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# Planning Proposal
# 10-12 Boondah Road and 6 Jacksons Road Warriewood
# Transport Impact Assessment

**Client //** Henroth Investments Pty Ltd
**Office //** NSW
**Reference //** N114960
**Date //** 14/12/16

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**Quality Record**

| Issue | Date | Description | Prepared By | Checked By | Approved By | Signed |
|---|---|---|---|---|---|---|
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# 1. Introduction



This report has been prepared on behalf of Henroth Investments Pty Ltd to present the findings of a preliminary assessment of the transport implications of a Planning Proposal for mixed use rezoning of 10-12 Boondah Road and ecological rehabilitation works to 6 Jacksons Road and riparian corridor.

The Concept Plan for the Planning Proposal has been prepared by GM Urban Design & Architecture, and comprises a mixed use development on 10-12 Boondah Road with bulky goods retail and residential apartments.

Previous planning work in the Warriewood Valley area has determined appropriate land uses for the area and measures required to accommodate future traffic demands. This assessment compares the likely impacts of the Concept Plan with those addressed in the previous work, and reviews the requirements for road upgrades. The subject sites lie within the Southern Buffer area.

The remainder of the report is set out as follows:

- Section 2 describes the background situation in the Warriewood Valley area, including the location of the proposed development, the planning background in the area, and the existing road network and public transport services.
- Section 3 describes the proposed Concept Plan and estimates its peak hourly traffic generation potential.
- Section 4 reviews the implications of the Concept Plan in comparison with previous planning work in the area, including traffic generation, roadway capacity and public transport implications. The Concept Plan's parking provisions are also reviewed.
- Section 5 presents a summary of the findings of this study.

# 2. Existing Situation



## 2.1 Site Location

The proposed Masterplan site lies within the area identified as the Southern Buffer in the *Warriewood Valley Planning Framework* (Pittwater Council, 2010). 10-12 Boondah Road is located on the western side of Boondah Road, to the south of the Meriton residential development, north of the Centro Warriewood shopping centre, and west of the Warriewood Waste Water Treatment Plant. 6 Jacksons Road is located on the northern side of Jacksons Road immediately to the east of Centro Warriewood shopping centre, and includes an area to the north of the shopping centre.

## 2.2 Planning Background

The *Warriewood Planning Framework* (Pittwater Council, 2010) identifies land within the Warriewood Valley which can suitably be developed, what general forms of development should occur, and densities of that development.

The *Warriewood Valley Roads Master Plan* (2006 Review) sets out road classifications, cross sections and management measures for the road system in the Warriewood Valley Urban Land Release Area. The traffic management measures are being completed over time under the *Warriewood Valley S94 Contributions Plan*, with the following measures of particular relevance to the subject site not yet completed:

- Roundabout at Vuko Place and Warriewood Road
- Roundabout at Macpherson Street and Warriewood Road
- Upgrade of Pittwater Road and Warriewood Road intersection
- Upgrade of Pittwater Road and Jacksons Road intersection (right turn bay from north to west already extended)
- Upgrade of Boondah Road to typical subarterial road cross-section, including calming measures and bridge work (partially completed).

## 2.3 Warriewood Valley Strategic Transport Study

The *Warriewood Valley Strategic Transport Study* (AECOM, 2011 and Addendum 2014) assessed the feasibility of development opportunities in the undeveloped land parcels in the Warriewood Valley Release Area. This included assessment of four scenarios, including two options for development within the Southern Buffer, as follows:

**Southern Buffer Option 1 (Scenario 3):**

- 18,000m$^2$ GFA (13,500m$^2$ GLFA) retail
- 2,000m$^2$ commercial; and
- 80 residential dwellings.

**Southern Buffer Option 2 (Scenario 4):**

- 25,000m$^2$ GFA (18,750m$^2$ GLFA) retail
- 22,500m$^2$ GLFA bulky goods
- 5,000m$^2$ GFA commercial; and
- 160 residential dwellings.

For that study, forecasts of increases in traffic were estimated using NSW Roads and Maritime Services trip rates, Journey to Work patterns as well as primary and secondary retail catchment information for the residential and commercial land uses. The traffic generation assessed for the two Southern Buffer development options is summarised in Table 2.1.

**Table 2.1: Warriewood Strategic Transport Review Southern Buffer Trip Generation (vehicles/hour)**

| Component | Option 1 (Scenario 3) | | Option 2 (Scenario 4) | |
|---|---|---|---|---|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Residential | 40 | 40 | 80 | 80 |
| Commercial | 40 | 40 | 100 | 100 |
| Retail | 270 | 608 | 375 | 844 |
| Bulky goods | - | - | 563 | 563 |
| **Total** | **350** | **688** | **1,118** | **1,587** |

Source: AECOM, 2011

The assessment found that under both these scenarios, all of the analysed intersections would perform adequately at Level of Service C or better, with the exception of the intersection of Jacksons Road and Pittwater Road. This intersection would require significant mitigation measures to provide additional capacity. For Scenario 3, the right turn bay in Pittwater Road North would need to be lengthened (which has now been completed). For Scenario 4, a second right turn lane would be needed in Pittwater Road North, together with an additional westbound lane in Jacksons Road, an unsignalised left turn slip lane from Jacksons Road to Pittwater Road, and remarking of the eastbound lanes in Jacksons Road to create two right turn lanes.

In addition, mitigation measures would be required at the intersection of Garden Street and Powder Works Road to provide additional capacity for the Scenario 2, which did not include the increased traffic generation from the Southern Buffer area. The suggested measures include remarking of the existing road space and removal of kerbside parking. No additional measures would be required at this intersection for Scenarios 3 and 4.

## 2.4 Other Regional Developments

Since the aforementioned planning and transport assessments were undertaken, additional developments have been proposed in the region, including the Mona Vale Place proposal, and the Ingleside Development Area.

The draft Mona Vale Place Plan has been released for public comment, and includes the *Mona Vale Town Centre Traffic and Parking Strategy* (Parking & Traffic Consultants, 2016). That study examines a number of improvement options to manage the road network and volumes of traffic while improving the environment for pedestrians and other road users. The options relate to changes to roads and intersections in the vicinity of Pittwater Road, Mona Vale Road, Bungan Street, Bungan Lane and Park Street. The traffic modelling of future traffic conditions with increased traffic demands found that subject to some mitigating works, the road network would operate with a good level of service. The study recommends that Council liaise with RMS with regard to changes to the arterial roads, notably the intersection of Pittwater Road and Barrenjoey Road. The study also proposes a strategy to change parking conditions for the area, including changes to time restrictions, introduction of maximum rather than minimum parking requirements for new development, promotion of travel smart incentives and a town centre dynamic parking signage plan.

The Ingleside greenfield release area draft Land Use and Infrastructure Strategy has been released for public comment, and includes the *Ingleside Precinct Traffic and Transport Assessment* (AECOM, 2016). The proposal is for predominantly low to medium density residential dwellings, with a neighbourhood centre and a community node with small retail offerings to serve local residents. AECOM (2016) indicates that "*Mona Vale Road is expected to accommodate the majority of through traffic movements and provide access to the strategic road network, while the remainder of the roads in the precinct will predominantly cater for local traffic.*" Mona Vale Road is planned to be upgraded to four lanes between McCarrs Creeks Road and Powder Works Road, and RMS is preparing a Review of Environmental Factors relating to this proposed upgrade.

A number of infrastructure and service improvements are proposed with the Ingleside proposal, including intersection improvements at Powderworks Road/Garden Street, Mona Vale Road/Pittwater Road and others. The need for these improvements has been determined by AECOM, based on modelling of future traffic conditions assuming some 3,500 dwellings in the precinct and planned or committed road and public transport infrastructure improvements in the region. While not specifically stated in the report, the future conditions modelling is expected to include the developments proposed within the Warriewood Valley consistent with that assessed in the Strategic Transport Study.

These draft proposals thus envisage changes to the road network to accommodate forecasts of future traffic demands, with additional capacity to be provided generally along at intersections with the surrounding arterial roads.

## 2.5 Existing Road Network

The primary roads relevant to access for the subject site are briefly described below.

**Boondah Road** is identified as a subarterial street in Council's Roads Master Plan, and has a single travel lane in each direction, and a speed limit of 50kph along its northern part, and 40kph along its southern part. It provides a link between Macpherson Street in the north and Jacksons Road in the south. It intersects with Jacksons Road to the east of Centro Warriewood, and has been upgraded to single lane roundabout control as identified in the Warriewood Valley Roads Master Plan. Raised flat top thresholds with marked pedestrian crossings (wombat crossings) and kerb extensions are provided across Boondah Road to the north of the roundabout, and another approximately 80 m further north. A pedestrian refuge is located in Boondah Road approximately 50 m north of the northern wombat crossing. Two lane speed humps are provided approximately 80 m and 160 m of the pedestrian refuge.

**Jacksons Road** extends east-west between Pittwater Road and Garden Street. Jacksons Road provides vehicular access to the Centro Warriewood shopping centre, and Narrabeen Sports High School. The easternmost access for Centro Warriewood is controlled by a single lane roundabout, and the central and eastern accesses are priority intersections. Jacksons Road has two travel lanes in each direction at its western end, and two eastbound lanes at its eastern end, at the approach to Pittwater Road. The remainder of Jacksons Road has a single travel lane for each direction, with pedestrian crossing facilities. The classification of Jacksons Road is not specified in the Warriewood Valley Roads Master Plan, however the traffic volume reported in that document is consistent with the upper limit for a sub-arterial road.

**Ponderosa Parade – Macpherson Street – Warriewood Road (east)** form a route through Warriewood Valley between Mona Vale Road to the north and Pittwater Road to the south-east. Along most of its length, the route typically has a single travel lane in each direction, and major

intersections within the Valley are controlled with roundabouts, including the intersection with Boondah Road, while the access intersections with Mona Vale Road and Pittwater Road are signal controlled. This route is classified as a subarterial route in the Warriewood Valley Roads Master Plan.

## 2.6 Public Transport

The primary type of public transport available in the vicinity of the subject site is buses, which are operated by Sydney Buses.

- Routes 185, L85 and E85 operate between Mona Vale and the City, and buses travel in both directions along Pittwater Road – Jacksons Road – Garden Street – Macpherson Street – Warriewood Road – Foley Street – Mona Vale Road.
- Route 182 operates between Mona Vale and Elanora Heights, and the buses travel in both directions along Powder Works Road – Pittwater Road – Jacksons Road – Garden Street – Macpherson Street – Ponderosa Parade – Mona Vale Road – Pittwater Road.

At the time of writing, due to roadworks in Macpherson Street, Routes 185, L85 and E85 are being temporarily detoured over a period of approximately 12 months from October 2016. Over that period, the routes are using Warriewood Road to/from Pittwater Road rather than Garden Street, and a temporary loop service is operating a shuttle service from Narrabeen to Warriewood to accommodate the missed stops. Temporary Route 181 buses travel from Narrabeen along Pittwater Road – Garden Street – Jacksons Road – Boondah Road – Macpherson Street – Garden Street – Jacksons Road – Pittwater Road. Although Route 181 currently operates along Boondah Road, there are no bus stops on Boondah Road. The nearest stops are located on Macpherson Street and Jacksons Road.

Sydney Buses reviews service levels on an on-going basis, and increases to services may result from increased demand generated by developments under construction or completed in the area.

# 3. The Planning Proposal



## 3.1 The Concept Plan

The Concept Plan for the subject sites proposes:

**10-12 Boondah Road**

- a mixed use development with bulky goods retail and supporting specialty shops/restaurants
- residential apartments
- vehicular access via Boondah Road
- roof top and undercroft car parking
- at grade parking on a street level boulevard.

**6 Jacksons Road**

- ecological rehabilitation works
- possible boardwalk linking through from the Warriewood Wetlands to Centro shopping centre.

Within the 10-12 Boondah Road portion of the site, the Concept Plan proposes the following, nothing that all yields are approximate only:

- 16,650m$^2$ GFA bulky goods retail
- 22 to 24 residential apartments
- 370 car parking spaces for retail users
- 54 car parking spaces for residential users.

## 3.2 Concept Plan Traffic Generation

The traffic generation of the Concept Plan development has been estimated using the same trip rates used in the Warriewood Valley Strategic Transport Review. The results are summarised in Table 3.1.

**Table 3.1: Concept Plan Weekday Peak Hour Traffic Generation – AECOM Rates (vehicles/hour)**

| | AM Rate | PM Rate | AM Trips | PM Trips |
|---|---|---|---|---|
| 24 Residential Units | 0.65 trips per dwelling | 0.65 trips per dwelling | 16 | 16 |
| 16,650m$^2$ GFA Bulky Goods Retail (approx. 12,500m$^2$ GLFA) | 2.5 trips/100m$^2$ GLFA | 2.5 trips/100m$^2$ GLFA | 313 | 313 |
| **Total Hourly Trips** | | | **329** | **329** |

Residential and bulky goods trip rates from AECOM (2011), assumes GLFA approximately 75% of GFA

Since the Warriewood Valley Strategic Transport Review was undertaken, RMS has published the results of updated traffic surveys undertaken at bulky goods retail shops. *Trip Generation and Parking Generation – Bulky Goods/Hardware Stores Data Analysis Report* (Hyder, 2009) was prepared on behalf of RMS, which then published *Technical Direction 2013/04 Guide to Traffic Generating Developments Updated Traffic Surveys*. The Technical Direction nominates an average peak trips rate of 2.7 vehicle trips per 100m$^2$ GFA. This is the busiest hour for traffic generation through the weekday, and does not coincide with either the morning or evening "network" peak hours on the road system. The surveys found that bulky goods retail shops open later in the morning than the peak hour for traffic on the surrounding road network, and so do not

contribute to the morning peak hour traffic conditions. During the evening network peak hour, the trip generation of the bulky goods shops was 1.31 vehicle trips per 100m$^2$ GFA across all the surveyed sites.

Table 3.2 summarises the network peak period trip generation of the Concept Plan based on the updated traffic survey results from RMS. The trip generation rate for the residential apartments is assumed to be the same as that for medium density residential dwellings as used in the Warriewood Valley Strategic Transport Study.

**Table 3.2: Concept Plan Weekday Peak Hour Traffic Generation – Updated RMS Rates (vehicles/hour)**

| | AM Rate | PM Rate | AM Trips | PM Trips |
|---|---|---|---|---|
| 24 Residential Units | 0.65 trips per dwelling | 0.65 trips per dwelling | 16 | 16 |
| 16,650m$^2$ GFA Bulky Goods Retail | - | 1.31 trips/100m$^2$ GFA | - | 218 |
| **Total Hourly Trips** | | | **16** | **234** |

Bulky goods trip rates from Hyder (2008) and RMS Technical Direction TDT 2013/04

# 4. Transport Implications



## 4.1 Traffic Generation and Distribution

Comparing the estimated traffic generation of the Concept Plan with that used in the Warriewood Valley Strategic Transport Review (Table 2.1), it is evident that the Concept Plan would generate fewer vehicle trips than either of the options assessed by AECOM. This comparison is presented in Table 4.1.

**Table 4.1: Traffic Generation Comparison (vehicles per hour)**

| | AM Peak | PM Peak |
|---|---|---|
| Option 1 – Scenario 3 | 350 | 688 |
| Option 2 – Scenario 4 | 1,118 | 1,587 |
| Concept Plan | **16** | **234** |

The total traffic generation of the Concept Plan is expected to be less than that assessed for both options by AECOM in the Strategic Transport Review. The types of trips being generated is expected to impact on the distribution of the traffic on the road network. This is because the arrival and departure pattern of residential traffic is different from that of retail traffic, which is different again to that of commercial traffic. The contribution of the various land uses to the total development is significantly different between the Concept Plan and the options assessed by AECOM. In order to compare the Concept Plan traffic impacts with the scenarios already assessed by AECOM, the Concept Plan traffic has been distributed on the road system using the same distribution assumptions applied by AECOM. For this assessment, the traffic generated by the playing fields has been assumed to be half from within the Warriewood Valley, and the remaining half on a similar basis to the retail traffic distribution used by AECOM. The resulting distribution of Southern Buffer traffic by direction is presented in Table 4.2 (AM peak hour) and Table 4.3 (PM peak hour).

**Table 4.2: AM Peak Concept Plan and Options 1 and 2 Peak Hour Traffic Distribution (vehicles/hour)**

| | South via Pittwater Rd | North/Northeast via Pittwater/Barrenjoey Rds | West via Mona Vale Rd | West via Powderworks Rd | Internal |
|---|---|---|---|---|---|
| **Concept Plan** | | | | | |
| Inbound | 1 | 0 | 0 | 0 | 1 |
| Outbound | 7 | 2 | 3 | 0 | 2 |
| Two Way | 8 | 2 | 3 | 0 | 3 |
| **Option 1** | | | | | |
| Inbound | 91 | 113 | 9 | 10 | 20 |
| Outbound | 57 | 30 | 8 | 3 | 10 |
| Two Way | 148 | 143 | 17 | 13 | 30 |
| **Option 2** | | | | | |
| Inbound | 296 | 384 | 22 | 35 | 64 |
| Outbound | 170 | 97 | 17 | 9 | 25 |
| Two Way | 466 | 482 | 39 | 45 | 89 |

Table 4.2 demonstrates that during the morning peak hour, the Concept Plan traffic travelling to and from all directions would be lower than that assessed by AECOM for Option 1 and Option 2.

**Table 4.3: PM Peak Concept Plan and Options 1 and 2 Peak Hour Traffic Distribution (vehicles/hour)**

| | South via Pittwater Rd | North/Northeast via Pittwater/Barrenjoey Rds | West via Mona Vale Rd | West via Powderworks Rd | Internal |
|---|---|---|---|---|---|
| **Concept Plan** | | | | | |
| Inbound | 53 | 71 | 3 | 7 | 11 |
| Outbound | 49 | 32 | 0 | 3 | 5 |
| Two Way | 102 | 103 | 3 | 10 | 16 |
| **Option 1** | | | | | |
| Inbound | 149 | 197 | 9 | 18 | 32 |
| Outbound | 154 | 95 | 8 | 10 | 19 |
| Two Way | 302 | 292 | 17 | 28 | 50 |
| **Option 2** | | | | | |
| Inbound | 340 | 454 | 18 | 42 | 71 |
| Outbound | 358 | 221 | 21 | 23 | 44 |
| Two Way | 698 | 675 | 39 | 65 | 115 |

Table 4.3 demonstrates that during the evening peak hour, the Concept Plan traffic travelling to and from all directions, including internally, would be lower than that assessed by AECOM for Option 1 and Option 2.

## 4.2 Road Capacity Impacts

As the traffic generated by the Concept Plan would be lower for travel in all directions than that assessed by AECOM for Option 1 (Scenario 3), it follows that the mitigation measures required to provide adequate roadway capacity for Scenario 3 would provide adequate or excess capacity for the Concept Plan.

Completion of the planned upgrading of Boondah Road to typical subarterial road cross-section would provide adequate capacity, and no additional measures would be warranted by the Concept Plan.

The primary location requiring additional capacity for Option 2 is the intersection of Pittwater Road and Jacksons Road. To further examine the implications of the difference between the Concept Plan and the AECOM options, Table 4.4 summarises the estimated traffic demand for the various movements at the intersection of Pittwater Road and Jacksons Road. This is intended as a general guide to compare the future traffic demands, noting that in reality, changes on an individual approach at an intersection cannot generally be isolated from the remainder of the intersection. This is because changes to the physical infrastructure on one approach of the intersection can (for example) allow for amendments to signal timing, which can in turn result in changes to delays and queues on other approaches.

**Table 4.4: Jacksons Road/Pittwater Road Capacity Improvements and Southern Buffer Traffic Contribution**

| | AM Peak Volume (vehicles/hour) | PM Peak Volume (vehicles/hour) | AECOM Mitigation Measure |
|---|---|---|---|
| **Right Turn Bay Pittwater Road North** | | | |
| Option 1 | 113 | 197 | Increase bay length (already constructed) |
| Option 2 | 384 | 454 | Add 140m long second bay |
| Concept Plan | 0 | 71 | - |
| **Jacksons Road Westbound** | | | |
| Option 1 | 203 | 346 | - |
| Option 2 | 680 | 794 | Add westbound lane |
| Concept Plan | 1 | 124 | - |
| **Jacksons Road Eastbound to Northbound** | | | |
| Option 1 | 30 | 95 | - |
| Option 2 | 97 | 221 | Add left turn slip lane |
| Concept Plan | 2 | 32 | - |
| **Jacksons Road Eastbound to Southbound** | | | |
| Option 1 | 57 | 154 | - |
| Option 2 | 170 | 358 | Remarking for double right turn lane |
| Concept Plan | 7 | 49 | - |

This comparison suggests that the Option 2 demands at the intersection of Pittwater Road and Jacksons Road would not be reached with the Concept Plan, thus the mitigation measures are not expected to be required at to result in acceptable Levels of Service during the peak hours. The extension of the right turn bay in Pittwater Road southbound to westbound required for Option 1 has already been constructed, and the Concept Plan demand for that right turn movement would be less than that of Option 1, thus no additional lengthening would be justified.

Previous assessments suggest that the roundabouts (existing and proposed) along Macpherson Street would operate at good levels of service with spare capacity during peak hours with significantly increased traffic demands. The spare capacity available is thus very unlikely to be exceeded by the Concept Plan traffic, and detailed assessments of the intersection operating conditions would be undertaken if required to confirm this as the development process proceeds.

## 4.3 Weekend Road Capacity Implications

It is noted that the busiest period for traffic generation of bulky goods retail shops tends to be on weekends, noting that Hyder (2009) found an average peak hour generation of 2.48 vehicle trips per 100m$^2$ GFA across all the surveyed sites during the hour which corresponds with the busiest hour on the surrounding road network on a weekend day. This would equate to 413 vehicle trips per hour from the proposed 16,650m$^2$ GFA. This is some 195 vehicle trips per hour more than expected during the weekday evening commuter peak.

The options assessed by AECOM in the *Strategic Transport Study* would also result in higher traffic generation during the weekend day peak hour than the weekday commuter peaks. Based on the RMS trip generation rates used by AECOM, the retail component of Option 1 would generate 216 more trips during the Saturday peak than the weekday evening peak, and the retail component of Option 2 would generate 300 more vehicle trips during the Saturday peak hour than the weekday evening peak hour.

Typically, background traffic during the weekend peak is lower than the weekday commuter peaks, thus the impact of the generated traffic is not critical to the capacity of the road network. The previously assessed options would result in higher weekend day traffic generation than that expected to be generated by the Concept Plan. The Concept Plan therefore does not introduce any new issues regarding the capacity of the road network.

## 4.4 Impacts on Public Transport

As noted in Section 2.6, bus routes currently operate along Jacksons Road to the south of the Concept Plan site and along Macpherson Street to the north of the Concept Plan site (once existing temporary bus route changes cease). Current timetables may be supplemented by additional buses or routes should appropriate demand be demonstrated.

Similarly, the Concept Plan development is likely to result in some increased demand for public transport, primarily by residents of the site and employees of the bulky goods retail shops. Once Boondah Road is fully upgraded to subarterial cross-section, should Sydney Buses determine that there is sufficient demand, there is the potential for a future bus route to operate in a north-south direction along Boondah Road.

## 4.5 Car Parking Requirements

Parking requirements for the Pittwater LGA are set out in Pittwater DCP 21, which has minimum on-site parking requirements for various land uses.

Pittwater DCP 21 specifies minimum parking requirements for multi-unit housing, with one space required for each one-bedroom apartment, two spaces for each apartment with two or more bedrooms, and visitor parking at a rate of one space per three dwellings. With an allowance for 2 one-bedroom apartments, 12 two-bedroom apartments, and 10 three-bedroom apartments this is equivalent to a requirement for 46 residential and 8 visitor parking spaces.

Pittwater DCP 21 does not include a specific parking requirement for bulky goods retail shops. For other development types not specifically addressed in the DCP, Pittwater DCP 21 indicates that the minimum number of car parking spaces DCP "*must be determined using appropriate guidelines for parking generation and servicing facilities based on development type comparison based on the Roads and Maritime Services Guide to Traffic Generating Development or analysis drawn from surveyed data for similar development uses*."

The aforementioned updated surveys of the traffic and parking characteristics of bulky goods retail shops found that the peak parking demand for bulky goods retail shops occurs on weekends. The peak demand varied from site to site, with an average peak demand of 1.36 spaces per 100m$^2$ GFA across the surveyed sites. For the 16,650m$^2$ GFA in the Concept Plan, this would equate to a demand for some 227 spaces. The surveyed sites comprise a mix of metropolitan and non-metropolitan locations. Considering only the peak parking demand of the metropolitan sites, these displayed an average peak parking demand (weekday and weekend) of 1.57 spaces per 100m$^2$ GFA, which is equivalent to peak parking demand of 262 spaces for the Concept Plan bulky goods.

On the basis of the above, it is anticipated that the Concept Plan would require some 316 car parking spaces on the 10-12 Boondah Road portion of the site to cater for the peak demand. The Concept Plan anticipates that approximately 370 retail and 54 residential car parking spaces may be accommodated on that site, thus the peak demand would be able to be met within the site.

At 6 Jackson Road, the Concept Plan anticipates ecological rehabilitation works and a possible boardwalk connection through this site from the Warriewood Wetlands to the Centre shopping centre. These activities would not generate any additional demand for car parking.

## 4.6 Other Parking Requirements

Pittwater DCP 21 also contains requirements for the provision of other parking and servicing, as follows, noting the "retail" requirements are included here assuming that the bulky goods retail requirements would be similar:

**Servicing**

- Multi-unit housing – provision for garbage collection, removalist vans and emergency vehicles
- Retail – adequate space for delivery vehicles.

**Accessible Car Parking**

- Retail – provision of accessible spaces for people with disabilities appropriately signposted at the rate of 3% of required car parking spaces or part thereof, i.e., approximately 8 car parking spaces of the 262 spaces required.

**Bicycle Parking**

- Residential – secure enclosed bicycle storage facilities within the building at the rate of 1 bicycle rack per 3 dwellings, i.e., 8 racks for the 24 dwellings proposed.

**Car Wash**

- Residential – designated wash bay on the site where developments have more than ten units.

**Other**

- Replacement of the number of on-street parking spaces lost as a direct result of the development due to access and traffic facilities requirements.

Sufficient space is expected to be required to accommodate these requirements within the 10-12 Boondah Road portion of the site.

## 4.7 Design and Access

All car parking, vehicular access and service vehicle areas would be designed in accordance with the relevant Australian Standards.

Delivery and service vehicle requirements would be designed as the development progresses, and would comply with the Pittwater DCP 21 guidelines. The Concept Plan provides for a loading/service vehicle area which is separate from the general car parking areas.

## 4.8 Pedestrian and Cycle Access

The Concept Plan includes provision for pedestrian access through the 10-12 Boondah Road portion of the site from Boondah Road to the Warriewood Wetlands. There is the potential for a link from there via a boardwalk through the 6 Jacksons Road portion of the site to the shopping centre. This link and boardwalk may be constructed as a shared path to cater for pedestrians and cyclists.

# 5. Summary and Conclusions



## 5.1 Summary

- The Concept Plan development site lies within the Southern Buffer in the Warriewood Valley Planning Framework.
- Previous studies in the area have established appropriate mitigation measures to provide satisfactory road operating conditions with expected/planned development of undeveloped in the area. The most recent study is the Warriewood Valley Strategic Transport Review (AECOM, 2011) which assessed the implications of two levels of development in the Southern Buffer.
- The Concept site is served by the subarterial road network of Warriewood Valley, with direct links to the arterial roads which surround Warriewood Valley.
- Sydney Buses operates bus services to the north and south of the Concept Plan site.
- The proposed Concept Plan comprises a mixed use development with bulky goods retail, residential apartments and ecological rehabilitation.
- The peak hour traffic generation potential of the Concept Plan is estimated at 16 and 234 vehicle trips per hour during the morning and evening peak hours respectively.
- The potential traffic generation is less than that assessed in the Warriewood Valley Strategic Transport Review for both Option 1 and Option 2 development of the Southern Buffer.
- The Option 1 mitigation measures described by AECOM for the intersection of Pittwater Road and Jacksons Road have already been constructed, and the Concept Plan would not warrant any additional upgrading of that key intersection.
- The Concept Plan is likely to result in some increased demand for public transport services, which may be supplemented by Sydney Buses as demand grows in the Warriewood Valley.
- The proposed provision of car parking at 10-12 Boondah Road is expected to meet the demands of the site, and is consistent with the Pittwater DCP 21 requirements. Adequate space would be available to accommodate the proposed car parking, together with bicycle parking, motor cycle parking and service vehicle requirements. All parking and service vehicle areas would be designed in accordance with the relevant Australian Standards.

## 5.2 Conclusions

The proposed Concept Plan development is at a significantly reduced scale than that which has been the subject of previous planning for the Warriewood Valley area. Car parking would be satisfactorily accommodated within the site, and generated peak hour traffic would not require any additional need for upgrade works at the key intersection of Pittwater Road with Jacksons Road.

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