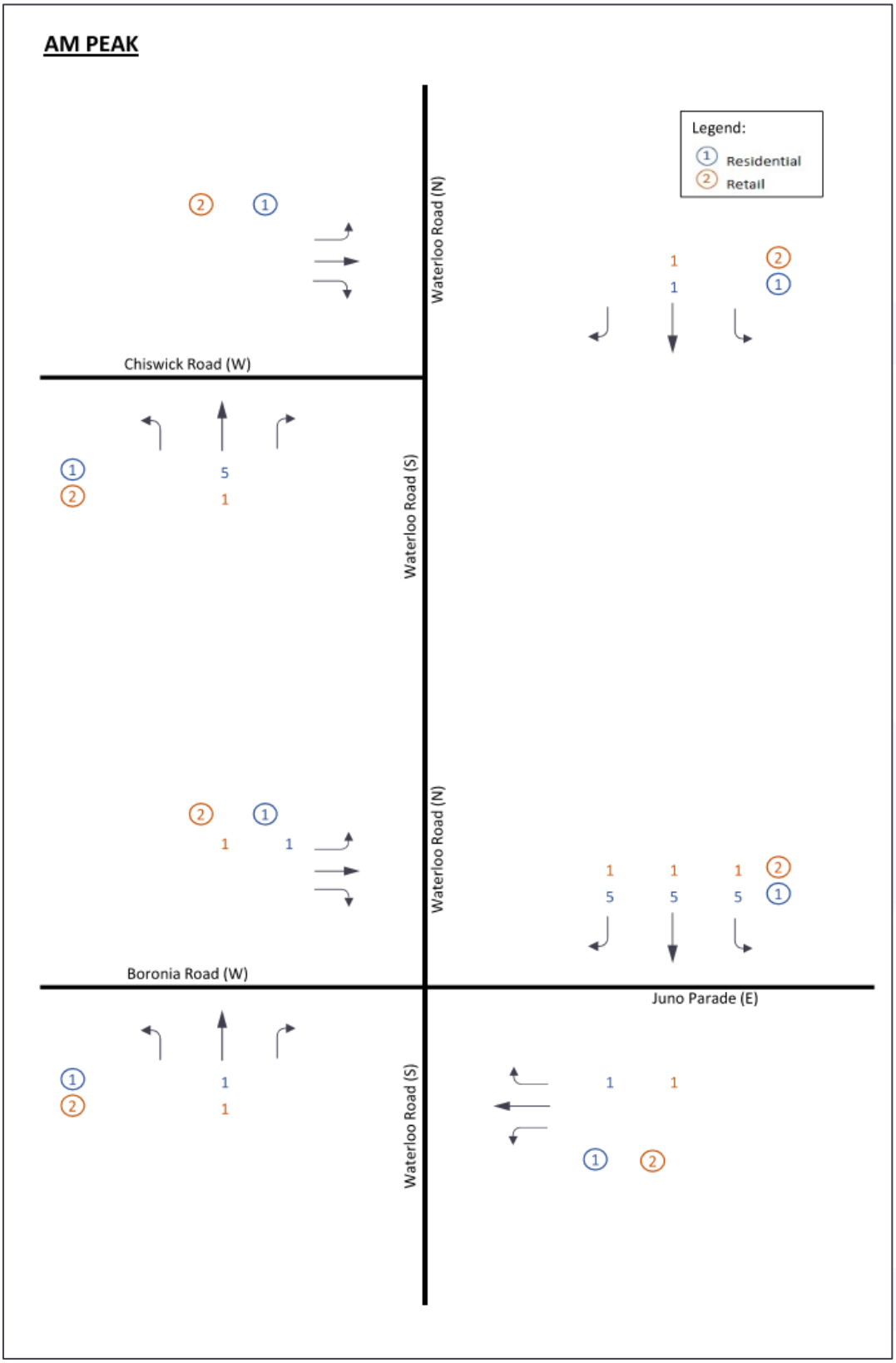
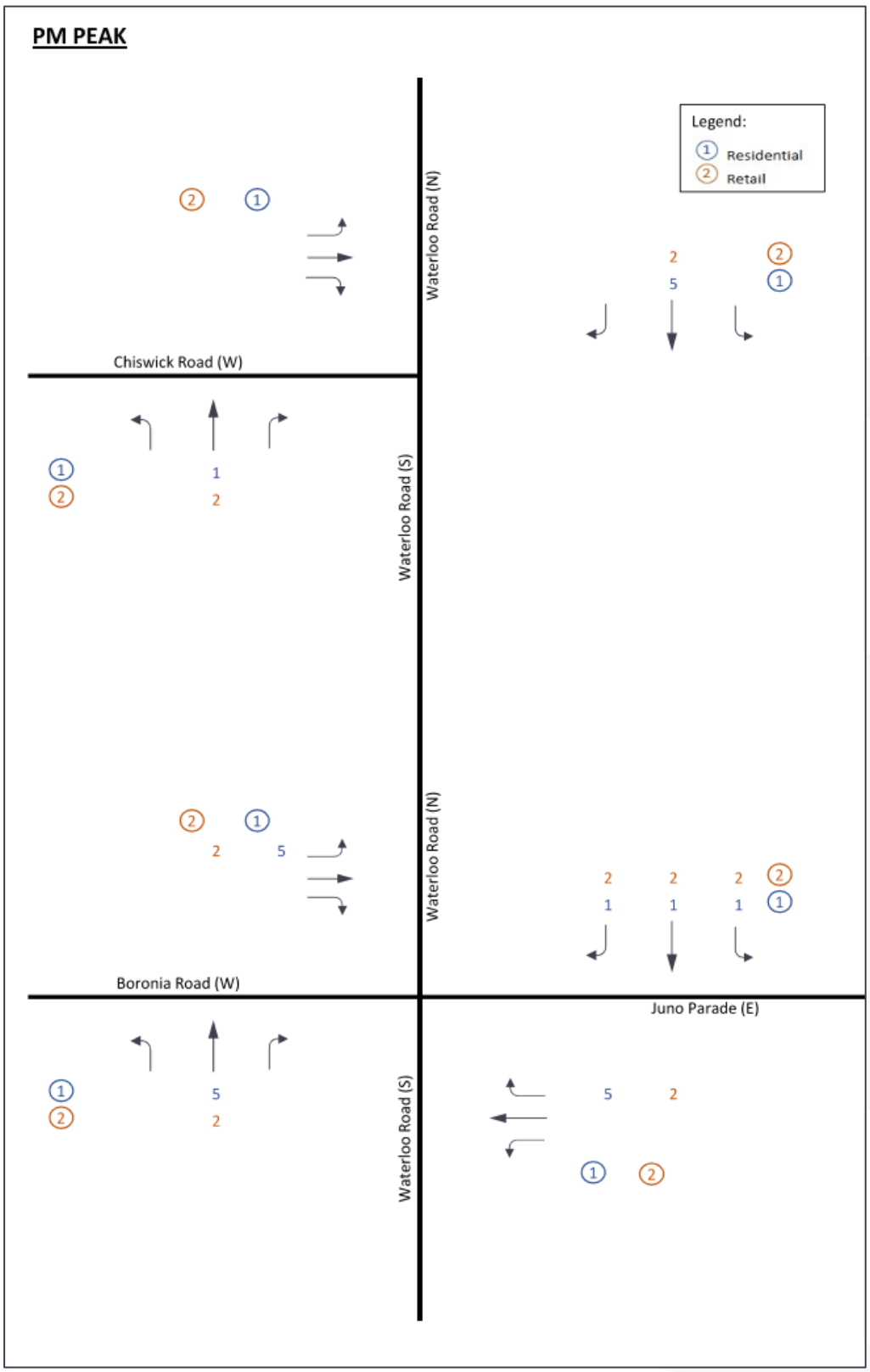


Figure 6-3 Inbound and Outbound Traffic during PM Peak



The projected development traffic is then added onto the background traffic and reanalysed using SIDRA. The assessment considers the existing state and post development state to provide an objective comparison in terms of traffic generation impact on the road network. The proposed Loading Zone with 20m No Stopping Zone is also taken into consideration to quantify the impact of this change on the intersection's performance. The assessed model outcome is summarised in Table 6-6.

Table 6-6 Existing and Post-Development SIDRA Assessment Outcome

Intersection	AM Peak			PM Peak		
	LOS	AVD	DOS	LOS	AVD	DOS
Pre-development						
Waterloo Road and Boronia Road	D	49.1s	0.681	D	47.7s	0.548
Waterloo Road and Chiswick Road	A (WRT)	13.7s	0.257	A (WRT)	13.9s	0.269
Post Development						
Waterloo Road and Boronia Road	D	49.6s	0.693	D	47.8s	0.572
Waterloo Road and Chiswick Road	A (WRT)	13.8s	0.258	A (WRT)	14.0s	0.273

Abbreviation:
WRT = West Right Turn

The SIDRA output is reproduced in **Attachment 4**.

The assessment found the existing road network operates with ample spare capacity with satisfactory levels of service. This satisfactory circumstance can be retained post-development. On this basis, the assessment concludes that the proposal will not result in an adverse traffic impact on the local road network.

7 Conclusion

The traffic and parking assessment undertaken for the Proposed Mixed-Use Development at 190 Waterloo Road, Greenacre has concluded that:

- The traffic generation of the proposed development will not present any adverse traffic implications on the local road network
- The proposed parking provision will comply with the SEPP (Housing) 2021 and Council's DCP criteria, and will adequately serve the development
- The proposed access, internal circulation and parking arrangements will be appropriate to AS design criteria
- Access to the Ground Level loading bay will be restricted to right-in and left-out only manoeuvres via the road frontage due to an existing power pole. The assessment recommends documenting a Loading Dock Management Plan prior to the occupation stage to guide and manage these operational restrictions.

Attachment 1

Architectural Plans

DA DRAWING REGISTER

DRAWING NO.	DRAWING NAME
A 0000	TITLE PAGE
A 1000	SITE ANALYSIS
A 1010	SITE PLAN
A 1020	OPPORTUNITIES AND CONSTRAINTS
A 1030	UNIT SCHEDULE
A 1100	SURVEY PLAN
A 1101	DEMOLITION PLAN
A 1150	STREETSCAPE ANALYSIS
A 1201	BASEMENT 02 PLAN
A 1202	BASEMENT 01 PLAN
A 1203	GROUND FLOOR PLAN
A 1204	LEVEL 01 PLAN
A 1205	LEVEL 02 PLAN
A 1206	LEVEL 03 PLAN
A 1207	LEVEL 04 PLAN
A 1208	LEVEL 05 PLAN
A 1209	LEVEL 06 PLAN
A 1210	ROOF PLAN
A 1250	TYPICAL GOLD LIVABLE UNITS
A 1251	TYPICAL GOLD LIVABLE UNITS
A 1252	TYPICAL SILVER LIVABLE UNITS
A 1253	TYPICAL SILVER LIVABLE LAYOUTS
A 1301	NORTH ELEVATION
A 1302	EAST ELEVATION
A 1303	SOUTH ELEVATION
A 1304	WEST ELEVATION
A 1401	SECTION AA
A 1402	SECTION BB
A 1403	RAMP SECTION
A 1404	BALCONY WALL SECTION DETAIL
A 2001	GFA CALCULATION
A 2002	AFFORDABLE UNITS CALCULATION
A 2010	SOLAR ACCESS DIAGRAM 2D
A 2011	SOLAR ACCESS DIAGRAM 3D (1)
A 2012	SOLAR ACCESS DIAGRAM 3D (2)
A 2013	SOLAR ACCESS DIAGRAM 3D (3)
A 2014	SOLAR ACCESS DIAGRAM 3D (4)
A 2020	CROSS-VENTILATION DIAGRAM 2D
A 2030	LANDSCAPE CALCULATION
A 2040	STORAGE SCHEDULE
A 2050	PERSPECTIVES
A 2101	SHADOW DIAGRAM 9.00 AM 21 JUNE
A 2102	SHADOW DIAGRAM 12.00 PM 21 JUNE
A 2103	SHADOW DIAGRAM 3.00 PM 21 JUNE
A 2201	MATERIAL SCHEDULE 1/2
A 2202	MATERIAL SCHEDULE 2/2

UNIT CALCULATIONS

GROUND FLOOR:	
RETAIL	04
TOTAL	04
LEVEL 01:	
1 BED	01
2 BED	08
3 BED	01
TOTAL	10
LEVEL 02:	
1 BED	03
2 BED	06
3 BED	01
TOTAL	10
LEVEL 03:	
1 BED	01
2 BED	08
3 BED	01
TOTAL	10
LEVEL 04:	
1 BED	01
2 BED	08
3 BED	01
TOTAL	10
LEVEL 05:	
1 BED	01
2 BED	08
3 BED	01
TOTAL	10
LEVEL 06:	
1 BED	01
2 BED	08
3 BED	01
TOTAL	10

TOTAL 1 BED: 08
TOTAL 2 BED: 46
TOTAL 3 BED: 06

TOTAL RESIDENTIAL UNITS: 60
TOTAL RETAIL: 04 (401.30 sqm)

TOTAL YIELD: 64

AFFORDABLE HOUSING:

LEVEL 01 - 103 & 104
LEVEL 02 - 204
LEVEL 03 - 301, 302, 309 & 310
LEVEL 04 - 401, 402, 409 & 410

TOTAL - 11 UNITS (1x 1 BED, 8x 2 BED, 2x 3 BED)

LIVABLE HOUSING:

SILVER RATING (12 UNITS) - 101, 102, 201, 202, 301, 302, 401, 402, 501, 502, 601, 602
GOLD RATING (12 UNITS) - 103, 104, 203, 204, 303, 304, 403, 404, 503, 504, 603, 604

GFA CALCULATIONS

SITE AREA = 1,782m^2
PERMISSIBLE FSR = 2.5:1 + 0.75 = 3.25:1 (30%) ARH BONUS
PERMISSIBLE GFA = 5,791.50m^2

TOTAL GFA: 5,789.84 SQM
TOTAL FSR: 3.249:1 (INC. 0.75 (30%) ARH BONUS)

CARPARKING

NON-AFFORDABLE UNITS:
TOTAL UNITS: 48
REQUIRED: 48
PROVIDED: **48**

AFFORDABLE HOUSING:
TOTAL UNITS: 11
REQUIRED: 6
PROVIDED: **6**

RETAIL:
TOTAL UNITS: 4
REQUIRED: 10
PROVIDED: **10**

VISITOR
REQUIRED: 12
PROVIDED: **12**

TOTAL CARPARKING REQUIRED: **76**
TOTAL CARPARKING PROVIDED: **76**

DRAFT

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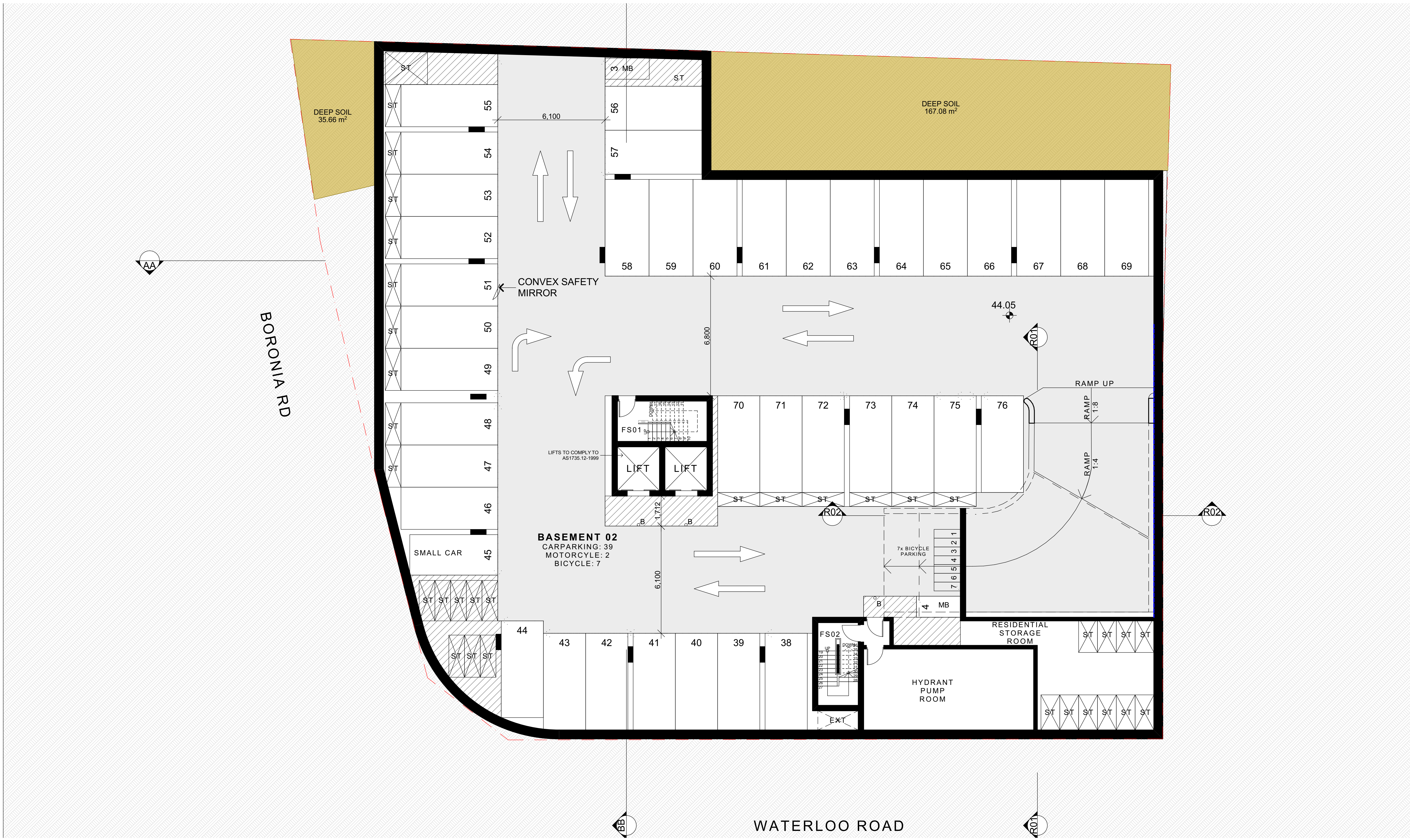
NSW reg. no. **7542** ABN: 67167131848
Design Practitioner No. **DEP0000073**

PROPOSED MIXED USE DEVELOPMENT

WATERLOO RD

190 WATERLOO ROAD, GREENACRE



BASEMENT 02

1:200

SCALE 1:200 @ A3

0 1 2 5 10M

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DA

A3 Drawing Original Size

DRAFT

Rev	Date	Description
A	28/02/2025	DA SUBMSSION

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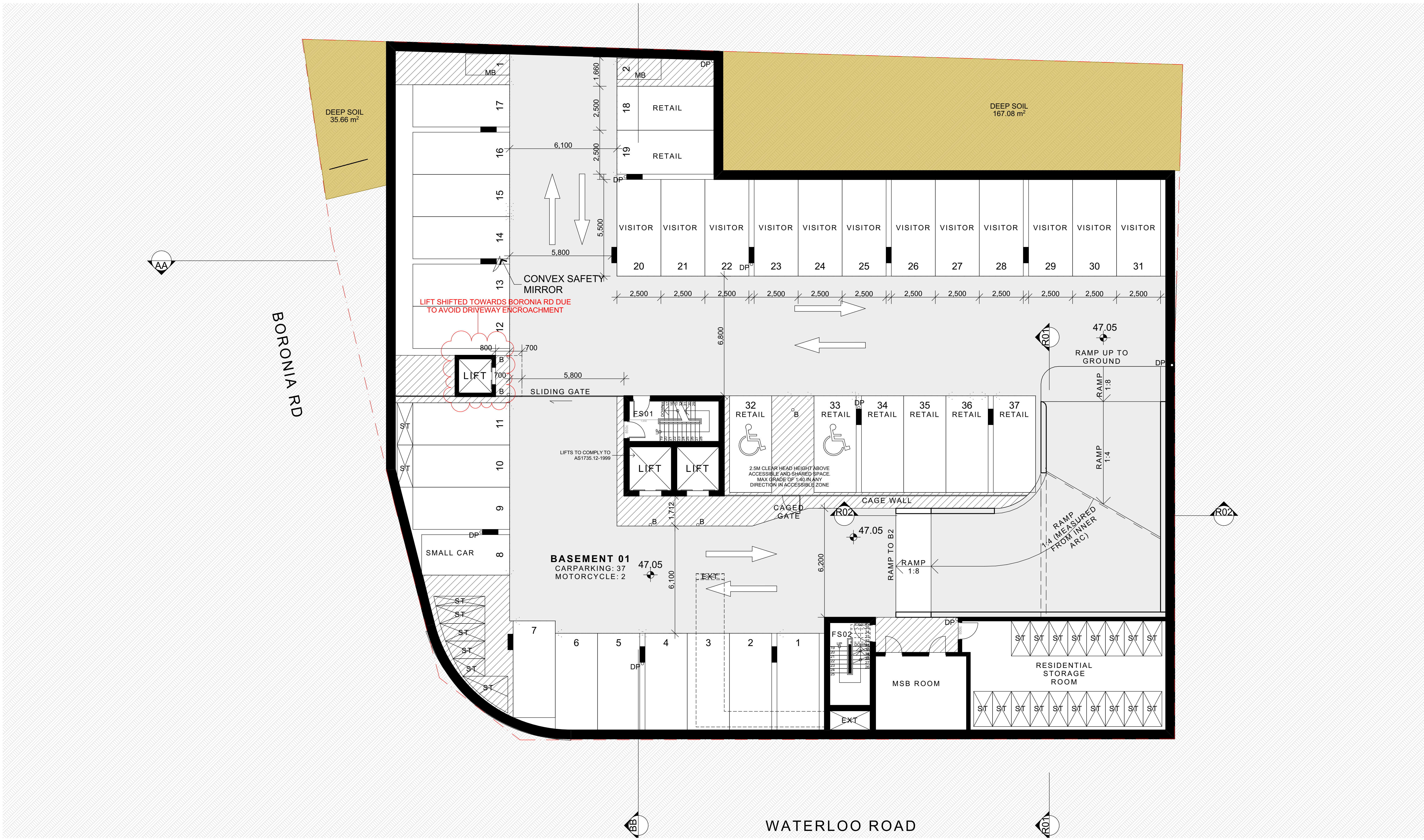
PROJECT	190 WATERLOO RD, GREENACRE
CLIENT	MOHAMMED DAHER
SCALE	1:200
DATE	3/07/2025
DRAWN	SN, MO, FA, CJ
PROJECT ARCHITECT	MO
PROJECT DIRECTOR	GA
DRAWING NAME	BASEMENT 02 PLAN
PROJECT NUMBER	29.17
DRAWING NUMBER	DA A 1201
ISSUE	A


DEEP SOIL
35.66 m²
DEEP SOIL
167.08 m²
BORONIA RD
WATERLOO ROAD
MB
DP
RETAIL
RETAIL
VISITOR
20
21
22
23
24
25
26
27
28
29
30
31
CONVEX SAFETY MIRROR
LIFT SHIFTED TOWARDS BORONIA RD DUE TO AVOID DRIVEWAY ENCROACHMENT
LIFT
SLIDING GATE
RAMP UP TO GROUND
RAMP 1:8
RAMP 1:4
47.05
FS01
LIFTS TO COMPLY TO AS1735.12-1999
LIFT
LIFT
32 RETAIL
33 RETAIL
34 RETAIL
35 RETAIL
36 RETAIL
37 RETAIL
2.5M CLEAR HEAD HEIGHT ABOVE ACCESSIBLE AND SHARED SPACE. MAX GRADE OF 1:40 IN ANY DIRECTION IN ACCESSIBLE ZONE
CAGED GATE
CAGE WALL
RAMP 1:4 (MEASURED FROM INNER ARC)
RAMP TO B2
RAMP 1:8
SMALL CAR
BASEMENT 01
CARPARKING: 37
MOTORCYCLE: 2
47.05
EXT
FS02
EXT
MSB ROOM
RESIDENTIAL STORAGE ROOM
ST
AA
BB
R01
R02

BASEMENT 01

1:200

SCALE 1:200 @ A3

0 1 2 5 10M

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Drawing Original Size A3

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A	26/02/25	DA SUBMISSION

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GEOTECHNICAL — Geotechnical Consultants Australia Pty Ltd

HYDRAULIC — Australiawide Consulting Services P/L

LANDSCAPING — concept

BCA

CONTAMINATION — EI Australia Pty Ltd

PLANNING — think planners

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ARCHITECT — GHAZI AL ALI ARCHITECT, NSW reg. no. 7542

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21 / 47-55 JOHN ST, LEICHHARDT NSW 2040

PROJECT: 190 WATERLOO RD, GREENACRE

CLIENT: MOHAMMED DAHER

SCALE: 1:200

DATE: 3/07/2025

DRAWN: SN, MO, FA, CJ

PROJECT ARCHITECT: MO

PROJECT DIRECTOR: GA

DRAWING NAME: BASEMENT 01 PLAN

PROJECT NUMBER: 29.17

DRAWING NUMBER: DA A 1202

ISSUE: A

SCALE 1:200 @ A3

0 1 2 5 10M

GROUND FLOOR PLAN
1:200

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A3 Drawing Original Size

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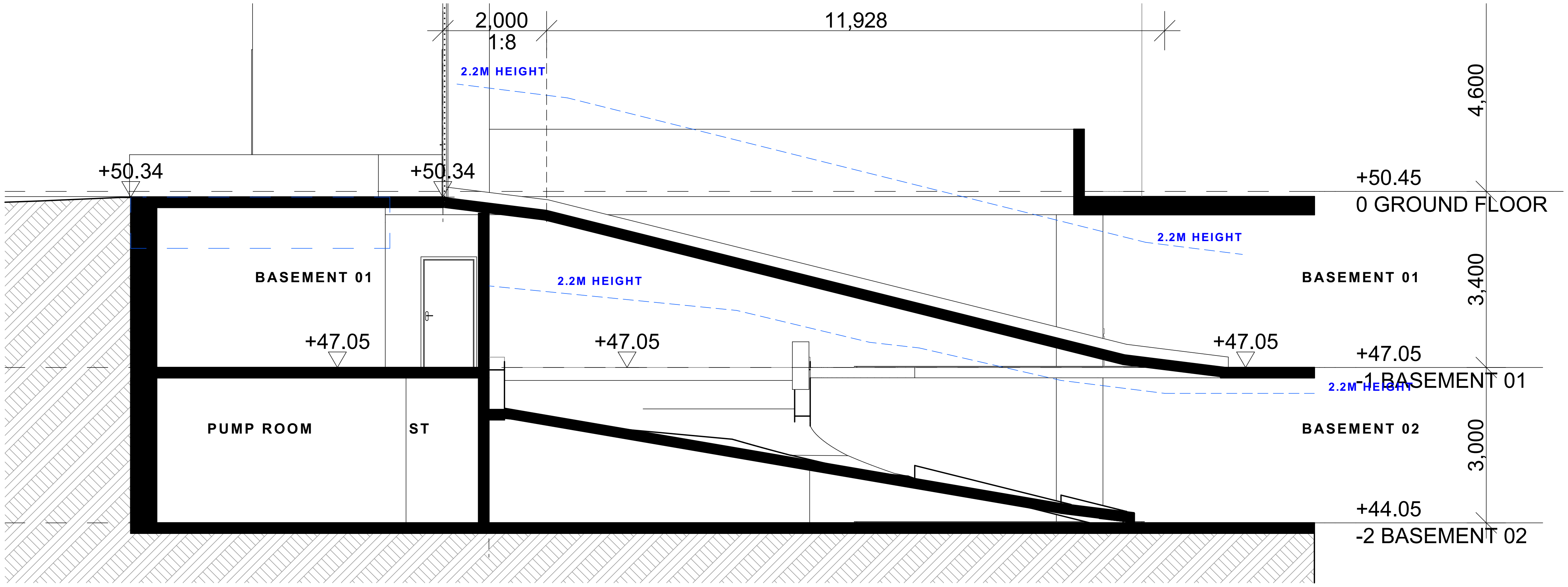
PROJECT	190 WATERLOO RD, GREENACRE		DRAWING NAME	GROUND FLOOR PLAN
CLIENT	MOHAMMED DAHER		PROJECT NUMBER	29.17
SCALE	1:200, 1:100	DATE 3/07/2025	DRAWING NUMBER	DA A 1203
DRAWN SN, MO, FA, CJ	PROJECT ARCHITECT MO	PROJECT DIRECTOR GA	ISSUE	A



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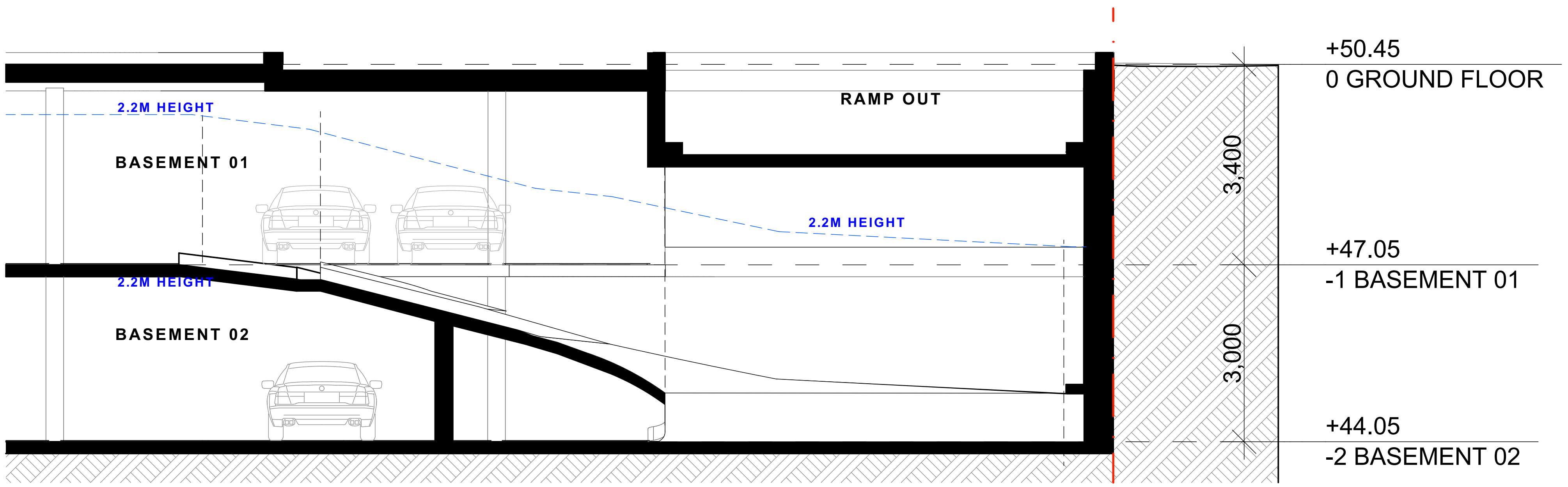

RAMP SECTION R02
1:100

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Drawing Original Size A3

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Rev	Date	Description
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PROJECT	190 WATERLOO RD, GREENACRE		
CLIENT	MOHAMMED DAHER		
SCALE	1:100	DATE	3/07/2025
DRAWN	SN, MO, FA, CJ	PROJECT ARCHITECT	MO
PROJECT DIRECTOR	GA		

DRAWING NAME: RAMP SECTION
PROJECT NUMBER: 29.17
DRAWING NUMBER: DA A 1403
ISSUE: A

Attachment 2

Turning Path Assessment

NOTES:

- MAXIMUM CHANGE IN GRADE FOR CARS SHOULD BE 1:8 OVER 2m
- MINIMUM HEIGHT CLEARANCE OF 2.2m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE CIRCULATION AISLES AND PARKING SPACES
- MINIMUM HEIGHT CLEARANCE OF 2.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE ACCESSIBLE PARKING SPACES
- MINIMUM HEIGHT CLEARANCE OF 4.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE SERVICE VEHICLE ACCESS ROADWAYS AND LOADING DOCKS
- HEIGHT CLEARANCE ABOVE A SAG CHANGE IN GRADES SHOULD BE MEASURED IN ACCORDANCE WITH FIGURE 5.3 AS2890.1:2004

ENSURE PLANTER BOX IS NOT MORE THAN 1.1m HIGH

190 WATERLOO ROAD, GREENACRE
GROUND FLOOR
COMPLIANCE ASSESSMENT

DRAWING REF NO. 24060-V1.16-SP

SHEET NO. 01 OF 10

ISSUE DATE 3 July 2025

DESIGNED BY A.XIA

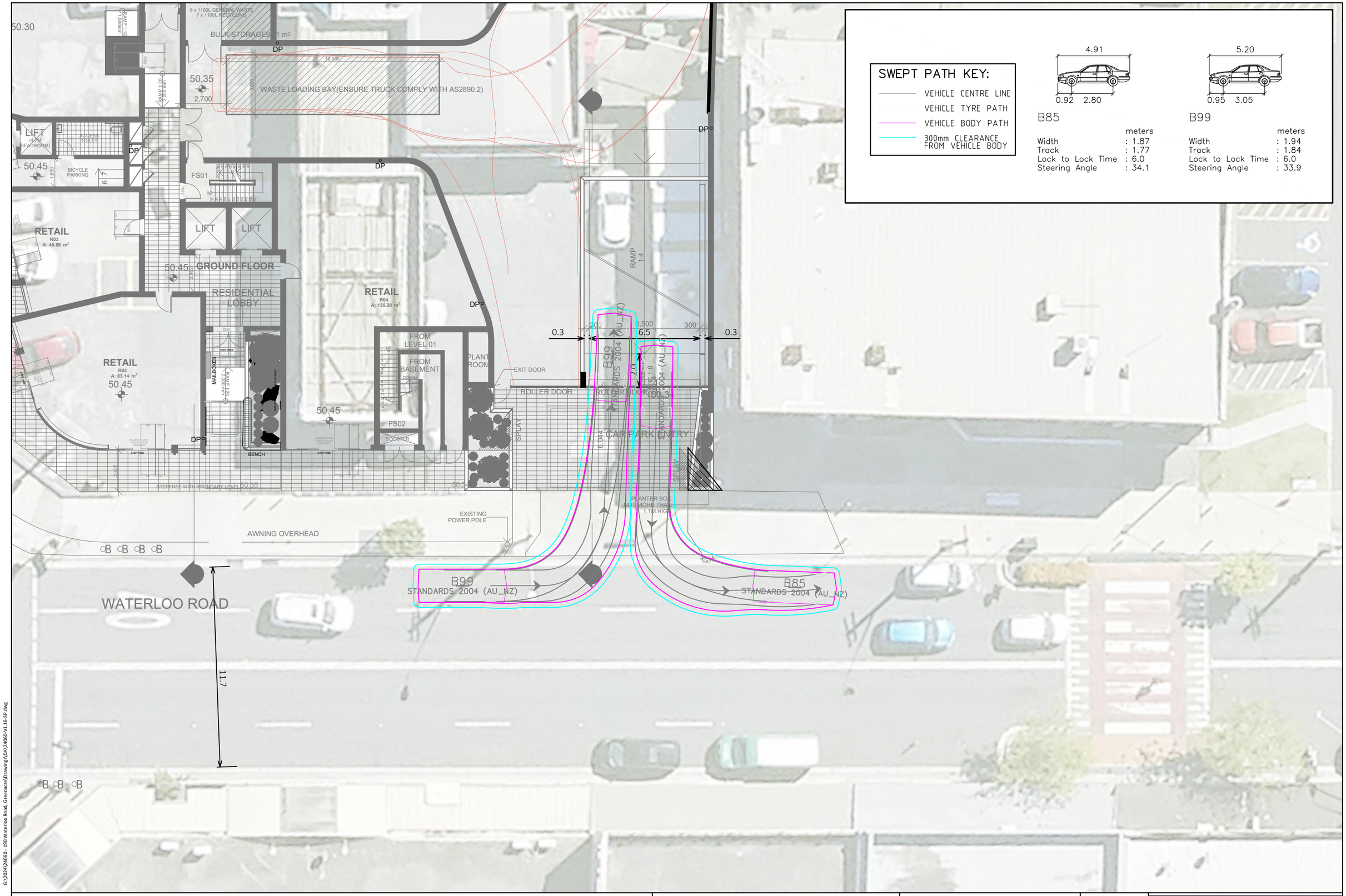
REVIEWED BY B.LO

SCALE A3 1:200

DRAWING REFERENCE (SOURCE): G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic

Plotted by Lamone Ng G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawings\DA\24060-V1.16-SP.dwg



190 WATERLOO ROAD, GREENACRE
GROUND FLOOR
SWEPT PATH ASSESSMENT - B85 AND B99 PASSING

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 02 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY	A.XIA
REVIEWED BY	B.LO
SCALE	A3
	1:200

DRAWING REFERENCE (SOURCE):
G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

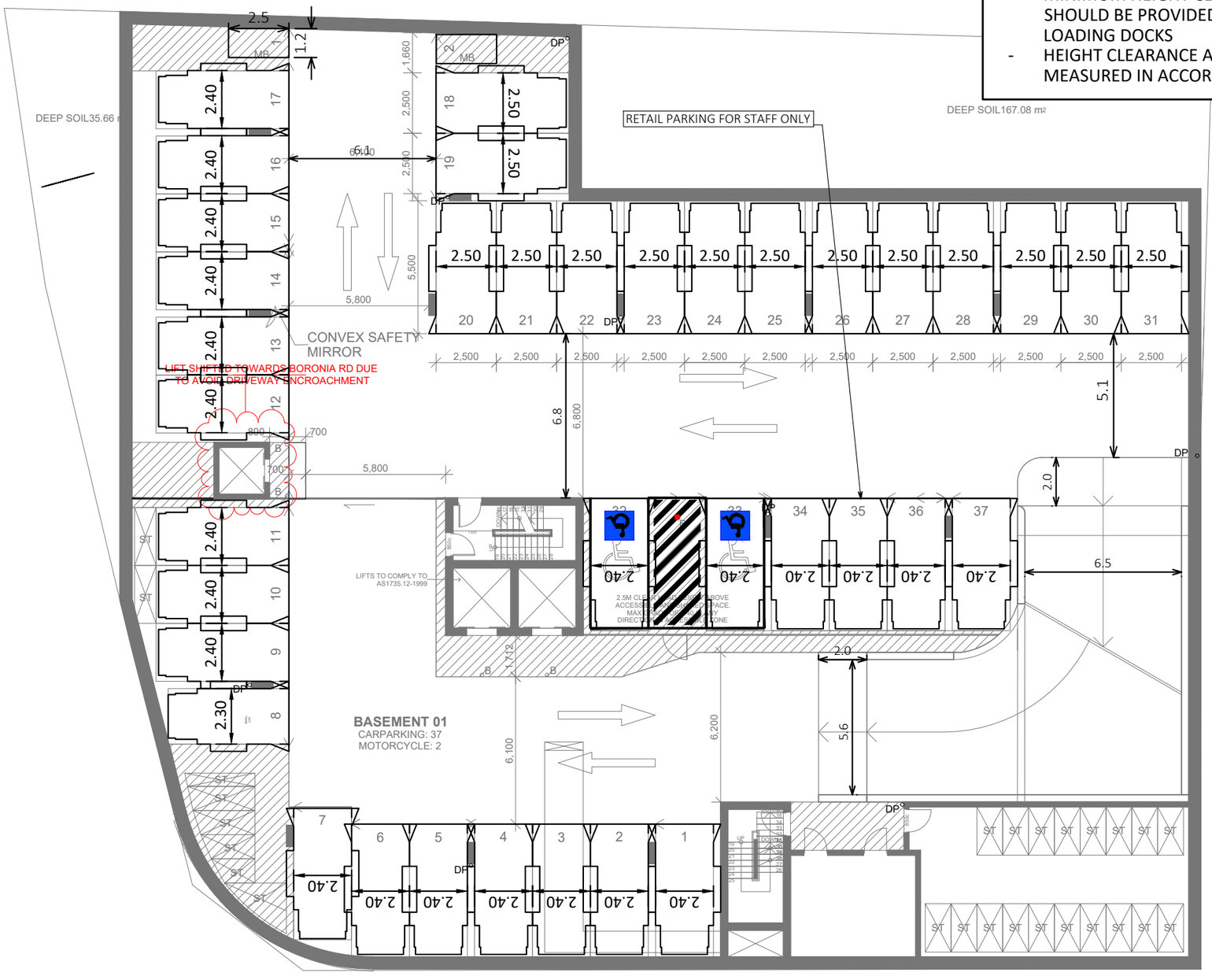
Genesis Traffic.

G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawings\DA\24060-V1.16-SP.dwg

Plotted by Jamone Ng

NOTES:

- MAXIMUM CHANGE IN GRADE FOR CARS SHOULD BE 1:8 OVER 2m
- MINIMUM HEIGHT CLEARANCE OF 2.2m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE CIRCULATION AISLES AND PARKING SPACES
- MINIMUM HEIGHT CLEARANCE OF 2.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE ACCESSIBLE PARKING SPACES
- MINIMUM HEIGHT CLEARANCE OF 4.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE SERVICE VEHICLE ACCESS ROADWAYS AND LOADING DOCKS
- HEIGHT CLEARANCE ABOVE A SAG CHANGE IN GRADES SHOULD BE MEASURED IN ACCORDANCE WITH FIGURE 5.3 AS2890.1:2004



190 WATERLOO ROAD, GREENACRE
BASEMENT 1
CAR PARK COMPLIANCE ASSESSMENT

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 03 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY A.XIA REVIEWED BY B.LO

SCALE A3 1:200

DRAWING REFERENCE (SOURCE): G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

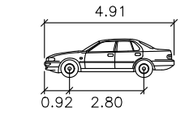
Genesis Traffic

G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawing\DA\24060-V1.16-SP.dwg

Plotted by Lamone Ng

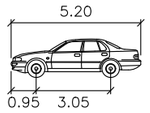
SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1



B99

	meters
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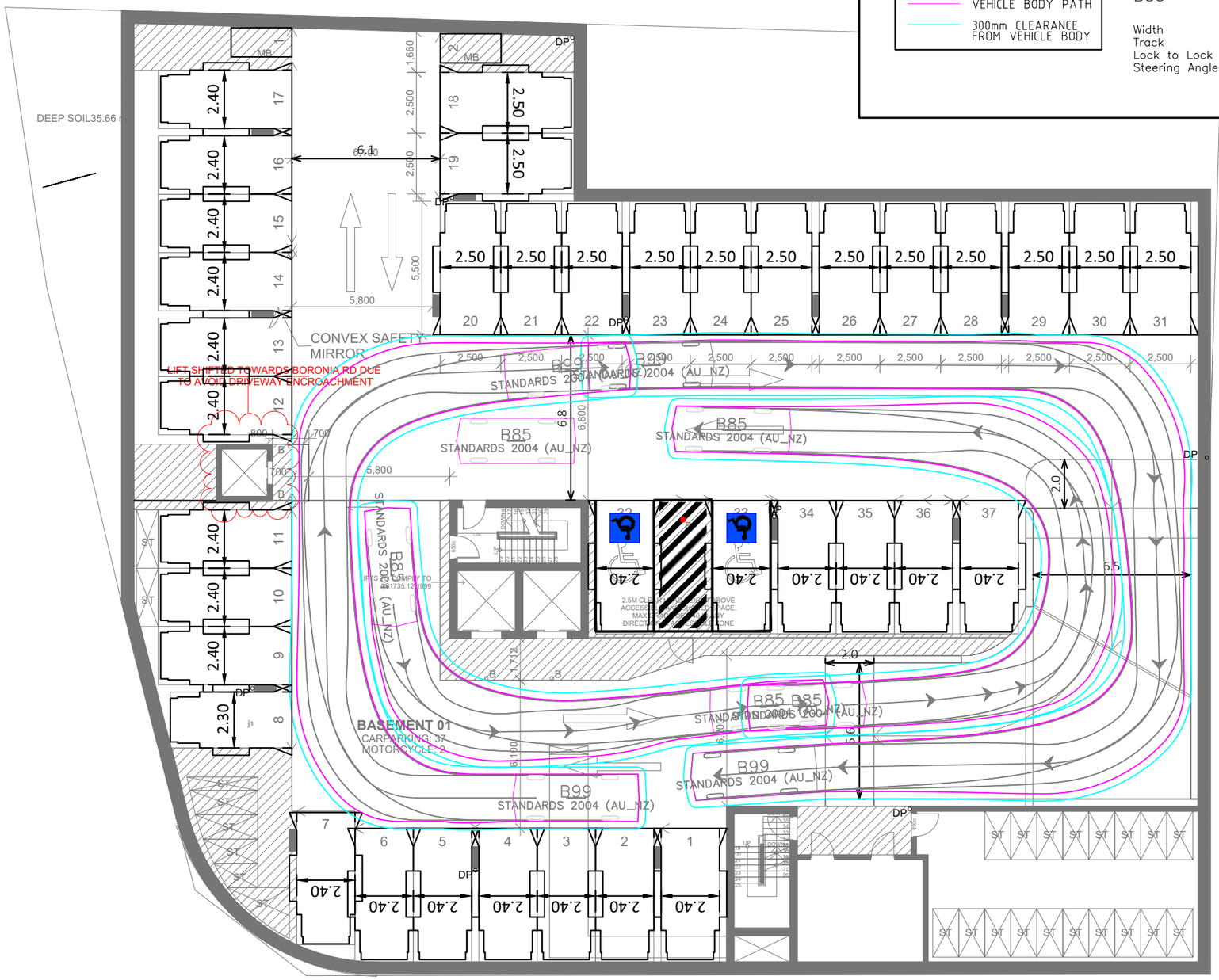
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.9



190 WATERLOO ROAD, GREENACRE
BASEMENT 1
SWEPT PATH ASSESSMENT - CIRCULATION

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 04 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY	REVIEWED BY
A.XIA	B.LO

SCALE A3 1:200

DRAWING REFERENCE (SOURCE):
G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic.

Plotted by Lamone Ng
G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawings\DA\24060-V1.16-SP.dwg

LIFT SHIFTED TOWARDS BORONIA RD DUE TO AVOID DRIVEWAY ENCROACHMENT

CONVEX SAFETY MIRROR

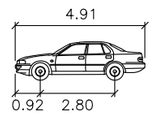
LIFTS TO COMPLY TO AS1735.12-1999

LIFT SHIFTED TOWARDS BORONIA RD DUE TO AVOID DRIVEWAY ENCROACHMENT

CONVEX SAFETY MIRROR

SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

190 WATERLOO ROAD, GREENACRE
BASEMENT 01
SWEPT PATH ASSESSMENT - B85 PARKING ENTRY AND EXIT

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 05 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY A.XIA REVIEWED BY B.LO

SCALE A3 1:100

DRAWING REFERENCE (SOURCE): G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic

G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawings\DA\24060-V1.16-SP.dwg

Plotted by Jamone Ng

LIFT SHIFTED TOWARDS BORONIA RD DUE TO AVOID DRIVEWAY ENCROACHMENT

LIFT SHIFTED TOWARDS BORONIA RD DUE TO AVOID DRIVEWAY ENCROACHMENT

CONVEX SAFETY MIRROR

CONVEX SAFETY MIRROR

LIFTS TO COMPLY TO AS1735.12-1999

LIFTS TO C AS17

B85 STANDARDS 2004 (AU_NZ)

SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

190 WATERLOO ROAD, GREENACRE
BASEMENT 01
SWEPT PATH ASSESSMENT - B85 PARKING ENTRY AND EXIT

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 06 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY A.XIA REVIEWED BY B.LO

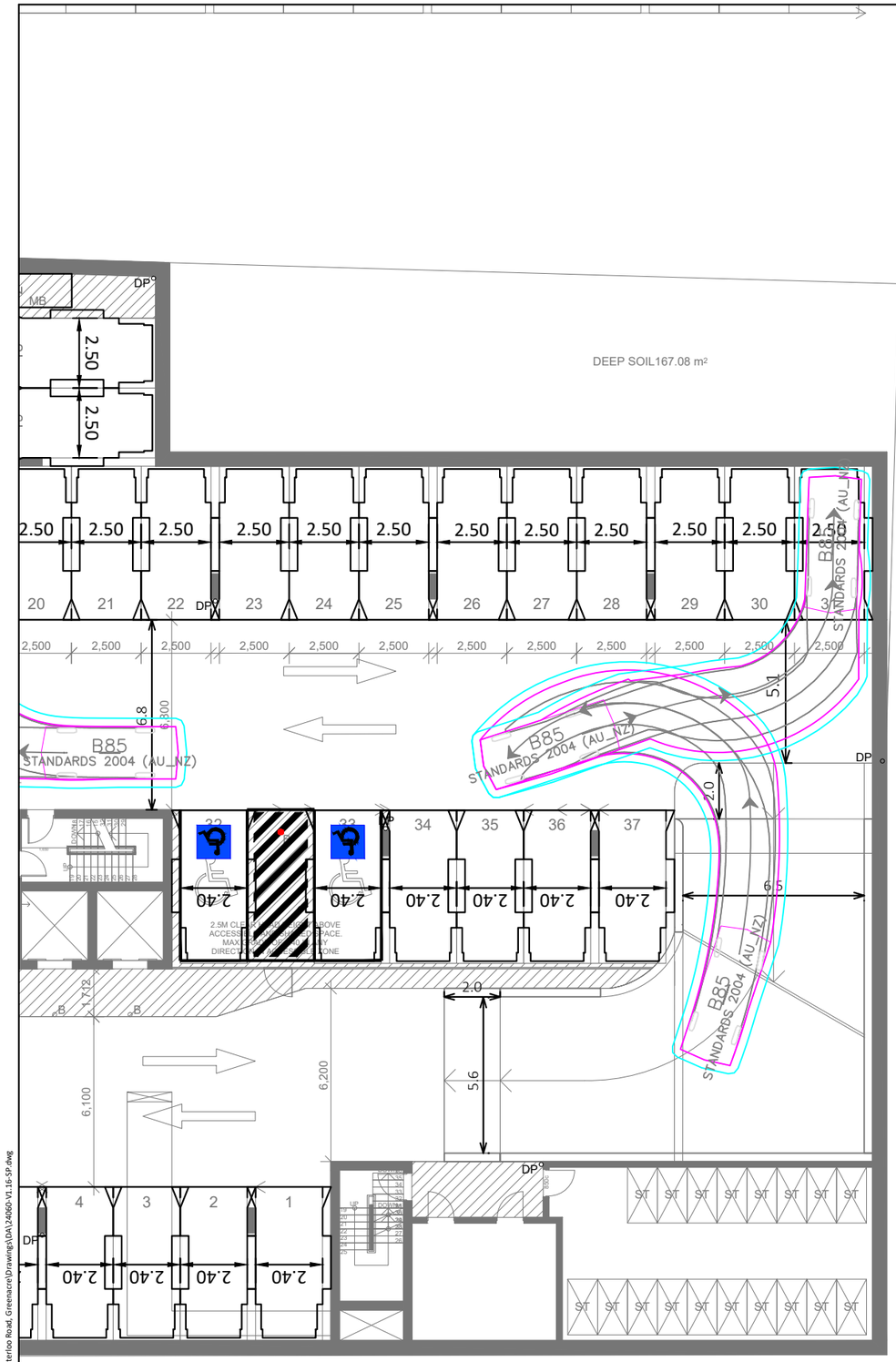
SCALE A3 1:100

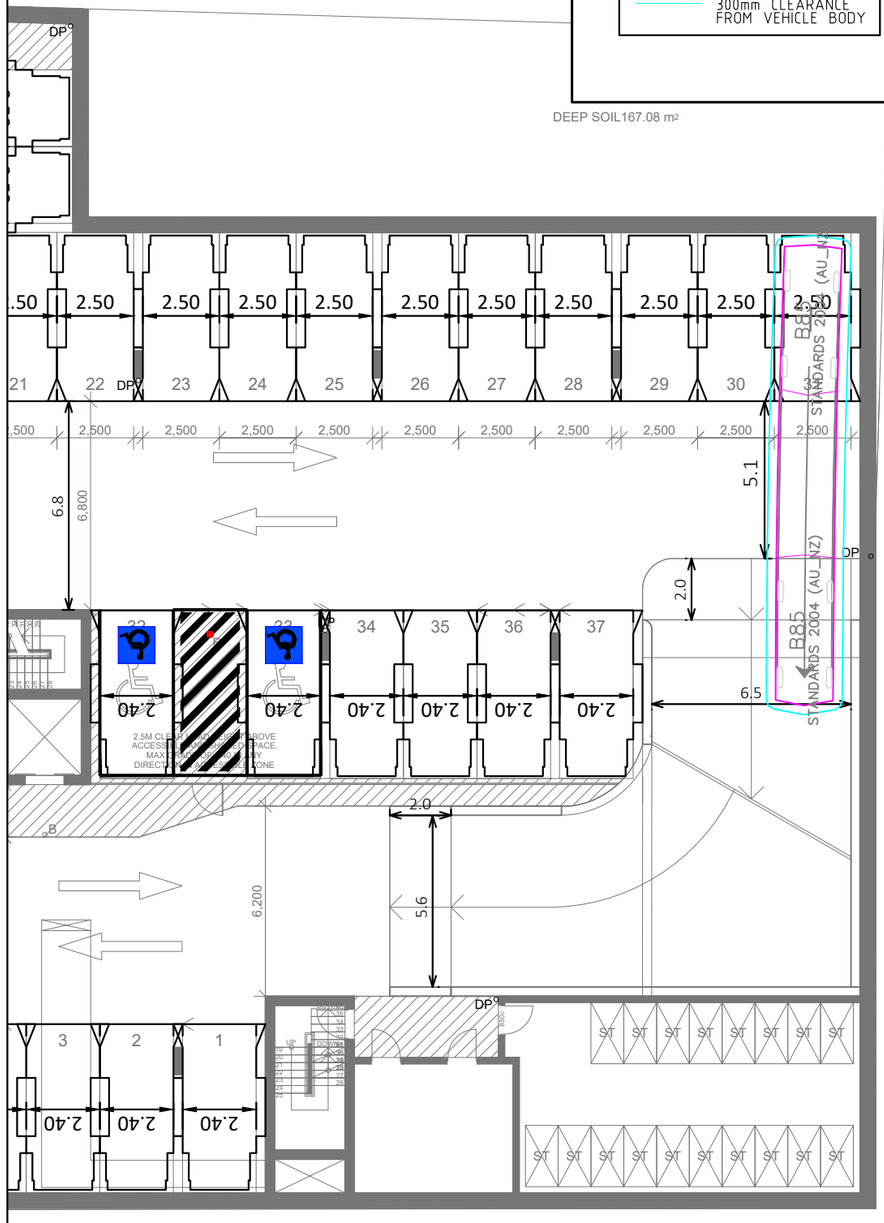
DRAWING REFERENCE (SOURCE): G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic

G:\2024\24060 - 190 Waterloo Road, Greenacre\D\drawings\DA\24060-V1.16-SP.dwg

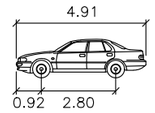
Plotted by Lamone Ng





SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

190 WATERLOO ROAD, GREENACRE
BASEMENT 01
SWEPT PATH ASSESSMENT - B85 PARKING SPACE 31 ENTRY AND EXIT

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 07 OF 10 ISSUE DATE 3 July 2025

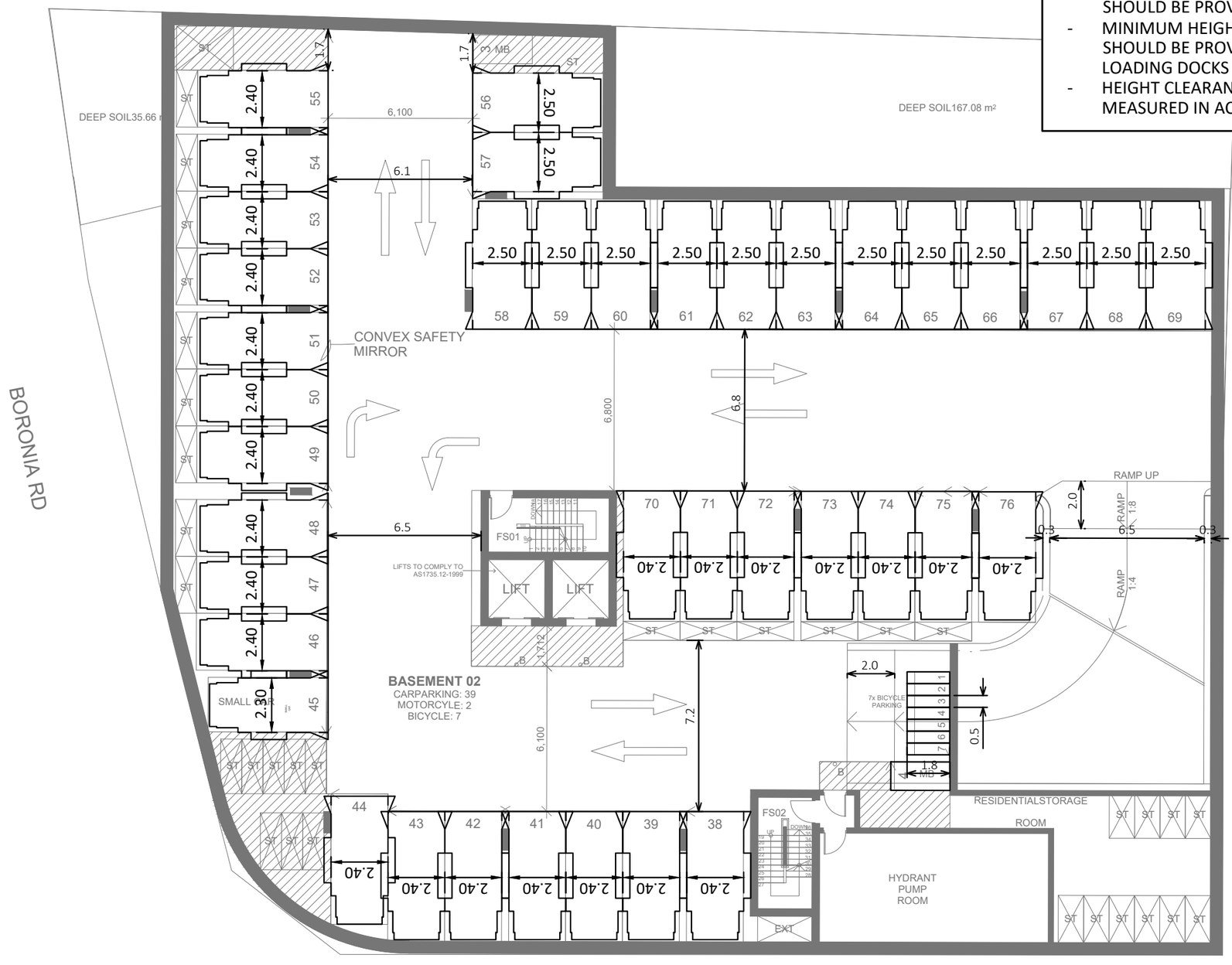
DESIGNED BY A.XIA
REVIEWED BY B.LO
SCALE A3 1:200

DRAWING REFERENCE (SOURCE):
G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic

G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawing\DA\24060-V1.16-SP.dwg
Plotted by Lamone Ng

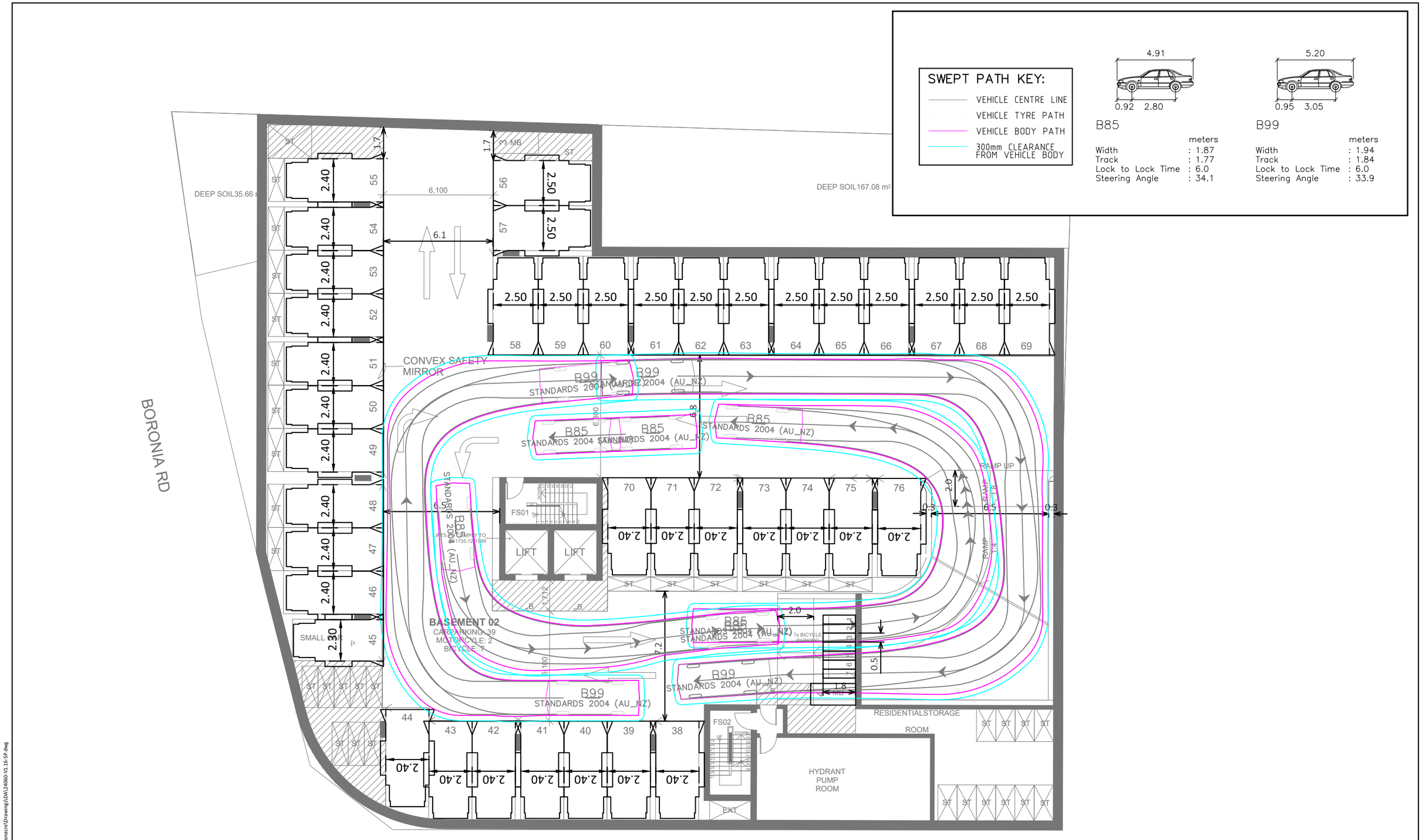
NOTES:
- MAXIMUM CHANGE IN GRADE FOR CARS SHOULD BE 1:8 OVER 2m
- MINIMUM HEIGHT CLEARANCE OF 2.2m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE CIRCULATION AISLES AND PARKING SPACES
- MINIMUM HEIGHT CLEARANCE OF 2.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE ACCESSIBLE PARKING SPACES
- MINIMUM HEIGHT CLEARANCE OF 4.5m (TO SERVICES AND STRUCTURE) SHOULD BE PROVIDED ABOVE SERVICE VEHICLE ACCESS ROADWAYS AND LOADING DOCKS
- HEIGHT CLEARANCE ABOVE A SAG CHANGE IN GRADES SHOULD BE MEASURED IN ACCORDANCE WITH FIGURE 5.3 AS2890.1:2004



190 WATERLOO ROAD, GREENACRE BASEMENT 02 CAR PARK COMPLIANCE ASSESSMENT DRAWING REF NO. 24060-V1.16-SP SHEET NO. 08 OF 10 ISSUE DATE 3 July 2025	DESIGNED BY A.XIA REVIEWED BY B.LO SCALE A3 1:200	DRAWING REFERENCE (SOURCE): G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic

Plotted by Lamone Ng G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawings\DA\24060-V1.16-SP.dwg



190 WATERLOO ROAD, GREENACRE
BASEMENT 02
SWEPT PATH ASSESSMENT - CIRCULATION

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 09 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY A.XIA
REVIEWED BY B.LO
SCALE A3
0 2.0 4.0
1:200

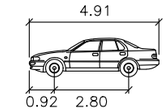
DRAWING REFERENCE (SOURCE):
G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic

Plotted by Lamone Ng
G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawings\DA\24060-V1.16-SP.dwg

SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY



B85

	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

2.50 2.50 2.50 2.50 2.50 2.50 2.50

63 64 65 66 67 68 69

0 2.50 2.50 2.50

64 65 66 67 68 69

STANDARDS 2004 (AU_NZ)

B85

RAMP UP

RAMP 1:8

RAMP 1:4

2.0

0.3 6.5 0.3

2.40 2.40 2.40 2.40

73 74 75 76

ST ST ST

2.0

7x BICYCLE PARKING

1 2 3 4 5 6 7

0.5

STANDARDS 2004 (AU_NZ)

B85

RAMP UP

RAMP 1:8

RAMP 1:4

2.0

0.3 6.5 0.3

2.40 2.40 2.40 2.40

73 74 75 76

ST ST ST

2.0

7x BICYCLE PARKING

1 2 3 4 5 6 7

0.5

190 WATERLOO ROAD, GREENACRE
BASEMENT 02
SWEPT PATH ASSESSMENT - B85 PARKING ENTRY AND EXIT

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 10 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY	REVIEWED BY
A.XIA	B.LO

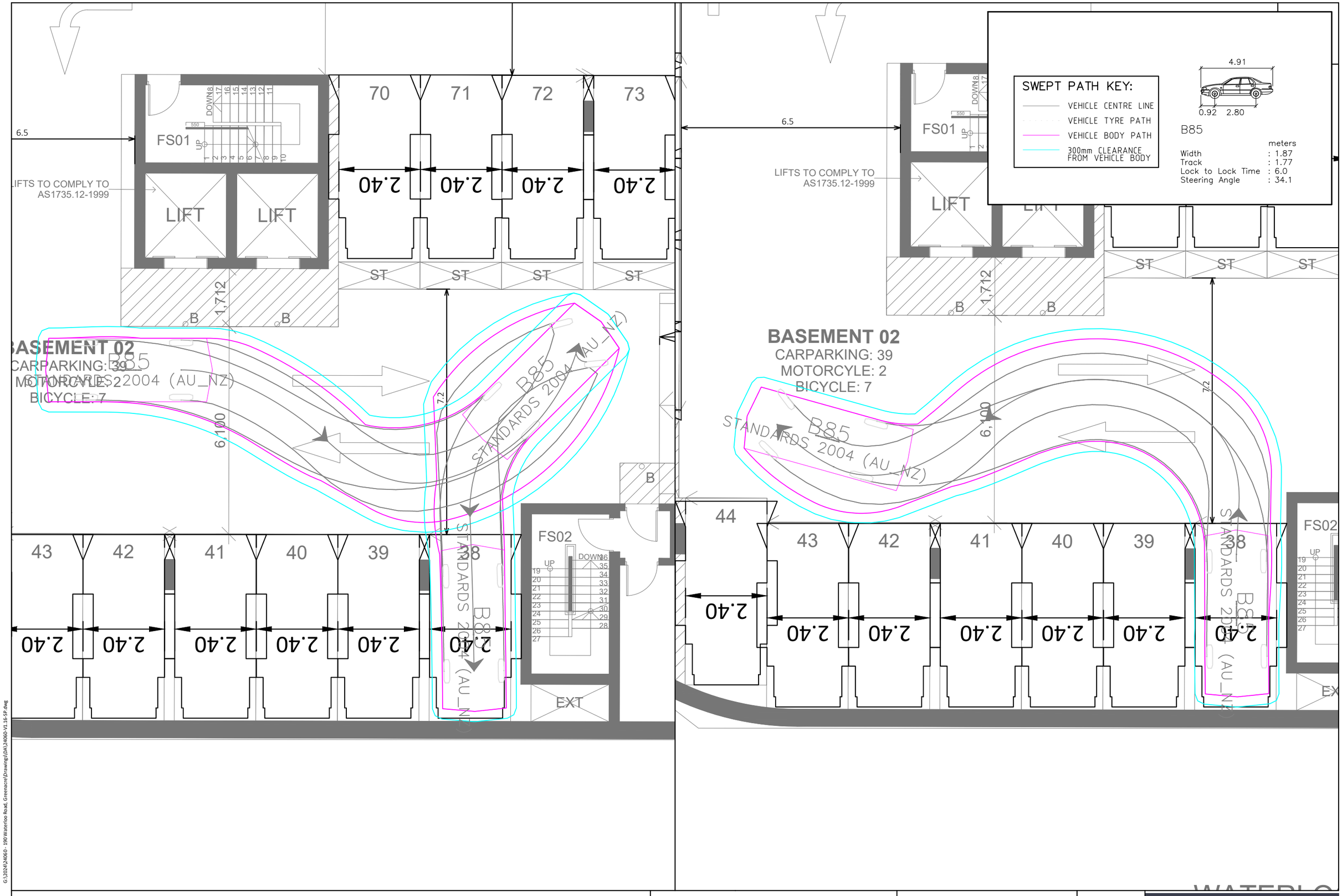
SCALE A3 0 1.0 2.0 1:100

DRAWING REFERENCE (SOURCE):
G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic

G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawings\DA\24060-V1.16-SP.dwg

Plotted by: Lamone Ng



190 WATERLOO ROAD, GREENACRE
BASEMENT 02
SWEPT PATH ASSESSMENT - B85 PARKING ENTRY AND EXIT

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 11 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY A.XIA
REVIEWED BY B.LO
SCALE A3
0 1.0 2.0
1:100

DRAWING REFERENCE (SOURCE):
G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

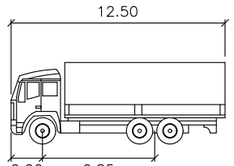
Genesis Traffic

G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawings\DA\24060-V1.16-SP.dwg

Plotted by: Lamone Ng

SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY



HRV

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.7

RIGHT IN ONLY

LEFT OUT ONLY

190 WATERLOO ROAD, GREENACRE
GROUND FLOOR
SWEPT PATH ASSESSMENT - HRV ENTRY & EXIT

DRAWING REF NO. 24060-V1.16-SP SHEET NO. 12 OF 10 ISSUE DATE 3 July 2025

DESIGNED BY	REVIEWED BY
A.XIA	B.LO

SCALE A3 1:250

DRAWING REFERENCE (SOURCE):
G:\2024\24060 - 190 WATERLOO ROAD, GREENACRE\DRAWINGS\DA\20250703

Genesis Traffic

G:\2024\24060 - 190 Waterloo Road, Greenacre\Drawing\DA\24060-V1.16-SP.dwg

Plotted by Jamone Ng

Attachment 3

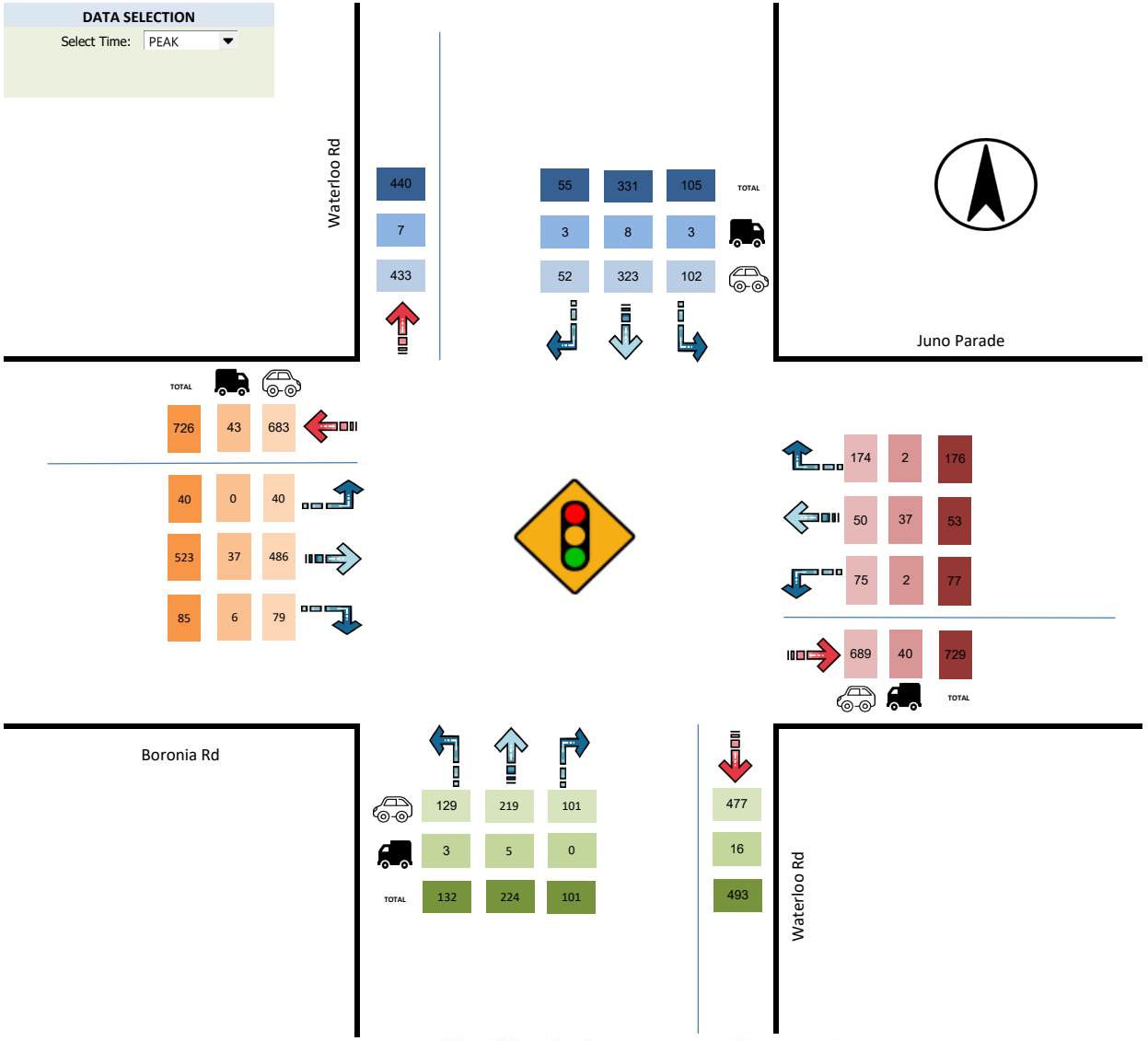
Traffic Survey Data

Location	**Waterloo Rd**	**Duration**	**7:00**	**-**	**09:00**
	Juno Parade			**-**	
	Waterloo Rd		**16:00**	**-**	**18:00**
	Boronia Rd	**Date**	**Thursday, 6 February 2025**		
Suburb	**GREENACRE**	**Weather**	**-**		

DATA SELECTION

Select Time: PEAK

TIME RANGE		
PEAK	**-**	**AM**
PEAK		
8:00	**-**	**9:00**



Traffic Information Specialist

ABN: 42 613 389 923

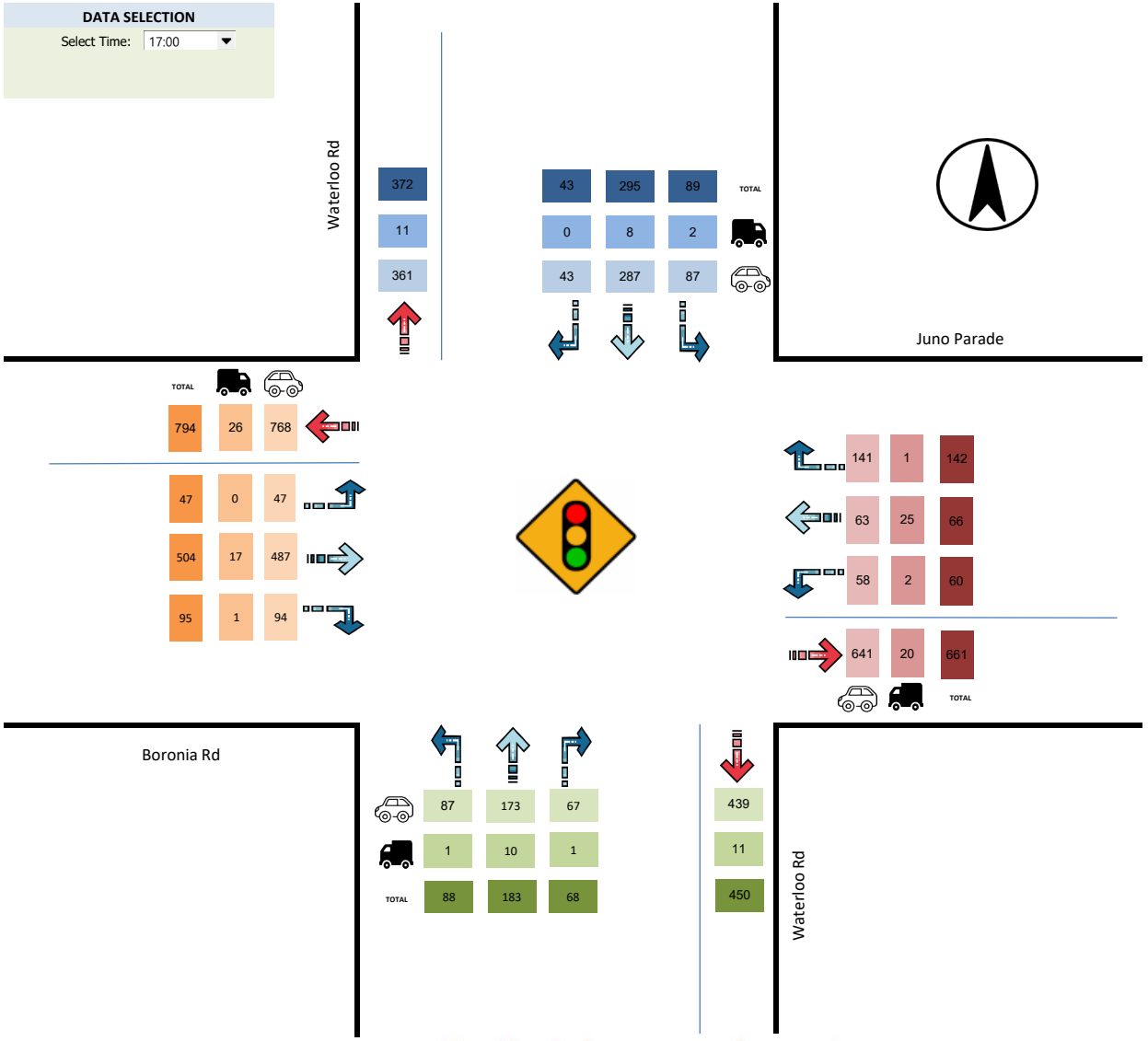
Email info@tistraffic.com.au

Location	**Waterloo Rd**		**Duration**	**7:00**	**-**	**09:00**
	Juno Parade				**-**	
	Waterloo Rd			**16:00**	**-**	**18:00**
	Boronia Rd		**Date**	**Thursday, 6 February 2025**		
Suburb	**GREENACRE**		**Weather**	**-**		

DATA SELECTION

Select Time: 17:00

TIME RANGE		
17:00	**-**	**18:00**
PEAK		
16:00	**-**	**17:00**



Traffic Information Specialist

ABN: 42 613 389 923

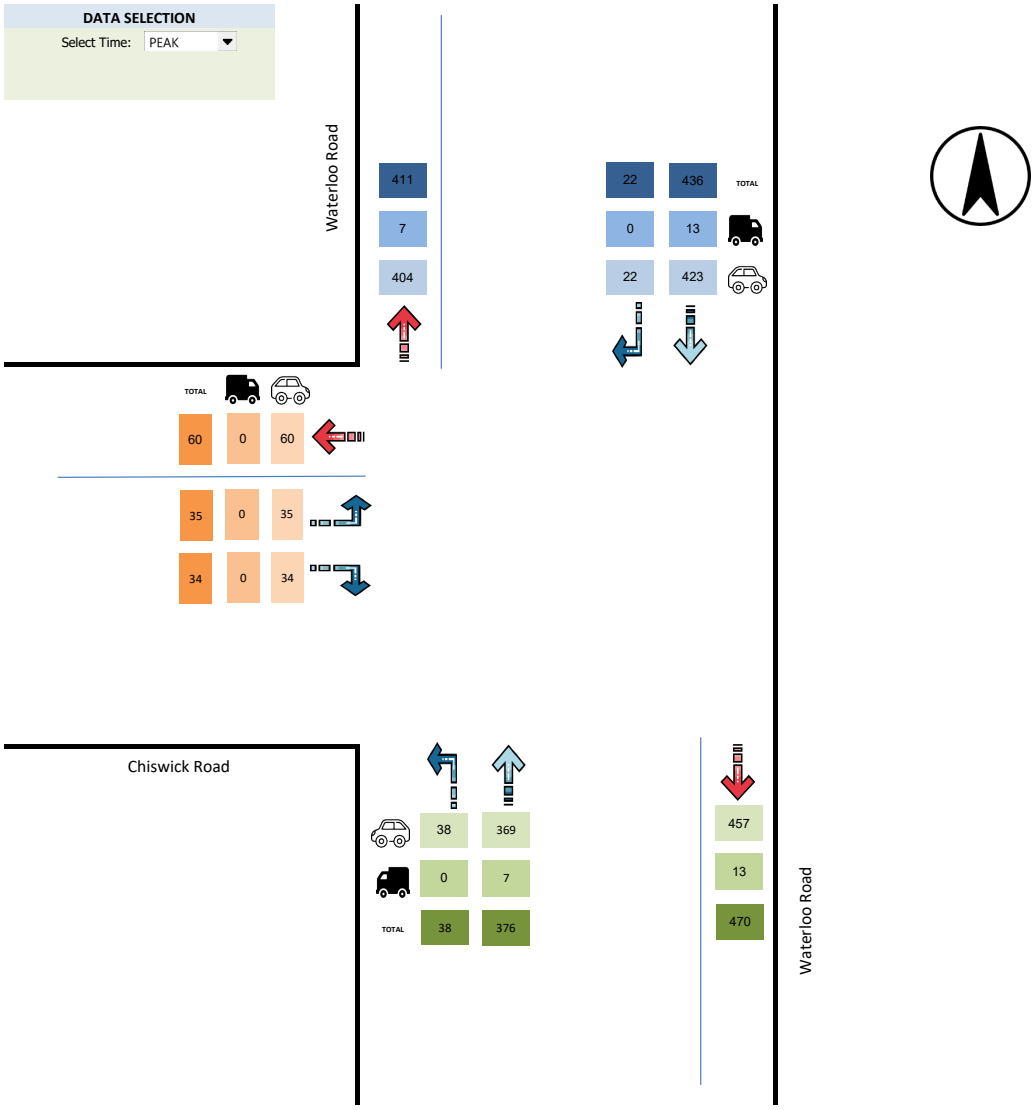
Email info@tistraffic.com.au

Location	**Waterloo Road**	**Duration**	**7:00**	**-**	**09:00**
				-	
	Waterloo Road		**16:00**	**-**	**18:00**
	Chiswick Road	**Date**	**Thursday, 6 February 2025**		
Suburb	**GREENARCE**	**Weather**	**-**		

DATA SELECTION

Select Time: PEAK

TIME RANGE		
PEAK	-	AM
PEAK		
8:00	-	9:00



Traffic Information Specialist

ABN: 42 613 389 923

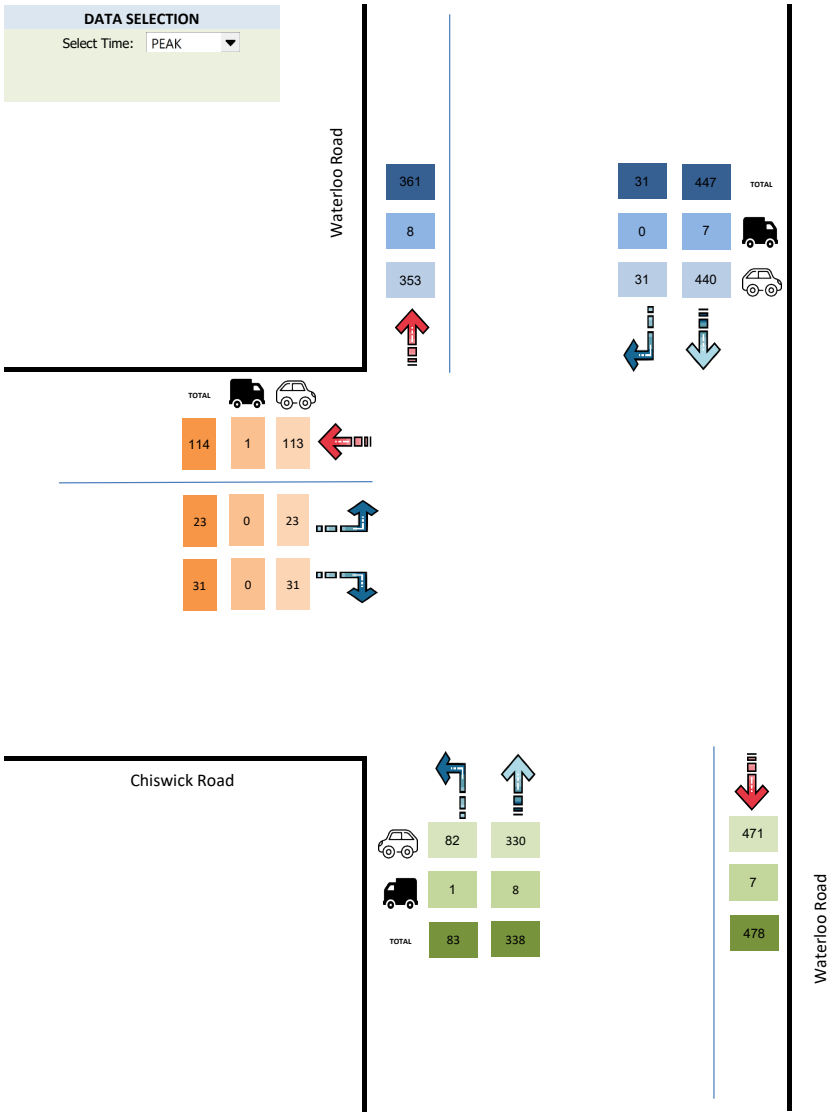
Email info@tistraffic.com.au

Location	**Waterloo Road**	**Duration**	**7:00**	**-**	**09:00**
				-	
	Waterloo Road		**16:00**	**-**	**18:00**
	Chiswick Road	**Date**	**Thursday, 6 February 2025**		
Suburb	**GREENARCE**	**Weather**	**-**		

DATA SELECTION

Select Time: PEAK

TIME RANGE		
PEAK	**-**	**PM**
PEAK		
16:00	**-**	**17:00**



Traffic Information Specialist

ABN: 42 613 389 923

Email info@tistraffic.com.au

Attachment 4

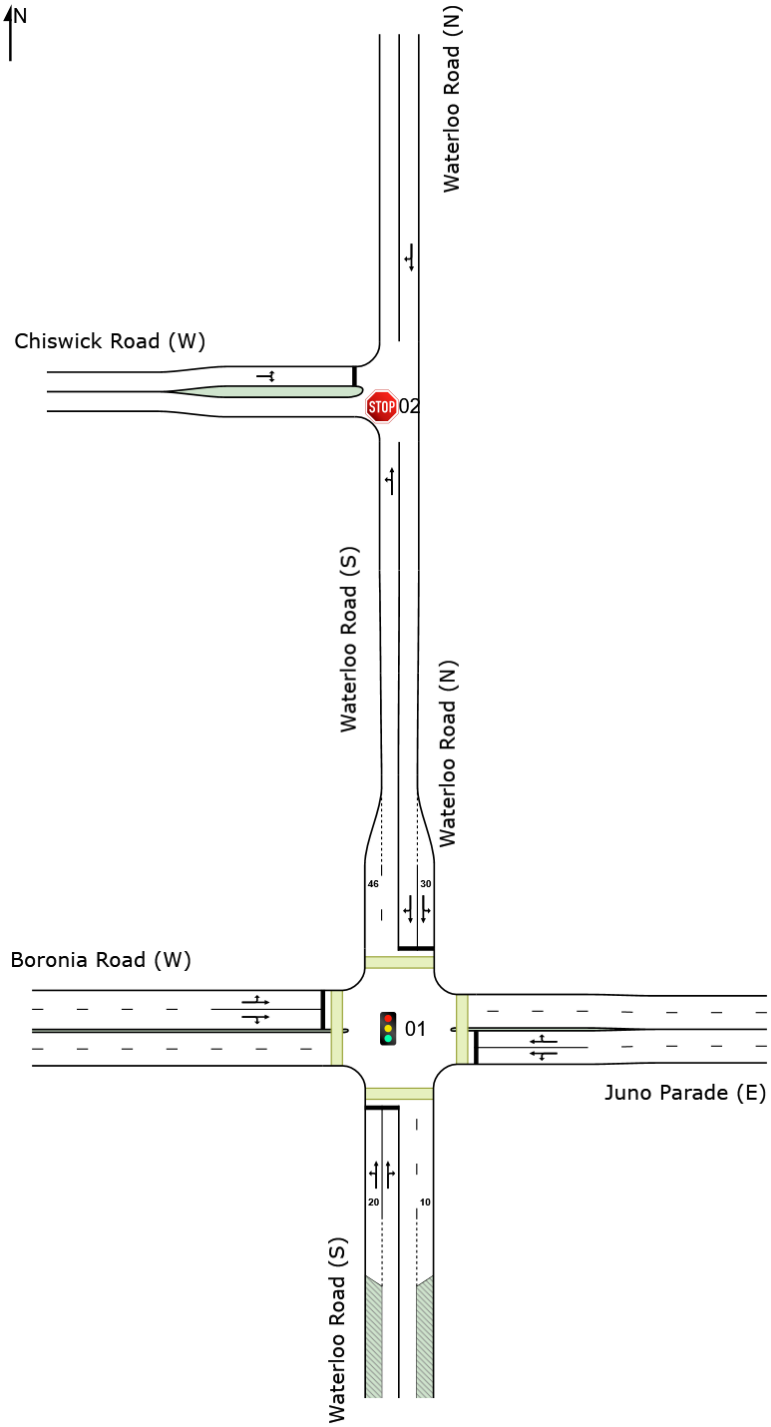
SIDRA Result

NETWORK LAYOUT

Network: N01 [AM Peak (Network Folder: Existing Development)]

AM Peak 8:00am - 9:00am
Network Category: Year 2025

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
01	NA	Waterloo Road | Boronia Road | Juno Parade
02	NA	Waterloo Road | Chiswick Road

MOVEMENT SUMMARY

Site: 01 [Waterloo Road | Boronia Road | Juno Parade (Site Folder: Existing Development - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N01 [AM Peak (Network Folder: Existing Development)]

AM Peak 8:00am - 9:00am
Site Category: Year 2025
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given 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	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Waterloo Road (S)															
1	L2	All MCs	139	2.3	139	2.3	0.639	30.8	LOS C	10.4	74.5	0.84	0.76	0.84	33.6
2	T1	All MCs	236	2.2	236	2.2	0.639	58.4	LOS E	10.4	74.5	0.84	0.76	0.84	24.4
3	R2	All MCs	106	0.0	106	0.0	* 0.662	74.5	LOS F	3.8	26.5	0.98	0.85	1.06	27.0
Approach			481	1.8	481	1.8	0.662	54.0	LOS D	10.4	74.5	0.87	0.78	0.89	23.7
East: Juno Parade (E)															
4	L2	All MCs	81	2.6	81	2.6	0.656	62.6	LOS E	4.9	43.0	1.00	0.84	1.04	26.7
5	T1	All MCs	56	69.8	56	69.8	0.656	53.4	LOS D	4.9	43.0	1.00	0.84	1.04	30.3
6	R2	All MCs	185	1.1	185	1.1	* 0.681	59.6	LOS E	6.5	46.2	1.00	0.84	1.04	20.5
Approach			322	13.4	322	13.4	0.681	59.3	LOS E	6.5	46.2	1.00	0.84	1.04	24.4
North: Waterloo Road (N)															
7	L2	All MCs	111	2.9	111	2.9	0.568	29.9	LOS C	9.3	66.6	0.80	0.73	0.80	32.0
8	T1	All MCs	348	2.4	348	2.4	0.568	45.9	LOS D	9.3	66.6	0.84	0.74	0.84	26.3
9	R2	All MCs	58	5.5	58	5.5	0.568	79.0	LOS F	5.4	38.7	0.93	0.78	0.93	26.5
Approach			517	2.9	517	2.9	0.568	46.2	LOS D	9.3	66.6	0.84	0.75	0.84	24.2
West: Boronia Road (W)															
10	L2	All MCs	42	0.0	42	0.0	* 0.668	50.3	LOS D	10.9	80.1	0.95	0.82	0.95	25.3
11	T1	All MCs	551	7.1	551	7.1	0.668	41.6	LOS C	11.0	81.5	0.95	0.82	0.95	35.2
12	R2	All MCs	89	7.1	89	7.1	0.668	47.4	LOS D	11.0	81.5	0.95	0.82	0.95	30.4
Approach			682	6.6	682	6.6	0.668	42.9	LOS D	11.0	81.5	0.95	0.82	0.95	34.1
All Vehicles			2002	5.6	2002	5.6	0.681	49.1	LOS D	11.0	81.5	0.91	0.79	0.92	27.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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
South: Waterloo Road (S)											
P1	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91

East: Juno Parade (E)										
P2	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
North: Waterloo Road (N)										
P3	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
West: Boronia Road (W)										
P4	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
All Pedestrians		211	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91

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

MOVEMENT SUMMARY

Site: 02 [Waterloo Road | Chiswick Road (Site Folder: Existing Development - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N01 [AM Peak (Network Folder: Existing Development)]

AM Peak 8:00am - 9:00am
Site Category: Year 2025
Stop (Two-Way)

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	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Waterloo Road (S)															
1	L2	All MCs	40	0.0	40	0.0	0.225	5.6	LOS A	0.0	0.0	0.00	0.05	0.00	55.8
2	T1	All MCs	396	1.9	396	1.9	0.225	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.2
Approach			436	1.7	436	1.7	0.225	0.5	NA	0.0	0.0	0.00	0.05	0.00	58.8
North: Waterloo Road (N)															
8	T1	All MCs	459	3.0	459	3.0	0.257	0.2	LOS A	0.1	0.8	0.07	0.08	0.07	58.9
9	R2	All MCs	23	0.0	23	0.0	0.257	7.5	LOS A	0.1	0.8	0.07	0.08	0.07	52.5
Approach			482	2.8	482	2.8	0.257	0.5	NA	0.1	0.8	0.07	0.08	0.07	58.2
West: Chiswick Road (W)															
10	L2	All MCs	37	0.0	37	0.0	0.118	9.3	LOS A	0.2	1.2	0.55	0.92	0.55	45.6
12	R2	All MCs	36	0.0	36	0.0	0.118	13.7	LOS A	0.2	1.2	0.55	0.92	0.55	39.1
Approach			73	0.0	73	0.0	0.118	11.5	LOS A	0.2	1.2	0.55	0.92	0.55	43.2
All Vehicles			991	2.1	991	2.1	0.257	1.3	NA	0.2	1.2	0.07	0.13	0.07	56.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

MOVEMENT SUMMARY

Site: 01 [Waterloo Road | Boronia Road | Juno Parade (Site Folder: Existing Development - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [PM Peak (Network Folder: Existing Development)]

PM Peak 16:00pm - 17:00pm
Site Category: Year 2025
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given 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	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Waterloo Road (S)															
1	L2	All MCs	93	1.1	93	1.1	0.527	29.4	LOS C	7.4	53.8	0.84	0.74	0.84	32.6
2	T1	All MCs	193	5.5	193	5.5	0.527	60.8	LOS E	7.4	53.8	0.85	0.74	0.85	22.7
3	R2	All MCs	72	1.5	72	1.5	* 0.527	80.4	LOS F	3.2	22.7	0.97	0.79	0.97	26.9
Approach			357	3.5	357	3.5	0.527	56.6	LOS E	7.4	53.8	0.87	0.75	0.87	22.8
East: Juno Parade (E)															
4	L2	All MCs	63	3.3	63	3.3	0.538	59.9	LOS E	4.4	36.2	0.97	0.79	0.97	27.5
5	T1	All MCs	69	37.9	69	37.9	* 0.538	50.9	LOS D	5.2	37.0	0.97	0.79	0.97	31.3
6	R2	All MCs	149	0.7	149	0.7	0.538	56.7	LOS E	5.2	37.0	0.97	0.80	0.97	21.2
Approach			282	10.4	282	10.4	0.538	56.0	LOS D	5.2	37.0	0.97	0.80	0.97	25.8
North: Waterloo Road (N)															
7	L2	All MCs	94	2.2	94	2.2	0.548	34.2	LOS C	8.3	59.2	0.84	0.75	0.84	30.1
8	T1	All MCs	311	2.7	311	2.7	0.548	52.3	LOS D	8.3	59.2	0.88	0.76	0.88	25.0
9	R2	All MCs	45	0.0	45	0.0	0.548	83.6	LOS F	5.1	36.5	0.95	0.78	0.95	25.7
Approach			449	2.3	449	2.3	0.548	51.7	LOS D	8.3	59.2	0.88	0.76	0.88	23.0
West: Boronia Road (W)															
10	L2	All MCs	49	0.0	49	0.0	* 0.536	43.0	LOS D	9.8	70.2	0.87	0.76	0.87	27.9
11	T1	All MCs	531	3.4	531	3.4	0.536	34.6	LOS C	10.0	71.3	0.87	0.76	0.87	37.7
12	R2	All MCs	100	1.1	100	1.1	0.536	40.4	LOS C	10.0	71.3	0.87	0.77	0.87	32.2
Approach			680	2.8	680	2.8	0.536	36.1	LOS C	10.0	71.3	0.87	0.77	0.87	36.3
All Vehicles			1768	4.0	1768	4.0	0.548	47.4	LOS D	10.0	71.3	0.89	0.77	0.89	28.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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
South: Waterloo Road (S)											
P1	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91

East: Juno Parade (E)										
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
North: Waterloo Road (N)										
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
West: Boronia Road (W)										
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91

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

MOVEMENT SUMMARY

Site: 02 [Waterloo Road | Chiswick Road (Site Folder: Existing Development - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [PM Peak (Network Folder: Existing Development)]

PM Peak 16:00pm - 17:00pm
Site Category: Year 2025
Stop (Two-Way)

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	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Waterloo Road (S)															
1	L2	All MCs	87	1.2	87	1.2	0.230	5.6	LOS A	0.0	0.0	0.00	0.12	0.00	55.0
2	T1	All MCs	356	2.4	356	2.4	0.230	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	58.4
Approach			443	2.1	443	2.1	0.230	1.1	NA	0.0	0.0	0.00	0.12	0.00	57.7
North: Waterloo Road (N)															
8	T1	All MCs	471	1.6	471	1.6	0.269	0.2	LOS A	0.2	1.1	0.10	0.11	0.10	58.5
9	R2	All MCs	33	0.0	33	0.0	0.269	7.6	LOS A	0.2	1.1	0.10	0.11	0.10	52.4
Approach			503	1.5	503	1.5	0.269	0.7	NA	0.2	1.1	0.10	0.11	0.10	57.7
West: Chiswick Road (W)															
10	L2	All MCs	24	0.0	24	0.0	0.099	9.0	LOS A	0.1	1.0	0.56	0.92	0.56	45.4
12	R2	All MCs	33	0.0	33	0.0	0.099	13.9	LOS A	0.1	1.0	0.56	0.92	0.56	38.8
Approach			57	0.0	57	0.0	0.099	11.8	LOS A	0.1	1.0	0.56	0.92	0.56	42.5
All Vehicles			1003	1.7	1003	1.7	0.269	1.5	NA	0.2	1.1	0.08	0.16	0.08	56.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

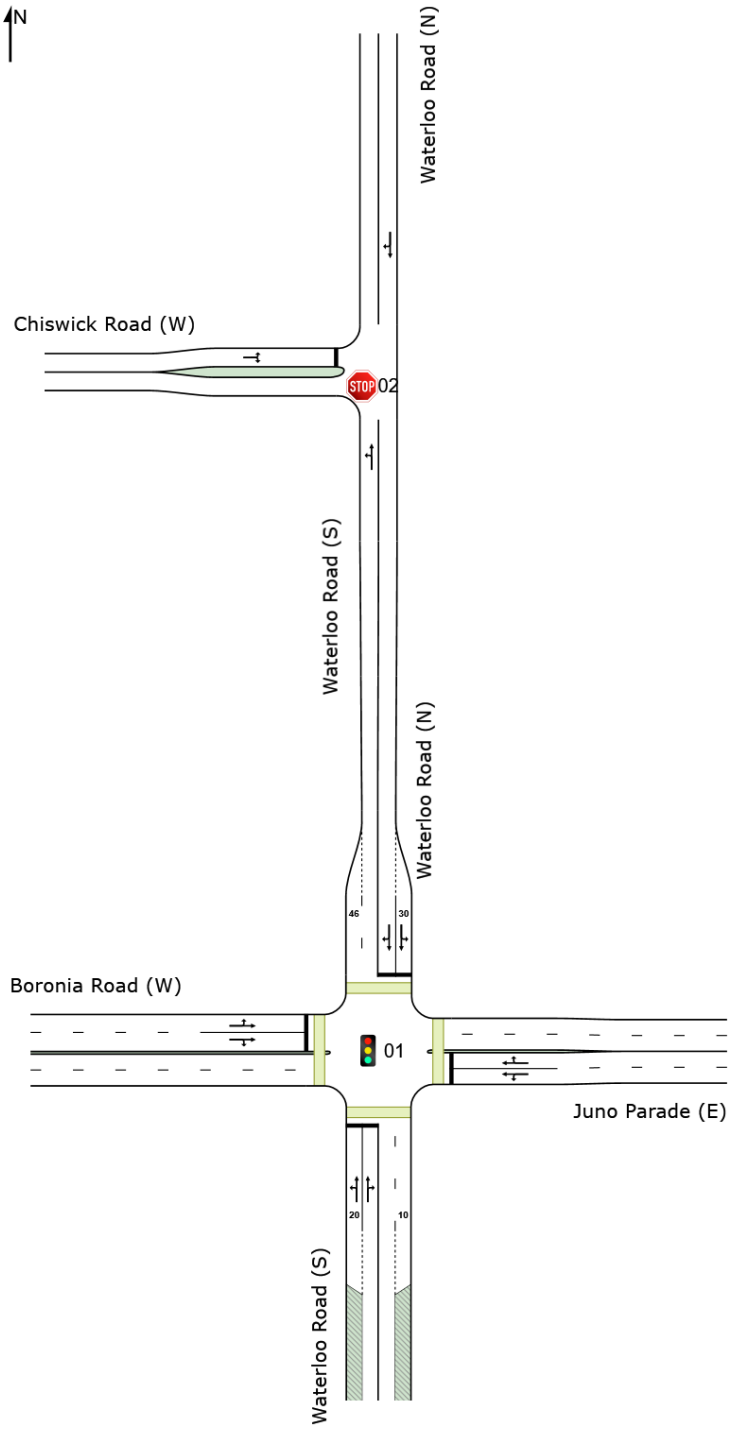
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

NETWORK LAYOUT

Network: N101 [PM Peak (Network Folder: Existing Development)]

PM Peak 16:00pm - 17:00pm
Network Category: Year 2025

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



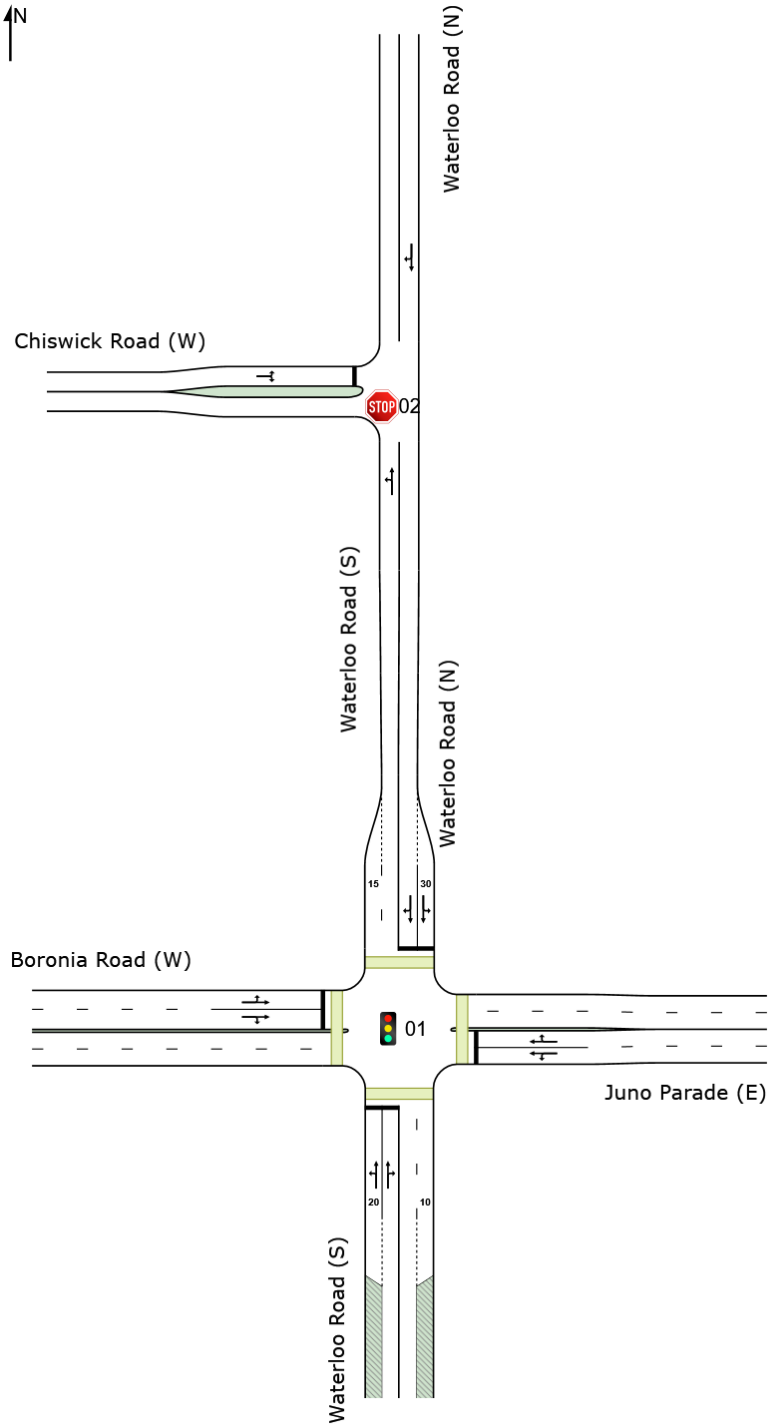
SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
01	NA	Waterloo Road | Boronia Road | Juno Parade
02	NA	Waterloo Road | Chiswick Road

NETWORK LAYOUT

Network: N01 [AM Peak (Network Folder: Post Development)]

AM Peak 8:00am - 9:00am
Network Category: Year 2025

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
01	NA	Waterloo Road | Boronia Road | Juno Parade
02	NA	Waterloo Road | Chiswick Road

MOVEMENT SUMMARY

Site: 01 [Waterloo Road | Boronia Road | Juno Parade (Site Folder: Post Development - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N01 [AM Peak (Network Folder: Post Development)]

AM Peak 8:00am - 9:00am
Site Category: Year 2025
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given 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	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Waterloo Road (S)															
1	L2	All MCs	139	2.3	139	2.3	0.644	30.9	LOS C	10.6	75.3	0.84	0.76	0.84	33.6
2	T1	All MCs	239	2.2	239	2.2	0.644	58.6	LOS E	10.6	75.3	0.84	0.76	0.84	24.4
3	R2	All MCs	106	0.0	106	0.0	* 0.674	75.0	LOS F	3.8	26.7	0.98	0.86	1.08	26.9
Approach			484	1.7	484	1.7	0.674	54.3	LOS D	10.6	75.3	0.87	0.78	0.89	23.7
East: Juno Parade (E)															
4	L2	All MCs	81	2.6	81	2.6	0.656	62.6	LOS E	4.9	43.0	1.00	0.84	1.04	26.7
5	T1	All MCs	56	69.8	56	69.8	0.656	53.4	LOS D	4.9	43.0	1.00	0.84	1.04	30.3
6	R2	All MCs	188	1.1	188	1.1	* 0.693	59.9	LOS E	6.7	47.2	1.00	0.84	1.05	20.4
Approach			325	13.3	325	13.3	0.693	59.5	LOS E	6.7	47.2	1.00	0.84	1.05	24.3
North: Waterloo Road (N)															
7	L2	All MCs	117	2.7	117	2.7	0.605	31.3	LOS C	10.0	71.6	0.82	0.74	0.82	31.8
8	T1	All MCs	355	2.4	355	2.4	0.605	47.5	LOS D	10.0	71.6	0.86	0.76	0.86	26.2
9	R2	All MCs	64	4.9	64	4.9	0.605	79.4	LOS F	5.5	39.4	0.94	0.79	0.94	26.3
Approach			536	2.8	536	2.8	0.605	47.8	LOS D	10.0	71.6	0.86	0.76	0.86	23.9
West: Boronia Road (W)															
10	L2	All MCs	45	0.0	45	0.0	* 0.671	50.3	LOS D	10.9	80.5	0.95	0.82	0.95	25.2
11	T1	All MCs	551	7.1	551	7.1	0.671	41.6	LOS C	11.0	82.0	0.95	0.82	0.95	35.2
12	R2	All MCs	89	7.1	89	7.1	0.671	47.4	LOS D	11.0	82.0	0.95	0.82	0.95	30.4
Approach			685	6.6	685	6.6	0.671	43.0	LOS D	11.0	82.0	0.95	0.82	0.95	34.0
All Vehicles			2031	5.5	2031	5.5	0.693	49.6	LOS D	11.0	82.0	0.91	0.80	0.93	27.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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
South: Waterloo Road (S)											
P1	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91

East: Juno Parade (E)										
P2 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
North: Waterloo Road (N)										
P3 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
West: Boronia Road (W)										
P4 Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
All Pedestrians	211	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91

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

MOVEMENT SUMMARY

Site: 02 [Waterloo Road | Chiswick Road (Site Folder: Post Development - AM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N01 [AM Peak (Network Folder: Post Development)]

AM Peak 8:00am - 9:00am
Site Category: Year 2025
Stop (Two-Way)

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	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Waterloo Road (S)															
1	L2	All MCs	40	0.0	40	0.0	0.228	5.6	LOS A	0.0	0.0	0.00	0.05	0.00	55.8
2	T1	All MCs	402	1.8	402	1.8	0.228	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.2
Approach			442	1.7	442	1.7	0.228	0.5	NA	0.0	0.0	0.00	0.05	0.00	58.9
North: Waterloo Road (N)															
8	T1	All MCs	462	3.0	462	3.0	0.258	0.2	LOS A	0.1	0.8	0.07	0.08	0.07	58.9
9	R2	All MCs	23	0.0	23	0.0	0.258	7.6	LOS A	0.1	0.8	0.07	0.08	0.07	52.5
Approach			485	2.8	485	2.8	0.258	0.5	NA	0.1	0.8	0.07	0.08	0.07	58.2
West: Chiswick Road (W)															
10	L2	All MCs	37	0.0	37	0.0	0.119	9.3	LOS A	0.2	1.2	0.56	0.92	0.56	45.6
12	R2	All MCs	36	0.0	36	0.0	0.119	13.8	LOS A	0.2	1.2	0.56	0.92	0.56	39.0
Approach			73	0.0	73	0.0	0.119	11.6	LOS A	0.2	1.2	0.56	0.92	0.56	43.2
All Vehicles			1000	2.1	1000	2.1	0.258	1.3	NA	0.2	1.2	0.07	0.13	0.07	56.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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

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

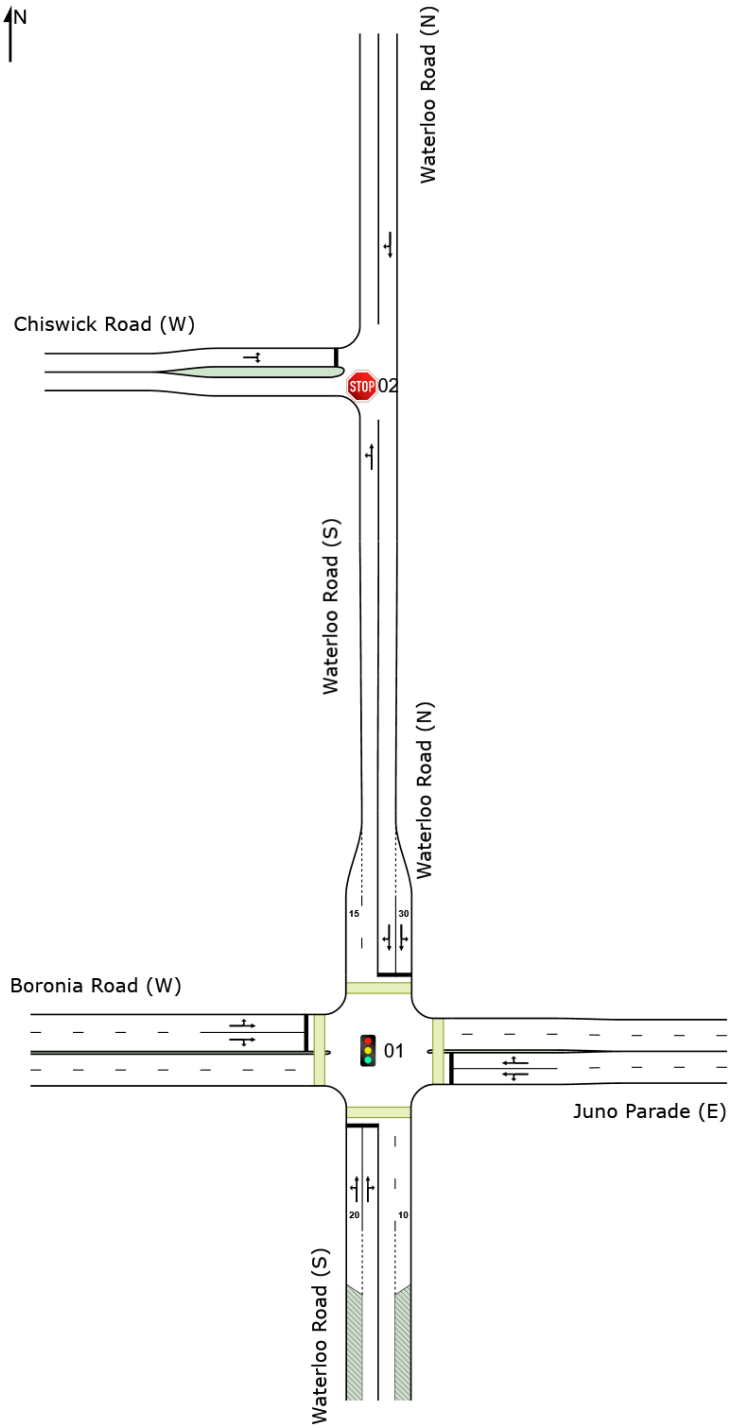
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

NETWORK LAYOUT

Network: N101 [PM Peak (Network Folder: Post Development)]

PM Peak 16:00pm - 17:00pm
Network Category: Year 2025

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
01	NA	Waterloo Road | Boronia Road | Juno Parade
02	NA	Waterloo Road | Chiswick Road

MOVEMENT SUMMARY

Site: 01 [Waterloo Road | Boronia Road | Juno Parade (Site Folder: Post Development - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [PM Peak (Network Folder: Post Development)]

PM Peak 16:00pm - 17:00pm
Site Category: Year 2025
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given 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	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Waterloo Road (S)															
1	L2	All MCs	93	1.1	93	1.1	0.518	29.1	LOS C	7.5	54.3	0.82	0.73	0.82	33.1
2	T1	All MCs	200	5.3	200	5.3	0.518	57.9	LOS E	7.5	54.3	0.83	0.73	0.83	23.2
3	R2	All MCs	72	1.5	72	1.5	0.518	79.9	LOS F	3.1	22.0	0.97	0.78	0.97	26.9
Approach			364	3.5	364	3.5	0.518	54.9	LOS D	7.5	54.3	0.85	0.74	0.85	23.0
East: Juno Parade (E)															
4	L2	All MCs	63	3.3	63	3.3	0.550	60.1	LOS E	4.5	37.2	0.97	0.79	0.97	27.5
5	T1	All MCs	69	37.9	69	37.9	* 0.550	51.0	LOS D	5.4	37.8	0.97	0.79	0.97	31.3
6	R2	All MCs	157	0.7	157	0.7	0.550	56.8	LOS E	5.4	37.8	0.97	0.81	0.97	21.1
Approach			289	10.2	289	10.2	0.550	56.1	LOS D	5.4	37.8	0.97	0.80	0.97	25.6
North: Waterloo Road (N)															
7	L2	All MCs	98	2.2	98	2.2	0.560	33.3	LOS C	8.8	63.0	0.84	0.75	0.84	30.6
8	T1	All MCs	315	2.7	315	2.7	0.560	51.3	LOS D	8.8	63.0	0.88	0.76	0.88	25.2
9	R2	All MCs	49	0.0	49	0.0	* 0.560	89.3	LOS F	5.0	35.3	0.97	0.79	0.97	24.9
Approach			462	2.3	462	2.3	0.560	51.5	LOS D	8.8	63.0	0.88	0.76	0.88	23.0
West: Boronia Road (W)															
10	L2	All MCs	57	0.0	57	0.0	* 0.572	44.9	LOS D	10.2	72.9	0.89	0.78	0.89	27.0
11	T1	All MCs	531	3.4	531	3.4	0.572	36.5	LOS C	10.4	74.4	0.89	0.78	0.89	36.9
12	R2	All MCs	100	1.1	100	1.1	0.572	42.3	LOS C	10.4	74.4	0.89	0.79	0.89	31.7
Approach			687	2.8	687	2.8	0.572	38.1	LOS C	10.4	74.4	0.89	0.78	0.89	35.5
All Vehicles			1803	4.0	1803	4.0	0.572	47.8	LOS D	10.4	74.4	0.89	0.77	0.89	27.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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	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
South: Waterloo Road (S)											
P1	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91

East: Juno Parade (E)										
P2	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
North: Waterloo Road (N)										
P3	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
West: Boronia Road (W)										
P4	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91
All Pedestrians		211	54.3	LOS E	0.2	0.2	0.95	0.95	220.9	200.0	0.91

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

MOVEMENT SUMMARY

Site: 02 [Waterloo Road | Chiswick Road (Site Folder: Post Development - PM Peak)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [PM Peak (Network Folder: Post Development)]

PM Peak 16:00pm - 17:00pm
Site Category: Year 2025
Stop (Two-Way)

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	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Waterloo Road (S)															
1	L2	All MCs	87	1.2	87	1.2	0.232	5.6	LOS A	0.0	0.0	0.00	0.12	0.00	55.0
2	T1	All MCs	360	2.3	360	2.3	0.232	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	58.4
Approach			447	2.1	447	2.1	0.232	1.1	NA	0.0	0.0	0.00	0.12	0.00	57.7
North: Waterloo Road (N)															
8	T1	All MCs	478	1.5	478	1.5	0.273	0.2	LOS A	0.2	1.2	0.09	0.10	0.09	58.5
9	R2	All MCs	33	0.0	33	0.0	0.273	7.6	LOS A	0.2	1.2	0.09	0.10	0.09	52.4
Approach			511	1.4	511	1.4	0.273	0.7	NA	0.2	1.2	0.09	0.10	0.09	57.7
West: Chiswick Road (W)															
10	L2	All MCs	24	0.0	24	0.0	0.101	9.1	LOS A	0.1	1.0	0.56	0.92	0.56	45.4
12	R2	All MCs	33	0.0	33	0.0	0.101	14.0	LOS A	0.1	1.0	0.56	0.92	0.56	38.7
Approach			57	0.0	57	0.0	0.101	11.9	LOS A	0.1	1.0	0.56	0.92	0.56	42.4
All Vehicles			1015	1.7	1015	1.7	0.273	1.5	NA	0.2	1.2	0.08	0.16	0.08	56.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

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