12-14 Waters Road, Neutral Bay

Planning Proposal Transport Impact Assessment

Prepared for:

Central Element

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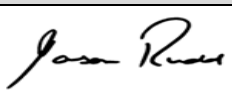
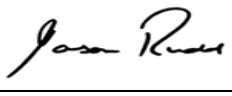
V01	13/12/21	K. Lam	J. Rudd	J. Rudd	
V02	21/12/21	K. Lam	J. Rudd	J. Rudd	

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1 Introduction

The Transport Planning Partnership (TTPP) Pty Ltd has been engaged by Central Element to undertake a transport impact assessment of planning proposal for a proposed mixed-use development at 12 -14 Waters Road, Neutral Bay.

A planning proposal (DA) is to be lodged with North Sydney Council (Council) seeking approval to construct a 6 storey mixed-use development with residential and non-residential uses on the site.

1.1 Background to Site Development Approvals

In October 2020, the North Sydney Local Planning Panel approved a development application (DA 104/20) at 12 Waters Road for the construction of a 5-storey mixed use development comprising 16 residential apartments, ground level commercial floor space, lower ground commercial space along with 3 levels of basement car parking.

In February 2021, the Military Road Corridor Strategy (MRCS) was endorsed by Council but has not yet been adopted and awaits further community consultation. The MRCS has identified the high level of connectivity of the Neutral Bay town centre site and the available public transport services. The study seeks to provide additional employment floor space within the town centre with a diversity of use to promote vibrancy and long-term viability combined with town centre public domain improvements.

After the approval of DA 104/20, Central Element secured owners consent to lodge a DA for development of the combined site comprising 12 and 14 Waters Road.

The combined site provides additional development opportunities compared to the single lot site at 12 Waters Road. These opportunities include increased street frontage providing options for vehicle access locations, activation of street frontages with retail land uses, improved service vehicle access and on-site parking arrangements.

Generally, the combine site affords opportunities to deliver a development which better reflects the transport aims and objectives of the current planning controls for the site and the MRCS.

In October 2021, the North Sydney Planning Panel grant deference commencement consent (DA92/21) for a 5 storey mixed use development on the site at 12-14 Waters Road Neutral Bay. The approved development comprised:

- 36 residential apartments
- 1,973 m2 GFA of retail / commercial floor space;

- 100 basement car parking spaces; and
- Loading dock for a MRV accessed via Waters Lane.

1.2 Overview of Planning Proposal

Central Element will submit a planning proposal for the site to increase the height of the approved building to be constructed on the site from 5 to 6 storeys.

The planning proposal development will comprise:

- 42 residential apartments
- 1,973 m2 GFA of retail / commercial floor space;
- 105 basement car parking spaces; and
- Loading dock for a MRV accessed via Waters Lane.

Vehicle access to and from the site for car parking and service vehicles will remain unchanged by the planning proposal development compared to the approved development.

1.3 Purpose of this Report

This report presents the findings of TTPP's assessment of the traffic, transport and parking implications of the proposed 6 storey development on the site at 12-14 Waters Road, Neutral Bay. The remainder of the report is set out as follows:

- Chapter 2 discusses the existing conditions including a description of the subject site
- Chapter 3 provides a brief description of the proposed development
- Chapter 4 assesses the transport implications of the proposed development, including on-site parking provisions
- Chapter 5 presents the conclusions of the assessment.

2 Existing Conditions

2.1 Site Description

The site is located at 12-14 Waters Road, Neutral Bay within the Neutral Bay town centre.

The location of the site and its surrounds is shown in Figure 2.1 and property boundaries comprising the development site are displayed in Figure 2.2.

Figure 2.1: Site Location and Locality

Source: Google Maps Australia

The site has three road frontages, namely Waters Road (31 metres) to the east, Grosvenor Street (55 metres) to the north and Waters Lane (31 metres) to the west.

Figure 2.2: Site Property Boundaries

Source: Nearmap Aerial dated 18 April 2020

The building on 12 Waters Road is currently occupied by ground floor retail (approx. 400m2) and 3 levels of commercial land uses above. The building on 14 Waters Road includes a single level basement with 4 ground floor retail premises on the corner of Grosvenor Street and Waters Road, and 3 levels of commercial accessed via Grosvenor Street.

Both 12 Waters Road and 14 Waters Road provide existing basement parking each of which is accessed via separate single lane driveways at Waters Lane.

TTPP's surveys of the site's existing vehicle access indicated that existing site uses generated the following peak period vehicle movements:

- AM Peak (8-9am): 13 vehicle trips / hour
- PM Peak (5-6pm): 14 vehicle trips / hour

Waste collection is currently undertaken by kerbside collections in Waters Lane for both 12 and 14 Waters Road.

Loading and deliveries are undertaken via on street loading bays, including the sign posted loading zones in Waters Lane and Waters Road adjacent to the site's frontage.

The site is located to the north of commercial and retail uses adjacent to Military Road. There are additional retail uses to the east and west of the site. Land further north of the site is predominantly occupied by residential uses.

2.2 Surrounding Road Network

2.2.1 Waters Road

Waters Road is a two-way road generally aligned in a north – south direction between the Belgrave Street-Gerard Street intersection and Military Road. There is a 50 km/h speed limit in operation and 1P restricted kerbside parking is generally provided on both sides of the road. There is also a loading zone located immediately outside of the development site. The carriageway is approximately 12.5m wide.

2.2.2 Grosvenor Street

Grosvenor Street is a two-way road aligned in an east-west direction between Waters Road and Ben Boyd Road. Within the vicinity of the site, 2P restricted 90-degree angle parking is provided on the south side of the road and 1/2P restrictions are in operation on the north side. Grosvenor Street has a sign posted speed limit of 50 km/h. The carriageway is approximately 12.5m wide.

2.2.3 Waters Lane

Waters Lane is a one-way (southbound only) pedestrian priority shared zone aligned in a north-south direction and serves as the vehicle access point to the existing development. There is currently a loading zone in operation of the eastern side of Waters Labe near the Grosvenor Lane intersection. There is a 10 km/h speed limit in operation and the carriageway is approximately 7m wide.

Waters Lane is also a service lane for properties fronting onto Waters Road, with vehicle access driveways located off Waters Lane. The building alignment for these properties on to kerb do not facilitate pedestrian movements along a very narrow verge. Observations of pedestrian movements indicate that the main desire lines for pedestrians is along footpath on the western side of Waters Lane along the supermarket (Woolworths) frontage.

2.2.4 Grosvenor Lane

Grosvenor Lane is a one-way (eastbound only) pedestrian priority shared zone aligned in an east-west direction between Waters Road and Young Street. There is a small amount of 1P restricted kerbside parking available on the north side of the road and in addition to this, Grosvenor Lane leads through to a public car park. There is a 10 km/h speed limit in operation and the carriageway is approximately 7m wide.

2.2.5 Military Road

At Waters Road, Military Road is six-lane road generally aligned in an east-west direction between Middle Head Road and the Warringah Freeway, providing a key thoroughfare from the Northern Beaches towards the CBD, thus comprising an important component of the arterial road network. The speed limit is generally 60 km/h, although there is a 40 km/h school zone to the east of the Waters Road intersection.

2.2.6 Traffic and Pedestrian Surveys

Peak period traffic and pedestrian flow surveys were undertaken in the immediate vicinity of the site to provide an understanding of existing conditions, primarily at the site's proposed vehicle access at Waters Road.

The surveys identified the following peak hour periods:

- AM Peak: 8:15am - 9:15am
- PM Peak: 4:45am – 5:45pm
- Weekend Peak: 11:45am – 12:45pm

Error! Reference source not found. provides the peak hour results of the survey.

Table 2.1: Summary of Existing Traffic and Pedestrian Flows

TIME PERIOD	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekend Peak Hour
Vehicles along Waters Road @ Site	248 v/h	322 v/h	354 v/h
Pedestrians on Site's Waters Road Frontage	129 p/h	95 p/h	148 p/h
Pedestrians Crossing Waters Road – south of Grosvenor Road	122 p/h	112 p/h	169 p/h
Vehicles along Grosvenor Road (east of Waters Road)	305 v/h	347 v/h	428 v/h

Notes: v/h = vehicles per hour

p/h = pedestrians per hour

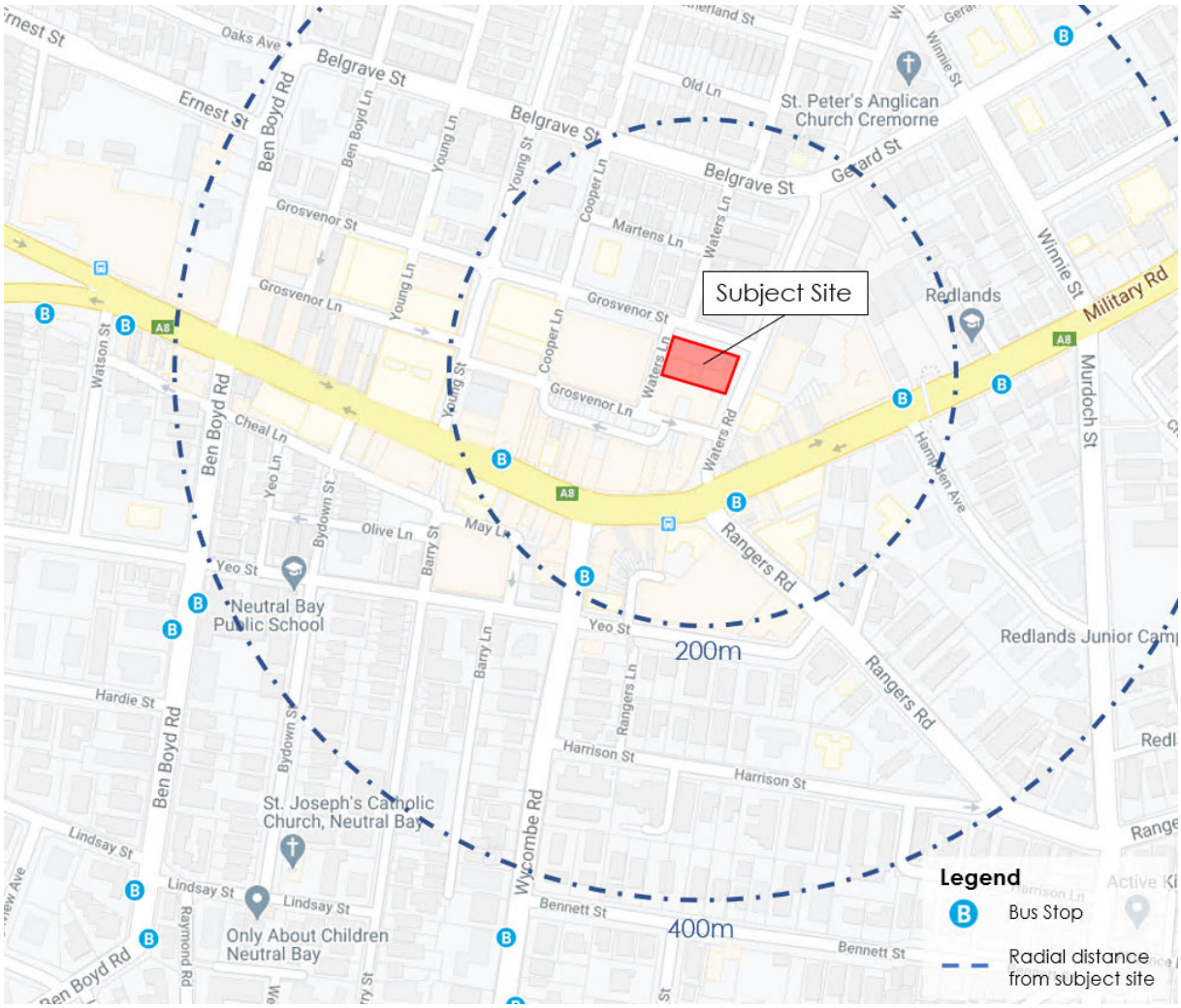
Traffic and pedestrian surveys undertake 4th and 5th of December 2020.

2.3 Public Transport Facilities

The site is well serviced high frequency public transport services. While there are no railway stations in the local area, there are a large number of bus stops within a 400m walking distance catchment radius, in particular along Military Road.

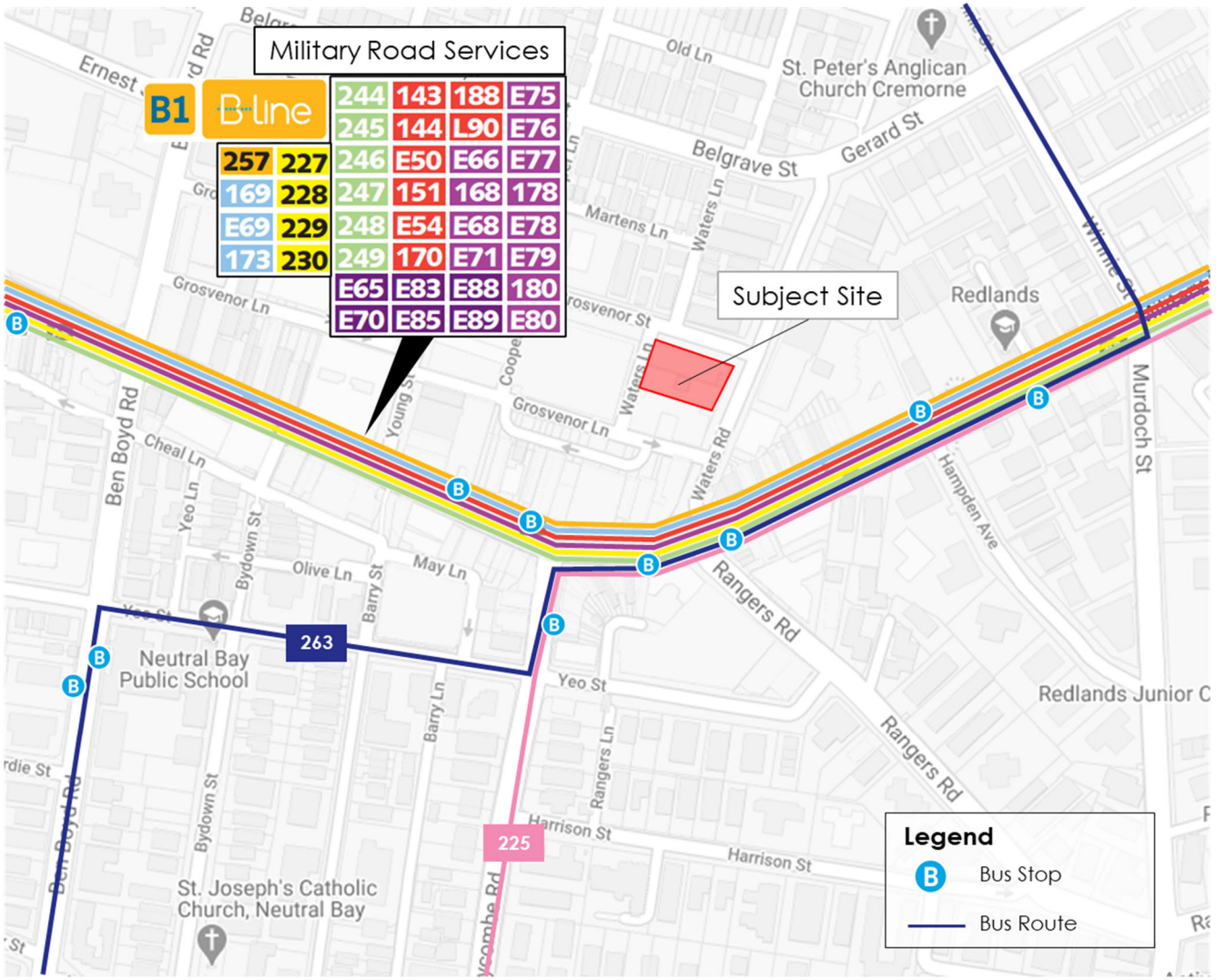
The available public transport facilities in the local area are displayed in Figure 2.3 and Figure 2.4.

Figure 2.3: Public Transport Facilities



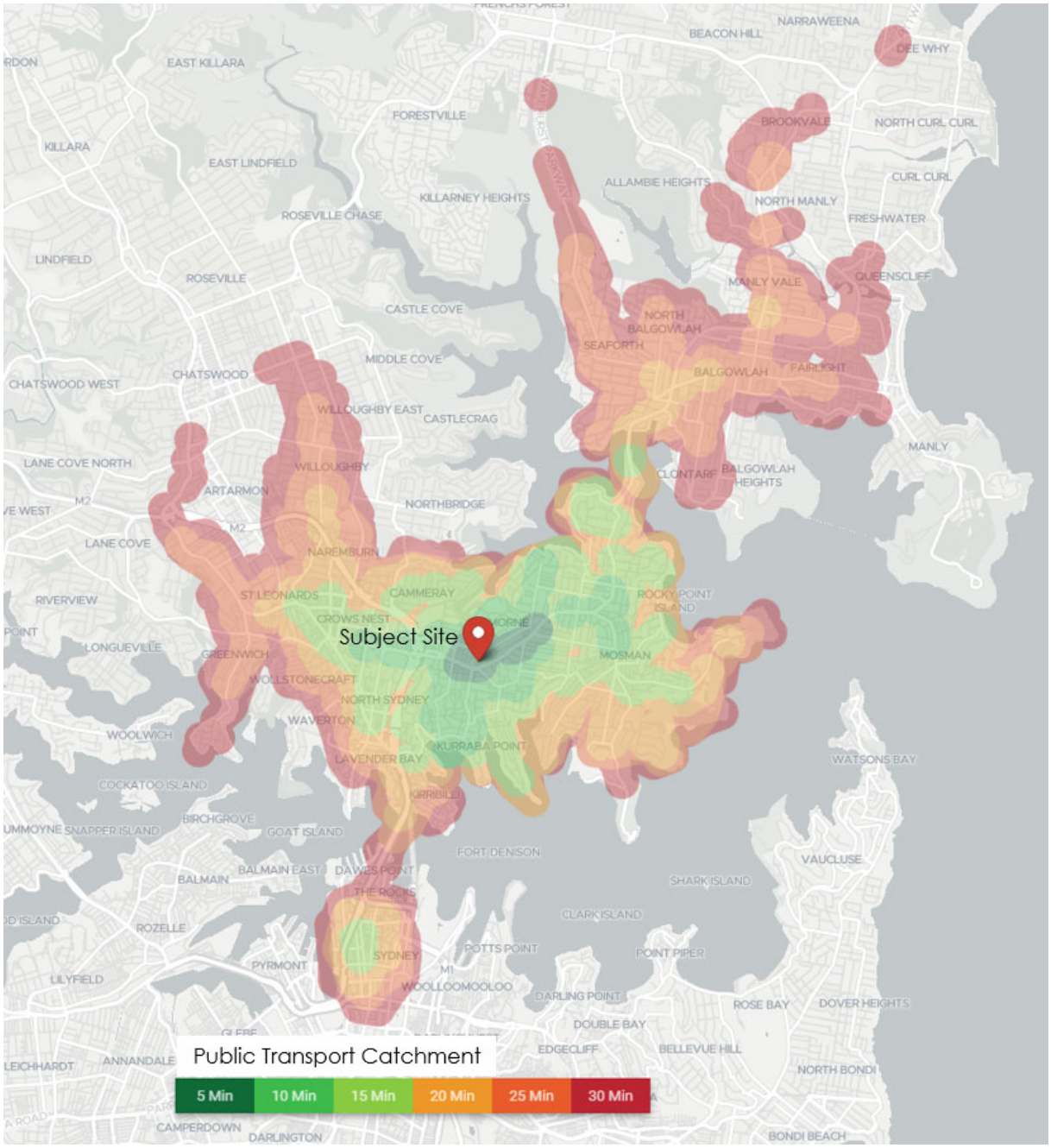
Base Map Source: Google Maps Australia

Figure 2.4: Bus Routes Servicing the Site



As demonstrated in Figure 2.5, the available public transport services surrounding the sites results in the site being well connected to surrounding areas with an extensive array of locations within 30 minute travel time by public transport.

Figure 2.5: 30 minute Public Transport Catchment for the Site



2.4 Pedestrian and Cycle Infrastructure

There is a good provision of pedestrian infrastructure within the vicinity of the site, with dedicated footpaths generally provided on the surrounding roads. A marked pedestrian crossing of Waters Road is provided to the site of the intersection with Grosvenor Street adjacent to the site.

Further to this, the Military Road-Wycombe Road intersection is signalised and features a pedestrian priority crossing that connects the site to the wider Neutral Bay area.

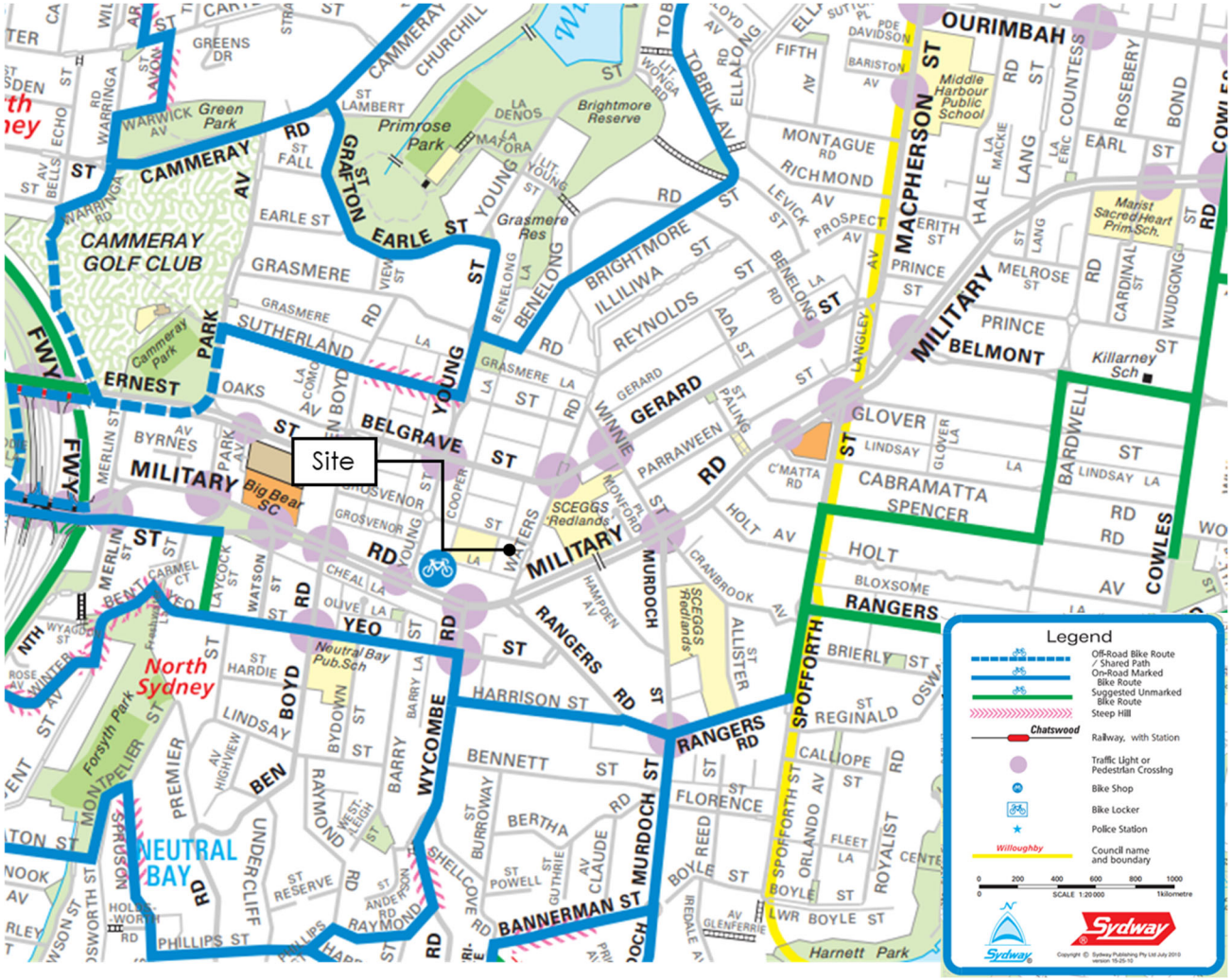
The Military Road-Wycombe Road intersection to the south of the site is signalised, featuring pedestrian priority crossing facilities. There is also a pedestrian priority crossing located outside of the site on Waters Road.

The site is also well connected to the regional cycle network. An off-road cycle tracks runs to the south of the site on Yeo Street and Harrison Street providing connectivity towards the wider Neutral Bay area and further south towards the CBD. In addition to this, further off-road bicycle routes are provided further north on Sutherland Street and Brightmore Street that provide accessibility towards Cremorne.

The regional cycle network is displayed in Figure 2.6.

The Walking and Cycling catchments for the proposed development site at 12-14 Waters Road Neutral Bay are shown in Figure 2.7 and Figure 2.8 respectively.

Figure 2.6: Regional Cycle Network



Source: Mosman Council

Figure 2.7: Walk Catchment for Proposed Development Site

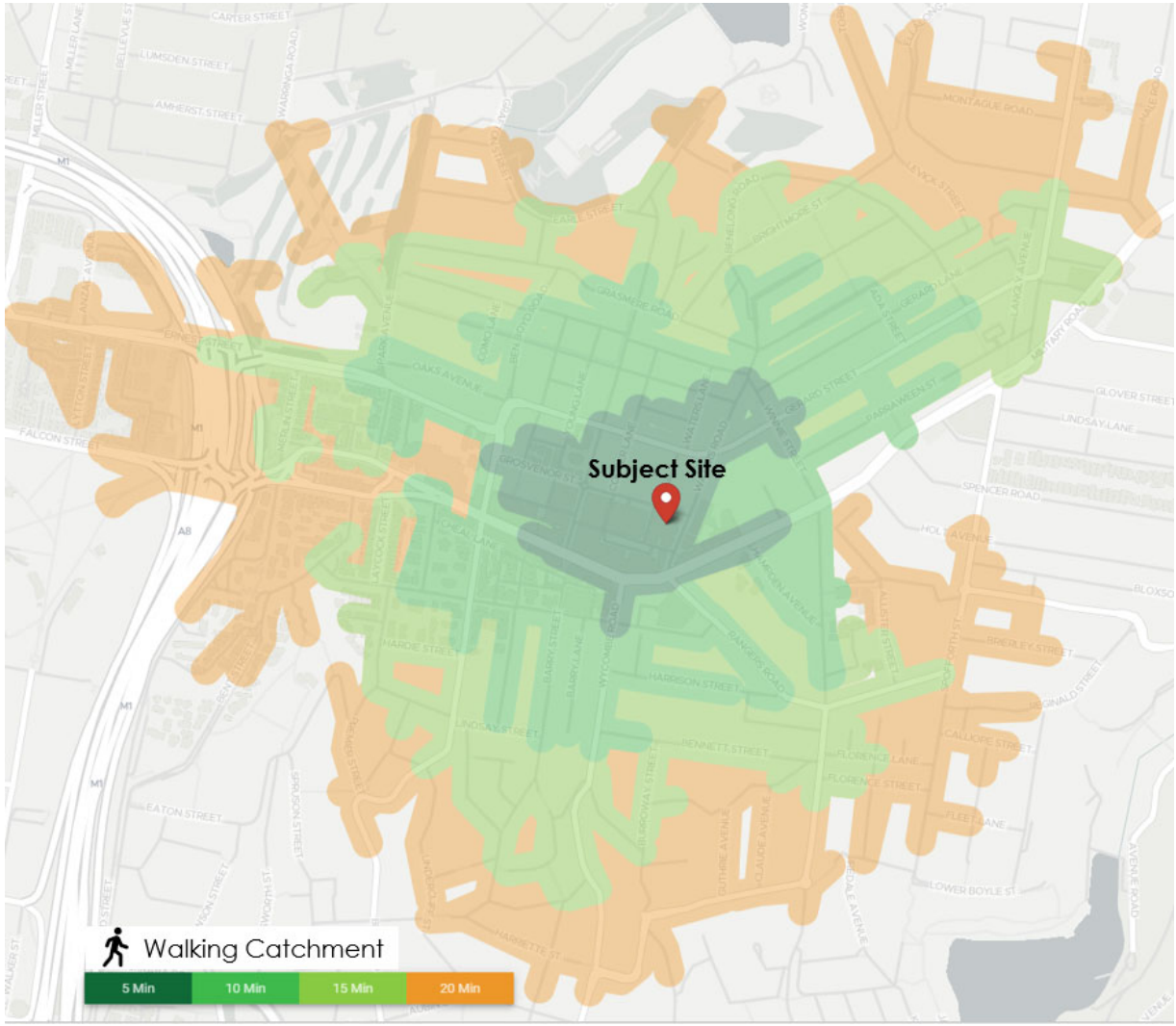
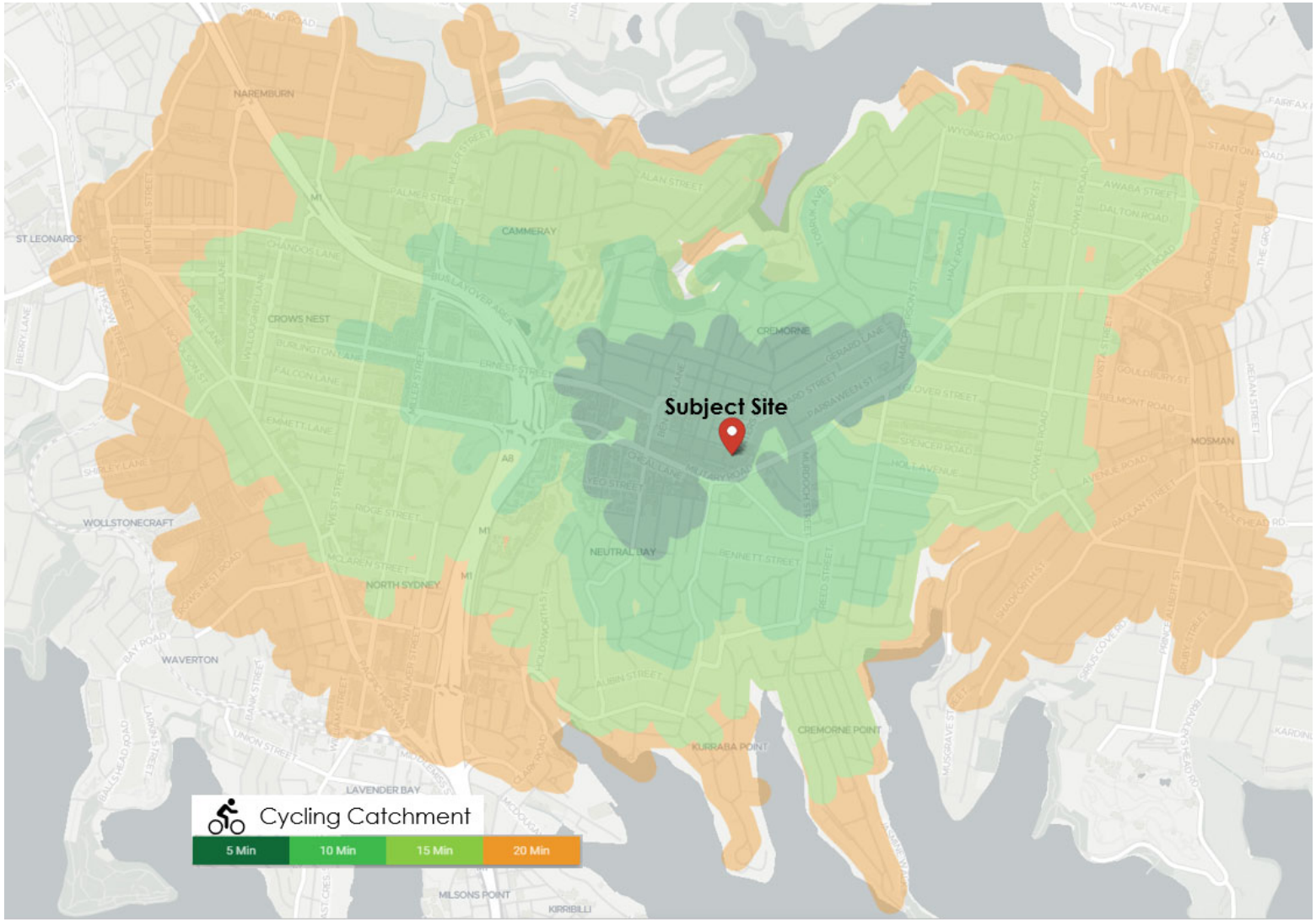


Figure 2.8: Cycle Catchment for Proposed Development Site



2.5 Car Share

Car sharing is a flexible, cost-effective alternative to car ownership and is a convenient and reliable way for residents to use a car when they need one. GoGet and Flexicar are car share companies operating in Australia, with a number of vehicles positioned within the area.

Car share is a concept by which members join a car ownership club, choose a rate plan and pay an annual fee. The fees cover fuel, insurance, maintenance and cleaning. The vehicles are mostly sedans, but also include SUVs, station wagons and vans. Each vehicle has a home location, referred to as a "pod", either in a parking lot or on a street, typically in a densely populated urban neighbourhood. Members reserve a car by web, telephone and use a key card to access the vehicle.

The locations of GoGet car sharing pods in the vicinity of the site are shown in Figure 2.9.

Figure 2.9: GoGet Car Sharing Vehicles

Base Map Source: GoGet Australia, https://www.goget.com.au/find-cars/

3 Overview of Planning Proposal Development

The Planning Proposal is seeking approval to demolish existing on-site buildings and the construction of a new 6 storey mixed-use building on the site at 12-14 Waters Road, Neutral Bay.

The combination of 12 and 14 Waters Road into a single development site will allow vehicle access to / from on-site car parking to be located away from Waters Lane to enable the existing service lane and shared pedestrian priority zone to be maintained along Waters Lane.

The development proposal would include the following:

- 42 residential apartments with the following mix:
  - 6 x 1 bedroom apartments (including 2 adaptable apartments)
  - 14 x 2 bedroom apartments
  - 22 x 3+ bedroom apartments (including 7 adaptable apartments)
- 1,973 m^2 GFA of non-residential floor area:
  - 1,449 m^2 large floor plate retail floor space
  - 542 m^2 retail floor space
- On-site basement car parking area accessed via Waters Road providing a total of 105 car parking spaces, comprising:
  - 60 x non-residential car spaces (including 1 accessible space)
  - 5 x visitor parking spaces (including 1 accessible spaces)
  - 40 x residential car spaces (including 9 adaptable parking spaces)
- 1 x car wash bay
- 12 x motorcycle parking spaces
- On-site bicycle parking / storage areas:
- On-site loading area accommodating a standard waste collection vehicle (9.7m long). The loading area would be accessed via Waters Lane.
- The proposed basement car parking area would be accessed via a driveway located on the site's road frontage to Waters Road.

4 Assessment of Proposed Development

4.1 On-Site Parking Provisions

The North Sydney DCP 2013 (DCP) sets out required parking provisions for different development and land use types within the Council area.

The DCP parking requirements have been applied to the proposed development at 12-14 Waters Road, Neutral Bay.

The parking requirements are set out below.

4.1.1 Car Parking Provisions

The Site is located within a "B4-Mixed Use Zone" which has maximum on-site car parking allowances and reflects the site's excellent access to public transport services.

With regard to on-site car parking, the maximum parking requirements are calculated based on a development yield at follows:

- Residential - 42 apartments; and
- Non-Residential - 1,973 m^2 GFA

The DCP 2013 maximum allowable rates for on-site car parking have been applied to the proposed development site and are presented in Table 4.1.

The assessment presented in Table 4.1 demonstrates that the proposed car parking space provisions for development are compliant with the DCP 2013 parking maximum allowable parking for the site and are consistent with the sustainable transport policies applicable to a site within the DCP.

The objectives of the endorsed MRCS have been noted including no increase to the existing DCP 2013 parking objectives. The proposal has therefore adopted the relevant allowable parking provisions under the existing DCP.

Notwithstanding the above, it is acknowledged that while visitor parking for residential development is not required under the DCP parking controls, in its approval of DA 104/20 Council recommended the provision of on-site residential visitor car parking.

Council's recommendation for the provision of residential visitor car parking has been incorporated into the proposed development of 12-14 Waters Road with a total of 5 visitor spaces provided within the basement parking area including 1 accessible visitor parking space.

Table 4.1: Assessment of Proposed Car Parking Provisions

Land Use	No. of Apartments / GFA (m2)	DCP Maximum Parking Rate	Maximum DCP Allowable Spaces	Proposed Parking Provision
Residential				
1 bedroom Apartment (Non Adaptable)	4	0.5 space / apartment	2	2
2+ bedroom Apartment (Non Adaptable)	29	1.0 space / apartment	29	29
Adaptable Apartments	9	1 adaptable space / adaptable apartment	9	9
Total Residential Tenant	**42**		**40**	**40**
Residential Visitors [1]		1.0 space / 4 apartments	**10**	**5**
Residential Car Wash		**1 car wash for 4+ apartments**	**1**	**1**
Non Residential				
Non-Residential Supermarket	1,449	1 / 25m2	58	-
Non-Residential Retail / Commercial	524	1 / 60m2	9	-
Total Non-Residential			**67**	**60**
TOTAL (excludes car wash bay)			**117**	**105**

Notes: 1. Visitor parking requirement of 1 space / 4 apartments based on DA approval for DA 104/20.
NSDCP does not specify minimum residential visitor parking requirements for B4 zonings.

As shown in Table 4.1, the proposed on-site parking provisions comply with the maximum allowable provisions as set out in Council's DCP.

Moreover, the on-site parking provisions are consistent with the transport objectives set out in the Military Road Corridor Strategy.

The on-site parking provisions includes 9 adaptable (accessible) residential car parking spaces with one adaptable space to be allocated to each of the 9 adaptable apartments in accordance with AS4299-Adaptable Housing.

One additional accessible parking space is also proposed for the non-residential uses and one accessible spaces for residential visitor parking thus providing a total of 11 accessible parking spaces within the basement parking area.

The proposed basement car parking space dimensions have been set out in accordance with the requirements of AS2890.1/6 and AS4299 and will facilitate convenient manoeuvring to / from parking spaces.

4.1.2 Visitor Parking

The application of a maximum rate of 1 residential visitor parking space / 4 apartments to the proposed development would establish a maximum allowable provision of 10 parking spaces.

Thus, the proposed provision of 5 residential visitor spaces is 5 spaces below the maximum allowable provision of 10 visitor parking spaces.

It is noted that for residential development within a B4 zone, the North Sydney Development Control Plan (NSDCP) does not require the provision of visitor parking.

As 12-14 Waters Road is within a B4 zoning, under the NSDCP controls there is no requirement to provide any visitor parking.

Notwithstanding the above, it is acknowledged that the development consent for 12 Waters Road (DA 104/20) and 12-14 Waters Road (DA 92/21) included consideration for visitor parking at a maximum rate of 1 space / 4 apartments.

DA 92/21 approved 1 dedicated visitor parking space where the application of 1 space / 4 apartments would have allowed up to 9 visitor parking spaces.

And it is acknowledged that there will be benefits associated with the provision of some level of visitor parking on site. However, Neutral Bay and the site are well connected to high quality public transport services.

The provision of 5 visitor parking spaces is considered to be an appropriate provision with regard to the B4 Zone and the access to public transport while being a consistent with the recent consents for the site.

All 5 visitor spaces are to be provided within the residential parking area at Basement Level 4. Two of the residential visitor spaces will be designed to accommodate electric vehicle charging.

4.1.3 Bicycle Parking

The proposed development will provide 40 residential storage cages and 9 residential storage rooms within the basement parking area which will be suitable for the provision of residential bicycle parking.

A total of 14 bicycle parking racks will be provided on Basement 2 and Basement 3. These racks will be available for non-residential bicycle parking demand. Additionally 5 racks will be provided within the public domain on the site's frontage to Waters Road.

The proposed bicycle parking provisions are considered appropriate to accommodate potential demands and are consistent with DCP 2013 bicycle parking requirements.

4.1.4 Motorcycle Parking

As set out in the DCP 2013, motorcycle parking is required to be provided for the development at a rate of 1 motorcycle space for every 10 car parking spaces provided as part of the development.

For the proposed parking provision of 105 car spaces this equates to a required provision of 11 motorcycle spaces.

The proposed provision of 12 motorcycle parking spaces located within the basement complies with the minimum motorcycle parking requirements.

4.2 Traffic Generation Implications

4.2.1 Estimated Traffic Generation

The traffic generation potential of the residential component of the proposed development has been estimated using Roads and Maritime Services *Guide to Traffic Generation Developments – Updated Traffic Surveys* (TDT 2013/04a).

It is noted that these RMS traffic generation rates assume a minimum level of car parking provisions in line with RMS Guidelines.

The proposed development of 12-14 Waters Road will be providing parking significantly less parking than RMS Guidelines would suggest in order to be consistent with the DCP and MRCS maximum parking controls.

As per the traffic assessment used in the approved DA 104/20 and DA 92/21, the traffic generation rates for the non-residential components have been adjusted proportionally in line with the parking provisions such that, like the residential component, a traffic generation rate per parking space is applied.

TDT 2013/04a provides updated traffic generation rates for a variety of land uses including high density residential development. The updated rates provided in TDT 2013/04a are provided as both vehicle trips per apartment and by parking space.

The TDT 2013/04a vehicle trips per parking space have been applied to the proposed development to reflect the restrained on-site parking provision proposed.

For residential developments, the TDT 2013/04a rates are:

- AM peak hour = 0.15 vehicle trips per car parking space
- PM peak hour = 0.12 vehicle trips per car parking space.

For the non-residential uses within the proposed development, again RMS guidelines have been used to estimate the likely traffic generation of the proposed development.

As all 60 non-residential parking spaces on Basement Levels 2, 3 and 4 will be accessible by supermarket customers, the traffic generation rate for a supermarket use has been used in this assessment. Supermarket uses have a higher peak hour generation compared to slower trade general retail. Thus, the traffic assessment is considered to be conservation.

As per approved developments for the site (DA 104/20 and DA92/21) the estimated traffic generation for the non-residential uses has based on the predictive model method as set out in Section 3.6 of the RMS *Guide to Traffic Engineering Developments* (2002).

It is noted that the RMS guide does not provide AM peak rates for supermarkets. However, as a conservative assessment the AM Peak period rate has been assumed to be 50% of the weekend peak rate.

The RMS predictive model traffic generation rates applied are as follow:

- Weekday PM peak (Thursday): 15.5 vehicle trips / 100m2 GLFA
- Weekday AM peak: 7.8 vehicle trips / 100m2 GLFA
- Weekend Peak: 14.7 vehicle trips / 100m2 GLFA

The predictive model is based on GLFA not GFA. Based on the RMS guide parking rate of 6.1 spaces / 100m2 GLFA, the retail traffic generation rate per parking space has been calculated as set out below:

- Weekday PM peak (Thursday): 2.5 vehicle trips / parking space
- Weekday AM peak: 1.3 vehicle trips / parking space
- Weekend Peak: 2.4 vehicle trips / parking space

These traffic generation rates per parking space has been applied to the non-residential component of the Planning Proposal development as summarised in Table 4.2.

Table 4.2: Estimated Traffic Generation Potential of Planning Proposal Development (6 storey)

Land Use	Weekday AM Peak Hour (vehicles / hour)	Weekday PM Peak Hour (vehicles / hour)	Weekend Midday Peak Hour (vehicles / hour)
Residential Development	7	5	7
Non-Residential Development	76	152	144
TOTAL	**83**	**157**	**151**

The above traffic generations assumptions also assume that the proposed development would operate as a stand-alone development in isolation of other retail offerings. However, the proposed retail uses on the proposed development site will function as part the broader Neutral Bay town centre.

A large proportion of vehicle trips to the supermarket on the site will be combined with trips to other retail and commercial offerings within the town centre. Thus, a significant proportion of trips to the site will be existing trips rather than new trips to / from the Neutral Bay town centre.

The Planning Proposal traffic assessment hasn't specifically allowed for this reduction in additional trips. The RMS guidelines do however provide traffic generation rates for larger shopping centres which could be applied to broader retail offerings in a town centre.

It is noted that the existing site generates a combined level of traffic of some 13-14 vehicle movements per AM and PM peak hour periods.

In comparison with the approved 5 storey development on the site (DA92/21) the proposed car parking allocation to non-residential floor space remains unchanged at 60 spaces.

Additionally, the floor area for the non-residential component of the development is essentially unchanged from the approved development.

With regards to traffic generation, the net change from the approved 5 storey development (DA92/21) and the 6 storey planning proposal is the traffic generation associated with the additional 6 apartments.

As shown in Table 4.3 the additional apartments correspond to a net increase in traffic generation of no more than 1 vehicle trip per peak hour.

Table 4.3: Comparison of Estimated Site Based Traffic Generation Potential

	Approved 5 storey development (DA92/21)	Planning Proposal 6 Storey Scheme	Net Change
Weekday AM Peak Hour (veh/hr)	82	83	+ 1
Weekday PM Peak (veh / hr)	157	157	0
Weekend Peak Hour (veh/hr)	150	151	+ 1

In summary, with regard to traffic generation, the planning proposal development is essentially the same development as the approved 5 storey development on the site.

4.2.2 Road Network Operation with Proposed Development

The operation of the surrounding road network has been assessed using SIDRA, a computer-based modelling package which assesses intersection performance under prevailing traffic conditions.

The key intersections assessed were as follows:

- Grosvenor Street / Waters Lane
- Waters Road / Grosvenor Street
- Waters Road / Proposed Site Access
- Waters Road / Grosvenor Lane
- Military Road / Waters Road / Rangers Road

The intersection configurations were sourced from aerial photos and confirmed with site inspections.

The traffic and pedestrian flows were sourced from TTPP's surveys as described in Section 2.2.6. SIDRA modellings were calibrated to the conditions observed during the surveys.

SIDRA modellings provide several useful indicators to determine the level of intersection (LoS) performance.

LoS is a basic performance parameter used to describe the operation of an intersection. Levels of service indicators range from LoS A (indicating good intersection operation) to LoS F (indicating over-saturated conditions with long delays and queues).

At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement (refer to Table 4.4).

Table 4.4: Level of Service Criteria for Intersections

Level of Service	Average Delay (seconds per vehicle)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	good operation	good operation
B	15 to 28	good with acceptable delays and spare capacity	acceptable delays and spare capacity
C	29 to 42	satisfactory	satisfactory, but accident study required
D	43 to 56	operating near capacity	near capacity and accident study required
E	57 to 70	at capacity At signals, incidents will cause excessive delays.	at capacity, requires other control mode
F	Greater than 71	unsatisfactory with excessive queuing	unsatisfactory with excessive queuing; requires other control mode

Average delay is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. At priority-controlled intersections and roundabouts, the average delay for the most delayed movement is usually reported.

To assess the road network implications of the proposed development, a SIDRA Intersection analysis was conducted for the following scenarios:

- Weekday AM Peak – Existing Conditions
- Weekday PM Peak – Existing Conditions
- Weekend Midday Peak – Existing Conditions
- Weekday AM Peak – Existing Conditions + Proposed Development Traffic
- Weekday PM Peak – Existing Conditions + Proposed Development Traffic
- Weekend Midday Peak – Existing Conditions + Proposed Development Traffic

The traffic flow and distribution for each scenario is provided in Appendix B.

The analysis results for traffic conditions are presented in Table 4.5.

Table 4.5 indicates that with the exception of the Military Road / Water Road intersection, the adjacent intersections to the site operate satisfactorily with minimal vehicle delay.

The existing left turn movement from Waters Road to Military Road experiences significant delays and operates at a LoS E in the PM weekday peak period. Vehicle queues along Waters Road from Military Road were observed to occur (albeit infrequently) back a far as the Grosvenor Lane intersection. However, the queues dissipated quickly due to platooning (or gaps) in the traffic flows along Military Road as a result of upstream traffic signals. Vehicle queuing was not observed to extend along Waters Road beyond the proposed vehicle access to on site car parking.

It is noted that TfNSW raised no objection to the traffic arrangements or operation of the Military Road / Waters Road intersection when DA 92/21 was referred by Council to TfNSW.

As shown in Table 4.5 the additional traffic associated with the proposed development would not further impact on the existing LoS at any of the surveyed intersections.

The SIDRA analysis indicates that the additional estimated traffic associated with the proposed development will not have a discernible adverse impact on the operation of intersections for each of the peak periods.

Additionally, the proposed site access intersection with Waters Road will operate satisfactorily (LoS A) with minimal delays and minimum vehicle queuing during each of the peak periods.

Table 4.5: Intersection Operating Conditions – SIDRA Modelling Results

Peak Period	Intersection	Existing		Existing + Development	
		Level of Service (LoS)	Ave. Delay (sec/veh)	Level of Service (LoS)	Ave. Delay (sec/veh)
Weekday AM Peak	Grosvenor Road / Waters Lane	A	9	A	9
	Waters Road / Grosvenor Road	A	5	A	5
	Waters Road / Site Access	-	-	A	6
	Waters Road / Grosvenor Lane	A	3	A	3
	Military Road / Waters Road /Rangers Road	A	11	A	10
Weekday PM Peak	Grosvenor Road / Waters Lane	A	10	A	10
	Waters Road / Grosvenor Road	A	6	A	7
	Waters Road / Site Access	-	-	A	6
	Waters Road / Grosvenor Lane	A	3	A	4
	Military Road / Waters Road /Rangers Road	E	66	E	65
Weekend Midday Peak	Grosvenor Road / Waters Lane	A	10	A	10
	Waters Road / Grosvenor Road	A	6	A	7
	Waters Road / Site Access	-	-	A	7
	Waters Road / Grosvenor Lane	A	4	A	4
	Military Road / Waters Road /Rangers Road	A	12	A	12

The traffic surveys undertaken by TTPP in December 2020 indicated potentially higher existing traffic flows along Waters Road and Grosvenor Street than Council's February 2021 counts. In particular the surveyed (and modelled) traffic flows along Grosvenor Street were closer to 400 vehicles per hour.

It is noted that the intersection of Waters Road / Grosvenor Street was and has been modelled to operate at a Level of Service A with minimal vehicle delays both with TTPP surveyed conditions and with additional traffic associated with the proposed development.

Thus, the operational capacity of Waters Road and Grosvenor Street is not considered to be an issue for the development.

However, with regard to 'amenity' implications there will be additional traffic generated by the proposed development along both Waters Road and Grosvenor Street.

Notwithstanding the above, both Waters Road and Grosvenor Street are important access roads for the Neutral Bay town centre and while there are residential properties along the street, the roads do not function as local residential streets.

The amenity implications associated with traffic along both these streets have been addressed with recent installation of various speed control devices and pedestrians crossings which creates an appropriate town centre environment for all road users.

It is noted that the supporting studies behind the Council commissioned Neutral Bay Town Centre Strategy stipulates a minimum non-residential FSR of 1.2:1 for all sites and 1.8:1 for some sites.

It is therefore reasonable to assume that some level of additional traffic generation associated with developments within the Neutral Bay town centre (such as the proposed development at 12-14 Waters Road) would have likely been contemplated as part of the broader strategy.

4.3 Sustainable Transport Measures

As described above, the DCP 2013 sets maximum car parking provisions for development sites with good access to public transport and services. This restrained car parking provision is one measure to encourage use of sustainable transport modes. The restrained car parking provisions are further reflected in the MRCS.

The Site is well connected to public transport, walking and cycle pathways. Accessibility to these sustainable travel modes for residents, employees and visitors will encourage use of these sustainable modes.

4.4 Vehicle Access Arrangements

It is proposed that vehicle access to on-site basement car parking shall be provided via a combined entry / exit driveway located on Waters Road.

As shown in Appendix D, the vehicle swept path analysis demonstrates that the driveway design can satisfactorily accommodate simultaneous entry and exit movements.

The location of the driveway is set back as far practical from the Waters Road / Grosvenor Street intersection, noting that sight line splays to pedestrians approaching the driveway from both the north and south have been provided in accordance with AS2890.1.

Furthermore, the proposed location of the car park driveway will not impact on existing on street parking, namely no existing car parking spaces or loading zone spaces will need to be removed to accommodate the proposed Waters Road access.

The provision of vehicle access to the site's car parking facility at Waters Road allows vehicles to enter and exit the site without the need to utilise Water Lane. It is noted that the Military Road Corridor Planning Strategy envisages improved pedestrian and town centre amenity around the Grosvenor Lane car park. The provision of vehicle access via Waters Road rather than Waters Lane, allows for the future pedestrian priority measures to be implemented along Waters Lane.

The site is currently served by two single lane driveways at Waters Lane. The existing driveway located on Waters Lane servicing the lot 12 Waters Road would be retained (with modifications) to provide service vehicle access to the proposed on-site loading and waste collection facility servicing the combined site. The redundant driveway on Waters Lane which currently services 14 Waters Road would be removed and replaced with kerb and gutter.

Forward entry and forward exit movements by service vehicles will be facilitated by a vehicle turntable located within the loading area. The swept path analysis demonstrating satisfactory service vehicles access to the loading facility via Waters Lane is provided in Appendix D.

It is noted that the proposed service vehicle arrangements in the Planning Proposal are consistent with the approved development for 12-14 Waters Road (DA 92/21).

The volume of service vehicles expected to service the site is relatively low and can be managed to occur outside of peak periods.

Notwithstanding the above, it is recommended that traffic management measures be implemented to manage vehicle access to / from the loading area at Waters Lane.

Recommended traffic management measures include the installation of a signal system to alert vehicles that the loading area is occupied.

4.5 Internal Vehicle Circulation and Manoeuvring

The vehicle swept path analysis provided in Appendix D indicates that vehicles can satisfactorily access the site's proposed car park via Waters Road and the loading area via Waters Lane.

The swept paths used in the analysis are based on the vehicle dimensions specified by AS2890.1:2004.

The internal vehicle circulation, car parking aisles, ramp grades and parking space dimensions have been set out in accordance with the design requirements of AS2890.1 and are satisfactory for the proposed development.

4.6 Service Vehicle Arrangements

As discussed in Section 2, waste collection and deliveries are currently undertaken via kerbside collections within Waters Lane and on street loading zones.

It is proposed that the existing waste collection arrangements via Waters Lane will continue to occur for the residential component of the proposed development.

Waste associated with the retail / commercial land uses will be collected on-site via the loading area. As shown in Appendix D, the loading area has been designed to accommodate a standard garbage collection vehicle.

5 Conclusions

This traffic and parking impact assessment has been undertaken to assess the traffic implications of the proposed redevelopment at 12-14 Waters Street, Neutral Bay to provide a 6-storey building on the site.

Key findings of the assessment are presented below.

- The development proposal seeks approval for 42 residential apartments and 1,973m2 of non-residential GFA along with associated basement parking facilities for cars, motorcycle and bicycle parking and an on-site loading area.
- The proposed development site is located within the Neutral Bay town centre and has excellent access to public and active transport networks. This access to public transport and services is acknowledged by the Military Road Corridor Planning Strategy.
- The proposed on-site car parking arrangements comply with the maximum allowable provisions set out in the DCP.
- The traffic generation potential of the site and the proposed vehicle access arrangements can be satisfactorily accommodated by the existing surrounding road network.
- Servicing for the site is to be accommodated via the on-site loading area and the existing on-street facilities including the existing loading zone on Waters Lane and Waters Road.

Overall, the traffic and parking aspects of the proposed development are satisfactory.

Appendix A

Proposed Development Traffic Generation

18439 12-14 Waters Road, Neutral Bay - 6 Storey Scheme

Residential Traffic Generation

No. of Residential Parking Spaces = 45

Traffic Generation	Rate / parking space	Vehicle / Hr	Inbound	Outbound
AM Weekday	0.15	7	1	6
PM Weekday	0.12	5	1	4
Weekend	0.15	7	4	3

Non Residential Traffic Generation

Supermarket 1449 m2 GFA

1374 m2 GLFA

0.71 reduced parking provision adjustment factor (proposed 60 spaces compared to 84 spaces under RMS rates)

Traffic Generation	Rate / GLFA	Parking Space Ratio Rate	Vehicle / Hr	Inbound	Outbound
AM Weekday	0.078	0.71	76	38	38
PM Weekday	0.155	0.71	151	76	75
Weekend	0.147	0.71	143	71	72

Non-Residential 524 m2 GFA parking spaces

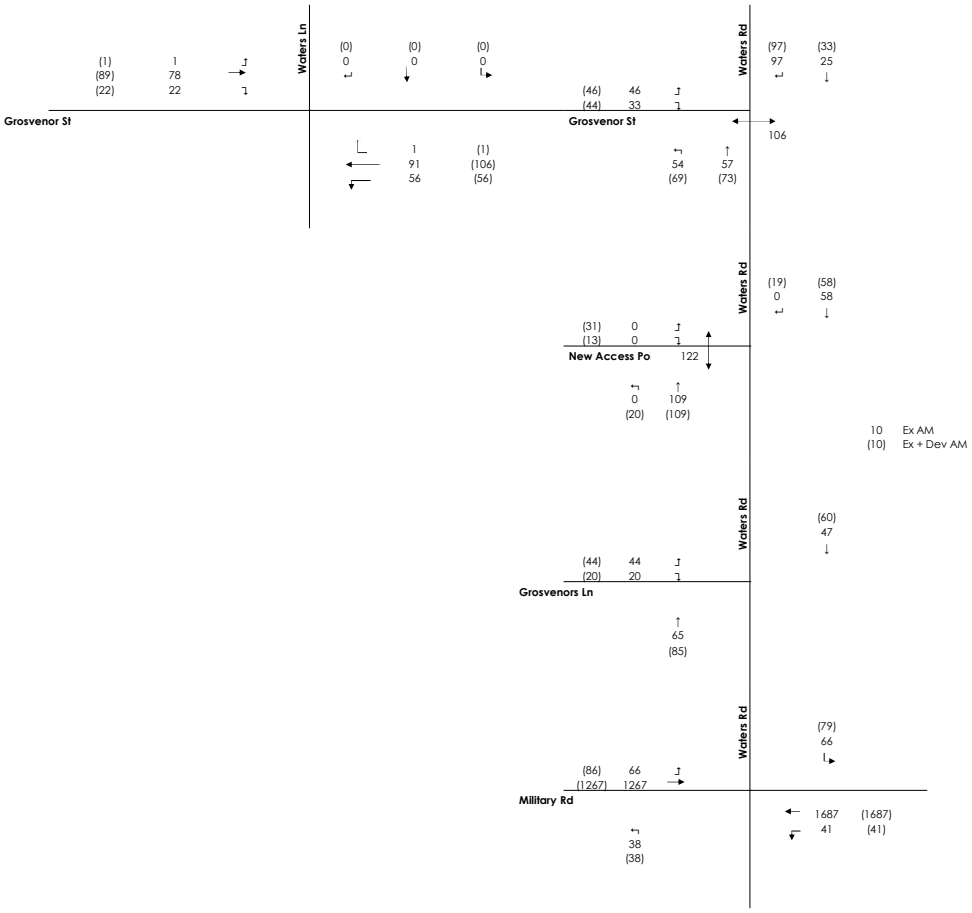
Traffic Generation	Rate / parking space	Vehicle / Hr	Inbound	Outbound
AM Weekday	0.8	0	0	0
PM Weekday	0.8	0	0	0
Weekend	0.8	0	0	0

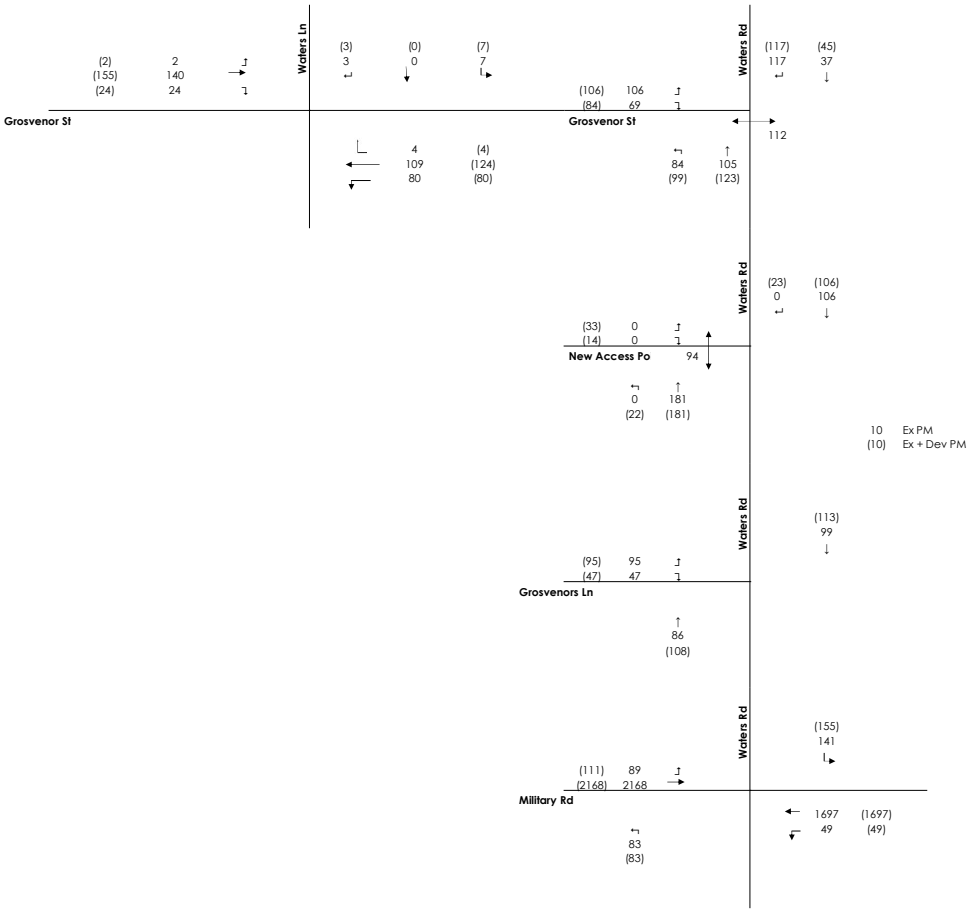
Total Traffic Generation

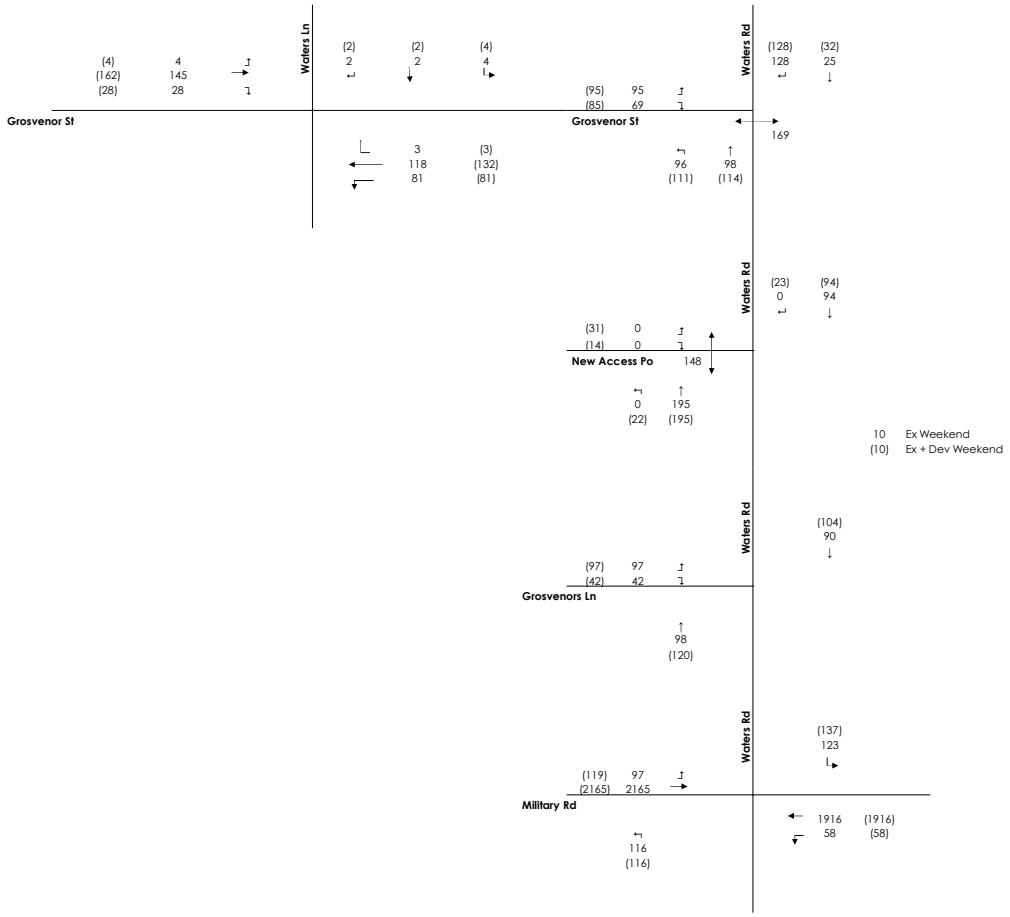
Traffic Generation	Vehicle / Hr	Inbound	Outbound
AM Weekday	83	39	44
PM Weekday	156	77	79
Weekend	150	75	75

Appendix B

Traffic and Pedestrian Movements


Waters Ln
Grosvenor St
Grosvenor St
Waters Rd
Waters Rd
New Access Po
Waters Rd
Grosvenors Ln
Waters Rd
Military Rd
10 Ex AM
(10) Ex + Dev AM


Waters Ln
Waters Rd
Grosvenor St
Grosvenor St
New Access Po
Grosvenors Ln
Military Rd
(2) (155) (24)
2 140 24
(3) 3
(0) 0
(7) 7
4 109 80
(4) (124) (80)
(106) (84)
106 69
(117) 117
(45) 37
112
84 (99)
105 (123)
(23) 0
(106) 106
(33) (14)
0 0
94
0 (22)
181 (181)
10 Ex PM
(10) Ex + Dev PM
(113) 99
(95) (47)
95 47
86 (108)
(155) 141
(111) (2168)
89 2168
1697 49
(1697) (49)
83 (83)


Waters Ln
Waters Rd
Grosvenor St
Grosvenor St
New Access Po
Grosvenors Ln
Military Rd
(4)
(162)
(28)
4
145
28
(2)
2
(2)
2
(4)
4
3
118
81
(3)
(132)
(81)
(95)
(85)
95
69
96
(111)
98
(114)
(128)
128
(32)
25
169
(23)
0
(94)
94
(31)
(14)
0
0
148
0
(22)
195
(195)
10 Ex Weekend
(10) Ex + Dev Weekend
(104)
90
(97)
(42)
97
42
98
(120)
(137)
123
(119)
(2165)
97
2165
1916
58
(1916)
(58)
116
(116)

Appendix C

SIDRA Intersection Analysis

MOVEMENT SUMMARY

Site: 101 [Grosvenor St-Waters Ln (Site Folder: Weekday AM Peak Ex)]

Network: N103 [Weekday AM Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Grosvenor St														
4	L2	59	0.0	59	0.0	0.095	7.5	LOS A	0.4	2.5	0.11	0.40	0.11	10.8
5	T1	96	2.2	96	2.2	0.095	0.1	LOS A	0.4	2.5	0.11	0.40	0.11	46.4
6	R2	1	0.0	1	0.0	0.095	4.2	LOS A	0.4	2.5	0.11	0.40	0.11	44.9
Approach		156	1.4	156	1.4	0.095	3.0	NA	0.4	2.5	0.11	0.40	0.11	20.6
North: Waters Ln														
7	L2	1	0.0	1	0.0	0.003	7.7	LOS A	0.0	0.1	0.23	0.89	0.23	41.3
8	T1	1	0.0	1	0.0	0.003	8.9	LOS A	0.0	0.1	0.23	0.89	0.23	16.2
9	R2	1	0.0	1	0.0	0.003	8.0	LOS A	0.0	0.1	0.23	0.89	0.23	44.3
Approach		3	0.0	3	0.0	0.003	8.2	LOS A	0.0	0.1	0.23	0.89	0.23	26.0
West: Grosvenor St														
10	L2	1	0.0	1	0.0	0.061	4.8	LOS A	0.2	1.3	0.15	0.19	0.15	48.2
11	T1	82	2.6	82	2.6	0.061	0.3	LOS A	0.2	1.3	0.15	0.19	0.15	47.5
12	R2	23	13.6	23	13.6	0.061	7.4	LOS A	0.2	1.3	0.15	0.19	0.15	16.6
Approach		106	5.0	106	5.0	0.061	1.9	NA	0.2	1.3	0.15	0.19	0.15	28.7
All Vehicles		265	2.8	265	2.8	0.095	2.6	NA	0.4	2.5	0.13	0.32	0.13	23.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Grosvenor St-Waters Rd (Site Folder: Weekday AM Peak Ex)]

Network: N103 [Weekday AM Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	57	3.7	57	3.7	0.063	1.9	LOS A	0.0	0.0	0.00	0.34	0.00	27.4
2	T1	60	5.3	60	5.3	0.063	0.2	LOS A	0.0	0.0	0.00	0.34	0.00	49.2
Approach		117	4.5	117	4.5	0.063	1.0	NA	0.0	0.0	0.00	0.34	0.00	48.0
North: Waters Rd (N)														
8	T1	26	0.0	26	0.0	0.077	0.4	LOS A	0.4	2.6	0.23	0.42	0.23	44.6
9	R2	102	0.0	102	0.0	0.077	4.9	LOS A	0.4	2.6	0.23	0.42	0.23	44.6
Approach		128	0.0	128	0.0	0.077	4.0	NA	0.4	2.6	0.23	0.42	0.23	44.6
West: Grosvenor St														
10	L2	48	0.0	48	0.0	0.080	4.0	LOS A	0.3	2.1	0.17	0.52	0.17	44.3
12	R2	35	6.1	35	6.1	0.080	5.2	LOS A	0.3	2.1	0.17	0.52	0.17	24.8
Approach		83	2.5	83	2.5	0.080	4.5	LOS A	0.3	2.1	0.17	0.52	0.17	41.9
All Vehicles		328	2.2	328	2.2	0.080	3.1	NA	0.4	2.6	0.13	0.42	0.13	44.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Waters Rd-Grosvenor Ln (Site Folder: Weekday AM Peak Ex)]

Network: N103 [Weekday AM Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd														
2	T1	68	1.5	68	1.5	0.036	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		68	1.5	68	1.5	0.036	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
North: Waters Rd														
8	T1	49	4.3	49	4.3	0.026	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		49	4.3	49	4.3	0.026	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Grosvenor Ln														
10	L2	46	9.1	46	9.1	0.036	2.6	LOS A	0.1	1.1	0.17	0.89	0.17	9.1
12	R2	21	15.0	21	15.0	0.025	3.1	LOS A	0.1	0.7	0.23	0.88	0.23	8.8
Approach		67	10.9	67	10.9	0.036	2.7	LOS A	0.1	1.1	0.19	0.89	0.19	9.0
All Vehicles		185	5.7	185	5.7	0.036	1.0	NA	0.1	1.1	0.07	0.32	0.07	17.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Military Rd-Waters Rd-Rangers Rd (Site Folder: Weekday AM Peak Ex)]

Network: N103 [Weekday AM Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rangers Rd														
1	L2	40	23.7	40	23.7	0.035	5.3	LOS A	0.1	1.2	0.22	0.50	0.22	48.4
Approach		40	23.7	40	23.7	0.035	5.3	LOS A	0.1	1.2	0.22	0.50	0.22	48.4
East: Military Rd														
4	L2	43	4.9	43	4.9	0.086	5.8	LOS A	0.2	2.6	0.10	0.21	0.10	52.0
5	T1	1776	9.7	1776	9.7	0.417	0.1	LOS A	0.2	2.6	0.00	0.01	0.00	59.6
Approach		1819	9.5	1819	9.5	0.417	0.3	NA	0.2	2.6	0.01	0.01	0.01	59.4
North: Waters Rd														
7	L2	69	7.6	69	7.6	0.114	10.5	LOS A	0.4	3.1	0.59	1.00	0.59	34.5
Approach		69	7.6	69	7.6	0.114	10.5	LOS A	0.4	3.1	0.59	1.00	0.59	34.5
West: Military Road														
10	L2	69	1.5	69	1.5	0.401	5.9	LOS A	0.7	5.2	0.05	0.36	0.05	54.9
11	T1	1334	12.4	1334	12.4	0.401	2.4	LOS A	0.7	5.2	0.02	0.36	0.02	57.2
Approach		1403	11.9	1403	11.9	0.401	2.6	NA	0.7	5.2	0.02	0.36	0.02	57.1
All Vehicles		3332	10.6	3332	10.6	0.417	1.5	NA	0.7	5.2	0.03	0.18	0.03	57.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Grosvenor St-Waters Ln (Site Folder: Weekday PM Peak Ex)] Network: N104 [Weekday PM Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Grosvenor St														
4	L2	84	0.0	84	0.0	0.126	7.5	LOS A	0.5	3.7	0.12	0.44	0.12	10.7
5	T1	115	1.8	115	1.8	0.126	0.2	LOS A	0.5	3.7	0.12	0.44	0.12	46.0
6	R2	4	0.0	4	0.0	0.126	4.5	LOS A	0.5	3.7	0.12	0.44	0.12	44.5
Approach		203	1.0	203	1.0	0.126	3.3	NA	0.5	3.7	0.12	0.44	0.12	19.5
North: Waters Ln														
7	L2	7	0.0	7	0.0	0.012	8.0	LOS A	0.0	0.3	0.27	0.87	0.27	41.3
8	T1	1	0.0	1	0.0	0.012	9.6	LOS A	0.0	0.3	0.27	0.87	0.27	16.2
9	R2	3	0.0	3	0.0	0.012	8.6	LOS A	0.0	0.3	0.27	0.87	0.27	44.3
Approach		12	0.0	12	0.0	0.012	8.3	LOS A	0.0	0.3	0.27	0.87	0.27	35.1
West: Grosvenor St														
10	L2	2	0.0	2	0.0	0.095	4.8	LOS A	0.2	1.4	0.11	0.14	0.11	48.6
11	T1	147	0.0	147	0.0	0.095	0.2	LOS A	0.2	1.4	0.11	0.14	0.11	48.1
12	R2	25	0.0	25	0.0	0.095	7.4	LOS A	0.2	1.4	0.11	0.14	0.11	16.7
Approach		175	0.0	175	0.0	0.095	1.3	NA	0.2	1.4	0.11	0.14	0.11	32.8
All Vehicles		389	0.5	389	0.5	0.126	2.6	NA	0.5	3.7	0.12	0.32	0.12	24.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Grosvenor St-Waters Rd (Site Folder: Weekday PM Peak Ex)]

Network: N104 [Weekday PM Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	88	0.0	88	0.0	0.105	1.9	LOS A	0.0	0.0	0.00	0.21	0.00	29.9
2	T1	111	1.9	111	1.9	0.105	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	48.8
Approach		199	1.1	199	1.1	0.105	0.8	NA	0.0	0.0	0.00	0.21	0.00	48.0
North: Waters Rd (N)														
8	T1	39	2.7	39	2.7	0.103	0.6	LOS A	0.5	3.5	0.31	0.43	0.31	44.4
9	R2	123	0.0	123	0.0	0.103	5.2	LOS A	0.5	3.5	0.31	0.43	0.31	44.4
Approach		162	0.6	162	0.6	0.103	4.1	NA	0.5	3.5	0.31	0.43	0.31	44.4
West: Grosvenor St														
10	L2	112	0.0	112	0.0	0.188	4.3	LOS A	0.8	5.3	0.27	0.56	0.27	43.8
12	R2	73	0.0	73	0.0	0.188	6.2	LOS A	0.8	5.3	0.27	0.56	0.27	23.5
Approach		184	0.0	184	0.0	0.188	5.0	LOS A	0.8	5.3	0.27	0.56	0.27	41.4
All Vehicles		545	0.6	545	0.6	0.188	3.2	NA	0.8	5.3	0.18	0.39	0.18	44.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Waters Rd-Grosvenor Ln (Site Folder: Weekday PM Peak Ex)] Network: N104 [Weekday PM Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd														
2	T1	91	0.0	91	0.0	0.047	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		91	0.0	91	0.0	0.047	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
North: Waters Rd														
8	T1	104	1.0	104	1.0	0.063	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		104	1.0	104	1.0	0.063	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Grosvenor Ln														
10	L2	100	2.1	100	2.1	0.076	2.6	LOS A	0.3	2.2	0.20	0.89	0.20	9.1
12	R2	49	2.1	49	2.1	0.070	3.4	LOS A	0.2	1.5	0.30	0.89	0.30	8.7
Approach		149	2.1	149	2.1	0.076	2.9	LOS A	0.3	2.2	0.23	0.89	0.23	8.9
All Vehicles		344	1.2	344	1.2	0.076	1.3	NA	0.3	2.2	0.10	0.39	0.10	16.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Military Rd-Waters Rd-Rangers Rd (Site Folder: Weekday PM Peak Ex)]

Network: N104 [Weekday PM Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rangers Rd														
1	L2	87	1.2	87	1.2	0.118	7.9	LOS A	0.4	3.2	0.55	0.75	0.55	47.6
Approach		87	1.2	87	1.2	0.118	7.9	LOS A	0.4	3.2	0.55	0.75	0.55	47.6
East: Military Rd														
4	L2	52	0.0	52	0.0	0.339	5.8	LOS A	0.5	3.5	0.04	0.05	0.04	53.5
5	T1	1786	7.8	1786	7.8	0.339	0.1	LOS A	0.5	3.5	0.01	0.02	0.01	59.6
Approach		1838	7.6	1838	7.6	0.339	0.2	NA	0.5	3.5	0.01	0.02	0.01	59.4
North: Waters Rd														
7	L2	148	0.7	148	0.7	0.834	65.5	LOS E	6.5	46.0	0.96	1.48	2.50	20.1
Approach		148	0.7	148	0.7	0.834	65.5	LOS E	6.5	46.0	0.96	1.48	2.50	20.1
West: Military Road														
10	L2	94	0.0	94	0.0	0.437	5.9	LOS A	1.0	7.1	0.06	0.07	0.06	58.1
11	T1	2282	7.4	2282	7.4	0.437	0.1	LOS A	1.0	7.1	0.02	0.02	0.02	59.4
Approach		2376	7.1	2376	7.1	0.437	0.4	NA	1.0	7.1	0.02	0.02	0.02	59.4
All Vehicles		4449	7.0	4449	7.0	0.834	2.6	NA	6.5	46.0	0.06	0.08	0.11	57.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Grosvenor St-Waters Ln (Site Folder: Weekend Ex)]

Network: N105 [Weekend Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Grosvenor St														
4	L2	85	1.2	85	1.2	0.132	7.6	LOS A	0.5	3.7	0.12	0.42	0.12	10.8
5	T1	124	0.0	124	0.0	0.132	0.1	LOS A	0.5	3.7	0.12	0.42	0.12	46.2
6	R2	3	0.0	3	0.0	0.132	4.5	LOS A	0.5	3.7	0.12	0.42	0.12	44.7
Approach		213	0.5	213	0.5	0.132	3.2	NA	0.5	3.7	0.12	0.42	0.12	19.9
North: Waters Ln														
7	L2	4	0.0	4	0.0	0.009	8.0	LOS A	0.0	0.2	0.30	0.88	0.30	41.0
8	T1	2	0.0	2	0.0	0.009	9.7	LOS A	0.0	0.2	0.30	0.88	0.30	16.2
9	R2	2	0.0	2	0.0	0.009	8.8	LOS A	0.0	0.2	0.30	0.88	0.30	44.2
Approach		8	0.0	8	0.0	0.009	8.6	LOS A	0.0	0.2	0.30	0.88	0.30	27.6
West: Grosvenor St														
10	L2	4	0.0	4	0.0	0.103	4.8	LOS A	0.3	1.8	0.11	0.15	0.11	48.5
11	T1	153	0.0	153	0.0	0.103	0.2	LOS A	0.3	1.8	0.11	0.15	0.11	48.0
12	R2	29	3.6	29	3.6	0.103	7.5	LOS A	0.3	1.8	0.11	0.15	0.11	16.7
Approach		186	0.6	186	0.6	0.103	1.5	NA	0.3	1.8	0.11	0.15	0.11	32.0
All Vehicles		407	0.5	407	0.5	0.132	2.5	NA	0.5	3.7	0.12	0.31	0.12	24.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Grosvenor St-Waters Rd (Site Folder: Weekend Ex)]

Network: N105 [Weekend Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	101	0.0	101	0.0	0.107	1.9	LOS A	0.0	0.0	0.00	0.24	0.00	28.9
2	T1	103	0.0	103	0.0	0.107	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	48.7
Approach		204	0.0	204	0.0	0.107	0.9	NA	0.0	0.0	0.00	0.24	0.00	47.7
North: Waters Rd (N)														
8	T1	26	0.0	26	0.0	0.104	0.7	LOS A	0.5	3.5	0.32	0.47	0.32	44.0
9	R2	135	0.8	135	0.8	0.104	5.3	LOS A	0.5	3.5	0.32	0.47	0.32	44.0
Approach		161	0.7	161	0.7	0.104	4.5	NA	0.5	3.5	0.32	0.47	0.32	44.0
West: Grosvenor St														
10	L2	100	0.0	100	0.0	0.178	4.2	LOS A	0.7	5.0	0.26	0.55	0.26	43.8
12	R2	73	0.0	73	0.0	0.178	6.1	LOS A	0.7	5.0	0.26	0.55	0.26	23.5
Approach		173	0.0	173	0.0	0.178	5.0	LOS A	0.7	5.0	0.26	0.55	0.26	41.2
All Vehicles		538	0.2	538	0.2	0.178	3.3	NA	0.7	5.0	0.18	0.41	0.18	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Waters Rd-Grosvenor Ln (Site Folder: Weekend Ex)]

Network: N105 [Weekend Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd														
2	T1	103	0.0	103	0.0	0.054	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		103	0.0	103	0.0	0.054	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
North: Waters Rd														
8	T1	95	0.0	95	0.0	0.049	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		95	0.0	95	0.0	0.049	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Grosvenor Ln														
10	L2	102	0.0	102	0.0	0.078	2.6	LOS A	0.3	2.2	0.21	0.88	0.21	9.1
12	R2	44	4.8	44	4.8	0.055	3.5	LOS A	0.2	1.3	0.31	0.89	0.31	8.7
Approach		146	1.4	146	1.4	0.078	2.9	LOS A	0.3	2.2	0.24	0.88	0.24	8.9
All Vehicles		344	0.6	344	0.6	0.078	1.2	NA	0.3	2.2	0.10	0.38	0.10	16.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Military Rd-Waters Rd-Rangers Rd (Site Folder: Weekend Ex)]

Network: N105 [Weekend Peak (Network Folder: Ex)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rangers Rd														
1	L2	122	3.4	122	3.4	0.183	8.7	LOS A	0.7	5.0	0.59	0.81	0.59	47.0
Approach		122	3.4	122	3.4	0.183	8.7	LOS A	0.7	5.0	0.59	0.81	0.59	47.0
East: Military Rd														
4	L2	61	1.7	61	1.7	0.373	5.9	LOS A	0.6	4.2	0.04	0.05	0.04	53.4
5	T1	2017	3.3	2017	3.3	0.373	0.1	LOS A	0.6	4.2	0.01	0.02	0.01	59.6
Approach		2078	3.2	2078	3.2	0.373	0.3	NA	0.6	4.2	0.01	0.02	0.01	59.4
North: Waters Rd														
7	L2	129	1.6	129	1.6	0.107	11.8	LOS A	0.4	3.1	0.28	0.88	0.28	47.9
Approach		129	1.6	129	1.6	0.107	11.8	LOS A	0.4	3.1	0.28	0.88	0.28	47.9
West: Military Road														
10	L2	102	0.0	102	0.0	0.161	5.8	LOS A	0.6	4.6	0.11	0.22	0.11	55.2
11	T1	2279	2.9	2279	2.9	0.559	0.6	LOS A	0.6	4.6	0.01	0.02	0.01	59.3
Approach		2381	2.8	2381	2.8	0.559	0.8	NA	0.6	4.6	0.01	0.02	0.01	59.2
All Vehicles		4711	3.0	4711	3.0	0.559	1.1	NA	0.7	5.0	0.04	0.06	0.04	58.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Grosvenor St-Waters Ln (Site Folder: Weekday AM Peak Ex+Dev)]

Network: N101 [Weekday AM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Grosvenor St														
4	L2	59	0.0	59	0.0	0.104	7.5	LOS A	0.4	2.6	0.10	0.37	0.10	10.8
5	T1	112	1.9	112	1.9	0.104	0.1	LOS A	0.4	2.6	0.10	0.37	0.10	46.7
6	R2	1	0.0	1	0.0	0.104	4.2	LOS A	0.4	2.6	0.10	0.37	0.10	45.1
Approach		172	1.2	172	1.2	0.104	2.7	NA	0.4	2.6	0.10	0.37	0.10	21.8
North: Waters Ln														
7	L2	1	0.0	1	0.0	0.003	7.7	LOS A	0.0	0.1	0.25	0.89	0.25	41.2
8	T1	1	0.0	1	0.0	0.003	9.0	LOS A	0.0	0.1	0.25	0.89	0.25	16.2
9	R2	1	0.0	1	0.0	0.003	8.2	LOS A	0.0	0.1	0.25	0.89	0.25	44.3
Approach		3	0.0	3	0.0	0.003	8.3	LOS A	0.0	0.1	0.25	0.89	0.25	25.9
West: Grosvenor St														
10	L2	1	0.0	1	0.0	0.068	4.8	LOS A	0.2	1.3	0.14	0.17	0.14	48.3
11	T1	94	2.2	94	2.2	0.068	0.3	LOS A	0.2	1.3	0.14	0.17	0.14	47.7
12	R2	23	13.6	23	13.6	0.068	7.5	LOS A	0.2	1.3	0.14	0.17	0.14	16.6
Approach		118	4.5	118	4.5	0.068	1.7	NA	0.2	1.3	0.14	0.17	0.14	29.7
All Vehicles		293	2.5	293	2.5	0.104	2.4	NA	0.4	2.6	0.12	0.29	0.12	24.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Grosvenor St-Waters Rd (Site Folder: Weekday AM Peak Ex+Dev)]

Network: N101 [Weekday AM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	73	2.9	73	2.9	0.080	1.9	LOS A	0.0	0.0	0.00	0.23	0.00	29.0
2	T1	77	4.1	77	4.1	0.080	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	48.8
Approach		149	3.5	149	3.5	0.080	0.9	NA	0.0	0.0	0.00	0.23	0.00	47.7
North: Waters Rd (N)														
8	T1	35	0.0	35	0.0	0.083	0.5	LOS A	0.4	2.8	0.26	0.40	0.26	44.7
9	R2	102	0.0	102	0.0	0.083	5.0	LOS A	0.4	2.8	0.26	0.40	0.26	44.7
Approach		137	0.0	137	0.0	0.083	3.9	NA	0.4	2.8	0.26	0.40	0.26	44.7
West: Grosvenor St														
10	L2	48	0.0	48	0.0	0.078	4.0	LOS A	0.3	2.0	0.19	0.53	0.19	44.4
12	R2	46	4.5	46	4.5	0.078	4.7	LOS A	0.3	2.0	0.19	0.53	0.19	25.0
Approach		95	2.2	95	2.2	0.078	4.4	LOS A	0.3	2.0	0.19	0.53	0.19	41.4
All Vehicles		381	1.9	381	1.9	0.083	2.8	NA	0.4	2.8	0.14	0.37	0.14	44.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [Site Access-Waters Rd (Site Folder: Weekday AM Peak Ex+Dev)]

Network: N101 [Weekday AM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	21	0.0	21	0.0	0.077	3.4	LOS A	0.2	1.1	0.08	0.08	0.08	48.3
2	T1	115	4.6	115	4.6	0.077	0.1	LOS A	0.2	1.1	0.08	0.08	0.08	40.6
Approach		136	3.9	136	3.9	0.077	0.6	NA	0.2	1.1	0.08	0.08	0.08	45.8
North: Waters Rd (N)														
8	T1	61	3.4	61	3.4	0.046	0.3	LOS A	0.1	1.0	0.19	0.13	0.19	33.7
9	R2	20	0.0	20	0.0	0.046	3.3	LOS A	0.1	1.0	0.19	0.13	0.19	46.9
Approach		81	2.6	81	2.6	0.046	1.1	NA	0.1	1.0	0.19	0.13	0.19	44.3
West: Site Access														
10	L2	33	0.0	33	0.0	0.042	5.0	LOS A	0.2	1.1	0.23	0.53	0.23	43.5
12	R2	14	0.0	14	0.0	0.042	5.8	LOS A	0.2	1.1	0.23	0.53	0.23	43.5
Approach		46	0.0	46	0.0	0.042	5.2	LOS A	0.2	1.1	0.23	0.53	0.23	43.5
All Vehicles		263	2.8	263	2.8	0.077	1.6	NA	0.2	1.1	0.14	0.17	0.14	44.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Waters Rd-Grosvenor Ln (Site Folder: Weekday AM Peak Ex+Dev)]

Network: N101 [Weekday AM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd														
2	T1	89	1.2	89	1.2	0.047	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		89	1.2	89	1.2	0.047	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
North: Waters Rd														
8	T1	63	3.3	63	3.3	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		63	3.3	63	3.3	0.033	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Grosvenor Ln														
10	L2	46	9.1	46	9.1	0.037	2.7	LOS A	0.1	1.1	0.19	0.88	0.19	9.1
12	R2	21	15.0	21	15.0	0.026	3.3	LOS A	0.1	0.7	0.27	0.88	0.27	8.8
Approach		67	10.9	67	10.9	0.037	2.9	LOS A	0.1	1.1	0.22	0.88	0.22	9.0
All Vehicles		220	4.8	220	4.8	0.047	0.9	NA	0.1	1.1	0.07	0.27	0.07	17.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Military Rd-Waters Rd-Rangers Rd (Site Folder: Weekday AM Peak Ex+Dev)]

Network: N101 [Weekday AM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rangers Rd														
1	L2	40	23.7	40	23.7	0.035	5.3	LOS A	0.1	1.2	0.22	0.50	0.22	48.4
Approach		40	23.7	40	23.7	0.035	5.3	LOS A	0.1	1.2	0.22	0.50	0.22	48.4
East: Military Rd														
4	L2	43	4.9	43	4.9	0.086	5.8	LOS A	0.2	2.6	0.10	0.21	0.10	52.0
5	T1	1776	9.7	1776	9.7	0.417	0.1	LOS A	0.2	2.6	0.00	0.01	0.00	59.6
Approach		1819	9.5	1819	9.5	0.417	0.3	NA	0.2	2.6	0.01	0.01	0.01	59.4
North: Waters Rd														
7	L2	83	6.3	83	6.3	0.131	10.3	LOS A	0.5	3.6	0.59	1.00	0.59	34.6
Approach		83	6.3	83	6.3	0.131	10.3	LOS A	0.5	3.6	0.59	1.00	0.59	34.6
West: Military Road														
10	L2	91	1.2	91	1.2	0.409	5.9	LOS A	0.9	6.8	0.06	0.37	0.06	54.7
11	T1	1334	12.4	1334	12.4	0.409	2.5	LOS A	0.9	6.8	0.03	0.36	0.03	57.1
Approach		1424	11.7	1424	11.7	0.409	2.7	NA	0.9	6.8	0.03	0.36	0.03	57.0
All Vehicles		3366	10.5	3366	10.5	0.417	1.6	NA	0.9	6.8	0.03	0.19	0.03	57.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Grosvenor St-Waters Ln (Site Folder: Weekday PM Peak Ex+Dev)]

Network: N102 [Weekday PM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Grosvenor St														
4	L2	84	0.0	84	0.0	0.140	7.6	LOS A	0.5	3.9	0.11	0.40	0.11	10.8
5	T1	141	1.5	141	1.5	0.140	0.1	LOS A	0.5	3.9	0.11	0.40	0.11	46.4
6	R2	4	0.0	4	0.0	0.140	4.6	LOS A	0.5	3.9	0.11	0.40	0.11	44.9
Approach		229	0.9	229	0.9	0.140	2.9	NA	0.5	3.9	0.11	0.40	0.11	20.9
North: Waters Ln														
7	L2	7	0.0	7	0.0	0.012	8.1	LOS A	0.0	0.3	0.30	0.87	0.30	41.2
8	T1	1	0.0	1	0.0	0.012	10.0	LOS A	0.0	0.3	0.30	0.87	0.30	16.2
9	R2	3	0.0	3	0.0	0.012	9.0	LOS A	0.0	0.3	0.30	0.87	0.30	44.3
Approach		12	0.0	12	0.0	0.012	8.5	LOS A	0.0	0.3	0.30	0.87	0.30	35.0
West: Grosvenor St														
10	L2	2	0.0	2	0.0	0.109	4.8	LOS A	0.2	1.5	0.10	0.12	0.10	48.7
11	T1	174	0.0	174	0.0	0.109	0.2	LOS A	0.2	1.5	0.10	0.12	0.10	48.3
12	R2	25	0.0	25	0.0	0.109	7.5	LOS A	0.2	1.5	0.10	0.12	0.10	16.7
Approach		201	0.0	201	0.0	0.109	1.2	NA	0.2	1.5	0.10	0.12	0.10	34.1
All Vehicles		442	0.5	442	0.5	0.140	2.3	NA	0.5	3.9	0.11	0.28	0.11	25.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Grosvenor St-Waters Rd (Site Folder: Weekday PM Peak Ex+Dev)]

Network: N102 [Weekday PM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	115	0.0	115	0.0	0.135	1.9	LOS A	0.0	0.0	0.00	0.22	0.00	29.9
2	T1	142	1.5	142	1.5	0.135	0.0	LOS A	0.0	0.0	0.00	0.22	0.00	48.8
Approach		257	0.8	257	0.8	0.135	0.8	NA	0.0	0.0	0.00	0.22	0.00	48.0
North: Waters Rd (N)														
8	T1	53	2.0	53	2.0	0.115	0.8	LOS A	0.6	4.0	0.36	0.41	0.36	44.5
9	R2	123	0.0	123	0.0	0.115	5.5	LOS A	0.6	4.0	0.36	0.41	0.36	44.5
Approach		176	0.6	176	0.6	0.115	4.1	NA	0.6	4.0	0.36	0.41	0.36	44.5
West: Grosvenor St														
10	L2	112	0.0	112	0.0	0.238	4.4	LOS A	1.0	6.8	0.34	0.60	0.34	43.3
12	R2	99	0.0	99	0.0	0.238	6.9	LOS A	1.0	6.8	0.34	0.60	0.34	22.1
Approach		211	0.0	211	0.0	0.238	5.6	LOS A	1.0	6.8	0.34	0.60	0.34	39.9
All Vehicles		643	0.5	643	0.5	0.238	3.3	NA	1.0	6.8	0.21	0.39	0.21	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [Site Access-Waters Rd (Site Folder: Weekday PM Peak Ex+Dev)]

Network: N102 [Weekday PM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	41	0.0	41	0.0	0.130	3.3	LOS A	0.3	2.2	0.09	0.09	0.09	48.2
2	T1	191	1.1	191	1.1	0.130	0.1	LOS A	0.3	2.2	0.09	0.09	0.09	39.9
Approach		232	0.9	232	0.9	0.130	0.7	NA	0.3	2.2	0.09	0.09	0.09	45.8
North: Waters Rd (N)														
8	T1	112	0.9	112	0.9	0.086	0.3	LOS A	0.3	1.9	0.19	0.14	0.19	33.6
9	R2	40	0.0	40	0.0	0.086	3.2	LOS A	0.3	1.9	0.19	0.14	0.19	46.9
Approach		152	0.7	152	0.7	0.086	1.1	NA	0.3	1.9	0.19	0.14	0.19	44.4
West: Site Access														
10	L2	58	0.0	58	0.0	0.069	5.2	LOS A	0.3	1.8	0.29	0.56	0.29	43.3
12	R2	25	0.0	25	0.0	0.069	6.0	LOS A	0.3	1.8	0.29	0.56	0.29	43.3
Approach		83	0.0	83	0.0	0.069	5.4	LOS A	0.3	1.8	0.29	0.56	0.29	43.3
All Vehicles		466	0.7	466	0.7	0.130	1.7	NA	0.3	2.2	0.16	0.19	0.16	44.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Waters Rd-Grosvenor Ln (Site Folder: Weekday PM Peak Ex+Dev)]

Network: N102 [Weekday PM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd														
2	T1	132	0.0	132	0.0	0.069	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		132	0.0	132	0.0	0.069	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
North: Waters Rd														
8	T1	129	0.8	129	0.8	0.085	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		129	0.8	129	0.8	0.085	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Grosvenor Ln														
10	L2	100	2.1	100	2.1	0.080	2.8	LOS A	0.3	2.3	0.25	0.88	0.25	9.0
12	R2	49	2.1	49	2.1	0.083	3.9	LOS A	0.2	1.6	0.36	0.90	0.36	8.6
Approach		149	2.1	149	2.1	0.083	3.2	LOS A	0.3	2.3	0.28	0.88	0.28	8.9
All Vehicles		411	1.0	411	1.0	0.085	1.2	NA	0.3	2.3	0.10	0.32	0.10	16.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Military Rd-Waters Rd-Rangers Rd (Site Folder: Weekday PM Peak Ex+Dev)]

Network: N102 [Weekday PM Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rangers Rd														
1	L2	87	1.2	87	1.2	0.118	7.9	LOS A	0.4	3.2	0.55	0.75	0.55	47.6
Approach		87	1.2	87	1.2	0.118	7.9	LOS A	0.4	3.2	0.55	0.75	0.55	47.6
East: Military Rd														
4	L2	52	0.0	52	0.0	0.339	5.8	LOS A	0.5	3.5	0.04	0.05	0.04	53.5
5	T1	1786	7.8	1786	7.8	0.339	0.1	LOS A	0.5	3.5	0.01	0.02	0.01	59.6
Approach		1838	7.6	1838	7.6	0.339	0.2	NA	0.5	3.5	0.01	0.02	0.01	59.4
North: Waters Rd														
7	L2	174	0.6	174	0.6	0.865	65.1	LOS E	8.0	56.0	0.96	1.59	2.82	20.1
Approach		174	0.6	174	0.6	0.865	65.1	LOS E	8.0	56.0	0.96	1.59	2.82	20.1
West: Military Road														
10	L2	135	0.0	135	0.0	0.447	5.9	LOS A	1.4	10.0	0.08	0.10	0.08	57.4
11	T1	2282	7.4	2282	7.4	0.447	0.2	LOS A	1.4	10.0	0.02	0.03	0.02	59.3
Approach		2417	7.0	2417	7.0	0.447	0.5	NA	1.4	10.0	0.03	0.03	0.03	59.3
All Vehicles		4516	6.9	4516	6.9	0.865	3.0	NA	8.0	56.0	0.07	0.10	0.14	56.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Grosvenor St-Waters Ln (Site Folder: Weekend Ex +Dev)]

Network: N103 [Weekend Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Grosvenor St														
4	L2	85	1.2	85	1.2	0.146	7.6	LOS A	0.6	4.0	0.11	0.38	0.11	10.8
5	T1	152	0.0	152	0.0	0.146	0.1	LOS A	0.6	4.0	0.11	0.38	0.11	46.6
6	R2	3	0.0	3	0.0	0.146	4.6	LOS A	0.6	4.0	0.11	0.38	0.11	45.0
Approach		240	0.4	240	0.4	0.146	2.8	NA	0.6	4.0	0.11	0.38	0.11	21.3
North: Waters Ln														
7	L2	4	0.0	4	0.0	0.010	8.1	LOS A	0.0	0.2	0.33	0.87	0.33	40.8
8	T1	2	0.0	2	0.0	0.010	10.1	LOS A	0.0	0.2	0.33	0.87	0.33	16.2
9	R2	2	0.0	2	0.0	0.010	9.2	LOS A	0.0	0.2	0.33	0.87	0.33	44.1
Approach		8	0.0	8	0.0	0.010	8.9	LOS A	0.0	0.2	0.33	0.87	0.33	27.6
West: Grosvenor St														
10	L2	4	0.0	4	0.0	0.118	4.8	LOS A	0.3	1.9	0.10	0.13	0.10	48.6
11	T1	181	0.0	181	0.0	0.118	0.2	LOS A	0.3	1.9	0.10	0.13	0.10	48.2
12	R2	29	3.6	29	3.6	0.118	7.7	LOS A	0.3	1.9	0.10	0.13	0.10	16.7
Approach		215	0.5	215	0.5	0.118	1.4	NA	0.3	1.9	0.10	0.13	0.10	33.3
All Vehicles		463	0.5	463	0.5	0.146	2.3	NA	0.6	4.0	0.11	0.28	0.11	25.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Grosvenor St-Waters Rd (Site Folder: Weekend Ex +Dev)]

Network: N103 [Weekend Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	128	0.0	128	0.0	0.137	1.9	LOS A	0.0	0.0	0.00	0.24	0.00	28.9
2	T1	132	0.0	132	0.0	0.137	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	48.7
Approach		260	0.0	260	0.0	0.137	0.9	NA	0.0	0.0	0.00	0.24	0.00	47.7
North: Waters Rd (N)														
8	T1	37	0.0	37	0.0	0.115	0.9	LOS A	0.6	3.9	0.37	0.46	0.37	44.1
9	R2	135	0.8	135	0.8	0.115	5.5	LOS A	0.6	3.9	0.37	0.46	0.37	44.1
Approach		172	0.6	172	0.6	0.115	4.5	NA	0.6	3.9	0.37	0.46	0.37	44.1
West: Grosvenor St														
10	L2	100	0.0	100	0.0	0.230	4.4	LOS A	0.9	6.5	0.33	0.59	0.33	43.3
12	R2	101	0.0	101	0.0	0.230	6.7	LOS A	0.9	6.5	0.33	0.59	0.33	22.1
Approach		201	0.0	201	0.0	0.230	5.6	LOS A	0.9	6.5	0.33	0.59	0.33	39.5
All Vehicles		633	0.2	633	0.2	0.230	3.4	NA	0.9	6.5	0.20	0.41	0.20	43.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [Site Access-Waters Rd (Site Folder: Weekend Ex +Dev)]

Network: N103 [Weekend Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd (S)														
1	L2	40	0.0	40	0.0	0.138	3.6	LOS A	0.3	2.3	0.10	0.09	0.10	48.2
2	T1	205	0.0	205	0.0	0.138	0.2	LOS A	0.3	2.3	0.10	0.09	0.10	39.9
Approach		245	0.0	245	0.0	0.138	0.7	NA	0.3	2.3	0.10	0.09	0.10	45.6
North: Waters Rd (N)														
8	T1	99	0.0	99	0.0	0.083	0.7	LOS A	0.3	2.2	0.29	0.16	0.29	28.9
9	R2	39	0.0	39	0.0	0.083	4.0	LOS A	0.3	2.2	0.29	0.16	0.29	46.3
Approach		138	0.0	138	0.0	0.083	1.6	NA	0.3	2.2	0.29	0.16	0.29	42.9
West: Site Access														
10	L2	56	0.0	56	0.0	0.082	5.4	LOS A	0.3	2.1	0.34	0.58	0.34	43.1
12	R2	23	0.0	23	0.0	0.082	7.1	LOS A	0.3	2.1	0.34	0.58	0.34	43.1
Approach		79	0.0	79	0.0	0.082	5.9	LOS A	0.3	2.1	0.34	0.58	0.34	43.1
All Vehicles		462	0.0	462	0.0	0.138	1.9	NA	0.3	2.3	0.20	0.19	0.20	43.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Waters Rd-Grosvenor Ln (Site Folder: Weekend Ex +Dev)]

Network: N103 [Weekend Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Waters Rd														
2	T1	143	0.0	143	0.0	0.075	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		143	0.0	143	0.0	0.075	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
North: Waters Rd														
8	T1	118	0.0	118	0.0	0.061	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		118	0.0	118	0.0	0.061	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Grosvenor Ln														
10	L2	102	0.0	102	0.0	0.081	2.8	LOS A	0.3	2.3	0.26	0.87	0.26	9.0
12	R2	44	4.8	44	4.8	0.060	4.0	LOS A	0.2	1.5	0.36	0.89	0.36	8.5
Approach		146	1.4	146	1.4	0.081	3.2	LOS A	0.3	2.3	0.29	0.88	0.29	8.9
All Vehicles		407	0.5	407	0.5	0.081	1.1	NA	0.3	2.3	0.10	0.32	0.10	16.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Military Rd-Waters Rd-Rangers Rd (Site Folder: Weekend Ex+Dev)]

Network: N103 [Weekend Peak (Network Folder: EX +DEV)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Rangers Rd														
1	L2	122	3.4	122	3.4	0.183	8.7	LOS A	0.7	5.0	0.59	0.81	0.59	47.0
Approach		122	3.4	122	3.4	0.183	8.7	LOS A	0.7	5.0	0.59	0.81	0.59	47.0
East: Military Rd														
4	L2	61	1.7	61	1.7	0.373	5.9	LOS A	0.6	4.2	0.04	0.05	0.04	53.4
5	T1	2017	3.3	2017	3.3	0.373	0.1	LOS A	0.6	4.2	0.01	0.02	0.01	59.6
Approach		2078	3.2	2078	3.2	0.373	0.3	NA	0.6	4.2	0.01	0.02	0.01	59.4
North: Waters Rd														
7	L2	153	1.4	153	1.4	0.120	11.7	LOS A	0.5	3.6	0.23	0.88	0.23	48.1
Approach		153	1.4	153	1.4	0.120	11.7	LOS A	0.5	3.6	0.23	0.88	0.23	48.1
West: Military Road														
10	L2	142	0.0	142	0.0	0.164	5.8	LOS A	0.8	5.4	0.14	0.31	0.14	53.6
11	T1	2279	2.9	2279	2.9	0.572	0.5	LOS A	0.8	5.4	0.01	0.02	0.01	59.3
Approach		2421	2.7	2421	2.7	0.572	0.9	NA	0.8	5.4	0.01	0.03	0.01	59.1
All Vehicles		4774	2.9	4774	2.9	0.572	1.1	NA	0.8	5.4	0.04	0.07	0.04	58.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D

Vehicle Swept Path Analysis

VEHICLE ENTERING

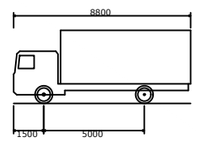
VEHICLE EXITING

SPLAY DRIVEWAY TO ACCOMMODATE SWEPT PATH.

SPLAY DRIVEWAY TO ACCOMMODATE SWEPT PATH.

KEY:

	Forward	Reverse
Wheel path		
Body envelope		
300mm clearance		



MRV - Medium Rigid Vehicle

Overall Length	8800mm
Overall Width	2500mm
Overall Body Height	3633mm
Min Body Ground Clearance	428mm
Track Width	2500mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10000mm

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	KM	JR	JR	21/12/21

ttpp transport planning

PROJECT: 12 WATERS ROAD, NEUTRAL BAY

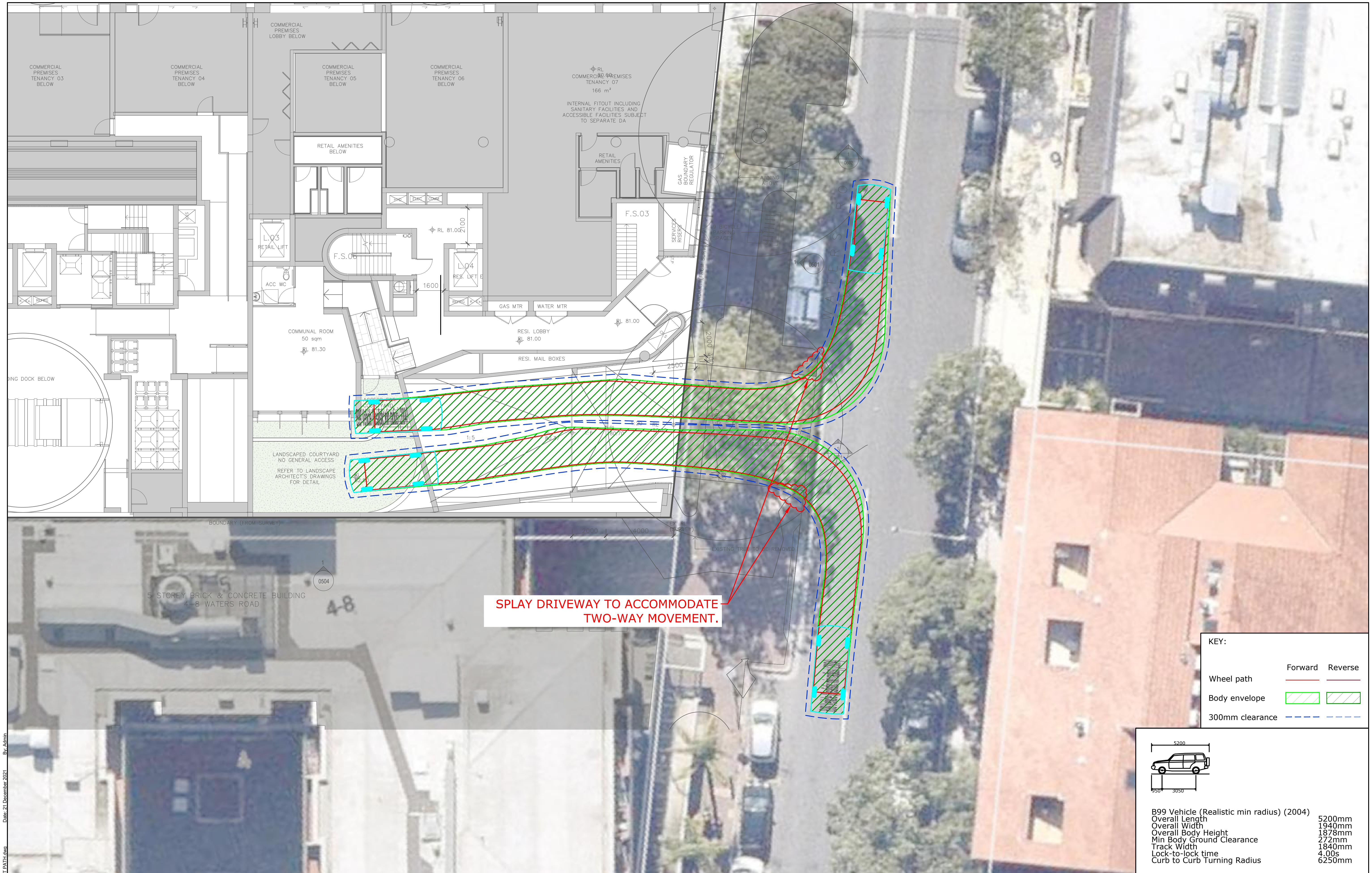
TITLE: SWEPT PATH ANALYSIS - LOADING DOCK
AS2890.2 8.8m MEDIUM RIGID VEHICLE

DWG No. 19439CAD14
FIGURE 1

DATE STAMP: 21 DECEMBER 2021

PROJECT No.	SCALE	REV.
19439	1:200 @A3	A

Filename: 19439CAD14-211221-SWEPT PATH.dwg Date: 21 December 2021 By: Admin



COMMERCIAL PREMISES LOBBY BELOW
COMMERCIAL PREMISES TENANCY 03 BELOW
COMMERCIAL PREMISES TENANCY 04 BELOW
COMMERCIAL PREMISES TENANCY 05 BELOW
COMMERCIAL PREMISES TENANCY 06 BELOW
COMMERCIAL PREMISES TENANCY 07
166 m²
INTERNAL FITOUT INCLUDING SANITARY FACILITIES AND ACCESSIBLE FACILITIES SUBJECT TO SEPARATE DA
RETAIL AMENITIES BELOW
RETAIL AMENITIES
GAS BOUNDARY REGULATOR
F.S.03
SERVICES RISERS
L.03 RETAIL LIFT
F.S.06
RL 81.00
L.04 RES. LIFT
ACC WC
1600
GAS MTR
WATER MTR
COMMUNAL ROOM 50 sqm
RL 81.30
RESI. LOBBY RL 81.00
RESI. MAIL BOXES
RL 81.00
2500
LOADING DOCK BELOW
LANDSCAPED COURTYARD NO GENERAL ACCESS
REFER TO LANDSCAPE ARCHITECT'S DRAWINGS FOR DETAIL
BOUNDARY (FROM SURVEY)
5 STOREY BRICK & CONCRETE BUILDING
4-8 WATERS ROAD
4-8
SPLAY DRIVEWAY TO ACCOMMODATE
TWO-WAY MOVEMENT.
KEY:
Forward
Reverse
Wheel path
Body envelope
300mm clearance
5200
950
3050
B99 Vehicle (Realistic min radius) (2004)
Overall Length 5200mm
Overall Width 1940mm
Overall Body Height 1878mm
Min Body Ground Clearance 272mm
Track Width 1840mm
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 6250mm

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	KM	JR	JR	21/12/21

ttpp transport planning

PROJECT: 12 WATERS ROAD, NEUTRAL BAY

TITLE: SWEPT PATH ANALYSIS - ENTRY DRIVEWAY
AS2890.1 5.2m B99 VEHICLE

DWG No.	DATE STAMP	PROJECT No.	SCALE	REV.
19439CAD14 FIGURE 2	21 DECEMBER 2021	19439	1:200 @A3	A

Filename: 19439CAD14 -211221-SWEPT PATH.dwg Date: 21 December 2021 By: Admin

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