114-126 MILITARY ROAD PORT KEMBLA
PLANNING PROPOSAL
TRAFFIC IMPACT ASSESSMENT

FOR

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P3452.001R Military Road Port Kembla Planning Proposal TIA	L. Johnston / A. Payne	A. Bitzios	L. Johnston	02/03/18	Luke Rollinson MMJ Real Estate

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1. INTRODUCTION

1.1 BACKGROUND

Bitzios Consulting has been engaged by Mr Olly Vujic to undertake a traffic impact assessment for the planning proposal to enable medium-density residential development on the former Port Kembla Public School site. This site is located at 114-126 Military Road (Lot 1 DP811699), Port Kembla, as shown in Figure 1.1.

Source: Google Earth

Figure 1.1: Site Location

1.2 PROPOSED DEVELOPMENT

The planning proposal is to propose that the site be rezoned from B4 Mixed Use to R3 Medium Density Residential and RE2 Private Recreation. This reduces minimum lot sizes from 1,999m^2 to 299m^2 and facilitates the proposed medium-density residential development consisting of:

- 7 small lot houses fronting Marne Street to the south of the site;
- 64 medium-density townhouse / terrace style residential dwellings through the middle of the site; and
- 36 residential flat dwellings at the northern end of the site.

The proposed small lot housing is to have vehicular access from individual driveways off Marne Street. An access will also be provided off Reservoir Street for the townhouses / terrace houses. Access to the proposed residential flats will be via Electrolytic Street. A copy of the development plans is provided in Appendix A.

1.3 SCOPE

The scope of this assessment consists of the following:

- a review of the existing road network and traffic conditions in proximity to the site;
- estimation of background traffic volumes at year of completion and 10-years post completion;
- calculation of the development's traffic generation and estimation of the distribution onto the external road network;
- undertake detailed traffic analysis using SIDRA Intersection analysis software to assess the capacity of the Military Road / Marne Street and Military Road / Church Street intersections at the year of opening and the 10-year design horizon;
- qualitatively assess the surrounding local access streets to determine the required road cross sections;
- advise on the location and form of all site accesses including sight distance checks;
- assessment of the development's parking and servicing requirements in accordance with Council's Development Control Plan;
- advise on the location and form of the bus stop on the development's Military Road frontage; and
- assessment of the public transport, pedestrian and cycling networks and connectivity within the vicinity of the site.

2. EXISTING CONDITIONS

2.1 ROAD NETWORK

Details of the road network surrounding the subject site is shown in Table 2.1.

Table 2.1: Surrounding Road Network

Road Name	No. of Lanes	Speed Limit	Divided	Jurisdiction	Hierarchy	Comments
Military Road	2	60	No	Wollongong City Council	Collector Street	Collector Road fronting the north of the site connecting to Five Island Road / State Route B65
Marne Street	2	50	No	Wollongong City Council	Local Street (major)	Minor residential street fronting the south of the site
Church Street	2	60	No	Wollongong City Council	Collector Street	Collector Road connecting Military Road to Northcliffe Road, the east-west connector between Port Kembla and the M1
Reservoir Street	2	50	No	Wollongong City Council	Local Street (major)	Minor residential street fronting the east of the site
Electrolytic Street	2 / 1	50	No	Wollongong City Council	Access Street	Minor access fronting the North of the site. Narrows to one-way east of Reservoir Street

2.2 EXISTING BACKGROUND TRAFFIC

Background traffic volumes were obtained from intersection counts undertaken by Matrix Traffic and Transport Data for the Military Road / Marne Street and Military Road / Church Street intersections on Friday 2nd February 2018. The background traffic volumes surveyed for the AM (8:00-9:00) and PM (15:00-16:00) peaks are presented in Figure 2.1. The traffic survey data has been attached as Appendix B.

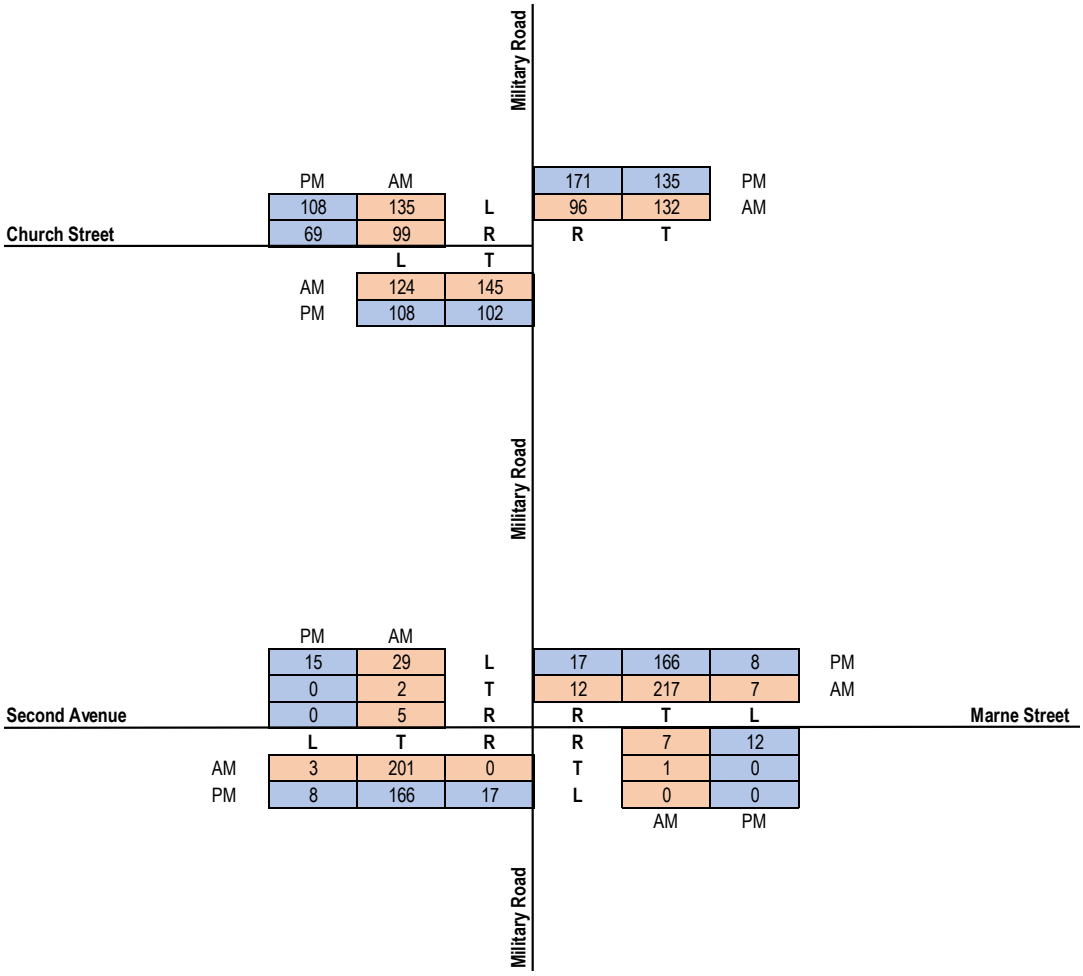


Figure 2.1: 2018 Background Traffic Volumes

2.3 PUBLIC TRANSPORT

Several bus services are provided in proximity to the subject site. Details of bus stops located within a reasonable walking distance (<400m) are provided in Table 2.2.

Table 2.2: Surrounding Bus Stop Summary

Bus Stop ID	Location	Approximate Distance from Site	Service
250544	Military Road (at Marne Street)	70m	Route 43 Route 65
-	Military Road after Second Avenue	40m	Route 43
250572	Wentworth Street Before Church Street	290m	Route 43 Route 65
250523	Port Kembla Community Centre, Wentworth Road	300m	Route 34 Route 43 Route 65
250545	Military Road (at Quarry Street)	350m	Route 43 Route 65
250521	Military Road (Opposite Quarry Street)	350m	Route 34 Route 43 Route 65

These bus stops identified are serviced by a number of different bus routes. Service details of these bus routes are shown in Table 2.3.

Table 2.3: Surrounding Bus Services

Service	Route	Frequency			
		Weekday Peak	Weekday Off-peak	Saturday	Sunday
34	Wollongong to Warrawong	20 minutes	30 minutes	30 minutes	Hourly
43	Port Kembla to Dapto District	Hourly	Hourly	Hourly	2 hourly
65	North Wollongong to Port Kembla	Hourly	Hourly	2 hourly	2 hourly

Hourly train services are also available from Port Kembla Train Station located approximately 1.2km north of the proposed development site. This station is serviced by the South Coast Line providing access from Bomaderry / Port Kembla to Central and Bondi Junction.

2.4 ACTIVE TRANSPORT

Limited pedestrian footpaths are present within the immediate vicinity of the subject site. An existing pedestrian crossing is present on Military Road between Church Street and Third Avenue however kerb ramps are not provided for this crossing. There are also no dedicated on-street cycle lanes on roads in the local network. However, line marking indicating bicycle awareness zones are present in some areas and the additional carriageway width on Military Road may encourage cyclist usage. Existing active transport facilities are shown in Figure 2.2.

Source: Google Earth

Figure 2.2: Existing Active Transport Facilities

3. TRAFFIC ASSESSMENT

3.1 GROWTH

Considering the future expected growth of Port Kembla as outlined in the Illawarra Shoalhaven Regional Plan, and potential redevelopment or change of use of unutilised steel works buildings, some growth is expected in the vicinity of the site. Roads and Maritime Services (RMS) average annual daily traffic (AADT) counts for Illawarra Street show a linear increase of approximately 1.3% linearly in total traffic volumes from 2012 to 2017. The counter is located approximately 500m west of the Military Road / Church Street intersection as shown in Figure 3.1.

Source: Google Earth

Figure 3.1: Counter Location on Illawarra Street

As such, a linear growth rate of 1.5% p.a. has been applied uniformly to the surveyed background traffic volumes to conservatively forecast 2019 and 2029 background traffic volumes. Given the surrounding residential streets are mostly developed, this rate is considered appropriate for traffic modelling.

3.2 FORECAST BACKGROUND TRAFFIC VOLUMES

The forecast background traffic volumes for 2019 and 2029 are provided in Figure 3.2 and Figure 3.3 respectively.

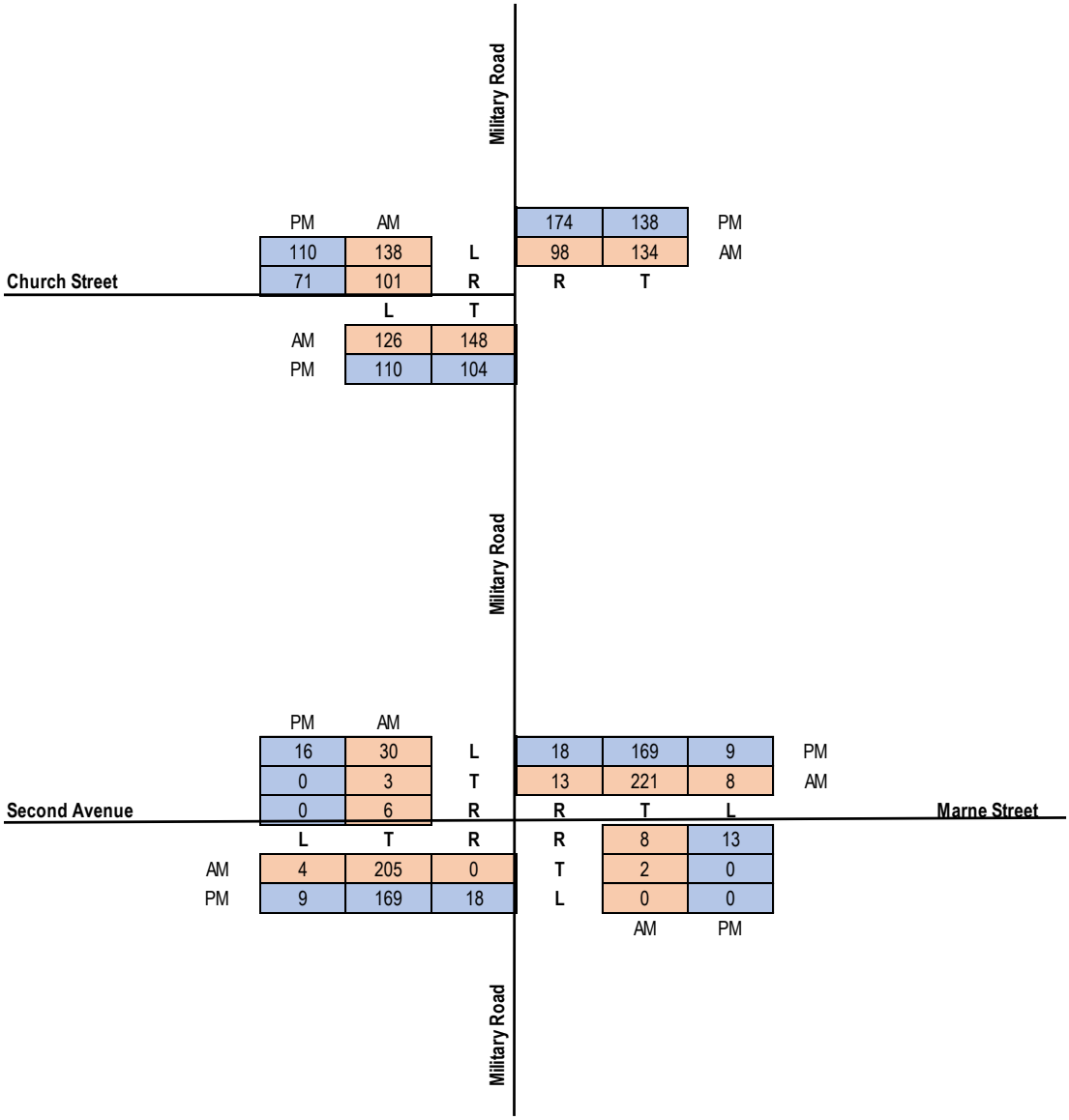


Figure 3.2: 2019 Forecast Background Traffic

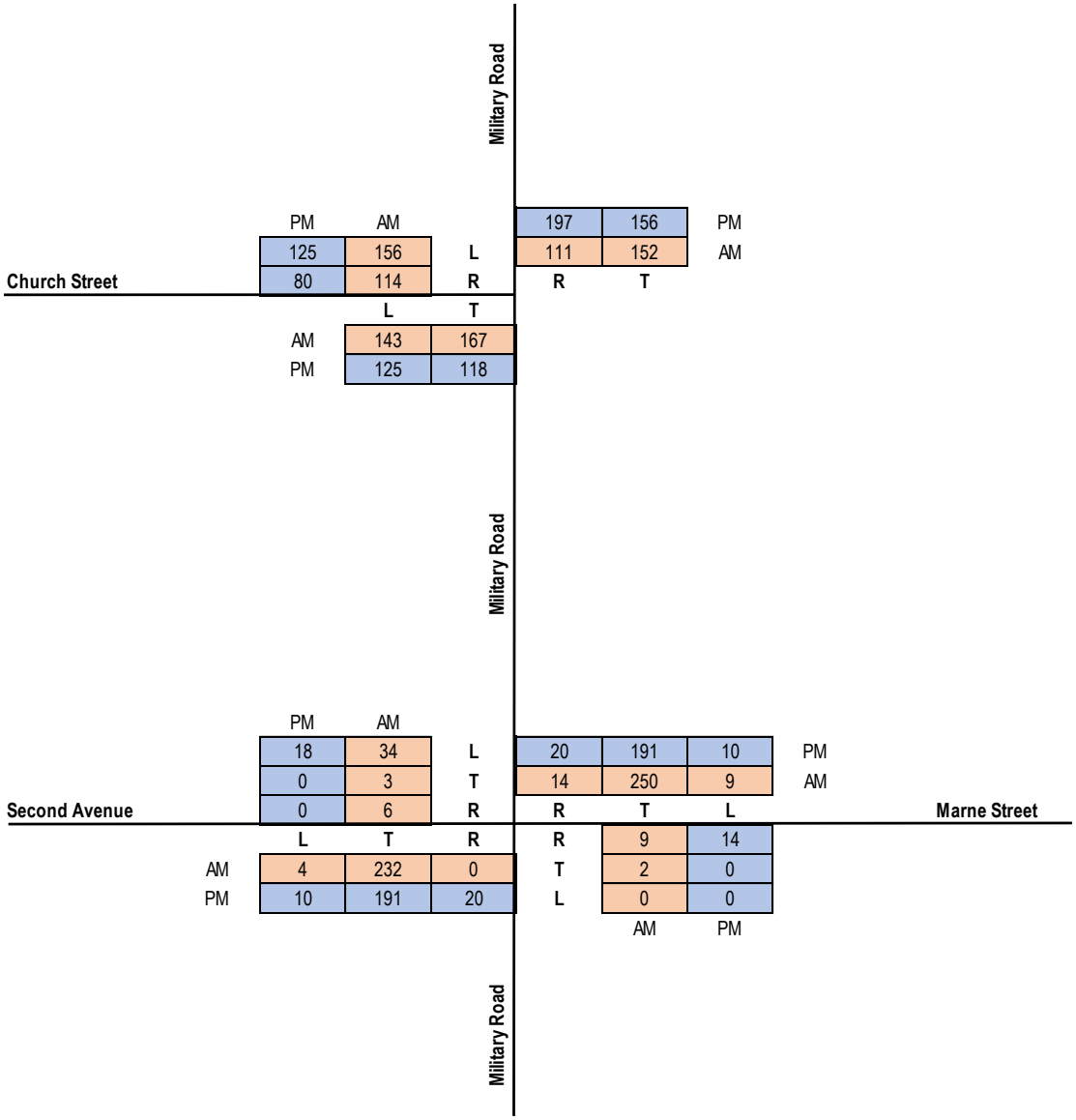


Figure 3.3: 2029 Forecast Background Traffic

3.3 TRAFFIC GENERATION

Traffic generation rates applicable to the proposed development are outlined in the RMS *Guide to Traffic Generating Developments (2002)* and the *Guide to Traffic Generating Developments Technical Direction 04a (2013)*. Maximum traffic generation rates were conservatively adopted due to the relatively low levels of public transport services available. These traffic generation rates and associated AM and PM vehicle trips are outlined in Table 3.1.

Table 3.1: Development Traffic Generation

Land Use	Quantity	AM Rate	PM Rate	AM Trips	PM Trips
Flats up to 2 bedrooms	36	0.5	0.5	18	18
Units 3 or more bedrooms	64	0.65	0.65	42	42
Small lot housing	7	0.85	0.9	6	7
Total	**107**			**66**	**67**

As shown in Table 3.1, the development is anticipated to generate 66 vehicle trips in the AM peak and 67 trips in the PM peak. The peak AM and PM trip splits for the development are shown in Table 3.2.

Table 3.2: Traffic Directionality

Land Use	AM Trips	PM Trips	AM IN/ OUT %	PM IN/ OUT %	AM Trips IN	AM Trips Out	PM Trips IN	PM Trips OUT
Total Residential	66	67	20%/80%	70%/30%	14	53	47	21

The proposed traffic distributions have been derived based on the traffic survey results and taking into consideration the development's expected local catchment. This distribution is shown in Figure 3.4.

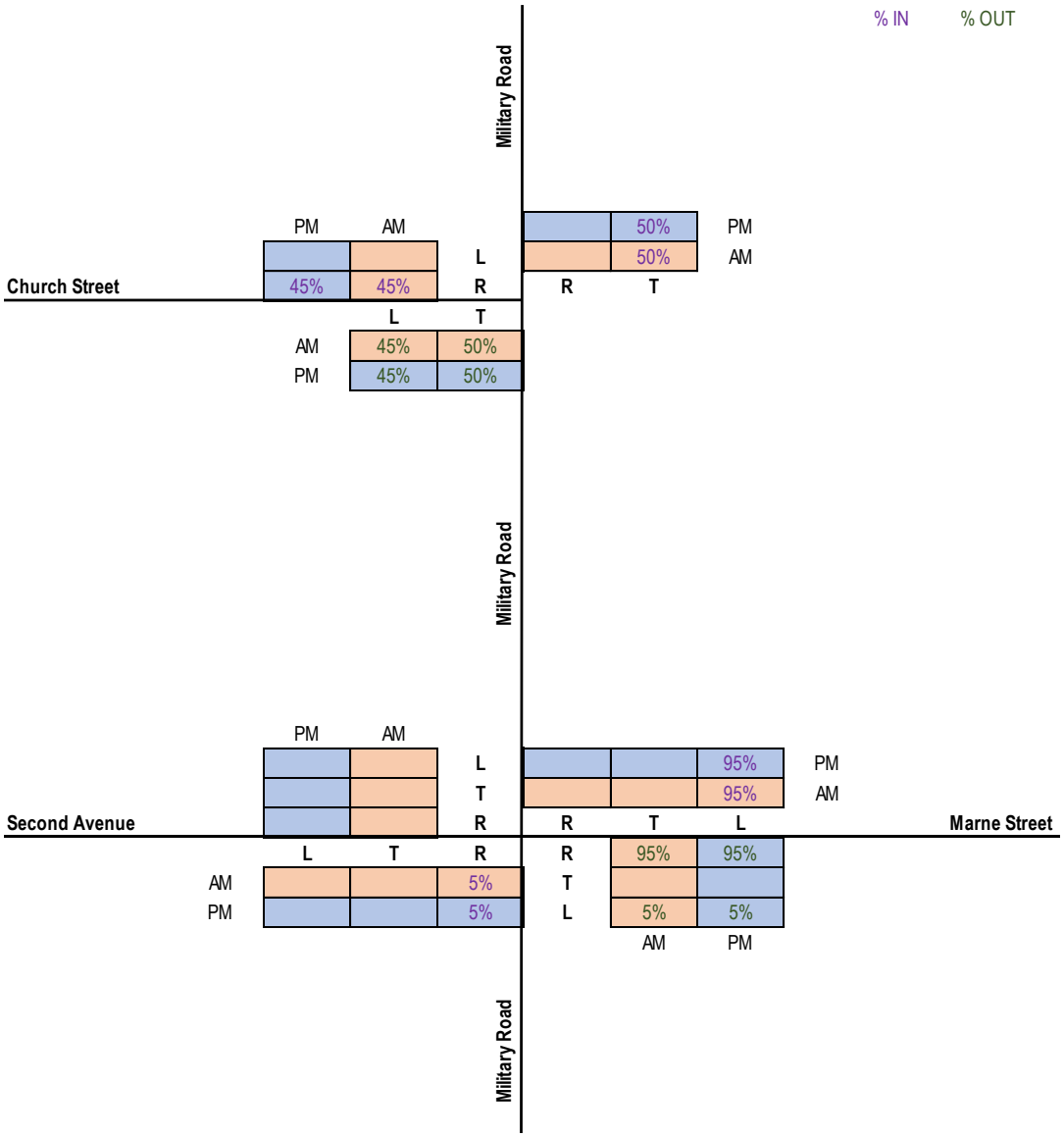


Figure 3.4: Development Traffic Distribution

Estimated development traffic volumes are provided in Figure 3.5.

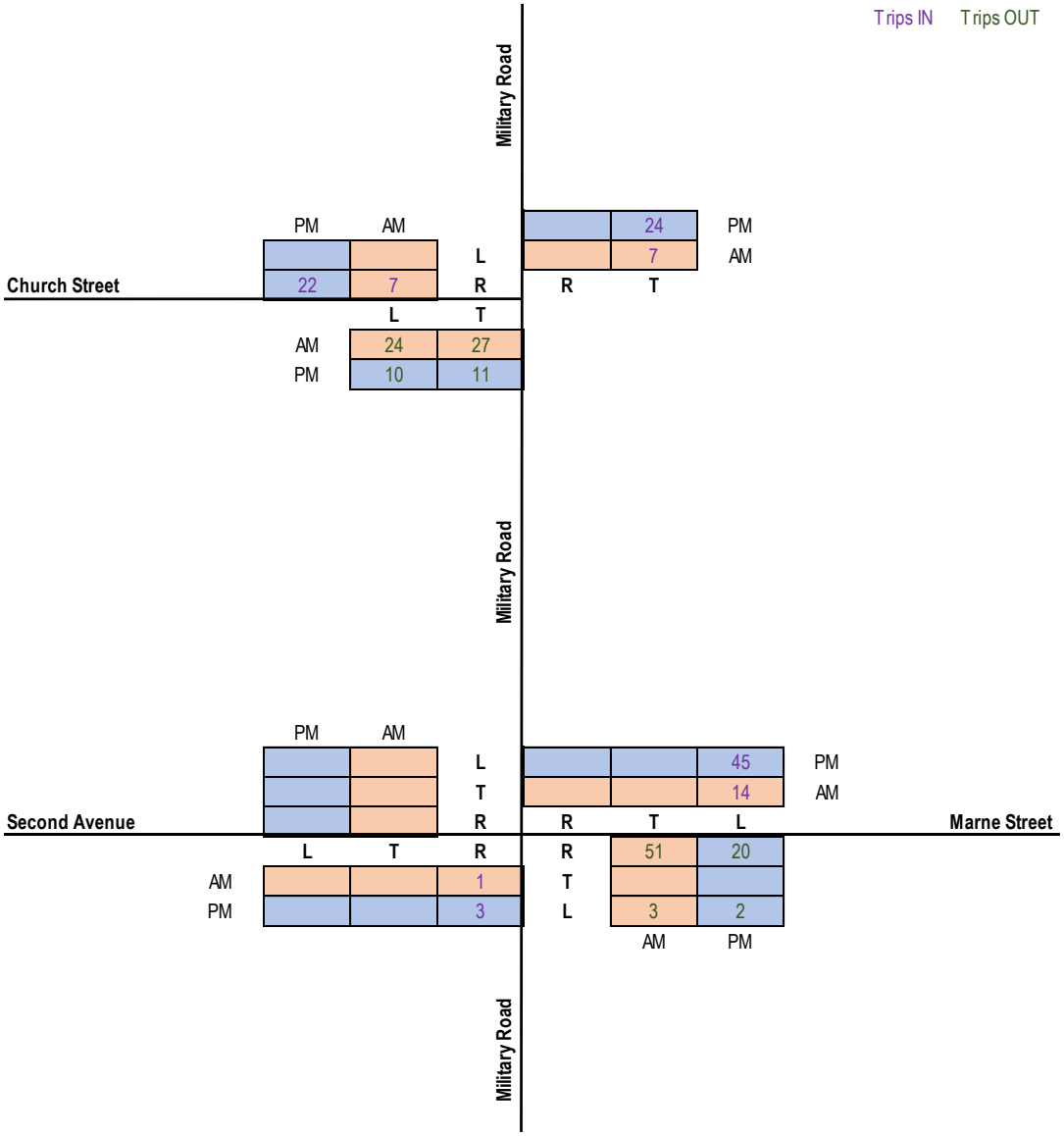


Figure 3.5: Development Traffic

3.4 DESIGN TRAFFIC VOLUMES

The design traffic volumes (i.e. base traffic plus development traffic) for 2019 and 2029 are provided in Figure 3.6 and Figure 3.7 respectively.

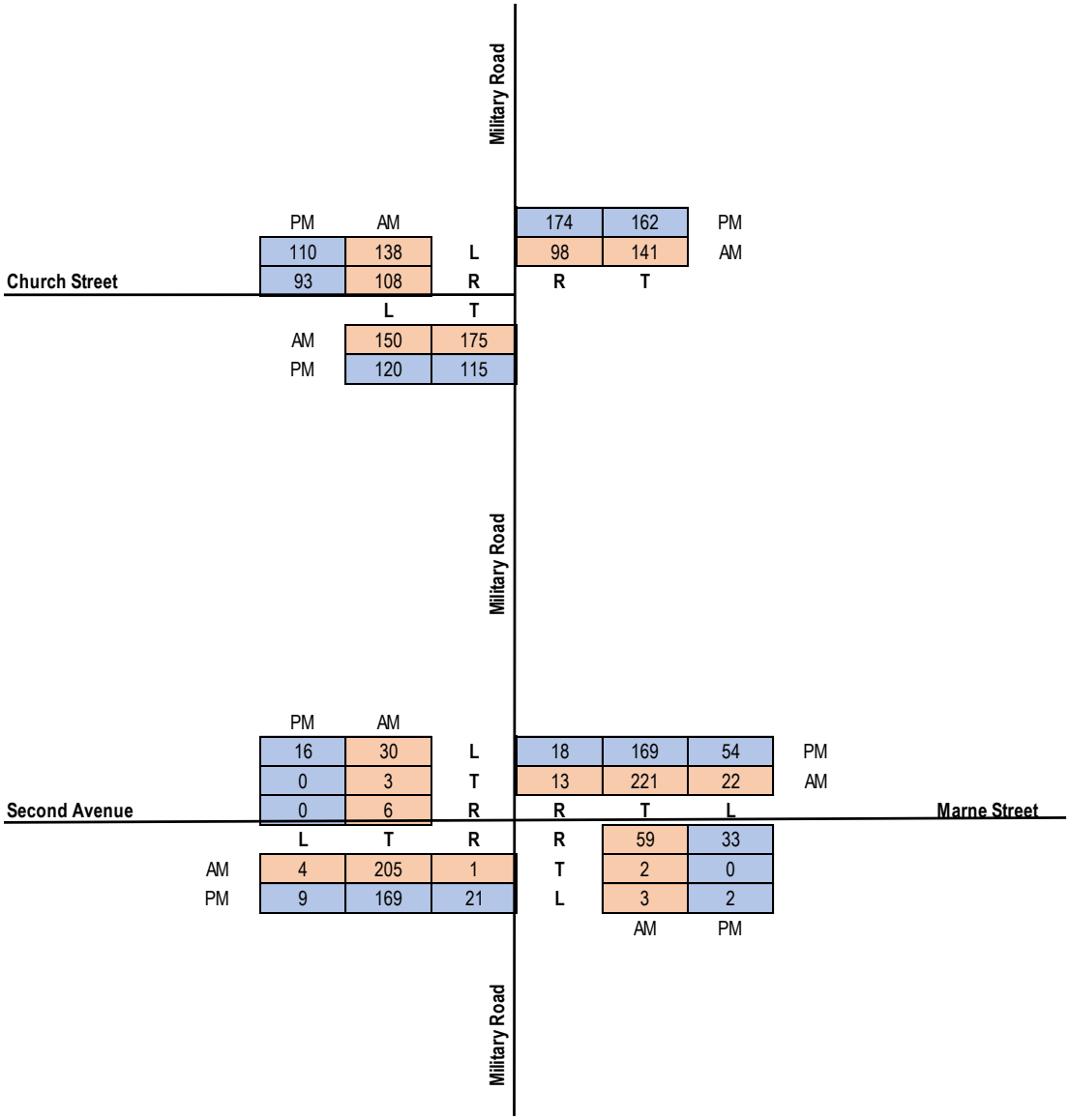


Figure 3.6: 2019 Design Traffic Volumes

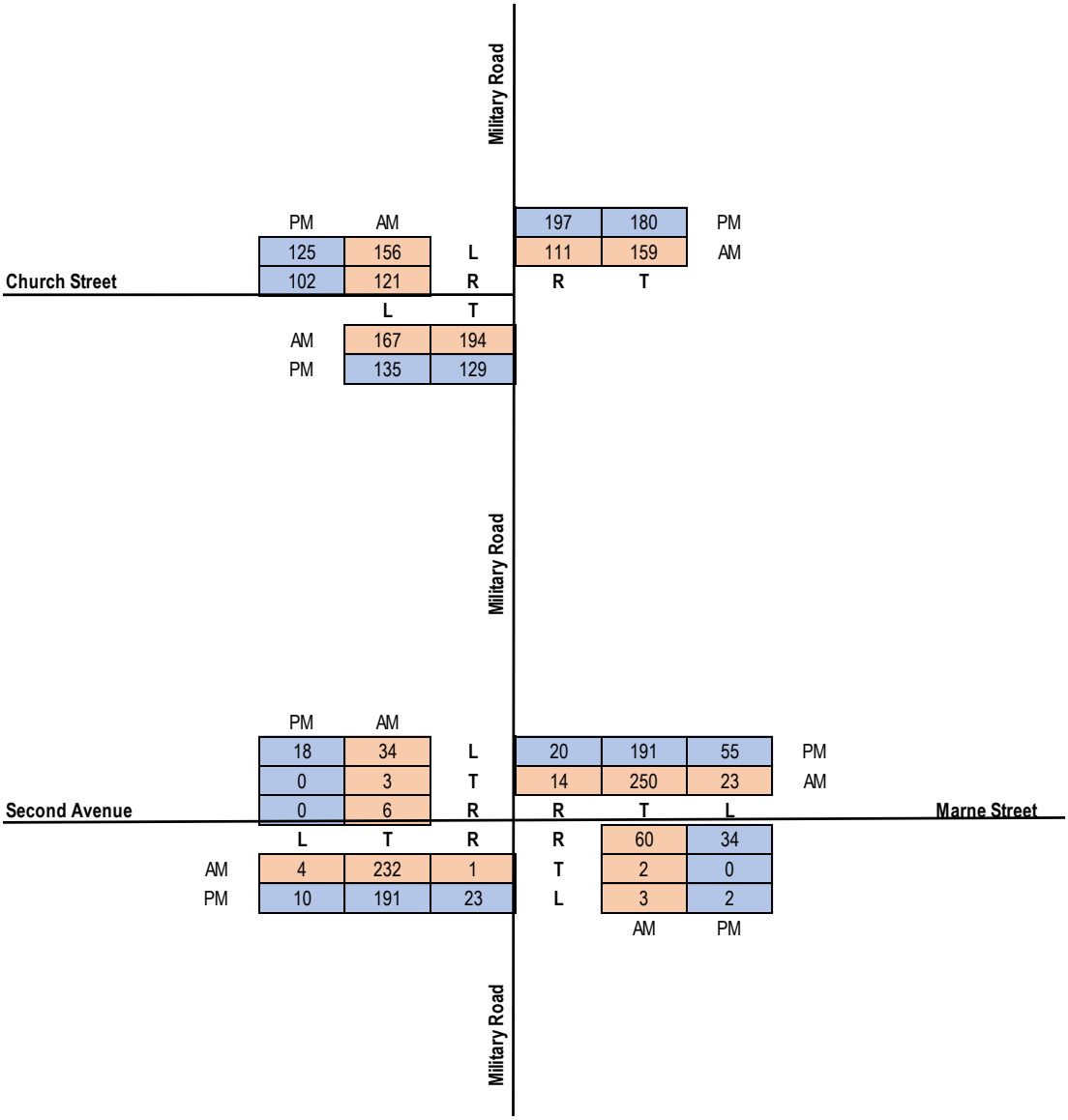


Figure 3.7: 2029 Design Traffic Volumes

3.5 SIDRA ANALYSIS

3.5.1 Methodology

SIDRA Intersection 7.0 Plus was used to model the impact of background and design traffic on the surrounding intersections for the year of opening (2019) and 10-year design horizon (2029). The intersections analysed are as follows:

- Military Road / Marne Street intersection; and
- Military Road / Church Street intersection.

3.5.2 Military Road / Marne Street Intersection

The Military Road / Marne Street intersection as assessed in SIDRA is shown in Figure 3.8.

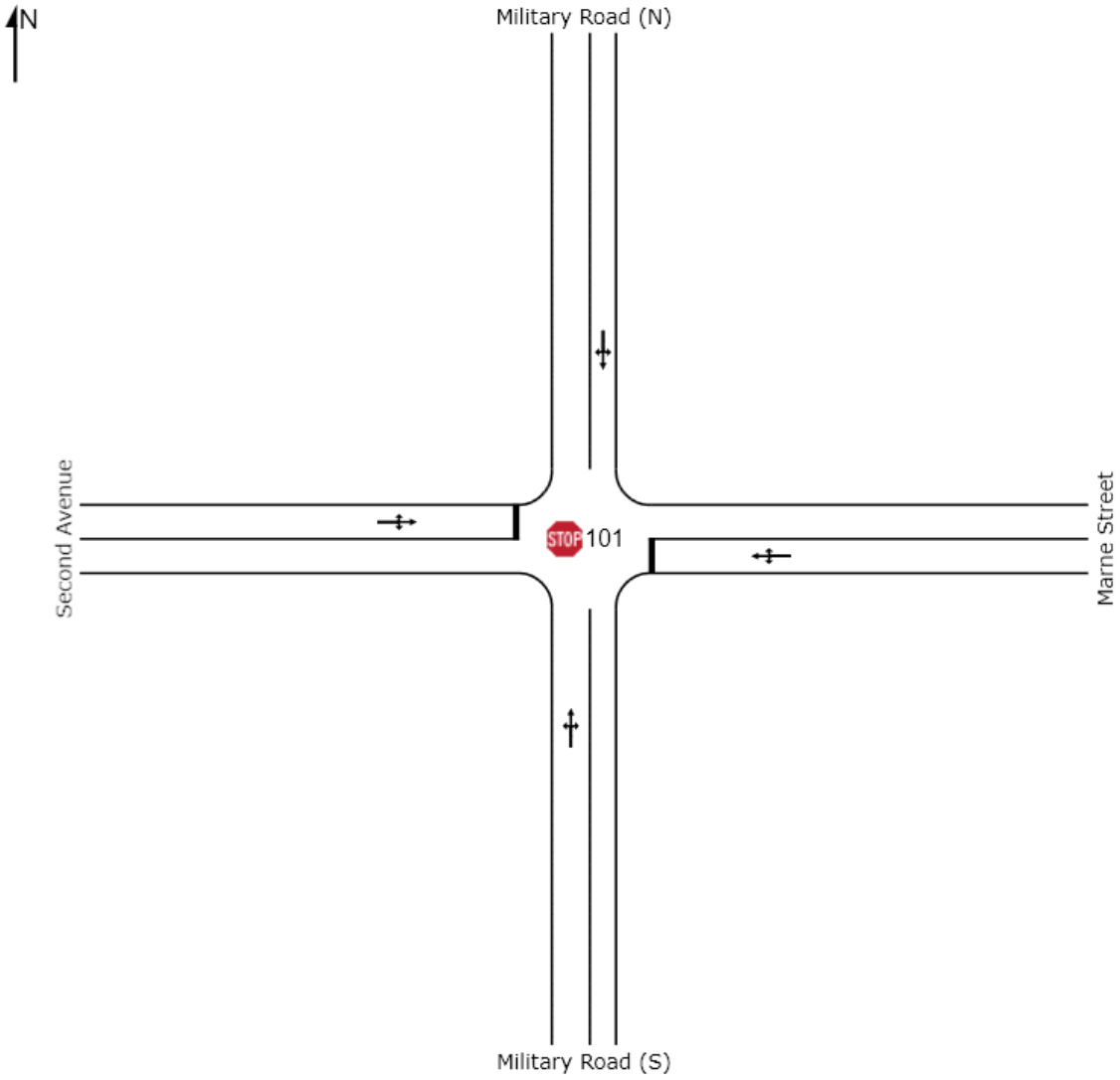


Figure 3.8: Military Road / Marne Street Intersection Layout

The SIDRA Intersection network results for the Military Road / Marne Street for the background traffic volumes are shown in Table 3.3 for years 2019 and 2029.

Table 3.3: Military Road / Marne Street Background SIDRA Results

Intersection	Movement	AM Peak				PM Peak			
		LOS	Avg. Delay (s)	95%ile Queue (m)	DOS	LOS	Avg. Delay (s)	95%ile Queue (m)	DOS
2019 Background									
Military Road (S)	Left Turn	A	6	0	0.11	A	6	2	0.11
	Through	A	0	0	0.11	A	1	2	0.11
	Right Turn	A	7	0	0.11	A	7	2	0.11
Marne Street	Left Turn	A	9	1	0.02	A	9	1	0.02
	Through	A	11	1	0.02	A	10	1	0.02
	Right Turn	A	12	1	0.02	A	11	1	0.02
Military Road (N)	Left Turn	A	7	1	0.13	A	6	2	0.11
	Through	A	1	1	0.13	A	1	2	0.11
	Right Turn	A	7	1	0.13	A	7	2	0.11
Second Avenue	Left Turn	A	9	2	0.04	A	9	1	0.02
	Through	A	11	2	0.04	A	10	1	0.02
	Right Turn	A	12	2	0.04	A	11	1	0.02
2029 Background									
Military Road (S)	Left Turn	A	6	1	0.12	A	7	2	0.12
	Through	A	0	1	0.12	A	1	2	0.12
	Right Turn	A	7	1	0.12	A	7	2	0.12
Marne Street	Left Turn	A	9	1	0.02	A	9	1	0.03
	Through	A	11	1	0.02	A	11	1	0.03
	Right Turn	A	12	1	0.02	A	12	1	0.03
Military Road (N)	Left Turn	A	7	1	0.15	A	7	2	0.13
	Through	A	1	1	0.15	A	1	2	0.13
	Right Turn	A	7	1	0.15	A	7	2	0.13
Second Avenue	Left Turn	A	9	2	0.05	A	9	1	0.02
	Through	A	11	2	0.05	A	11	1	0.02
	Right Turn	A	12	2	0.05	A	11	1	0.02

Table 3.3 demonstrates that the intersection of Military Road / Marne Street is expected to operate within acceptable performance limits for a priority-controlled intersection with 2019 and 2029 background traffic volumes.

The SIDRA Intersection network results for the Military Road / Marne Street for the design traffic volumes are shown in Table 3.4 for 2029.

Table 3.4: Military Road / Marne Street Design SIDRA Results

Intersection	Movement	AM Peak				PM Peak			
		LOS	Avg. Delay (s)	95%ile Queue (m)	DOS	LOS	Avg. Delay (s)	95%ile Queue (m)	DOS
2029 Design									
Military Road (S)	Left Turn	A	6	1	0.12	A	7	2	0.12
	Through	A	0	1	0.12	A	1	2	0.12
	Right Turn	A	7	1	0.12	A	7	2	0.12
Marne Street	Left Turn	A	10	4	0.13	A	9	2	0.07
	Through	A	12	4	0.13	A	11	2	0.07
	Right Turn	A	13	4	0.13	A	12	2	0.07
Military Road (N)	Left Turn	A	6	2	0.16	A	6	2	0.15
	Through	A	1	2	0.16	A	1	2	0.15
	Right Turn	A	7	2	0.16	A	7	2	0.15
Second Avenue	Left Turn	A	9	2	0.5	A	9	1	0.02
	Through	A	12	2	0.5	A	11	1	0.02
	Right Turn	A	12	2	0.5	A	11	1	0.02

Table 3.4 demonstrates that the intersection of Military Road / Marne Street is expected to operate within acceptable performance limits for a priority-controlled intersection with 2029 design traffic volumes.

3.5.3 Military Road / Church Street Intersection

The Military Road / Church Street intersection as assessed in SIDRA is shown in Figure 3.9.

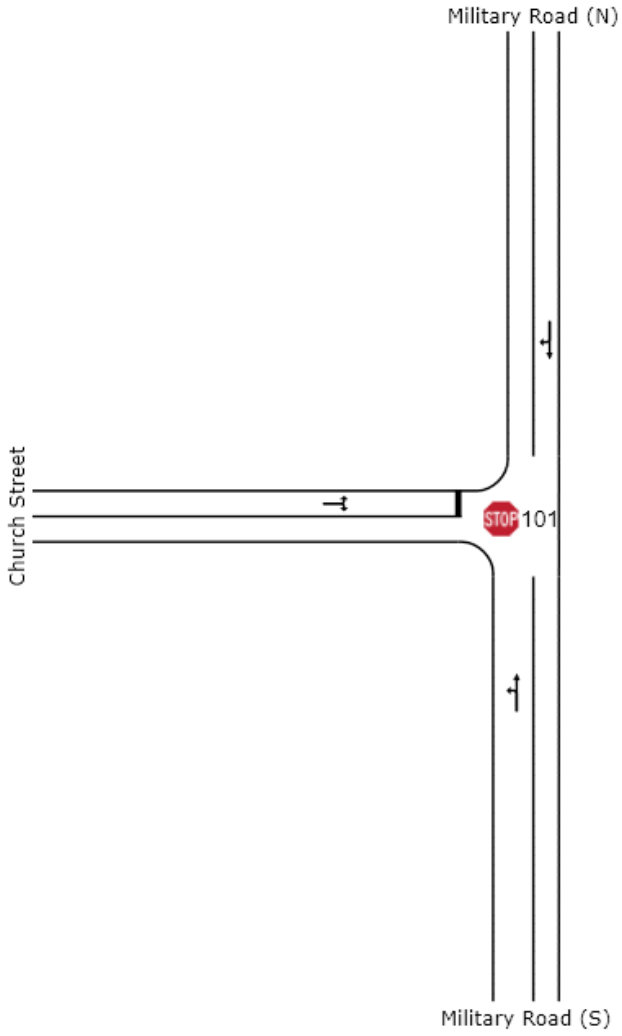


Figure 3.9: Military Road / Church Street Intersection Layout

The SIDRA Intersection network results for the Military Road / Church Street intersection layout for the background traffic volumes are shown in Table 3.5 for years 2019 and 2029.

Table 3.5: Military Road / Church Street Existing Layout Background SIDRA Results

Intersection	Movement	AM Peak				PM Peak			
		LOS	Avg. Delay (s)	95%ile Queue (m)	DOS	LOS	Avg. Delay (s)	95%ile Queue (m)	DOS
2019 Background									
Military Road (S)	Left Turn	A	5	0	0.14	A	5	0	0.11
	Through	A	0	0	0.14	A	0	0	0.11
Military Road (N)	Through	A	1	5	0.16	A	1	9	0.21
	Right Turn	A	7	5	0.16	A	6	9	0.21
Church Street	Left Turn	A	9	11	0.28	A	9	6	0.21
	Right Turn	A	12	11	0.28	A	12	6	0.21
2029 Background									
Military Road (S)	Left Turn	A	5	0	0.16	A	5	0	0.13
	Through	A	0	0	0.16	A	0	0	0.13
Military Road (N)	Through	A	1	7	0.18	A	1	10	0.24
	Right Turn	A	7	7	0.18	A	7	10	0.24
Church Street	Left Turn	A	10	11	0.33	A	9	8	0.25
	Right Turn	A	12	11	0.33	A	13	8	0.25

Table 3.5 demonstrates that the intersection of Military Road / Church Street is expected to operate within acceptable performance limits for a priority-controlled intersection with 2019 and 2029 background traffic volumes.

The SIDRA Intersection network results for the Military Road / Church Street intersection layout for the design traffic volumes are shown in Table 3.6 for 2029.

Table 3.6: Military Road / Church Street Existing Layout Design SIDRA Results

Intersection	Movement	AM Peak				PM Peak			
		LOS	Avg. Delay (s)	95%ile Queue (m)	DOS	LOS	Avg. Delay (s)	95%ile Queue (m)	DOS
2029 Design									
Military Road (S)	Left Turn	A	5	0	0.19	A	5	0	0.14
	Through	A	0	0	0.19	A	0	0	0.14
Military Road (N)	Through	A	2	7	0.19	A	1	11	0.26
	Right Turn	A	7	7	0.19	A	7	11	0.26
Church Street	Left Turn	A	10	13	0.36	A	9	9	0.30
	Right Turn	A	12	13	0.36	A	13	9	0.30

Table 3.6 demonstrates that the intersection of Military Road / Church Street is expected to operate within acceptable performance limits for a priority-controlled intersection with 2029 design traffic volumes.

4. PARKING ASSESSMENT

4.1 CAR PARKING REQUIREMENTS

The relevant car parking requirements are stipulated in the Wollongong City Council *Development Control Plan (DCP) – Chapter E3: Car Parking, Access, Servicing / Loading Facilities and Traffic Management*. Table 4.1 details the applicable car parking rates and car parking requirements. DCP parking rates are determined based on the floor area of each dwelling. As the proposed floor area is not defined at the time of this report (February 2018) the following conservative assumptions were made:

- 1-bedroom flat floor area is less than 70m^2;
- 2-bedroom flat floor area is greater than 70m^2 but less than 110m^2;
- 3-bedroom townhouse floor area is greater than 110m^2; and
- small lot dwellings are greater than 125m^2.

Table 4.1: Car Parking Requirement

Land Use	Type	Parking Rate	Quantity	Parking Spaces Required
Dwelling House	Resident parking >125m^2 dwelling	2 spaces per dwelling	7	14
Residential Flat Building / Multi-Dwelling Housing / Attached Dwelling	Resident parking <70m^2 dwelling	1 space per dwelling	12	12
	Resident parking 70-110m^2 dwelling	1.5 spaces per dwelling	24	36
	Resident parking >110m^2 dwelling	2 spaces per dwelling	64	128
	Visitor parking	0.2 spaces per dwelling	100	20
			Total	**210**

As shown in Table 4.1, a total of 210 car spaces are required across the development site. It is noted that double garages are proposed with each small lot house in accordance with DCP requirements. As such, 176 resident car parking spaces and 20 visitor car parking spaces shall be provided to service the corresponding terraces / townhouses and flats. Adaptable car parking spaces shall also be provided as required to meet adaptable housing requirements outlined in the DCP.

4.2 BICYCLE / MOTORCYCLE PARKING REQUIREMENTS

Dedicated motorcycle and bicycle parking facilities are required to be provided for residents living in the residential flats and 2-3 story terrace style residential. Rates determining these parking requirements are stipulated in the Wollongong City Council *Development Control Plan (DCP) – Chapter E3: Car Parking, Access, Servicing / Loading Facilities and Traffic Management*. Table 4.2 details the applicable bicycle and motorcycle parking rates and relevant parking requirements based upon development yields.

Table 4.2: Bicycle & Motorcycle Parking Requirement

Parking	Type	Parking Rate	Quantity	Spaces Required
Motorcycle	Resident Parking	1 per 15 dwellings	100	7
Bicycle	Resident Parking (Security Class B)	1 per 3 dwellings		34
	Visitor Parking (Security Class C)	1 per 12 dwellings		9

4.3 PARKING LAYOUT

The on-site parking is to be designed in accordance with the relevant requirements of Council's DCP and Australian Standards AS2890. The proposed development shall comply with the following:

- resident car parking bay are to be 2.4m wide by 5.4m long (user class 1A);
- visitor car parking bays are to be 2.6m wide by 5.4m long (user class 3);
- car parking aisle widths are to be 5.8m wide plus an additional 0.3m clearance to vertical obstructions;
- double garages are to have a 6m internal width and length;
- domestic driveway grades are to have a maximum grade of 1:20 (5%) across the verge, and a maximum grade of 1:4(25%) elsewhere;
- domestic driveway width is to be a minimum of 3m located at least 6m from any intersections;
- access ramps are to have a maximum of 1:5 (20%) with 2m grade transitions if used only by cars. If service vehicles between the size of a MRV and HRV are to use the access ramp, maximum grade is to be 1:5.6 (15.4%) with a maximum rate of change of grade of 1:16 (6.25%) in 7m of travel;
- accesses are to be a minimum of 6m wide; and
- bicycle parking is to be a minimum of 0.5m wide and 1.8m long with a minimum aisle width of 1.5m

5. INTERNAL LAYOUT AND ACCESS

5.1 ELECTROLYTIC STREET

The existing Electrolytic Street road width is less than the width specified for an 'Access Street' road type in accordance with the Wollongong DCP and as such isn't sufficient to cater for two-way traffic flow. The existing road width is sufficient for a one-way 'Access Place'. Due to road gradient, intersecting angle and other vertical obstructions, vehicles exiting Electrolytic Street onto Military Road have poor available sight distance. It is therefore recommended that Electrolytic Street be restricted to one-way, eastbound traffic flow, with vehicles entering from Military Road.

In accordance with requirements outlined in AS1742, signage and line marking shall be provided as required to Electrolytic Street to one-way traffic movements only. Provision of a concrete blister is also recommended at the end of Reservoir Street to further discourage any northbound vehicles from turning left into Electrolytic Street. The location of the signage, line marking, and the recommended blister is detailed in Appendix D.

5.2 ACCESSES

Access to the seven (7) small-lot dwellings is proposed as individual driveways for each dwelling off Marne Street. Two (2) accesses are proposed for the townhouse / terrace style accommodation off Reservoir Street. It is recommended that the northern access to the townhouses off Reservoir Street be relocated to be a minimum of 45m south from the Reservoir Street / Electrolytic Street intersection. The residential flats to the north of the site will be accessed via Electrolytic Street. Figure 5.1 shows the proposed location of all site access points.

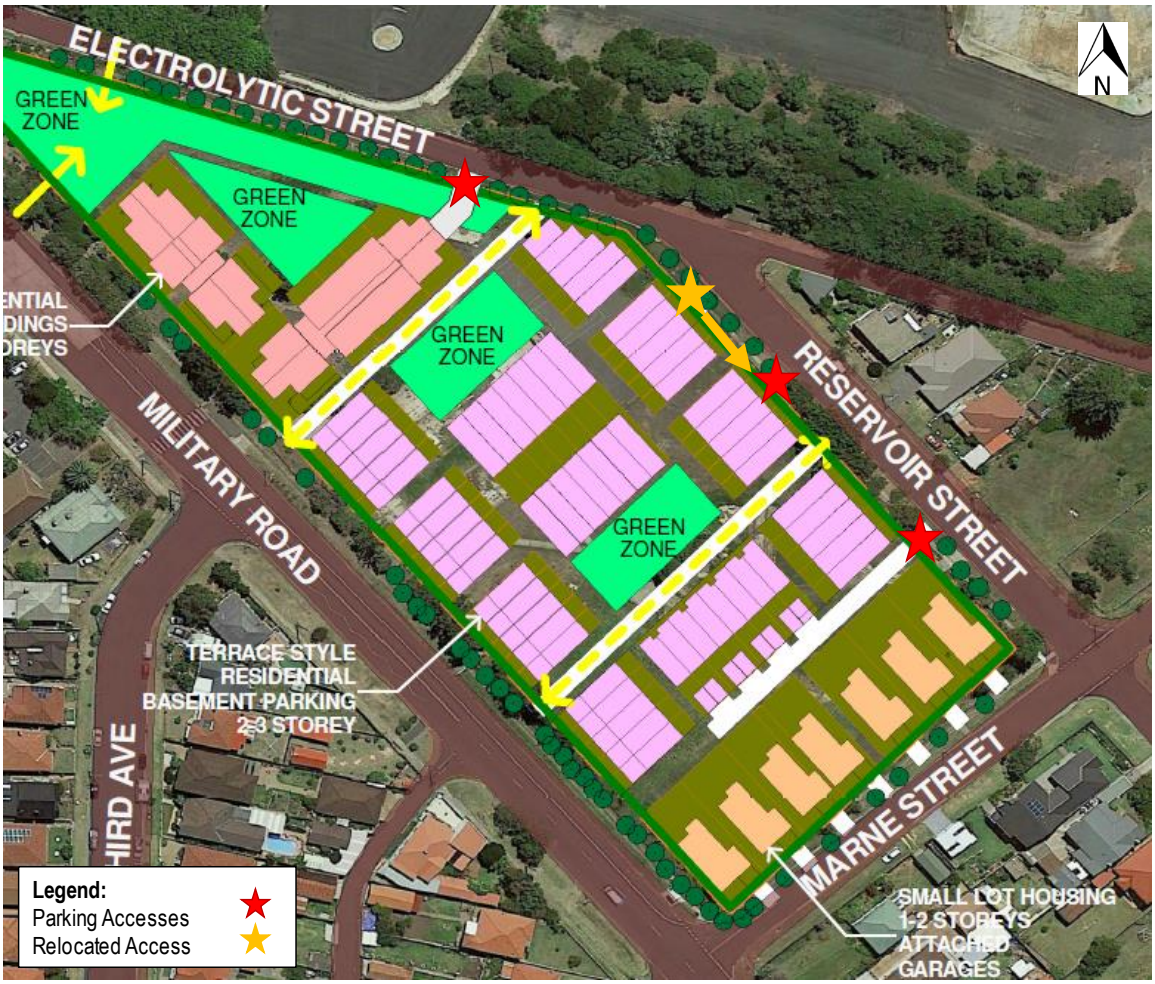


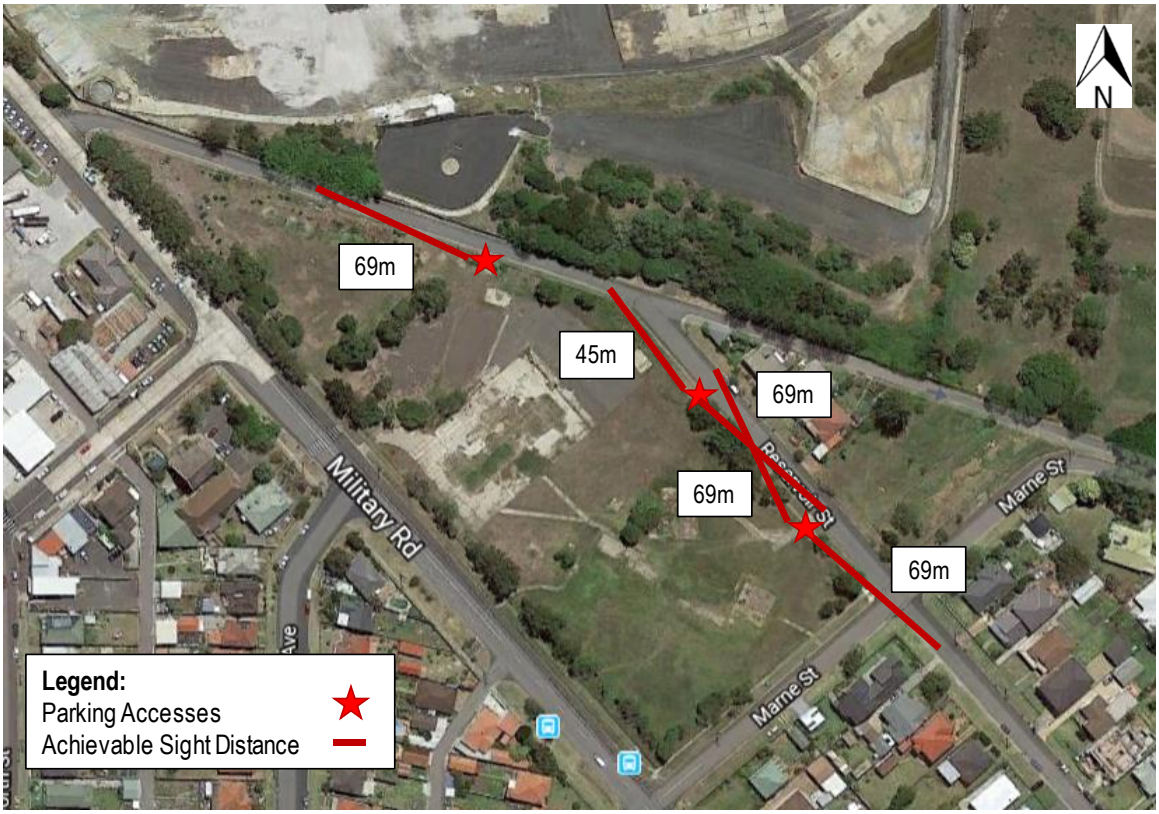
Figure 5.1: Site Access Locations

5.3 SERVICING & REFUSE COLLECTION

Kerbside refuse collection will be undertaken for the proposed small-lot dwellings. It is expected that refuse collection for all other dwellings will be undertaken on-site by a front-loading refuse collection vehicle (RCV). As such, the internal layout shall allow for a 10.24m RCV to manoeuvre within the site and ingress and egress in forward gear. The design service vehicle for the site is an 8.8m medium rigid vehicle (MRV). Therefore, as the internal layout shall facilitate a 10.24m RCV, the layout shall also facilitate an 8.8m MRV. MRV service bays shall be provided as required to service the proposed development.

5.4 SIGHT DISTANCE

A sight distance assessment was conducted for the proposed accesses to the townhouse / terrace style housing and residential flats. Considering a speed limit of 50km/h, in accordance with AS2890.1, desirable sight distance is 69m. Achievable sight distance for each access are shown in Figure 5.2, noting that adequate sight distance is only required west of the Electrolytic Street access if restricted to one-way traffic flow.



Source: Google Earth

Figure 5.2: Achievable Sight Distances

The desired 69m sight distance is not achievable from the relocated northern access recommended off Reservoir Street. However, minimum sight distance in accordance with AS2890.1 is achieved. It is also noted that the distance to the Marne Street / Reservoir Street intersection is less than the required sight distance. However, vehicles turning into Reservoir Street from Marne Street or Electrolytic Street are expected to slow below 50km/h. There is also very minimal development on Reservoir Street north of Marne Street and as such conflicting traffic will be minimal. Therefore, safety is not deemed to be adversely impacted.

6. ALTERNATIVE TRANSPORT MODES

6.1 PUBLIC TRANSPORT

Two (2) existing bus stops are present on Military Road fronting the development immediately north of the Military Road / Marne Street intersection. It is recommended that the two bus stops (Stop IDs 250544) be upgraded to formalised bus shelters designed in accordance with requirements outlined in *AS1428.1: Design for Access and Mobility*. These bus stops service Route 43 and Route 65 providing public transport connectivity from Port Kembla to Dapto and the Wollongong CBD.

While it is noted that heavy rail services are available, as service frequency is low and the distance from the proposed site to the train station is significant, no allowances for development connectivity to the rail network are required.

6.2 ACTIVE TRANSPORT

The proposed development provides dedicated pedestrian links through the site and pedestrian site access points on Military Road, Reservoir Street and Electrolytic Street. Accesses to the proposed green zone at the northern end of the site are also proposed. It is recommended that further pedestrian facilities be provided to facilitate connectivity between the site and the Port Kembla Town Centre and the existing active transport network northwest of the site. Allowances should also be made to provide safe and efficient access to the bus stops on Military Road adjacent to the site.

It is recommended that the existing footpath on Reservoir Street be extended to connect with the proposed pedestrian access off Electrolytic Street. In accordance with the Wollongong DCP, verge cross-fall is to be a maximum of 2.5% from the back of kerb to the property boundary. As such, in order to achieve this on Military Road, it is recommended that pedestrian stairs fronting the site are removed, earthworks are conducted as required and a retaining wall, stairs / ramps and pedestrian protection be provided. A 2.5m shared path is recommended on the upgraded Military Road verge fronting the site. Figure 6.1 details the location of these recommendations.

Figure 6.1: Active Transport Recommendations

The existing pedestrian crossing on Military Road between Church Street and Third Avenue is non-compliant with RMS and Australian Standards. As such, three (3) recommended options have been identified to provide a suitable pedestrian treatment for active transport users to cross Military road. The upgrade the existing pedestrian crossing so that the crossing is provided with kerb ramps, line marking and signage compliant with requirements outlined in AS1742.10.

In accordance with the RMS Supplement to AS1742 – Manual of Uniform Traffic Control Devices (2013), the expected pedestrian and traffic volumes on Military Road do not warrant a 'zebra' crossing. As such, an alternative option is to remove the existing pedestrian crossing and instead provide kerb blisters designed in accordance with AS1742.10 at the same location.

A third potential option is to provide a formalised, channelised right-turn (CHR) treatment on the northern approach to the Military Road / Church Street intersection. The provision of this CHR facilitates a pedestrian refuge to be placed opposite, on the southern approach to the Military Road / Church Street intersection. If implemented this pedestrian refuge is to be designed in accordance with all relevant requirements stipulated in AS1742.10.

Pedestrian links from internal footpaths to Military Road shall connect directly with the proposed pedestrian crossing at the north of the site and bus stops to the south of the site. With the development and associated upgrades, there will be high levels of pedestrian amenity and connectivity with nearby bus services and the Port Kembla Town Centre.

7. CONCLUSION

The key findings of the traffic impact assessment for the proposed medium-density residential development located at 114-126 Military Road, Port Kembla are as follows:

- the proposed residential development will consist of seven (7) small-lot dwellings, 64 medium density townhouse/terrace style dwellings and 36 residential flats;
- the proposed development is expected to generate 66 vehicle trips in the AM peak hour and 67 vehicle trips in the PM peak hour;
- the existing Military Road / Marne Street and Military Road / Church Street intersections can sufficiently cater for design traffic for the 10-year design horizon;
- in addition to the 14 car spaces proposed for the small lot dwellings, 176 resident car parking spaces and 20 visitor car parking spaces shall be provided in accordance with Chapter E3 of the Wollongong DCP;
- on-site parking is to be designed in accordance with the relevant requirements of Council's DCP and Australian Standards AS2890;
- it is recommended that Electrolytic Street be restricted to eastbound one-way traffic flow with signage and line marking provided as required in accordance with AS1742;
- the internal layout of the site shall allow a 10.24m front-loading RCV to manoeuvre the site and enter and exit in forward gear;
- the site is expected to be serviced by an 8.8m MRV and as such a service bay shall be provided;
- it is recommended that existing bus stops on Military Road fronting the site be upgraded to formalised bus shelters designed in accordance with requirements outlined in *AS1428.1: Design for Access and Mobility*;
- is it recommended that the existing footpath on Reservoir Street be extended to connect with the proposed pedestrian access off Electrolytic Street;
- it is recommended that earthworks be conducted on the Military Road verge fronting the site to provide a maximum 2.5% crossfall. A 2.5m wide shared path is also recommended on this verge in accordance with the Wollongong DCP; and
- as the existing pedestrian crossing on Military Road is non-compliant, it is recommended that it is upgraded or replaced with an alternative pedestrian treatment.

Based on the above assessment we conclude that there are no significant traffic or transport impacts associated with the proposed development to preclude its approval and relevant conditioning on transport planning grounds.

APPENDIX A

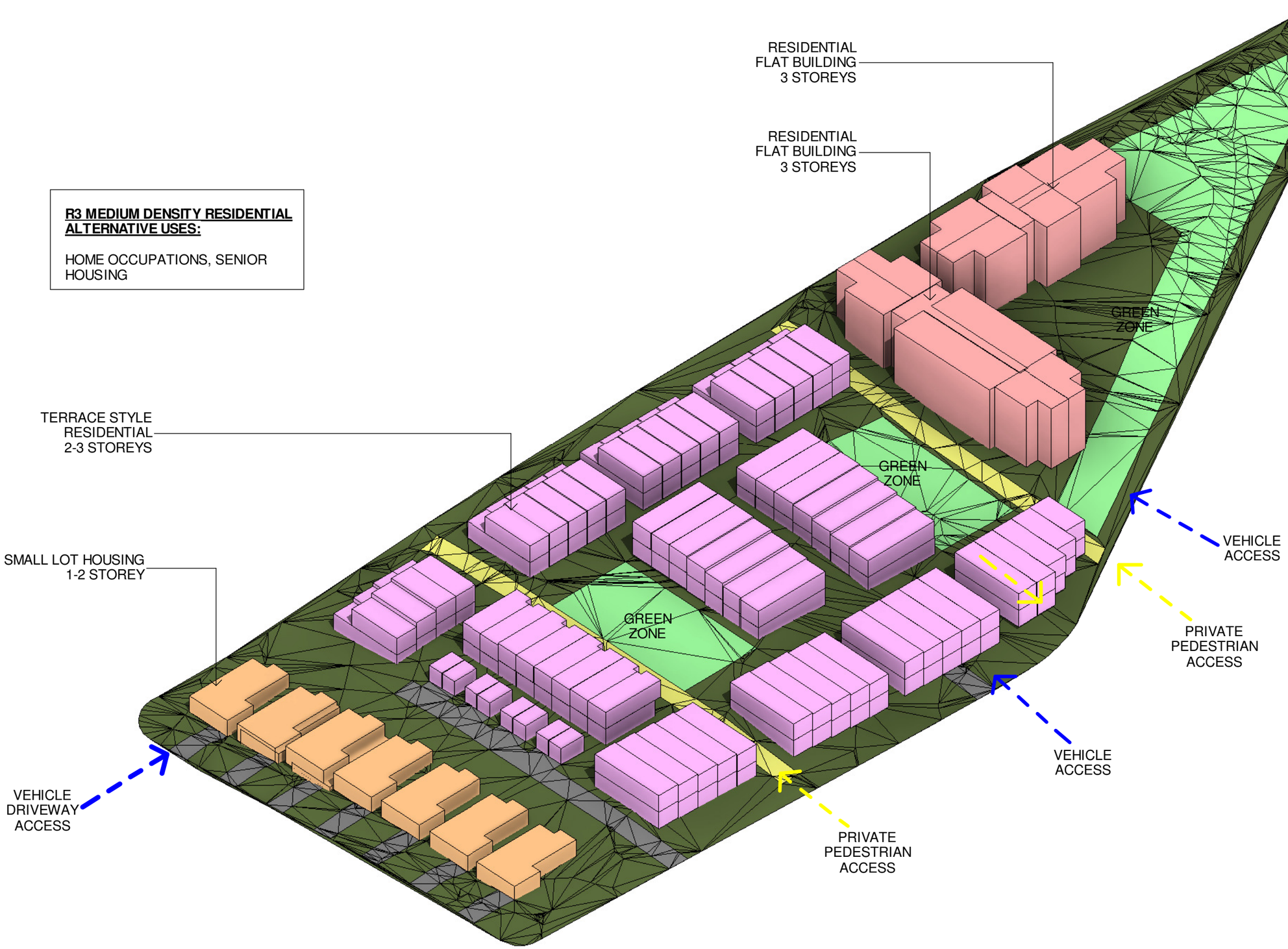
DEVELOPMENT PLANS

Proposed Site Development and Context

Proposed Site Development - 3d

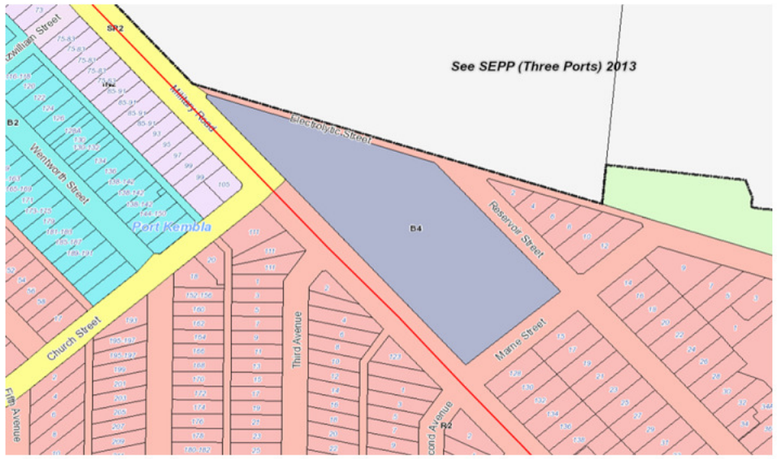
R3 MEDIUM DENSITY RESIDENTIAL ALTERNATIVE USES:

HOME OCCUPATIONS, SENIOR HOUSING



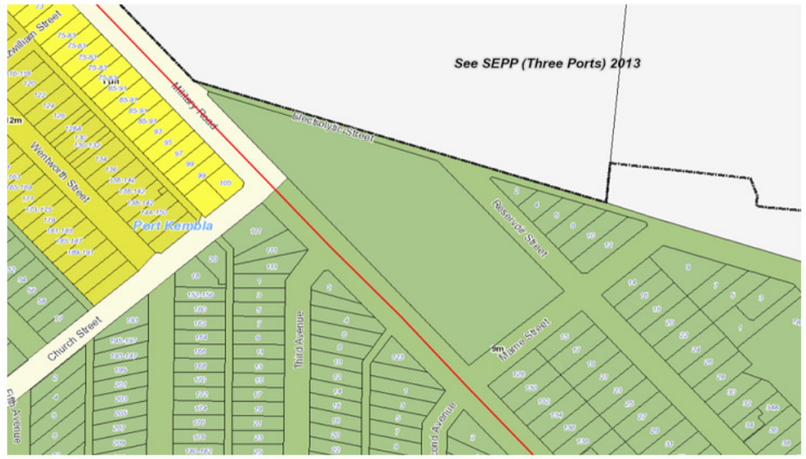
LEP Maps Proposed Site and Context

CURRENT WOLLONGONG LEP MAPS



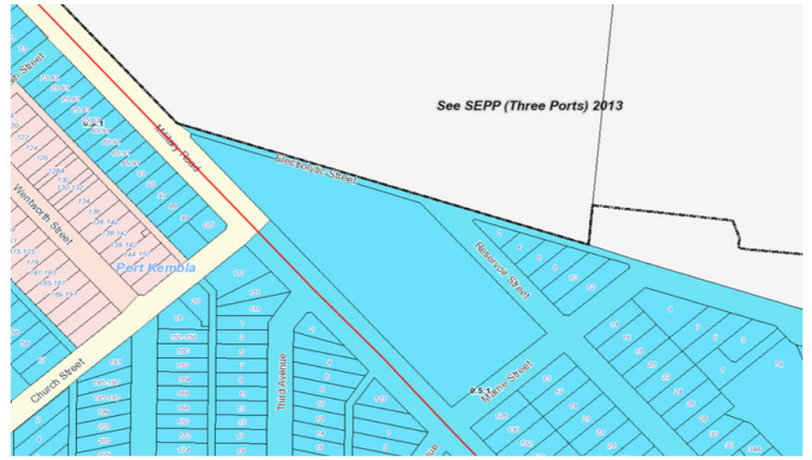
EXTRACT OF LAND ZONING MAP
SOURCE: WOLLONGONG LEP 2009

Land Zoning - B4 Mixed Use



EXTRACT OF BUILDING HEIGHT MAP
SOURCE: WOLLONGONG LEP 2009

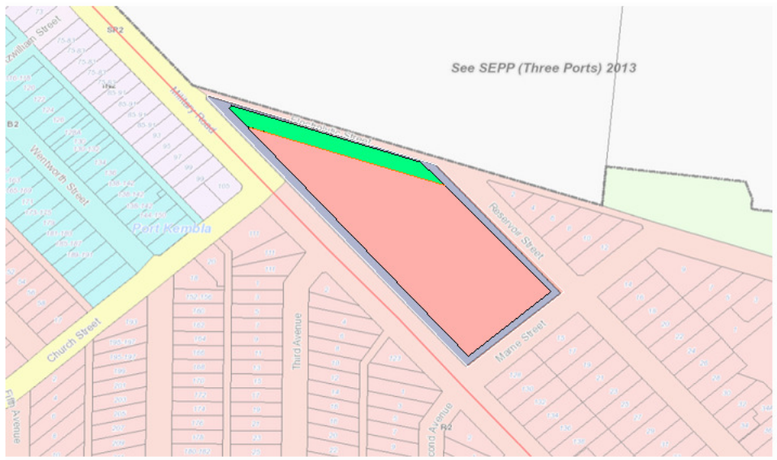
Height of Buildings - 9m



EXTRACT OF FLOOR SPACE RATIO MAP
SOURCE: WOLLONGONG LEP 2009

Floor Space Ratio - 0.5 : 1

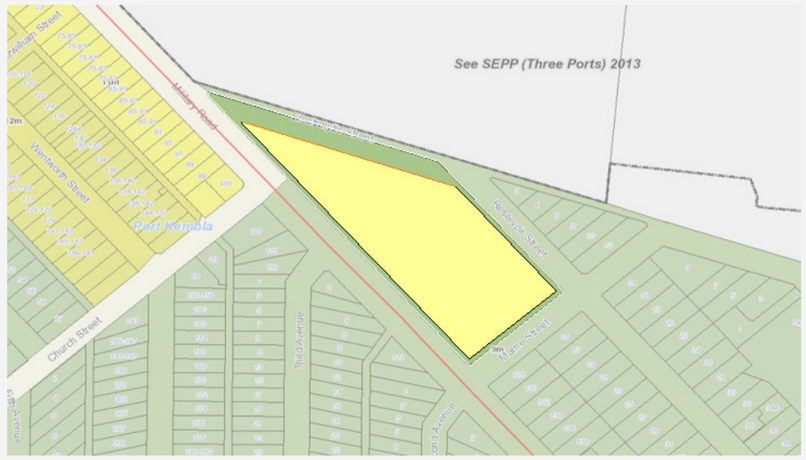
PROPOSED AMENDMENTS TO WOLLONGONG LEP MAPS



EXTRACT OF LAND ZONING MAP
SOURCE: WOLLONGONG LEP 2009

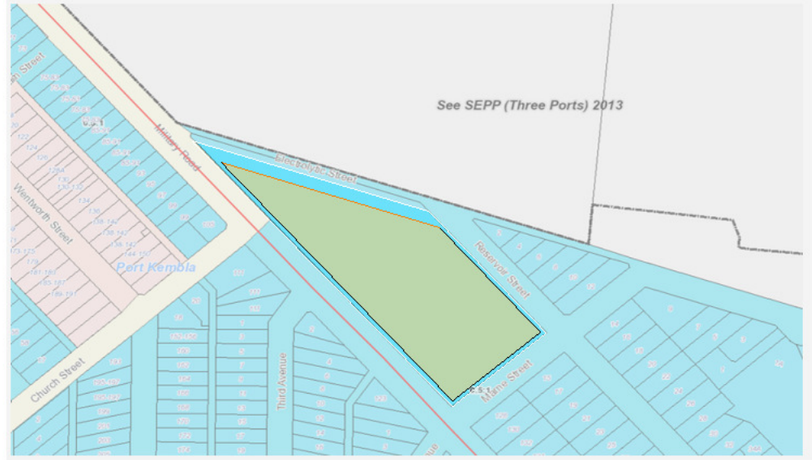
R3 (Medium Density Residential)

RE2 (Private Recreation)



EXTRACT OF BUILDING HEIGHT MAP
SOURCE: WOLLONGONG LEP 2009

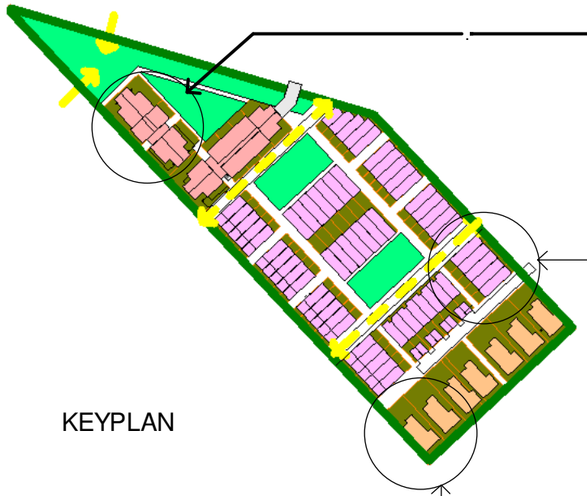
11 METER HEIGHT LIMIT



EXTRACT OF FLOOR SPACE RATIO MAP
SOURCE: WOLLONGONG LEP 2009

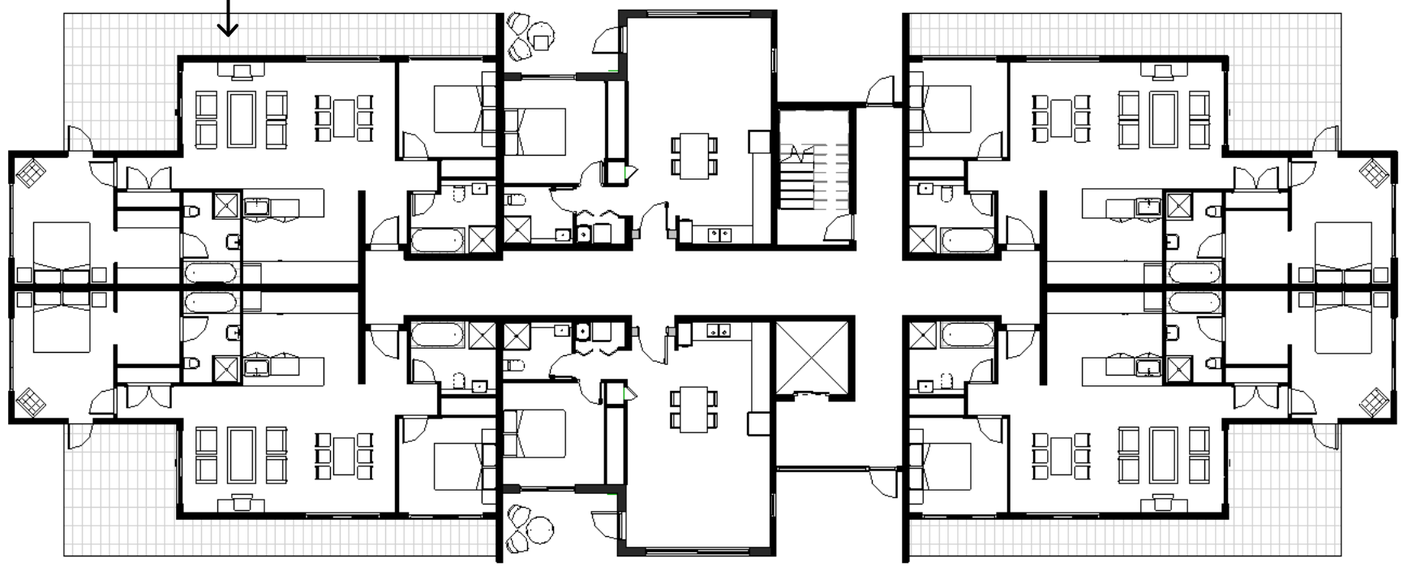
0.75:1 FSR

TYPICAL FLOOR PLANS

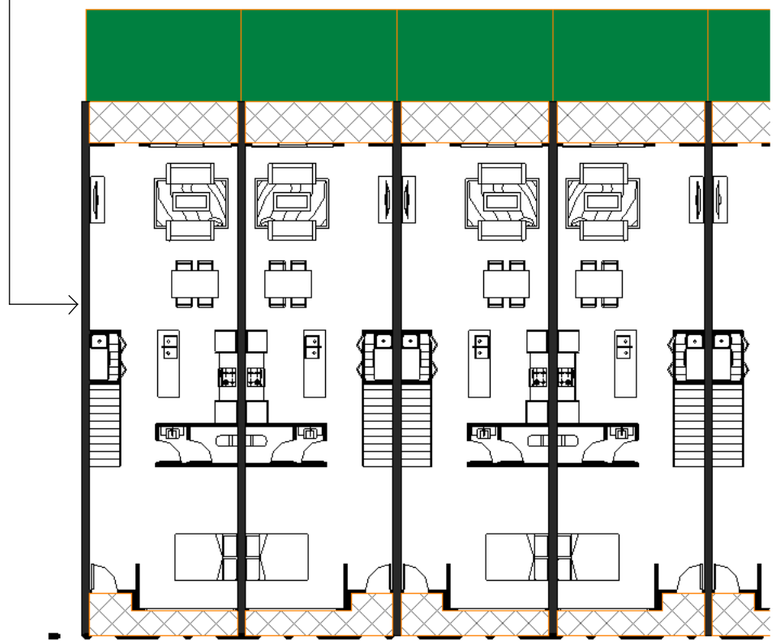


KEYPLAN

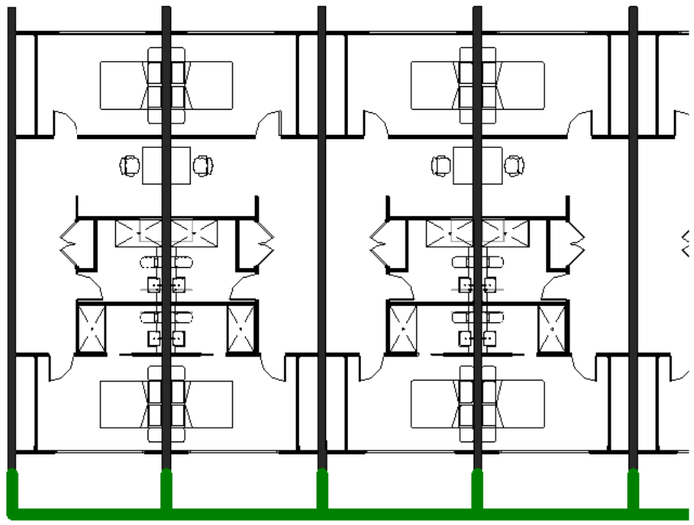
STAGE 1 - TYPICAL SMALL LOT HOUSING



STAGE 3 - TYPICAL FLOOR OF UNIT BLOCK



STAGE 2 - TYPICAL TOWNHOUSES - GROUND FLOOR



STAGE 2 - TYPICAL TOWNHOUSES - UPPER FLOOR

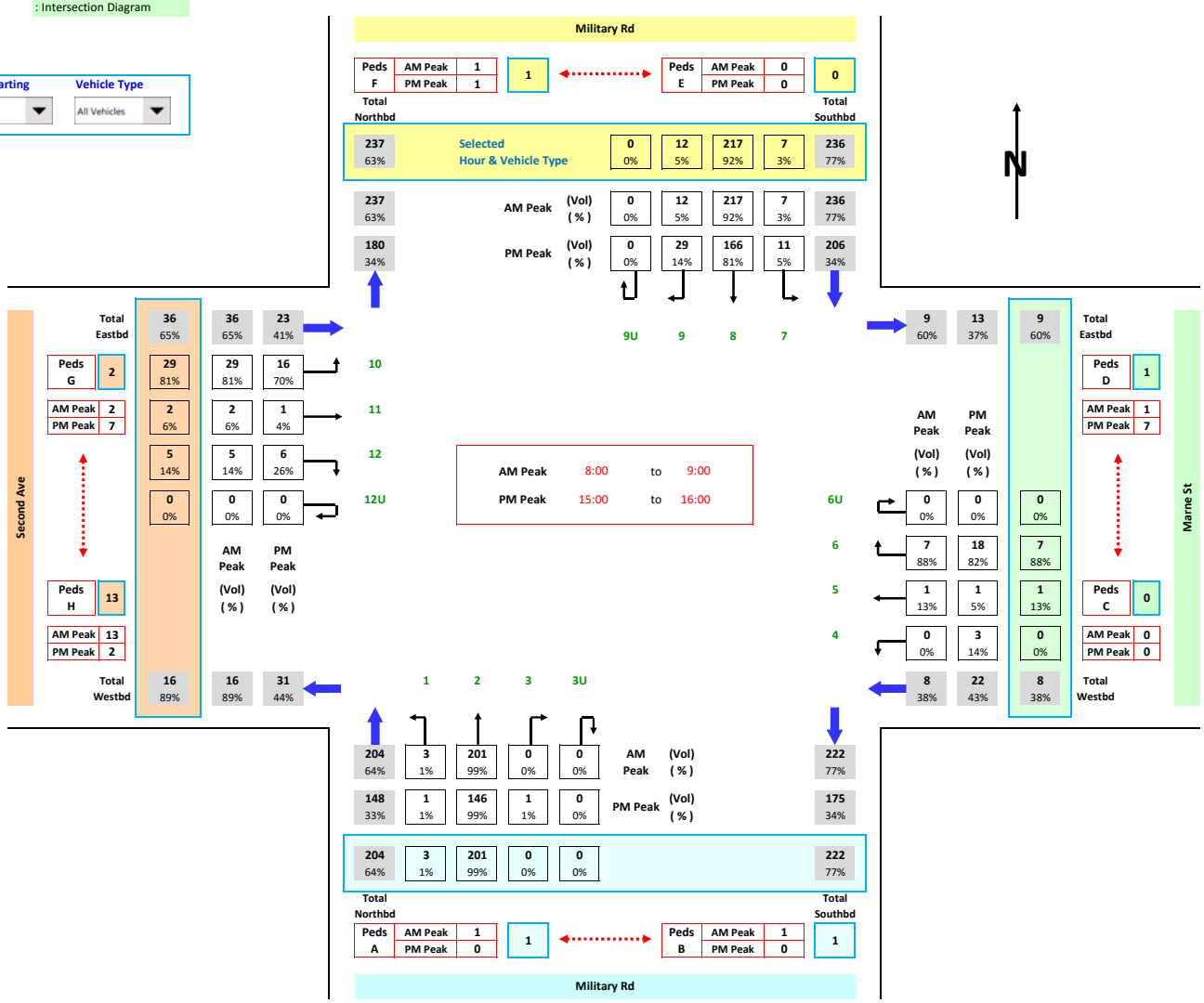
APPENDIX B

TRAFFIC COUNTS

Job No. : N3855
Client : Bitzios
Suburb : Port Kembla
Location : 1. Military Rd / Marne St / Second Ave

Day/Date : Friday, 2nd February 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

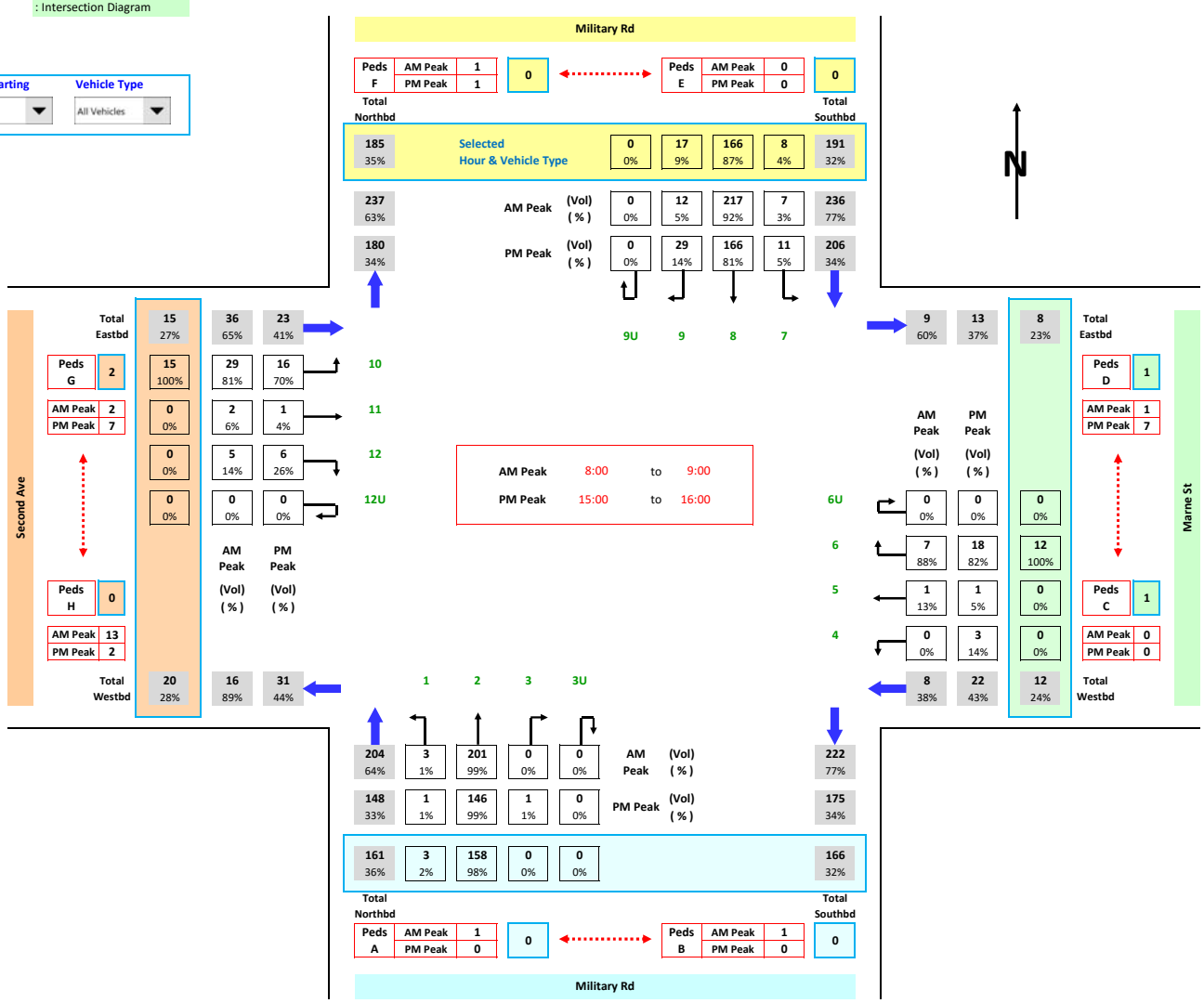
Hour Starting: 8:00 | Vehicle Type: All Vehicles



Job No. : N3855
Client : Bitzios
Suburb : Port Kembla
Location : 1. Military Rd / Marne St / Second Ave

Day/Date : Friday, 2nd February 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

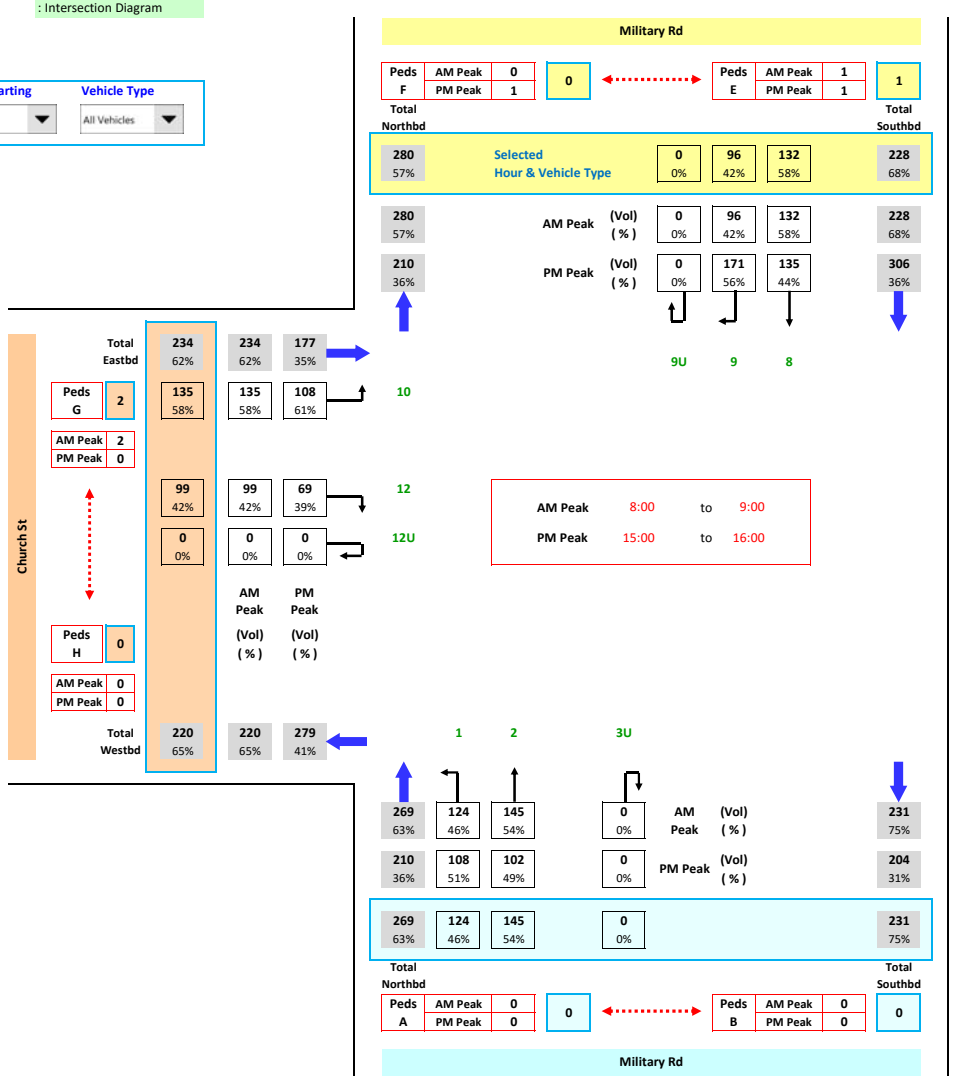
Hour Starting: 15:00 | Vehicle Type: All Vehicles



Job No. : N3855
Client : Bitzios
Suburb : Port Kembla
Location : 2. Military Rd / Church St

Day/Date : Friday, 2nd February 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

Hour Starting	Vehicle Type
8:00	All Vehicles

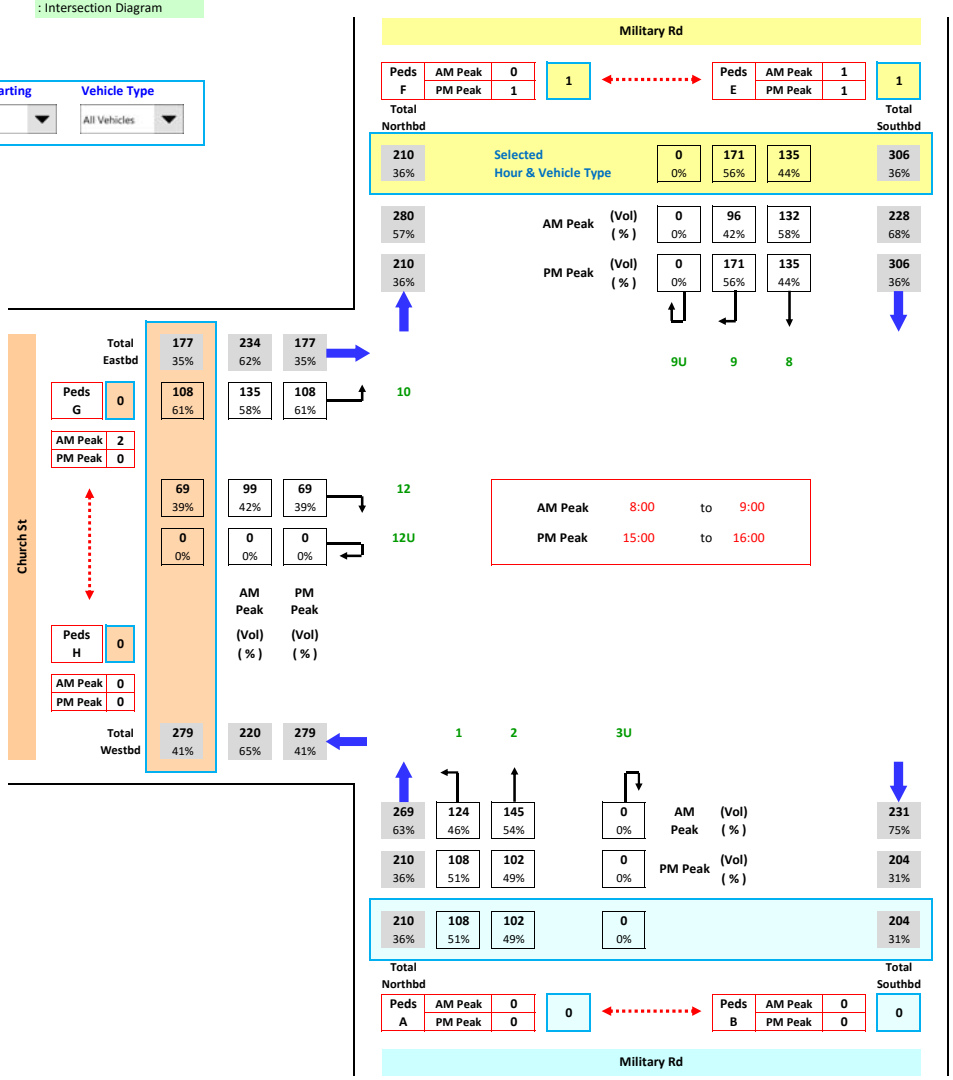


N

Job No. : N3855
Client : Bitzios
Suburb : Port Kembla
Location : 2. Military Rd / Church St

Day/Date : Friday, 2nd February 2018
Weather : Fine
Description : Classified Intersection Count
: Intersection Diagram

Hour Starting 15:00 **Vehicle Type** All Vehicles



N

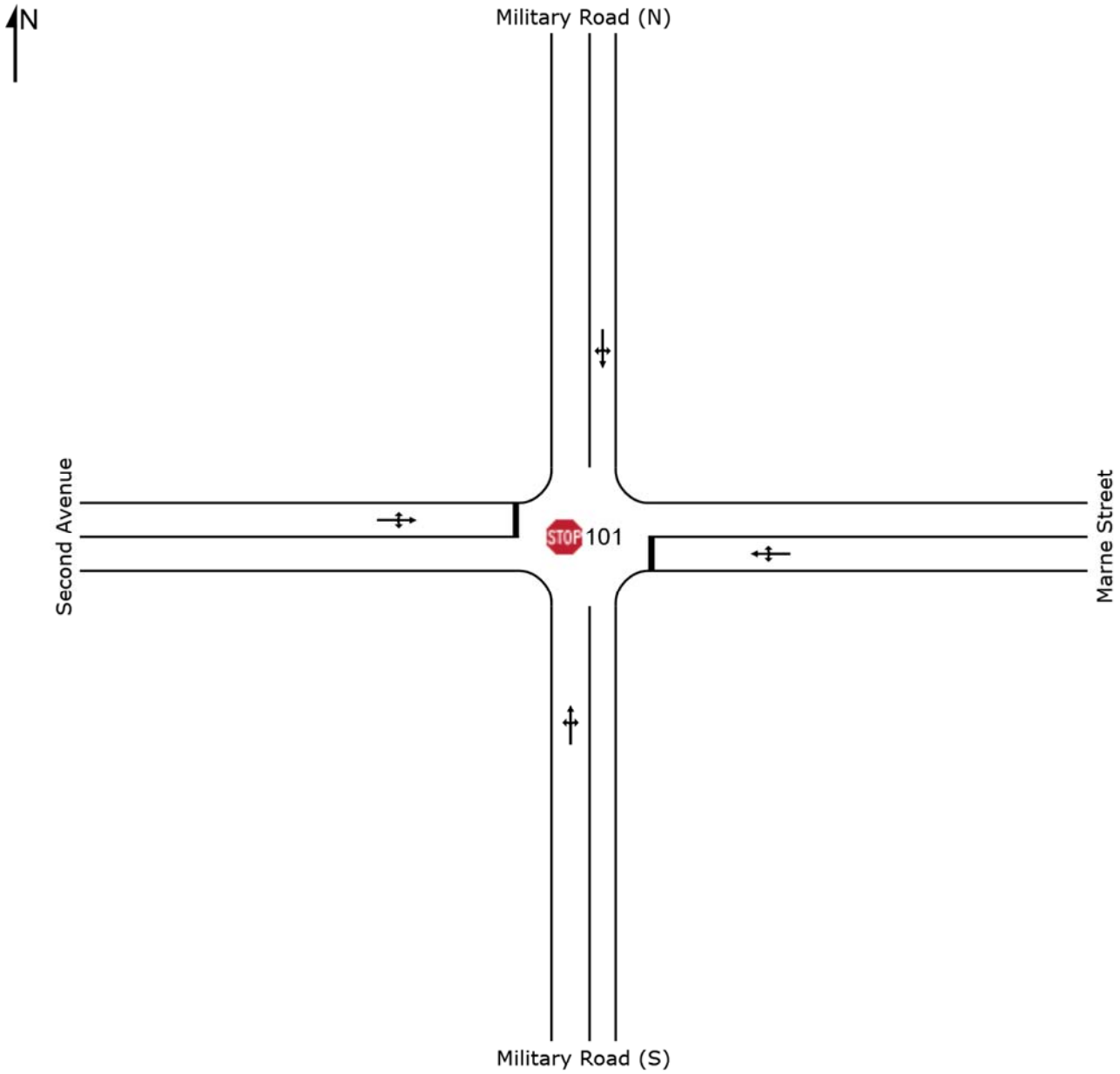
APPENDIX C

SIDRA RESULTS

SITE LAYOUT

Site: 101 [2019 BG AM]

Military Road / Marne Street Unsignalised BG Intersection
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 101 [2019 BG AM]

Military Road / Marne Street Unsignalised BG Intersection
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	4	0.0	0.108	5.7	LOS A	0.0	0.1	0.01	0.01	57.2
2	T1	216	3.5	0.108	0.0	LOS A	0.0	0.1	0.01	0.01	59.8
3	R2	1	0.0	0.108	6.3	LOS A	0.0	0.1	0.01	0.01	56.5
Approach		221	3.4	0.108	0.1	NA	0.0	0.1	0.01	0.01	59.8
East: Marne Street											
4	L2	1	0.0	0.019	8.9	LOS A	0.1	0.4	0.46	0.89	45.7
5	T1	2	0.0	0.019	10.2	LOS A	0.1	0.4	0.46	0.89	33.0
6	R2	8	0.0	0.019	11.3	LOS A	0.1	0.4	0.46	0.89	45.4
Approach		12	0.0	0.019	10.9	LOS A	0.1	0.4	0.46	0.89	44.1
North: Military Road (N)											
7	L2	8	0.0	0.134	6.1	LOS A	0.1	0.9	0.05	0.05	56.3
8	T1	233	0.5	0.134	0.1	LOS A	0.1	0.9	0.05	0.05	59.3
9	R2	14	0.0	0.134	6.3	LOS A	0.1	0.9	0.05	0.05	56.2
Approach		255	0.5	0.134	0.6	NA	0.1	0.9	0.05	0.05	59.1
West: Second Avenue											
10	L2	32	0.0	0.042	8.9	LOS A	0.2	1.1	0.34	0.87	47.3
11	T1	3	0.0	0.042	10.4	LOS A	0.2	1.1	0.34	0.87	34.8
12	R2	6	0.0	0.042	11.1	LOS A	0.2	1.1	0.34	0.87	47.0
Approach		41	0.0	0.042	9.3	LOS A	0.2	1.1	0.34	0.87	46.7
All Vehicles		528	1.6	0.134	1.3	NA	0.2	1.1	0.06	0.12	58.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2019 BG PM]

Military Road / Marne Street Unsignalised BG Intersection
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	9	0.0	0.105	6.0	LOS A	0.2	1.2	0.08	0.08	55.9
2	T1	178	5.4	0.105	0.1	LOS A	0.2	1.2	0.08	0.08	58.9
3	R2	19	0.0	0.105	6.1	LOS A	0.2	1.2	0.08	0.08	55.1
Approach		206	4.7	0.105	0.9	NA	0.2	1.2	0.08	0.08	58.6
East: Marne Street											
4	L2	1	0.0	0.024	8.7	LOS A	0.1	0.6	0.43	0.89	46.1
5	T1	1	0.0	0.024	9.8	LOS A	0.1	0.6	0.43	0.89	33.5
6	R2	14	0.0	0.024	10.6	LOS A	0.1	0.6	0.43	0.89	45.8
Approach		16	0.0	0.024	10.4	LOS A	0.1	0.6	0.43	0.89	45.3
North: Military Road (N)											
7	L2	9	0.0	0.111	6.0	LOS A	0.2	1.1	0.08	0.08	55.7
8	T1	178	3.6	0.111	0.1	LOS A	0.2	1.1	0.08	0.08	58.9
9	R2	19	0.0	0.111	6.2	LOS A	0.2	1.1	0.08	0.08	55.6
Approach		206	3.1	0.111	0.9	NA	0.2	1.1	0.08	0.08	58.6
West: Second Avenue											
10	L2	17	0.0	0.017	8.7	LOS A	0.1	0.4	0.29	0.86	47.7
11	T1	1	0.0	0.017	9.8	LOS A	0.1	0.4	0.29	0.86	35.4
12	R2	1	0.0	0.017	10.4	LOS A	0.1	0.4	0.29	0.86	47.4
Approach		19	0.0	0.017	8.8	LOS A	0.1	0.4	0.29	0.86	47.3
All Vehicles		447	3.6	0.111	1.6	NA	0.2	1.2	0.10	0.14	57.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2029 BG AM]

Military Road / Marne Street Unsignalised BG Intersection
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	4	0.0	0.122	5.8	LOS A	0.0	0.1	0.01	0.01	57.2
2	T1	244	3.5	0.122	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
3	R2	1	0.0	0.122	6.5	LOS A	0.0	0.1	0.01	0.01	56.5
Approach		249	3.4	0.122	0.1	NA	0.0	0.1	0.01	0.01	59.8
East: Marne Street											
4	L2	1	0.0	0.023	9.0	LOS A	0.1	0.5	0.49	0.91	45.1
5	T1	2	0.0	0.023	10.7	LOS A	0.1	0.5	0.49	0.91	32.3
6	R2	9	0.0	0.023	12.0	LOS A	0.1	0.5	0.49	0.91	44.8
Approach		13	0.0	0.023	11.5	LOS A	0.1	0.5	0.49	0.91	43.6
North: Military Road (N)											
7	L2	9	0.0	0.151	6.2	LOS A	0.1	1.0	0.06	0.05	56.3
8	T1	263	0.5	0.151	0.1	LOS A	0.1	1.0	0.06	0.05	59.3
9	R2	15	0.0	0.151	6.5	LOS A	0.1	1.0	0.06	0.05	56.2
Approach		287	0.5	0.151	0.6	NA	0.1	1.0	0.06	0.05	59.1
West: Second Avenue											
10	L2	36	0.0	0.048	9.0	LOS A	0.2	1.2	0.37	0.88	47.1
11	T1	3	0.0	0.048	10.9	LOS A	0.2	1.2	0.37	0.88	34.6
12	R2	6	0.0	0.048	11.8	LOS A	0.2	1.2	0.37	0.88	46.8
Approach		45	0.0	0.048	9.5	LOS A	0.2	1.2	0.37	0.88	46.6
All Vehicles		595	1.7	0.151	1.3	NA	0.2	1.2	0.07	0.12	58.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2029 BG PM]

Military Road / Marne Street Unsignalised BG Intersection
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	11	0.0	0.119	6.1	LOS A	0.2	1.4	0.08	0.08	55.8
2	T1	201	5.4	0.119	0.1	LOS A	0.2	1.4	0.08	0.08	58.9
3	R2	21	0.0	0.119	6.2	LOS A	0.2	1.4	0.08	0.08	55.1
Approach		233	4.7	0.119	0.9	NA	0.2	1.4	0.08	0.08	58.5
East: Marne Street											
4	L2	1	0.0	0.028	8.8	LOS A	0.1	0.6	0.46	0.90	45.6
5	T1	1	0.0	0.028	10.2	LOS A	0.1	0.6	0.46	0.90	33.0
6	R2	15	0.0	0.028	11.1	LOS A	0.1	0.6	0.46	0.90	45.4
Approach		17	0.0	0.028	10.9	LOS A	0.1	0.6	0.46	0.90	44.9
North: Military Road (N)											
7	L2	11	0.0	0.126	6.1	LOS A	0.2	1.3	0.08	0.08	55.7
8	T1	201	3.6	0.126	0.1	LOS A	0.2	1.3	0.08	0.08	58.9
9	R2	21	0.0	0.126	6.3	LOS A	0.2	1.3	0.08	0.08	55.6
Approach		233	3.1	0.126	0.9	NA	0.2	1.3	0.08	0.08	58.6
West: Second Avenue											
10	L2	19	0.0	0.019	8.8	LOS A	0.1	0.5	0.31	0.86	47.6
11	T1	1	0.0	0.019	10.2	LOS A	0.1	0.5	0.31	0.86	35.3
12	R2	1	0.0	0.019	10.9	LOS A	0.1	0.5	0.31	0.86	47.3
Approach		21	0.0	0.019	9.0	LOS A	0.1	0.5	0.31	0.86	47.2
All Vehicles		503	3.6	0.126	1.6	NA	0.2	1.4	0.11	0.14	57.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2029 DES AM]

Military Road / Marne Street Unsignalised BG Intersection
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	4	0.0	0.122	5.8	LOS A	0.0	0.1	0.01	0.01	57.2
2	T1	244	3.5	0.122	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
3	R2	1	0.0	0.122	6.5	LOS A	0.0	0.1	0.01	0.01	56.5
Approach		249	3.4	0.122	0.1	NA	0.0	0.1	0.01	0.01	59.8
East: Marne Street											
4	L2	3	0.0	0.130	9.2	LOS A	0.4	3.1	0.53	0.99	44.4
5	T1	2	0.0	0.130	11.2	LOS A	0.4	3.1	0.53	0.99	31.4
6	R2	63	0.0	0.130	12.5	LOS A	0.4	3.1	0.53	0.99	44.2
Approach		68	0.0	0.130	12.3	LOS A	0.4	3.1	0.53	0.99	44.0
North: Military Road (N)											
7	L2	24	0.0	0.159	5.9	LOS A	0.2	1.1	0.06	0.07	56.0
8	T1	263	0.5	0.159	0.1	LOS A	0.2	1.1	0.06	0.07	59.1
9	R2	15	0.0	0.159	6.5	LOS A	0.2	1.1	0.06	0.07	55.9
Approach		302	0.4	0.159	0.9	NA	0.2	1.1	0.06	0.07	58.8
West: Second Avenue											
10	L2	36	0.0	0.049	9.0	LOS A	0.2	1.3	0.37	0.88	47.1
11	T1	3	0.0	0.049	11.1	LOS A	0.2	1.3	0.37	0.88	34.6
12	R2	6	0.0	0.049	11.8	LOS A	0.2	1.3	0.37	0.88	46.8
Approach		45	0.0	0.049	9.6	LOS A	0.2	1.3	0.37	0.88	46.6
All Vehicles		665	1.5	0.159	2.4	NA	0.4	3.1	0.11	0.20	57.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2029 DES PM]

Military Road / Marne Street Unsignalised BG Intersection
Stop (Two-Way)

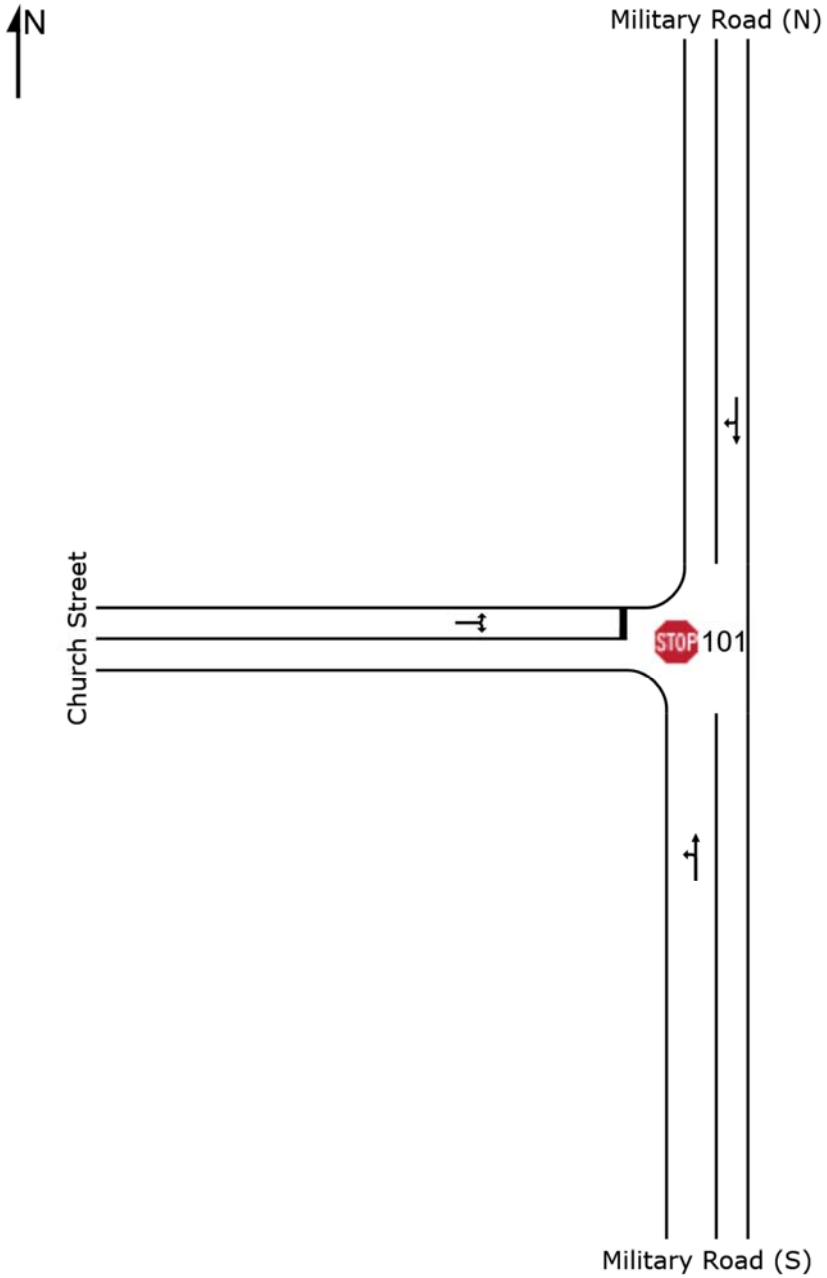
Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	11	0.0	0.122	6.3	LOS A	0.2	1.6	0.11	0.09	55.6
2	T1	201	5.4	0.122	0.2	LOS A	0.2	1.6	0.11	0.09	58.7
3	R2	24	0.0	0.122	6.4	LOS A	0.2	1.6	0.11	0.09	54.9
Approach		236	4.6	0.122	1.1	NA	0.2	1.6	0.11	0.09	58.4
East: Marne Street											
4	L2	2	0.0	0.067	8.8	LOS A	0.2	1.6	0.48	0.94	45.3
5	T1	1	0.0	0.067	10.6	LOS A	0.2	1.6	0.48	0.94	32.5
6	R2	36	0.0	0.067	11.5	LOS A	0.2	1.6	0.48	0.94	45.0
Approach		39	0.0	0.067	11.3	LOS A	0.2	1.6	0.48	0.94	44.8
North: Military Road (N)											
7	L2	58	0.0	0.151	5.8	LOS A	0.2	1.5	0.08	0.16	54.6
8	T1	201	3.6	0.151	0.1	LOS A	0.2	1.5	0.08	0.16	58.1
9	R2	21	0.0	0.151	6.3	LOS A	0.2	1.5	0.08	0.16	54.6
Approach		280	2.6	0.151	1.7	NA	0.2	1.5	0.08	0.16	57.4
West: Second Avenue											
10	L2	19	0.0	0.019	8.8	LOS A	0.1	0.5	0.31	0.86	47.6
11	T1	1	0.0	0.019	10.6	LOS A	0.1	0.5	0.31	0.86	35.3
12	R2	1	0.0	0.019	10.9	LOS A	0.1	0.5	0.31	0.86	47.3
Approach		21	0.0	0.019	9.0	LOS A	0.1	0.5	0.31	0.86	47.2
All Vehicles		576	3.1	0.151	2.4	NA	0.2	1.6	0.13	0.21	56.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [2019 BG AM]

Military Road Church Street Unsignalised
Stop (Two-Way)



MOVEMENT SUMMARY

Site: 101 [2019 BG AM]

Military Road Church Street Unsignalised
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	133	4.0	0.142	4.3	LOS A	0.0	0.0	0.00	0.26	31.2
2	T1	156	1.4	0.142	0.0	LOS A	0.0	0.0	0.00	0.26	49.4
Approach		288	2.6	0.142	2.0	NA	0.0	0.0	0.00	0.26	38.4
North: Military Road (N)											
8	T1	141	0.8	0.155	0.8	LOS A	0.7	5.3	0.34	0.26	43.8
9	R2	103	8.3	0.155	6.3	LOS A	0.7	5.3	0.34	0.26	31.6
Approach		244	4.0	0.155	3.1	NA	0.7	5.3	0.34	0.26	36.9
West: Church Street											
10	L2	145	5.9	0.276	9.0	LOS A	1.2	8.4	0.35	0.92	29.8
12	R2	106	4.0	0.276	11.1	LOS A	1.2	8.4	0.35	0.92	28.1
Approach		252	5.1	0.276	9.9	LOS A	1.2	8.4	0.35	0.92	29.1
All Vehicles		784	3.8	0.276	4.9	NA	1.2	8.4	0.22	0.48	34.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2019 BG PM]

Military Road Church Street Unsignalised
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	116	4.0	0.111	4.3	LOS A	0.0	0.0	0.00	0.30	30.9
2	T1	109	1.4	0.111	0.0	LOS A	0.0	0.0	0.00	0.30	48.4
Approach		225	2.7	0.111	2.2	NA	0.0	0.0	0.00	0.30	37.0
North: Military Road (N)											
8	T1	145	0.8	0.211	0.8	LOS A	1.1	8.1	0.35	0.34	41.4
9	R2	183	8.3	0.211	6.0	LOS A	1.1	8.1	0.35	0.34	30.6
Approach		328	5.0	0.211	3.7	NA	1.1	8.1	0.35	0.34	34.0
West: Church Street											
10	L2	116	5.9	0.206	8.7	LOS A	0.8	6.0	0.27	0.93	29.8
12	R2	75	4.0	0.206	11.3	LOS A	0.8	6.0	0.27	0.93	28.2
Approach		191	5.2	0.206	9.7	LOS A	0.8	6.0	0.27	0.93	29.2
All Vehicles		744	4.3	0.211	4.8	NA	1.1	8.1	0.22	0.48	33.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2029 BG AM]

Military Road Church Street Unsignalised
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	151	4.0	0.160	4.3	LOS A	0.0	0.0	0.00	0.27	31.2
2	T1	176	1.4	0.160	0.0	LOS A	0.0	0.0	0.00	0.27	49.4
Approach		326	2.6	0.160	2.0	NA	0.0	0.0	0.00	0.27	38.4
North: Military Road (N)											
8	T1	160	0.8	0.180	1.0	LOS A	0.9	6.3	0.37	0.27	43.3
9	R2	117	8.3	0.180	6.5	LOS A	0.9	6.3	0.37	0.27	31.4
Approach		277	4.0	0.180	3.3	NA	0.9	6.3	0.37	0.27	36.7
West: Church Street											
10	L2	164	5.9	0.328	9.3	LOS A	1.5	10.9	0.39	0.93	29.2
12	R2	120	4.0	0.328	12.0	LOS A	1.5	10.9	0.39	0.93	27.6
Approach		284	5.1	0.328	10.4	LOS A	1.5	10.9	0.39	0.93	28.5
All Vehicles		887	3.8	0.328	5.1	NA	1.5	10.9	0.24	0.48	33.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2029 BG PM]

Military Road Church Street Unsignalised
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	132	4.0	0.126	4.3	LOS A	0.0	0.0	0.00	0.30	30.9
2	T1	124	1.4	0.126	0.0	LOS A	0.0	0.0	0.00	0.30	48.4
Approach		256	2.7	0.126	2.2	NA	0.0	0.0	0.00	0.30	37.0
North: Military Road (N)											
8	T1	164	0.8	0.244	1.0	LOS A	1.3	9.7	0.39	0.35	41.0
9	R2	207	8.3	0.244	6.2	LOS A	1.3	9.7	0.39	0.35	30.4
Approach		372	5.0	0.244	3.9	NA	1.3	9.7	0.39	0.35	33.8
West: Church Street											
10	L2	132	5.9	0.247	8.8	LOS A	1.0	7.3	0.30	0.92	29.4
12	R2	84	4.0	0.247	12.1	LOS A	1.0	7.3	0.30	0.92	27.8
Approach		216	5.2	0.247	10.1	LOS A	1.0	7.3	0.30	0.92	28.8
All Vehicles		843	4.3	0.247	5.0	NA	1.3	9.7	0.25	0.48	33.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2029 DES AM]

Military Road Church Street Unsignalised
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	176	4.0	0.187	4.3	LOS A	0.0	0.0	0.00	0.27	31.2
2	T1	204	1.4	0.187	0.0	LOS A	0.0	0.0	0.00	0.27	49.3
Approach		380	2.6	0.187	2.0	NA	0.0	0.0	0.00	0.27	38.4
North: Military Road (N)											
8	T1	167	0.8	0.190	1.2	LOS A	0.9	6.8	0.40	0.27	43.0
9	R2	117	8.3	0.190	6.9	LOS A	0.9	6.8	0.40	0.27	31.3
Approach		284	3.9	0.190	3.5	NA	0.9	6.8	0.40	0.27	36.5
West: Church Street											
10	L2	164	5.9	0.356	9.7	LOS A	1.8	12.8	0.44	0.95	28.6
12	R2	127	4.0	0.356	12.9	LOS A	1.8	12.8	0.44	0.95	26.9
Approach		292	5.1	0.356	11.1	LOS A	1.8	12.8	0.44	0.95	27.9
All Vehicles		956	3.7	0.356	5.2	NA	1.8	12.8	0.25	0.48	33.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [2029 DES PM]

Military Road Church Street Unsignalised
Stop (Two-Way)

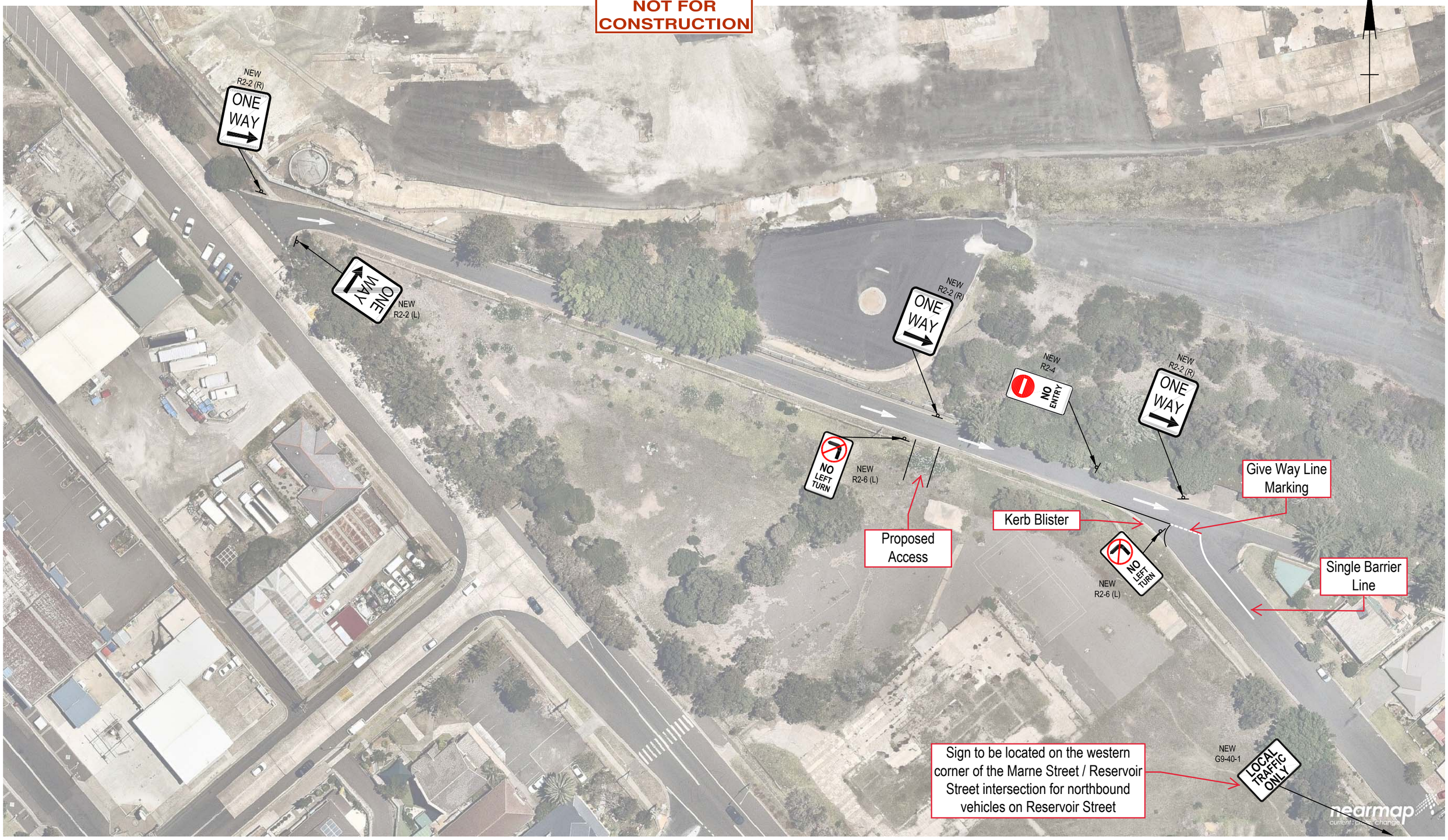
Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Military Road (S)											
1	L2	142	4.0	0.137	4.3	LOS A	0.0	0.0	0.00	0.29	30.9
2	T1	136	1.4	0.137	0.0	LOS A	0.0	0.0	0.00	0.29	48.4
Approach		278	2.7	0.137	2.2	NA	0.0	0.0	0.00	0.29	37.1
North: Military Road (N)											
8	T1	189	0.8	0.261	1.0	LOS A	1.4	10.4	0.40	0.33	41.4
9	R2	207	8.3	0.261	6.4	LOS A	1.4	10.4	0.40	0.33	30.6
Approach		397	4.7	0.261	3.8	NA	1.4	10.4	0.40	0.33	34.3
West: Church Street											
10	L2	132	5.9	0.297	8.9	LOS A	1.2	9.0	0.34	0.93	28.8
12	R2	107	4.0	0.297	12.8	LOS A	1.2	9.0	0.34	0.93	27.1
Approach		239	5.0	0.297	10.7	LOS A	1.2	9.0	0.34	0.93	28.1
All Vehicles		914	4.2	0.297	5.1	NA	1.4	10.4	0.26	0.48	33.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX D

ELECTROLYTIC STREET MODIFICATION

NOT FOR CONSTRUCTION



Date: 2/03/18	Drawing Name: Electrolytic Street Modification			
Project No: P3452	Project Name: Military Road Port Kembla TIA		Sheet 1	Version A