



# Traffic Impact Assessment

3 Brookvale Avenue, Brookvale  
NSW 2100

March 2021



**Type of Assessment:** Traffic Impact Assessment

**Site Location:** 3 Brookvale Avenue, Brookvale NSW 2100

**Prepared for:** Barry Rush and Associates

**Prepared by:** APEX Engineers

ABN 52 487 919 980

[www.apexengineers.com.au](http://www.apexengineers.com.au)

## Disclaimer

This report has been prepared on the basis of information available at the date of publication. APEX Engineers will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person relying on information in this report. Reproduction of this report or any part is not permitted without prior written consent of APEX Engineers.

© Copyright 2021 by APEX Engineers

## TABLE OF CONTENTS

1. Introduction.....	4
2. Background and Existing Conditions.....	4
2.1 Site Description and Local Road Network .....	4
2.2 Details of the Proposed Development.....	6
2.3 Public Transport Services .....	6
3. Parking Provision Assessment .....	7
4. Car Parking Design Review .....	8
4.1 Car Spaces.....	8
4.2 Lateral Clearances.....	8
4.3 Ramp Width and Grade.....	8
4.4 Headroom Clearance .....	9
4.5 Gradients within Parking Modules.....	10
4.6 Gradient of Access Driveway .....	10
4.7 Circulation / Vehicle Conflicts.....	10
4.7 Vehicle Manoeuvrability Conditions.....	10
4.8 Pedestrian Sight Distance Availability .....	13
5. Traffic Impact Assessment .....	15
6. Conclusions .....	16

## LIST OF FIGURES AND TABLES

Figure 1: Location of the subject site .....	5
Figure 2: Brookvale Avenue as seen at the site frontage .....	5
Figure 3: Public transport map for the site vicinity .....	6
Figure 4: Council DCP parking rates .....	7
Table 1: Statutory parking provision requirement for the subject proposal .....	7
Figure 5: Template of an 85 <sup>th</sup> percentile vehicle (as per AS2890.1-2004) .....	11
Figure 6: Entry movement into car space 4.....	12
Figure 7: Exit movement from car space 4.....	12
Figure 8: Movement of vehicles in opposite directions .....	13
Figure 9: Pedestrian sight distance requirement (AS 2890.1) .....	13
Figure 10: Proposed preservation of pedestrian sight distance.....	14

## 1. INTRODUCTION

APEX Engineers were engaged by Barry Rush and Associates to provide a Traffic Impact Assessment as a part of the development application for the proposed residential flat building at 3 Brookvale Avenue in Brookvale.

This report is structured into the following sections:

- **Section 2** Describes the existing transport conditions in the locality and provides an overview of the proposed development;
- **Section 3** Assesses the statutory parking provision requirements applicable for the subject development;
- **Section 4** Provides a review of the proposed car park design in accordance with the relevant Australian Standards;
- **Section 5** Provides an estimate of the peak period traffic impact anticipated to be generated by the proposed development on the surrounding local road network; and
- **Section 6** Provides the summary and conclusions of the study.

## 2. BACKGROUND AND EXISTING CONDITIONS

### 2.1 Site Description and Local Road Network

The subject site is located at 3 Brookvale Avenue in Brookvale, within a predominantly residential area (zoned R3: Medium Density Residential under the Warringah Local Environmental Plan 2011). At the site frontage, Brookvale Avenue is a local access road (no through road) with a cul-de-sac end approximately 200m to the west of the subject site.

**Figure 1** highlights the site location from an aerial perspective.

**Figure 2** illustrates Brookvale Avenue as seen at the site frontage.





Figure 1: Location of the subject site



Figure 2: Brookvale Avenue as seen at the site frontage



## 2.2 Details of the Proposed Development

The subject proposal involves demolition of the existing residential dwelling and construction of a 4 residential unit (all 3-bedroom) building within the subject site. It will provide 9 on-site car parking spaces within the basement level with access off Brookvale Avenue.

## 2.3 Public Transport Services

The locality of the subject site was assessed for public transport options likely to be utilised by prospective tenants. This assessment identified that the site lies within comfortable walking distance to a number of bus routes which are serviced at bus stops on Pittwater Road (500m from the subject site, 6-minute walk). Prospective tenants will be able to carry out most non-local trips through these options, thus reducing the propensity to drive.

Figure 3 below illustrates the public transport map for the subject site area, outlining the coverage of the local bus services.

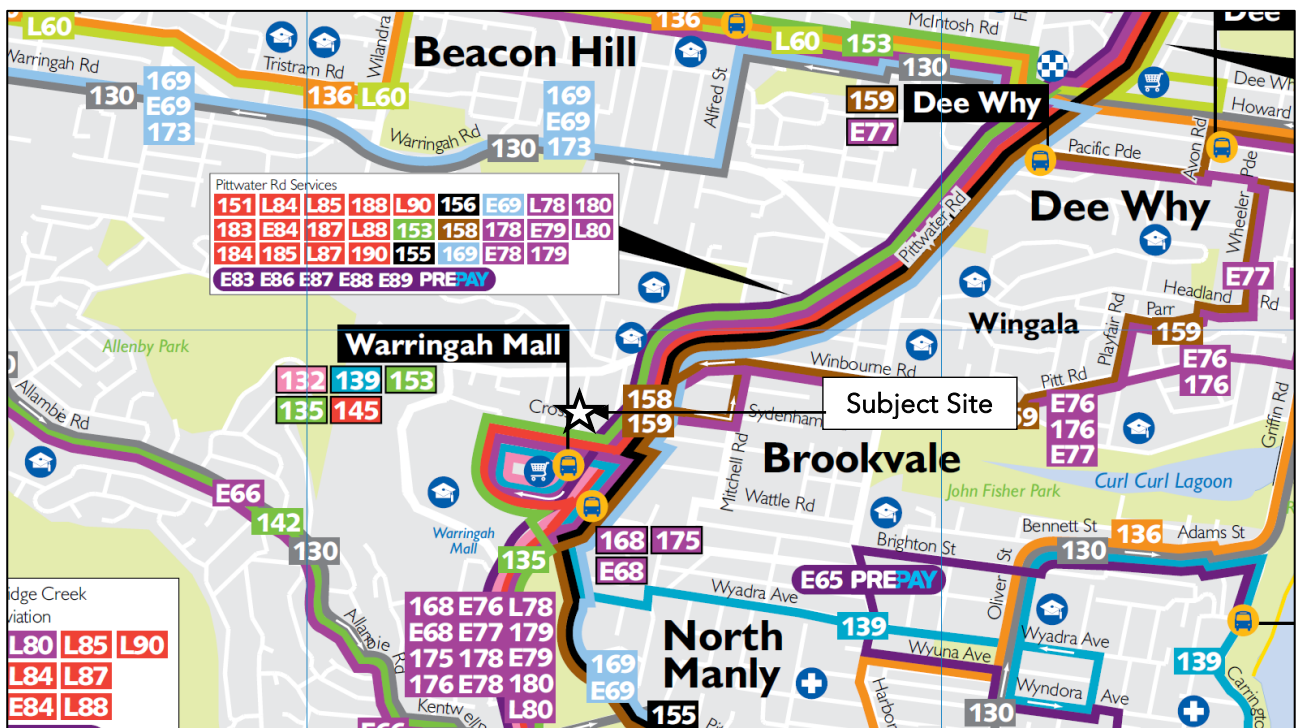


Figure 3: Public transport map for the site vicinity

### 3. PARKING PROVISION ASSESSMENT

The car parking provision requirements for the proposed development were determined in accordance with the rates provided in Appendix 1 of the Car Parking Chapter in the Warringah Development Control Plan (Part H Appendices – Requirements), for multi-dwelling housing developments (as shown below in **Figure 4**).

Multi-dwelling housing, Residential flat buildings, Serviced apartments (including holiday flats), Shop-top housing (residential component)	<b>General:</b> <ul style="list-style-type: none"> <li>• 1 space per 1 bedroom dwelling</li> <li>• 1.2 spaces per 2 bedroom dwelling</li> <li>• 1.5 spaces per 3 bedroom dwelling</li> <li>• 1 visitor space per 5 units or part of dwellings</li> </ul>
---	--

Figure 4: Council DCP parking rates

The following table outlines the proposed car parking provisions against the DCP car parking requirements.

Table 1: Statutory parking provision requirement for the subject proposal

Component	Number proposed	Statutory parking rate	Parking spaces required
Residential	4 x 3-Bedroom dwellings	1.5 spaces per 3-bedroom unit	6
Visitors	All 4 residential dwellings considered	1 visitor space per 5 units	1
<b>Total car spaces required</b>			<b>7</b>

As per the information presented in the table above, the overall development includes a statutory car parking provision requirement of 7 car parking spaces (6 car spaces for residents and 1 car space for visitors). The subject proposal includes provision of 9 car parking spaces (2 car spaces per residential unit x 4 units + 1 visitor space). Accordingly, the proposed on-site car parking provision satisfies the relevant statutory car parking provision requirement for the subject proposal.

## **4. CAR PARKING DESIGN REVIEW**

This section will carry out the necessary checks to certify whether the car parking area (provided within the basement level) have been designed to satisfy the minimum requirements outlined by the Australian Standards (AS 2890.1:2004). This section shall be read in conjunction with the complete site layout plans submitted as a part of the Development Application lodgement.

### **4.1 Car Spaces**

The proposed car spaces can be categorised under user class 1A (residential/domestic parking) in AS 2890.1:2004. The minimum dimensional requirements stipulated in the AS 2890.1:2004 for user class 1A car spaces are - 2.4m width, 5.4m length and 5.8m aisle width. The proposed car spaces comply with the above identified minimum dimensions.

### **4.2 Lateral Clearances**

At blind aisles (end of aisle), AS 2890.1 requires the aisle to be extended by an additional 1m in order to allow reverse exit manoeuvres by the vehicles parked in the corner spaces. This required 1m extension is available within the proposed design (adjacent to car spaces 1 and 4).

When car spaces are located adjacent to vertical obstructions (>150mm high), a further 300mm clearance is required for the car space width for door opening. This requirement has been satisfied at car spaces 1, 3, 4, 6 and 9 which are located adjacent to walls.

### **4.3 Ramp Width and Grade**

AS 2890.1-2004 states the grade requirements for straight ramps at private or residential car parks as follows:

- (i) Longer than 20 m—1 in 5 (20%) maximum.
- (ii) Up to 20 m long—1 in 4 (25%) maximum. The allowable 20 m maximum length shall include any parts of grade change transitions at each end that exceed 1 in 5 (20%).



(iii) A stepped ramp comprising a series of lengths each exceeding 1 in 5 (20%) grade shall have each two lengths separated by a grade of not more than 1 in 8 (12½%) and at least 10 m long.

Furthermore, where the difference in grade between two sections of ramp or floor is greater than 1:8 (12.5 percent) for a summit grade change, or greater than 1:6.7 (15 percent) for a sag grade change, the ramp must include a transition section of at least 2 metres to prevent vehicles scraping or bottoming.

The length of the proposed ramp is less than 20m (for sections exceeding 20% grade) and it includes a maximum grade of 25% - thus complying with the AS 2890.1 requirements. This 25% graded section of the ramp includes 2m lengths of transition sections (graded at 12.5%) on either end, thus complying with the grade transition requirements.

The proposed ramp into the basement car park is a one-way ramp. The minimum ramp width requirement, for straight sections, as per AS 2890.1:2004 is 3m. Additionally, AS 2890.1 also stipulates:

*Where there is to be a kerb or barrier higher than 150 mm and closer than 300 mm from one edge of the roadway or ramp, the roadway or ramp shall be widened to provide a minimum of 300 mm clearance to the obstruction. If there is to be a high kerb or barrier on both sides, the width increase shall be sufficient to provide 300 mm on both sides.*

Accordingly, the proposed one-way ramp is designed at 3.6m width (3m ramp width + 300mm clearance on either side).

#### **4.4 Headroom Clearance**

For the proposed basement level car parking area, the design vehicle is a typical passenger car – this vehicle requires a headroom of 2.2m minimum (above the car space and along the path of vehicles to and from the spaces). This required vertical clearance is available throughout the proposed car parking area including along the ramp.

#### **4.5 Gradients within Parking Modules**

AS 2890.1 stipulates that parking modules, at maximum, should have a grade of 1 in 16 (measured in any direction other than parallel to the angle of parking). The proposed car parking spaces are at grade and therefore comply with the above requirements.

#### **4.6 Gradient of Access Driveway**

In relation to the gradient of the access driveway, AS 2890.1 requires the first 6m into the car park to include a maximum grade of 5% (1 in 20). The first 6m into the proposed car park (the driveway into the subject site) has been graded at 5%.

#### **4.7 Circulation / Vehicle Conflicts**

The proposed access to the car parking area is categorised under access category 1 (1A facility, <25 car spaces, frontage road local). Therefore, the entry/exit combined access points should provide at least 3m width. While AS 2890.1 recommends provision of a passing bay for driveways longer than 30m (the proposed driveway ramp is just over 30m long), this provision has not been made in the design due to other constraints. As such, an operational measure is proposed to manage conflicting movements of vehicles along the ramp. In particular, a sign can be provided at the ramp landing (along with a line marked waiting bay) to notify the motorists exiting the basement level to give way to those entering the car park. A convex safety mirror can be mounted to the wall at the ramp landing. Given the straight alignment of the ramp, facilitated by the convex safety mirror, the motorists in conflicting directions should have the ability to perceive each other conveniently. **Figure 8** shows the swept path for the above scenario, where a vehicle gives way at the ramp landing to another vehicle entering the car park. As can be seen, there is sufficient space at the ramp landing for a vehicle to wait while another vehicle enters the car park.

#### **4.7 Vehicle Manoeuvrability Conditions**

In order to investigate the anticipated manoeuvrability conditions of a vehicle, at a critical car space, swept path assessments were undertaken using AutoTURN software (the industry standard vehicle swept path assessment software). The following figure illustrates

the template of the 85<sup>th</sup> percentile vehicle (B85 vehicle) used to simulate the swept paths (it is noted that this 85<sup>th</sup> percentile vehicle template is developed according to the dimensions specified in AS 2890.1-2004).

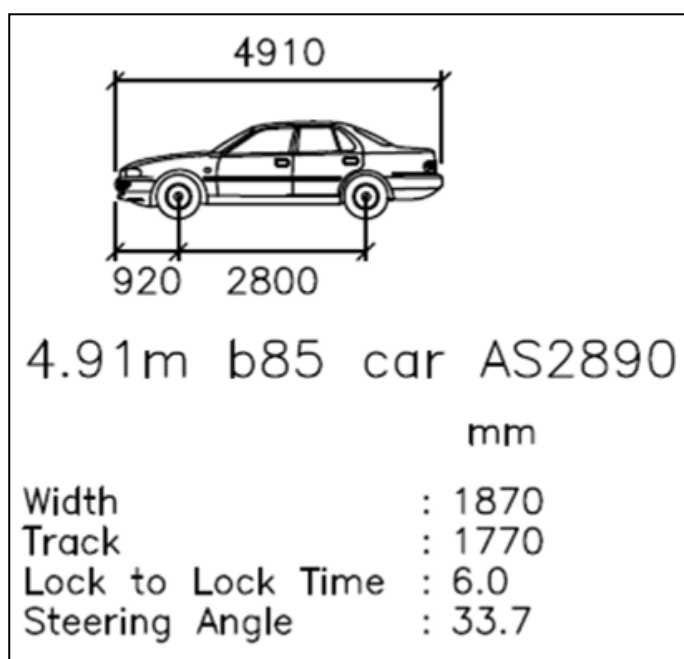
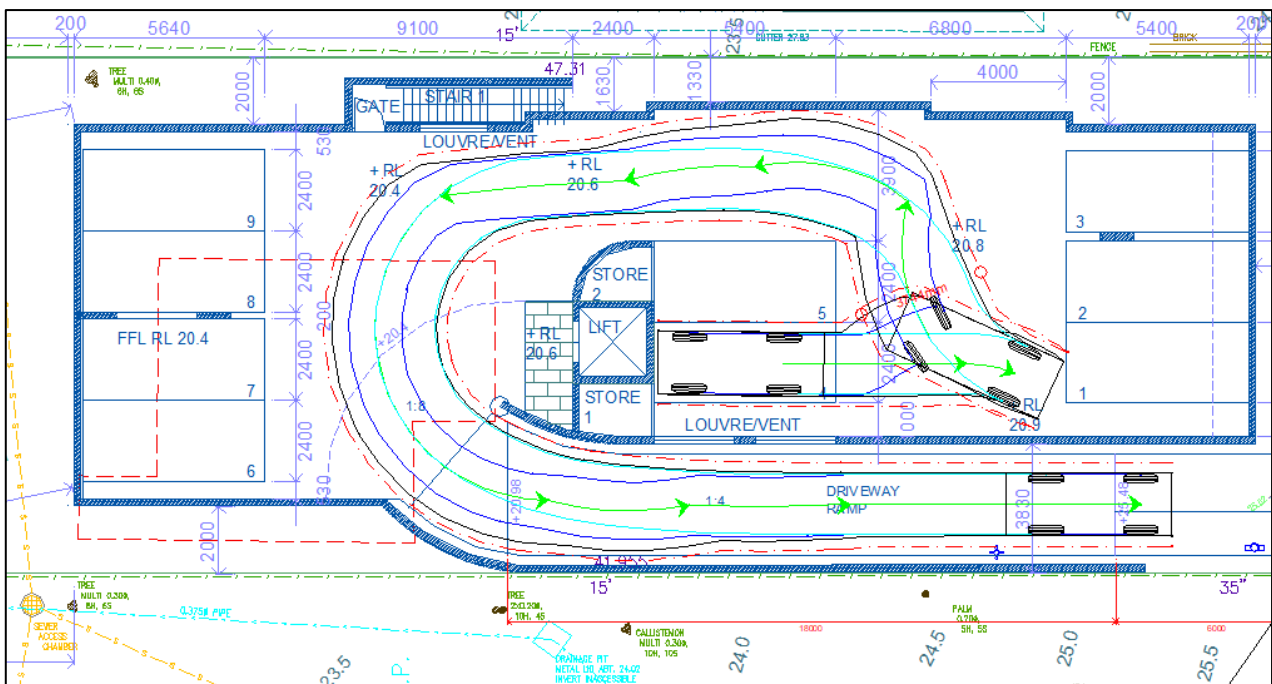
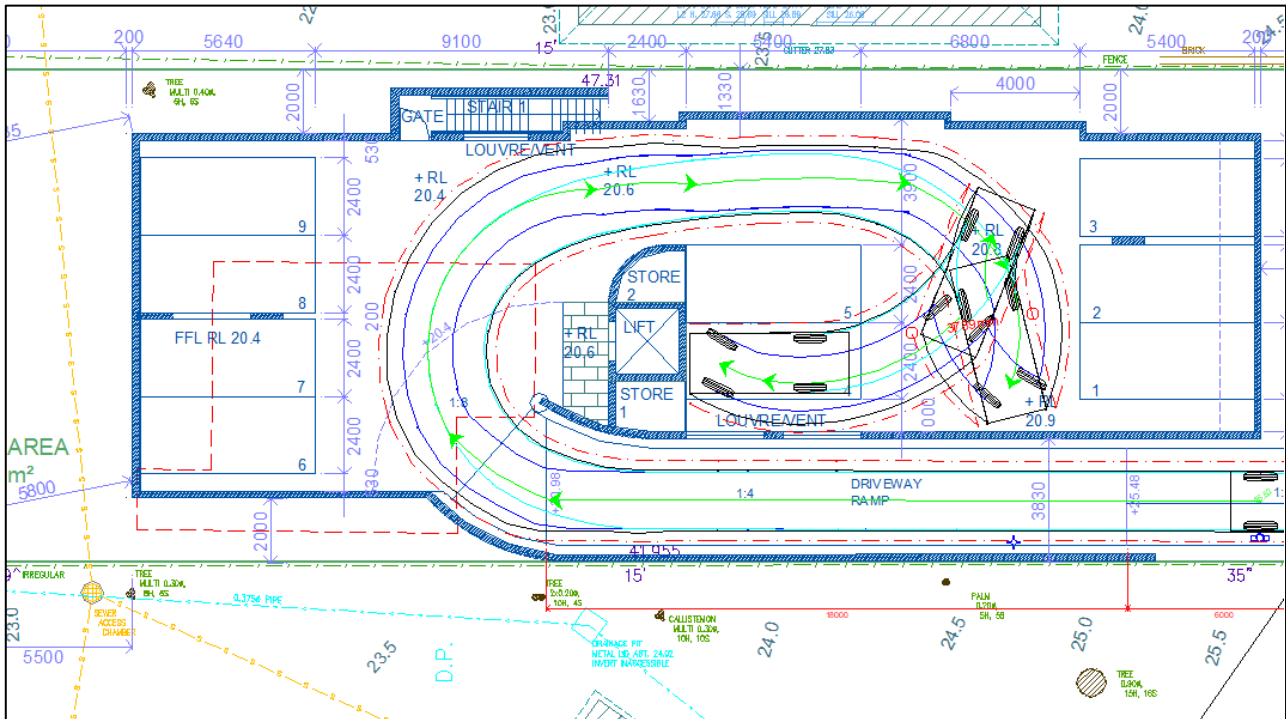


Figure 5: Template of an 85<sup>th</sup> percentile vehicle (as per AS2890.1-2004)

The following figures (**Figures 6-8**) illustrate the results obtained from the swept path analysis.

It is noted that the Blue and Cyan colour lines in the swept paths indicate the front and rear tyre tracks of the vehicle, respectively, while the Black colour of the swept paths indicate the vehicle body (the Green colour line indicated the centreline of the swept path while the dashed Red colour lines indicate the 300mm vehicle body clearance envelop).

As can be seen from the swept path results above, the critical car space is accessible by a passenger (while retaining the 300mm clearance envelop any obstructions) car without any undue number of additional corrections (at most, one correctional manoeuvre is required). This level of manoeuvrability is considered acceptable for low turnover residential developments, where the drivers will likely be regular users who are familiar with the layout of the car park.





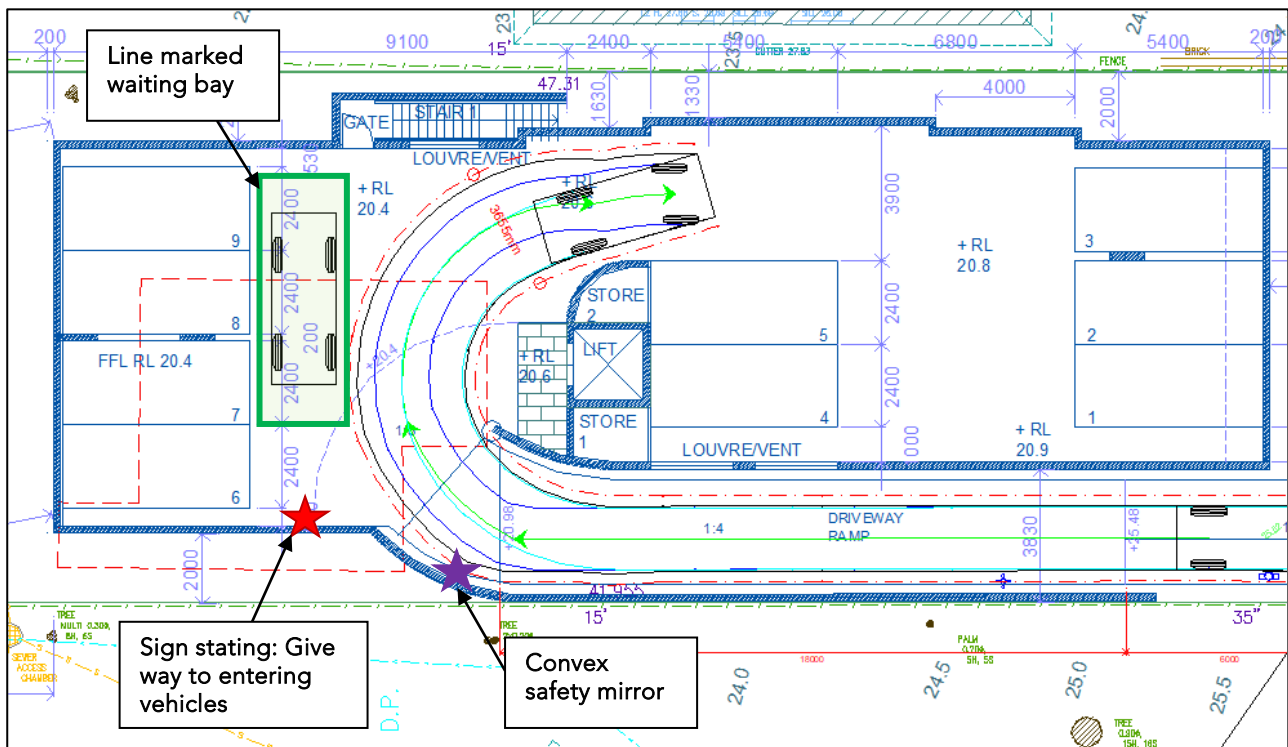


Figure 8: Movement of vehicles in opposite directions

#### 4.8 Pedestrian Sight Distance Availability

AS 2890.1 requires a sight triangle of 2.5m length by 2m width, to be provided at the site egress location, in order to ensure sufficient sight distance availability for pedestrians. This requirement is illustrated below in Figure 9.

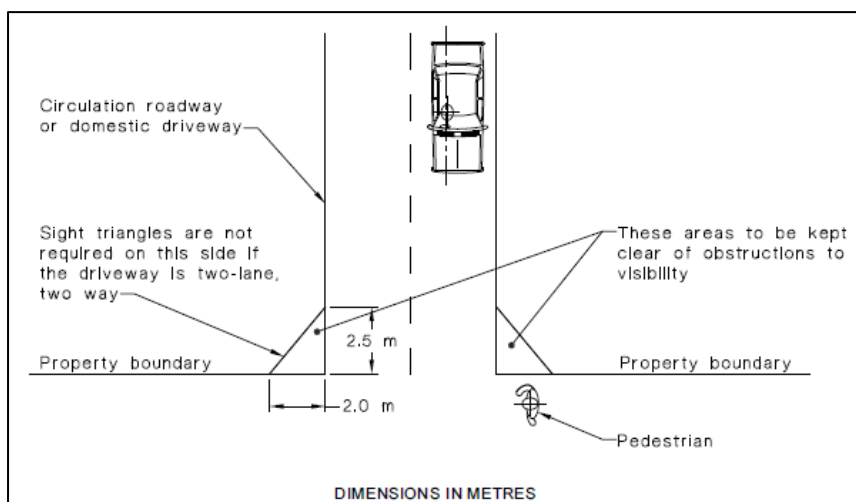


Figure 9: Pedestrian sight distance requirement (AS 2890.1)



## 5. TRAFFIC IMPACT ASSESSMENT

A traffic impact assessment was undertaken to determine in potential impacts caused by the proposed development upon the local road network. According to the Guide to *Traffic Generating Developments (RMS 2002)*, a **medium density residential building** with three or more bedrooms will generate, approximately:

- Daily vehicle trips = 5.0-6.5 per dwelling, and
- Weekday peak hour vehicle trips = 0.5-0.65 per dwelling

Applying the higher end of above rates to the proposed multi-dwelling housing development (consisting 4 x 3-bedroom units) leads to the following trip generation levels:

- 26 daily trips, and
- 3 peak hour trips.

It is noted that the above established peak hour and daily trip levels are conservative since they have been determined notwithstanding the traffic generation levels from the existing residential dwelling located at the subject site. Even if the full trip generation rate is realised, the above trip figures are insignificant (peak hour trip generation level of 3 trips).

It is also noted Brookvale Avenue is a local road with a cul-de-sac end. Therefore, Brookvale Road is unlikely to serve high levels of traffic. As such, the predicted traffic generation level from the proposal is unlikely to eventuate into any adverse impacts on existing traffic conditions within the site vicinity.

## 6. CONCLUSIONS

APEX Engineers were engaged by Barry Rush and Associates to provide a Traffic Impact Assessment as a part of the development application for the proposed residential flat building at 3 Brookvale Avenue in Brookvale.

The subject site is serviced by a number of bus routes that operate along Pittwater Road. These bus routes can be accessed from bus stops located within 500m radius of the subject site. As such, it was concluded that prospective tenants can carry out most trips via public transport, eliminating the need for driving trips.

A parking provision assessment was undertaken in accordance with the Warringah Development Control Plan, leading to a total requirement of 7 on-site car parking spaces. The subject site includes provision for 9 on-site car parking spaces which satisfies the relevant statutory on-site car parking provision requirement.

The proposed car parking design was also assessed with reference to AS 2890.1. It was found that the proposed design was generally compliant with the relevant design requirements. The swept path tests carried out reveal sufficient manoeuvrability conditions for vehicles accessing the critical car spaces within the basement level.

The daily and peak hour trip generations for the proposed development were determined from the trip rates stipulated in the *Guide to Traffic Generating Developments (RMS 2002)*. Using the rates offered within this guide, a peak hour rate of 3 trips and a daily trip rate of 26 trips was established. This number of trips are considered minimal and are unlikely to eventuate into any noticeable impacts within the local road network (especially considering the local access nature of Brookvale Avenue).

In light of the above, the proposed multi-unit residential development is expected to accommodate its own parking demand and will impose generally negligible traffic impacts to the local road network.





apex  
ENGINEERS

adding value through  
resilient engineering

**m** 0416 137 635

**e** [info@apexengineers.com.au](mailto:info@apexengineers.com.au)

**w** [www.apexengineers.com.au](http://www.apexengineers.com.au)