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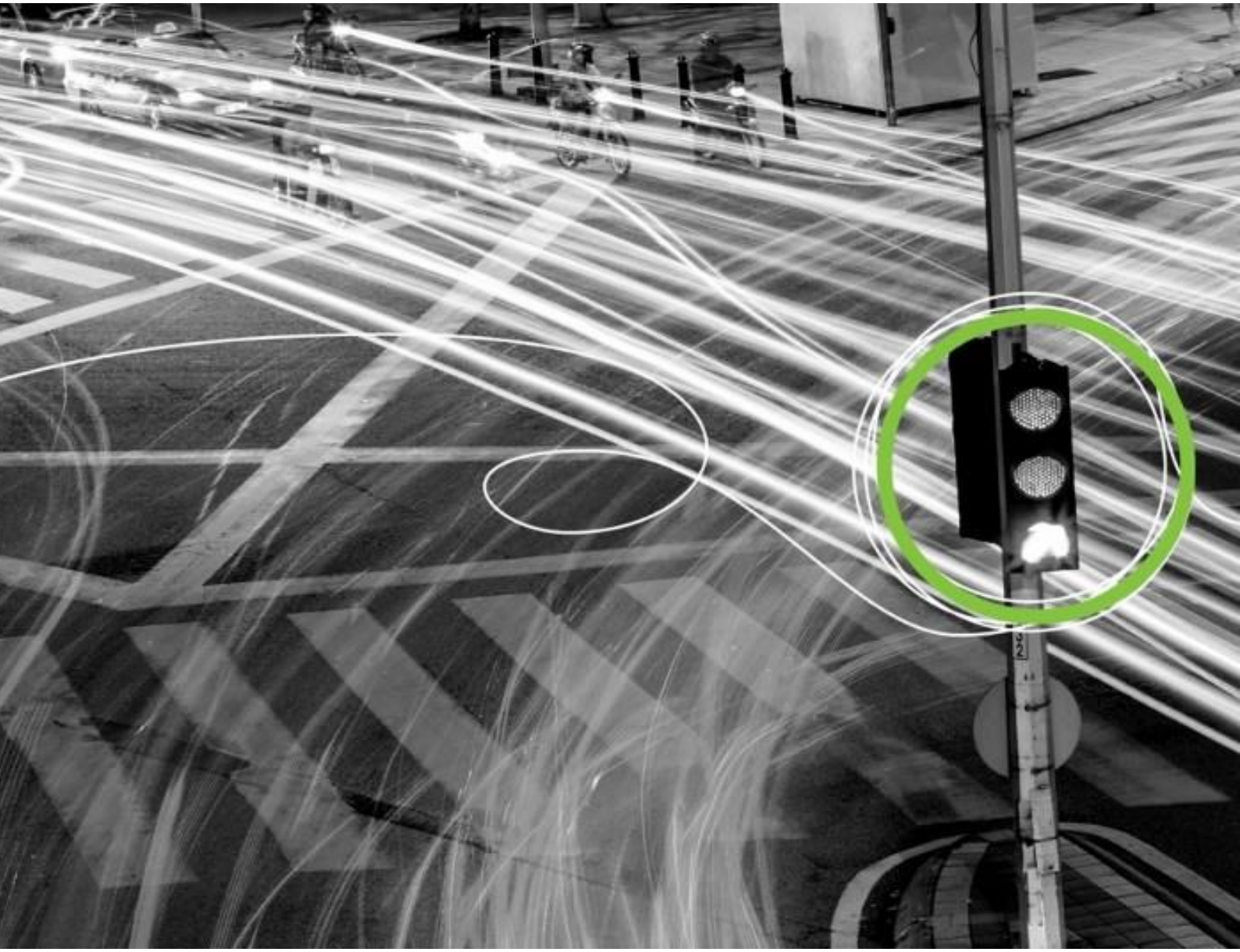

Nine Network Site Redevelopment Willoughby
Transport Impact Assessment

Client // LEPC9
Office // NSW
Reference // 16S1405100
Date // 18/07/16

Nine Network Site Redevelopment

Willoughby

Transport Impact Assessment

Issue: B 18/07/16

Client: LEPC9
Reference: 16S1405100
GTA Consultants Office: NSW

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	28/06/16	Final	Dean Rance	Nicole Vukic	Nicole Vukic	Nicole Vukic
B	18/07/16	Final – revised	Dean Rance	Nicole Vukic	Nicole Vukic	N.Vukic

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1. Introduction

1.1 Background

The redevelopment of the Nine Network Australia Studio site was declared to be a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* applies on 19 November 2010. Nine Network Australia submitted a concept plan application (MP 10_0198) to the NSW Department of Planning and Environment in November 2012.

In December 2014, following a lengthy planning assessment and community engagement process, the NSW Planning Assessment Commission Planning Assessment Commission (PAC), Willoughby City Council (Council) and Nine Network mediated an agreed planning approval before the NSW Land and Environment Court. The mediated outcome was formalised by the PAC in its final determination on 23 December 2014 to approve the concept plan application for:

The use of the site for a residential development with small-scale non-residential uses, incorporating:

- *Building envelopes for five residential flat buildings above basement level parking and two rows of terrace houses incorporating:*
  - *Up to 400 dwellings*
  - *Up to 500 square metres floor space of non-residential uses to support the development*
- *Retention and adaptive reuse of No 6 Artarmon Road for retail/ commercial purposes*
- *New internal roadways and other infrastructure works to support the development*
- *Publicly accessible open space and through Site link*
- *Temporary exhibition homes and/or exhibition villages*
- *Superlot subdivision.*

The Concept Plan Approval establishes maximum building footprints and heights, open space areas, road infrastructure and other development parameters, and sets out the future environmental assessment requirements for detailed development applications that are required to be submitted to Council in the future.

Euro Properties and Lotus Property Fun No.8 (LEPC9) agreed to purchase the site from Nine Network Australia in late August 2015. Recognising the opportunity to deliver an improved urban design, planning, development and community outcome, LEPC9 engaged five of Australia's leading urban design firms to participate in a design competition to identify the most appropriate residential master plan for the site. This voluntary design excellence process led to the selection of the CHROFI master plan by a panel of industry experts and, along with a substantial public benefit offer above the requirements of the current approval, has the potential to deliver a substantial improvement to the current approval for all project stakeholders.

GTA Consultants was commissioned by Platform Project Services in April, 2016 to undertake a transport impact assessment for the proposed modification development.

1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, providing a comparison of the approved and revised development schemes, including consideration of the following:

i Existing traffic and parking conditions surrounding the site
ii Suitability of the proposed parking in terms of supply (quantum) and layout
iii Service vehicle requirements
iv Pedestrian and bicycle requirements
v Traffic generating characteristics of the proposed development
vi Suitability of the proposed access arrangements for the site
vii Transport impact of the development proposal on the surrounding road network
viii Traffic and transport impact of increasing the number of dwellings from 400 to 510.

1.3 References

In preparing this report, reference has been made to the following:

- An inspection of the site and its surrounds on 18 and 25 May 2016
- Willoughby City Council Development Control Plan (DCP)
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- Australian Standard / New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- Traffic and car parking surveys undertaken by Austraffic as referenced in the context of this report
- *Nine Network Site, Artarmon Road, Willoughby, Transport and Access Review* (GTA Consultants' due-diligence report for the Nine Network site, 8 March 2016)
- *Nine Network Australia – Willoughby Site Redevelopment Independent Transport Assessment* (Arup, 15 July 2013)
- *Nine Network Australia (NNA) Willoughby site redevelopment Transport and Accessibility Impact Assessment* (AECOM, 19 March 2013)
- Master plan for the proposed development prepared by CHROFI, drawing number A-SK-002, revision A, dated 26 April 2016
- Other documents and data as referenced in this report.

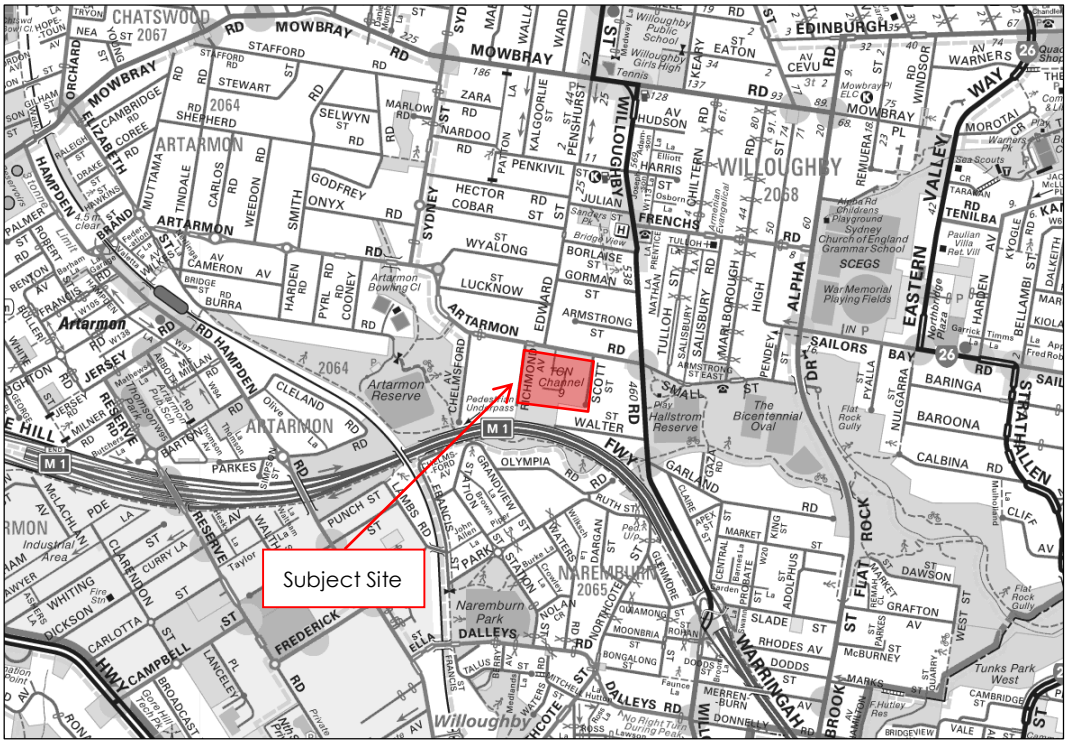
2. Existing Conditions

The existing Nine Network Australia Studio site is located on Artarmon Road in Willoughby, which is approximately 200 metres west of the Willoughby Road/ Small Street/ Artarmon Road intersection.

The site has a frontage of 200 metres to Artarmon Road along its northern boundary and is bounded by Gore Hill Freeway to the south, Richmond Avenue to the west and Scott Street to the east. The site has a total area of 30,644 square metres and is predominantly surrounded by low and medium density residential land uses. There are also a number of commercial developments in the immediate vicinity, particularly to the east, including a child care facility along Artarmon Road, a car dealership on Willoughby Road and the Willoughby Leisure Centre further east on Small Street.

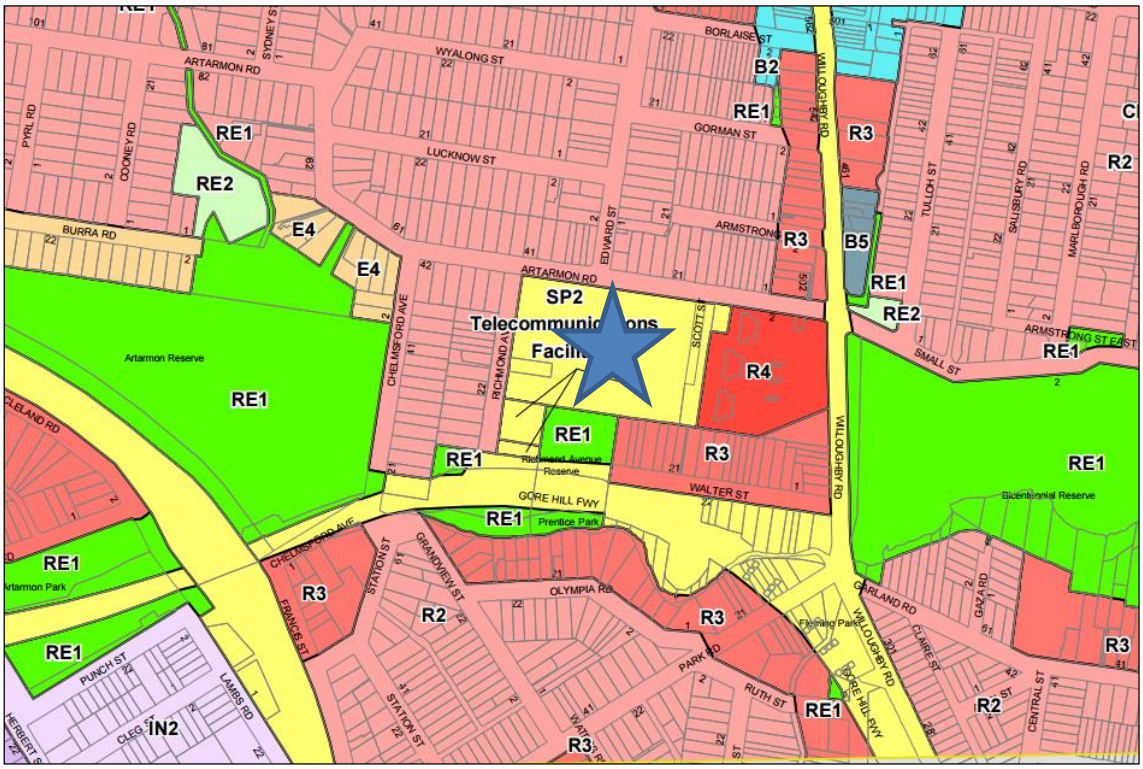
The location of the subject site and its surrounding environs is shown in Figure 2.1 and the current land zoning map is shown in Figure 2.2. The current site access from Artarmon Street is shown in Figure 2.3.

Figure 2.1: Subject site and its environs



Source: Reproduced with permission from Sydway Publishing Pty Ltd

Figure 2.2: Current land zoning map



Source: http://www.legislation.nsw.gov.au/maps/db17cf11-5f70-c22f-acf0-db33d5d22296/8250_COM_LZN_004_010_20121112.pdf, accessed 26 April 2016

Figure 2.3: Existing land use – Nine Network Australia Studio

2.1 Road Network

The following roads are the key collector and arterial roads surrounding the site.

2.1.1 Adjoining Roads

Artarmon Road

Artarmon Road functions as a collector road and in the vicinity of the site is aligned in an east-west direction. It is a two-way road with unrestricted parking permitted on both sides.

Artarmon Road is shown in Figure 2.4 and Figure 2.5.

Figure 2.4: Artarmon Road looking west

Figure 2.5: Artarmon Road at Willoughby Road

Willoughby Road

Willoughby Road is a classified State road (MR 641), which is aligned in a north-south direction. It is a two-way, undivided four-lane road with a carriageway width of approximately 12.9 metres carriageway, set within a road reserve of about 20.6 metres.

Kerbside parking is not permitted at any time on Willoughby Road in the vicinity of the site, with clearway periods during peak times. North of Armstrong Street, there is unrestricted parking (with the exception of Saturday 8am to 4pm) and clearways remain in place during peak periods.

2.1.2 Surrounding Intersections

The following intersections currently exist in the vicinity of the site:

- Artarmon Road, Willoughby Road and Small Street (traffic signals)
- Artarmon Road and Scott Street (priority control)
- Artarmon Road and Edward Street (priority control)
- Artarmon Road and Richmond Avenue (priority control).

2.2 Traffic Volumes

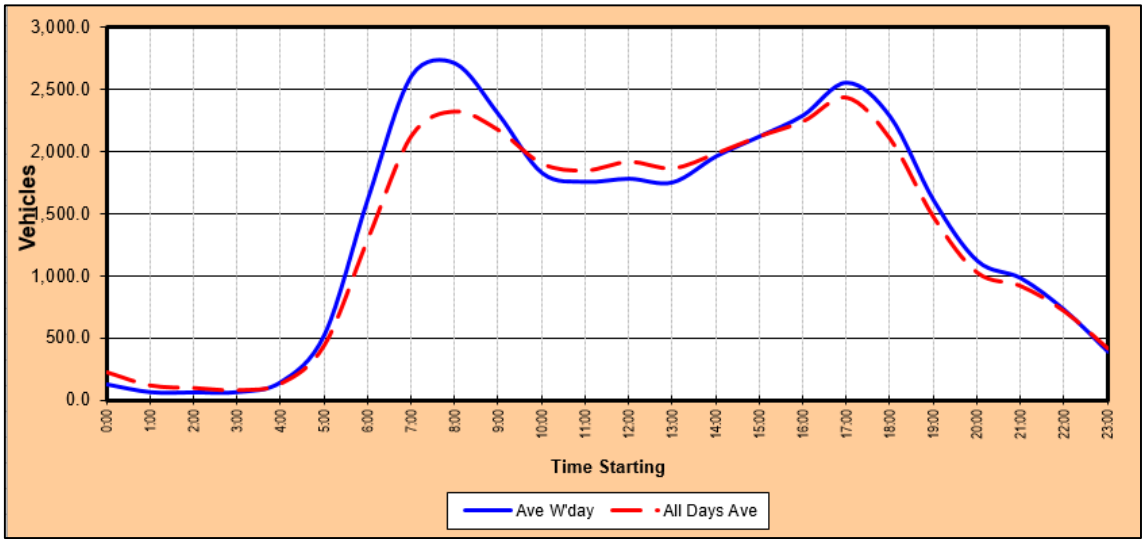
GTA Consultants commissioned traffic turning movement counts on key intersections in the vicinity of the site being Willoughby Road and Artarmon Road/Small Street, Artarmon Road and Richmond Avenue, as well as the intersection of Artarmon Road and Wyalong Street, on a Thursday (12 May 2016) and Saturday (14 May 2016) during the following peak periods:

- 7am to 9am (Thursday)
- 4pm to 6pm (Thursday)
- 9am and 1pm (Saturday)

The AM and PM peak hour traffic volumes are summarised in Appendix A.

In addition to the peak time turning counts, a mid-block tube count was commissioned for a period of seven days on Willoughby Road between its intersection with Artarmon Road and Small Street and Walter Street. The data output illustrated in Figure 2.7 is largely consistent with Roads and Maritime Services (Roads and Maritime) data. Average traffic vehicle movements were 15,365 per day (northbound) and 16,667 per day (southbound). One of the key congestion periods is the weekend during the day, which is reflected in the data with weekends having higher traffic volumes than weekdays between 10am and 2pm. This peak period impacts the operation of the Willoughby Road/ Artarmon Road/ Small Street intersection during weekends, noting that during this period the right turn bans from Willoughby Road into Small Street are not in place.

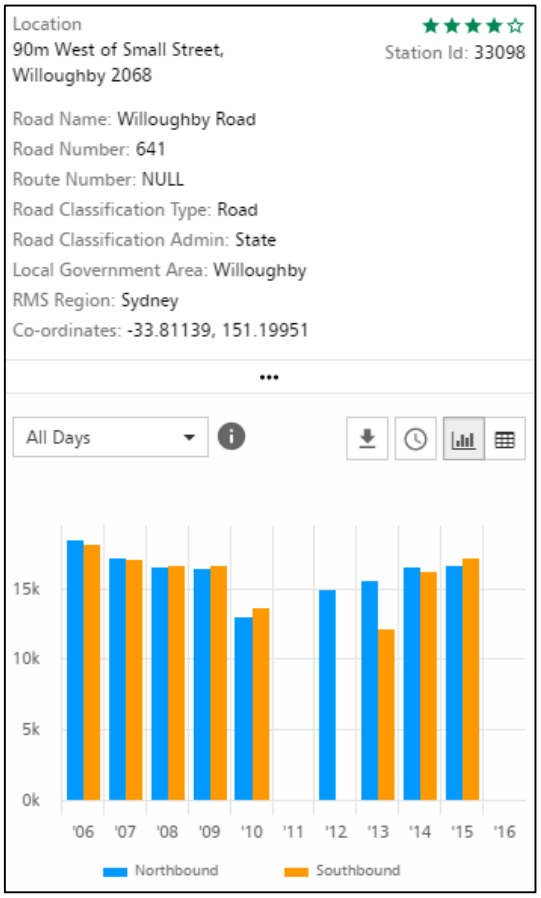
Figure 2.6: Two-way traffic flow on Artarmon Road



Source: Austraffic, data received 25 May 2016

Long term Roads and Maritime counts are publicly available for Willoughby Road between Artarmon Road/ Small Street and Walter Street. The data records establish approximately 16,000 vehicle movements per day (each way) with a moderate degree of variability across the years and a slight upward trend since 2010 (where data is provided), however, volumes remain lower than recorded in 2006.

Figure 2.7: Roads and Maritime Services count data



Source: RMS Traffic Volume Viewer, accessed 26 April 2016
Note: The location description above incorrectly states 'west' of Small Street instead of 'south' if coordinates are utilised

2.3 Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION[1], version 6.1, a computer based modelling package, which calculates intersection performance.

The commonly used measure of intersection performance, as defined by Roads and Maritime, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.1 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

Table 2.1: SIDRA INTERSECTION level of service criteria

Level of service	Average delay per vehicle (secs/veh)	Traffic signals, roundabout	Give way and stop sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 2.2 presents a summary of the existing operation of the intersection, with full results presented in Appendix B.

Table 2.2: Existing operating conditions (2016)

Intersection	Peak	Degree of saturation (v/c)	Average delay (sec)	95th percentile queue (m)	Level of service[2]
Willoughby Road/ Artarmon Road/ Small Street	Thursday AM	0.73	27	222	B
	Thursday PM	0.78	28	278	B
	Saturday	0.82	33	296	C
Artarmon Road/ Edward Street**	Thursday AM	0.25	7	4	A
	Thursday PM	0.24	6	2	A
	Saturday	0.22	6	2	A
Artarmon Road/ Richmond Avenue	Thursday AM	0.25	7	1	A
	Thursday PM	0.22	7	1	A
	Saturday	0.20	7	1	A
Artarmon Road/ Wyalong Street	Thursday AM	0.33	6	15	A
	Thursday PM	0.32	5	15	A
	Saturday	0.28	5	13	A

** Data for Edward Street was extrapolated as the difference in the traffic between Scott Street and Richmond Avenue

On the basis of the above assessment, it is evident that the local road network in vicinity of the site is operating at an acceptable level of service of C or better for the peak periods assessed.

1 Program used under license from Akcelik & Associates Pty Ltd.

2 For intersections without traffic signals, the level of service is reported for the worst movement at the intersection.

2.4 Car Parking

2.4.1 Supply

GTA Consultants undertook a site visit and estimated the current provision and proposed future provision of on-street parking. It is estimated that along the length of Richmond Avenue, Scott Street and Artarmon Road west of Richmond Avenue, there is currently the provision of approximately 107 on-street parking spaces.

Utilising aerial photography of the site, it is estimated that the current Nine Network Australia site has approximately 261 off-street parking spaces, with approximately a further 47 privately allocated spaces on Scott Street.

2.4.2 Demand

An anecdotal review of publicly available car parking in the vicinity of the site indicates that demand for on-street parking is moderate to high, this is consistent with a shortfall of parking associated with the existing Nine Network Australia site due to a high number of car parking with secure access. Artarmon Road has high demand for untimed parking with limited capacity for further parking. Anecdotal observations also indicated a tendency for people to park their vehicles on Artarmon Road and walk to the bus stop on Willoughby Road. This high demand for parking was also observed to spill over onto surrounding local streets such as Edward Street and Richmond Avenue.

2.5 Public Transport

A review of the public transport available in the vicinity of the site is illustrated in Figure 2.8 and summarised in Table 2.3.

Figure 2.8: Sydney Buses map

Source: http://www.sydneybuses.info/routes/Region_guide_North-2015.pdf, accessed 26 April 2016

Table 2.3: Public transport provision

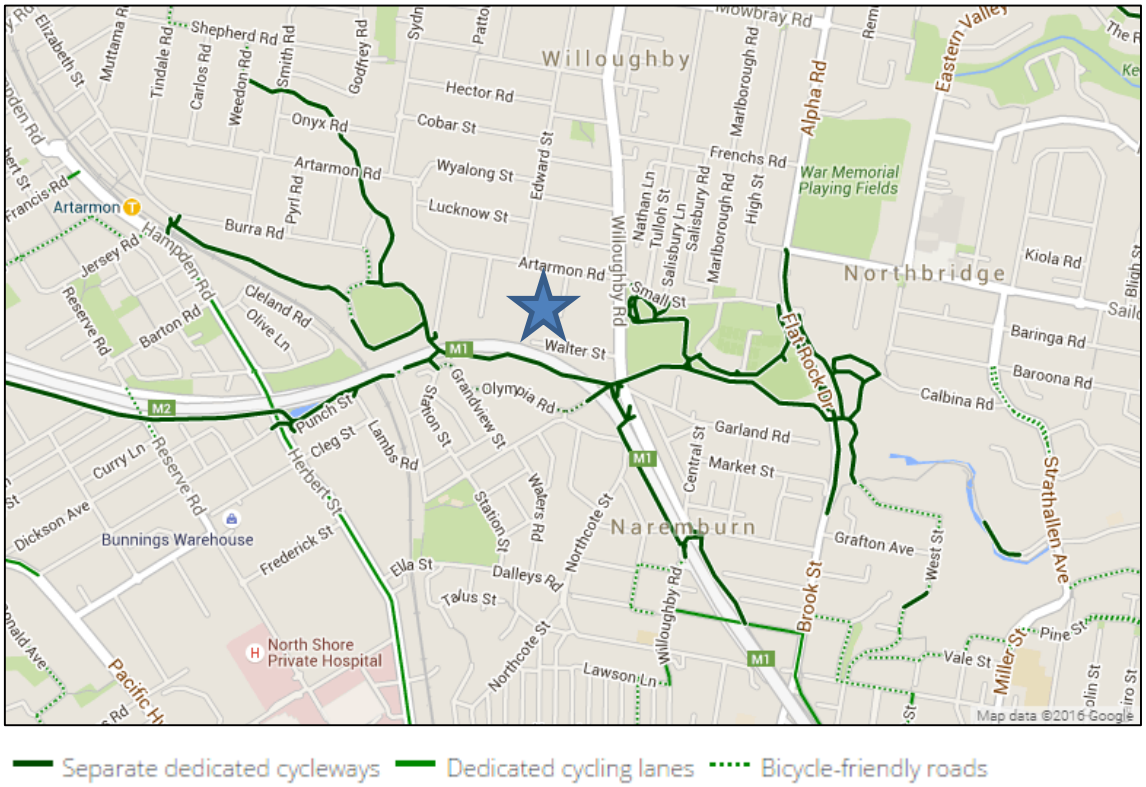
Service	Route number	Route description	Location of stop	Distance to nearest stop	Frequency on/off peak
Bus	272	North Willoughby to Sydney CBD (Wynyard)	Willoughby Road near Artarmon/Small Street	250 m	10 mins/30 mins
Bus	257	Balmoral Beach to Chatswood			20 mins/ 30 mins
Bus	343	Kingsford to Chatswood via Sydney CBD			10 mins/20 mins
Bus	M40	Bondi Junction to Chatswood via Sydney CBD			10 mins/20 mins
Train	T1 North Shore	Hornsby/Epping to Richmond/Penrith via Sydney CBD	Artarmon	1,300 m	3 mins/8 mins

2.6 Pedestrian and Cycle Infrastructure

A well-developed network of footpaths exists in the vicinity of the site with most streets having standard width paths on both sides of the road.

High quality cycling infrastructure exists in close proximity to the site, with the Naremburn cycleway a few hundred metres away to the east or west. This cycleway is arguably one of Sydney's primary cycling corridors and provides largely off-road links to and between various centres such as Chatswood, North Sydney, Macquarie Park, Lane Cove and the Sydney CBD. Linking the development with pedestrian and cyclist facilities to either Artarmon Reserve or Bicentennial Oval would enhance the environment for all community members.

Figure 2.9: Cycle infrastructure



Source: http://www.sydneycycleways.net/map/, accessed 26 April 2016

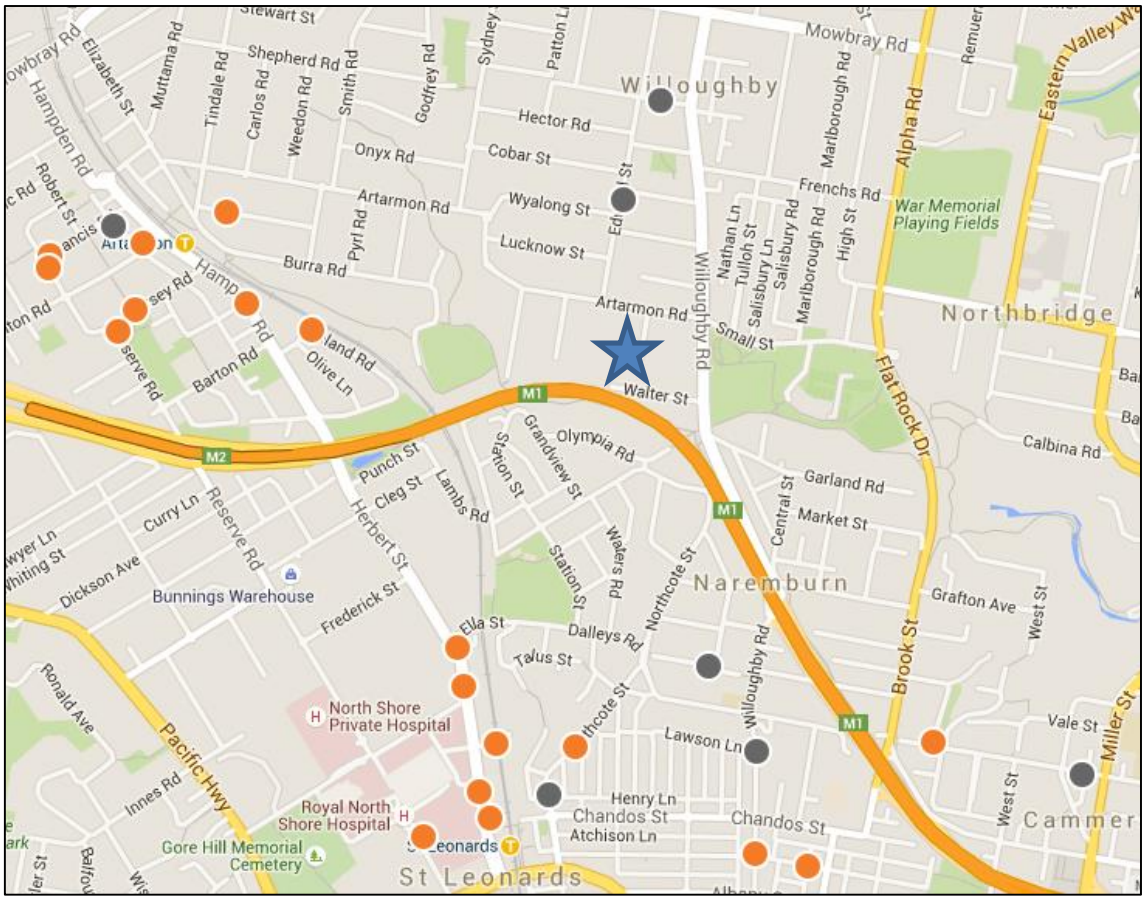
Figure 2.10: High quality cycling infrastructure adjacent to Lane Cove Road west of site

2.7 Local Car Sharing Initiatives

GoGet car sharing service operates a number of share vehicles in the vicinity of the site. Currently, two vehicles are located north of the site on or close to Edward Street. The nearest

being 300 metres away, with higher concentrations of vehicles in close proximity to railway stations (St Leonards and Artarmon).

Figure 2.11: GoGet vehicle map



Source: https://www.goget.com.au/find-cars/, accessed 26 April 2016
Note: The differences in the markers show the available (orange) and non-available (grey) vehicles at the time of viewing the map, 26 April 2016 at 1:30pm

3. Development Proposal

3.1 Approved Development

A Concept Plan Approval for a development scheme for 400 apartments has been granted by the Planning and Assessment Commission (PAC) under Part 3A of the EP&A Act. This report details the gross impacts of an application to modify the Concept Plan Approval, which will comprise development of 510 apartments over forecast traffic conditions and provides a comparison between the impacts of the approved concept plan with the modified concept plan proposal.

3.2 Land Uses

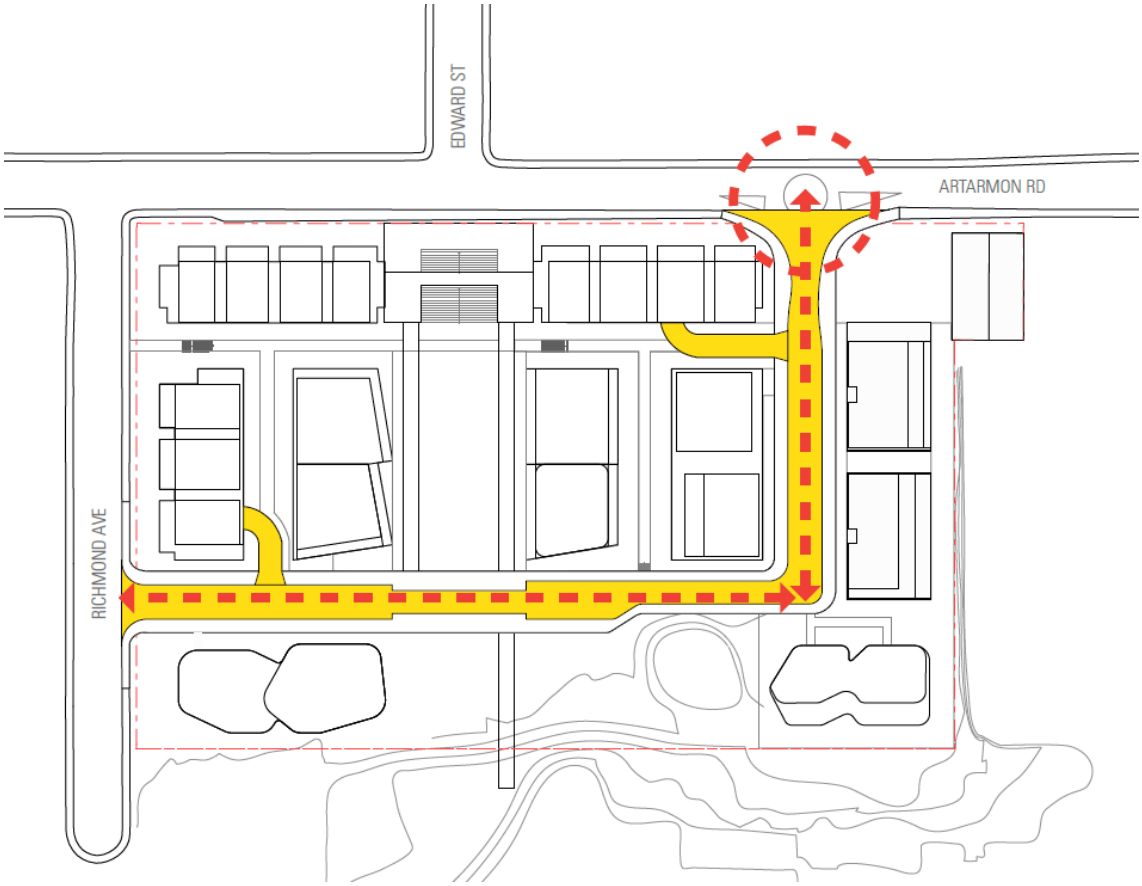
The modified concept plan proposes to includes the construction of a residential development with ancillary retail floor space, car parking and open space with a mix of building heights of up to 12 storeys. A total of 510 apartments are proposed, with a preliminary mix of one-bedroom, two-bedroom and three-bedroom units accounting for about 33 per cent, 63 per cent and 5 per cent of the total number of units, respectively.

In addition, 1,322 square metres of commercial floor space is proposed within the development and an additional 415 square metres of retail floor space has been allocated.

3.3 Vehicle Access

Vehicular access to the site is to be achieved by creating an internal road within the site. This road has access points from Artarmon Road and Richmond Avenue as shown in Figure 3.1. This will assist in distributing the traffic generation of the site. The road highlighted yellow (realignment and extension of Scott Street) is to be a local road with driveways to a number of underground carparks for the proposed development.

Figure 3.1: Site access



To facilitate safe access to the site and reduce the speed environment on Artarmon Road a roundabout will be implemented at the new Artarmon Road / Scott Street intersection. This roundabout design will be developed as the design progresses for the site and will take into consideration existing geometry of the corridor and access to adjacent properties, minimising impacts to the existing residential properties on Artarmon Road.

3.4 Car Parking

It has been tentatively identified that car parking will be provided according to the following schedule, which is consistent with Council's DCP, the current concept plan approval (Condition 29) and in line with requirements for developments within major transport corridors and railway precincts:

- 1 bedroom apartments – 1 per dwelling
- 2 bedroom apartments – 1 per dwelling
- 3 bedroom apartments – 1.25 per dwelling
- Visitor parking – 1 per 4 dwellings

Provision of disabled and adaptable parking requirements will be provided in accordance with Council's DCP (pages C4 to 5, Willoughby DCP).

Parking for the proposed commercial and retail use will be provided in accordance with Council's DCP requirements for one space per 110 square metres for office and business space within major transport corridors and railway precincts for one space per 25 square metres for retail.

At this stage, residential community infrastructure such as pools, gyms and childcare facilities are yet to be confirmed.

The provision of motorcycle parking will be confirmed as the design progresses for the proposed development.

The car parking provision, its suitability for the development and layout is discussed in Section 4 of this report.

3.5 Pedestrian Facilities

A pedestrian refuge will be provided on Artarmon Road, west of Edward Street. Condition 17 of the concept approval requires this to be upgraded to a pedestrian crossing if warrants are met.

The provision of additional pedestrian facilities within and immediately surrounding the site is yet to be confirmed, however, all new roads shall have footpaths and where possible, additional internal links shall be provided to facilitate pedestrian access within and surrounding the site. All facilities will comply with Austroads Guide to Road Design: 6A – Providing for cyclists and pedestrians and Council's requirements.

The suitability of the proposed pedestrian facilities is discussed in Section 5.2 of this report.

3.6 Bicycle Facilities

The provision of bicycle facilities is yet to be confirmed. Notwithstanding, sufficient bicycle parking shall be provided as part of the development consistent with Council's DCP.

The suitability of the bicycle provisions is discussed in Section 5.3 of this report.

3.7 Loading and Waste Collection Areas

Bulk waste disposal will be preferred due to the size of the development. Twice-weekly general garbage collection is proposed, along with weekly recycling collection. This will be confirmed as development applications for buildings are submitted to Council in the future.

Council's DCP requires that the design for waste collection on private property has a minimum unobstructed height clearance of 3.8 metres over all areas traversed by Council's refuse collection (pages 8 to 3, Willoughby DCP).

4. Car Parking

4.1 Car Parking Requirements

The car parking provision requirements for different development types are set out in Council's DCP – Part C and the rates approved for the approved concept plan (Condition 29). A review of the car parking requirement rates and the floor area schedule results in a statutory parking requirement for the proposed development and is summarised in Table 4.1.

Table 4.1: Statutory car parking requirements for 510 dwellings

Use	Size/ number (% of dwellings)	Statutory parking rate	Statutory parking requirement
Residential (510)	1 bedroom (33%)	1/dwelling (166)	166
	2 bedrooms (63%)	1/dwelling (320)	320
	3 bedrooms (5%)	1.25/dwelling (24)	30
	Visitor	1 /4 dwellings	128
Residential Sub-Total			***644***
Commercial	1,322 m^2	1/110m^2	13
Retail	415 m^2	1/25m^2	17
Mixed Sub-Total			***30***
Total		**674 spaces**	

Based on the above, the proposed development is required to provide 674 car parking spaces. The proposed development will meet these statutory parking provisions providing sufficient parking on site for the proposed land uses.

4.2 Adequacy of On-street Parking Supply

Future works associated with the proposed roundabout is likely to result in some loss of on-street parking on Artarmon Road. This on-street parking loss will be offset by the increase of on-street public parking on Scott Street. It is estimated that the provision of on-street parking bounded by the same area as above, with the inclusion of new parking on Scott Street will be up to approximately 107 spaces. This is in addition to the proposed off-street parking provision specified in Section 4.1. Table 4.2 summarises the existing and proposed on-street parking provision.

Table 4.2: On-street public parking provision

Location	Current estimate	Revised development estimate (change from existing)
Richmond Avenue (west side)	17	17 (0)
Richmond Avenue (east side)	26	19 (-7)
Artarmon Road (north side) (between Richmond Avenue and Edward Street)	4	4 (0)
Artarmon Road (north side) (between Edward Street and Willoughby Road)	28	12 (-16)
Artarmon Road (south side) (between Willoughby Road and Richmond Avenue)	23	17 (-6)
Scott Street	9	38 (+29)
Total	**107**	**107 (0)**

On the basis of the empirical assessment of the expected demand, the on-site car parking provision is expected to be capable of accommodating the car parking demands associated with the proposed development with minimal overflow onto the existing local road network.

The approved concept plan comprises two roundabouts to be constructed on Artarmon Road. The construction of the second roundabout would result in an overall reduction of on-street parking on Artarmon Road. Therefore, the revised concept plan has less impact on on-street parking provision compared with the approved concept plan.

As part of the development, it is understood the Department of Planning and Environment and Council support a reduced rate of parking supply requirement given the proximity of the site to existing transport facilities including buses on Willoughby Road.

4.3 Car Park and Site Access Design Review

The roundabout to be located on Artarmon Road at Scott Street has been designed such that full access will be able to be accommodated for an 8.8 metre medium rigid vehicle (Austroads service vehicle). In addition, it has been designed such that 12.5-metre heavy rigid vehicles will be able to be accommodated for through movements along Artarmon Road.

The car park accesses have been assessed and all nominated access points have been designed to accommodate two 99 percentile vehicles (cars) passing each other. The swept path analysis for the proposed car park accesses is provided in Appendix C.

As the design for the proposed development progresses, the car park layout will be designed in accordance with the requirements of the Australian Standard for off street car parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009).

5. Traffic Impact Assessment

5.1 Traffic Generation

5.1.1 Design Rates

Traffic generation estimates for the proposed development are based on the *Guide to Traffic Generating Developments* (Roads and Maritime, October 2002) and *Technical Direction (TDT 2013/04a) Guide to Traffic Generating Developments Updated traffic surveys* (Roads and Maritime, August 2013). For the purposes of this report, a peak hour traffic generation rate of 0.32 vehicle trips per dwelling was adopted for weekdays and 0.25 vehicle trips per dwelling on Saturdays. These rates are also consistent with the Arup report, which was commissioned by the former NSW Department of Planning and Infrastructure to provide and independent assessment of the proposed development.

Estimates of peak hour and daily traffic volumes resulting from the proposal for 510 dwellings are summarised in Table 5.1.

Table 5.1: Traffic generation estimates

Period	Traffic generation rate	Vehicle movements	Increase in number of vehicle movements from approved 400 dwellings
	Movements/ dwelling	Total	Total
AM Peak	0.32/peak hr	164/hr	36/hr
PM Peak	0.32/peak hr	164/hr	36/hr
Saturday Peak	0.25/peak hr	128/hr	28/hr
Daily	1.52/day	776/day	167/day

Table 5.1 indicates that the site could potentially generate up to 164 vehicle movements in any peak hour, which equates to an additional 36 vehicle movements per peak hour from the approved concept plan of 400 dwellings. The site would generate around 776 vehicle movements over the entire day, which is an additional 167 vehicle movements per day from approved development of 400 dwellings. It is to be noted that this estimate is based on traffic for the residential component of the development. The additional traffic likely generated by the retail and commercial spaces is expected to be around six to seven trips in the peak hours, which is considered negligible relative to the residential aspect of the development. These traffic volumes have been considered in this assessment. The type of commercial and retail uses proposed for the development is uncertain and will be determined as the design progresses and tenants are confirmed.

For the purpose of this assessment, it assumed that the following inbound and outbound vehicles trips would be associated with the proposed development, based on similar developments in comparable study areas:

- AM peak hour: 85 per cent outbound / 15 per cent inbound
- PM peak hour: 30 per cent outbound / 70 per cent inbound
- Saturday peak hour: 50 per cent outbound / 50 per cent inbound.

The Arup report indicates that the existing Nine Network Australia Studio site generates up to 198 and 176 movements in AM and PM peak hours, respectively. There is a net reduction of 28 and six movements, respectively that can be expected in the weekday AM and PM peak periods,

respectively (based on the development of 510 dwellings). The Arup report outlines the Nine Network Australia site generates about 24 movements on a Saturday peak hour and the site is forecast to generate a net increase of 104 movements in a peak hour (based on the development of 510 dwellings).

It is noted that the current traffic generated by the Nine Network Australia Studio site has the majority of traffic travelling inbound during the AM peak and outbound during the PM peak, which is the reverse for the traffic generated by the proposed development. This directional split has been considered in the assessment of the impacts and the modelling presented in Section 5.3.

5.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

i Configuration of the arterial road network in the immediate vicinity of the site
ii Existing operation of intersections providing access between the local and arterial road network
iii Surrounding employment centres, retail centres and schools in relation to the site
iv Configuration of access points to the site.

Having considered the above, for the purposes of estimating vehicle movements, the following directional distributions have been assumed and are consistent with the Arup report:

- Willoughby Road northbound 29%
- Willoughby Road southbound 43%
- Artarmon Road westbound 28%.

Appendix A contains the post development traffic count forecasts.

5.3 Traffic Impact

The traffic impact was assessed for key intersections surrounding the site using SIDRA INTERSECTION. The assessment excludes traffic generated by the existing Nine Network Australia land use and includes the traffic generation estimates for the proposed residential development.

Table 5.2 presents the findings from the intersection analysis with the proposed development traffic for 510 dwellings, compared with the approved development of 400 dwellings.

Table 5.2: Operating conditions with development

Intersection	Peak	Current level of service[3]	Approved 400 dwellings				510 Dwellings *without intersection* upgrade			
			Degree of saturation (v/c)	Average delay (sec)	95th percentile queue (m)	Forecast level of service	Degree of saturation (v/c)	Average delay (sec)	95th percentile queue (m)	Forecast level of service
Willoughby Road/ Artarmon Road/ Small Street	Thursday AM	B	0.73	28	232	B	0.77	30	246	C
	Thursday PM	B	0.80	28	284	B	0.81	29	296	C
	Saturday	C	0.85	34	309	C	0.86	35	323	C
Artarmon Road/ Scott Street	Thursday AM	Not calculated	0.37	5	18	A	0.38	5	19	A
	Thursday PM	Not calculated	0.31	4	14	A	0.33	4	15	A
	Saturday	Not calculated	0.27	4	12	A	0.28	4	12	A
Artarmon Road/ Edward Street	Thursday AM	A	0.23	6	4	A	0.23	6	4	A
	Thursday PM	A	0.23	6	2	A	0.23	8	2	A
	Saturday	A	0.22	6	2	A	0.22	6	2	A
Artarmon Road/ Richmond Avenue	Thursday AM	A	0.24	6	1	A	0.24	6	1	A
	Thursday PM	A	0.22	7	2	A	0.22	7	2	A
	Saturday	A	0.21	6	1	A	0.21	6	1	A
Artarmon Road/ Wyalong Street	Thursday AM	A	0.32	6	14	A	0.32	6	14	A
	Thursday PM	A	0.30	5	14	A	0.31	5	15	A
	Saturday	A	0.28	5	13	A	0.29	5	13	A

[3] For intersections without traffic signals, the level of service is reported for the worst movement at the intersection.

The traffic forecasts for the site were added to existing 2016 traffic counts, subtracting Nine Network Australia site generation. It is noted:

- One intersection will operate at an acceptable level of service of C, under forecast traffic volumes with the proposed development of 510 dwellings
- Four intersections will operate at a level of service of A, under forecast traffic volumes with the proposed development of 510 dwellings
- Compared with the approved development of 400 dwellings, the levels of service marginally decrease from B to C on weekdays, however, intersections still operate at an acceptable level of service
- The weekday AM peak queue along Artarmon Road may approach the proposed roundabout. The SIDRA analysis shows a forecast 95th percentile queue length of 118 metres. Compared with the approved development of 400 dwellings, which has a forecast 95th percentile queue length of 111 metres, the modified development results in additional seven metres or the length of one queued car.

In summary, future traffic volume estimates in the vicinity of the site and the additional traffic generated by the proposed development are not forecast to compromise the safety or function of the surrounding road network, with the exception of potential queuing to the proposed roundabout during the AM peak period (refer to Section 5.4). The movements are to add to the existing capacity constraints of the Willoughby Road/ Artarmon Road/ Small Street intersection, and proposed upgrade works are outlined in Section 5.4.

5.4 Mitigating Measures and Intersection Works

As a consequence of previous developments in the surrounding area, existing network constraints and this development, two changes to the road network are proposed.

5.4.1 Roundabout construction

It is anticipated that there will be a requirement for the construction of a roundabout at the intersection of the access road (realigned Scott Street) and Artarmon Road (the current approval proposes two roundabouts to be constructed on Artarmon Road). This is partially a consequence of the traffic generation of the site, but the implementation of this would have positive traffic calming impacts to Artarmon Road in slowing traffic where sightlines can be considered inadequate. The roundabout will be designed in accordance with Austroads and Council requirements and would consider road geometry, existing residential accesses and minimise impacts to existing residential properties along Artarmon Road.

5.4.2 Intersection upgrade

To improve the level of service of the intersection of Willoughby Road/ Artarmon Road/ Small Street and reduce queuing on Artarmon Road on the approach to this intersection, the developer has committed to contributing a $3 million Voluntary Planning Agreement (VPA) contribution for Council's planned upgrade of the intersection. This will be subject to negotiation with Council. This proposed upgrade will provide a 100 metre right turn bay for northbound vehicles on Willoughby Road and provide a slip left turn lane out of Small Street into Willoughby Road.

Figure 5.1 provides a preliminary sketch of the proposed intersection layout for the upgrade of Willoughby Road/ Artarmon Road/ Small Street. The design of this proposed upgrade will need to

refine what was prepared for Council as part of the Willoughby Leisure Centre upgrade study and would be subject to a more detailed assessment of constraints prior to implementation.

Figure 5.1: Willoughby Road/ Artarmon Road/ Small Street GTA concept layout

Source: *Willoughby Leisure Centre Expansion – Traffic and Parking Study* (GTA Consultants, May 2012)

Table 5.3 to Table 5.5 demonstrate the existing conditions, the impact of the approved 400 dwellings, as well as the impact of 510 dwellings with and without the upgrade of Willoughby Road/ Artarmon Road/ Small Street intersection. It is to be noted that the phasing of the proposed intersection upgrade is based on existing phase times and queue lengths could be further improved through a review of phase times. This would be coordinated with Roads and Maritime as the design is progressed.

Table 5.3: Willoughby Road-Small Street/ Artarmon Road intersection level of service and average delay (seconds)

Time period	Existing	400 dwellings	510 dwelling without upgrade	510 dwellings with upgrade
Thursday AM	B (27)	B (28)	C (30)	B (26)
Thursday PM	B (28)	B (28)	C (29)	B (25)
Saturday	C (33)	C (34)	C (35)	C (35)

Table 5.4: Artarmon Road queue length (metres)

Time period	Existing	400 dwellings	510 dwelling without upgrade	510 dwellings with upgrade
Thursday AM	99	111	118	115
Thursday PM	96	91	95	92
Saturday	101	108	111	104

Table 5.5: Richmond Avenue south leg movements (delay in seconds)

Time period	Existing	400 dwellings	510 dwellings
Thursday AM	7	6	6
Thursday PM	7	7	7
Saturday	7	6	6

A SIDRA analysis of the proposed intersection layout indicates that the intersection will operate at an acceptable level of service of C or better during AM, PM and Saturday peak periods. With the increase in the number of dwellings from 400 to 510, the level of service reduces from B to C, which is attributed to minor increase in average delay of one to two seconds per vehicle. This level of increase and the forecast level of service is not considered to trigger the requirement for the upgrade of the intersection as a result of the revised concept plan.

Queuing on Artarmon Road is a key issue raised by the community. The queue lengths shown in Table 5.4 indicate 95th percentile queue lengths for the western approach to Willoughby Road. The impact of 510 dwellings with the intersection upgrade represents minor increases compared with current conditions. This increase represents an additional two to three vehicles queued, which is considered insignificant. The existing queues on Artarmon Road extend beyond the Castle Vale access. Therefore, the proposed development is unlikely to further impact access to the Castle Vale site. It is noted that the upgrade scenario assessed does not propose any phase timing changes. It is estimated that with a shorter overall phase sequence for the intersection would reduce traffic queues on Artarmon Road and further reduce the potential for impacts to the Castle Vale site and the proposed roundabout.

The Concept Plan Approval for the 400 dwellings included the implementation of roundabout control of the Artarmon Road/ Richmond Avenue intersection. Based on the analysis conducted for this assessment, the existing intersection control is satisfactory for accommodating the forecast traffic movements for the proposed development of 510 dwellings and a roundabout is not required.

Under the proposed road network for the site, the loop road from Artarmon Road to Richmond Avenue, via a new access road (formed by the realignment of Scott Street) is proposed as a two-way local road. The estimated volume of traffic on the east-west aligned section of the loop road is minimal, with the majority of traffic accessing the site via the proposed roundabout at the Artarmon Road/ Scott Street intersection. Should the access to Richmond Avenue be restricted to one-way into the proposed development, the impacts are likely to be negligible.

Sufficient resident and visitor parking is proposed to be provided within the development site. However, to mitigate the potential impact of vehicles parking within the existing residential streets as a result of the proposed development, it is recommended that the developer consults with Council to implement a resident parking scheme for the local roads. It is common practice to implement resident parking schemes adjacent to high density residential developments to minimise the impacts of on-street parking within the local road network.

Further exploration of car sharing vehicle opportunities should be examined as part of the development to further reduce the demand for parking. An SGS Economics and Planning report[4] highlighted that the benefit cost ratio (BCR) of car sharing is approximately 20:1. Evidence from this report demonstrates on average 22 community members utilising one shared vehicle.

It is understood that Willoughby Road has been tentatively identified as a strategic bus corridor, which will likely result in new routes and higher frequency of buses in the future. Further, it might be appropriate that an east-west bus link route can be provided that links the site with Artarmon railway station.

5.5 Future Transport Infrastructure

The existing bus services along Willoughby Road are often at capacity during peak periods with buses travelling towards the CBD in the AM peak observed to bypass the nearest bus stop to the development on Willoughby Road. With the introduction of the Sydney Metro and the CBD light rail extension, it is anticipated that the regional public transport services will be reviewed to provide increased capacity and improved efficiency in bus services in the study area.

The Sydney Metro will develop new stations through the north shore area. As outlined in the Environmental Impact Statement for the project, a station has tentatively been identified at the Pacific Highway and Oxley Street. This represents a distance of 2.5 kilometres from the proposed development to gain access to modern, high quality transport infrastructure. Bus services linking the community to the metro station should be a key future consideration.

5.6 Safety

The proposed roundabout intersection of the access road to the development and Artarmon Road has some geometry constraints associated with being located on a grade. These constraints will be addressed to provide a safe roundabout design that meets the sight distance requirements in accordance with Austroads. The introduction of a roundabout on Artarmon Road is likely to reduce the speed environment along Artarmon Road during off-peak periods, which would improve safety for all road users.

A pedestrian refuge may be provided on Artarmon Road, west of Edward Street, which will provide improved safety for pedestrians crossing at this location and facilitate pedestrian access to the proposed development site.

Swept path analyses have been carried out to assess the proposed vehicular access to the site and the proposed off-street parking areas. These swept path analyses confirm that vehicles likely to access the proposed development would be able to perform the required manoeuvres without encroaching oncoming traffic lanes or leaving the carriageway.

[4] http://www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0012/122502/CarShareEconomicAppraisalFINALREPORT.pdf, accessed 20 May 2016

6. Conclusion

6.1 Secretary's Environmental Assessment Requirements (SEARs)

Table 6.1 summarises the responses to the SEARs issued for the proposed development on 16 May 2016.

Table 6.1: Addressing SEARS comments

SEARs comment	GTA response
Daily and peak traffic movements likely to be generated by the development including the impact on surrounding intersections and the need for upgrades/improvements, specifically addressing Willoughby Road/Artarmon Road-Small Street	Up to 776 and 164 traffic movements can be expected to be generated by the development daily and in a peak hour respectively by the residential component. This equates to an additional 167 daily and 36 peak hour traffic movements compared with the Concept Plan Approval for 400 dwellings. The impact of this generation has been modelled on a number of surrounding intersections, including the Willoughby Road/Artarmon Road-Small Street intersection and with proposed upgrade works. The intersections are forecast to operate at an acceptable level of service of C or better for all peak periods after the development of 510 dwellings is complete. Notwithstanding the acceptable intersection performance with the traffic generated by the proposed development, the developer proposes to contribute $3 million by way of a VPA to upgrade the intersection of Willoughby Road/ Artarmon Road-Small Street.
Details of proposed accesses and the parking provision associated with the development	An access street adjacent to the existing Scott Street will be constructed and will be connected to Richmond Avenue. This street will accommodate all off street parking access associated with the development. Detailed design has not been undertaken of the car parking facilities, but in due course, these will be designed consistent with Australian Standards.
Proposed number of car parking spaces and compliance with the appropriate parking codes	The development will require the removal of some on-street parking on Artarmon Road which will be offset by new parking on Scott Street. A parking rate has been agreed to with Council (consistent with the DCP) and the Department of Planning and Environment. The development will be required to provide 674 parking spaces based on the proposed land uses proposed.
Details of service vehicle movements	Service vehicle movements have not been confirmed, but access has been considered with the roundabout on Artarmon Road able to accommodate a medium rigid vehicle turning into Scott Street. Bulk waste disposal will be preferred due to the size of the development. The development will be required to be in the basement with a minimum height clearance of 3.8 metres consistent with access requirements.

6.2 Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

i A redevelopment of the existing Nine Network Australia site on Artarmon Road in Willoughby is proposed with 510 apartments and ancillary retail space. This is an additional 110 dwellings compared with the approved development of 400 dwellings.

ii The proposed development generates a statutory parking requirement of 674 spaces, for the presently nominated land uses proposed.

iii The proposed parking supply is consistent with the rates which have been previously agreed.

iv The proposed parking layout is to be consistent with the dimensional requirements as set out in Council's Planning Scheme and Australian/New Zealand Standard for Off Street Car Parking (AS/NZS2890.1:2004 and AS/NZS2890.6:2009).

v The provision of loading facilities is to be more carefully considered as part of the future development application process.

vi The residential aspect of the site is expected to generate up to 164 and 776 vehicle movements in any peak hour and daily respectively. This equates to an additional 36 peak hour and 167 daily traffic movements compared with the Concept Plan Approval for 400 dwellings.

vii There is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development when the appropriate mitigation measures are adopted. The analysis considers the impacts of reversing the directional split of traffic during peak periods when comparing the existing Nine Network Australia with the proposed development.

viii A $3 million contribution as part of VPA will be allocated to Council's planned upgrade of the Willoughby Road/Artarmon Road-Small Street intersection. Additionally, a new roundabout is proposed for the access road to the development and Artarmon Road intersection near Scott Street.

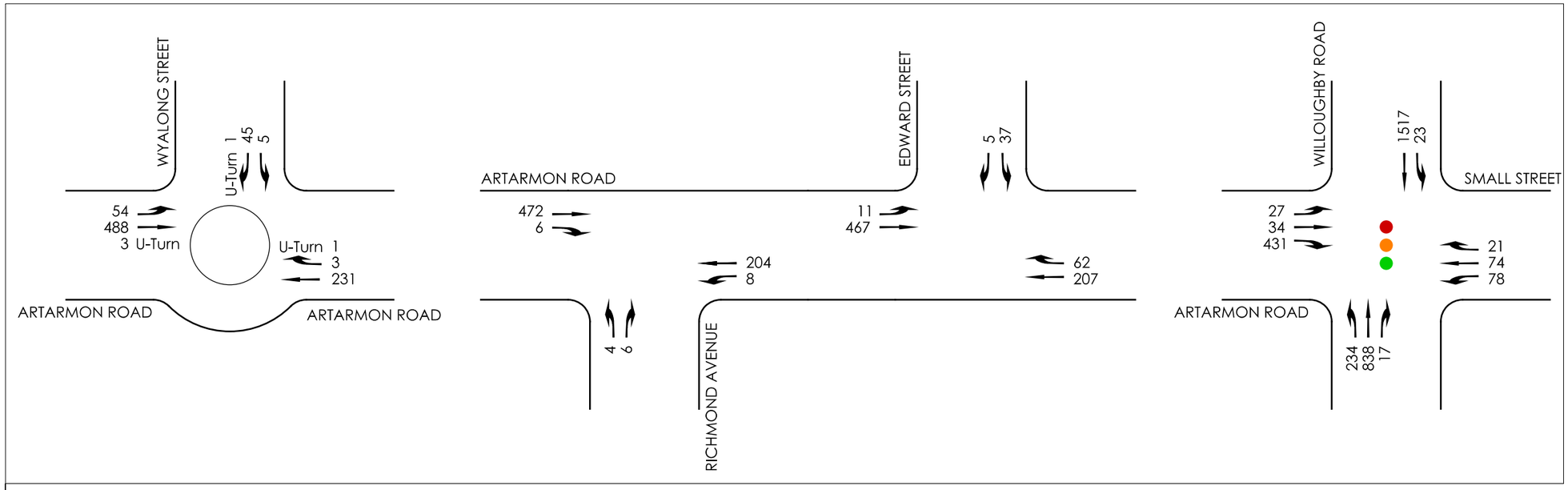
ix Any potential adverse effects from land use development proposals on road safety and operational efficiency are identified and, where necessary, mitigating road improvement works as part of the development costs are recommended to minimise these effects and retain, within practical limitations, the level of safety and operational efficiency that would have existed without the development.

x A construction management plan should be prepared for the development prior to commencement of work.

Appendix A

Existing and Forecast Traffic Volumes

THURSDAY AM PEAK HOUR



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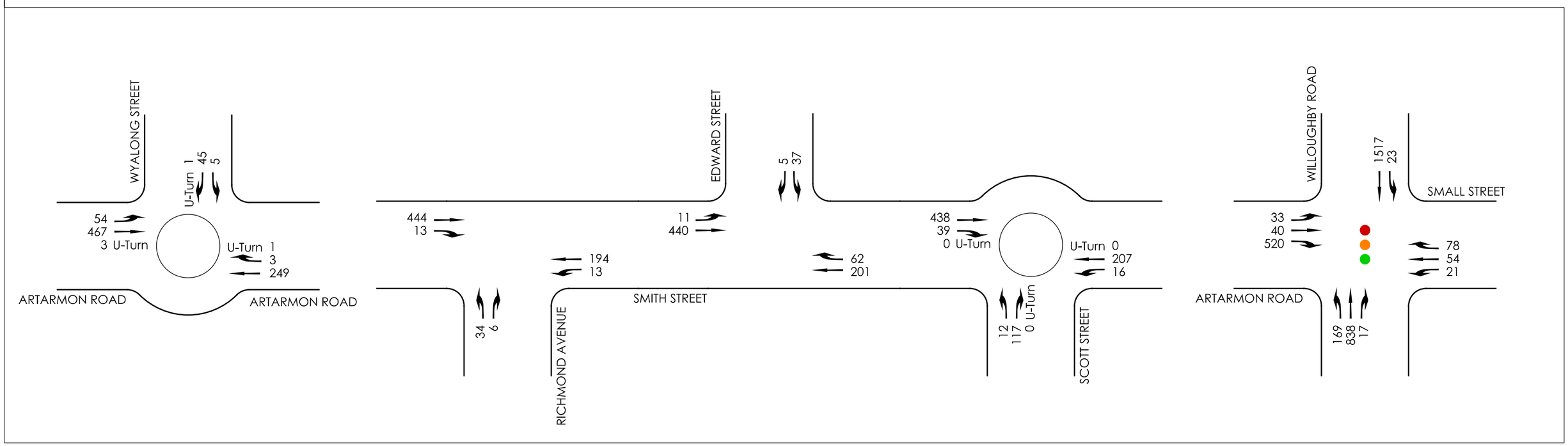
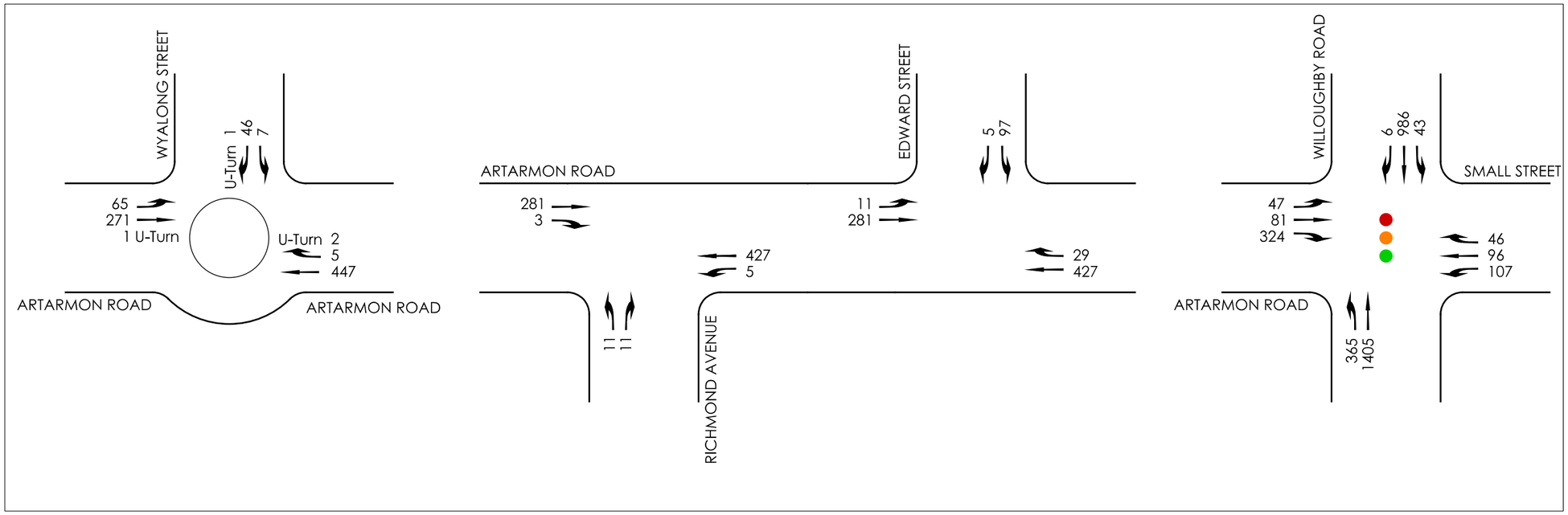
15/6/16

EXISTING TRAFFIC VOLUMES



POST DEVELOPMENT TRAFFIC VOLUMES

THURSDAY PM PEAK HOUR



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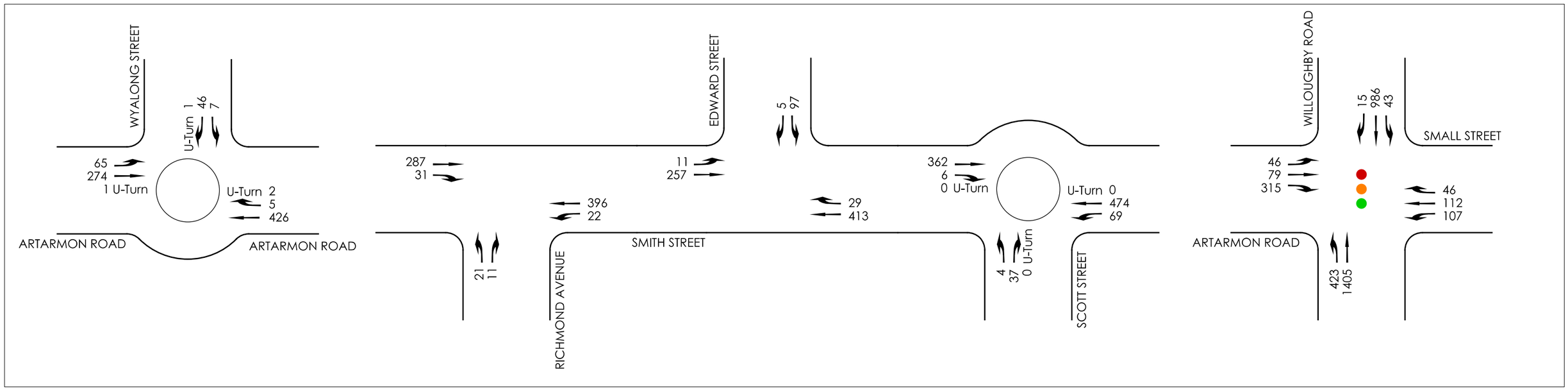
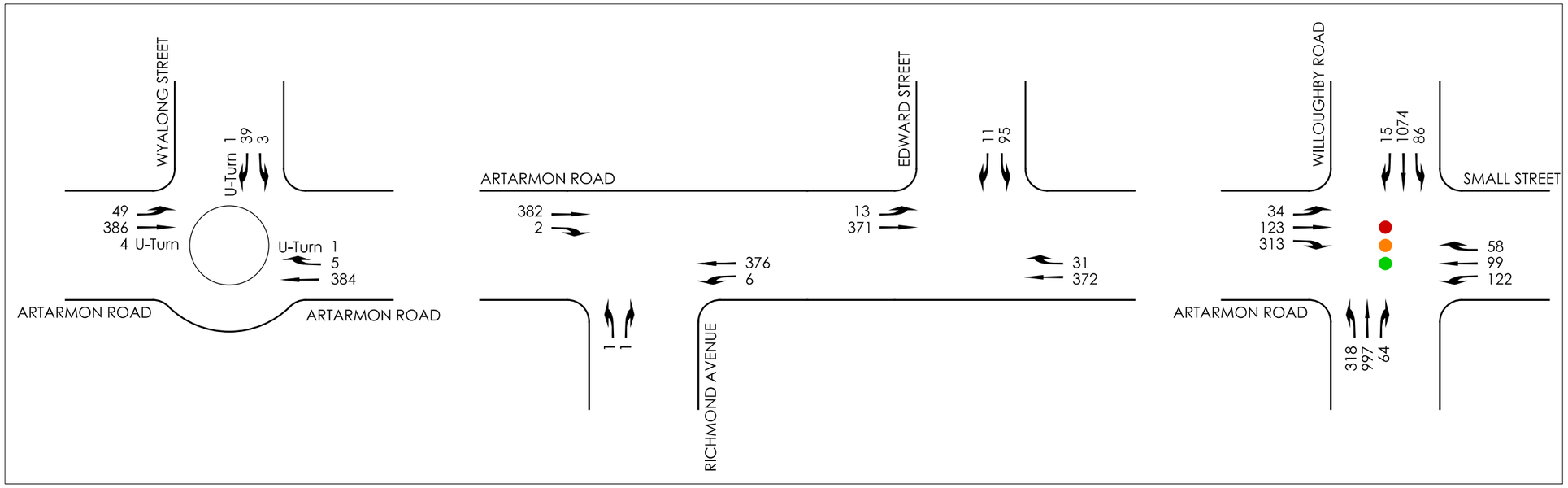
15/6/16

EXISTING TRAFFIC VOLUMES



POST DEVELOPMENT TRAFFIC VOLUMES

SATURDAY PEAK HOUR



EXISTING TRAFFIC VOLUMES

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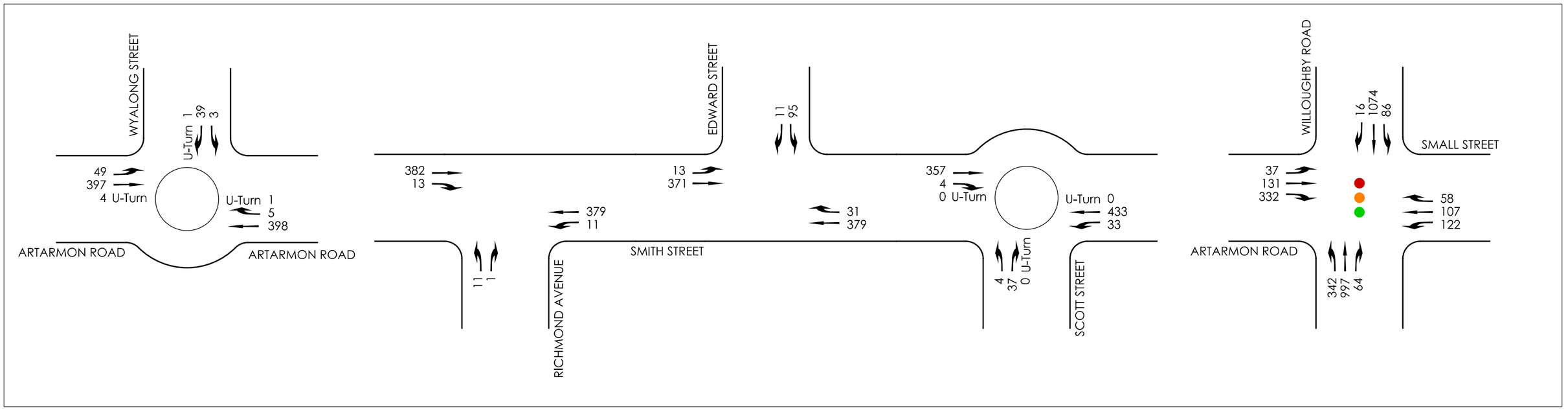


POST DEVELOPMENT TRAFFIC VOLUMES

Appendix B

SIDRA INTERSECTION Results

MOVEMENT SUMMARY

Site: Edward St/ Artarmon Rd - Sat Midday 400

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Artarmon Rd											
11	T1	377	0.8	0.220	0.2	LOS A	0.3	2.2	0.10	0.04	49.5
12	R2	31	0.0	0.220	6.3	LOS A	0.3	2.2	0.10	0.04	48.8
Approach		407	0.8	0.220	0.7	NA	0.3	2.2	0.10	0.04	49.4
North: Edward St											
1	L2	95	0.0	0.082	5.9	LOS A	0.3	2.2	0.41	0.61	45.7
3	R2	11	0.0	0.018	8.5	LOS A	0.1	0.4	0.55	0.73	44.0
Approach		105	0.0	0.082	6.2	LOS A	0.3	2.2	0.43	0.62	45.5
West: Artarmon Rd											
4	L2	13	0.0	0.197	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
5	T1	371	0.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		383	0.0	0.197	0.2	NA	0.0	0.0	0.00	0.02	49.9
All Vehicles		896	0.4	0.220	1.1	NA	0.3	2.2	0.09	0.10	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Edward St/ Artarmon Rd - Sat Midday 510

Giveway / Yield (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
East: Artarmon Rd											
11	T1	379	0.8	0.221	0.2	LOS A	0.3	2.2	0.10	0.04	49.5
12	R2	31	0.0	0.221	6.3	LOS A	0.3	2.2	0.10	0.04	48.8
Approach		409	0.8	0.221	0.7	NA	0.3	2.2	0.10	0.04	49.4
North: Edward St											
1	L2	95	0.0	0.082	5.9	LOS A	0.3	2.2	0.41	0.61	45.7
3	R2	11	0.0	0.018	8.5	LOS A	0.1	0.4	0.55	0.73	44.0
Approach		105	0.0	0.082	6.2	LOS A	0.3	2.2	0.43	0.62	45.5
West: Artarmon Rd											
4	L2	13	0.0	0.197	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
5	T1	371	0.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		383	0.0	0.197	0.2	NA	0.0	0.0	0.00	0.02	49.9
All Vehicles		898	0.4	0.221	1.1	NA	0.3	2.2	0.09	0.10	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Edward St/ Artarmon Rd - Sat Midday Ex

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Artarmon Rd											
11	T1	372	0.8	0.217	0.2	LOS A	0.3	2.2	0.10	0.04	49.5
12	R2	31	0.0	0.217	6.3	LOS A	0.3	2.2	0.10	0.04	48.8
Approach		402	0.8	0.217	0.7	NA	0.3	2.2	0.10	0.04	49.4
North: Edward St											
1	L2	95	0.0	0.082	5.9	LOS A	0.3	2.2	0.41	0.61	45.7
3	R2	11	0.0	0.018	8.5	LOS A	0.1	0.4	0.55	0.72	44.0
Approach		105	0.0	0.082	6.2	LOS A	0.3	2.2	0.43	0.62	45.5
West: Artarmon Rd											
4	L2	13	0.0	0.197	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
5	T1	371	0.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		383	0.0	0.197	0.2	NA	0.0	0.0	0.00	0.02	49.9
All Vehicles		891	0.4	0.217	1.1	NA	0.3	2.2	0.09	0.10	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Edward St/ Artarmon Rd - Thurs AM 400

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Artarmon Rd											
11	T1	198	0.5	0.157	0.8	LOS A	0.6	4.0	0.29	0.15	48.5
12	R2	62	0.0	0.157	6.5	LOS A	0.6	4.0	0.29	0.15	47.8
Approach		260	0.4	0.157	2.2	NA	0.6	4.0	0.29	0.15	48.3
North: Edward St											
1	L2	37	0.0	0.034	6.1	LOS A	0.1	0.9	0.44	0.61	45.6
3	R2	5	0.0	0.008	7.9	LOS A	0.0	0.2	0.51	0.67	44.3
Approach		42	0.0	0.034	6.4	LOS A	0.1	0.9	0.45	0.61	45.4
West: Artarmon Rd											
4	L2	11	20.0	0.232	4.8	LOS A	0.0	0.0	0.00	0.01	49.1
5	T1	440	0.2	0.232	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		451	0.7	0.232	0.1	NA	0.0	0.0	0.00	0.01	49.9
All Vehicles		753	0.6	0.232	1.2	NA	0.6	4.0	0.12	0.09	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Edward St/ Artarmon Rd - Thurs AM 510

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Artarmon Rd											
11	T1	201	0.5	0.159	0.8	LOS A	0.6	4.1	0.28	0.15	48.5
12	R2	62	0.0	0.159	6.5	LOS A	0.6	4.1	0.28	0.15	47.8
Approach		263	0.4	0.159	2.1	NA	0.6	4.1	0.28	0.15	48.3
North: Edward St											
1	L2	37	0.0	0.034	6.1	LOS A	0.1	0.9	0.44	0.61	45.6
3	R2	5	0.0	0.008	7.9	LOS A	0.0	0.2	0.51	0.67	44.3
Approach		42	0.0	0.034	6.4	LOS A	0.1	0.9	0.45	0.62	45.4
West: Artarmon Rd											
4	L2	11	20.0	0.232	4.8	LOS A	0.0	0.0	0.00	0.01	49.1
5	T1	440	0.2	0.232	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		451	0.7	0.232	0.1	NA	0.0	0.0	0.00	0.01	49.9
All Vehicles		756	0.6	0.232	1.2	NA	0.6	4.1	0.12	0.09	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Edward St/ Artarmon Rd - Thurs AM Ex

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Artarmon Rd											
11	T1	207	0.5	0.164	0.9	LOS A	0.6	4.2	0.29	0.15	48.5
12	R2	62	0.0	0.164	6.7	LOS A	0.6	4.2	0.29	0.15	47.8
Approach		269	0.4	0.164	2.2	NA	0.6	4.2	0.29	0.15	48.3
North: Edward St											
1	L2	37	0.0	0.036	6.3	LOS A	0.1	0.9	0.45	0.62	45.6
3	R2	5	0.0	0.009	8.2	LOS A	0.0	0.2	0.53	0.68	44.1
Approach		42	0.0	0.036	6.5	LOS A	0.1	0.9	0.46	0.63	45.4
West: Artarmon Rd											
4	L2	11	20.0	0.247	4.8	LOS A	0.0	0.0	0.00	0.01	49.1
5	T1	467	0.2	0.247	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		478	0.7	0.247	0.1	NA	0.0	0.0	0.00	0.01	49.9
All Vehicles		789	0.5	0.247	1.2	NA	0.6	4.2	0.12	0.09	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Edward St/ Artarmon Rd - Thurs PM 400

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Artarmon Rd											
11	T1	408	0.3	0.231	0.1	LOS A	0.3	1.9	0.07	0.04	49.6
12	R2	29	0.0	0.231	5.7	LOS A	0.3	1.9	0.07	0.04	48.9
Approach		438	0.2	0.231	0.5	NA	0.3	1.9	0.07	0.04	49.5
North: Edward St											
1	L2	97	0.0	0.074	5.4	LOS A	0.3	2.1	0.33	0.56	45.8
3	R2	5	0.0	0.008	7.8	LOS A	0.0	0.2	0.51	0.67	44.3
Approach		102	0.0	0.074	5.5	LOS A	0.3	2.1	0.34	0.56	45.8
West: Artarmon Rd											
4	L2	11	0.0	0.137	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
5	T1	256	0.0	0.137	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		266	0.0	0.137	0.2	NA	0.0	0.0	0.00	0.02	49.8
All Vehicles		806	0.1	0.231	1.0	NA	0.3	2.1	0.08	0.10	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Edward St/ Artarmon Rd - Thurs PM 510

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Artarmon Rd											
11	T1	413	0.3	0.234	0.1	LOS A	0.3	1.9	0.07	0.04	49.6
12	R2	29	0.0	0.234	5.7	LOS A	0.3	1.9	0.07	0.04	48.9
Approach		442	0.2	0.234	0.5	NA	0.3	1.9	0.07	0.04	49.5
North: Edward St											
1	L2	97	0.0	0.074	5.4	LOS A	0.3	2.1	0.34	0.56	45.8
3	R2	5	0.0	0.008	7.9	LOS A	0.0	0.2	0.51	0.67	44.3
Approach		102	0.0	0.074	5.5	LOS A	0.3	2.1	0.34	0.56	45.8
West: Artarmon Rd											
4	L2	11	0.0	0.138	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
5	T1	257	0.8	0.138	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		267	0.8	0.138	0.2	NA	0.0	0.0	0.00	0.02	49.8
All Vehicles		812	0.4	0.234	1.0	NA	0.3	2.1	0.08	0.10	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
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: Edward St/ Artarmon Rd - Thurs PM Ex

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Artarmon Rd											
11	T1	427	0.2	0.242	0.1	LOS A	0.3	1.9	0.07	0.04	49.6
12	R2	29	0.0	0.242	5.8	LOS A	0.3	1.9	0.07	0.04	48.9
Approach		457	0.2	0.242	0.5	NA	0.3	1.9	0.07	0.04	49.5
North: Edward St											
1	L2	97	0.0	0.076	5.5	LOS A	0.3	2.1	0.35	0.57	45.8
3	R2	5	0.0	0.009	8.2	LOS A	0.0	0.2	0.53	0.68	44.1
Approach		102	0.0	0.076	5.6	LOS A	0.3	2.1	0.36	0.57	45.7
West: Artarmon Rd											
4	L2	11	0.0	0.150	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
5	T1	281	0.7	0.150	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		292	0.7	0.150	0.2	NA	0.0	0.0	0.00	0.02	49.8
All Vehicles		851	0.4	0.242	1.0	NA	0.3	2.1	0.08	0.10	49.2

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Sat Midday 400

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Richmond Ave											
1	L2	8	0.0	0.007	5.8	LOS A	0.0	0.2	0.40	0.55	45.7
3	R2	1	0.0	0.002	8.2	LOS A	0.0	0.0	0.54	0.62	44.1
Approach		9	0.0	0.007	6.1	LOS A	0.0	0.2	0.41	0.55	45.5
East: Artarmon Rd											
4	L2	9	0.0	0.200	4.6	LOS A	0.0	0.0	0.00	0.01	49.4
5	T1	378	0.8	0.200	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		387	0.8	0.200	0.1	NA	0.0	0.0	0.00	0.01	49.9
West: Artarmon Rd											
11	T1	382	0.0	0.205	0.1	LOS A	0.1	0.8	0.04	0.02	49.8
12	R2	11	0.0	0.205	6.3	LOS A	0.1	0.8	0.04	0.02	49.1
Approach		393	0.0	0.205	0.2	NA	0.1	0.8	0.04	0.02	49.8
All Vehicles		789	0.4	0.205	0.3	NA	0.1	0.8	0.02	0.02	49.8

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Sat Midday 510

Giveway / Yield (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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Richmond Ave											
1	L2	11	0.0	0.009	5.8	LOS A	0.0	0.2	0.40	0.55	45.7
3	R2	1	0.0	0.002	8.3	LOS A	0.0	0.0	0.54	0.62	44.1
Approach		12	0.0	0.009	6.0	LOS A	0.0	0.2	0.41	0.56	45.5
East: Artarmon Rd											
4	L2	11	0.0	0.201	4.6	LOS A	0.0	0.0	0.00	0.01	49.4
5	T1	379	0.8	0.201	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		389	0.8	0.201	0.1	NA	0.0	0.0	0.00	0.01	49.9
West: Artarmon Rd											
11	T1	382	0.0	0.207	0.1	LOS A	0.1	0.9	0.04	0.02	49.8
12	R2	13	0.0	0.207	6.3	LOS A	0.1	0.9	0.04	0.02	49.1
Approach		395	0.0	0.207	0.3	NA	0.1	0.9	0.04	0.02	49.8
All Vehicles		796	0.4	0.207	0.3	NA	0.1	0.9	0.03	0.02	49.7

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Sat Midday Ex

Giveway / Yield (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: Richmond Ave											
1	L2	1	0.0	0.001	5.7	LOS A	0.0	0.0	0.40	0.50	45.7
3	R2	1	0.0	0.002	8.1	LOS A	0.0	0.0	0.53	0.62	44.2
Approach		2	0.0	0.002	6.9	LOS A	0.0	0.0	0.47	0.56	44.9
East: Artarmon Rd											
4	L2	6	0.0	0.197	4.6	LOS A	0.0	0.0	0.00	0.01	49.4
5	T1	376	0.8	0.197	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		382	0.8	0.197	0.1	NA	0.0	0.0	0.00	0.01	49.9
West: Artarmon Rd											
11	T1	382	0.0	0.198	0.0	LOS A	0.0	0.2	0.01	0.00	50.0
12	R2	2	0.0	0.198	6.3	LOS A	0.0	0.2	0.01	0.00	49.3
Approach		384	0.0	0.198	0.0	NA	0.0	0.2	0.01	0.00	50.0
All Vehicles		768	0.4	0.198	0.1	NA	0.0	0.2	0.00	0.01	49.9

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Thurs AM 400

Giveway / Yield (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: Richmond Ave											
1	L2	27	0.0	0.020	5.1	LOS A	0.1	0.5	0.27	0.51	46.0
3	R2	6	0.0	0.009	7.6	LOS A	0.0	0.2	0.49	0.66	44.5
Approach		34	0.0	0.020	5.6	LOS A	0.1	0.5	0.31	0.54	45.7
East: Artarmon Rd											
4	L2	12	0.0	0.105	4.6	LOS A	0.0	0.0	0.00	0.03	49.3
5	T1	192	0.5	0.105	0.0	LOS A	0.0	0.0	0.00	0.03	49.8
Approach		203	0.5	0.105	0.3	NA	0.0	0.0	0.00	0.03	49.8
West: Artarmon Rd											
11	T1	444	0.7	0.237	0.0	LOS A	0.1	0.7	0.02	0.01	49.9
12	R2	12	0.0	0.237	5.4	LOS A	0.1	0.7	0.02	0.01	49.2
Approach		456	0.7	0.237	0.2	NA	0.1	0.7	0.02	0.01	49.8
All Vehicles		693	0.6	0.237	0.5	NA	0.1	0.7	0.03	0.04	49.6

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Thurs AM 510

Giveway / Yield (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: Richmond Ave											
1	L2	34	0.0	0.024	5.1	LOS A	0.1	0.7	0.28	0.52	46.0
3	R2	6	0.0	0.010	7.6	LOS A	0.0	0.2	0.49	0.66	44.5
Approach		40	0.0	0.024	5.5	LOS A	0.1	0.7	0.31	0.54	45.7
East: Artarmon Rd											
4	L2	13	0.0	0.106	4.6	LOS A	0.0	0.0	0.00	0.03	49.3
5	T1	194	0.5	0.106	0.0	LOS A	0.0	0.0	0.00	0.03	49.8
Approach		206	0.5	0.106	0.3	NA	0.0	0.0	0.00	0.03	49.8
West: Artarmon Rd											
11	T1	444	0.7	0.238	0.0	LOS A	0.1	0.8	0.02	0.02	49.8
12	R2	13	0.0	0.238	5.4	LOS A	0.1	0.8	0.02	0.02	49.1
Approach		457	0.7	0.238	0.2	NA	0.1	0.8	0.02	0.02	49.8
All Vehicles		703	0.6	0.238	0.5	NA	0.1	0.8	0.03	0.05	49.6

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Thurs AM Ex

Giveway / Yield (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: Richmond Ave											
1	L2	4	0.0	0.003	5.1	LOS A	0.0	0.1	0.28	0.49	46.0
3	R2	6	0.0	0.010	7.8	LOS A	0.0	0.2	0.51	0.67	44.3
Approach		11	0.0	0.010	6.7	LOS A	0.0	0.2	0.41	0.60	45.0
East: Artarmon Rd											
4	L2	8	0.0	0.110	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
5	T1	204	0.5	0.110	0.0	LOS A	0.0	0.0	0.00	0.02	49.9
Approach		213	0.5	0.110	0.2	NA	0.0	0.0	0.00	0.02	49.8
West: Artarmon Rd											
11	T1	472	0.7	0.247	0.0	LOS A	0.1	0.4	0.01	0.01	49.9
12	R2	6	0.0	0.247	5.5	LOS A	0.1	0.4	0.01	0.01	49.2
Approach		478	0.7	0.247	0.1	NA	0.1	0.4	0.01	0.01	49.9
All Vehicles		701	0.6	0.247	0.2	NA	0.1	0.4	0.01	0.02	49.8

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Thurs PM 400

Giveway / Yield (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: Richmond Ave											
1	L2	19	0.0	0.017	6.0	LOS A	0.1	0.5	0.43	0.58	45.6
3	R2	11	0.0	0.017	8.2	LOS A	0.1	0.4	0.53	0.71	44.1
Approach		29	0.0	0.017	6.8	LOS A	0.1	0.5	0.47	0.63	45.1
East: Artarmon Rd											
4	L2	18	0.0	0.229	4.6	LOS A	0.0	0.0	0.00	0.02	49.4
5	T1	427	0.2	0.229	0.0	LOS A	0.0	0.0	0.00	0.02	49.8
Approach		445	0.2	0.229	0.2	NA	0.0	0.0	0.00	0.02	49.8
West: Artarmon Rd											
11	T1	281	0.7	0.166	0.3	LOS A	0.3	1.8	0.11	0.05	49.4
12	R2	24	0.0	0.166	6.5	LOS A	0.3	1.8	0.11	0.05	48.7
Approach		305	0.7	0.166	0.8	NA	0.3	1.8	0.11	0.05	49.4
All Vehicles		780	0.4	0.229	0.7	NA	0.3	1.8	0.06	0.05	49.5

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Thurs PM 510

Giveway / Yield (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: Richmond Ave											
1	L2	21	0.0	0.019	5.9	LOS A	0.1	0.5	0.41	0.57	45.7
3	R2	11	0.0	0.017	8.1	LOS A	0.1	0.4	0.52	0.70	44.2
Approach		32	0.0	0.019	6.6	LOS A	0.1	0.5	0.45	0.62	45.2
East: Artarmon Rd											
4	L2	22	0.0	0.215	4.6	LOS A	0.0	0.0	0.00	0.03	49.3
5	T1	396	0.3	0.215	0.0	LOS A	0.0	0.0	0.00	0.03	49.8
Approach		418	0.3	0.215	0.3	NA	0.0	0.0	0.00	0.03	49.8
West: Artarmon Rd											
11	T1	287	0.7	0.174	0.3	LOS A	0.3	2.1	0.12	0.06	49.3
12	R2	31	0.0	0.174	6.4	LOS A	0.3	2.1	0.12	0.06	48.7
Approach		318	0.7	0.174	0.9	NA	0.3	2.1	0.12	0.06	49.3
All Vehicles		767	0.4	0.215	0.8	NA	0.3	2.1	0.07	0.06	49.4

Level of Service (LOS) Method: Delay (RTA NSW).
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: Richmond Ave/ Artarmon Rd - Thurs PM Ex

Giveway / Yield (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: Richmond Ave											
1	L2	11	0.0	0.010	6.0	LOS A	0.0	0.3	0.43	0.57	45.6
3	R2	11	0.0	0.017	8.0	LOS A	0.1	0.4	0.52	0.70	44.2
Approach		21	0.0	0.017	7.0	LOS A	0.1	0.4	0.47	0.63	44.9
East: Artarmon Rd											
4	L2	5	0.0	0.222	4.6	LOS A	0.0	0.0	0.00	0.01	49.4
5	T1	427	0.2	0.222	0.0	LOS A	0.0	0.0	0.00	0.01	49.9
Approach		433	0.2	0.222	0.1	NA	0.0	0.0	0.00	0.01	49.9
West: Artarmon Rd											
11	T1	281	0.7	0.148	0.0	LOS A	0.0	0.2	0.01	0.01	49.9
12	R2	3	0.0	0.148	6.4	LOS A	0.0	0.2	0.01	0.01	49.2
Approach		284	0.7	0.148	0.1	NA	0.0	0.2	0.01	0.01	49.9
All Vehicles		738	0.4	0.222	0.3	NA	0.1	0.4	0.02	0.02	49.8

Level of Service (LOS) Method: Delay (RTA NSW).
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: Scott St/ Artarmon Rd - Post Dev Sat Midday 400

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Scott St											
1	L2	3	0.0	0.034	5.7	LOS A	0.2	1.1	0.50	0.65	44.3
3	R2	28	0.0	0.034	9.1	LOS A	0.2	1.1	0.50	0.65	44.9
Approach		32	0.0	0.034	8.8	LOS A	0.2	1.1	0.50	0.65	44.8
East: Artarmon Rd											
4	L2	25	0.0	0.272	3.6	LOS A	1.7	11.7	0.04	0.40	47.0
5	T1	432	0.7	0.272	3.6	LOS A	1.7	11.7	0.04	0.40	47.9
Approach		457	0.7	0.272	3.6	LOS A	1.7	11.7	0.04	0.40	47.9
West: Artarmon Rd											
11	T1	357	0.0	0.243	3.7	LOS A	1.6	11.1	0.15	0.40	47.5
12	R2	3	0.0	0.243	7.0	LOS A	1.6	11.1	0.15	0.40	47.4
Approach		360	0.0	0.243	3.8	LOS A	1.6	11.1	0.15	0.40	47.5
All Vehicles		848	0.4	0.272	3.9	LOS A	1.7	11.7	0.10	0.41	47.6

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Scott St/ Artarmon Rd - Post Dev Sat Midday 510

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Scott St											
1	L2	4	0.0	0.044	5.8	LOS A	0.2	1.5	0.50	0.66	44.3
3	R2	37	0.0	0.044	9.1	LOS A	0.2	1.5	0.50	0.66	44.9
Approach		41	0.0	0.044	8.8	LOS A	0.2	1.5	0.50	0.66	44.8
East: Artarmon Rd											
4	L2	33	0.0	0.279	3.6	LOS A	1.7	12.2	0.04	0.40	47.0
5	T1	433	0.7	0.279	3.6	LOS A	1.7	12.2	0.04	0.40	47.9
Approach		465	0.7	0.279	3.6	LOS A	1.7	12.2	0.04	0.40	47.8
West: Artarmon Rd											
11	T1	357	0.0	0.250	3.8	LOS A	1.6	11.5	0.18	0.40	47.5
12	R2	4	0.0	0.250	7.1	LOS A	1.6	11.5	0.18	0.40	47.3
Approach		361	0.0	0.250	3.8	LOS A	1.6	11.5	0.18	0.40	47.5
All Vehicles		867	0.4	0.279	3.9	LOS A	1.7	12.2	0.12	0.41	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Scott St/ Artarmon Rd - Post Dev Thurs AM 400

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Scott St											
1	L2	9	0.0	0.092	4.6	LOS A	0.5	3.2	0.37	0.62	44.7
3	R2	92	0.0	0.092	8.0	LOS A	0.5	3.2	0.37	0.62	45.3
Approach		101	0.0	0.092	7.6	LOS A	0.5	3.2	0.37	0.62	45.2
East: Artarmon Rd											
4	L2	13	0.0	0.157	3.7	LOS A	0.9	6.2	0.16	0.40	46.7
5	T1	206	0.5	0.157	3.8	LOS A	0.9	6.2	0.16	0.40	47.5
Approach		219	0.5	0.157	3.8	LOS A	0.9	6.2	0.16	0.40	47.5
West: Artarmon Rd											
11	T1	447	0.5	0.369	4.2	LOS A	2.6	18.2	0.33	0.46	46.9
12	R2	39	0.0	0.369	7.5	LOS A	2.6	18.2	0.33	0.46	46.7
Approach		486	0.4	0.369	4.4	LOS A	2.6	18.2	0.33	0.46	46.9
All Vehicles		806	0.4	0.369	4.7	LOS A	2.6	18.2	0.29	0.46	46.8

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Scott St/ Artarmon Rd - Post Dev Thurs AM 510

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Scott St											
1	L2	12	0.0	0.117	4.7	LOS A	0.6	4.2	0.38	0.62	44.7
3	R2	117	0.0	0.117	8.0	LOS A	0.6	4.2	0.38	0.62	45.3
Approach		128	0.0	0.117	7.7	LOS A	0.6	4.2	0.38	0.62	45.2
East: Artarmon Rd											
4	L2	16	0.0	0.160	3.7	LOS A	0.9	6.4	0.17	0.40	46.7
5	T1	207	0.5	0.160	3.8	LOS A	0.9	6.4	0.17	0.40	47.5
Approach		223	0.5	0.160	3.8	LOS A	0.9	6.4	0.17	0.40	47.5
West: Artarmon Rd											
11	T1	438	0.5	0.376	4.4	LOS A	2.6	18.5	0.37	0.48	46.7
12	R2	39	0.0	0.376	7.6	LOS A	2.6	18.5	0.37	0.48	46.6
Approach		477	0.4	0.376	4.6	LOS A	2.6	18.5	0.37	0.48	46.7
All Vehicles		828	0.4	0.376	4.9	LOS A	2.6	18.5	0.32	0.48	46.7

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Scott St/ Artarmon Rd - Post Dev Thurs PM 400

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Scott St											
1	L2	3	0.0	0.035	6.0	LOS A	0.2	1.2	0.52	0.65	44.2
3	R2	28	0.0	0.035	9.3	LOS A	0.2	1.2	0.52	0.65	44.8
Approach		32	0.0	0.035	9.0	LOS A	0.2	1.2	0.52	0.65	44.7
East: Artarmon Rd											
4	L2	54	0.0	0.314	3.6	LOS A	2.0	14.1	0.05	0.40	47.0
5	T1	469	0.2	0.314	3.6	LOS A	2.0	14.1	0.05	0.40	47.9
Approach		523	0.2	0.314	3.6	LOS A	2.0	14.1	0.05	0.40	47.8
West: Artarmon Rd											
11	T1	396	0.5	0.270	3.7	LOS A	1.8	12.9	0.16	0.40	47.5
12	R2	5	0.0	0.270	7.0	LOS A	1.8	12.9	0.16	0.40	47.3
Approach		401	0.5	0.270	3.8	LOS A	1.8	12.9	0.16	0.40	47.5
All Vehicles		956	0.3	0.314	3.9	LOS A	2.0	14.1	0.11	0.41	47.6

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Scott St/ Artarmon Rd - Post Dev Thurs PM 510

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Scott St											
1	L2	4	0.0	0.045	6.0	LOS A	0.2	1.6	0.53	0.67	44.1
3	R2	37	0.0	0.045	9.4	LOS A	0.2	1.6	0.53	0.67	44.7
Approach		41	0.0	0.045	9.0	LOS A	0.2	1.6	0.53	0.67	44.7
East: Artarmon Rd											
4	L2	69	0.0	0.328	3.6	LOS A	2.2	15.1	0.06	0.41	47.0
5	T1	474	0.2	0.328	3.6	LOS A	2.2	15.1	0.06	0.41	47.9
Approach		543	0.2	0.328	3.6	LOS A	2.2	15.1	0.06	0.41	47.7
West: Artarmon Rd											
11	T1	362	0.6	0.255	3.8	LOS A	1.7	11.9	0.18	0.40	47.4
12	R2	6	0.0	0.255	7.1	LOS A	1.7	11.9	0.18	0.40	47.3
Approach		368	0.6	0.255	3.8	LOS A	1.7	11.9	0.18	0.40	47.4
All Vehicles		953	0.3	0.328	3.9	LOS A	2.2	15.1	0.13	0.41	47.5

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Willoughby Rd/ Artarmon Rd/ Small St - Post Dev Sat Midday - with upgrades 510

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	342	0.6	0.782	33.0	LOS C	34.3	243.1	0.90	0.85	37.4
2	T1	997	2.0	0.782	26.4	LOS B	34.3	243.1	0.85	0.78	41.4
3	R2	64	1.6	0.534	54.8	LOS D	3.6	25.7	0.94	0.80	30.0
Approach		1403	1.7	0.782	29.3	LOS C	34.3	243.1	0.87	0.80	39.7
East: Small St											
4	L2	473	0.2	0.778	37.8	LOS C	23.1	161.8	0.96	1.01	34.7
5	T1	107	0.0	0.287	45.0	LOS D	5.4	37.9	0.90	0.71	31.0
6	R2	58	0.0	0.163	48.4	LOS D	2.8	19.9	0.87	0.74	31.1
Approach		638	0.2	0.778	40.0	LOS C	23.1	161.8	0.94	0.94	33.6
North: Willoughby Rd											
7	L2	86	0.0	0.708	31.5	LOS C	29.8	212.0	0.85	0.78	38.8
8	T1	1074	2.3	0.708	28.6	LOS C	29.8	212.0	0.87	0.79	40.6
9	R2	16	0.0	0.708	37.2	LOS C	25.3	180.2	0.89	0.80	36.8
Approach		1176	2.1	0.708	28.9	LOS C	29.8	212.0	0.87	0.79	40.4
West: Artarmon Rd											
10	L2	37	0.0	0.759	58.5	LOS E	14.8	104.0	1.00	0.90	29.3
11	T1	131	0.0	0.759	53.9	LOS D	14.8	104.0	1.00	0.90	28.3
12	R2	332	0.3	0.759	58.6	LOS E	14.8	104.0	1.00	0.89	28.9
Approach		499	0.2	0.759	57.4	LOS E	14.8	104.0	1.00	0.89	28.8
All Vehicles		3716	1.3	0.782	34.8	LOS C	34.3	243.1	0.90	0.83	36.9

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	46	19.9	LOS B	0.1	0.1	0.58	0.58
P3	North Full Crossing	114	52.5	LOS E	0.4	0.4	0.94	0.94
P4	West Full Crossing	33	21.6	LOS C	0.1	0.1	0.60	0.60
All Pedestrians		193	39.4	LOS D			0.79	0.79

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: Willoughby Rd/ Artarmon Rd/ Small St - Post Dev Thurs AM - with upgrades 510

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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: Willoughby Rd											
1	L2	169	1.2	0.327	20.2	LOS B	10.6	76.1	0.57	0.62	43.0
2	T1	838	5.2	0.646	17.6	LOS B	25.5	186.2	0.69	0.65	46.2
3	R2	17	0.0	0.162	43.8	LOS D	0.8	5.6	0.79	0.72	32.9
Approach		1024	4.4	0.646	18.5	LOS B	25.5	186.2	0.67	0.64	45.4
East: Small St											
4	L2	78	2.7	0.249	23.7	LOS B	2.7	19.5	0.66	0.71	39.9
5	T1	54	2.0	0.558	64.6	LOS E	3.3	23.5	1.00	0.76	26.6
6	R2	21	5.0	0.235	67.5	LOS E	1.3	9.2	0.99	0.70	26.7
Approach		153	2.8	0.558	44.1	LOS D	3.3	23.5	0.83	0.73	32.1
North: Willoughby Rd											
7	L2	23	9.1	0.717	25.8	LOS B	32.4	235.1	0.79	0.73	41.5
8	T1	1517	4.2	0.717	20.1	LOS B	32.5	235.4	0.79	0.73	45.1
Approach		1540	4.2	0.717	20.2	LOS B	32.5	235.4	0.79	0.73	45.0
West: Artarmon Rd											
10	L2	33	0.0	0.726	51.3	LOS D	16.4	115.1	0.97	0.86	30.6
11	T1	40	0.0	0.726	46.7	LOS D	16.4	115.1	0.97	0.86	29.6
12	R2	520	0.4	0.726	51.3	LOS D	16.4	115.1	0.97	0.86	30.6
Approach		593	0.4	0.726	51.0	LOS D	16.4	115.1	0.97	0.86	30.5
All Vehicles		3309	3.5	0.726	26.3	LOS B	32.5	235.4	0.79	0.72	40.9

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	13	14.5	LOS B	0.0	0.0	0.49	0.49
P3	North Full Crossing	84	46.1	LOS E	0.3	0.3	0.88	0.88
P4	West Full Crossing	41	16.0	LOS B	0.1	0.1	0.52	0.52
All Pedestrians		138	34.3	LOS D			0.74	0.74

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: Willoughby Rd/ Artarmon Rd/ Small St - Post Dev Thurs PM - with upgrades 510

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	423	0.0	0.778	23.5	LOS B	38.6	272.4	0.80	0.80	41.5
2	T1	1405	1.8	0.778	17.9	LOS B	38.8	276.1	0.80	0.76	45.9
3	R2	1	100.0	0.011	32.0	LOS C	0.0	0.5	0.64	0.62	38.0
Approach		1829	1.4	0.778	19.2	LOS B	38.8	276.1	0.80	0.77	44.8
East: Small St											
4	L2	107	0.0	0.211	16.4	LOS B	2.9	20.4	0.54	0.68	43.3
5	T1	112	0.0	0.763	64.1	LOS E	7.0	48.7	1.00	0.88	26.7
6	R2	46	0.0	0.333	64.0	LOS E	2.7	18.9	0.99	0.74	27.4
Approach		265	0.0	0.763	44.8	LOS D	7.0	48.7	0.81	0.78	31.8
North: Willoughby Rd											
7	L2	43	0.0	0.514	19.2	LOS B	19.6	139.8	0.61	0.56	44.8
8	T1	986	2.7	0.514	16.8	LOS B	19.6	139.8	0.65	0.60	46.9
9	R2	15	0.0	0.514	26.5	LOS B	16.9	120.9	0.72	0.64	41.2
Approach		1044	2.5	0.514	17.0	LOS B	19.6	139.8	0.65	0.60	46.7
West: Artarmon Rd											
10	L2	46	2.3	0.746	59.7	LOS E	13.1	92.0	1.00	0.88	28.8
11	T1	79	0.0	0.746	55.1	LOS D	13.1	92.0	1.00	0.88	27.9
12	R2	315	0.7	0.746	59.7	LOS E	13.1	92.0	1.00	0.88	28.7
Approach		440	0.7	0.746	58.8	LOS E	13.1	92.0	1.00	0.88	28.5
All Vehicles		3579	1.6	0.778	25.3	LOS B	38.8	276.1	0.78	0.73	41.1

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	2	11.7	LOS B	0.0	0.0	0.44	0.44
P3	North Full Crossing	67	54.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	22	13.1	LOS B	0.0	0.0	0.47	0.47
All Pedestrians		92	43.4	LOS E			0.82	0.82

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: Willoughby Rd/ Artarmon Rd/ Small St - Sat Midday 400

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	336	0.6	0.831	26.8	LOS B	43.6	308.9	0.87	0.84	40.2
2	T1	997	1.8	0.831	29.5	LOS C	43.6	308.9	0.91	0.88	39.8
3	R2	64	1.6	0.831	47.4	LOS D	27.1	192.9	0.97	0.95	33.2
Approach		1397	1.5	0.831	29.7	LOS C	43.6	308.9	0.90	0.88	39.5
East: Small St											
4	L2	122	0.9	0.662	63.7	LOS E	7.3	51.2	1.00	0.82	27.6
5	T1	105	0.0	0.852	65.9	LOS E	10.5	73.6	1.00	0.98	26.0
6	R2	58	0.0	0.852	70.5	LOS E	10.5	73.6	1.00	0.98	26.8
Approach		285	0.4	0.852	65.9	LOS E	10.5	73.6	1.00	0.91	26.8
North: Willoughby Rd											
7	L2	86	0.0	0.589	21.8	LOS B	24.1	171.4	0.68	0.64	43.2
8	T1	1074	2.3	0.589	20.0	LOS B	24.1	171.4	0.73	0.67	44.9
9	R2	15	0.0	0.589	30.0	LOS C	21.5	153.0	0.78	0.70	39.6
Approach		1175	2.1	0.589	20.3	LOS B	24.1	171.4	0.72	0.67	44.7
West: Artarmon Rd											
10	L2	36	0.0	0.825	63.6	LOS E	15.4	108.0	1.00	0.95	28.1
11	T1	128	0.0	0.825	59.0	LOS E	15.4	108.0	1.00	0.95	27.2
12	R2	326	0.3	0.825	63.7	LOS E	15.4	108.0	1.00	0.93	27.7
Approach		491	0.2	0.825	62.5	LOS E	15.4	108.0	1.00	0.94	27.6
All Vehicles		3347	1.4	0.852	34.3	LOS C	43.6	308.9	0.86	0.82	37.2

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	46	13.1	LOS B	0.1	0.1	0.47	0.47
P3	North Full Crossing	114	51.6	LOS E	0.4	0.4	0.93	0.93
P4	West Full Crossing	33	14.5	LOS B	0.1	0.1	0.49	0.49
All Pedestrians		193	36.0	LOS D			0.74	0.74

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: Willoughby Rd/ Artarmon Rd/ Small St - Sat Midday 510

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	342	0.6	0.842	28.1	LOS B	45.7	323.4	0.89	0.86	39.6
2	T1	997	1.8	0.842	31.0	LOS C	45.7	323.4	0.92	0.90	39.1
3	R2	64	1.6	0.842	49.6	LOS D	27.5	195.3	0.98	0.97	32.5
Approach		1403	1.5	0.842	31.2	LOS C	45.7	323.4	0.91	0.89	38.9
East: Small St											
4	L2	122	0.9	0.662	63.7	LOS E	7.3	51.2	1.00	0.82	27.6
5	T1	107	0.0	0.862	66.7	LOS E	10.7	75.2	1.00	1.00	25.8
6	R2	58	0.0	0.862	71.3	LOS F	10.7	75.2	1.00	1.00	26.6
Approach		287	0.4	0.862	66.4	LOS E	10.7	75.2	1.00	0.92	26.7
North: Willoughby Rd											
7	L2	86	0.0	0.599	22.0	LOS B	24.7	176.0	0.68	0.65	43.1
8	T1	1074	2.3	0.599	20.7	LOS B	24.7	176.0	0.74	0.68	44.6
9	R2	16	0.0	0.599	31.4	LOS C	21.5	153.7	0.80	0.72	39.0
Approach		1176	2.1	0.599	20.9	LOS B	24.7	176.0	0.73	0.68	44.4
West: Artarmon Rd											
10	L2	37	0.0	0.839	64.7	LOS E	15.9	111.2	1.00	0.97	27.9
11	T1	131	0.0	0.839	60.1	LOS E	15.9	111.2	1.00	0.97	27.0
12	R2	332	0.3	0.839	64.8	LOS E	15.9	111.2	1.00	0.94	27.5
Approach		499	0.2	0.839	63.6	LOS E	15.9	111.2	1.00	0.95	27.4
All Vehicles		3365	1.4	0.862	35.4	LOS C	45.7	323.4	0.87	0.83	36.8

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	46	13.1	LOS B	0.1	0.1	0.47	0.47
P3	North Full Crossing	114	51.6	LOS E	0.4	0.4	0.93	0.93
P4	West Full Crossing	33	14.5	LOS B	0.1	0.1	0.49	0.49
All Pedestrians		193	36.0	LOS D			0.74	0.74

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: Willoughby Rd/ Artarmon Rd/ Small St - Sat Midday Ex

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	318	0.7	0.816	26.1	LOS B	41.8	296.2	0.86	0.82	40.6
2	T1	997	1.8	0.816	28.1	LOS B	41.8	296.2	0.90	0.86	40.4
3	R2	64	1.6	0.816	45.1	LOS D	26.2	186.4	0.95	0.92	33.9
Approach		1379	1.5	0.816	28.4	LOS B	41.8	296.2	0.89	0.86	40.1
East: Small St											
4	L2	122	0.9	0.662	63.7	LOS E	7.3	51.2	1.00	0.82	27.6
5	T1	99	0.0	0.819	63.9	LOS E	9.9	69.3	1.00	0.95	26.4
6	R2	58	0.0	0.819	68.4	LOS E	9.9	69.3	1.00	0.95	27.1
Approach		279	0.4	0.819	64.7	LOS E	9.9	69.3	1.00	0.89	27.0
North: Willoughby Rd											
7	L2	86	0.0	0.585	21.7	LOS B	23.8	169.6	0.68	0.64	43.2
8	T1	1074	2.3	0.585	19.7	LOS B	23.8	169.6	0.72	0.67	45.1
9	R2	15	0.0	0.585	29.3	LOS C	21.4	152.5	0.78	0.70	39.9
Approach		1175	2.1	0.585	20.0	LOS B	23.8	169.6	0.72	0.66	44.9
West: Artarmon Rd											
10	L2	34	0.0	0.790	61.5	LOS E	14.4	100.7	1.00	0.92	28.6
11	T1	123	0.0	0.790	56.9	LOS E	14.4	100.7	1.00	0.92	27.7
12	R2	313	0.3	0.790	61.6	LOS E	14.4	100.7	1.00	0.90	28.2
Approach		469	0.2	0.790	60.4	LOS E	14.4	100.7	1.00	0.91	28.1
All Vehicles		3302	1.4	0.819	33.0	LOS C	41.8	296.2	0.85	0.80	37.7

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	46	13.1	LOS B	0.1	0.1	0.47	0.47
P3	North Full Crossing	114	51.6	LOS E	0.4	0.4	0.93	0.93
P4	West Full Crossing	33	14.5	LOS B	0.1	0.1	0.49	0.49
All Pedestrians		193	36.0	LOS D			0.74	0.74

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: Willoughby Rd/ Artarmon Rd/ Small St - Thurs AM 400

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	166	1.3	0.362	20.0	LOS B	12.0	86.4	0.58	0.61	43.2
2	T1	838	5.0	0.714	21.2	LOS B	28.1	205.0	0.76	0.72	44.1
3	R2	17	0.0	0.714	29.2	LOS C	28.1	205.0	0.83	0.75	40.0
Approach		1021	4.3	0.714	21.2	LOS B	28.1	205.0	0.73	0.70	43.9
East: Small St											
4	L2	78	1.4	0.726	70.2	LOS E	4.9	34.7	1.00	0.85	26.3
5	T1	53	0.0	0.664	64.5	LOS E	4.6	32.3	1.00	0.81	26.3
6	R2	21	5.0	0.664	69.1	LOS E	4.6	32.3	1.00	0.81	27.1
Approach		152	1.4	0.726	68.1	LOS E	4.9	34.7	1.00	0.83	26.4
North: Willoughby Rd											
7	L2	23	13.6	0.708	25.1	LOS B	31.8	231.3	0.78	0.72	41.8
8	T1	1517	4.4	0.708	19.4	LOS B	31.9	231.6	0.78	0.71	45.5
Approach		1540	4.5	0.708	19.5	LOS B	31.9	231.6	0.78	0.71	45.4
West: Artarmon Rd											
10	L2	32	0.0	0.718	52.8	LOS D	15.9	111.2	0.98	0.86	30.2
11	T1	38	0.0	0.718	48.3	LOS D	15.9	111.2	0.98	0.86	29.2
12	R2	497	0.2	0.718	52.8	LOS D	15.9	111.2	0.98	0.86	30.1
Approach		566	0.2	0.718	52.5	LOS D	15.9	111.2	0.98	0.86	30.0
All Vehicles		3279	3.6	0.726	28.0	LOS B	31.9	231.6	0.81	0.74	40.1

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	13	14.0	LOS B	0.0	0.0	0.48	0.48
P3	North Full Crossing	84	45.2	LOS E	0.2	0.2	0.87	0.87
P4	West Full Crossing	41	15.5	LOS B	0.1	0.1	0.51	0.51
All Pedestrians		138	33.5	LOS D			0.73	0.73

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: Willoughby Rd/ Artarmon Rd/ Small St - Thurs AM 510

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	169	1.2	0.382	21.8	LOS B	12.9	92.6	0.61	0.64	42.3
2	T1	838	5.0	0.753	24.1	LOS B	29.8	217.7	0.81	0.75	42.6
3	R2	17	0.0	0.753	32.4	LOS C	29.8	217.7	0.88	0.80	38.6
Approach		1024	4.3	0.753	23.8	LOS B	29.8	217.7	0.78	0.74	42.5
East: Small St											
4	L2	21	5.0	0.318	63.9	LOS E	2.6	18.6	0.98	0.73	28.0
5	T1	54	0.0	0.770	62.2	LOS E	6.8	47.8	0.99	0.82	26.5
6	R2	78	1.4	0.770	69.2	LOS E	6.8	47.8	1.00	0.89	26.7
Approach		153	1.4	0.770	66.0	LOS E	6.8	47.8	1.00	0.85	26.8
North: Willoughby Rd											
7	L2	23	13.6	0.740	27.5	LOS B	33.7	245.2	0.82	0.76	40.7
8	T1	1517	4.4	0.740	21.8	LOS B	33.8	245.5	0.82	0.75	44.2
Approach		1540	4.5	0.740	21.8	LOS B	33.8	245.5	0.82	0.75	44.1
West: Artarmon Rd											
10	L2	33	0.0	0.759	53.4	LOS D	16.7	117.3	0.98	0.88	30.1
11	T1	40	0.0	0.759	48.9	LOS D	16.7	117.3	0.98	0.88	29.0
12	R2	520	0.2	0.759	53.5	LOS D	16.8	117.7	0.98	0.88	30.0
Approach		593	0.2	0.759	53.2	LOS D	16.8	117.7	0.98	0.88	29.9
All Vehicles		3309	3.5	0.770	30.1	LOS C	33.8	245.5	0.84	0.77	39.2

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	13	15.5	LOS B	0.0	0.0	0.51	0.51
P3	North Full Crossing	84	44.4	LOS E	0.2	0.2	0.86	0.86
P4	West Full Crossing	41	17.1	LOS B	0.1	0.1	0.53	0.53
All Pedestrians		138	33.6	LOS D			0.73	0.73

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: Willoughby Rd/ Artarmon Rd/ Small St - Thurs AM Ex

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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: Willoughby Rd											
1	L2	234	0.9	0.372	19.1	LOS B	12.3	88.3	0.56	0.64	43.3
2	T1	838	5.0	0.733	20.4	LOS B	29.9	218.2	0.77	0.73	44.5
3	R2	17	0.0	0.733	27.8	LOS B	29.9	218.2	0.82	0.75	40.6
Approach		1088	4.1	0.733	20.3	LOS B	29.9	218.2	0.72	0.71	44.2
East: Small St											
4	L2	78	1.4	0.565	65.6	LOS E	4.7	33.0	1.00	0.77	27.2
5	T1	74	0.0	0.660	62.1	LOS E	5.8	40.7	1.00	0.82	26.9
6	R2	21	5.0	0.660	66.7	LOS E	5.8	40.7	1.00	0.82	27.6
Approach		173	1.2	0.660	64.2	LOS E	5.8	40.7	1.00	0.80	27.1
North: Willoughby Rd											
7	L2	23	13.6	0.688	23.6	LOS B	30.5	222.1	0.75	0.69	42.5
8	T1	1517	4.4	0.688	17.9	LOS B	30.6	222.3	0.75	0.69	46.4
Approach		1540	4.5	0.688	18.0	LOS B	30.6	222.3	0.75	0.69	46.3
West: Artarmon Rd											
10	L2	27	0.0	0.721	56.3	LOS D	14.1	98.9	1.00	0.86	29.4
11	T1	34	0.0	0.721	51.7	LOS D	14.1	98.9	1.00	0.86	28.4
12	R2	431	0.2	0.721	56.3	LOS D	14.1	98.9	1.00	0.86	29.3
Approach		492	0.2	0.721	56.0	LOS D	14.1	98.9	1.00	0.86	29.2
All Vehicles		3293	3.5	0.733	26.8	LOS B	30.6	222.3	0.79	0.73	40.6

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	13	13.1	LOS B	0.0	0.0	0.47	0.47
P3	North Full Crossing	84	48.8	LOS E	0.3	0.3	0.90	0.90
P4	West Full Crossing	41	14.5	LOS B	0.1	0.1	0.49	0.49
All Pedestrians		138	35.3	LOS D			0.74	0.74

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: Willoughby Rd/ Artarmon Rd/ Small St - Thurs PM 400

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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: Willoughby Rd											
1	L2	403	0.0	0.788	24.9	LOS B	39.3	277.1	0.82	0.81	40.9
2	T1	1405	1.8	0.788	19.3	LOS B	39.9	283.6	0.83	0.78	45.1
Approach		1808	1.4	0.788	20.5	LOS B	39.9	283.6	0.82	0.79	44.1
East: Small St											
4	L2	107	0.0	0.578	62.4	LOS E	6.3	43.8	1.00	0.79	27.9
5	T1	107	0.0	0.800	62.9	LOS E	9.6	67.1	1.00	0.93	26.6
6	R2	46	0.0	0.800	67.5	LOS E	9.6	67.1	1.00	0.93	27.4
Approach		261	0.0	0.800	63.5	LOS E	9.6	67.1	1.00	0.87	27.3
North: Willoughby Rd											
7	L2	43	0.0	0.516	20.2	LOS B	19.7	141.0	0.63	0.58	44.2
8	T1	986	2.7	0.516	17.5	LOS B	19.7	141.0	0.67	0.61	46.5
9	R2	13	0.0	0.516	26.5	LOS B	17.4	124.4	0.72	0.64	41.2
Approach		1042	2.5	0.516	17.7	LOS B	19.7	141.0	0.66	0.61	46.3
West: Artarmon Rd											
10	L2	45	2.3	0.767	61.3	LOS E	12.9	91.1	1.00	0.90	28.4
11	T1	75	0.0	0.767	56.7	LOS E	12.9	91.1	1.00	0.90	27.5
12	R2	308	0.7	0.767	61.3	LOS E	12.9	91.1	1.00	0.89	28.2
Approach		428	0.7	0.767	60.5	LOS E	12.9	91.1	1.00	0.89	28.1
All Vehicles		3540	1.5	0.800	27.7	LOS B	39.9	283.6	0.81	0.75	40.1

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	2	12.6	LOS B	0.0	0.0	0.46	0.46
P3	North Full Crossing	67	52.4	LOS E	0.2	0.2	0.94	0.94
P4	West Full Crossing	22	14.0	LOS B	0.0	0.0	0.48	0.48
All Pedestrians		92	42.2	LOS E			0.82	0.82

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: Willoughby Rd/ Artarmon Rd/ Small St - Thurs PM 510

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	423	0.0	0.809	25.9	LOS B	40.9	288.9	0.85	0.83	40.4
2	T1	1405	1.8	0.809	20.3	LOS B	41.6	296.0	0.85	0.80	44.5
Approach		1828	1.4	0.809	21.6	LOS B	41.6	296.0	0.85	0.81	43.5
East: Small St											
4	L2	107	0.0	0.534	61.1	LOS E	6.2	43.2	0.99	0.79	28.1
5	T1	112	0.0	0.758	60.4	LOS E	9.6	67.4	1.00	0.89	27.1
6	R2	46	0.0	0.758	65.0	LOS E	9.6	67.4	1.00	0.89	27.9
Approach		265	0.0	0.758	61.5	LOS E	9.6	67.4	1.00	0.85	27.7
North: Willoughby Rd											
7	L2	43	0.0	0.537	21.1	LOS B	20.9	149.7	0.65	0.60	43.8
8	T1	986	2.7	0.537	19.0	LOS B	20.9	149.7	0.69	0.63	45.6
9	R2	15	0.0	0.537	29.2	LOS C	17.9	127.7	0.76	0.68	39.9
Approach		1044	2.5	0.537	19.2	LOS B	20.9	149.7	0.69	0.63	45.4
West: Artarmon Rd											
10	L2	46	2.3	0.787	62.2	LOS E	13.4	94.7	1.00	0.91	28.2
11	T1	79	0.0	0.787	57.6	LOS E	13.4	94.7	1.00	0.91	27.4
12	R2	315	0.7	0.787	62.3	LOS E	13.4	94.7	1.00	0.90	28.0
Approach		440	0.7	0.787	61.4	LOS E	13.4	94.7	1.00	0.90	27.9
All Vehicles		3578	1.5	0.809	28.8	LOS C	41.6	296.0	0.83	0.77	39.6

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	2	13.1	LOS B	0.0	0.0	0.47	0.47
P3	North Full Crossing	67	52.4	LOS E	0.2	0.2	0.94	0.94
P4	West Full Crossing	22	14.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		92	42.4	LOS E			0.82	0.82

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: Willoughby Rd/ Artarmon Rd/ Small St - Thurs PM Ex

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Willoughby Rd											
1	L2	365	0.0	0.782	25.3	LOS B	38.5	272.1	0.83	0.81	40.8
2	T1	1405	1.8	0.782	19.7	LOS B	39.1	278.0	0.83	0.78	44.9
Approach		1771	1.4	0.782	20.9	LOS B	39.1	278.0	0.83	0.78	43.9
East: Small St											
4	L2	107	0.0	0.578	62.4	LOS E	6.3	43.8	1.00	0.79	27.9
5	T1	96	0.0	0.741	60.8	LOS E	8.6	60.5	1.00	0.88	27.0
6	R2	46	0.0	0.741	65.3	LOS E	8.6	60.5	1.00	0.88	27.8
Approach		249	0.0	0.741	62.3	LOS E	8.6	60.5	1.00	0.84	27.5
North: Willoughby Rd											
7	L2	43	0.0	0.487	20.4	LOS B	18.2	129.8	0.62	0.57	44.1
8	T1	986	2.7	0.487	16.2	LOS B	18.2	129.8	0.64	0.58	47.3
9	R2	6	0.0	0.487	23.1	LOS B	17.2	123.2	0.66	0.59	42.8
Approach		1036	2.5	0.487	16.4	LOS B	18.2	129.8	0.64	0.58	47.1
West: Artarmon Rd											
10	L2	47	2.2	0.767	60.5	LOS E	13.6	95.8	1.00	0.90	28.6
11	T1	81	0.0	0.767	55.9	LOS D	13.6	95.8	1.00	0.90	27.7
12	R2	324	0.6	0.767	60.6	LOS E	13.6	95.8	1.00	0.89	28.4
Approach		453	0.7	0.767	59.7	LOS E	13.6	95.8	1.00	0.89	28.3
All Vehicles		3508	1.6	0.782	27.5	LOS B	39.1	278.0	0.81	0.74	40.2

Level of Service (LOS) Method: Delay (RTA NSW).
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.
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 Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	2	13.1	LOS B	0.0	0.0	0.47	0.47
P3	North Full Crossing	67	51.5	LOS E	0.2	0.2	0.93	0.93
P4	West Full Crossing	22	14.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		92	41.7	LOS E			0.81	0.81

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: Wyalong St/ Artarmon Rd - Sat Midday 400

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Artarmon Rd											
1	L2	395	0.8	0.283	3.8	LOS A	1.9	13.3	0.20	0.47	46.6
3a	R1	5	0.0	0.283	6.3	LOS A	1.9	13.3	0.20	0.47	47.0
3u	U	1	0.0	0.283	8.6	LOS A	1.9	13.3	0.20	0.47	47.9
Approach		401	0.8	0.283	3.9	LOS A	1.9	13.3	0.20	0.47	46.6
NorthEast: Wyalong St											
24a	L1	3	0.0	0.046	5.3	LOS A	0.2	1.6	0.49	0.64	45.1
26a	R1	39	2.7	0.046	8.2	LOS A	0.2	1.6	0.49	0.64	44.9
26u	U	1	0.0	0.046	10.5	LOS A	0.2	1.6	0.49	0.64	45.7
Approach		43	2.4	0.046	8.1	LOS A	0.2	1.6	0.49	0.64	45.0
West: Artarmon Rd											
10a	L1	49	0.0	0.274	3.3	LOS A	1.7	11.8	0.06	0.60	45.9
12	R2	394	0.0	0.274	6.9	LOS A	1.7	11.8	0.06	0.60	46.0
12u	U	4	0.0	0.274	8.4	LOS A	1.7	11.8	0.06	0.60	46.5
Approach		447	0.0	0.274	6.5	LOS A	1.7	11.8	0.06	0.60	46.0
All Vehicles		892	0.5	0.283	5.4	LOS A	1.9	13.3	0.15	0.54	46.2

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Wyalong St/ Artarmon Rd - Sat Midday 510

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Artarmon Rd											
1	L2	398	0.8	0.285	3.8	LOS A	1.9	13.4	0.21	0.47	46.6
3a	R1	5	0.0	0.285	6.3	LOS A	1.9	13.4	0.21	0.47	47.0
3u	U	1	0.0	0.285	8.6	LOS A	1.9	13.4	0.21	0.47	47.9
Approach		404	0.8	0.285	3.9	LOS A	1.9	13.4	0.21	0.47	46.6
NorthEast: Wyalong St											
24a	L1	3	0.0	0.046	5.3	LOS A	0.2	1.6	0.49	0.64	45.1
26a	R1	39	2.7	0.046	8.2	LOS A	0.2	1.6	0.49	0.64	44.9
26u	U	1	0.0	0.046	10.5	LOS A	0.2	1.6	0.49	0.64	45.7
Approach		43	2.4	0.046	8.1	LOS A	0.2	1.6	0.49	0.64	44.9
West: Artarmon Rd											
10a	L1	49	0.0	0.276	3.3	LOS A	1.7	11.9	0.06	0.60	45.9
12	R2	397	0.0	0.276	6.9	LOS A	1.7	11.9	0.06	0.60	46.0
12u	U	4	0.0	0.276	8.4	LOS A	1.7	11.9	0.06	0.60	46.5
Approach		451	0.0	0.276	6.5	LOS A	1.7	11.9	0.06	0.60	46.0
All Vehicles		898	0.5	0.285	5.4	LOS A	1.9	13.4	0.15	0.54	46.2

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Wyalong St/ Artarmon Rd - Sat Midday Ex

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Artarmon Rd											
1	L2	384	0.8	0.276	3.8	LOS A	1.8	12.8	0.20	0.47	46.6
3a	R1	5	0.0	0.276	6.3	LOS A	1.8	12.8	0.20	0.47	47.0
3u	U	1	0.0	0.276	8.6	LOS A	1.8	12.8	0.20	0.47	47.9
Approach		391	0.8	0.276	3.9	LOS A	1.8	12.8	0.20	0.47	46.6
NorthEast: Wyalong St											
24a	L1	3	0.0	0.046	5.3	LOS A	0.2	1.6	0.48	0.64	45.2
26a	R1	39	2.7	0.046	8.2	LOS A	0.2	1.6	0.48	0.64	44.9
26u	U	1	0.0	0.046	10.4	LOS A	0.2	1.6	0.48	0.64	45.7
Approach		43	2.4	0.046	8.0	LOS A	0.2	1.6	0.48	0.64	45.0
West: Artarmon Rd											
10a	L1	49	0.0	0.269	3.3	LOS A	1.6	11.5	0.06	0.60	45.9
12	R2	386	0.0	0.269	6.9	LOS A	1.6	11.5	0.06	0.60	46.0
12u	U	4	0.0	0.269	8.4	LOS A	1.6	11.5	0.06	0.60	46.5
Approach		440	0.0	0.269	6.5	LOS A	1.6	11.5	0.06	0.60	46.0
All Vehicles		874	0.5	0.276	5.4	LOS A	1.8	12.8	0.15	0.54	46.2

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Wyalong St/ Artarmon Rd - Thurs AM 400

Roundabout

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: Artarmon Rd											
1	L2	238	0.4	0.178	3.8	LOS A	1.1	7.5	0.20	0.47	46.6
3a	R1	3	0.0	0.178	6.3	LOS A	1.1	7.5	0.20	0.47	47.0
3u	U	1	0.0	0.178	8.7	LOS A	1.1	7.5	0.20	0.47	47.9
Approach		242	0.4	0.178	3.9	LOS A	1.1	7.5	0.20	0.47	46.6
NorthEast: Wyalong St											
24a	L1	5	0.0	0.057	5.8	LOS A	0.3	2.0	0.53	0.66	45.0
26a	R1	45	0.0	0.057	8.6	LOS A	0.3	2.0	0.53	0.66	44.8
26u	U	1	0.0	0.057	10.9	LOS A	0.3	2.0	0.53	0.66	45.5
Approach		52	0.0	0.057	8.4	LOS A	0.3	2.0	0.53	0.66	44.8
West: Artarmon Rd											
10a	L1	54	3.9	0.315	3.3	LOS A	2.0	14.3	0.05	0.61	45.9
12	R2	465	0.5	0.315	6.9	LOS A	2.0	14.3	0.05	0.61	46.0
12u	U	3	0.0	0.315	8.4	LOS A	2.0	14.3	0.05	0.61	46.5
Approach		522	0.8	0.315	6.5	LOS A	2.0	14.3	0.05	0.61	46.0
All Vehicles		816	0.6	0.315	5.9	LOS A	2.0	14.3	0.13	0.57	46.1

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Wyalong St/ Artarmon Rd - Thurs AM 510

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Artarmon Rd											
1	L2	249	0.4	0.186	3.8	LOS A	1.1	7.9	0.20	0.47	46.6
3a	R1	3	0.0	0.186	6.4	LOS A	1.1	7.9	0.20	0.47	47.0
3u	U	1	0.0	0.186	8.7	LOS A	1.1	7.9	0.20	0.47	47.9
Approach		254	0.4	0.186	3.9	LOS A	1.1	7.9	0.20	0.47	46.6
NorthEast: Wyalong St											
24a	L1	5	0.0	0.057	5.8	LOS A	0.3	2.0	0.53	0.66	45.0
26a	R1	45	0.0	0.057	8.6	LOS A	0.3	2.0	0.53	0.66	44.8
26u	U	1	0.0	0.057	10.9	LOS A	0.3	2.0	0.53	0.66	45.5
Approach		52	0.0	0.057	8.4	LOS A	0.3	2.0	0.53	0.66	44.8
West: Artarmon Rd											
10a	L1	54	3.9	0.317	3.3	LOS A	2.0	14.4	0.05	0.61	45.9
12	R2	467	0.5	0.317	6.9	LOS A	2.0	14.4	0.05	0.61	46.0
12u	U	3	0.0	0.317	8.4	LOS A	2.0	14.4	0.05	0.61	46.5
Approach		524	0.8	0.317	6.5	LOS A	2.0	14.4	0.05	0.61	46.0
All Vehicles		829	0.6	0.317	5.8	LOS A	2.0	14.4	0.13	0.57	46.1

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Wyalong St/ Artarmon Rd - Thurs AM Ex

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Artarmon Rd											
1	L2	231	0.5	0.173	3.8	LOS A	1.0	7.3	0.20	0.47	46.6
3a	R1	3	0.0	0.173	6.3	LOS A	1.0	7.3	0.20	0.47	47.0
3u	U	1	0.0	0.173	8.7	LOS A	1.0	7.3	0.20	0.47	47.9
Approach		235	0.4	0.173	3.9	LOS A	1.0	7.3	0.20	0.47	46.6
NorthEast: Wyalong St											
24a	L1	5	0.0	0.058	5.9	LOS A	0.3	2.0	0.54	0.67	44.9
26a	R1	45	0.0	0.058	8.8	LOS A	0.3	2.0	0.54	0.67	44.7
26u	U	1	0.0	0.058	11.1	LOS A	0.3	2.0	0.54	0.67	45.4
Approach		52	0.0	0.058	8.5	LOS A	0.3	2.0	0.54	0.67	44.7
West: Artarmon Rd											
10a	L1	54	3.9	0.329	3.3	LOS A	2.1	15.1	0.05	0.61	45.9
12	R2	488	0.4	0.329	6.9	LOS A	2.1	15.1	0.05	0.61	46.0
12u	U	3	0.0	0.329	8.4	LOS A	2.1	15.1	0.05	0.61	46.5
Approach		545	0.8	0.329	6.6	LOS A	2.1	15.1	0.05	0.61	46.0
All Vehicles		832	0.6	0.329	5.9	LOS A	2.1	15.1	0.12	0.57	46.1

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Wyalong St/ Artarmon Rd - Thurs PM 400

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Artarmon Rd											
1	L2	423	0.0	0.304	3.8	LOS A	2.0	14.3	0.22	0.47	46.6
3a	R1	5	0.0	0.304	6.4	LOS A	2.0	14.3	0.22	0.47	47.0
3u	U	2	0.0	0.304	8.7	LOS A	2.0	14.3	0.22	0.47	47.8
Approach		431	0.0	0.304	3.9	LOS A	2.0	14.3	0.22	0.47	46.6
NorthEast: Wyalong St											
24a	L1	7	0.0	0.053	4.6	LOS A	0.3	1.8	0.41	0.60	45.6
26a	R1	46	2.3	0.053	7.5	LOS A	0.3	1.8	0.41	0.60	45.3
26u	U	1	0.0	0.053	9.8	LOS A	0.3	1.8	0.41	0.60	46.1
Approach		55	1.9	0.053	7.2	LOS A	0.3	1.8	0.41	0.60	45.4
West: Artarmon Rd											
10a	L1	65	1.6	0.208	3.3	LOS A	1.2	8.4	0.06	0.59	46.1
12	R2	266	0.8	0.208	6.9	LOS A	1.2	8.4	0.06	0.59	46.1
12u	U	1	0.0	0.208	8.4	LOS A	1.2	8.4	0.06	0.59	46.7
Approach		333	0.9	0.208	6.2	LOS A	1.2	8.4	0.06	0.59	46.1
All Vehicles		818	0.5	0.304	5.1	LOS A	2.0	14.3	0.17	0.53	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Wyalong St/ Artarmon Rd - Thurs PM 510

Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Artarmon Rd											
1	L2	426	0.0	0.307	3.8	LOS A	2.1	14.5	0.22	0.47	46.6
3a	R1	5	0.0	0.307	6.4	LOS A	2.1	14.5	0.22	0.47	47.0
3u	U	2	0.0	0.307	8.7	LOS A	2.1	14.5	0.22	0.47	47.8
Approach		434	0.0	0.307	3.9	LOS A	2.1	14.5	0.22	0.47	46.6
NorthEast: Wyalong St											
24a	L1	7	0.0	0.053	4.6	LOS A	0.3	1.8	0.41	0.61	45.6
26a	R1	46	2.3	0.053	7.5	LOS A	0.3	1.8	0.41	0.61	45.3
26u	U	1	0.0	0.053	9.8	LOS A	0.3	1.8	0.41	0.61	46.1
Approach		55	1.9	0.053	7.2	LOS A	0.3	1.8	0.41	0.61	45.4
West: Artarmon Rd											
10a	L1	65	1.6	0.213	3.3	LOS A	1.2	8.7	0.06	0.59	46.1
12	R2	274	0.8	0.213	6.9	LOS A	1.2	8.7	0.06	0.59	46.1
12u	U	1	0.0	0.213	8.4	LOS A	1.2	8.7	0.06	0.59	46.7
Approach		340	0.9	0.213	6.2	LOS A	1.2	8.7	0.06	0.59	46.1
All Vehicles		828	0.5	0.307	5.1	LOS A	2.1	14.5	0.17	0.53	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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: Wyalong St/ Artarmon Rd - Thurs PM Ex

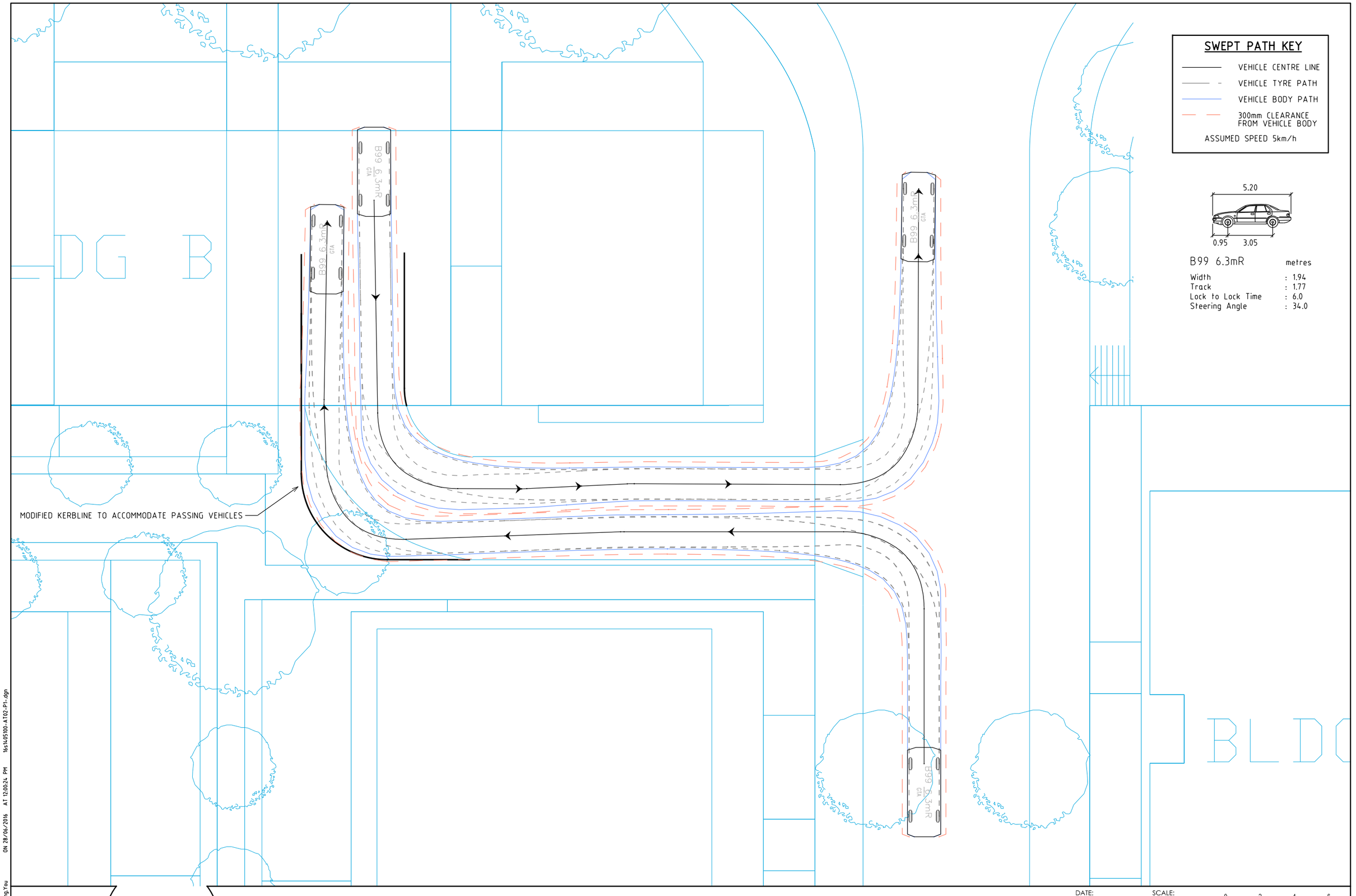
Roundabout

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: Artarmon Rd											
1	L2	447	0.0	0.320	3.9	LOS A	2.2	15.4	0.22	0.47	46.6
3a	R1	5	0.0	0.320	6.4	LOS A	2.2	15.4	0.22	0.47	47.0
3u	U	2	0.0	0.320	8.7	LOS A	2.2	15.4	0.22	0.47	47.8
Approach		455	0.0	0.320	3.9	LOS A	2.2	15.4	0.22	0.47	46.6
NorthEast: Wyalong St											
24a	L1	7	0.0	0.053	4.6	LOS A	0.3	1.8	0.41	0.60	45.6
26a	R1	46	2.3	0.053	7.5	LOS A	0.3	1.8	0.41	0.60	45.3
26u	U	1	0.0	0.053	9.8	LOS A	0.3	1.8	0.41	0.60	46.1
Approach		55	1.9	0.053	7.2	LOS A	0.3	1.8	0.41	0.60	45.4
West: Artarmon Rd											
10a	L1	65	1.6	0.211	3.3	LOS A	1.2	8.6	0.06	0.59	46.1
12	R2	271	0.8	0.211	6.9	LOS A	1.2	8.6	0.06	0.59	46.1
12u	U	1	0.0	0.211	8.4	LOS A	1.2	8.6	0.06	0.59	46.7
Approach		337	0.9	0.211	6.2	LOS A	1.2	8.6	0.06	0.59	46.1
All Vehicles		846	0.5	0.320	5.0	LOS A	2.2	15.4	0.17	0.53	46.3

Level of Service (LOS) Method: Delay (RTA NSW).
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.
Roundabout Capacity Model: SIDRA Standard.
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 C

Swept Path Analysis



SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

B99 6.3mR — metres

Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

PLOTTED BY : Chenlong.You ON 28/06/2016 AT 12:00:24 PM 16s1405100-AT02-P1-.dgn

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CHANNEL 9 REDEVELOPMENT
BLDG B
VEHICLE SWEPT PATH ASSESSMENT B99

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
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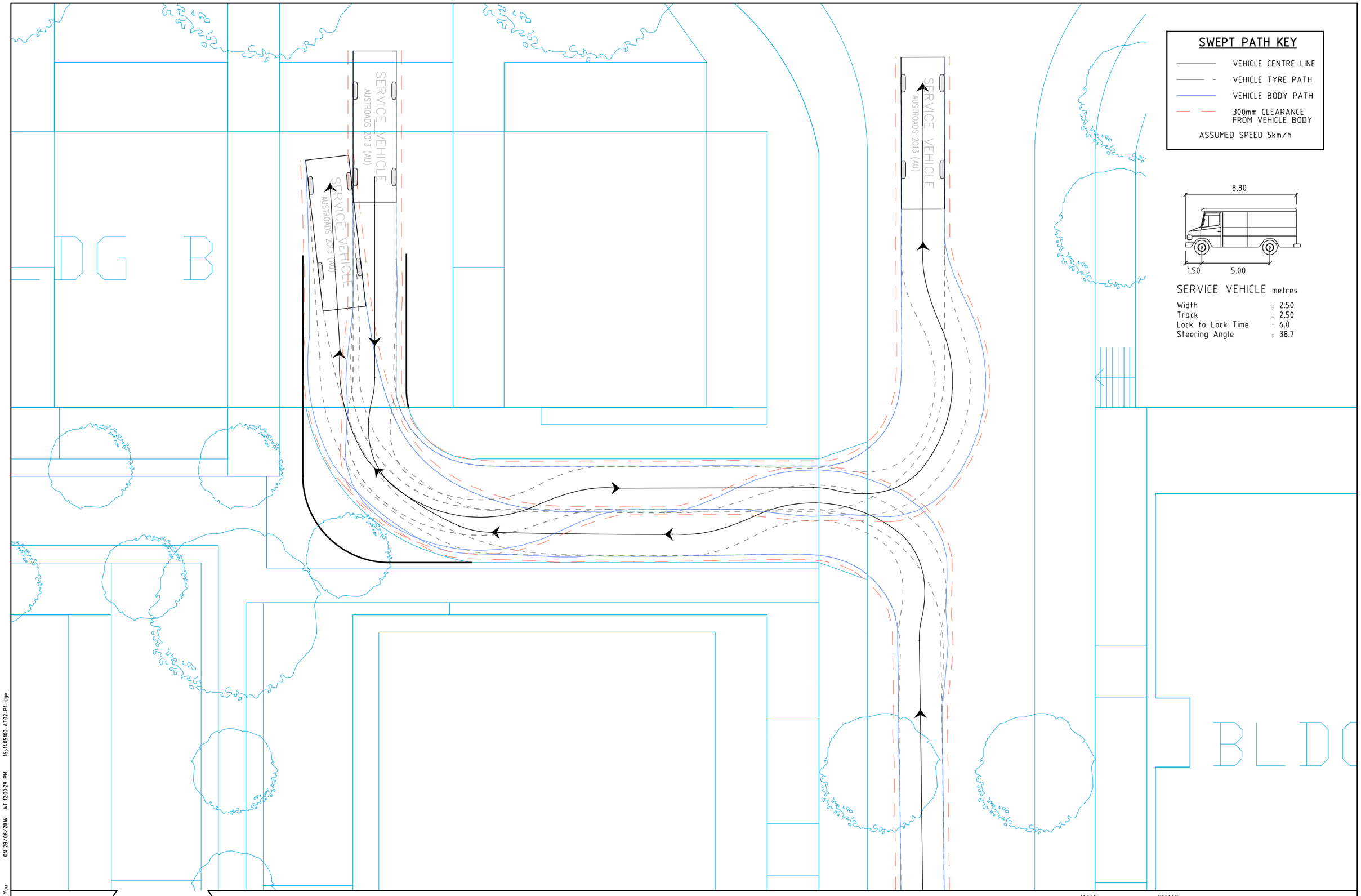
SHEET: 01 OF 05



SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

SERVICE VEHICLE metres

Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 38.7

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CHANNEL 9 REDEVELOPMENT
BLDG B
VEHICLE SWEPT PATH ASSESSMENT MRV

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
APPROVED: NXV
DRAWING NO. 16S1405100-AT02-02-P1
SHEET: 02 OF 05

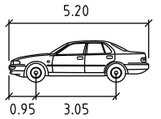
BLDG C

BLDG D

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99 6.3mR

	metres
Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

B99 6.3mR GTA

B99 6.3mR GTA

B99 6.3mR GTA

B99

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CHANNEL 9 REDEVELOPMENT
BLDG D
VEHICLE SWEPT PATH ASSESSMENT B99 IN

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
APPROVED: NXV
DRAWING NO. 16S1405100-AT02-03-P1
SHEET: 03 OF 05

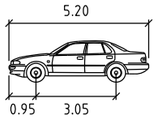
BLDG C

BLDG D

SWEPT PATH KEY

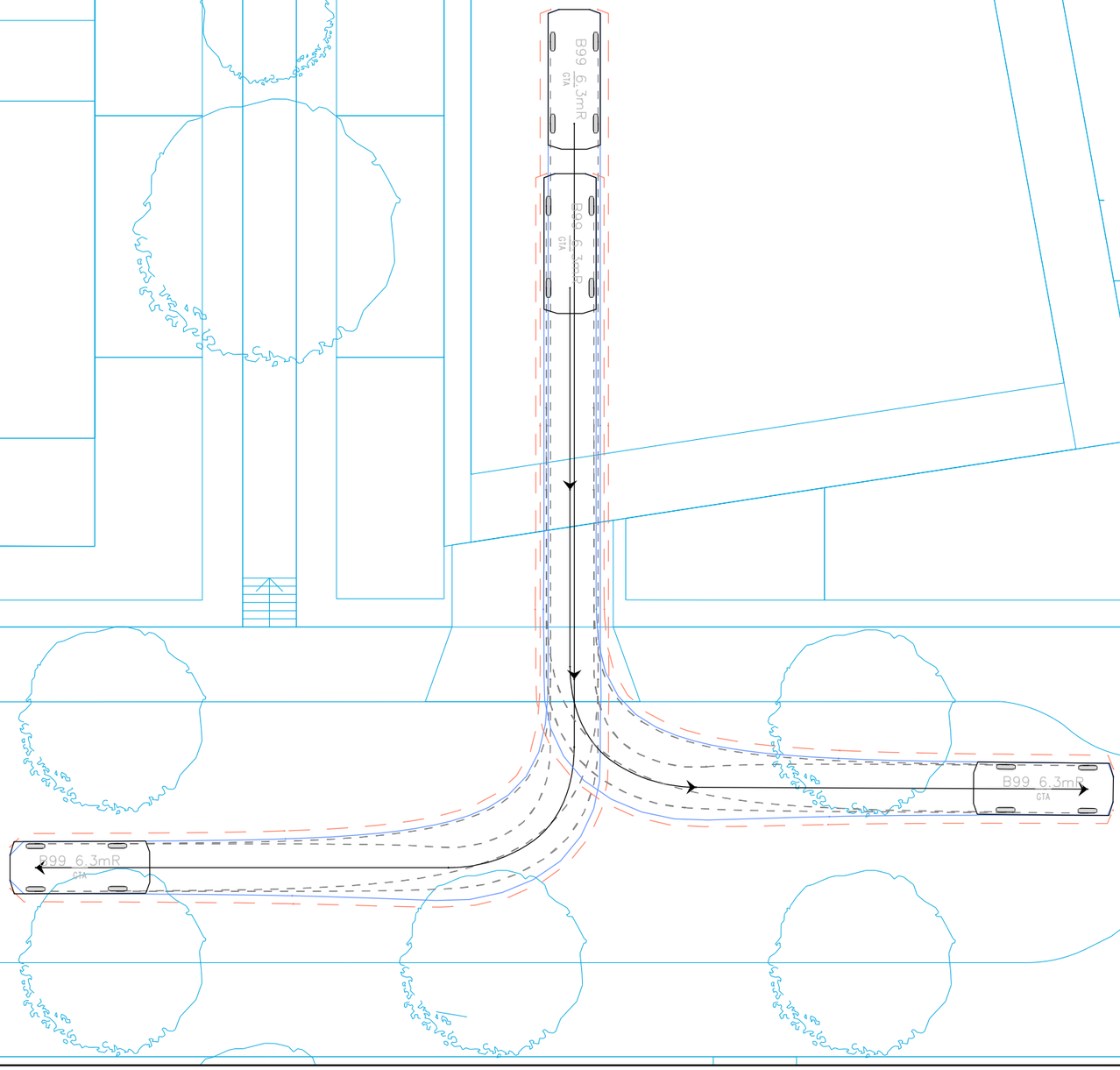
- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99 6.3mR metres

Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0



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CHANNEL 9 REDEVELOPMENT
BLDG D
VEHICLE SWEPT PATH ASSESSMENT B99 OUT

DATE: 28/06/2016
SCALE: 1:200@A3
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APPROVED: NXV
DRAWING NO. 16S1405100-AT02-04-P1
SHEET: 04 OF 05

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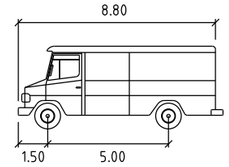
BLDG C

BLDG D

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



SERVICE VEHICLE metres

Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 38.7

SERVICE VEHICLE
AUSTROADS 2013 (AU)

SERVICE VEHICLE
AUSTROADS 2013 (AU)

SERVICE VEHICLE
AUSTROADS 2013 (AU)

SERVICE VEHICLE
AUSTROADS 2013 (AU)

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PRELIMINARY PLAN
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SUBJECT TO CHANGE WITHOUT NOTIFICATION

CHANNEL 9 REDEVELOPMENT
BLDG D
VEHICLE SWEPT PATH ASSESSMENT MRV

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
APPROVED: NXV
DRAWING NO. 16S1405100-AT02-05-P1
SHEET: 05 OF 05

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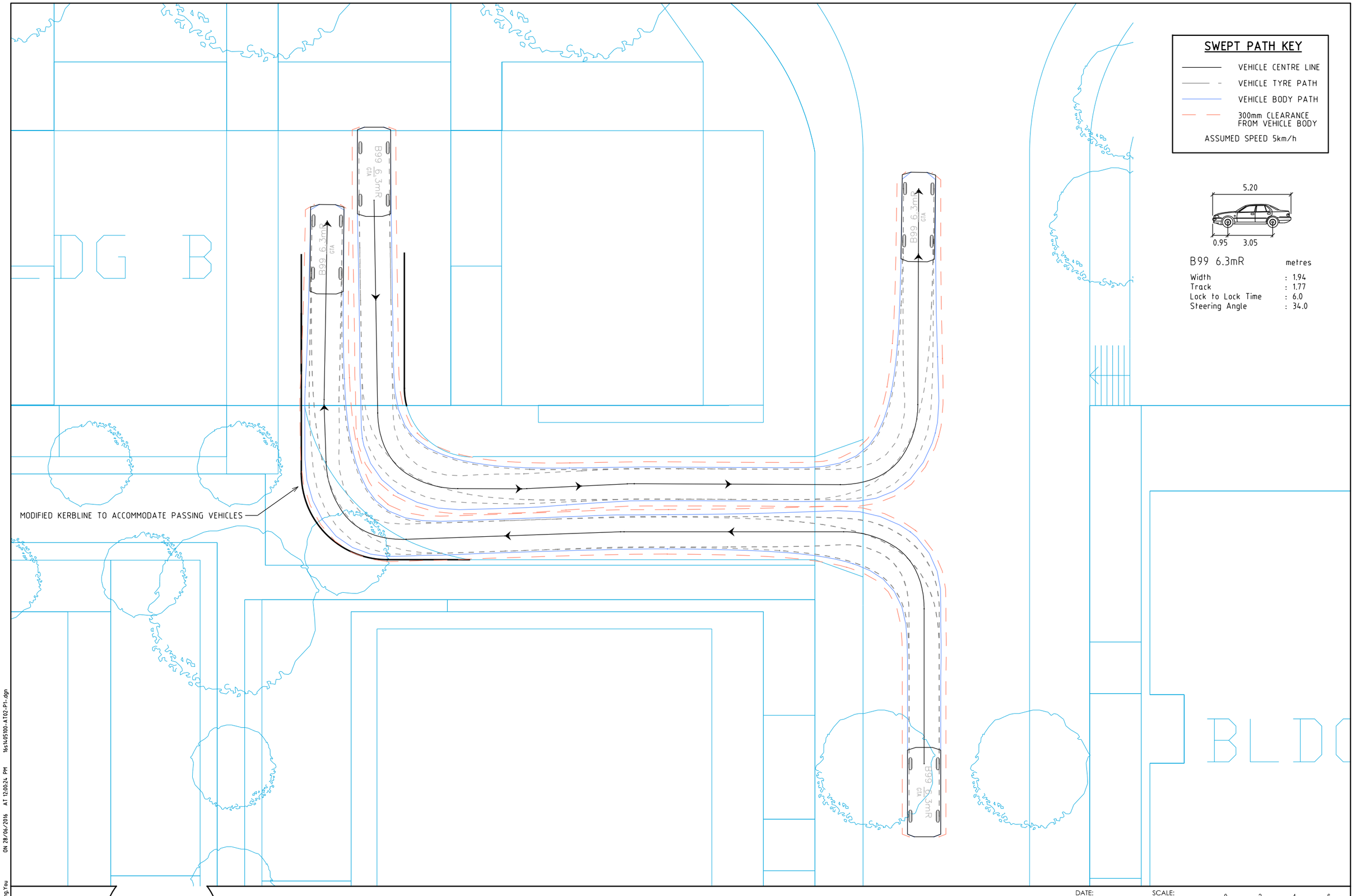

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

B99 6.3mR — metres

Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

PLOTTED BY : Chenlong.You ON 28/06/2016 AT 12:00:24 PM 16s1405100-AT02-P1-.dgn

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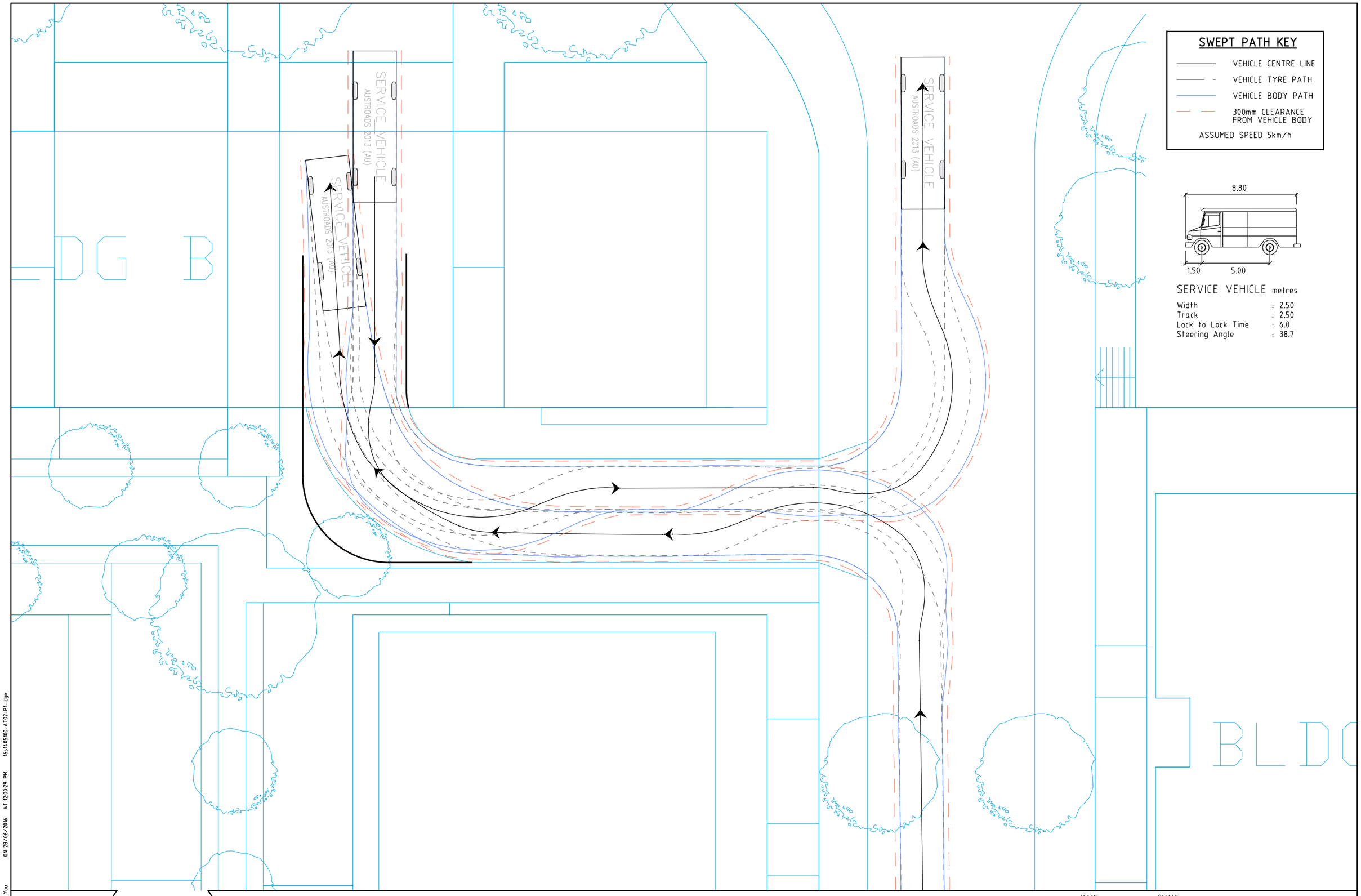
PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT NOTIFICATION

CHANNEL 9 REDEVELOPMENT
BLDG B
VEHICLE SWEPT PATH ASSESSMENT B99

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
APPROVED: NXV
DRAWING NO. 16S1405100-AT02-01-P1
SHEET: 01 OF 05



SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h

SERVICE VEHICLE metres

Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 38.7

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CHANNEL 9 REDEVELOPMENT
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VEHICLE SWEPT PATH ASSESSMENT MRV

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
APPROVED: NXV
DRAWING NO. 16S1405100-AT02-02-P1
SHEET: 02 OF 05

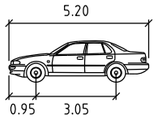
BLDG C

BLDG D

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99 6.3mR

	metres
Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

B99 6.3mR GTA

B99 6.3mR GTA

B99 6.3mR GTA

B99

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N

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT NOTIFICATION

CHANNEL 9 REDEVELOPMENT
BLDG D
VEHICLE SWEPT PATH ASSESSMENT B99 IN

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
APPROVED: NXV
DRAWING NO. 16S1405100-AT02-03-P1
SHEET: 03 OF 05

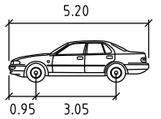
BLDG C

BLDG D

SWEPT PATH KEY

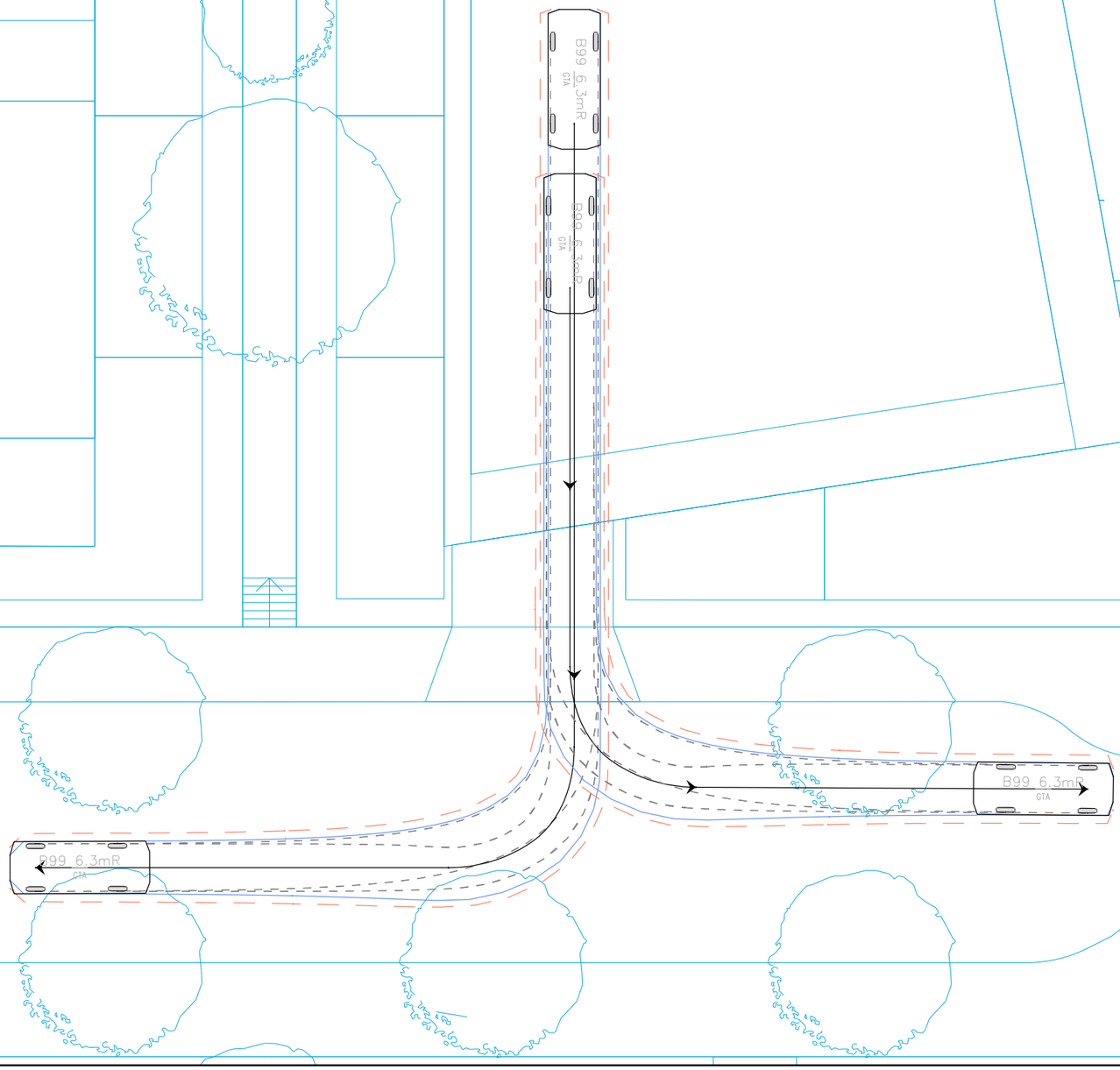
- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



B99 6.3mR metres

Width	: 1.94
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.0



Melbourne 03 9851 9600
Sydney 02 8448 1800
Brisbane 07 3113 5000
Canberra 02 6243 9400
Adelaide 08 8334 3600
Gold Coast 07 5510 4814
Townsville 07 4722 2765
Perth 08 6316 4634

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PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT NOTIFICATION

CHANNEL 9 REDEVELOPMENT
BLDG D
VEHICLE SWEPT PATH ASSESSMENT B99 OUT

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
APPROVED: NXV
DRAWING NO. 16S1405100-AT02-04-P1
SHEET: 04 OF 05

PLOTTED BY : Chenlong.You ON 28/06/2016 AT 12:58:12 PM 16s1405100-AT02-P1-.dgn

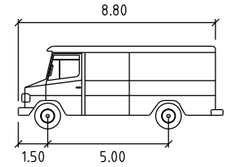
BLDG C

BLDG D

SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 300mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h



SERVICE VEHICLE metres

Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 38.7

SERVICE VEHICLE
AUSTROADS 2013 (AU)

SERVICE VEHICLE
AUSTROADS 2013 (AU)

SERVICE VEHICLE
AUSTROADS 2013 (AU)

SERVICE VEHICLE
AUSTROADS 2013 (AU)

Melbourne 03 9851 9600
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PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT NOTIFICATION

CHANNEL 9 REDEVELOPMENT
BLDG D
VEHICLE SWEPT PATH ASSESSMENT MRV

DATE: 28/06/2016
SCALE: 1:200@A3
0 2 4 6
APPROVED: NXV
DRAWING NO. 16S1405100-AT02-05-P1
SHEET: 05 OF 05

PLOTTED BY : Chentong.Tou ON 28/06/2016 AT 12:00:46 PM 16s1405100-AT02-P1-.dgn

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GTA CONSULTANTS MARK-UP
16S1405100-AT01-P1 - CHANNEL 9 REDEVELOPMENT
PROPOSED ROUNDABOUT
27/04/2016

INDICATIVE ROUNDABOUT DESIGN
ACCOMMODATING:
- 12.5m BUSES/HRV THROUGH MOVEMENTS
- 8.8m FULL TURNING MOVEMENTS

98° 26' 05"
193.765
98° 25' 30"
11.585
233°35'15"
2.155
72.5
75
77.5
3.0
3.0m MINIMUM BOUNDARY OFFSET
BLDG 2
A: 1184.06m²
30°
ALTERNATE LOCATION FOR ACCESS TO BUILDING 7??

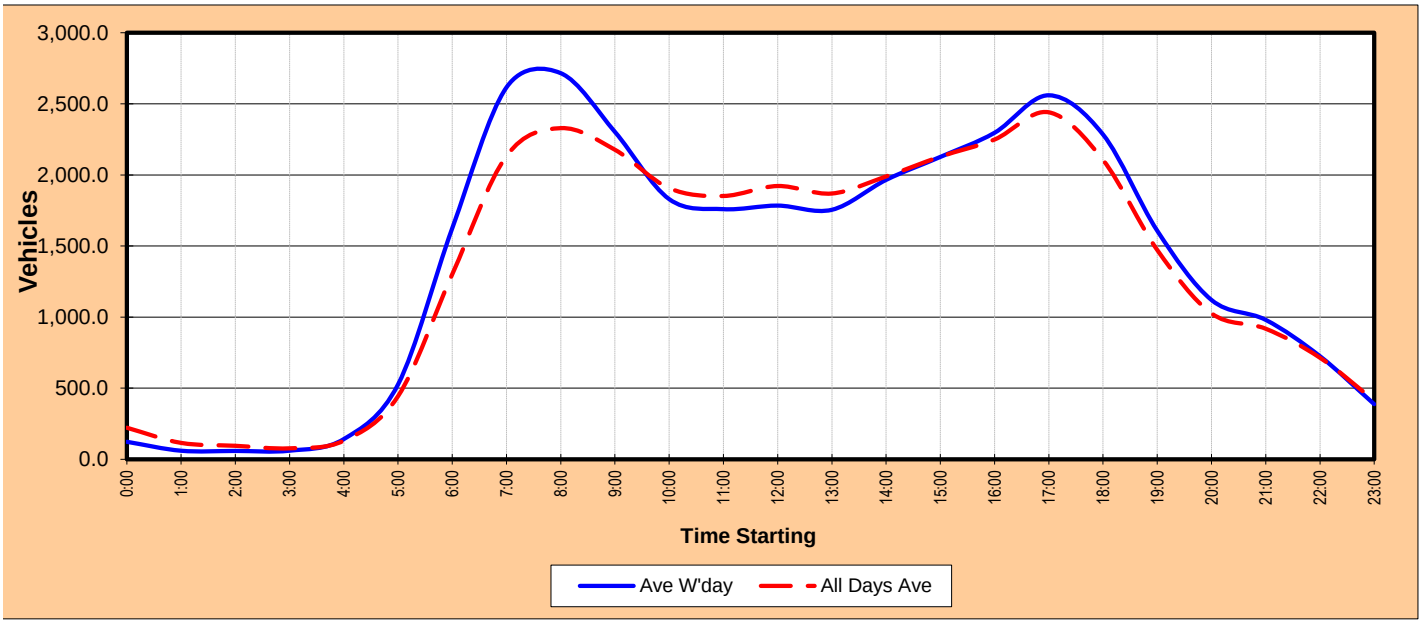
Appendix D

Survey Results

Road	Willoughby Rd
Location	between Artarmon Rd and Walter St
Site No.	1
Start Date	Thursday 12/05/2016
Direction	Two ways

Average Weekday	33412
All Day Average	32032
Weekday Heavy's	5.8%
All Day Heavy's	5.1%

Starting Time	Day of Week							Ave W'day	All Days Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	16-May	17-May	18-May	12-May	13-May	14-May	15-May		
AM Peak	**2687**	**2714**	**2710**	**2781**	**2706**	**2301**	**1924**		
PM Peak	**2533**	**2551**	**2523**	**2595**	**2598**	**2402**	**2131**		
0:00	88	102	114		189	347	492	123	222
1:00	47	58	69	24	104	206	300	60	115
2:00	48	53	51	62	81	165	206	59	95
3:00	56	60	55	68	65	107	130	61	77
4:00	152	141	148	139	131	103	102	142	131
5:00	545	540	535	507	503	248	228	526	444
6:00	1623	1657	1647	1585	1614	591	393	1625	1301
7:00	2631	2714	2663	2507	2563	1223	632	2616	2133
8:00	2687	2694	2710	2781	2706	1721	1003	2716	2329
9:00	2189	2351	2338	2356	2278	2140	1587	2302	2177
10:00	1731	1801	1787	1933	1896	2301	1898	1830	1907
11:00	1634	1742	1766	1779	1875	2243	1924	1759	1852
12:00	1704	1768	1783	1789	1877	2402	2131	1784	1922
13:00	1711	1667	1725	1782	1889	2335	1976	1755	1869
14:00	1866	1802	1953	2047	2158	2199	1901	1965	1989
15:00	2056	2046	2106	2143	2282	2248	2021	2127	2129
16:00	2261	2217	2263	2310	2431	2208	2053	2296	2249
17:00	2533	2551	2523	2595	2598	2347	1935	2560	2440
18:00	2059	2251	2210	2444	2456	1834	1481	2284	2105
19:00	1388	1603	1522	1763	1760	1252	1015	1607	1472
20:00	950	1127	1165	1239	1122	818	764	1121	1026
21:00	785	950	1021	1170	977	854	671	981	918
22:00	533	606	696	847	943	951	425	725	714
23:00	234	281	374	419	632	718	237	388	414
Total	**31511**	**32782**	**33224**	**34289**	**35130**	**31561**	**25505**	**33412**	**32032**
% Heavies	**5.9%**	**6.0%**	**5.7%**	**5.8%**	**5.5%**	**3.7%**	**2.8%**	**5.8%**	**5.1%**



austraffic

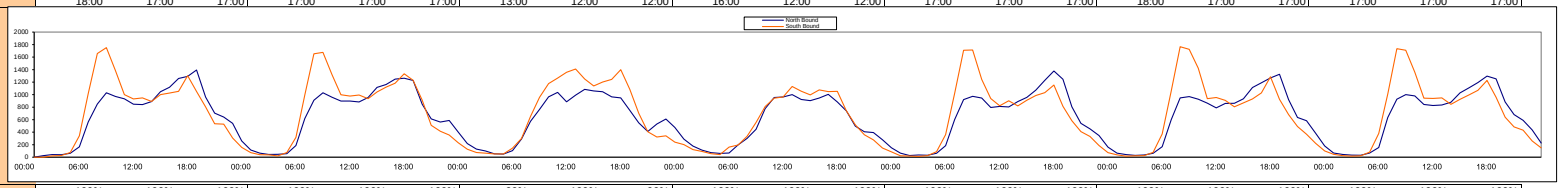
Summary - Matrix Data Tabular / Graphical Presentation GTA **Ref:** Individual-1299-1N.txt

Willoughby Rd between Artarmon Rd and Walter St

Suburb Willoughby **Job** 7460
SiteId 1
Speed Limit 60 **Map Ref**

Date Record		Thursday 12/05/2016			Friday 13/05/2016			Saturday 14/05/2016			Sunday 15/05/2016			Monday 16/05/2016			Tuesday 17/05/2016			Wednesday 18/05/2016		
Interval (min)	60	North Bound	South Bound	Two ways	North Bound	South Bound	Two ways	North Bound	South Bound	Two ways	North Bound	South Bound	Two ways	North Bound	South Bound	Two ways	North Bound	South Bound	Two ways	North Bound	South Bound	Two ways
Short	%	92.6%	93.7%	93.2%	92.9%	94.0%	93.5%	94.4%	96.0%	95.3%	96.1%	96.7%	96.4%	92.7%	93.3%	93.0%	92.3%	93.6%	93.0%	92.4%	93.8%	93.1%
Med	%	4.0%	3.2%	3.6%	3.8%	3.1%	3.4%	2.5%	1.7%	2.1%	1.9%	1.4%	1.7%	4.0%	3.4%	3.7%	4.1%	3.2%	3.7%	4.0%	3.0%	3.5%
Long	%	2.3%	2.2%	2.2%	2.2%	1.9%	2.1%	1.9%	1.3%	1.6%	1.2%	1.1%	1.2%	2.2%	2.2%	2.2%	2.5%	2.2%	2.3%	2.3%	2.1%	2.2%
7am-7pm	Vol	12471	13995	26466	12546	14463	27009	11068	14133	25201	9839	10703	20542	12020	13042	25062	12047	13557	25604	12171	13656	25827
24Hr Vol		16478	17811	34289	16687	18443	35130	14599	16962	31561	12546	12959	25505	15335	16176	31511	15754	17028	32782	16022	17202	33224
85%ile	Km	57.0	62.0	60.0	57.0	62.0	60.0	56.0	61.0	60.0	58.0	62.0	60.0	57.0	62.0	60.0	57.0	62.0	60.0	57.0	62.0	60.0
Mean Spd		46.6	55.2	51.0	46.3	55.0	50.8	43.1	55.0	49.4	48.3	56.1	52.2	47.6	55.2	51.4	47.2	55.4	51.3	46.7	55.2	51.0
Std Dev		11.3	8.1	10.7	11.5	8.1	10.8	14.3	8.3	12.9	10.6	6.7	9.7	10.7	8.0	10.2	10.9	7.6	10.2	11.5	7.9	10.7
AM PK Interval Vol		1030	1751	2781	1030	1676	2706	1037	1358	2301	962	962	1924	973	1714	2687	969	1766	2714	1001	1735	2710
AM Pk Factor		0.06	0.10	0.08	0.06	0.09	0.08	0.07	0.08	0.07	0.08	0.07	0.08	0.06	0.11	0.09	0.06	0.10	0.08	0.06	0.10	0.08
AM Pk 85%		56.0	59.0	58.0	55.0	59.0	57.0	48.0	60.0	59.0	54.0	62.0	59.0	56.0	58.0	58.0	56.0	60.0	59.0	55.0	61.0	58.0
AM PK starts		08:00	08:00	08:00	08:00	08:00	08:00	10:00	11:00	10:00	11:00	11:00	11:00	08:00	08:00	08:00	08:00	07:00	07:00	08:00	07:00	08:00
PM Pk Interval Vol		1394	1303	2595	1263	1335	2598	1085	1409	2402	1005	1131	2131	1379	1154	2533	1325	1285	2551	1296	1227	2523
PM Pk Factor		0.08	0.07	0.08	0.08	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.08	0.09	0.07	0.08	0.08	0.08	0.08	0.08	0.07	0.08
PM Pk 85%		51.0	60.0	57.0	42.0	59.0	56.0	52.0	61.0	59.0	55.0	62.0	60.0	51.0	61.0	58.0	54.0	60.0	57.0	46.0	60.0	57.0
PM Pk starts		18:00	17:00	17:00	17:00	17:00	17:00	13:00	12:00	12:00	16:00	12:00	12:00	17:00	17:00	17:00	18:00	17:00	17:00	17:00	17:00	17:00

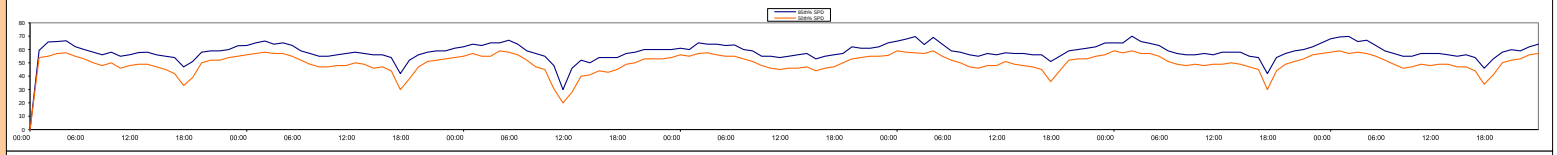
Volume Distribution



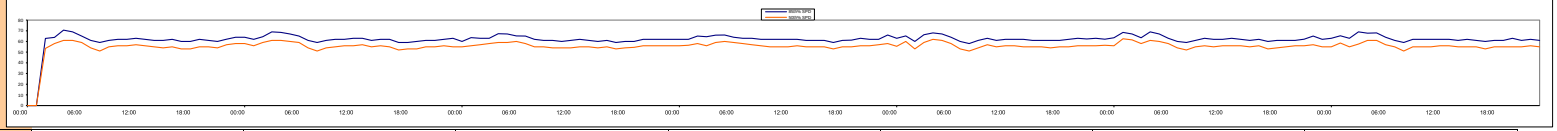
Speed Stats

>9Km	100%	100%	100%	100%	100%	100%	99%	100%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
>19Km	98%	99%	99%	97%	99%	98%	91%	99%	95%	99%	100%	99%	99%	99%	99%	98%	100%	99%	98%	100%	99%	
>29Km	91%	99%	95%	90%	99%	95%	79%	99%	90%	94%	100%	97%	93%	99%	96%	92%	99%	96%	91%	99%	95%	
>39Km	75%	97%	87%	74%	97%	86%	65%	98%	83%	81%	99%	90%	78%	97%	88%	77%	98%	88%	75%	97%	87%	
>49Km	43%	80%	62%	43%	79%	62%	38%	80%	60%	48%	84%	66%	46%	80%	64%	45%	81%	64%	44%	80%	63%	
>59Km	9%	24%	17%	8%	23%	16%	8%	22%	16%	10%	25%	18%	10%	24%	17%	9%	24%	17%	9%	24%	17%	
>69Km	1%	3%	2%	1%	3%	2%	1%	2%	2%	1%	2%	2%	1%	2%	2%	1%	2%	2%	1%	2%	2%	
>79Km	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
>89Km	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
>99Km	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
>109Km	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	

North Bound Speed Dist. 50th & 85th Percentiles



South Bound Speed Dist. 50th & 85th Percentiles



1: Car+MotorCycle	15,002	16,398	31,400	15,208	17,060	32,268	13,569	16,065	29,634	11,916	12,391	24,307	13,939	14,824	28,763	14,290	15,672	29,962	14,563	15,847	30,410	
2: Car + Trailer	257	294	551	289	272	561	206	223	429	136	144	280	280	272	552	258	264	522	249	284	533	
3: 2 axle truck	496	409	905	479	417	896	233	171	404	192	110	302	458	371	829	479	401	880	477	346	823	
4: 3axle truck	89	94	183	101	105	206	75	82	157	32	57	89	96	112	208	86	88	174	97	92	189	
5: 4 axle truck	70	63	133	59	44	103	55	39	94	19	16	35	52	66	118	85	64	149	66	74	140	
6: 3 axle semi	20	36	56	27	34	61	23	20	43	18	14	32	24	38	62	32	32	64	26	36	62	
7: 4 axle semi	265	245	510	257	223	480	220	174	394	117	105	222	242	225	467	265	254	519	260	244	504	
8: 5 axle semi	15	16	31	11	17	28	10	10	20	1	7	8	11	8	19	7	13	20	14	13	27	
9: 6 axle semi	45	60	105	56	58	114	19	19	38	16	17	33	31	53	84	63	52	115	48	58	106	
10: 7/8 axle truck	14	16	30	8	8	16	7	0	7	0	1	1	18	19	37	8	3	11	6	5	11	
11: Road Train	11	16	27	12	12	24	4	4	8	0	2	2	15	8	23	10	9	19	6	7	13	
12: Road Train	5	7	12	4	6	10	1	1	2	1	0	1	4	1	5	3	7	10	3	6	9	
13: Unknown	189	157	346	176	187	363	177	154	331	98	95	193	165	179	344	168	169	337	207	190	397	
14: Motorcycle	208	213	421	220	215	435	232	171	403	103	96	199	191	193	384	208	202	410	251	210	461	
Unpaired Axles	79	90	169	80	159	239	106	199	305	42	90	132	78	115	193	78	74	152	84	122	206	

Pace Min	42.0	47.0	46.0	42.0	47.0	46.0	42.0	47.0	46.0	43.0	48.0	46.0	42.0	48.0	46.0	42.0	48.0	46.0	42.0	48.0	46.0	
%Vol	57%	76%	64%	57%	76%	65%	48%	78%	62%	60%	81%	68%	59%	77%	65%	59%	78%	66%	57%	77%	65%	

Definitions
85th Percentile Speed = The speed at or below which 85% of volume is observed to travel
15kph Pace Speed = The 15kph speed range within which the largest percentage of volume is observed to travel

Unless otherwise stated all summary information is relevant to a 24 hour day
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