Traffic Impact Assessment

638 Pittwater Road, Brookvale NSW 2100

September 2019

APEX ENGINEERS

Type of Assessment: Traffic Impact Assessment

Site Location: 638 Pittwater Road, Brookvale NSW 2100

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1. Introduction

APEX Engineers were engaged by Tony Chirillo to provide a traffic impact assessment as a part of the development application for the proposed mixed use development located at 638 Pittwater Road, 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 relevant 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 and Council DCP controls;
- **Section 5** Provides an estimate of the 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 638 Pittwater Road in Brookvale, in the local government area of Northern Beaches Council. The subject site is zoned as Business Development (B5) and is bound by 3 roads; Pittwater Road to the west, Orchard Road to the south and Charlton Lane to the east. At the site frontage, Pittwater Road includes two traffic lanes and a bus lane in each direction (with a posted speed limit of 60 km/hr) and is a part of the A8 arterial route linking Mona Vale to North Sydney. Both Orchard Road (with a posted speed limit of 50 km/hr) and Charlton Lane are local roads. Orchard Road includes left in/left out access from/to Pittwater Road.

Figure 1 Highlights the site location from an aerial perspective.

Figure 2 Illustrates Pittwater Road and Orchard Road as seen at the site frontage.

Figure 1: Location of the Subject Site

Figure 2: Pittwater Road and Orchard Road at the Site Frontage

2.2 Details of the Proposed Development

The proposed development includes the following components;

- **40** residential units (**1** x studio unit + **23** x 1 bed units + **2** x 1 bed and study units + **10** x 2 bed units + **4** x 3 bed units).
- **12** Commercial units totalling **2,124** square metres of GFA (**1** exclusively commercial unit in basement level 1 + **3** exclusively commercial units in ground floor level + **8** Soho units comprising commercial office areas in the ground floor level).
- Total of **157** car parking spaces (includes **14** disability accessible parking spaces) with access off Charlton Lane (**35** car spaces in basement level 1 + **58** car spaces in basement level 2 + **64** car spaces in basement level 3).
- Total of **60** bicycle racks (**13** racks in basement level 1 + **4** racks in basement level 2 + **43** racks in basement level 3).
- Total of **8** motorcycle spaces (**4** spaces in basement level 2 + **4** spaces in basement level 3).
- **2** service vehicle bays (within ground level) with access off Orchard Road.

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 (within 400m distance, 5 minute walk), as listed below;

- Bus route 132: Warringah Mall to Manly via North Balgowlah
- Bus route 135: North Head to Warringah Mall via Manly
- Bus route 139: Warringah Mall to Manly via South Curl Curl
- Bus route 145: Warringah Mall to Seaforth
- Bus route 146: Wheeler Heights to Manly
- Bus route 151: Mona Vale to City QVB

- Bus route 158: Cromer to Manly
- Bus route 159: Dee Why to Manly
- Bus route 168: North Balgowlah to Milsons Point
- Bus route 169: Manly to City Wynyard via Narraweena
- Bus route 178: Cromer Heights to City Wynyard
- Bus route 179: Stockland Green Hills to North Rothbury via Maitland
- Bus route 180: Collaroy Plateau to City Wynyard
- Bus route 185: Mona Vale to Warringah Mall via Warriewood
- Bus route 188: Mona Vale to City Wynyard
- Bus route 199: Palm Beach to Manly
- Bus route 280: Warringah Mall to Chatswood
- Bus route B1: Mona Vale to City Wynyard (B-Line)
- Bus route E54: Mona Vale to Milsons Point (Express Service)
- Bus route E68: Brookvale to City Wynyard via North Balgowlah (Express Service)
- Bus route E75: Brookvale to City Wynyard (Express Service)
- Bus route E76: Dee Why to City Wynyard via North Curl Curl (Express Service)
- Bus route E77: Dee Why to City Wynyard via Wingala (Express Service)
- Bus route E78: Cromer Heights to City Wynyard (Express Service)
- Bus route E79: Wheeler Heights to City Wynyard (Express Service)
- Bus route E80: Collaroy Plateau to City Wynyard (Express Service)
- Bus route E83: PrePay Only - North Narrabeen to City Wynyard (Express Service)
- Bus route E85: Mona Vale to City Wynyard via Warriewood (Express Service)
- Bus route L90: Palm Beach to City Wynyard (Limited Stops)

As per the above, there is a substantial number of bus services that can be accessed within the close vicinity (within a 5 minute walking distance) of the subject site. These routes operate with various frequencies, from low to high, and provide

coverage to much of the Sydney region including major destinations such as Sydney City, Manly and Warringah Mall. **Figure 3** below provides the public transport map for the subject site area, outlining the coverage of the above listed bus services.

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

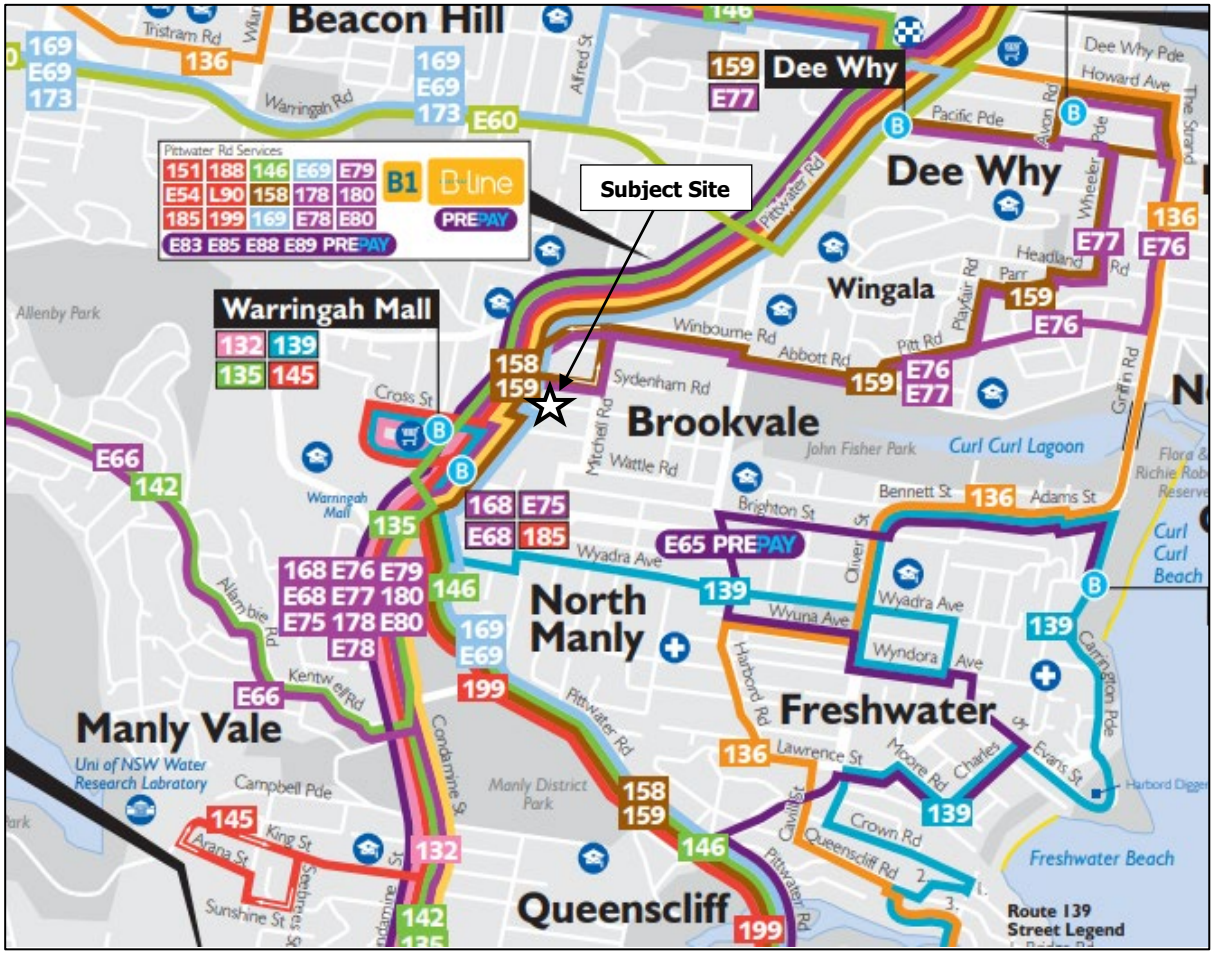

Figure 3: Public Transport Map for the Site Vicinity

2.3 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 supports pedestrian footpaths

for convenient pedestrian travel. The intersection of Pittwater Road with Sydenham Road (located approx. 80m to the north of the site) includes signalised pedestrian crossings across both Pittwater Road with Sydenham Road, so that bus stops along either side of these roads can be accessed by pedestrians.

Furthermore, a number of cycling routes (useful unmarked) were noted around the locality, providing access to much of the local area. Given the number of nearby shops, supermarkets, and other facilities, it was concluded that residents and staff of the development will regularly utilise modes of active transport to travel within the locality.

Figure 4 illustrates the cycling network surrounding the subject site.

Figure 4: Cycling Network within the Site Locality

3. Parking Provision Review

3.1 Car Parking Provisions

The statutory car parking provision requirements for the proposed development were determined in accordance with the Warringah Council Development Control Plan (DCP 2011). This policy document stipulates the following car parking rates;

- Multi-dwelling housing, Residential flat buildings, Serviced apartments (including holiday flats), Shop-top housing (residential component);
    - 1 space per 1 bedroom dwelling.
    - 1.2 spaces per 2 bedroom dwelling.
    - 1.5 spaces per 3 bedroom dwelling.
    - 1 visitor space per 5 units or part of dwellings.
- Office premises;
    - 1 space per 40 m^2 GFA.

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

Table 1: Statutory Parking Provision Requirement for the Subject Proposal

Component	Dwelling type	Number proposed / GFA	Statutory parking rate	Parking spaces required
Residential	1 Bedroom	26	1 space per 1 bedroom dwelling	26
	2 Bedroom	10	1.2 spaces per 2 bedroom dwelling	12
	3 Bedroom	4	1.5 spaces per 3 bedroom dwelling	6
Residential visitors	All residential dwellings considered	40	1 visitor space per 5 units or part of dwellings	8
Commercial units	All commercial units are considered to be offices	2,124 m^2	1 space per 40 m^2 GFA	54
Total car spaces required				**106**

As per the information presented in the table above, the overall development includes a statutory car parking provision requirement of 106 car parking spaces. The subject proposal includes provision of 157 car parking spaces. 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 rates;

- For residential dwellings – provide 1 bicycle space per dwelling + 1 visitor bicycle space per 12 dwellings.
- For office premises – provide 1 bicycle space per 200m^2 GFA + 1 visitor bicycle space per 750m^2 GFA for premises over 1,000m^2.

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

- 40 bicycle parking spaces for the residents (total of 40 residential dwellings);
- 4 bicycle parking spaces for the visitors to the residential component (40 residential dwellings x 1 visitor space per 12 dwellings);
- 11 bicycle parking spaces for staff at the office premises (total area of the proposed commercial premises = 2,124m^2); and
- 3 bicycle parking spaces for the visitors to the office premises (1 visitor bicycle space per 750m^2 GFA for commercial premises over 1,000m^2 applied to the proposed commercial GFA of 2,124 m^2).

Accordingly, the proposed development should include a total of 58 bicycle parking spaces. The subject proposal includes provision of 60 bicycle racks across the three basement parking levels, which conveniently satisfies the relevant statutory bicycle parking provision requirement.

4. Car Parking Design Review

The following section will carry out the necessary checks to certify whether the car parking areas have been designed to satisfy the minimum requirements outlined by the Australian Standards. Reference is made to AS 2890.1, AS 2890.2, AS 2890.3 and AS 2890.6 for compliance. This section shall be read in conjunction with the complete site layout plans submitted as a part of the full Development Application package.

The proposed on-site car parking arrangement is as follows;

- At ground level, 2 service vehicle (6.4m long small rigid vehicle) bays are provided with access off Orchard Road.
- At basement level 1 (access off Charlton Lane), 35 car parking spaces are provided.
- At basement level 2 (access off Charlton Lane), 58 car parking spaces are provided.
- At basement level 3 (access off Charlton Lane), 64 car parking spaces are provided.

Basement level 2 includes 2 boom gates which control access to the residential car parking spaces located within basement level 2 and 3.

4.1 Car Space Dimensions

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 Parking Bays

Component	Standard Dimension (m)	Dimension Provided (m)	Compliance/Comments
Space Width*	2.4	2.4 – 2.5	Compliant
Space Length	5.4	5.5	Compliant
Aisle Width	5.8	5.8 – 6.0	Compliant

*where car spaces are located adjacent to high vertical obstructions, additional 300mm clearance has been provided

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

4.2 Accessible Car Space Dimensions

According to AS 2890.6, the disability accessible parking spaces shall be designed with minimum dimensions of 2.4m width and 5.4m length. These car spaces shall be accompanied by a shared space, located adjacent to them, possessing equal dimensions. The proposed disability accessible parking spaces have been designed to satisfy the above requirements, with a shared space of equal dimensions located adjacent to the car space.

4.3 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 36, 23/24 in basement level 1, car spaces 1/64 and 39/42 in basement level 2 and car spaces 1/64 and 39/42 in basement level 3 are located adjacent to blind aisles. Accordingly, the aisles have been extended by an additional 1m at these locations or when there is a minor shortfall is blind aisle clearance, this has been compensated by provision of more aisle width, beyond the minimum requirement of 5.8m.

4.4 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). In addition, AS 2890.6 stipulates that the disability accessible car parking spaces and the shared areas shall not exceed the grade of 1 in 40 in any direction. The proposed parking modules do not include any grades higher than 1 in 40.

4.5 Column Positioning

The obstruction free design envelope presented in AS 2890.1 (shown below) was tested for each car space. It was found that all car spaces were designed to include this obstruction free design envelop.

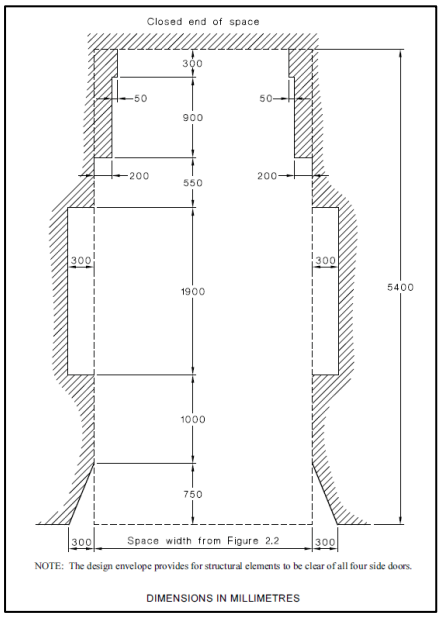

Figure 5: Obstruction Free Design Envelope (AS2890.1)

4.6 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 ramps include a maximum grade of 1 in 5 with either end of each ramp transitioned through a 2m long 1 in 10 section. Accordingly, the proposed ramp grades comply with the relevant maximum grade and transition requirements.

The ramps within the proposed car park are of two-way nature. The minimum ramp width requirement, for two-way straight sections, as per AS 2890.1:2004 is 5.5m. 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 ramps are located adjacent to walls, the total width of the ramp should be 6.1m (5.5m ramp width + 300mm clearance on either side). The proposed two way ramps include a minimum width of 6.6m (6.0 ramp width + 300mm clearance on either side), which complies with the above requirement.

4.7 Width and Grade of Access Driveway

The proposed access to the car parking area is categorised under access category 2 in AS 2890.1 (1A class parking facility, 101-300 car spaces, and frontage road local). Therefore, the entry/exit combined access points should provide at least 6m width. Accordingly, the proposed access to the basement off Charlton Lane is designed at a minimum width of 6m.

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.

Accordingly, the first 6m into the site has been graded at 5% (maximum) and is therefore compliant with the maximum allowable access driveway grade requirement.

4.8 Headroom Requirements

For all the basement parking levels, the design vehicle is a disability accessible passenger vehicle – this vehicle requires a headroom of 2.5m minimum above the parking spaces. Also, a minimum headroom clearance of 2.2m is required along the path of the vehicle to and from the disability accessible car space. The proposed basement levels, including along the length of the ramps, include a minimum headroom clearance of 2.2m and the proposed accessible parking spaces include a minimum headroom clearance of 2.5m.

For the ground level service bay area, the design vehicle is a 6.4m long small rigid vehicle (SRV). Based on AS 2890.2, an SRV requires a vertical clearance of 3.5m. Accordingly, a headroom clearance of 3.5m has been preserved within the ground level service bay area.

4.9 Motorbike Spaces

AS 2890.1 stipulates a requirement of 2.5m length and 1.2m width for motorcycle spaces. The proposed motorcycle spaces comply with the above identified minimum dimensional requirements.

4.10 Bicycle Racks

AS 2890.3 stipulates a bicycle spacing envelop requirement of 1.8m length and 0.5m width. The proposed bike racks within the basement include the above identified minimum dimensions.

4.11 Service Vehicle Bays

Based on AS 2890.2, a small rigid vehicle (SRV) requires a service bay width of 3.5m and a length of 6.4m. The proposed two service vehicle bays (on the ground floor level) are designed at 3.6m width and 6.4m length. Accordingly, the SRV

space dimensions comply with the minimum dimensional requirements in the Australian Standards.

4.12 Vehicle Manoeuvrability Assessment

The anticipated service vehicle manoeuvrability conditions within the car park have been investigated using a swept path tests. The largest anticipated delivery vehicle at the proposed loading bays is a SRV. Accordingly, the manoeuvrability condition of a SRV has been tested for the loading bays, using a SRV template (dimensioned as per AS 2890.2). The result of this swept path test, along with the vehicle template used, is illustrated in the figure below. 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 envelop the dashed Red lines indicate the 300mm clearance envelop).

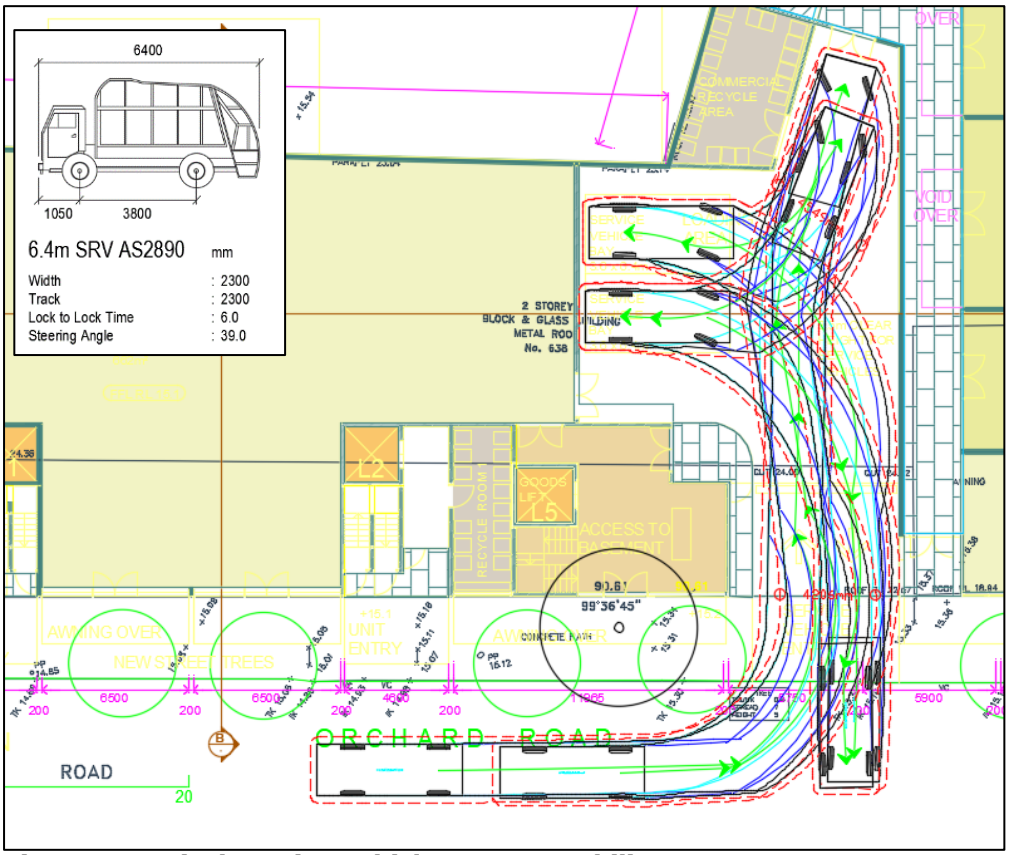

Figure 6: Typical Service Vehicle Manoeuvrability

As can be seen from the figure above, all the anticipated manoeuvres by a typical small rigid service vehicle, can be sufficiently accommodated within the confines of the proposed design with no additional correctional manoeuvres demanded from the driver of the vehicle. The SRV is capable of manoeuvring within the car parking area (with no additional correctional manoeuvres) in order to exit onto Orchard Road in forward gear.

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, TDT 2013/04)*;

- A **high density residential building** will generate, approximately;
  - 0.19 trips per unit in the AM peak;
  - 0.15 trips per unit in the PM peak; and
  - 1.52 trips per unit, daily.
- An **office premise** will generate, approximately;
  - 1.6 trips per 100m^2 GFA in the AM peak.
  - 1.2 trips per 100m^2 GFA in the PM peak; and
  - 11 trips per 100m^2 GFA, daily.

Notwithstanding the traffic generating potential of the existing development at the subject site, applying the above rates to the proposed multi-unit mixed use development leads to the trip generation levels as identified in the table below.

Table 3: Anticipated Traffic Generation Levels

Period	Residential Component	Commercial Component	Total Trips
AM Peak	40 units x 0.19 trips per unit = 8 trips	2,124 m^2 x 1.6 trips per 100m^2 GFA = 34 trips	42 AM peak trips
PM Peak	40 units x 0.15 trips per unit = 6 trips	2,124 m^2 x 1.2 trips per 100m^2 GFA = 26 trips	32 PM peak trips
Daily	40 units x 1.52 trips per unit = 61 trips	2,124 m^2 x 11 trips per 100m^2 GFA = 234 trips	295 daily 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 development located at the subject site.

Even if the full trip generation rate is realised, the above trip figures are moderate, and would not be expected to generate any noticeable impacts of the existing local road network. Since vehicular access to the subject site is proposed off Charlton Lane, vehicles can use both Sydenham Road (to the north) and Orchard Road (to the south) to access the site. This will further distribute the traffic at two different intersections, thus minimising the cumulative impact experienced by a single intersection. The following figure illustrates the anticipated paths of vehicles entering and exiting the subject site.

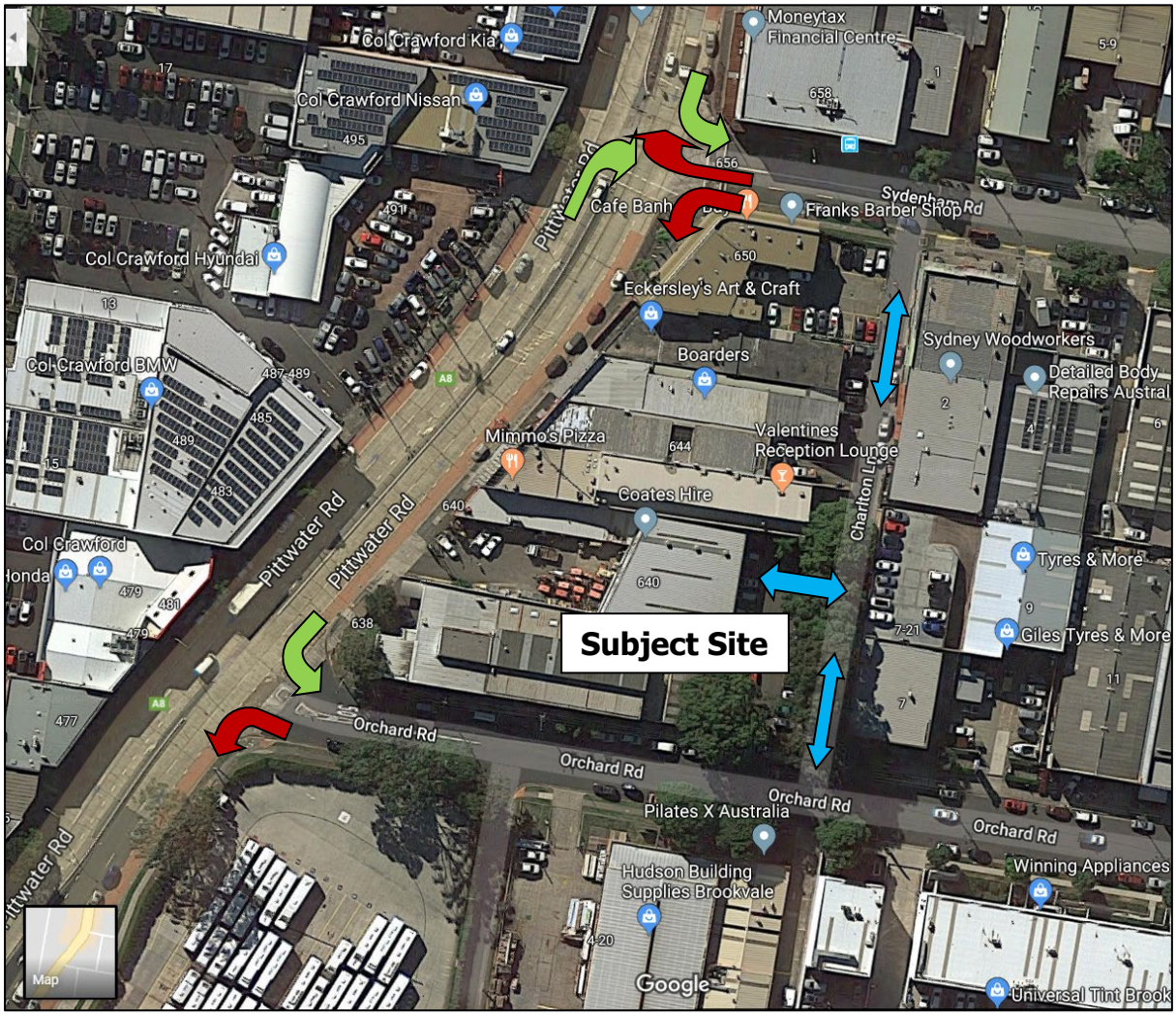

Figure 7: Anticipated Traffic Routes to and from the Subject Site

In particular, the following are evident;

- Northbound traffic on Pittwater Road, wishing to enter the subject site, will have to utilise the signalised intersection of Pittwater Road/Sydenham Road in order to turn right into Sydenham Road.
- Southbound traffic on Pittwater Road, wishing to enter the subject site, can turn left to either Sydenham Road or Orchard Road.
- Traffic leaving the subject site, wishing to travel northbound along Pittwater Road, will have to utilise the signalised intersection of Pittwater Road/Sydenham Road in order to turn right into Pittwater Road.
- Traffic leaving the subject site, wishing to travel southbound along Pittwater Road, can turn left into Pittwater Road from either Sydenham Road or Orchard Road.

As per above, all right turns into/out of the site out of/into Pittwater Road must utilise the signalised intersection at Sydenham Road (since the Orchard Road intersection with Pittwater Road includes only left in and left out access). As a result, the delays imposed by additional turning movements generated by the proposal on Pittwater Road through traffic will be minimal. As such, no ramifications to the existing traffic and pedestrian conditions are anticipated to result from any traffic generated by the proposed development.

6. Conclusions

APEX Engineers were engaged by Tony Chirillo to provide a traffic impact assessment as a part of the development application for the proposed mixed use development located at 638 Pittwater Road, 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 400m radius of the subject site (within 5 minute walking distance). As such, it was concluded that prospective tenants and staff at the proposed development 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 106 on-site car parking spaces. The overall development provides a total of 157 car spaces which conveniently satisfies the relevant statutory parking provision requirement. Additionally, the proposed site includes a statutory bicycle parking provision requirement of 58 bicycle parking spaces. The subject proposal includes provision of 60 bicycles parking spaces across the 3 basement levels.

The proposed car parking design was also assessed with reference to AS 2890.1, AS 2890.2, AS 2890.3 and AS 2890.6. It was found that the proposed design was compliant with the relevant design requirements. In addition, the swept path assessment undertaken revealed that a small rigid vehicle can manoeuvre within the ground level service bay area (without requiring additional correctional manoeuvres) in order to exit the site in forward gear onto Orchard Road.

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 NSW TDT 2013/04)*. Using the rates offered within this guide, an AM peak hour rate of 42 trips, a PM peak hour rate of 32 trips and a daily trip

rate of 295 trips was established. These trip estimates are considered conservative since they have been determined notwithstanding the traffic generation levels from the existing development located at the subject site. Even if the full trip generation rate is realised, the above trip figures are moderate, and would not be expected to generate any noticeable impacts of the existing local road network. Since vehicular access to the subject site is proposed off Charlton Lane, vehicles can use both Sydenham Road (to the north) and Orchard Road (to the south) to access the site. This will further distribute the traffic at two different intersections, thus minimising the cumulative impact experienced by a single intersection. The following figure illustrates the anticipated paths of vehicles entering and exiting the subject site.

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.