



2 and 18 Macpherson Street  
23-27 Warriewood Road  
Warriewood Valley  
Preliminary Transport Assessment

transportation planning, design and delivery

2 and 18 Macpherson Street  
23-27 Warriewood Road, Warriewood Valley  
Preliminary Transport Assessment

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## 1. Introduction

This report has been prepared on behalf of Karimbla Properties (No.32) Pty Ltd (Karimbla), to present the findings of a preliminary assessment of the transport implications of a proposal for residential development within the Warriewood Valley. The subject sites are located at 18 Macpherson Street, 2 Macpherson Street and 23-27 Warriewood Road.

Previous planning work in the Warriewood Valley area has determined appropriate land uses for the area and measures required to accommodate future traffic demands. Karimbla proposes to increase the density of residential development on the subject sites above that permissible under the existing planning controls and that assessed in the Warriewood Valley Strategic Transport Review. This assessment compares the likely impacts of the development density with those addressed in the previous work.

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 Planning Proposal and estimates its peak hourly traffic generation potential.
- Section 4 reviews the implications of the Planning Proposal in comparison with previous planning work in the area, including traffic generation, roadway capacity and public transport implications. The Planning Proposal'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 subject sites lie within the areas identified as Site 302, Buffer 1l and Buffer 1m in the *Warriewood Valley Planning Framework* (Pittwater Council, 2010), which are on the northern side of Macpherson Street and western side of Warriewood Road at its intersection with Macpherson Street.

### 2.2 Planning Background

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. Development levels were assessed on the basis of the now superseded version of the Warriewood Planning Framework. The traffic management measures are being completed over time, with the following measures of relevance to the subject sites not yet completed:

- Intersection median in Warriewood Road at Hill Street to make it left-in left-out adjacent to Buffer Area 1
- Bus bay in Warriewood Road at Macedon Place (near Macpherson Street)
- Warriewood Road entry threshold incorporating intersection control at Lakeview Parade
- Macpherson Street entry threshold at Narrabeen Creek (between Boondah Road and Warriewood Road)
- Roundabout at Boondah Road and Macpherson Street
- Roundabout at Vuko Place and Warriewood Road
- Amended roundabout at Macpherson Street and Warriewood Road
- Upgrade of Pittwater Road and Warriewood Road intersection
- Upgrade of Pittwater Road and Jacksons Road intersection
- Upgrade of Boondah Road to typical subarterial road cross-section, including calming measures and bridge work.

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.

With regard to the subject sites, the Planning Framework allows a potential 25 dwellings per hectare, with the following numbers of dwellings:

- 18 Macpherson Street (Site 302) 66 dwellings (of a total 131 dwellings across Sites 301-303)
- 23-27 Warriewood Road (Buffer 1l) 43 dwellings (of a total 201 dwellings across Buffer 1b-1l)
- 2 Macpherson Street (Buffer 1m) 0 dwellings.

### 2.3 Warriewood Valley Strategic Transport Study

The *Warriewood Valley Strategic Transport Study* (AECOM, 2011) 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. The four scenarios were:

- Scenario 1 Baseline – development of undeveloped residential land within Warriewood Valley at the densities specified in the Planning Framework (2010)
- Scenario 2 Future residential – development of undeveloped residential land within Warriewood Valley at the higher densities specified in the urban design study by HBO+EMBT
- Scenario 3 Southern Buffer Option 1 – Scenario 2 plus additional mixed use development within the Southern Buffer
- Scenario 4 Southern Buffer Option 2 – Scenario 3 with higher development potential within the Southern Buffer (worst case scenario).

For the development Scenario 2, the Warriewood Valley Strategic Transport Review assessed the traffic generation potential of the subject sites based on higher densities than those allowed for in the Planning Framework (2010), as follows, applying the same proportion of the total dwellings across the larger planning zones as in the Planning Framework (2010):

- 18 Macpherson Street (Site 302) 96 dwellings (of a total 192 dwellings across Sites 301-303)
- 23-27 Warriewood Road (Buffer 1l) 80 dwellings (of a total 373 dwellings across Buffer 1b-1l)
- 2 Macpherson Street (Buffer 1m) 0 dwellings.

Forecasts of increases in traffic were estimated using NSW Roads and Traffic Authority trip rates, Journey to Work patterns as well as primary and secondary retail catchment information for the residential and commercial land uses where relevant. The traffic generation assessed in the Warriewood Valley Strategic Transport Review for the subject sites is summarised in Table 2.1.

**Table 2.1: Warriewood Strategic Transport Review Trip Generation of Karimbla Sites (vehicles/hour)**

Site Address	Scenario 1		Scenario 2-4	
	Dwellings	Peak Hour Trips	Dwellings	Peak Hour Trips
18 Macpherson St	66	43	96	63
23-27 Warriewood Rd	43	28	80	52
2 Macpherson St	0	0	0	0
<b>Total</b>	<b>109</b>	<b>71</b>	<b>176</b>	<b>115</b>
<b>Total Additional<sup>A</sup></b>		<b>677</b>		<b>Scenario 2: 1,050 Scenario 3: 1,400 (1,738) Scenario 4: 2,168 (2,637)</b>

<sup>A</sup> Additional for whole Warriewood Valley including committed development traffic generation AM (PM) peaks

Together, the subject sites were thus assessed to generate some 71 vehicle trips per hour, increasing to 115 vehicle trips per hour with the higher density assumptions.

The assessment found that under Scenario 1, all of the analysed intersections would perform adequately at Level of Service C or better. Long queues are expected at the signalised intersections along Pittwater Road, and the intersection of Garden Street and Powder Works Road is expected to operate close to capacity.

Under Scenario 2, all the analysed intersections would perform adequately at Level of Service C or better, with the exception of the intersection of Garden Street and Powderworks Road, requiring minor modification. The suggested measures include remarking of the existing road space and removal of kerbside parking.

Under Scenarios 3 and 4, all the analysed intersections would perform adequately at Level of Service C or better, (assuming Scenario 2 upgrade to the Garden Street and Powderworks Road intersection), 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. 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 Jackson Road to Pittwater Road, and remarking of the eastbound lanes in Jacksons Road to create two right turn lanes.

The *Warriewood Valley Strategic Review Report* (Pittwater Council and Department of Planning and Infrastructure, 2012) recommends that the subject sites be permitted to be developed at a density of 32 dwellings per hectare. This is somewhat more than the 25 dwellings per hectare permitted assessed under Scenario 1, and less than the 40 dwellings per hectare assessed under Scenarios 2 to 4. The *Warriewood Valley Strategic Review Report* recommends that the Concept Plan exhibited for a mixed use development of the Southern Buffer not proceed. Future planning investigation by landowners would be required to address the constraints and opportunities relating to that area, and the report identifies impacts on environment, other centres, recreational lands and community expectations.

Nevertheless, it is noted that the AECOM assessment of higher residential densities combined with significant development within the Southern Buffer found that the traffic implications would be able to be accommodated with the additional capacity measures discussed above.

## 2.4 Existing Road Network

The primary roads relevant to access for the subject sites 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 shopping centre. The intersection is priority controlled, and is earmarked for upgrading to roundabout control in the Warriewood Valley Roads Master Plan.

**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 (or are planned to be), 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.

**Warriewood Road between Macpherson Street and Mona Vale Road** provides access through the Warriewood Valley. The route is not specifically classified in the Warriewood Valley Roads Master Plan, however the traffic assessment suggests an indicative daily traffic flow of 2,700 on Warriewood Road west of Manuka Place. This volume is consistent with the collector road threshold of 5,000 vehicles per day, and exceeds the local road threshold of 2,000 vehicles per day. Warriewood Road typically has a single travel lane in each direction, with kerbside parking permitted.

## 2.5 Public Transport

The primary type of public transport available in Warriewood Valley is buses, which are operated by Sydney Buses. Routes 185 and L85 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 – Garden Street – Pittwater Road – Jacksons Road – Garden Street – Macpherson Street – Ponderosa Parade – Mona Vale Road.

Sydney Buses review 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. Transport Implications

#### 3.1 Planning Proposal

Karimbla proposes to increase the density of residential development on the subject sites above that assessed in the Warriewood Valley Strategic Transport Review. The proposal involves increasing the density of dwellings to 80 dwellings per hectare. Indicatively, this would result in the following numbers of dwellings across the sites:

- 18 Macpherson Street (Site 302) 243 dwellings
- 2 Macpherson Street (Buffer 1m) and 23-27 Warriewood Road (Buffer 1l) 373 dwellings.

#### 3.2 Traffic Generation

The indicative traffic generation of the Planning Proposal development has been estimated using the RMS trip rates used in the Warriewood Valley Strategic Transport Review. It is noted that RMS has recently released updated traffic generation rates for residential developments, however for consistency the same rates have been adopted as those used in the Warriewood Valley Strategic Transport Review.

As for the Southern Buffer assessment (Scenarios 3 and 4) in the Warriewood Valley Strategic Transport Review, a lower trip generation rate has been used for the Planning Proposal, to reflect the higher density of development. The Scenario 1 and 2 assessments assumed a rate of 0.65 vehicle trips per dwelling, which is consistent with the upper end of the range given by RMS for larger (three and more bedroom) medium density dwellings such as larger units and townhouses. For the higher density Southern Buffer options, a rate of 0.5 vehicle trips per dwelling was adopted, which is consistent with the lower end of the range given by RMS rate for larger medium density dwellings, and upper end of the rate for smaller units and flats (up to two bedrooms).

Adoption of this rate also reflects Karimbla’s estimated development mix of 15 percent one-bedroom apartments, 75 percent two-bedroom apartments and 10 percent three-bedroom apartments.

Table 3.1 presents the resulting trip generation with the Planning Proposal and compares it with those used in the Strategic Transport Review assessments.

**Table 3.1: Planning Proposal Trip Generation of Karimbla Sites (vehicles/hour)**

Site Address	Warriewood Valley Strategic Transport Review		Planning Proposal
	Scenario 1	Scenario 2-4	
18 Macpherson St	43	63	122
2 Macpherson St and 23-27 Warriewood Rd	28	52	187
<b>Total</b>	<b>71</b>	<b>115</b>	<b>309</b>

The Planning Proposal would therefore generate an additional 238 vehicle trips per hour above that assessed for Scenario 1, and 194 vehicle trips per hour above that assessed for Scenarios 2 to 4.

Table 3.2 compares the total additional vehicle trips generated within Warriewood Valley under the Strategic Transport Review scenarios, and with the Planning Proposal on the Karimbla sites.

This is the additional trips including the committed developments identified in the Strategic Transport Review.

**Table 3.2: Total Additional Trip Generation Warriewood Valley**

Strategic Transport Study Scenario	With Strategic Transport Review Densities		With Planning Proposal Densities	
	AM Peak	PM Peak	AM Peak	PM Peak
Scenario 1	677	677	915	915
Scenario 2	1,050	1,050	1,244	1,244
Scenario 3	1,400	1,738	1,594	1,932
Scenario 4	2,168	2,637	2,362	2,831

Note: Additional for whole Warriewood Valley including committed development traffic generation

Table 3.2 demonstrates that with the Planning Proposal, the additional total traffic generation of the Warriewood Valley committed and potential developments would remain below the total generation of the “next busiest” scenario assessed by AECOM. Thus in general terms, it would be expected that the mitigation works required for Scenario 2 would provide adequate capacity for Scenario 1 with the increased densities on the Karimbla sites, and the mitigation works required for Scenario 3 would provide adequate capacity for Scenario 2 with the increased densities on the Karimbla sites. It is noted that the traffic generation of Scenario 3 under the Strategic Review is significantly higher than that of Scenario 2 with the Planning Proposal, thus the mitigation measures required are likely to be less than those recommended by AECOM.

Additional mitigation measures would be likely to be required under the “worst case” Scenario 4 with the increase densities on the Karimbla sites, however the Strategic Review Report recommends that the exhibited Concept Plan for the Southern Buffer not proceed, and it is unlikely that such a development would eventuate in the short to medium term.

### 3.3 Traffic Distribution

Comparing the estimated traffic generation of the Planning Proposal with that used in the Warriewood Valley Strategic Transport Review (Table 3.1), it is evident that the Planning Proposal would generate somewhat more vehicle trips than assessed by AECOM for the subject sites.

In order to compare the Planning Proposal traffic impacts with the scenarios already assessed by AECOM, the Planning Proposal traffic has been distributed on the road system using the same assumptions applied by AECOM for residential traffic. The resulting distribution of the traffic generated by the Karimbla sites is presented in Table 3.3.

**Table 3.3: Planning Proposal and WVSTR Peak Hour Traffic to/from Karimbla Sites (vehicles per hour)**

	South via Pittwater Rd	North/Northeast via Pittwater/Barrenjoey Rds	West via Mona Vale Rd	Internal
<b>AM Peak Hour</b>				
Planning Proposal	198	54	84	64
Scenario 1	35	10	15	11
Scenarios 2-4	57	16	24	18
<b>PM Peak Hour</b>				
Planning Proposal	179	74	88	60
Scenario 1	32	13	16	11
Scenarios 2-4	51	21	25	17

Table 3.3 demonstrates that the most significant increases in traffic as a result of the Planning Proposal compared with the previous assessment would be expected to occur on routes

between the sites and Pittwater Road both north and south. The most direct access routes for the developable Karimbla sites to/from Pittwater Road are:

- 18 Macpherson Street – via Macpherson Street and Warriewood Road east of Macpherson Street
- 2 Macpherson Street and 23-27 Warriewood Road – via Warriewood Road.

The most direct access routes for the developable Karimbla sites to/from the west via Mona Vale Road are:

- 18 Macpherson Street – via Macpherson Street and Ponderosa Parade OR via Macpherson Street – Garden Street – Powderworks Road
- 2 Macpherson Street and 23-27 Warriewood Road – via Warriewood Road – Jubilee Avenue – Ponderosa Parade OR Warriewood Road – Macpherson Street – Garden Street – Powderworks Road.

It is noted that the AECOM study distinguishes between traffic travelling to and from the west via Mona Vale Road and via Powderworks Road, and only assigns residential traffic to the “west via Mona Vale Road” not via Powderworks Road.

### 3.4 Intersection Capacity Impacts

As the Planning Proposal traffic generation would be higher than that assumed in the AECOM study, it follows that the mitigation measures required to provide adequate roadway capacity would also be needed for the Planning Proposal, with some additional measures. This section discusses specific intersections which may be impacted by the Planning Proposal traffic.

#### 3.4.1 Powderworks Road and Garden Street

The intersection of Powderworks Road and Garden Street is expected to operate near capacity under Scenario 1, and would require some mitigation measures under Scenarios 2 to 4. These measures include remarking of the existing road space and removal of kerbside parking.

The traffic generated by the Planning Proposal sites travelling to and from the west via Mona Vale Road may travel through this intersection, noting that the AECOM study assigned the residential traffic to/from the west via Mona Vale Road rather than Powderworks Road. Table 3.4 summarises the traffic generated by the Karimbla sites travelling to and from the west during the morning and evening peak hours, based on the distribution information provided by AECOM.

Table 3.4: Karimbla Sites Traffic to/from West via Mona Vale Road (vehicles per hour)

	Inbound	Outbound	Total
<b>AM Peak Hour</b>			
Planning Proposal	9	76	84
Scenario 1	2	13	15
Scenarios 2-4	2	22	24
<b>PM Peak Hour</b>			
Planning Proposal	79	9	88
Scenario 1	14	2	16
Scenarios 2-4	23	2	25

This demonstrates that should all the site’s traffic travelling to and from the west use Garden Street and Powderworks Road, the Planning Proposal would result in an increase in the outbound traffic turning right from Garden Street to Powderworks Road, and the inbound traffic turning left from

Powderworks Road to Garden Street. The extent to which residential traffic was assumed to use this route in the AECOM study is not known, thus it is difficult to identify what the impacts of the Planning Proposal on the intersection may actually be.

The upgrades recommended by AECOM involve lengthening of the lanes available for turning, by banning some parking and reallocating it elsewhere. The measures would provide additional capacity to turning vehicles, and would allow through vehicles to pass around vehicles waiting to turn. Should additional capacity be required, this may be available through further lengthening of turn lanes without need for land acquisition. This would be the subject of additional assessment as the development process proceeds to determine if any additional capacity would be required to meet the expected demand.

### 3.4.2 Pittwater Road Intersections

The AECOM study found that additional mitigation measures would be required at the intersection of Pittwater Road and Jacksons Road to address the impacts of the traffic generated under Scenarios 3 and 4. Traffic travelling to and from the Karimbla sites and Pittwater Road would tend to use the intersection of Warriewood Road rather than Jacksons Road, as the latter would be less direct. The increased traffic resulting from the Planning Proposal would therefore travel through the Jacksons Road intersection on Pittwater Road rather than turning into and out of Jacksons Road. The mitigation measures suggested at the Jacksons Road intersection are associated with providing additional capacity for traffic turning into and out of Jacksons Road.

The additional traffic would therefore be likely to have its greatest impact on the intersection of Pittwater Road with Warriewood Road. The AECOM assessment found that under the “worst case” Scenario 4, this intersection would operate at Levels of Service B in the morning peak hour with x-value 0.766 and C in the evening peak hour with x-value 0.847. X-value is the measure of the degree of saturation of the intersection, being the ratio of the demand to the capacity. At lower land use densities, the intersection would operate at lower x-values, i.e. with more spare capacity.

Table 3.5 summarises the expected traffic by direction generated by the Karimbla sites with the Planning Proposal, and compares it that expected under the AECOM scenarios.

Table 3.5: Karimbla Sites Traffic on Pittwater Road (vehicles per hour)

	Inbound	Outbound	Total
To/from South	Northbound	Southbound	Total
<b>AM Peak Hour</b>			
Planning Proposal	18	180	198
Scenario 1	3	32	35
Scenarios 2-4	5	52	57
<b>PM Peak Hour</b>			
Planning Proposal	159	20	179
Scenario 1	28	4	32
Scenarios 2-4	45	6	51
To/from North	Southbound	Northbound	Total
<b>AM Peak Hour</b>			
Planning Proposal	8	47	55
Scenario 1	2	8	10
Scenarios 2-4	2	14	16
<b>PM Peak Hour</b>			
Planning Proposal	69	5	74
Scenario 1	12	1	13
Scenarios 2-4	20	1	21

Table 3.5 indicates that the Planning Proposal is likely to increase demand significantly above the AECOM scenarios for the right turn movement out from Warriewood Road to Pittwater Road during the morning peak hour and for the left turn movement in from Pittwater Road to Warriewood Road during the evening peak hour.

The Warriewood Valley Roads Master Plan identified that the signalised intersection of Warriewood Road with Pittwater Road would require upgrading, and the concept plan for that intersection includes widening of Warriewood Road to provide an additional eastbound lane on its approach to Pittwater Road. Warriewood Road presently has two eastbound lanes, one being for right turns only, the other being for left, through and right turns. It has two westbound lanes from the Pittwater Road intersection, and no change to these is suggested by the Roads Master Plan.

The extent to which any additional mitigation measures would be required at this intersection should the Planning Proposal proceed would depend upon the ultimate level of development within the Warriewood Valley as a whole. Under Scenario 2, the intersection would have more spare capacity to accommodate the Planning Proposal traffic than under Scenario 4, which is considered to be unlikely to proceed, thus there may be no requirement for additional capacity.

If required, additional capacity for the turning movements at the intersection could be made available by lengthening of the turn lanes, allocation of lanes to specific movements, and/or amendments to signals phasing or timing. It is anticipated that the additional traffic generated by the Planning Proposal would be able to be accommodated within the measures recommended by AECOM for Scenario 3 or 4. More detailed assessment and consultation with RMS would be required to determine what mitigation measures, if any, would be appropriate. This would need to take into consideration the flow of traffic along Pittwater Road and the coordination of the signals.

### 3.4.3 Other Intersections

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 Planning Proposal traffic, and detailed assessments of the intersection operating conditions would be undertaken to confirm this as the development process proceeds.

## 3.5 Impacts on Public Transport

As noted in Section 2.5, bus routes currently operate along Macpherson Street and Warriewood Road adjacent to the Planning Proposal sites. Current timetables may be supplemented by additional buses or routes should appropriate demand be demonstrated. The current and potential developments in the area, such as the Meriton Oceanvale Apartments, are likely to increase demand for public transport services. Similarly, the Planning Proposal development is likely to increase demand for public transport.

## 3.6 Car Parking Requirements

Parking requirements for the Pittwater LGA are set out in Pittwater DCP 21 (Amendment 9), which has minimum on-site parking requirements for various land uses. The DCP treats multi-unit housing as being distinct from two and three storey residential flat buildings, however only specifies parking requirements for multi-unit housing, which it defines as having three or more dwellings. The Planning Proposal would contain a mix of residential building heights ranging from two storeys up to potentially five storeys, thus the multi-unit housing definition does not align with the type of residential development proposed.

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 RTA (now RMS) Guide to Traffic Generating Development or analysis drawn from surveyed data for similar development uses.*”

Table 3.6 therefore compares the proposed car parking rates for the Planning Proposal with those in both the Pittwater DCP 21 and the aforementioned RMS guidelines. The table uses the RMS rate for medium density residential development, which is higher than that for high density residential developments. The Planning Proposal is expected to comprise a mix of medium and high density residential based on the RMS definitions.

**Table 3.6: Parking Rates**

	DCP 21 Rate	RMS Residential Rate	Proposed Rate
Residential	Multi-unit housing: 1 space/ 1 bedroom dwelling 2 spaces/2+ bedroom dwelling	Medium density: 1 space/1 bedroom unit 1.2 spaces/2 bedroom unit 2.0 spaces/3+ bedroom unit	1.0 space/1 bedroom unit 1.5 spaces/2 bedroom unit 2.0 spaces/3+ bedroom unit
Visitors	Multi-unit housing: 1 space/3 dwellings	Medium density: 1 space/5 dwellings	1 space/5 dwellings

Table 3.6 indicates that the proposed car parking provision would comply with the RMS and Council guidelines for one and three bedroom units and visitors, and would exceed the RMS requirement for two bedroom units in medium density residential developments. This is considered appropriate for the type of development proposed, and complies with the Council’s requirement regarding development types not specified in DCP 21.

Car parking would be located within basement levels. All car parking and service vehicle areas would be designed in accordance with the relevant Australian Standards.

### 3.7 Other Parking Requirements

Pittwater DCP 21 also contains requirements for the provision of other parking and servicing or relevance to the Planning Proposal, as follows:

- Multi-unit housing – provision for garbage collection, removalist vans and emergency vehicles
- Residential – secure enclosed bicycle storage facilities within the building at the rate of 1 bicycle rack per 3 dwellings
- Residential – designated wash bay on the site where developments have more than ten units.

Development on the sites would comply with these requirements, and the wash bays and bicycle parking would be accommodated within the basement car parking levels.

Delivery and service vehicle requirements would be designed as the development progresses, and would comply with the Pittwater DCP 21 guidelines.

## 4. Summary and Conclusions

### 4.1 Summary

- The Planning Proposal sites lies within the Site 302, Buffer 1l and Buffer 1m 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 four development scenarios in the Warriewood Valley, including two residential densities on the subject sites.
- The Planning Proposal sites are served by the subarterial road network of Warriewood Valley, being on Macpherson Street, with direct links to the arterial roads which surround Warriewood Valley.
- Sydney Buses operates bus services along Macpherson Street and Warriewood Road past the sites.
- The Planning Proposal comprises residential development at a higher density than that assessed in the *Warriewood Valley Strategic Transport Review*.
- The peak hour traffic generation potential of the Planning Proposal is estimated at 309 vehicle trips per hour during the morning and evening peak hours.
- The potential traffic generation is more than that assessed in the *Warriewood Valley Strategic Transport Review* of 71 and 115 vehicle trips per hour for the two densities that were assessed.
- Detailed assessment and consultation with RMS would be undertaken to determine the requirements for upgrading of the intersection of Pittwater Road and Warriewood Road with the Planning Proposal development, noting the need for upgrading would be dependent on overall development levels within Warriewood Valley. This would occur following the Gateway determination.
- The Planning Proposal is likely to increase demand for public transport services, which may be supplemented by Sydney Buses as demand grows.
- Car parking provision consistent with RMS requirements can be achieved. Car parking, bicycle parking, and car wash requirements would be met within basement levels. Service vehicle needs would be identified as the development design proceeds. All parking and service vehicle areas would be designed in accordance with the relevant Australian Standards.

### 4.2 Conclusions

The proposed Planning Proposal would increase the density of residential development on the subject sites, with a corresponding increase in the expected traffic generation during peak hours. With the Planning Proposal traffic, the need for (and design of) additional upgrade works at key intersections would be assessed in consultation with RMS and Pittwater Council to assess the appropriate measures as the development process proceeds. This would occur following the Gateway determination. Car parking and servicing would be accommodated within the sites, and would be designed in accordance with the relevant Australian Standards.

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