Traffic Impact Assessment

4 Brookvale Avenue, Brookvale NSW 2100

February 2018

APEX ENGINEERS

Type of Assessment: Traffic Impact Assessment

Site Location: 4 Brookvale Avenue, Brookvale NSW 2100

Prepared for: Lotus Projects

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1. Introduction

APEX Engineers were engaged by Lotus Projects to provide a traffic impact assessment as part of the development application for the proposed multi-unit residential development located at 4 Brookvale Avenue, Brookvale NSW 2100.

This report has been 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 parking provision requirements applicable for the subject development;
- **Section 4** Provides a review of the proposed car park design in accordance with relevant Australian Standards and Council DCP controls;
- **Section 5** Provides an estimate of the traffic impact anticipated to be generated by the proposed development onto 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 4 Brookvale Avenue in Brookvale. At the site frontage, Brookvale Avenue is a local access road, which includes an undivided carriageway with kerbside parking on either side. Brookvale Avenue includes a cul-de-sac end approx. 300m from its roundabout intersection with Old Pittwater Road. The immediate site vicinity, on the north side of Old Pittwater Road, is characterised by residential uses. The south side of Old Pittwater Road, within the site vicinity, includes light industrial and commercial land uses.

Figure 1 Highlights the site location from an aerial perspective.

Figure 1: Location of the Subject Site

2.2 Details of the Proposed Development

The proposed development includes 11 residential units and a total of 17 car parking spaces. The specific details are as follows;

- Ground floor level – includes a total of 8 car parking spaces, 2 motorbike spaces and 8 bike racks.
- Level 1 – includes 9 car parking spaces and 4 bike racks along with 1 residential unit (1 x 2 bedroom unit).
- Level 2 – includes 2 residential units (2 bedroom units).
- Level 3 – includes 2 residential units (2 x 2 bedroom units).
- Level 4 – includes 2 residential units (2 x 2 bedroom units).
- Level 5 – includes 2 residential units (2 x 2 bedroom units).
- Level 6 – includes 2 residential units (2 x 2 bedroom units).

2.3 Public Transport Services

The local area was assessed for available public transport services that were both easily accessible from the subject site, and provide viable alternative options to private trips. This assessment identified that the site lies within comfortable walking distance to an abundance of bus routes operating along Pittwater Road (500m from the subject site, 7 minute walk), as listed below;

- Route 139: Warringah Mall to Manly via South Curl Curl.
- Route 146: Manly to Wheeler Heights.
- Route 151: Late night and early morning service between City-QVB, Neutral Bay, Cremorne, Manly, Manly Vale, Warringah Mall, Dee Why, Collaroy, Narrabeen & Mona Vale.
- Route 158: Manly to Cromer.
- Route 169: Manly to Manly to City Wynyard via Narraweena.
- Route 178: Cromer Heights to City Wynyard.
- Route 180: Collaroy Plateau to City Wynyard.
- Route 185: Mona Vale to Warringah Mall via Warriewood.
- Route 188: Early morning and late night services between Avalon, Newport and City.
- Route 199: Palm Beach to Manly.
- Route E78: Cromer Heights to City Wynyard (Express Service).
- Route E79: Wheeler Heights to City Wynyard (Express Service).

Figure 2 below provides the public transport map for the subject site area, outlining the coverage of the above listed bus services.

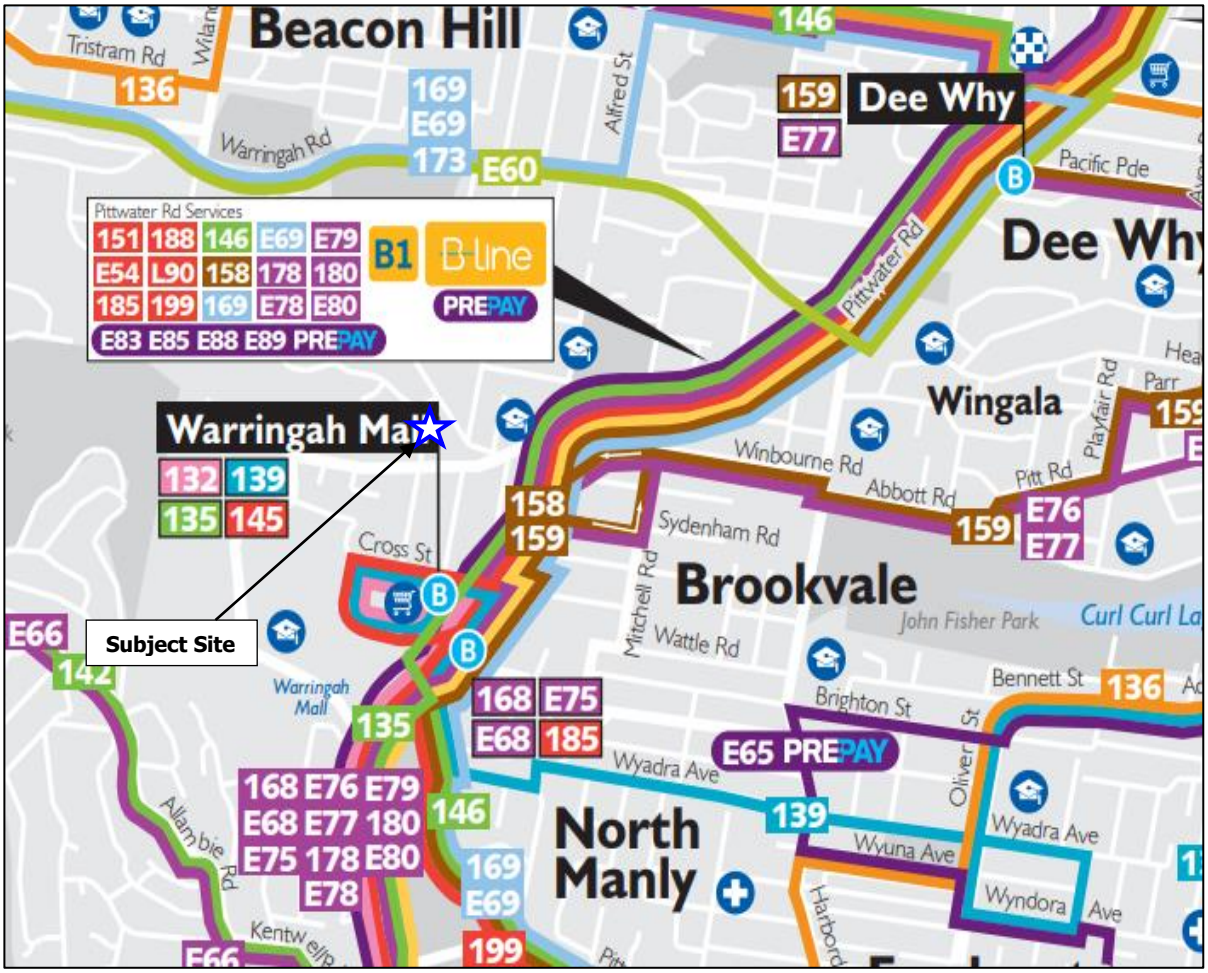

Figure 2: Public Transport Map for the Site Vicinity

As per the above, there is a substantial number of bus services that can be accessed within the close vicinity (within 5 minutes walking distance) of the subject site. These routes operate with various frequencies and provide coverage to much of the Sydney region including major destinations such as the CBD and Manly.

In light of the above, it was concluded that the site has excellent accessibility via public transport. Prospective tenants will be able to carry out most non-local trips through these options, thus greatly reducing the propensity to drive.

2.4 Active Transport Infrastructure

The locality was assessed for infrastructure that encourages modes of active travel for locals. It was identified that the local road network (which include Brookvale Road, Old Pittwater Road and Pittwater Road) provides footpaths for convenient pedestrian travel. The intersection of Old Pittwater Road with Pittwater Road includes a signalised pedestrian crossing across Pittwater Road, so that bus stops along either side of this road can be accessed by pedestrians. A number of on and off road cycling routes were also noted around the locality (as shown in **Figure 3**), providing access to much of the Brookvale area. Given the number of nearby shops, supermarkets, and other facilities, it was concluded that residents of the development will regularly utilise modes of active transport to travel within the locality.

Figure 3 illustrates the cycling network surrounding the subject site.

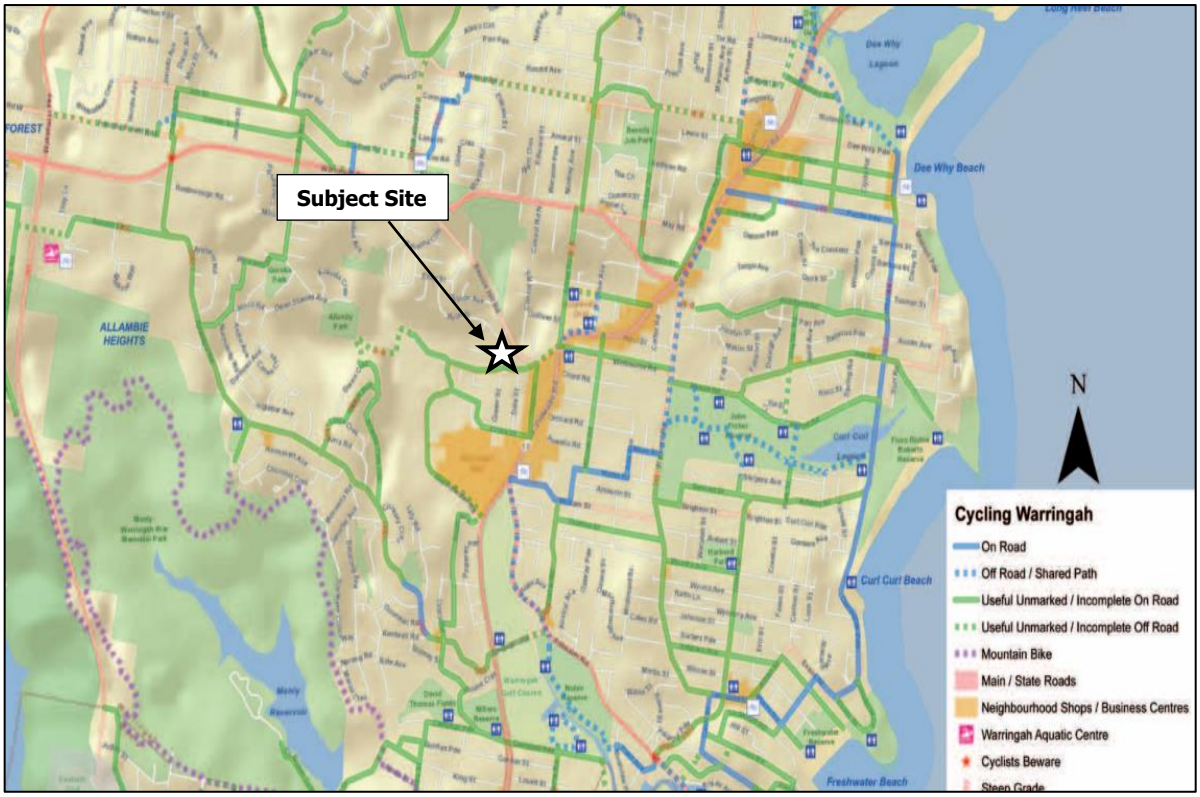

Figure 3: Cycling Network within the Site Locality

3. Parking Provision Assessment

3.1 Car Parking Provisions

The car parking provision requirements for the proposed development were determined in accordance with the Warringah Council Development Control Plan (2011).

This policy document stipulates the following car parking rates for residential flat buildings;

- 1.2 car spaces per 2 bedroom dwelling
- 1 visitor car space per 5 units or part of dwellings

The following table outlines the proposed car parking provisions against the statutory car parking requirements identified above.

Table 1: Statutory Parking Provision Requirement for the Subject Proposal

Component	Dwelling type	Number proposed	Statutory parking rate	Parking spaces required
Residential	2 Bedroom	11	1.2 spaces per 2 bedroom dwelling	13.2
Visitors	All residential dwellings considered	11	1 visitor space per 5 units or part of dwellings	2.2
Total car spaces required				**16 (rounded up)**

As per the information presented in the table above, the overall development includes a statutory car parking provision requirement of 16 car parking spaces. The subject proposal includes provision of 17 car parking spaces (8 car spaces within the ground floor level and 9 car spaces within first floor). Accordingly, the proposed on-site car parking provision conveniently satisfies the relevant statutory car parking provision requirement for the subject proposal.

3.2 Bicycle Parking Provisions

The Warringah Council Development Control Plan (DCP 2011) stipulates the following bicycle parking provision rate for residential developments;

- 1 bicycle space per dwelling + 1 visitor bicycle space per 12 dwellings.

As per the above bicycle parking rate, the overall proposal should provide;

- 11 bicycle parking spaces for the residents (total of 11 residential dwellings); and
- 1 bicycle parking space for the visitors.

Accordingly, the proposal should include a total of 12 bicycle parking spaces. The proposal includes provision of 12 bike racks (8 in ground floor level and 4 in first floor level), which satisfies the relevant statutory bicycle parking provision requirement.

In addition to bike racks, the proposal includes two motorcycle parking spaces within the ground level parking area.

4. Car Parking Design Review

This section will carry out the necessary checks to certify whether the car parking area (provided within the ground level and level 1) has been designed to satisfy the minimum requirements outlined by the Australian Standards. Reference is made to AS 2890.1 for compliance. 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 Space Dimensions

The compliance of the proposed car space dimensions against the minimum car bay and aisle requirements stipulated in the AS 2890.1:2004 for 90 degree car spaces (which are categorised under user class 1A: residential, domestic and employee parking), are highlighted in **Table 2** below.

Table 2: Compliance of Proposed Parking Bays

Component	Standard Dimension (m)	Dimension Provided (m)	Compliance
Space Width*	2.4	2.4	Compliant
Space Length	5.4	>or= 5.4	Compliant
Aisle Width	5.8	>or= 5.8	Compliant

**When car spaces are located adjacent to obstructions higher than 150mm, additional 300mm space width should be provided as per AS 2890.1. This requirement is applicable to car spaces 6, 8 (in ground level) and car spaces 1, 5, 6, 7, 9 (in first floor level). 300mm clearance has been provided against the high obstructions at the above identified car spaces.*

As per the information presented in the table above, all car space dimensions and aisle widths have been designed to comply with the AS 2890.1 requirements.

4.2 Blind Aisles

When car spaces are located adjacent to a blind aisle (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 these spaces. It is noted that car spaces 2 and 3 within ground level and car spaces 4 and 5 within level 1, are all located adjacent to blind aisles. Accordingly, the aisles have been extended by an additional 1m at these locations.

4.3 Column Location

Figure 5.2 of AS 2890.1-2004 illustrates the envelop around a car parking space that should be clear of any permanent obstructions (see figure below).

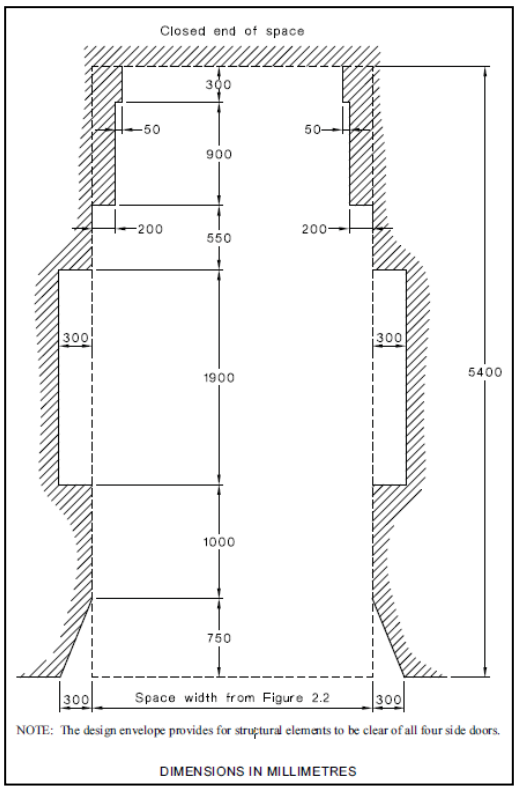

Figure 4: Design Envelop around a Parked Vehicle to be Free of Obstructions (AS2890.1)

The proposed car spaces (within both levels) comply with the above design envelop requirement. The proposed columns between car spaces are located outside of the above identified clearance envelop.

4.4 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 that 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 proposed ramp between the ground level and the first floor level is less than 20m in length and includes a maximum grade of 1 in 4. Either end of this maximum grade section has been transitioned by 2m long sections of 1 in 8 grade. Therefore, the proposed ramp is compliant against the maximum allowable grade criteria and does not include any grade changes greater than 12.5%.

It is noted that the ramp from the ground level and the first floor level is a one-way ramp. The minimum one-way ramp width requirement, for straight sections, as per AS 2890.1:2004 is 3m. However, the Australian Standard 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, when one-way ramps are located adjacent to walls on both sides, the total width of the ramp should be 3.6m (3m ramp width + 300mm clearance on either side). The proposed ramp includes a minimum width of 3.6m.

The proposed driveway ramp connecting Brookvale Avenue with the ground floor level is at grade and two-way. Two-way ramps should be designed at 5.5m minimum width + 300mm clearance from walls. Accordingly, the proposed two-way ramp is designed at 6.1m width.

4.5 Headroom Requirements

The design vehicle for the proposed car park is a typical passenger vehicle. As per AS 2890.1, this vehicle requires the height between the floor and an overhead obstruction to be a minimum of 2200mm. This headroom clearance requirement can be conveniently achieved within both levels of the proposed car park as well as along the proposed ramp.

4.6 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 parking modules are at grades and are therefore compliant with the above requirement.

4.7 Gradient of Access Driveway

AS 2890.1 stipulates the following access driveway gradient requirements;

- Property line/building alignment/pedestrian path—max. 1 in 20 (5%) between edge of frontage road and the property line, building alignment or pedestrian path, and for at least the first 6 m into the car park.

The first 6m into the property has been graded at less than 5% grade and is therefore compliant with the maximum allowable grade requirement.

4.8 Motorbike Spaces

AS 2890.1 stipulates a requirement of 2.5m length and 1.2m width for motorcycle spaces. The proposed two motorcycle spaces comply with this requirement.

4.9 Bicycle Racks

AS 2890.3 stipulates a bicycle spacing envelop requirement of 1.8m length and 0.5m width. Accordingly, the proposed bicycle racks have been dimensioned at 1.8m length and 0.5m width.

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. The *Guide to Traffic Generating Developments – updated traffic surveys (RMS, TDT 2013/04)* document provides trip rates for high density residential developments obtained through surveys of developments (majority within Sydney) which were (i) close to public transport, (ii) greater than six storeys and (iii) almost exclusively residential in nature. Since the proposed development is indeed similar in nature to the surveyed sites, in terms of the above aspects, the adopted trip rates are likely to represent the realistic traffic generation features of the proposed development in future.

Based on the *Guide to Traffic Generating Developments - updated traffic surveys (RMS, TDT 2013/04), a* high density residential building will generate, approximately;

- 0.19 trips per unit in the AM peak and 0.15 trips per unit in the PM peak; and
- 1.52 trips per unit, daily.

Applying the above rates to the proposed 11 unit residential development leads to the following trip generation levels.

- 3 trips in the AM peak and 2 trips in the PM peak; and
- 17 trips, daily.

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 development located at the subject site. All of the above identified trips will be realised at the Brookvale Avenue/Old Pittwater Road roundabout. However, the above trips are insignificant (peak hour trip generation level of 2-3 trips), and are not expected to generate any noticeable impacts on the existing traffic conditions in the local road network.

6. Conclusions

APEX Engineers were engaged by Lotus Projects to provide a traffic impact assessment as a part of the development application for the proposed multi-unit residential development at 4 Brookvale Avenue, Brookvale NSW 2100.

The subject site is well serviced by a number of bus routes that operate along Pittwater Road, which 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 Council Development Control Plan (DCP 2011), leading to a total requirement of 16 on-site car parking spaces. The overall development provides a total of 17 car spaces, thus comfortably satisfying the on-site car parking provision requirement. Additionally, the proposed site includes a statutory bicycle parking provision requirement of 12 bicycle parking spaces. Accordingly, provision has been made to accommodate 12 bicycles in the form of bike racks within each level of the proposed car park. The proposed car parking design was also assessed with reference to AS 2890.1. It was found that the proposed design was compliant with the relevant design requirements.

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 – updated traffic surveys (RMS NSW TDT 2013/04)*. The proposed development is anticipated to generate some 2-3 peak hour trips and 17 daily trips. This number of trips are considered minimal and are unlikely to eventuate into any noticeable impacts within the local road network.

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