



# **1-11 Rangers Road, Neutral Bay**

## **Transport Assessment**

Prepared for:

**Fabcot Pty Ltd**

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### PROJECT INFORMATION

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<b>Client:</b>	Fabcot Pty Ltd
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<b>Prepared By:</b>	JMT Consulting

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## Table of Contents

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<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	<i>Background</i>	1
1.2	<i>Site location</i>	1
1.3	<i>Report purpose</i>	2
<b>2</b>	<b>Existing Transport Conditions</b>	<b>3</b>
2.1	<i>Road network</i>	3
2.2	<i>Existing site uses and site access</i>	4
2.3	<i>Public transport services</i>	5
2.4	<i>Public transport accessibility</i>	8
2.5	<i>Walking and cycling</i>	9
2.6	<i>Traffic flows</i>	10
2.7	<i>Historical traffic growth</i>	11
<b>3</b>	<b>Transport and Access Strategy</b>	<b>12</b>
3.1	<i>Site access arrangements</i>	12
3.2	<i>Loading dock</i>	13
3.3	<i>Car park access and design</i>	14
3.4	<i>Car parking</i>	15
3.5	<i>Bicycle parking</i>	17
3.6	<i>Green travel plan</i>	18
<b>4</b>	<b>Traffic Impact Assessment</b>	<b>20</b>
4.1	<i>Traffic generation</i>	20
4.2	<i>Traffic distribution</i>	23
4.3	<i>Traffic modelling</i>	25
<b>5</b>	<b>Summary</b>	<b>28</b>
	<b>Appendix A: Traffic Modelling Outputs</b>	<b>29</b>

## Figures

Figure 1	Site location.....	1
Figure 2	Existing road network.....	3
Figure 3	Existing site view from Yeo Street.....	4
Figure 4	Existing vehicle site access.....	4
Figure 5	Existing bus stops servicing the site .....	5
Figure 6	30 minute public transport catchment from site .....	8
Figure 7	North Sydney cycling network.....	9
Figure 8	Traffic survey locations .....	10
Figure 9	Historical traffic flows – Military Road .....	11
Figure 10	Proposed site access .....	12
Figure 11	Vehicle swept paths – loading dock.....	13
Figure 12	Vehicle swept paths – car park access.....	14
Figure 13	Relationship between retail floor area and traffic generation.....	21
Figure 14	Forecast traffic distribution .....	23
Figure 15	Forecast increase in traffic movements by intersection (PM peak hour).....	24
Figure 16	Forecast increase in traffic movements by intersection (Sat peak hour).....	24
Figure 17	Intersection modelling results – PM weekday peak hour.....	26
Figure 18	Intersection modelling results – Saturday peak hour .....	26

## Tables

Table 1	Military Road bus services .....	5
Table 2	Residential car parking provision .....	15
Table 3	Potential bicycle parking requirements .....	17
Table 4	List of potential GTP measures.....	18
Table 5	Peak hour vehicle trip generation per parking space.....	21
Table 6	Forecast traffic generation for future retail (PM peak hour).....	22
Table 7	Forecast traffic generation for future retail (Saturday peak hour).....	22
Table 8	Net traffic generation.....	23
Table 9	Level of service grades / description.....	25

# 1 Introduction

## 1.1 Background

JMT Consulting was engaged by Fabcot Pty Ltd to undertake a transport assessment to support a Planning Proposal for the site at 1-11 Rangers Road, Neutral Bay. The Planning Proposal consists of the following:

- Woolworths supermarket with supporting ground floor retail
- Approximately 2,100sqm of commercial floor space
- 91 residential apartments
- Basement car parking for all uses including public parking, resident parking and Woolworths Direct to Boot offering

## 1.2 Site location

The extent of the site is shown in Figure 1 below. Located within the North Sydney LGA, the site is zoned B4 (mixed use) and has a site area of approximately 5,200m<sup>2</sup>. It is adjacent to the key Military Road transport corridor and bounded by Rangers Road, Yeo Street and Military Lane.



Figure 1 Site location

### 1.3 Report purpose

This report has been prepared to summarise the traffic and transport implications of the Planning Proposal. Specifically the assessment considers the following items:

- Existing transport conditions, including:
  - Surrounding road network
  - Vehicle site access
  - Car parking
  - Loading and servicing arrangements
  - Public transport provision
  - Pedestrian and cycling network
- Proposed site access arrangements
- Proposed vehicle loading and servicing arrangements
- Proposed parking rates to be adopted as part of a future development application for the site, including indicative parking numbers based on the reference scheme prepared by Koichi Takada Architects (KTA)
- Additional traffic movements resulting from the Planning Proposal and impacts to the adjacent road network
- Public transport, walking and cycling measures



## 2 Existing Transport Conditions

### 2.1 Road network

To manage the extensive network of roads for which councils are responsible under the Roads Act 1993, Transport for NSW (TfNSW) in partnership with local government established an administrative framework of *State*, *Regional*, and *Local Road* categories. State Roads are managed and financed by TfNSW and Regional and Local Roads are managed and financed by councils.

Regional Roads perform an intermediate function between the main arterial network of State Roads and council controlled Local Roads. Due to their network significance TfNSW provides financial assistance to councils for the management of their Regional Roads. Key State and Regional roads which provide access to the site are illustrated in Figure 2 below, which demonstrates the site is very well connected to the surrounding road network.

The site is primarily serviced by Military Road which is classified as a State Road. Regional Roads in the vicinity of the site include Spofforth Street, Belgrave Street, Ernest Street and Rangers Road to the south-east of the site. The site is also serviced by local roads managed by Council including direct frontage to Yeo Street.

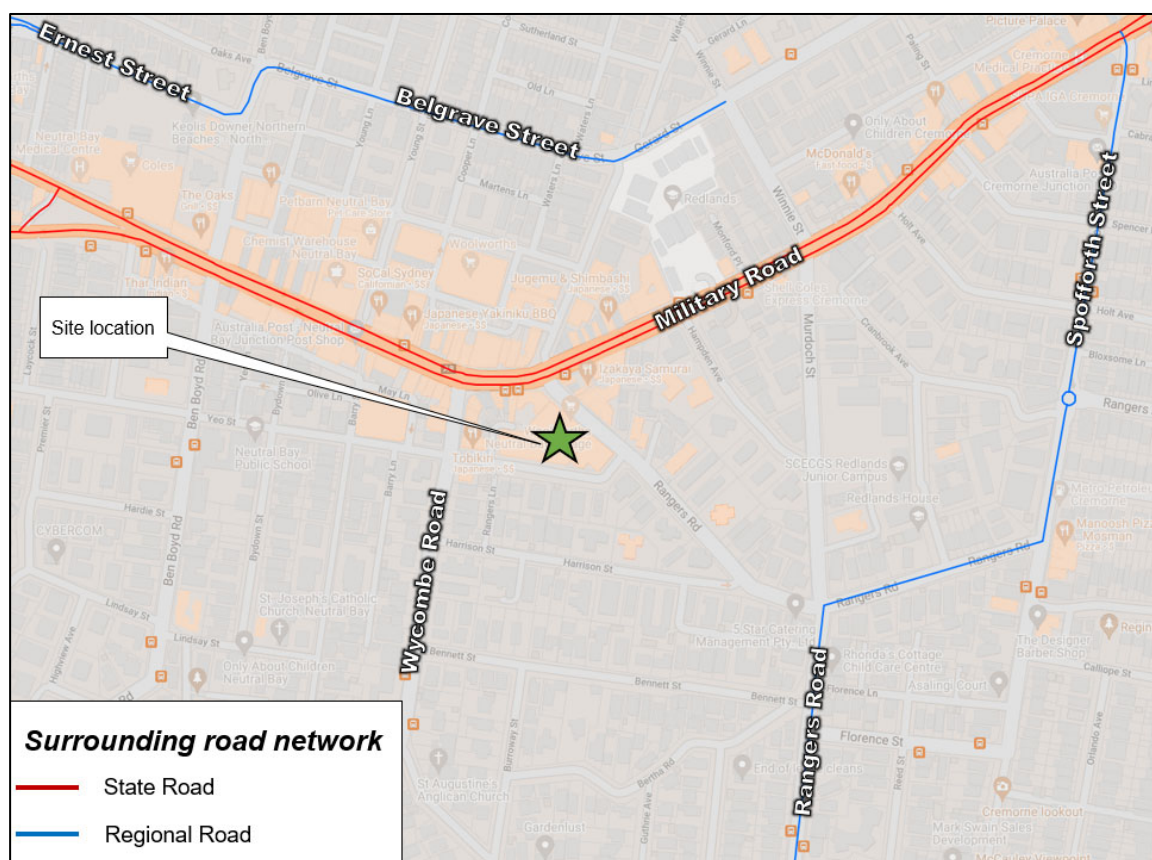


Figure 2 Existing road network

## 2.2 Existing site uses and site access

The existing site comprises of a Woolworths supermarket containing approximately 3,300m<sup>2</sup> GFA and 100 on-site car parking spaces. Access to the car park is provided via a driveway from Yeo Street as shown in Figure 3 below. Site access to the on-site loading is provided via Military Lane.



Figure 3 Existing site view from Yeo Street

Source: Google Street View



Figure 4 Existing vehicle site access



## 2.3 Public transport services

The site is located adjacent to the Military Road corridor which is one of Sydney's busiest and most important bus corridors - served by an established bus network that caters for a wide range of trips. The current bus network contains a variety of all-stops, limited stops and express services, joining and leaving the corridor at several locations. A number of bus stops are located directly opposite the site on Military Road as well as Wycombe Road as illustrated in Figure 5.



Figure 5 Existing bus stops servicing the site

A full list of the extensive bus network servicing the Military Road corridor is provided in Table 1.

Table 1 Military Road bus services

Route No.	Route (To / From)	Typical Frequency
143	Manly to Chatswood	Weekdays: 15-30 minutes peak only Weekends: No services
144	Manly to Chatswood	Weekdays: 10-15 minutes peak / 15 minutes off peak Weekends: 15 minutes
151	Mona Vale to City Queen Victoria Building (QVB)	Weekdays: Late night – early morning service Weekends: Late night – early morning service

Route No.	Route (To / From)	Typical Frequency
168	North Balgowlah to Milsons Point	Weekdays: 40-60 minutes Weekends: No services
169	Manly to City Wynyard	Weekdays: 30 minutes peak / 1 hour off peak Weekends: 60 minutes
173	Narraweena to Milsons Point	Weekdays: 4 AM peak services only Weekends: No services
178	Comer Heights to City Wynyard	Weekdays: No peak service / 30 minutes off peak Weekends: 15-30 minutes
180	Collaroy Plateau to City Wynyard	Weekdays: No peak service / 30 minutes off peak Weekends: 30 minutes
188	Mona Vale to City Wynyard	Weekdays: 3 morning services only Weekends: 2 morning services only
225	Cremorne Point Wharf to Neutral Bay	Weekdays: 13-15 minutes peak / 30 minutes off peak Weekends: 30 minutes
228	Clifton Gardens to Milsons Point	Weekdays: 35-40 minutes peak / 1 hour off peak Weekends: No services
229	Beauty Point to Milsons Point	Weekdays: 1 hour all day Weekends: No services
230	Mosman Wharf to Milsons Point	Weekdays: 15-20 minutes peak / 30 minutes off peak Weekends: 30 minutes
243	Spit Junction to City Wynyard	Weekdays: 20 minutes peak / 1 hour off peak Weekends: 30 minutes
244	Chowder Bay Mosman to City Wynyard	Weekdays: 20 minutes peak / 30 minutes off peak Weekends: 1 hour
245	Balmoral to City Wynyard	Weekdays: 15 minutes peak / 1 hour off peak Weekends: 1 hour
246	Balmoral Heights to City Wynyard	Weekdays: 2-10 minutes peak only Weekends: No services
247	Taronga Zoo to City Wynyard	Weekdays: 30 minutes Weekends: 30 minutes
248	Seaforth to City Wynyard	Weekdays: 20 minutes morning peak only Weekends: No services

Route No.	Route (To / From)	Typical Frequency
249	Beauty Point to City Wynyard	Weekdays: 3 morning peak services only Weekends: No services
257	Chatswood to Balmoral	Weekdays: 15-30 minutes peak / 15-30 minutes off peak Weekends: 30 minutes Saturdays & 30 minutes Sundays
263	Crows Nest to City Bridge St	Weekdays: 10-15 minutes peak / 40 minutes off peak Weekends: 1 hour 10 minutes
B1	Mona Vale to City Wynyard	Weekdays: 2-7 minutes peak / 8-12 minutes off peak Weekends: 8-15 minutes
E54	Mona Vale to Milsons Point	Weekdays: 5-10 minutes peak / 30 minutes off peak Weekends: No services
E50	Manly to Milsons Point (Express)	Weekdays: 10 minutes morning peak only Weekends: No services
E65	South Curl Curl to City Wynyard	Weekdays: 5 minutes morning peak only Weekends: No services
E66	Allambie to City Wynyard	Weekdays: 13 minutes morning peak only Weekends: No services
E68	Brookvale to City Wynyard	Weekdays: 15 minutes morning peak only Weekends: No services
E69	Manly to City Wynyard	Weekdays: 6 minutes morning peak only Weekends: No services
E71	Manly to City Wynyard (Express)	Weekdays: minutes peak only Weekends: No services

## 2.4 Public transport accessibility

A key indicator of the level of public transport accessibility a site contains is the number of locations accessible within a 30 minute public transport catchment. A key objective of the Greater Sydney Commission's Greater Sydney Region Plan is to deliver a 30-minute city where jobs, services and quality public transport spaces are in easy reach of residences.

As illustrated in Figure 6 a number of key employment centres across Sydney can be reached within 30 minutes public transport travel time of the site, including Central / Redfern, Sydney CBD, North Sydney CBD, St Leonards, Chatswood and Manly. The highly accessible nature of the site will facilitate the use of public transport, particularly the Military Road bus corridor.

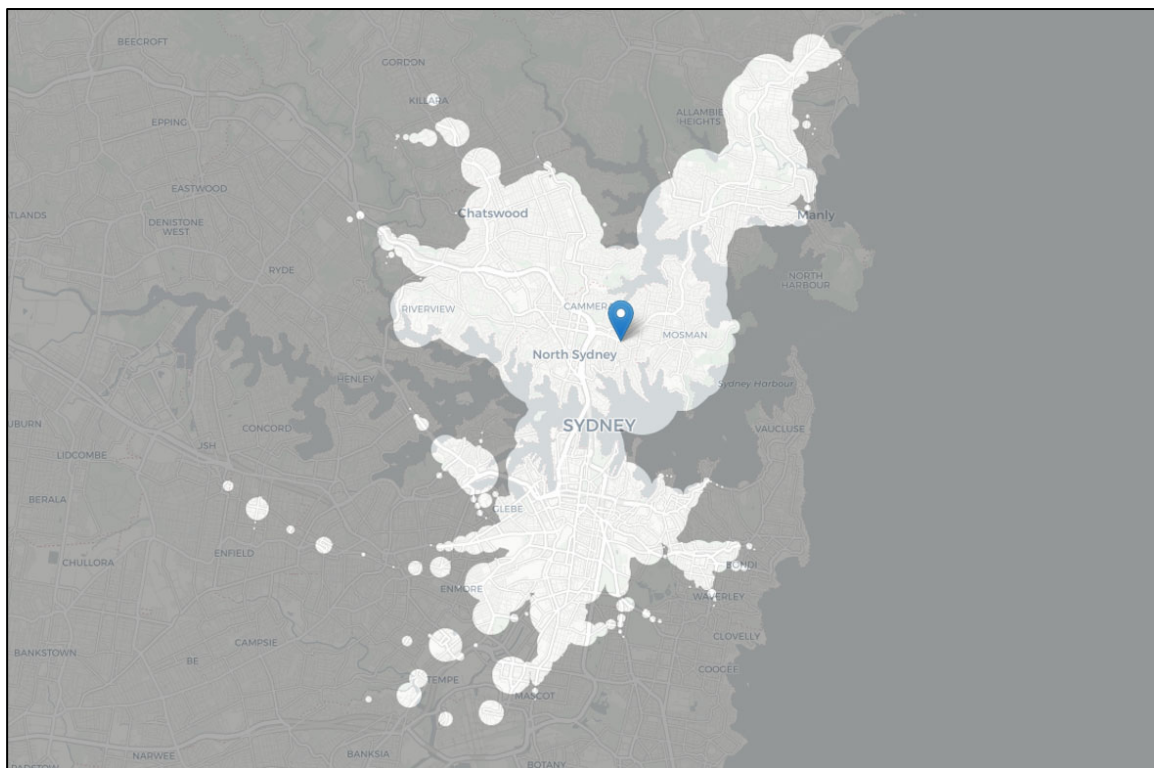


Figure 6 30 minute public transport catchment from site

Source: <https://www.mapnificent.net/sydney>



## 2.5 Walking and cycling

Good quality footpaths are provided along all streets in the vicinity of the site. This includes signalised pedestrian crossings on all legs of the signalised intersections at Military Road / Wycombe Road and Wycombe Road / Yeo Street. A zebra crossing is also provided adjacent to the site across Yeo Street near the intersection with Rangers Road.

There is a developing cycleway network in the vicinity of the site as illustrated in Figure 7 below. The site is located on the 'Route 5' cycleway as identified in the North Sydney Integrated Cycling Strategy, which will ultimately provide a connection between the North Sydney CBD and Mosman via Neutral Bay.



Figure 7 North Sydney cycling network

Source: North Sydney Council

## 2.6 Traffic flows

Traffic counts were undertaken on Thursday 11 November 2021 and Saturday 13 November 2021 to understand the existing level of traffic movements on the road network surrounding the site. It is important to note the traffic survey dates were undertaken outside of any 'stay at home' orders or other COVID-19 pandemic restrictions in place in the Sydney Metropolitan Area. The survey locations are summarised below and shown in Figure 8.

- Rangers Road / Yeo Street
- Yeo Street / Woolworths car park entry
- Wycombe Road / Yeo Street
- Wycombe Road / Military Road
- Rangers Road / Military Road



Figure 8 Traffic survey locations

The traffic surveys have been used as the basis for the traffic modelling carried out to understand the implications of the Planning Proposal on the surrounding road network.

## 2.7 Historical traffic growth

The Annual Average Daily traffic (AADT) data from the nearest Transport for NSW counting station 22001, which operates on Military Road west of the site, was extracted from TfNSW's traffic volume viewer to appreciate the pattern of traffic changes along the Military Road corridor within the study area. As can be seen in Figure 9 below, traffic flows during the morning peak hour on Military Road have remained largely static over the 10 year period since 2009. There was a significant reduction in 2020 and 2021 however this would primarily be due to the COVID-19 pandemic. It could be expected however that, with the increasing popularity of working from home, traffic flows on Military Road would not reach their pre-pandemic levels for some time. Importantly the data analysis indicates that traffic flows during peak hours on Military Road have not increased and therefore no future traffic growth rate has been assumed as part of the traffic modelling undertaken for this study.

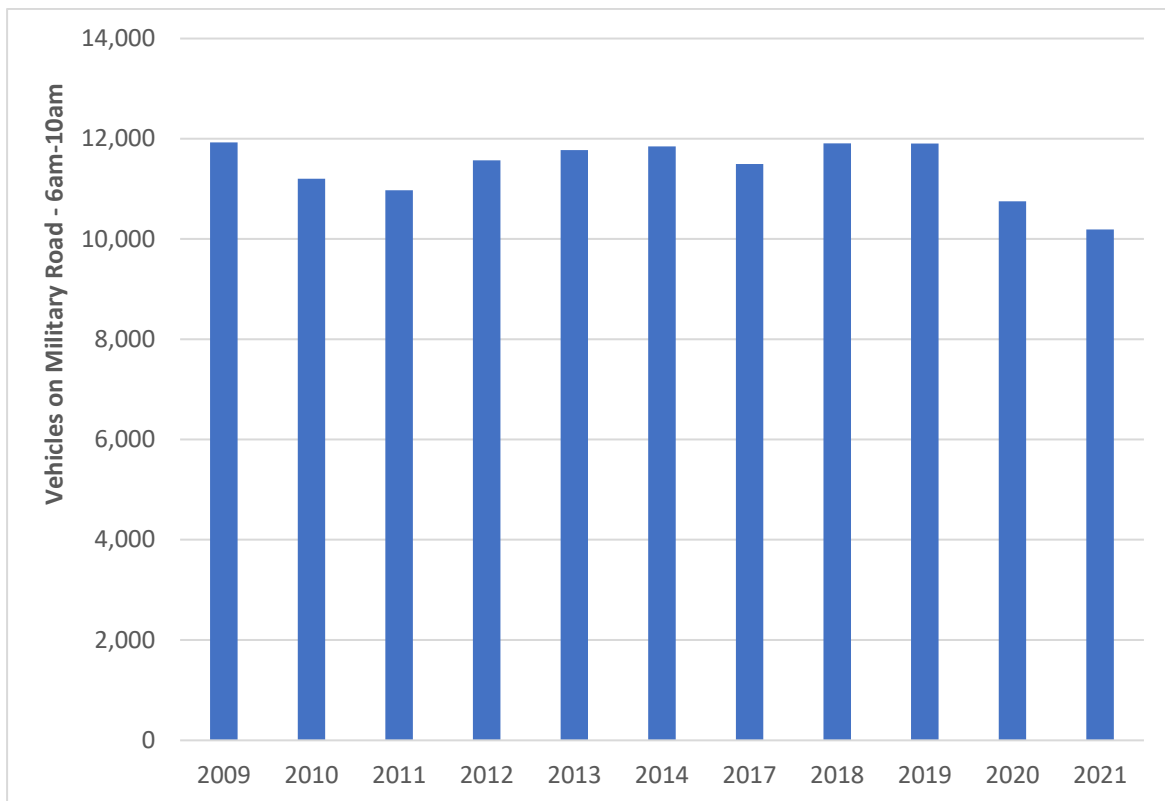


Figure 9 Historical traffic flows – Military Road



## 3 Transport and Access Strategy

### 3.1 Site access arrangements

Under the reference scheme prepared by Koichi Takada vehicle access (including B99s) would be obtained from Yeo Street, adjacent to the current access point as shown in Figure 10. Vehicles would access the on-site car parking area through a series of ramps on the eastern boundary of the site. The site would also offer a 'Direct to Boot service to facilitate online order pickups. A parking area will be provided at basement level for customers to access the Direct to Boot service with access also obtained via Yeo Street.

To ensure safe egress and separation from general traffic, it is proposed that service vehicles accessing the loading dock would do so via Military Lane similar to existing site arrangements.

Pedestrian access and site permeability would be significantly improved via a through site link and public plaza connecting Rangers Road to Yeo Street. Additional pedestrian access points would also be available via Rangers Road and Yeo Street.

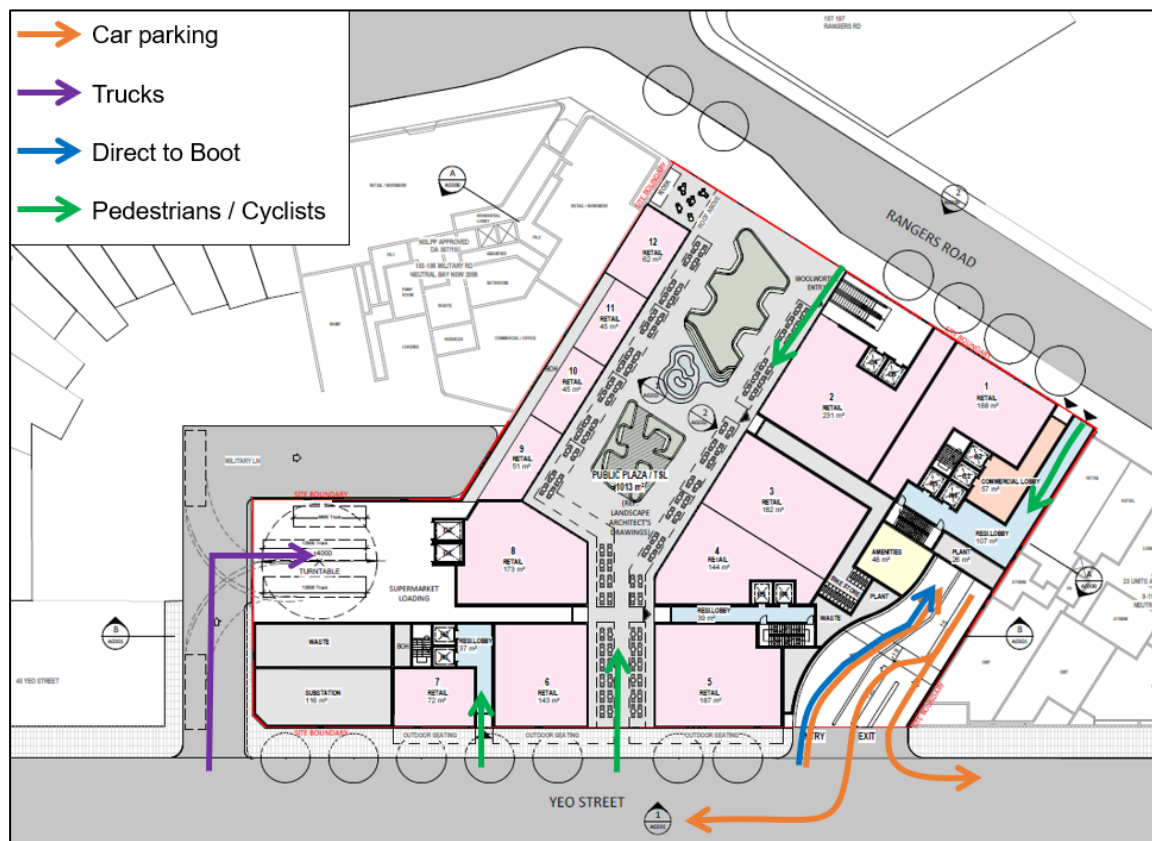


Figure 10 Proposed site access



### 3.2 Loading dock

The reference scheme includes an on-site loading dock which can accommodate up to three vehicles at any one time, those being:

- One Heavy Rigid Vehicle (HRVs), 12.5m in length
- One Medium Rigid Vehicle (MRV), 8.8m in length
- One Small Rigid Vehicle (SRV), 6.4m in length

This loading provision is considered suitable to accommodate the needs of the site based on the development yields associated with the reference scheme.

The loading dock is located on the ground floor at the western end of the site accessed via Military Lane. As indicated in the swept paths shown in the figure below, all vehicles have the ability to enter and exit Military lane in a forwards direction. All loading / unloading activities is to occur on-site and not in public streets.

The loading dock has been designed in accordance with the requirements outlined in the relevant Australian Standard (AS2890.2, 2018). The final design of the loading dock will be carried out at the Development Application stage of the project.

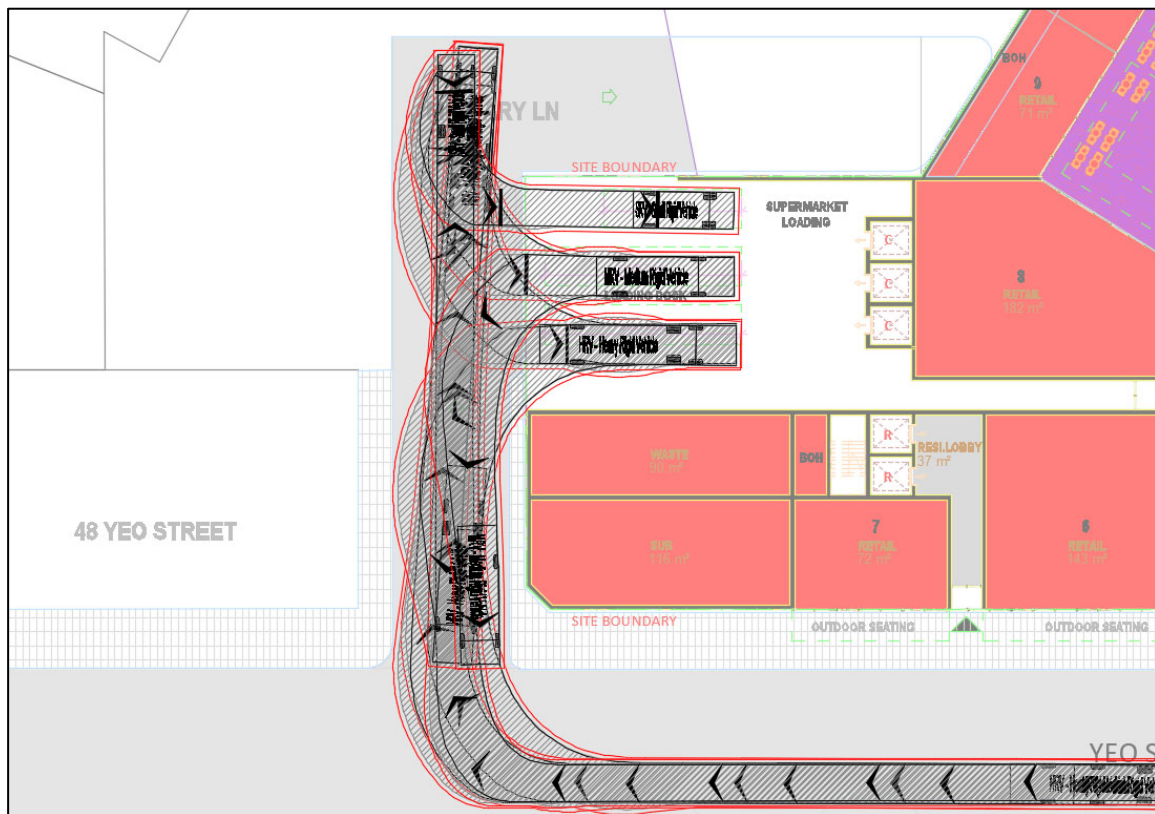


Figure 11 Vehicle swept paths – loading dock

### 3.3 Car park access and design

As part of the reference scheme developed for the Planning Proposal a basement car park has been designed to facilitate the future development. The car park and associated elements such as car parking space dimensions, circulation aisles and ramp would be designed in accordance with the relevant Australian Standard for car parking facilities, namely AS2890.1: 2004 and AS2890.6:2009.

Car parking spaces have been designed to comply with a Class 1 car park facility for the residential and commercial uses as specified in the Australian Standard (generally low turnover long term parking) with 2.4m wide spaces and aisle widths of 5.8m. For the retail car parking areas 2.6m wide spaces with 6.2m aisles have been provided in accordance with the requirements of Class 3 parking areas.

The final design of the car park will be carried out at the Development Application stage of the project.

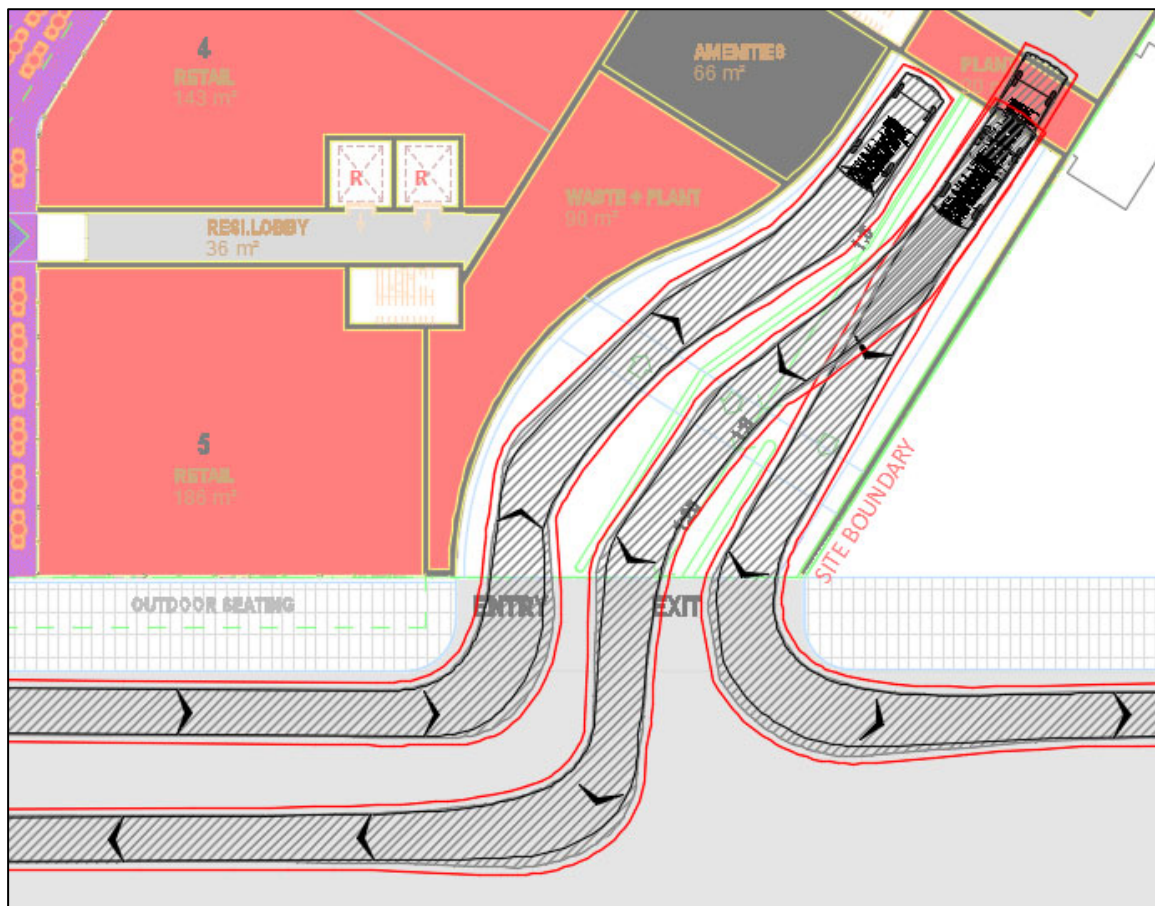


Figure 12 Vehicle swept paths – car park access

### 3.4 Car parking

The proposed level of car parking for the site, for each of the proposed uses, is outlined in the following sections of this report. The parking numbers are based on the reference scheme prepared by Koichi Takada for the purposes of the Planning Proposal. It should be noted that the reference scheme is conceptual in nature and further investigations will need to be undertaken at subsequent stages to confirm the final parking number and layout. The final car parking requirements and provision for the site will be confirmed at the Development Application (DA) stage of the project.

#### 3.4.1 Residential car parking

An assessment of car parking requirements for the proposal against requirements set out in North Sydney DCP has been undertaken as detailed in Table 2 below. This analysis demonstrates that the proposed parking provision of 87 spaces under the reference scheme is consistent with the maximum permissible parking provision allowable under the DCP.

Table 2 Residential car parking provision

Type	No. of units	DCP parking rate (B4 zones)	Max. no. of spaces under DCP	Car spaces provided
Studio	0	0.5 / unit	0	<b>87</b>
1 bed	8	0.5 / unit	4	
2 bed	36	1.0 / unit	36	
3 bed	47	1.0 / unit	47	
<b>Total</b>			<b>87</b>	

#### 3.4.2 Retail car parking

The North Sydney Council Development Control Plan (DCP) notes the following maximum parking rates for retail uses:

- Supermarkets - 4.0 spaces per 100m<sup>2</sup> GFA (1 space / 25m<sup>2</sup>)
- Speciality retail – 1.67 spaces per 100m<sup>2</sup> GFA (1 space / 60m<sup>2</sup>)

Adopting the floor space in the reference scheme prepared for the Planning Proposal a maximum of 163 spaces could be provided, comprising of 132 parking bays for the supermarket and 31 parking bays for speciality retail. The current reference scheme proposes 163 parking spaces for the retail uses of the site which is consistent with Council's controls. Providing an appropriate level of on-site car parking to meet customer needs will reduce demand for parking on surrounding streets and encourages customers to park in the basement.

### 3.4.3 Commercial car parking

The North Sydney DCP notes a maximum parking rate of 1 space per 60m<sup>2</sup> GFA for commercial uses. The reference scheme complies with this maximum parking rate by providing 35 parking spaces for the approximately 2,100m<sup>2</sup> of commercial floor space.

### 3.4.4 Public car parking

As part of the proposed Voluntary Planning Agreement (VPA) accompanying the Planning Proposal 65 public car parking spaces would be dedicated to Council for the benefit of existing businesses and visitors of the Neutral Bay town centre. The importance of public car parking to support the vibrancy and feasibility of the Neutral Bay town centre is recognised in the Military Road Corridor Planning Study which notes the following key objectives:

- *Provide public parking to support local shops.*
- *Replace on-street parking with off-street public car parking to free up public domain.*

These public car parking spaces would be located within the site itself but under the control and management of Council. As the Planning Proposal (and subsequent Development Application) for the site progresses a plan of management will be established for the future use of these Council controlled parking spaces so that they effectively service the Neutral Bay centre.

The public car parking spaces to be provided as part of the site redevelopment would not themselves generate additional traffic movements compared with current conditions. Instead they facilitate improved parking opportunities for people already travelling to the Neutral Bay town centre and relying on street parking on Military Road or surrounding residential streets. The Council controlled car parking spaces will also provide opportunities for Council to replace existing on-street parking to free up public domain in certain locations – as per the recommendations of the Military Road Corridor Planning Study.



### 3.5 Bicycle parking

The North Sydney Council DCP outlines minimum bicycle parking requirements for new developments. Table 3 below summarises the potential bicycle parking provision based on the reference design prepared for the Planning Proposal. This will be confirmed at the DA stage of the development.

Table 3 Potential bicycle parking requirements

Land Use	No. of units / GFA	User Type	Potential bicycle parking requirement	
			Rate	Number
Residential	91 units	Residents	1 per unit	91
		Visitors	1 per 10 units	9
Commercial	2103m <sup>2</sup>	Staff	1 per 150m <sup>2</sup>	14
		Visitors	1 per 400m <sup>2</sup>	5
Retail	5157m <sup>2</sup>	Staff	1 per 200 m <sup>2</sup>	26
		Visitors	1 per 300m <sup>2</sup>	17

For residents and staff bicycle parking will be located in a secure location only accessible via key or swipe card. This will either be in individual storage units (Class 1 facility) or a large secure bicycle parking room within the site boundary (Class 2 facility). For retail and residential visitors class 3 bike parking (i.e. bike rails) will be provided in a publicly accessible location with good passive surveillance.

## 3.6 Green travel plan

### 3.6.1 Background

A Green Travel Plan (GTP) is a package of measures put in place by the development occupants to try and encourage more sustainable travel. It is a means for a development to demonstrate a commitment and take a pro-active step towards improving the environmental sustainability of its activities.

More generally, the principles of a GTP are applied to all people travelling to and from a site. Government authorities are placing increasing emphasis on the need to reduce the number and lengths of motorised journeys and in doing so encourage greater use of alternative means of travel with less negative environmental impacts than the car.

### 3.6.2 Objectives

The main objectives of the GTP are to reduce the need to travel and promotion of sustainable means of transport. The more specific objectives include:

- High mode share for public transport, cycling and walking to work journeys;
- Ensuring adequate facilities are provided at the site to enable the tenants and visitors of the development to commute by sustainable transport modes;
- Reduce the number of car journeys associated with business travel;
- Facilitate the sustainable and safe travel of occupants; and
- Raise awareness of sustainable transport amongst tenants of the development.

### 3.6.3 Potential measures

A suite of potential measures is described below to be implemented as part of the GTP, which can be developed further as the Planning Proposal progresses.

Table 4 List of potential GTP measures

Action	Responsibility
<b>Cycling</b>	
Provide sufficient cycle parking to meet needs, which is easily accessible and secure	Developer
Provide adequate cycle parking facilities for visitors	Developer
Ensure cycle parking is clearly visible or provide signage to direct people to cycle bays	Building manager
Produce a map showing cycle routes and bike stands in the area	Building manager
Supply a communal toolkit for staff consisting of puncture repair equipment, a bike pump, a spare lock and lights.	Building manager
Promote the participation in annual events such as 'Ride to Work Day'	Tenants

Action	Responsibility
<b><i>Walking</i></b>	
Identify tenants living near work that may be interested in walking to work	Building manager
Identify through the travel survey what incentives might need to be put in place for non-walkers to consider a mode shift	
<b><i>Public Transport</i></b>	
Develop a map showing public transport routes in the area	Building manager
Put up a noticeboard with leaflets and maps showing the main public transport routes to and from the site	Building manager
<b><i>Carshare / Carpooling</i></b>	
Establish a car pooling program to help people find someone to share in their daily commute.	Building manager and tenants
Develop a map showing car-share spots in the area to encourage staff and visitors to use a shared car (e.g. GoGet) if they are required to drive	Building manager and tenants
<b><i>General actions</i></b>	
Promotion including: <ul style="list-style-type: none"> <li>• Allow staff the flexibility to commute outside peak periods to reduce overall congestion and travel time.</li> <li>• Identify a tenant/champion to complete travel coordinator duties</li> <li>• Provide a welcome pack upon initial occupation of each tenant which includes details around sustainable travel options</li> </ul>	Tenants

### 3.6.4 Monitoring and review

In order for the GTP to be effective, it must be reviewed on a regular basis. It is important to ensure that the GTP is meeting its objectives and having the intended impact on car use and transport choices. The GTP should be reviewed on a yearly basis by undertaking travel surveys. It is recommended that the mode shares are first reviewed at least 18 months after occupation, to allow activity levels to settle at the site.

## 4 Traffic Impact Assessment

The following section summarises the traffic assessment undertaken to consider the road network impacts of the Planning Proposal. Given the focus of the proposal around retail uses, the critical weekday PM peak hour and Saturday peak hour have been considered in the analysis. As retail uses generate minimal traffic movements during the AM weekday peak hour this has not been considered at this stage.

### 4.1 Traffic generation

#### 4.1.1 Existing retail traffic generation

As previously noted the site currently operates as a Woolworths supermarket with approximately 100 car parking spaces. Surveys undertaken in November 2021 indicated that currently the site generates the following levels of traffic:

- 229 vehicle movements during the PM peak hour (5pm – 6pm) or 8.44 trips / 100m<sup>2</sup> GLA<sup>1</sup>
- 205 vehicle movements during the Saturday peak hour (12pm – 1pm) or 7.56 trips / 100m<sup>2</sup> GLA

#### 4.1.2 Residential traffic generation

The forecast traffic generation for the residential uses has been determined based on the Sydney wide average traffic generation rates for high density residential uses as published by TfNSW which are as follows:

- PM peak hour: 0.19 vehicle trips per unit
- Saturday peak hour: 0.22 vehicle trips per unit

#### 4.1.3 Commercial traffic generation

Transport for NSW published a Technical Direction that described vehicular trip rates for commercial developments. Comparable commercial developments have been considered in order to understand the likely traffic generation resulting from the site. Four sites were selected given their similar proximity to nearby public transport as well as similar car parking rates, which were sites located in North Sydney, Chatswood, Macquarie Park and Parramatta.

Given the constrained on-site parking environment, traffic generation rates per parking space have been used to estimate the likely peak hour vehicle trips generated by the site. The average peak hour trip rates per parking space for the surveyed locations were estimated to be 0.40 and 0.25 trips per parking space during the AM and PM network peak hour respectively. The surveyed data for

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<sup>1</sup> GFA to GLA conversion factor of 0.80 adopted for this analysis



these sites is highlighted in Table 5 below. As a conservative estimate a generation rate of 0.5 trips / space has been adopted during the PM peak hour. Minimal traffic generation would be expected for the Saturday peak hour.

Table 5 Peak hour vehicle trip generation per parking space

Surveyed location	North Sydney	Chatswood	Macquarie Park	Parramatta	Average
AM peak hour trips	51	47	119	185	100
PM peak hour trips	44	36	72	75	57
Parking spaces	136	150	269	402	239
PM peak hour trip rate	0.32	0.24	0.27	0.19	0.25

Source: Roads and Maritime, Technical Direction 2013/14

#### 4.1.4 Future retail traffic generation

Surveys undertaken by Transport for NSW at a number of retail centres in NSW have been used to determine the level of traffic generation from future retail uses. The floor area for each retail centre has been plotted against the surveyed traffic generation rate, and a regression analysis undertaken to establish the relationship between floor area and traffic generation. This is illustrated in Figure 13 and indicates that as retail floor space increases the rate of traffic generation reduces -reflecting the fact that as more speciality stores are added to a centre already containing an anchor tenant the rate of traffic generation will reduce.

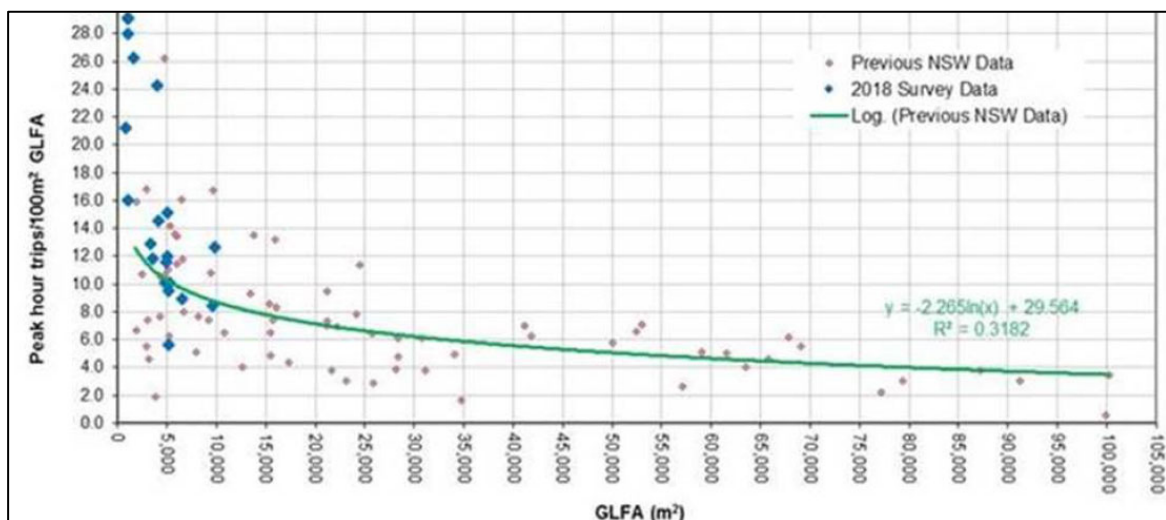


Figure 13 Relationship between retail floor area and traffic generation

Source: Transport for NSW

The analysis recognises that the site is an established retail centre with a major anchor tenant (Woolworths). The additional retail floor space proposed comprises of uses that are ancillary to this anchor tenants and complement the range of services offered on the site. Therefore the additional floor space will not generate a large number of additional traffic movements, but instead it will provide existing customers with a wider offering as they travel to the site.

The existing and proposed retail floor area were then used as inputs to determine a ratio between existing and post-development traffic generation rates. This ratio was applied to the existing traffic generation rates at the site to determine the forecast future level of traffic, taking into account passing trade which typically comprises approximately 25% of all traffic as noted in the *RMS guide traffic generating developments* document. These forecasts are shown in Table 6 for the Thursday PM peak hour and Table 7 for the Saturday lunchtime peak hour.

Table 6 Forecast traffic generation for future retail (PM peak hour)

Existing PM Peak Hour					Future PM Peak Hour					
Existing GLA	Existing gen. rate	Existing entry/exits	Passing trade trips	Total traffic generation	Future GLA	Future traffic gen. rate	Future entry/exits	Passing trade trips	Total traffic generation	Growth in trips
2,713	8.44	229	57	172	4,126	7.75	320	80	240	68

Table 7 Forecast traffic generation for future retail (Saturday peak hour)

Existing Saturday Peak Hour					Future Saturday Peak Hour					
Existing GLA	Existing gen. rate	Existing entry/exits	Passing trade trips	Total traffic generation	Future GLA	Future traffic gen. rate	Future entry/exits	Passing trade trips	Total traffic generation	Growth in trips
2,713	7.56	205	51	154	4,126	6.94	286	72	214	60

#### 4.1.5 Net traffic generation

Considering the various uses envisaged within the Planning Proposal the overall increase in traffic generation is summarised in Table 8 below.

Table 8 Net traffic generation

Use	Quantum	Unit	Traffic Generation Rate		Traffic Generation	
			PM Peak Hour	Sat Peak Hour	PM Peak Hour	Sat Peak Hour
Residential	91	apartments	0.19 / unit	0.22 / unit	17	20
Commercial	35	parking spaces	0.5 / space	0.1 / space	18	4
Retail	5,157	m <sup>2</sup> GFA	See Section 4.1.4		68	60
<b>Total</b>					<b>103</b>	<b>84</b>

#### 4.2 Traffic distribution

The forecast direction of travel to the site utilised in the traffic modelling is shown in Figure 14. The number of different arrival and departure routes available to customers contributes to spreading the traffic load and minimising the impact on the surrounding road network.

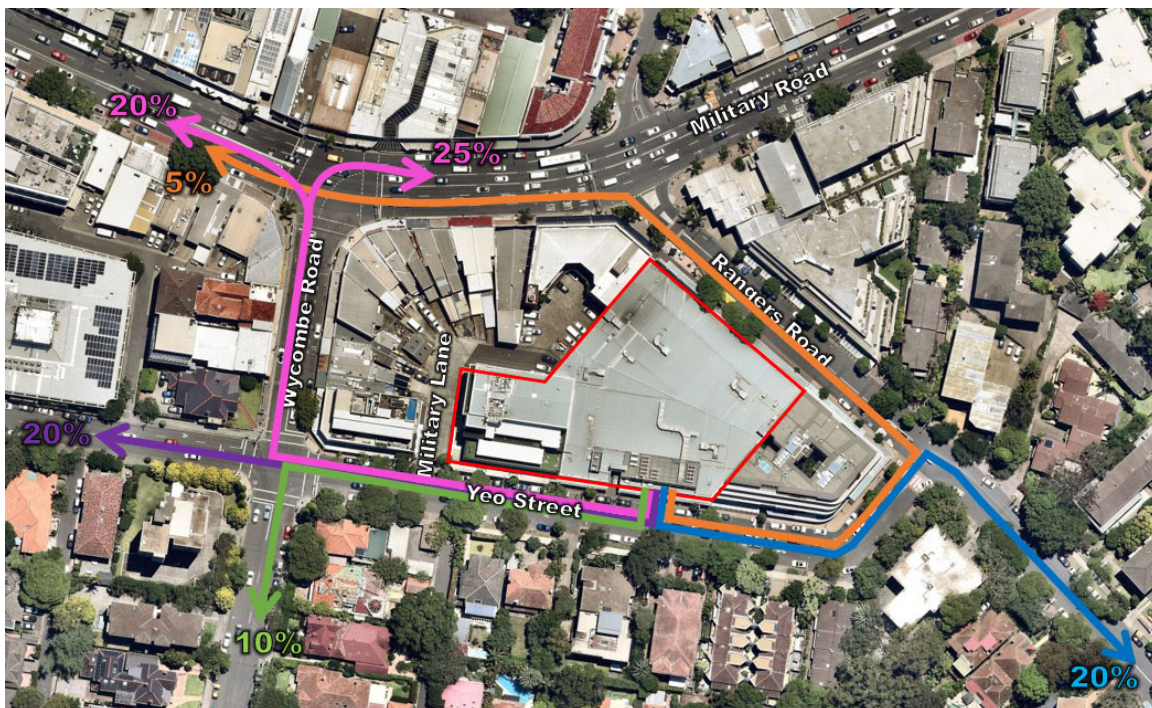


Figure 14 Forecast traffic distribution

The resulting increase in traffic movements at each intersection based on the forecast traffic generation and distribution is shown in the figures below. Through this it can be seen that, as a result of the relatively low net traffic increase and multiple routes available, that the increase in vehicles travelling through intersections around the site is generally modest at less than 20 vehicles per hour or one vehicle every three minutes.

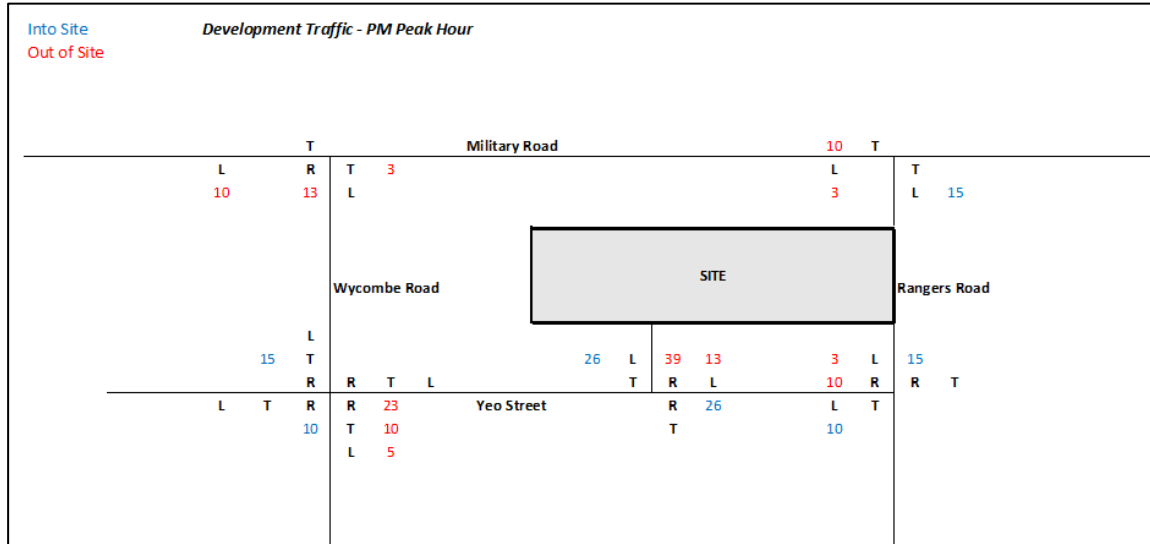


Figure 15 Forecast increase in traffic movements by intersection (PM peak hour)

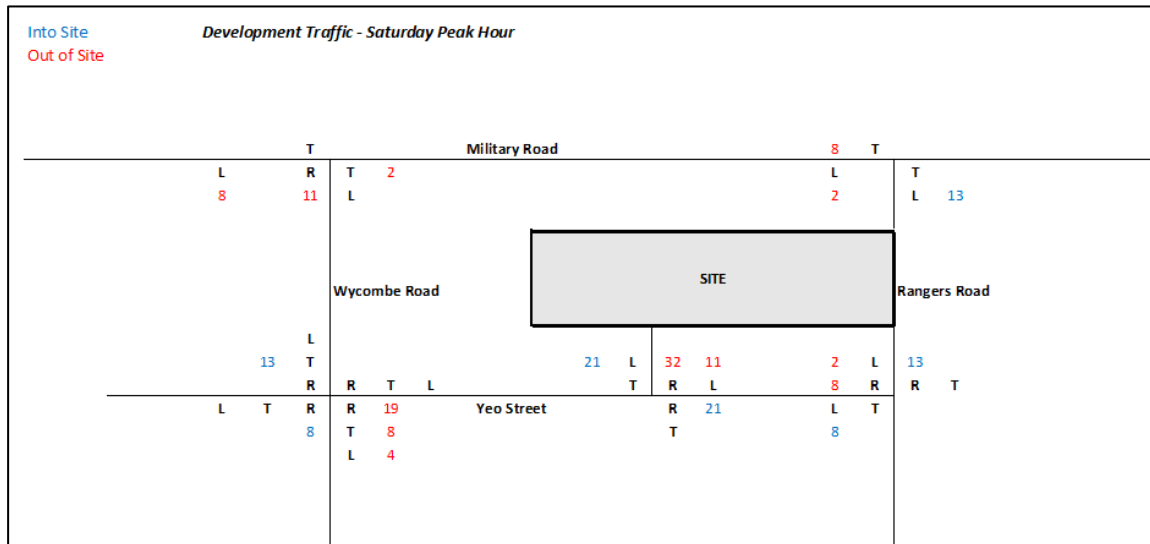


Figure 16 Forecast increase in traffic movements by intersection (Sat peak hour)



### 4.3 Traffic modelling

The traffic modelling metric used to analyse the performance of the intersections is intersection Level of Service (LOS). Level of Service is a measure that uses the average delay experienced by vehicles to categorically assign each approach and movement with a qualitative ordinal grade (A through F, with A being the best and F being the worst). RMS Traffic Modelling Guidelines indicate the average delay relating to each grade, this is outlined in Table 9. In typical urban environments it is typical for intersections to operate at Level of Service D or E and still remain within acceptable performance levels.

Table 9 Level of service grades / description

Level of service grade	Average delay (seconds)	Description
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode
F	Greater than 71	Unsatisfactory with excessive queuing

The traffic modelling has considered the following two scenarios:

- (i) 'Base Case' - Traffic flows as per the counts undertaken in November 2021
- (ii) 'Base Case + Development' - Traffic flows following the development of the subject site as envisaged in this Planning Proposal.

The results of the traffic modelling are illustrated in Figure 17 (PM peak hour) and Figure 18 (Saturday peak hour) on the following pages. Detailed traffic modelling outputs are provided in Appendix A of this document.



Figure 17 Intersection modelling results – PM weekday peak hour



Figure 18 Intersection modelling results – Saturday peak hour

The modelling undertaken indicates that the proposal is not anticipated to result in unacceptable traffic impacts on the surrounding road network. Intersection level of service remains at Level of Service D or below for all intersections. Therefore the proposal is not expected to unduly impact the operation of the surrounding road network.

It is also worthwhile noting that a significant level of traffic already travelling along key roads in the vicinity of the site such as Military Road do so for the purpose of accessing nearby retail centres such as Big Bear Shopping Centre. While not specifically considered in the traffic analysis, all traffic associated with the proposal would not 'new' – instead trips (particularly from those in the local area not currently served by a full line supermarket) would be intercepted at Neutral Bay that would otherwise have continued along Military Road towards these existing centres.

The traffic modelling undertaken for the project has also not considered the future reduction in traffic along Military Road expected to result from the future Western Harbour Tunnel and Beaches Link project. This project will provide a new underground motorway bypass of the Spit and Military Road and Warringah Road corridors. Transport for NSW estimates the project will result in a 10% reduction in traffic along Military Road which has not been considered as part of the traffic analysis undertaken for the Planning Proposal.



## 5 Summary

This transport assessment report has been undertaken by JMT Consulting to support a Planning Proposal for the site at 1-11 Rangers Road, Neutral Bay. The proposal seeks to amend the North Sydney Local Environmental Plan to increase maximum height and density controls on the site, facilitating the future development of a mixed-use site including retail, commercial and residential floor space. Key findings of the transport assessment are as follows:

- Vehicle access to the site for general vehicles would be provided on Yeo Street, close to the existing access point for the site.
- Service vehicle access to an on-site loading dock is to be provided Military Lane to segregate cars in the basement and trucks using the loading dock – providing a strong safety outcome.
- Car parking and bicycle parking on the site for all uses will be delivered in accordance with the parking rates outlined in the North Sydney DCP, with the final number of spaces to be determined at the Development Application stage of the project.
- The proposal includes 65 public car parking spaces, to be dedicated to Council, which benefit existing businesses and visitors of the Neutral Bay town centre and align with recommendations of the Military Road Corridor Planning Study.
- Traffic modelling undertaken indicates that the proposal is not anticipated to result in unacceptable traffic impacts on the surrounding road network – with all intersections in the vicinity of the site continuing to operate at acceptable levels of service.
- The NSW Government's future Western Harbour Tunnel and Beaches Link project will benefit the Military Road corridor by reducing the extent of regional traffic flows, with Transport for NSW projecting a 10% reduction in traffic along the corridor.
- Travel demand management measures have been suggested to improve the mode share of public transport and active transport. These items should be considered further at subsequent stages of the project.

In the above context, the traffic and transport impacts arising from the proposal are considered acceptable.



## Appendix A: Traffic Modelling Outputs

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# MOVEMENT SUMMARY

 **Site: 101 [Military Road - Wycombe Road (Site Folder: PM Existing)]**

 **Network: N101 [PM Existing (Network Folder: General)]**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist m				
South: Wycombe Road (S)														
1	L2	73	3.0	73	3.0	0.243	62.7	LOS E	2.7	19.2	0.91	0.76	0.91	21.6
3	R2	133	3.0	133	3.0	* 0.444	61.9	LOS E	5.1	36.4	0.95	0.79	0.95	4.3
Approach		205	3.0	205	3.0	0.444	62.2	LOS E	5.1	36.4	0.94	0.78	0.94	12.0
East: Military Road (E)														
4	L2	75	2.0	75	2.0	0.192	10.5	LOS A	2.1	15.6	0.31	0.44	0.31	25.7
5	T1	1902	7.0	1902	7.0	* 0.959	51.9	LOS D	10.8	80.0	0.94	1.08	1.17	24.5
Approach		1977	6.8	1977	6.8	0.959	50.3	LOS D	10.8	80.0	0.92	1.06	1.14	24.5
West: Military Road (W)														
11	T1	2523	7.0	2523	7.0	0.897	27.9	LOS B	32.3	239.4	0.84	0.87	0.93	31.5
Approach		2523	7.0	2523	7.0	0.897	27.9	LOS B	32.3	239.4	0.84	0.87	0.93	31.5
All Vehicles		4705	6.7	4705	6.7	0.959	38.8	LOS C	32.3	239.4	0.87	0.94	1.02	27.0

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.

Intersection and Approach LOS values are based on average delay for all vehicle 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.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		[ Ped ped	Dist m			sec	m	m/sec
South: Wycombe Road (S)											
P1	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	231.5	213.6	0.92
East: Military Road (E)											
P2	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	237.8	221.8	0.93
West: Military Road (W)											
P4	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	237.8	221.8	0.93
All Pedestrians		158	67.2	LOS F	0.2	0.2	0.98	0.98	235.7	219.1	0.93


Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Wycombe Road (S)											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
East: Yeo Street (E)											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
North: Wycombe Road (N)											
P3	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
West: Yeo Street (W)											

# MOVEMENT SUMMARY

 **Site: 101 [Rangers Road - Yeo Street (Site Folder: PM Existing)]**

 **Network: N101 [PM Existing (Network Folder: General)]**

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %	v/c	sec		[ Veh. veh	Dist m				km/h
South: Rangers Road (S)														
1	L2	239	3.0	239	3.0	0.170	5.6	LOS A	0.0	0.0	0.00	0.42	0.00	53.1
2	T1	95	3.0	95	3.0	0.170	0.0	LOS A	0.0	0.0	0.00	0.42	0.00	53.1
Approach		334	3.0	334	3.0	0.170	4.0	NA	0.0	0.0	0.00	0.42	0.00	53.1
North: Rangers Road (N)														
8	T1	29	3.0	29	3.0	0.034	0.8	LOS A	0.1	0.4	0.35	0.27	0.35	54.3
9	R2	24	3.0	24	3.0	0.034	6.7	LOS A	0.1	0.4	0.35	0.27	0.35	39.7
Approach		54	3.0	54	3.0	0.034	3.5	NA	0.1	0.4	0.35	0.27	0.35	51.6
West: Yeo Street (W)														
10	L2	28	3.0	28	3.0	0.327	8.6	LOS A	0.5	3.4	0.32	0.94	0.32	34.7
12	R2	265	3.0	265	3.0	0.327	9.8	LOS A	0.5	3.4	0.32	0.94	0.32	47.6
Approach		294	3.0	294	3.0	0.327	9.7	LOS A	0.5	3.4	0.32	0.94	0.32	47.1
All Vehicles		681	3.0	681	3.0	0.327	6.4	NA	0.5	3.4	0.16	0.63	0.16	49.9

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 Road - Rangers Road (Site Folder: PM Existing)]

Network: N101 [PM Existing (Network Folder: General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %	v/c	sec		[ Veh. veh	Dist m				km/h
South: Rangers Road (S)														
1	L2	120	2.0	120	2.0	0.182	9.4	LOS A	0.3	1.9	0.56	0.81	0.56	27.3
Approach		120	2.0	120	2.0	0.182	9.4	LOS A	0.3	1.9	0.56	0.81	0.56	27.3
East: Military Road (E)														
4	L2	54	2.0	54	2.0	0.859	8.2	LOS A	0.0	0.0	0.00	0.05	0.00	53.7
5	T1	1867	7.0	1867	7.0	0.859	3.1	LOS A	36.3	269.5	0.00	0.02	0.00	54.2
Approach		1921	6.9	1921	6.9	0.859	3.3	NA	36.3	269.5	0.00	0.02	0.00	54.2
West: Military Road (W)														
11	T1	2594	7.0	2594	7.0	0.843	0.4	LOS A	0.0	0.0	0.00	0.00	0.00	56.2
Approach		2594	7.0	2594	7.0	0.843	0.4	NA	0.0	0.0	0.00	0.00	0.00	56.2
All Vehicles		4635	6.8	4635	6.8	0.859	1.8	NA	36.3	269.5	0.01	0.03	0.01	55.1

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 Road - Wycombe Road (Site Folder: PM Future)]**

 **Network: N101 [PM Future (Network Folder: General)]**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist m				
South: Wycombe Road (S)														
1	L2	84	3.0	84	3.0	0.282	63.2	LOS E	3.1	22.4	0.92	0.77	0.92	21.5
3	R2	144	3.0	144	3.0	* 0.483	62.4	LOS E	5.6	39.9	0.96	0.80	0.96	4.3
Approach		228	3.0	228	3.0	0.483	62.7	LOS E	5.6	39.9	0.94	0.79	0.94	12.2
East: Military Road (E)														
4	L2	75	2.0	75	2.0	0.192	10.5	LOS A	2.1	15.6	0.31	0.44	0.31	25.7
5	T1	1907	7.0	1907	7.0	* 0.962	53.2	LOS D	10.8	80.0	0.95	1.10	1.19	24.1
Approach		1982	6.8	1982	6.8	0.962	51.6	LOS D	10.8	80.0	0.92	1.07	1.15	24.1
West: Military Road (W)														
11	T1	2523	7.0	2523	7.0	0.897	27.9	LOS B	32.3	239.4	0.84	0.87	0.93	31.5
Approach		2523	7.0	2523	7.0	0.897	27.9	LOS B	32.3	239.4	0.84	0.87	0.93	31.5
All Vehicles		4734	6.7	4734	6.7	0.962	39.5	LOS C	32.3	239.4	0.88	0.95	1.03	26.7

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.

Intersection and Approach LOS values are based on average delay for all vehicle 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.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		[ Ped ped	Dist m			sec	m	m/sec
South: Wycombe Road (S)											
P1	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	231.5	213.6	0.92
East: Military Road (E)											
P2	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	237.8	221.8	0.93
West: Military Road (W)											
P4	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	237.8	221.8	0.93
All Pedestrians		158	67.2	LOS F	0.2	0.2	0.98	0.98	235.7	219.1	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Site: 101 [Wycombe Road - Yeo Street (Site Folder: PM Future)]      Network: N101 [PM Future (Network Folder: General)]

Signals - EQUISAT (Fixed-Time/SCATS) Isolated      Cycle Time = 70 seconds (Site User-Given Cycle Time)

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.  
Intersection and Approach LOS values are based on average delay for all vehicle 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.

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Wycombe Road (S)											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
East: Yeo Street (E)											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
North: Wycombe Road (N)											
P3	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
West: Yeo Street (W)											

# MOVEMENT SUMMARY

Site: 101 [Military Road - Rangers Road (Site Folder: PM Future)]

Network: N101 [PM Future (Network Folder: General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %	v/c	sec		[ Veh. veh	Dist m				km/h
South: Rangers Road (S)														
1	L2	125	2.0	125	2.0	0.186	9.3	LOS A	0.3	1.9	0.56	0.81	0.56	27.5
Approach		125	2.0	125	2.0	0.186	9.3	LOS A	0.3	1.9	0.56	0.81	0.56	27.5
East: Military Road (E)														
4	L2	71	2.0	71	2.0	0.866	8.3	LOS A	0.0	0.0	0.00	0.06	0.00	53.2
5	T1	1867	7.0	1867	7.0	0.866	3.3	LOS A	37.0	274.9	0.00	0.02	0.00	53.9
Approach		1938	6.8	1938	6.8	0.866	3.5	NA	37.0	274.9	0.00	0.02	0.00	53.8
West: Military Road (W)														
11	T1	2605	7.0	2605	7.0	0.847	0.4	LOS A	0.0	0.0	0.00	0.00	0.00	56.1
Approach		2605	7.0	2605	7.0	0.847	0.4	NA	0.0	0.0	0.00	0.00	0.00	56.1
All Vehicles		4668	6.8	4668	6.8	0.866	1.9	NA	37.0	274.9	0.01	0.03	0.01	54.9

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 [Rangers Road - Yeo Street (Site Folder: PM Future)]**

 **Network: N101 [PM Future (Network Folder: General)]**

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %	v/c	sec		[ Veh. veh	Dist m				km/h
South: Rangers Road (S)														
1	L2	251	3.0	251	3.0	0.176	5.6	LOS A	0.0	0.0	0.00	0.42	0.00	53.0
2	T1	95	3.0	95	3.0	0.176	0.0	LOS A	0.0	0.0	0.00	0.42	0.00	53.0
Approach		345	3.0	345	3.0	0.176	4.1	NA	0.0	0.0	0.00	0.42	0.00	53.0
North: Rangers Road (N)														
8	T1	29	3.0	29	3.0	0.047	1.1	LOS A	0.1	0.7	0.40	0.36	0.40	53.2
9	R2	41	3.0	41	3.0	0.047	6.8	LOS A	0.1	0.7	0.40	0.36	0.40	36.9
Approach		71	3.0	71	3.0	0.047	4.4	NA	0.1	0.7	0.40	0.36	0.40	48.4
West: Yeo Street (W)														
10	L2	34	3.0	34	3.0	0.351	8.7	LOS A	0.5	3.9	0.32	0.95	0.34	34.3
12	R2	276	3.0	276	3.0	0.351	10.1	LOS A	0.5	3.9	0.32	0.95	0.34	47.4
Approach		309	3.0	309	3.0	0.351	10.0	LOS A	0.5	3.9	0.32	0.95	0.34	46.8
All Vehicles		725	3.0	725	3.0	0.351	6.6	NA	0.5	3.9	0.18	0.64	0.19	49.5

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: 101 [Military Road - Wycombe Road (Site Folder: Sat Existing)]

 Network: N101 [Sat Existing (Network Folder: General)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist m				
South: Wycombe Road (S)														
1	L2	73	0.0	73	0.0	0.238	63.5	LOS E	2.7	18.6	0.91	0.76	0.91	21.7
3	R2	142	3.7	142	3.7	* 0.478	62.3	LOS E	5.5	39.5	0.96	0.80	0.96	4.3
Approach		215	2.5	215	2.5	0.478	62.7	LOS E	5.5	39.5	0.94	0.79	0.94	11.6
East: Military Road (E)														
4	L2	64	11.5	64	11.5	0.197	10.5	LOS A	2.3	17.1	0.31	0.40	0.31	26.9
5	T1	2134	3.1	2134	3.1	* 0.985	63.0	LOS E	11.1	80.0	0.96	1.15	1.25	21.7
Approach		2198	3.3	2198	3.3	0.985	61.5	LOS E	11.1	80.0	0.94	1.13	1.22	21.7
West: Military Road (W)														
11	T1	2317	2.4	2317	2.4	0.894	29.2	LOS C	30.0	214.0	0.83	0.87	0.94	30.9
Approach		2317	2.4	2317	2.4	0.894	29.2	LOS C	30.0	214.0	0.83	0.87	0.94	30.9
All Vehicles		4729	2.8	4729	2.8	0.985	45.7	LOS D	30.0	214.0	0.89	0.98	1.07	24.7

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.

Intersection and Approach LOS values are based on average delay for all vehicle 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.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		[ Ped ped	Dist m			sec	m	m/sec
South: Wycombe Road (S)											
P1	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	231.5	213.6	0.92
East: Military Road (E)											
P2	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	237.8	221.8	0.93
West: Military Road (W)											
P4	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	237.8	221.8	0.93
All Pedestrians		158	67.2	LOS F	0.2	0.2	0.98	0.98	235.7	219.1	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec			m			sec	m	m/sec
South: Wycombe Road (S)											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
East: Yeo Street (E)											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
North: Wycombe Road (N)											
P3	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
West: Yeo Street (W)											

# MOVEMENT SUMMARY

Site: 101 [Military Road - Rangers Road (Site Folder: Sat Existing)]

Network: N101 [Sat Existing (Network Folder: General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %	v/c	sec		[ Veh. veh	Dist m				km/h
South: Rangers Road (S)														
1	L2	168	2.5	168	2.5	0.271	10.4	LOS A	0.4	3.1	0.61	0.86	0.68	25.8
Approach		168	2.5	168	2.5	0.271	10.4	LOS A	0.4	3.1	0.61	0.86	0.68	25.8
East: Military Road (E)														
4	L2	58	3.6	58	3.6	0.911	9.6	LOS A	0.0	0.0	0.00	0.05	0.00	51.2
5	T1	2026	3.3	2026	3.3	0.911	4.8	LOS A	47.1	339.1	0.00	0.01	0.00	51.6
Approach		2084	3.3	2084	3.3	0.911	5.0	NA	47.1	339.1	0.00	0.02	0.00	51.6
West: Military Road (W)														
11	T1	2354	2.5	2354	2.5	0.744	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	57.9
Approach		2354	2.5	2354	2.5	0.744	0.2	NA	0.0	0.0	0.00	0.00	0.00	57.9
All Vehicles		4606	2.9	4606	2.9	0.911	2.7	NA	47.1	339.1	0.02	0.04	0.02	54.5

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: 101 [Rangers Road - Yeo Street (Site Folder: Sat Existing)]**

 **Network: N101 [Sat Existing (Network Folder: General)]**

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %	v/c	sec		[ Veh. veh	Dist m				km/h
South: Rangers Road (S)														
1	L2	327	0.3	327	0.3	0.231	5.6	LOS A	0.0	0.0	0.00	0.42	0.00	53.0
2	T1	131	3.2	131	3.2	0.231	0.1	LOS A	0.0	0.0	0.00	0.42	0.00	53.0
Approach		458	1.1	458	1.1	0.231	4.0	NA	0.0	0.0	0.00	0.42	0.00	53.0
North: Rangers Road (N)														
8	T1	26	4.0	26	4.0	0.042	1.5	LOS A	0.1	0.6	0.45	0.36	0.45	53.0
9	R2	33	0.0	33	0.0	0.042	7.2	LOS A	0.1	0.6	0.45	0.36	0.45	36.5
Approach		59	1.8	59	1.8	0.042	4.7	NA	0.1	0.6	0.45	0.36	0.45	48.6
West: Yeo Street (W)														
10	L2	44	0.0	44	0.0	0.329	8.8	LOS A	0.5	3.5	0.34	0.96	0.36	33.9
12	R2	236	0.4	236	0.4	0.329	10.4	LOS A	0.5	3.5	0.34	0.96	0.36	47.3
Approach		280	0.4	280	0.4	0.329	10.1	LOS A	0.5	3.5	0.34	0.96	0.36	46.4
All Vehicles		797	0.9	797	0.9	0.329	6.2	NA	0.5	3.5	0.15	0.60	0.16	49.9

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.

Site: 101 [Wycombe Road - Yeo Street (Site Folder: Sat Future)]      Network: N101 [Sat Future (Network Folder: General)]

Signals - EQUISAT (Fixed-Time/SCATS) Isolated      Cycle Time = 70 seconds (Site User-Given Cycle Time)

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.  
 Intersection and Approach LOS values are based on average delay for all vehicle 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.

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Wycombe Road (S)											
P1	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
East: Yeo Street (E)											
P2	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
North: Wycombe Road (N)											
P3	Full	53	29.3	LOS C	0.1	0.1	0.92	0.92	194.9	215.2	1.10
West: Yeo Street (W)											

# MOVEMENT SUMMARY

 **Site: 101 [Military Road - Wycombe Road (Site Folder: Sat Future)]**

 **Network: N101 [Sat Future (Network Folder: General)]**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV % ]	[ Total veh/h	HV % ]				[ Veh. veh	Dist m ]				
South: Wycombe Road (S)														
1	L2	82	0.0	82	0.0	0.269	64.0	LOS E	3.0	21.2	0.92	0.77	0.92	21.6
3	R2	152	3.5	152	3.5	* 0.509	62.7	LOS E	5.9	42.3	0.96	0.80	0.96	4.3
Approach		234	2.3	234	2.3	0.509	63.1	LOS E	5.9	42.3	0.95	0.79	0.95	11.8
East: Military Road (E)														
4	L2	64	11.5	64	11.5	0.195	10.5	LOS A	2.3	17.1	0.31	0.40	0.31	27.0
5	T1	2139	3.1	2139	3.1	* 0.973	55.7	LOS D	11.1	80.0	0.96	1.12	1.21	23.5
Approach		2203	3.3	2203	3.3	0.973	54.4	LOS D	11.1	80.0	0.94	1.10	1.18	23.5
West: Military Road (W)														
11	T1	2317	2.4	2317	2.4	0.894	29.2	LOS C	30.0	214.0	0.83	0.87	0.94	30.9
Approach		2317	2.4	2317	2.4	0.894	29.2	LOS C	30.0	214.0	0.83	0.87	0.94	30.9
All Vehicles		4754	2.8	4754	2.8	0.973	42.5	LOS D	30.0	214.0	0.89	0.97	1.05	25.8

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.

Intersection and Approach LOS values are based on average delay for all vehicle 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.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance											
Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		[ Ped ped	Dist m			sec	m	m/sec
South: Wycombe Road (S)											
P1	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	231.5	213.6	0.92
East: Military Road (E)											
P2	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	237.8	221.8	0.93
West: Military Road (W)											
P4	Full	53	67.2	LOS F	0.2	0.2	0.98	0.98	237.8	221.8	0.93
All Pedestrians		158	67.2	LOS F	0.2	0.2	0.98	0.98	235.7	219.1	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# MOVEMENT SUMMARY

 **Site: 101 [Rangers Road - Yeo Street (Site Folder: Sat Future)]**

 **Network: N101 [Sat Future (Network Folder: General)]**

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %	v/c	sec		[ Veh. veh	Dist m				km/h
South: Rangers Road (S)														
1	L2	337	0.3	337	0.3	0.235	5.6	LOS A	0.0	0.0	0.00	0.42	0.00	53.0
2	T1	131	3.2	131	3.2	0.235	0.1	LOS A	0.0	0.0	0.00	0.42	0.00	53.0
Approach		467	1.1	467	1.1	0.235	4.1	NA	0.0	0.0	0.00	0.42	0.00	53.0
North: Rangers Road (N)														
8	T1	26	4.0	26	4.0	0.055	1.6	LOS A	0.1	0.8	0.47	0.43	0.47	52.3
9	R2	47	0.0	47	0.0	0.055	7.3	LOS A	0.1	0.8	0.47	0.43	0.47	35.0
Approach		74	1.4	74	1.4	0.055	5.3	NA	0.1	0.8	0.47	0.43	0.47	46.2
West: Yeo Street (W)														
10	L2	49	0.0	49	0.0	0.485	9.5	LOS A	1.0	7.4	0.42	1.02	0.56	32.4
12	R2	351	0.3	351	0.3	0.485	11.6	LOS A	1.0	7.4	0.42	1.02	0.56	46.4
Approach		400	0.3	400	0.3	0.485	11.3	LOS A	1.0	7.4	0.42	1.02	0.56	45.6
All Vehicles		941	0.8	941	0.8	0.485	7.2	NA	1.0	7.4	0.21	0.68	0.28	48.8

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 [Military Road - Rangers Road (Site Folder: Sat Future)]

Network: N101 [Sat Future (Network Folder: General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS [ Total HV ] veh/h %		ARRIVAL FLOWS [ Total HV ] veh/h %		Deg. Satn  v/c	Aver. Delay  sec	Level of Service	AVERAGE BACK OF QUEUE [ Veh. Dist ] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed  km/h
South: Rangers Road (S)														
1	L2	174	2.4	174	2.4	0.275	10.3	LOS A	0.4	3.2	0.60	0.85	0.68	25.9
Approach		174	2.4	174	2.4	0.275	10.3	LOS A	0.4	3.2	0.60	0.85	0.68	25.9
East: Military Road (E)														
4	L2	73	2.9	73	2.9	0.918	9.9	LOS A	0.0	0.0	0.00	0.06	0.00	50.6
5	T1	2026	3.3	2026	3.3	0.918	5.2	LOS A	43.8	315.5	0.00	0.02	0.00	51.1
Approach		2099	3.3	2099	3.3	0.918	5.3	NA	43.8	315.5	0.00	0.02	0.00	51.1
West: Military Road (W)														
11	T1	2363	2.5	2363	2.5	0.747	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	57.9
Approach		2363	2.5	2363	2.5	0.747	0.2	NA	0.0	0.0	0.00	0.00	0.00	57.9
All Vehicles		4636	2.9	4636	2.9	0.918	2.9	NA	43.8	315.5	0.02	0.04	0.03	54.2

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.