Traffic Impact Assessment

BWC2/25 - Blacktown Workers Sports Club

Site A: Outdoor Sports Facilities – 221 Walters Road, Arndell Park
Site B: Seniors Living Village – 170 Reservoir Road, Arndell Park

Reference: 15.533r01v3 (Final Report)
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Contents

Overview

TRAFFIX has been commissioned by Paynter Dixon Constructions Pty Ltd to undertake a traffic impact assessment of a masterplan for the Blacktown Workers Sports Club, situated in Arndell Park, New South Wales. This master plan is presented in **Appendix A**, and envisages the future development of outdoor sports facilities (Site A) and a seniors living village (Site B).

The Blacktown Workers Sports Club is located approximately 3.0 kilometres south of Blacktown Railway Station and 30 kilometres west of the Sydney central business district. It covers approximately 21 hectares and is enclosed by Reservoir Road, Holbeche Road, Walters Road and Penny Lane.

All existing development within the Blacktown Workers Sports Club is limited to an area known as *'The Club'*, which accommodates an existing registered club, hotel and restaurant. The division of areas within the master plan is shown in **Figure 1**, whereby the remaining land forms the subject of the following submissions:

- Site A – Lot 14 Sec 4 DP6796 and Lot 10 DP818679:
    - Planning Proposal to include a 'recreational facility (outdoor)';
    - Development Application for an outdoor sports facility; and
- Site B - Lot 201 DP8804404:
    - Compatibility Certificate for a Seniors Living Village on Lot 201 DP880404.

Given the integrated nature of the master plan, this report has been prepared for all three submissions. It has been split into two parts, each for Site A and Site B, and documents the findings of our investigations for each development envisaged under these proposals.

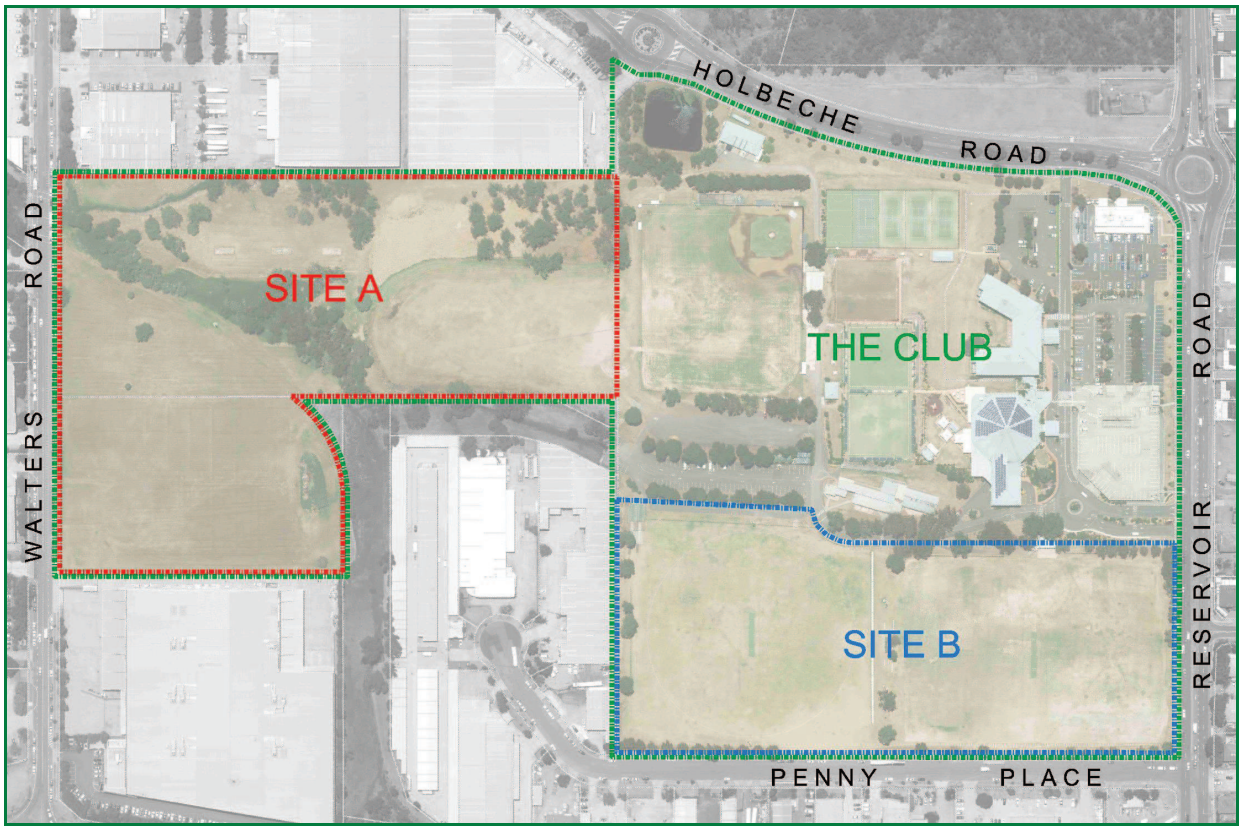


Figure 1: Blacktown Workers Sports Club

Site A

Outdoor Sports Facilities – 221 Walters Road, Arndell Park

A1. Introduction

The master plan for the Blacktown Workers Sports Club (BWSC) envisages the construction of outdoor sports facilities on Site A, at 221 Walters Road in Arndell Park.

The following submissions are sought for Site A:

- Planning Proposal to permit use of the this land for a '*recreational facility (outdoor)'* and
- Development Application for outdoor sports facilities that is understood to include sports fields, grandstands and car parks.

This report documents the parking requirements and traffic impacts associated with these future developments under these submissions. The overall site is located in the City of Blacktown local government area, for which Council will act as the consent authority for these proposals.

Site A proposes less than 200 car parking spaces and therefore does not require referral to the Roads and Maritime Services under the provisions of State Environmental Planning Policy (Infrastructure) 2007.

This part is structured as follows:

- Section A2: Describes the site and its location
- Section A3: Documents existing traffic conditions
- Section A4: Describes the proposed development that will be permissible
- Section A5: Assesses the parking requirements
- Section A6: Assesses traffic impacts
- Section A7: Presents the overall study conclusions.

A2. Location and Site

Site A is located at 221 Walters Road in Arndell Park and occupies the western side of BWSC. It is legally described as Lot 14 in DP6796 and Lot 10 in DP818679.

Site A has an irregular configuration with an area of approximately seven hectares. It has a single street frontage facing west to Walters Road that measures approximately 250 metres. The remainder of the site is bounded by the area within the BWSC known as 'The Club' to the east and by industrial developments to the north and south.

Site A currently comprises of vacant land and informal sports fields. Vehicular access is provided via a gate from an unsealed shoulder on Walters Road and by internal circulation roads within 'The Club' area of BWSC.

A Location Plan is presented in **Figure A1**, with a Site Plan presented in **Figure A2**.

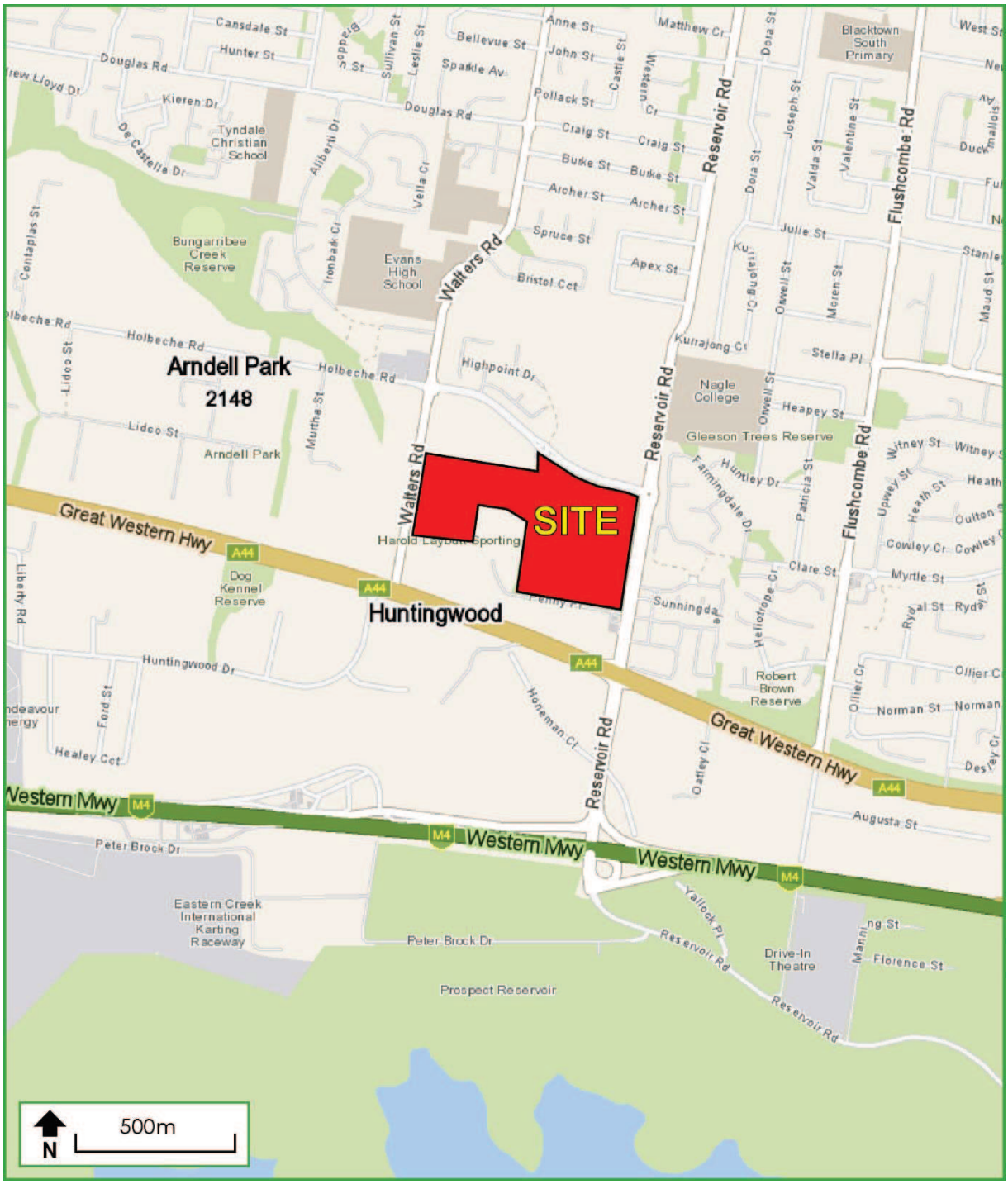


Figure A1: Location Plan

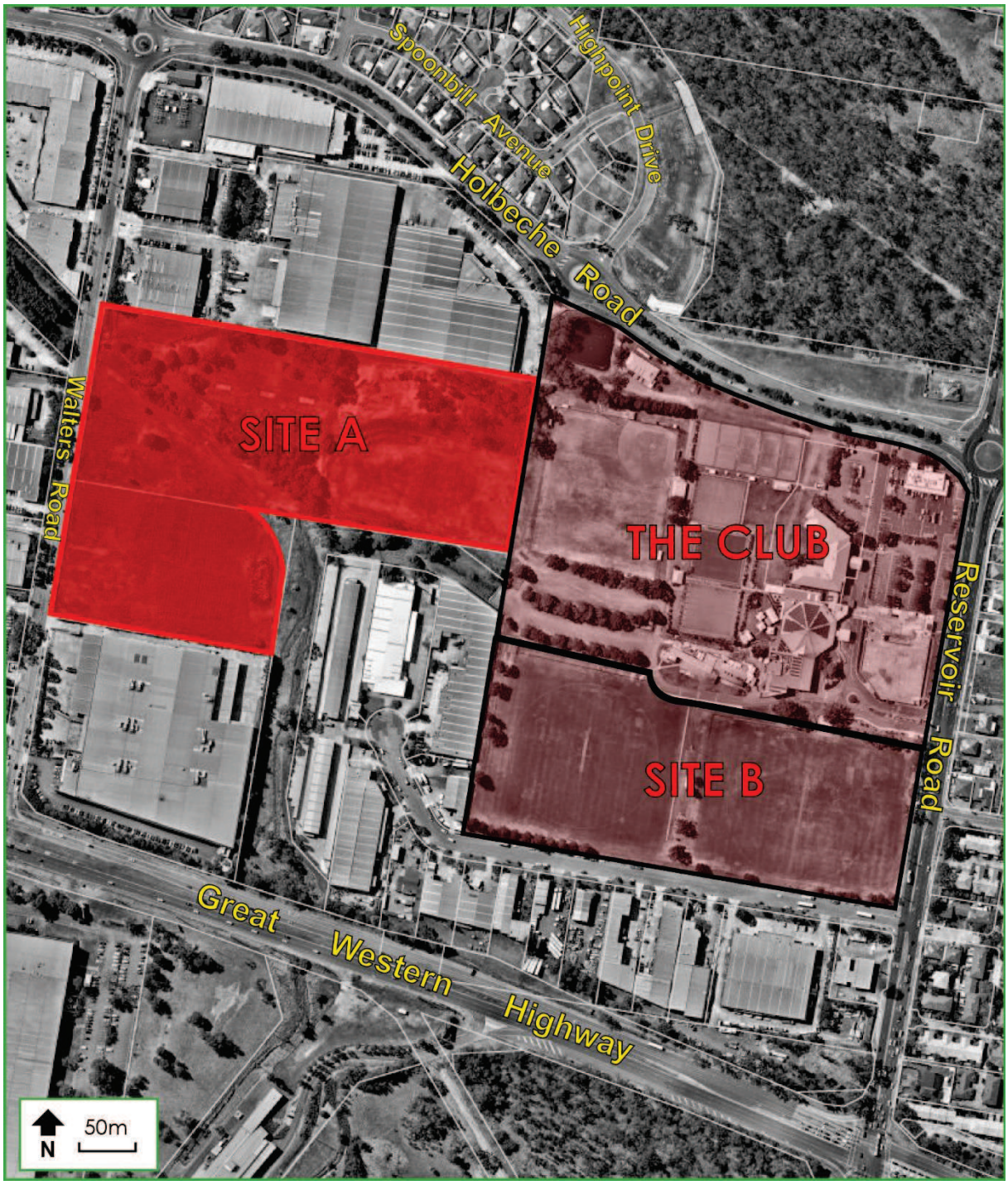


Figure A2: Site Plan

A3. Existing Traffic Conditions

A3.1. Road Hierarchy

The road hierarchy in the vicinity of the site is shown in **Figure A3** with the following roads of particular interest:

- Great Western Highway: a highway (HW5) that generally runs in an east-west direction between Broadway at Haymarket in the east and Brilliant Street at Bathurst to the west. In the vicinity of the site, it carries approximately 39,900 vehicles per day (2012 AADT) and has a posted speed limit of 80 km/h. The Great Western Highway accommodates three lanes of traffic in each direction within a divided carriageway on approach to Reservoir Road, whilst accommodating two lanes of traffic in each direction further west on approach to Walters Road.

- Reservoir Road: an RMS Main Road (MR683) that runs in a north-south direction between Bungarribee Road in the north and the M4 Western Motorway to the south (Reservoir Road continues as a local road south of the M4 Western Motorway). It carries approximately 21,900 vehicles per day (2005 AADT) and has a posted speed limit of 60 km/h. Between Holbeche Road, Reservoir Road accommodates two lanes of traffic in each direction within a divided carriageway.

- Holbeche Road: a local road that runs in an east-west direction between Reservoir Road in the east and Doonside Road to the west. Between Reservoir Road and Walters Road, it has a posted speed limit of 50 km/h and accommodates two lanes of traffic in each direction within a divided carriageway.

- Walters Road: a local road that runs in a north-south direction between Kildare Road in the north and the Great Western Highway to the south. It has a posted speed limit of 50 km/h and accommodates a single lane of traffic in each direction within an undivided carriageway.

It can be seen from Figure A3 that the site is conveniently located with respect to the arterial and local road systems serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts.

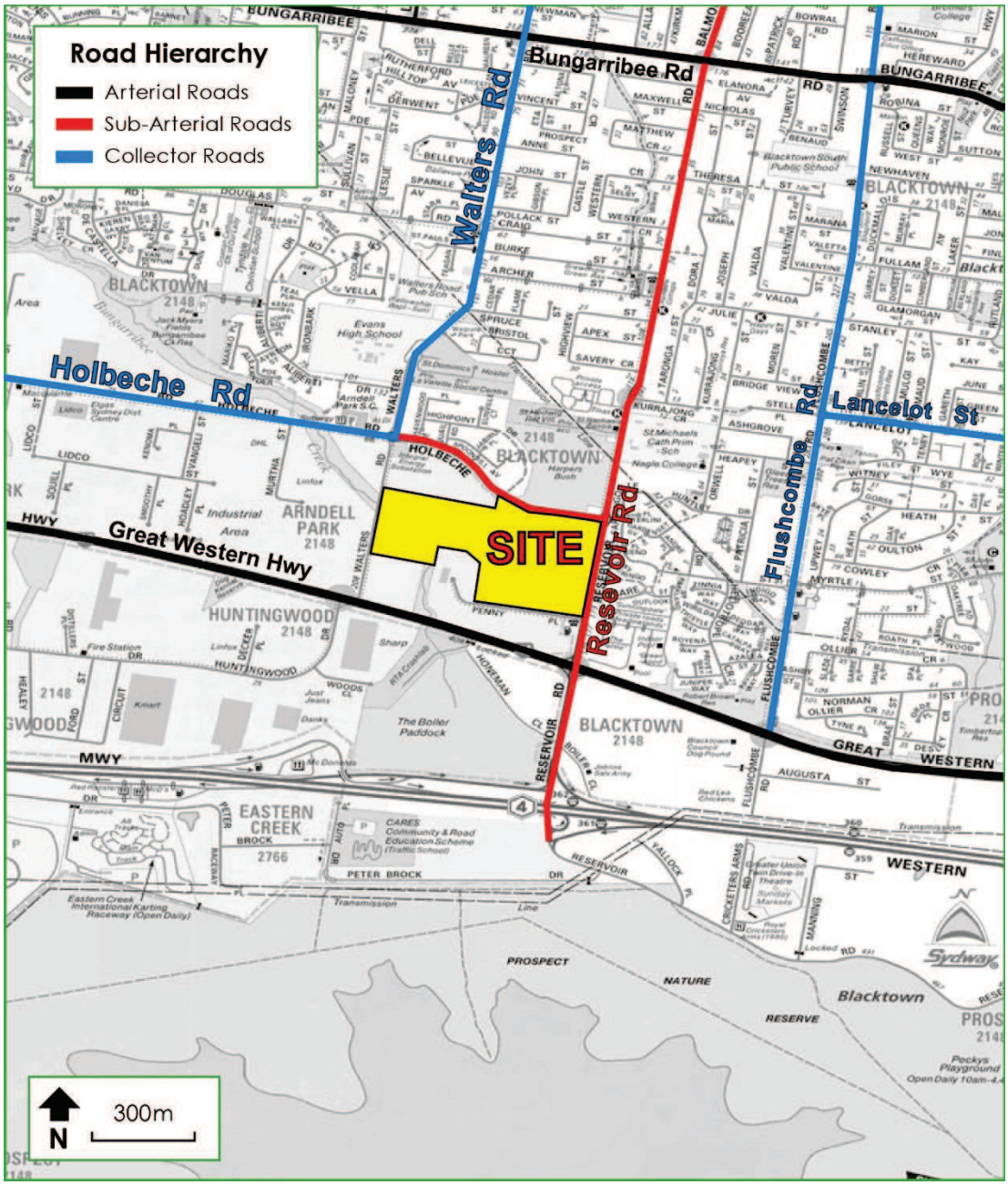


Figure A3: Road Hierarchy

A3.2. Key Intersections

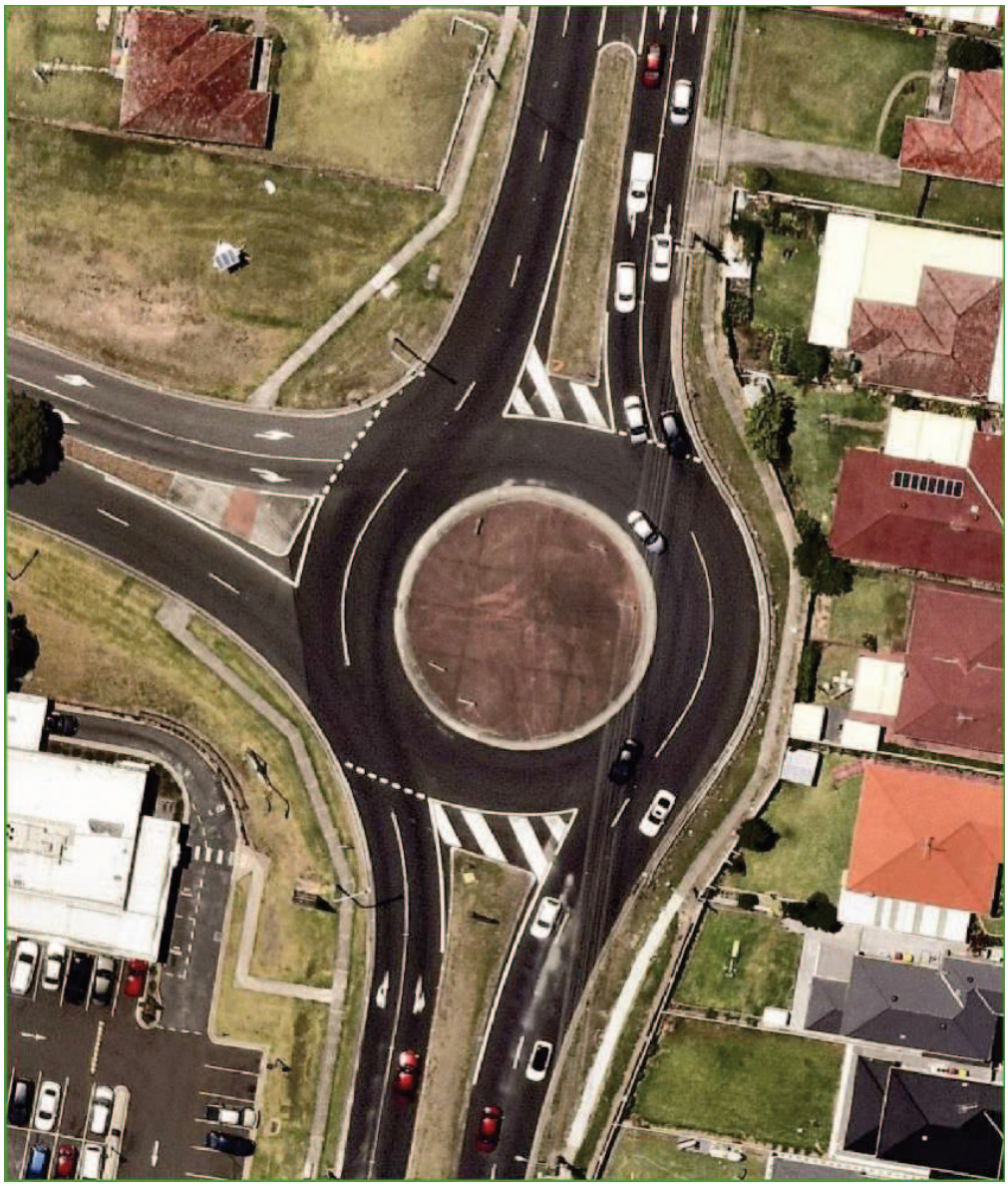
The key intersections in the vicinity of the site are shown below and provide an understanding of the existing road geometry and alignment:

Source: Near Map

Figure A4: BWSC Access and Holbeche Road

It can be seen from **Figure A4** that Holbeche Road and an existing access at 'The Club' section of BWSC forms a priority controlled 'T' junction. As Holbeche Road is divided, the intersection permits left-

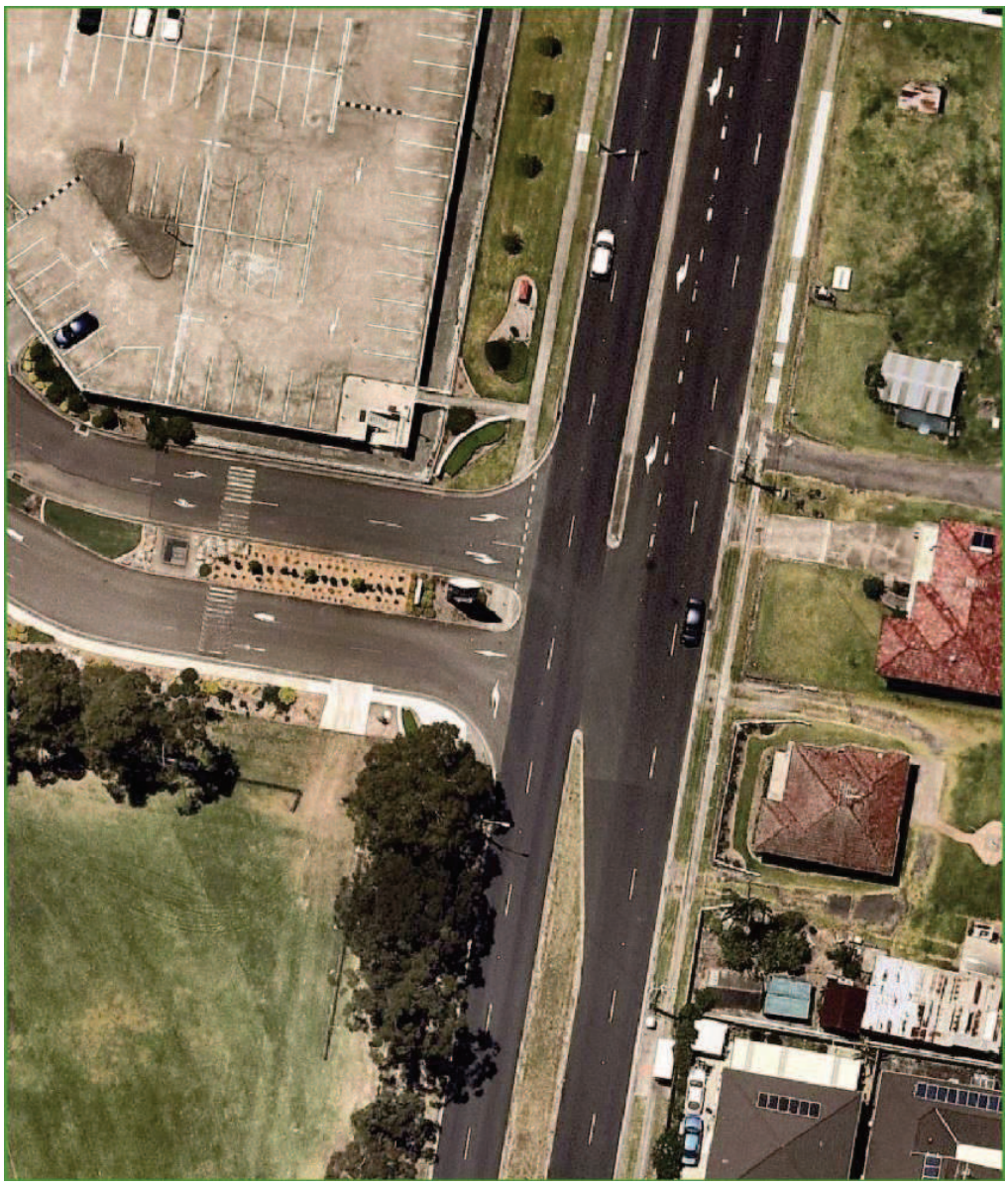
in / left-out movements only from the existing BWSC access. The intersection operates in a similar arrangement to a proposed BWSC access on Holbeche Road further west as shown in the master plan in **Appendix A**. That proposed intersection is subject to a separate application.



Source: Near Map

Figure A5: Intersection of Reservoir Road and Holbeche Road

It can be seen from **Figure A5** that Reservoir Road and Holbeche Road forms a two-lane roundabout. That is, two entry and exit lanes provided on each of the three legs of the intersection. Both lanes on the north and south approaches of Reservoir Road are permitted to proceed straight, whilst left turn only and right turn only lanes are provided on the Holbeche Road approach.



Source: Near Map

Figure A6: BWSC Access and Reservoir Road

It can be seen from **Figure A6** that Reservoir Road and the existing eastern access for the BWSC forms a priority controlled 'T' seagull junction. An auxiliary lane is provided for vehicles to turn right from the north approach of Reservoir Road, whilst storage area is provided for a vehicle when turning right from the BWSC access. A left turn only and right turn only lane is provided on the BWSC approach.

A3.3. Existing Intersection Performance

For the purposes of the assessment of traffic impacts of this development, surveys were undertaken of the following intersections related to the site:

- Reservoir Road / BWSC Access
- Reservoir Road / Penny Place
- Holbeche Road / (Existing) BWSC Access

These surveys were undertaken on a typical weekday morning between 7:00am-9:00am and afternoon between 4:00pm-6:00pm which corresponds to the expected peak periods of the local road network and the respective peak periods for the future retail and commercial uses. The results of the surveys were analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions. In particular, a SIDRA network model has been prepared to account for the coordination of the two closely spaces signalised intersections and indeed to determine the associated impacts of the existing access locations along Smith Street (all movements permitted) and Eastern Valley Way (left in, left out).

The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below in **Table A1**:

Table A1: Intersection Performance Characteristics

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided in **Table A2** for the morning (AM) and afternoon (PM) peak hours. Reference should also be made to the SIDRA outputs provided in **Appendix B**, which provide detailed results for individual lanes and approaches.

Table A2: Existing Intersection Performance –SIDRA Network

Intersection Description	Control Type	Period	Degree of Saturation	Average Delay (sec)	Level of Service
Reservoir Road / Site Access	Priority (Seagull)	AM	0.060	20.6	B
		PM	0.091	26.2	B
Reservoir Road / Penny Place	Priority (Seagull)	AM	0.104	25.4	B
		PM	0.277	39.1	C
Holbeche Road / (Existing) Site Access	Priority Left-in Left-out)	AM	0.184	4.6	A
		PM	0.194	4.6	A

* Note: Results shown are for the movement with the highest delay, in accordance with RMS Guidelines.

It can be seen from Table 2 that all key intersections operate satisfactorily under the existing 'base case' scenario, with Level of Service of C or better and with moderate delays, during both peak periods. It is stressed that the most relevant use of this analysis is to compare the relative change in the performance parameters as a result of future and proposed development. This is discussed further in Section A6.

A3.4. Public Transport

The existing public transport services that operate in the locality is shown in **Figure A7**. Bus stops within 400 metres of bus stops on Holbeche Road and Reservoir Road are serviced by the following routes:

- 722/4: Blacktown & Prospect / Arndell Park Loop
- 723: Blacktown & Prospect Loop
- 724: Blacktown to Mt Druitt

These bus services provide links to Blacktown Railway Station and other key regional bus services.

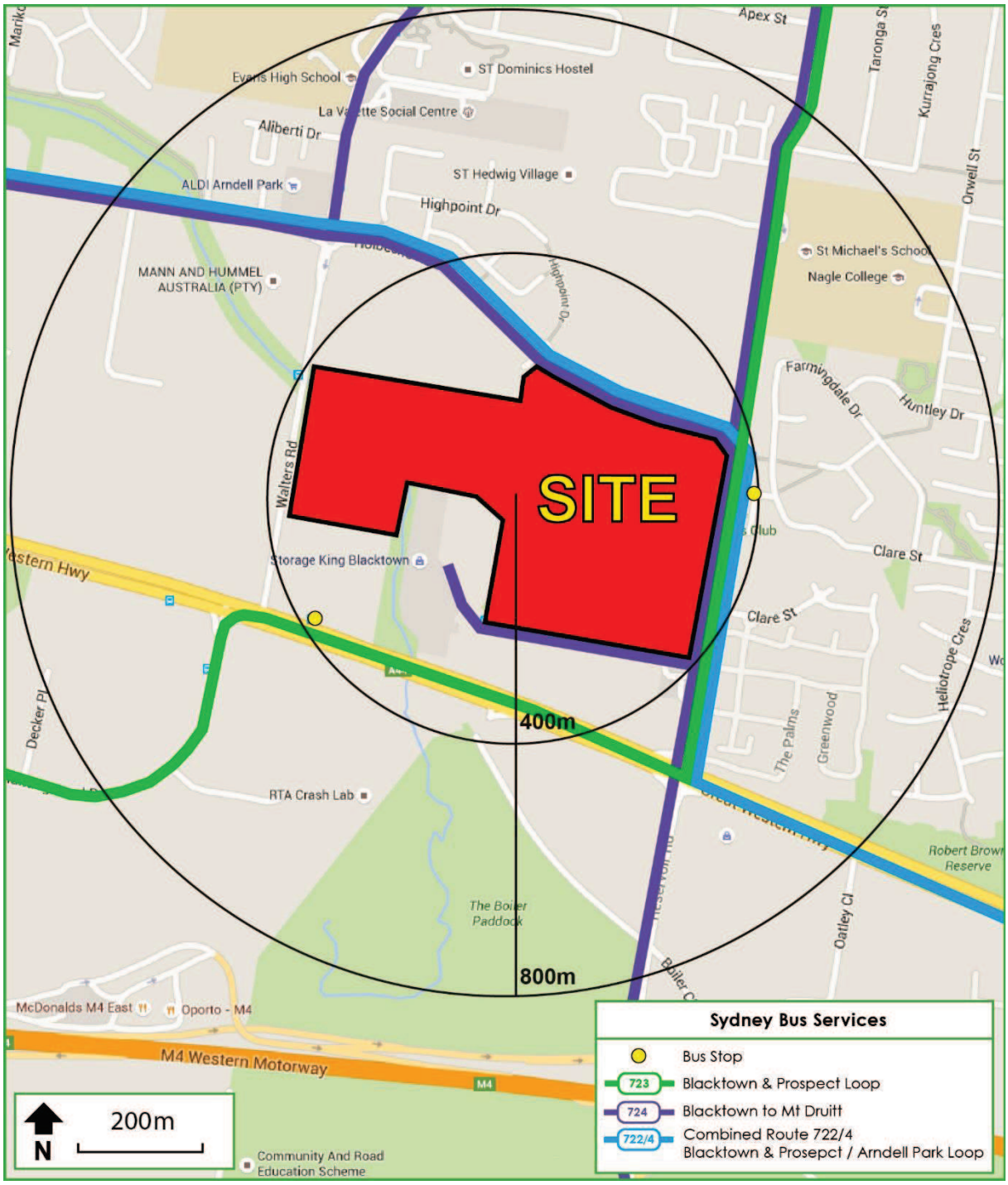


Figure A7: Public Transport

A4. Description of Proposed Development

A4.1. Proposal

In summary, the Planning Proposal seeks amendment under the *Blacktown Local Environmental Plan 2015* to allow '*recreational facility (outdoor)'* as a permissible use for Site A. It is envisaged under the BWSC master plan that a subsequent development application would seek approval for:

- Construction of:
  - Two rugby league sports grounds (with a synthetic cricket pitch) and an associated grandstand;
  - Four soccer fields (two full-size with a synthetic cricket pitch), four futsal fields and an associated grandstand;
- Provision for 153 parking spaces, split into two at-grade parking areas with 50 spaces to be accessed directly from Walters Road and 103 accessed from a newly formed private access road; and
- Construction of an additional Walters Road access that links to a newly formed private access road with controlled access.

The parking requirements and traffic impacts arising from the proposed development are discussed in Sections A5 and A6 respectively. Reference should be made to the master plan presented in **Appendix A**.

A4.2. Peak Times of Activity

The applicant has advised the months of regular season for the following sports that will be played at the proposed facilities:

- Soccer: February to September
- Rugby League: March to September

The applicant has also provided preliminary information regarding the peak times and attendances for each sport. These are summarised in **Table A3** below.

Table A3: Peak Times and Attendances

Sport	Weekday		Weekend	
	Peak Times	Peak Attendance	Peak Times	Peak Attendance
Soccer	Mon – Thurs: 5pm – 9pm Fri: 6pm-9pm	200	Sat: 8:30am – 7pm Sun: 8:30	500
Rugby League	Tue – Fri: 5pm – 9pm	200	Sat - Sun: 9am-5pm	200+

It is understood that these fields are suitable for hosting cricket matches during the summer season. As these fields would need to be consolidated into two grounds, the overall attendances for cricket matches is expected to be less than for winter sports. Accordingly, the parking demands and traffic impacts have been assessed for soccer and rugby league events, to account for peak conditions.

A5. Parking Requirements

A5.1. Sports Fields

The *Blacktown Development Control Plan 2015 (DCP)* does not specify parking rates for sports fields. As such, a 'first principles' approach has been adopted for this use based on the peak times and attendances provided by the applicant.

Peak parking demands are expected to occur on weekends where grandstands will accommodate larger attendances. It is however assumed that the grandstands will only reach capacity for major games (e.g. first division matches or grand finals) and that regular sports matches will attract a smaller crowd. As such, attendances of 500 people and 200 people have been adopted for major and regular sports matches, respectively.

Furthermore, it is envisaged that although both soccer and rugby league fields will have grandstands, major games for each sport will not occur concurrently. That is, major rugby league matches will coincide with regular soccer matches and vice versa.

It can be seen from the above that the proposed sports fields are estimated to accommodate a peak attendance of 700 people during weekends. Given that sports teams tend to be formed around a common area (e.g. suburb) and that family members will make up a significant proportion of audiences, a car occupancy ratio of 3.0 persons per car has been assumed for weekend sports matches. This equates to a peak parking demand of 233 parking spaces.

The above parking demand is considered to be for a maximum scenario and is not expected to occur very frequently. It also does it take into account the frequent turnover of parking spaces which take place between sports matches. It is therefore considered that a 85th percentile parking demand of 198 parking spaces is an appropriate parking provision, notwithstanding that any additional on-street parking demands are likely to occur on weekends where on-street demand from neighbouring industrial developments are generally low.

In response, it is proposed that the demand for 198 spaces for these events will rely on existing parking within the BWSC (78 spaces) in addition to the proposed 153 at-grade parking spaces (231 in total). This indicates a 33 space surplus. However, the demands of the gymnasium are additional and will also rely on the BWSC parking and this is considered in the following section.

A5.2. Sports Facility (Gymnasium)

The DCP stipulates a parking rate for a gymnasiums of one space per 25m^2 gross floor area (GFA). Application of this rate to the proposed sports facility, that is separate to Site A submissions and assumed to have 400m^2 GFA, results in a requirement to provide 16 parking spaces. It is noted that an existing at-grade car park to the south of this area, as shown in the master plan, accommodates 78 parking spaces. These spaces are proposed to be relied upon for the Site A sports facilities, as discussed below and can be accommodated in the 33 space surplus as discussed above.

A5.3. Summary

Collectively, the 85th percentile parking demand for the proposed Site A sports facilities and gymnasium is 214 parking spaces, which will occur during weekend periods. In response, the overall provision of 231 parking spaces, comprising of 153 newly proposed at-grade spaces and 78 existing at-grade spaces, will accommodate the majority of these demands.

A5.4. Accessible Parking

The DCP required accessible parking to be provided in accordance with the BCA. In turn, the BCA recommends that for an *assembly building (Class 9b)*, which includes a sports stadium, sporting or other club, one accessible parking spaces or part thereof should be designed as an accessible space. This equates to five (5) accessible parking spaces in the case of the proposed development. Whilst the master plan has not yet been developed in full detail, it is anticipated that accessible parking spaces will be provided in accordance with any condition of consent.

A5.5. Bicycle Facilities

The DCP provides the following advice in relation to bicycle parking:

“Applicants are encouraged to incorporate, in the design of their buildings, safe storage/parking areas for bicycles, with adequate shower and change facilities provided for staff (where appropriate)”

Whilst the master plan has not yet been developed in full detail, it is anticipated that bicycle parking will be provided in accordance with any condition of consent.

A5.6. Servicing

Servicing demands for the proposed development will principally relate to maintenance of sports fields. It is therefore considered suitable for vehicles to park on the sports fields, via controlled access from Walters Road.

A6. Traffic Impacts

A6.1. Trip Generation

As sports activities take place in evenings only during weeks, traffic impacts for the outdoor sports facilities has been assessed during the regular network PM peak period. Nonetheless, the trip generation for other developments within the BWSC master plan have been included for both AM and PM peak periods to form a worst case scenario and is discussed separately below.

Sports Fields

Based on the spread of activity anticipated by the client and described in **Table A3**, up to 240 people have been estimated to use the proposed sporting fields during the regular PM network peak between 5:00pm and 6:00pm. This has been split into 200 arrivals and 40 departures (to account for parents dropping off players). As these sessions will be for training sessions, a reduced a reduced car occupancy of 1.8 people per car has been adopted, which equates to the following traffic generation:

- No vehicle trips during the AM peak period; and
- 133 vehicle trips per hour during the PM peak period (111 in, 22 out).

Other Developments Proposed in the BWSC Master Plan:

Gymnasium (The Club):

The RMS Guide to Traffic Generating Developments recommends a trip generation rate of 9 vehicle trips per 100m^2 GFA for metropolitan sub-regional areas during the PM peak hourly period. This equates to the following traffic generation in the case of a 400m^2 GFA gymnasium.

- 36 vehicle trips per hour during the AM peak period (18 in, 18 out); and
- 36 vehicle trips per hour during the PM peak period (18 in, 18 out).

Child Care Centre (The Club):

A separate proposal for a child care centre at 'The Club' section of BWSC has been assumed to have a capacity for 150 placements. The RMS Guide recommends a trip generation rate of 0.8 and 0.7 vehicle trips per child during AM and PM peak periods respectively. However, given that the BWSC accommodates many existing sources of employment, a reduction factor of 0.8 is considered suitable as a proportion of trips would already take place by parents whom work at the site. Having regard for the above, the proposed child care centre will generate the following traffic:

- 84 vehicle trips per hour during the AM peak period (42 in, 42 out); and
- 96 vehicle trips per hour during the PM peak period (48 in, 48 out).

Independent Living Units (Site B)

It is proposed in Site B of the BWSC to construct up to 800 Independent Living Units, a Residential Aged Care Facility for 160 beds and ancillary retail/commercial space. The traffic impacts of this submission is discussed in the second part of this report for Site B, and has been assessed to generate:

- 352 vehicle trips per hour during the AM peak period (70 in, 282 out); and
- 352 vehicle trips per hour during the PM peak period (282 in, 70 out).

Total Traffic Generation for BWSC Master Plan

To assess a worst case scenario, the trip generation for other developments within in the BWSC master plan has been included to assess the traffic generation for all future development. Reference should be made to the additional volumes established in Section A6 in the first part of this report, where taking into account all future uses, the following traffic will be generated:

- 472 vehicle trips per hour during the AM peak period; and
- 617 vehicle trips per hour during the PM peak period

The above traffic generation forms the basis of the SIDRA modelling undertaken for key intersections impacted by these additional volumes. As the BWSC will have many existing and proposed site access, trip distributions for each development have been estimated as discussed below.

A6.2. Trip Distribution

Having respect to the proximity of each development to site accesses and the general location of the site within the region, the following trip distributions have been adopted for the SIDRA intersection modelling undertaken in Section 6.3.

- ILU and RACF: 60% Reservoir Road / 40% Penny Lane
- Retail: 60% Reservoir Road / 40% Penny Lane
- Sports Fields: 30% Walters Road / 50% Holbeche Road (new) / 20% Reservoir Road
- Gymnasium: 50% Holbeche Road (new) / 50% Reservoir Road
- Child Care Centre: 10% Holbeche Road (new) / 90% Reservoir Road

Furthermore, as the site is conveniently located between Blacktown to the north and the M4 Motorway / Great Western Highway to the south, a 50% split between left and right movements has been assumed for the Reservoir Road, Penny Lane and Walters Road accesses. Conversely the proposed Holbeche Road access will be left-in and left-out only.

A6.3. Peak Period Intersection Performances

A summary of the modelling results provided in **Table A4** below. Reference should also be made to the detailed SIDRA outputs which are provided in **Appendix C**.

Table A4: Intersection Performance SIDRA Network: Existing & Future

Intersection Description	Control Type	Period	Degree of Saturation	Average Delay (sec)	Level of Service
Reservoir Road / Site Access	Priority (Seagull)	AM	0.677	43.1	D
		PM	0.567	55.1	D
Reservoir Road / Penny Place	Priority (Seagull)	AM	0.361	27.5	B
		PM	0.415	44.7	D
Holbeche Road / (Future) Site Access	Priority (Left-in Left-out)	AM	0.184	4.6	A
		PM	0.021	5.4	A

* Note: Results shown are for the movement with the highest delay, in accordance with RMS Guidelines.

The future development on Site A is estimated to generate 169 vehicle trips per hour during the critical PM peak period (with no traffic volumes assumed for the AM peak period). The analysis in any case has focussed on the cumulative impacts associated with the proposed Seniors Living Village on Site B, which is considered in the first part (Part A) of this report, and the proposed child care centre in 'The Club' section of the BWSC.

The results indicate that full development of BWSC will result in minimal increases in delays for all site accesses, with a Level of Service no worse than D experienced for any intersection. On this basis, it is concluded that the traffic impacts of the proposed sporting facilities at Site A are considered to be acceptable and can be more accurately examined in a subsequent development application stage.

A7. Conclusions

In summary:

- Submissions for Site A of the Blacktown Workers Sports Club involve a Planning Proposal to permit use for a recreational facility (outdoor), where a subsequent development application would seek approval to construct sports fields, grandstands and at-grade parking areas. The applicant has provided information regarding the sports to be played at the proposed facility, where a maximum attendance of 200 persons is expected for each sport during training periods on weekdays, whilst up to 500 people may attend a major sports event during weekend periods. These have been adjusted to reflect the 85th percentile demand level at both venues.

- The addition of 153 parking spaces to supplement an existing 78 parking spaces adjacent to Site A (231 spaces in total) will readily accommodate the 85th percentile parking demand of 198 parking spaces associated with major sports matches on weekends, as well as the 16 space demand associated with the gymnasium. The remaining 17 spaces will be available to accommodate demands above the design level.

- Future development on Site A has been estimated to generate up to 169 vehicle trips per hour during the PM peak period and no volumes during the AM peak period. Based on the distributions of these volumes across all site accesses, the traffic impacts of this assessment has been modelled using SIDRA for a worst case scenario involving other future developments on-site at the BWDC (the cumulative assessment), with the use of the proposed Seniors Living Village at Site B and proposed child care centre at 'The Club' section taken into account.

- The results indicate that full development of BWSC (with 472 veh/hr and 617 veh/hr during AM and PM peak periods respectively) will result in minimal increases in delays for all site accesses with a Level of Service of no worse than D experienced for every intersection. On this basis, the traffic impacts of the proposed sports facilities at Site A are considered to be acceptable.

It is therefore concluded that the proposed development on Site A is supportable on traffic planning grounds and will operate satisfactorily.

Site B

Seniors Living Village – 170 Reservoir Road, Arndell Park

B1. Introduction

The master plan for the Blacktown Workers Sports Club proposes a Compatibility Certificate for a Seniors Living Village within Site B. It is understood that this submission will propose:

- 800 Independent Living Units;
- A Residential Aged Care Facility providing 160 beds; and
- 300m^2 gross floor area of retail/commercial space.

This report documents the parking requirements and traffic impacts of the above development. As the site is located in the City of Blacktown local government area, it has been assessed under that Council's controls, in addition to the provisions of State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004.

The development is expected to contain more than 200 car parking spaces and therefore requires referral to the Roads and Maritime Services (RMS) under the provisions of State Environmental Planning Policy (Infrastructure) 2007.

This part is structured as follows:

- Section A2: Describes the site and its location
- Section A3: Documents existing traffic conditions
- Section A4: Describes the proposed and permissible developments
- Section A5: Assesses the parking requirements
- Section A6: Assesses traffic impacts
- Section A7: Presents the overall study conclusions.

B2. Location and Site

Site B is located at 170 Reservoir Road in Arndell Park and is legally described as Lot 201 in DP880404. It occupies the south eastern portion of the Blacktown Workers Sports Club (BWSC)

Site B has a rectangular shaped configuration and with an area of approximately five hectares. It has an eastern frontage to Reservoir Road that measures approximately 140 metres and a southern frontage to Penny Lane that measures approximately 360 metres. The remainder of the site is bounded by the area within the BWSC known as 'The Club' to the north and by industrial developments to the west.

Site B currently comprises of two sports fields. Vehicular access is provided via an internal circulation road within 'The Club' area of BWSC that in turn, is most conveniently accessed from Reservoir Road.

A Location Plan is presented in **Figure B1**, with a Site Plan presented in **Figure B2**.

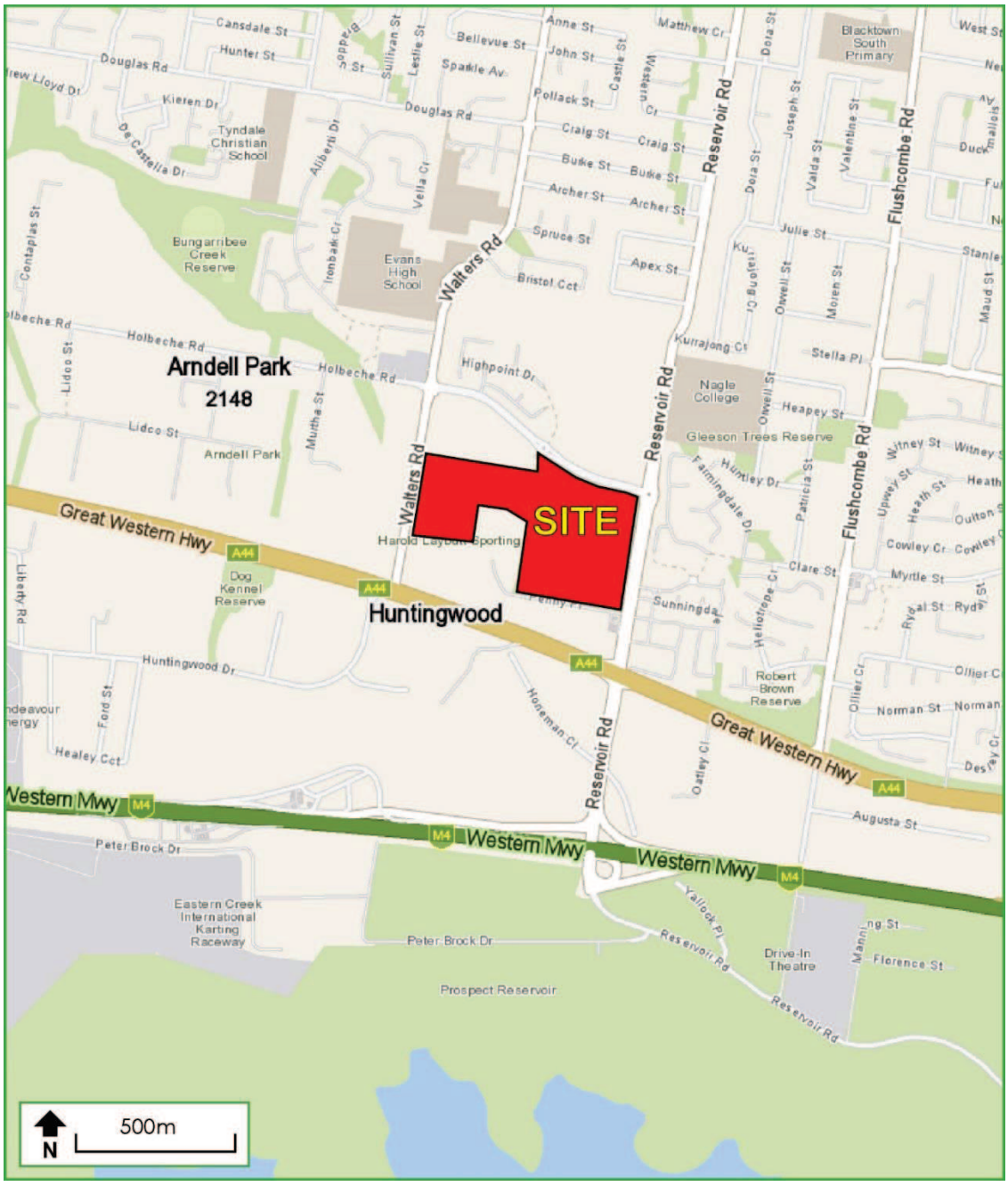


Figure B1: Location Plan

Figure B2: Site Plan

B3. Existing Traffic Conditions

B3.1. Road Hierarchy

The road hierarchy in the vicinity of the site is shown in **Figure B3** with the following roads of particular interest:

- Great Western Highway: a highway (HW5) that generally runs in an east-west direction between Broadway at Haymarket in the east and Brilliant Street at Bathurst to the west. In the vicinity of the site, it carries approximately 39,900 vehicles per day (2012 AADT) and has a posted speed limit of 80 km/h. The Great Western Highway accommodates three lanes of traffic in each direction within a divided carriageway on approach to Reservoir Road, whilst accommodating two lanes of traffic in each direction further west on approach to Walters Road.

- Reservoir Road: an RMS Main Road (MR683) that runs in a north-south direction between Bungarribee Road in the north and the M4 Western Motorway to the south (Reservoir Road continues as a local road south of the M4 Western Motorway). It carries approximately 21,900 vehicles per day (2005 AADT) and has a posted speed limit of 60 km/h. Between Holbeche Road, Reservoir Road accommodates two lanes of traffic in each direction within a divided carriageway.

- Holbeche Road: a local road that runs in an east-west direction between Reservoir Road in the east and Doonside Road to the west. Between Reservoir Road and Walters Road, it has a posted speed limit of 50 km/h and accommodates two lanes of traffic in each direction within a divided carriageway.

- Penny Place: a local road that extends west of Reservoir Road and forms a cul-de-sac. It has a 50 km/h speed limit and accommodates a single lane of traffic within an undivided carriageway.

It can be seen from **Figure B3** that the site is conveniently located with respect to the arterial and local road systems serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts.

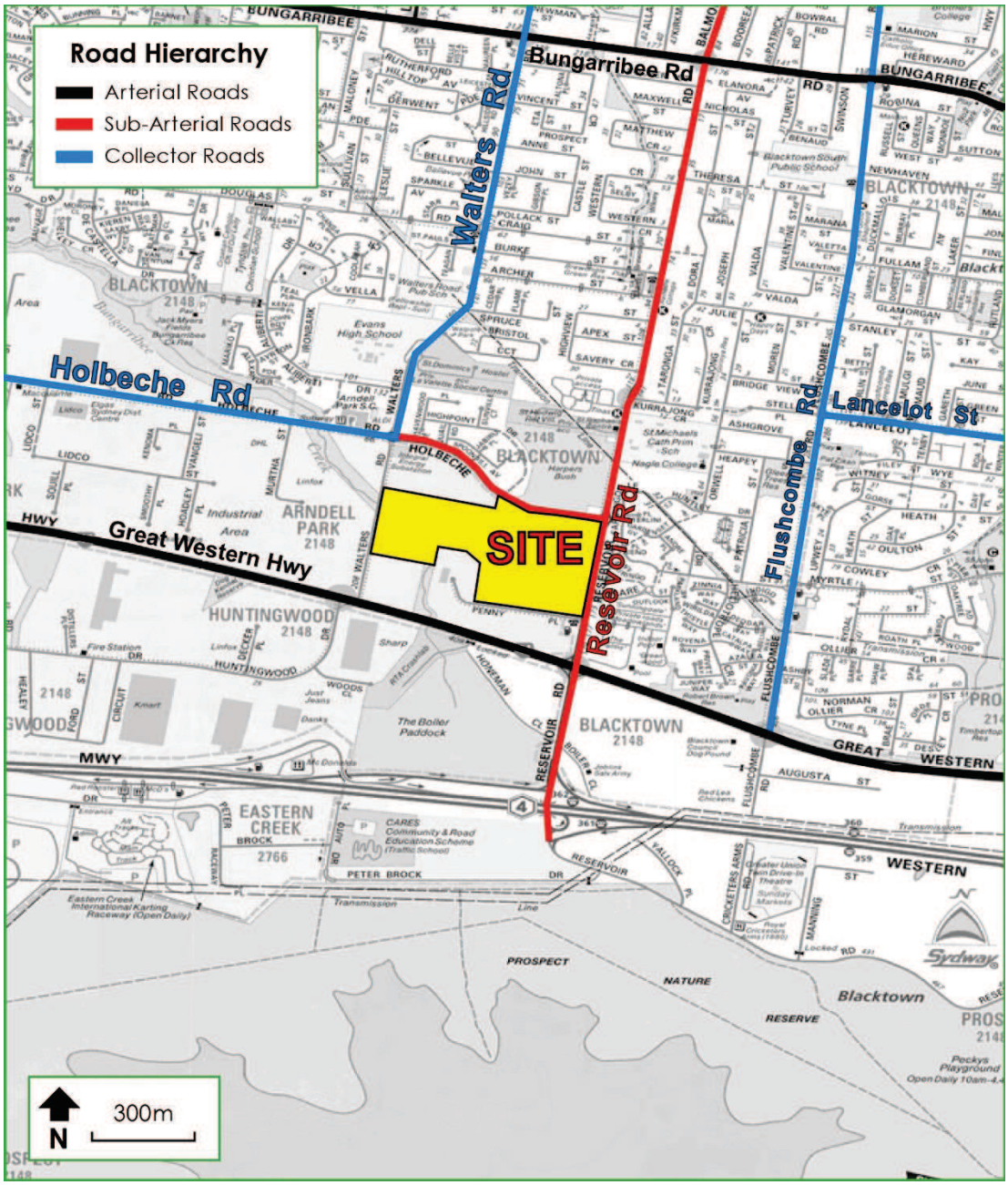
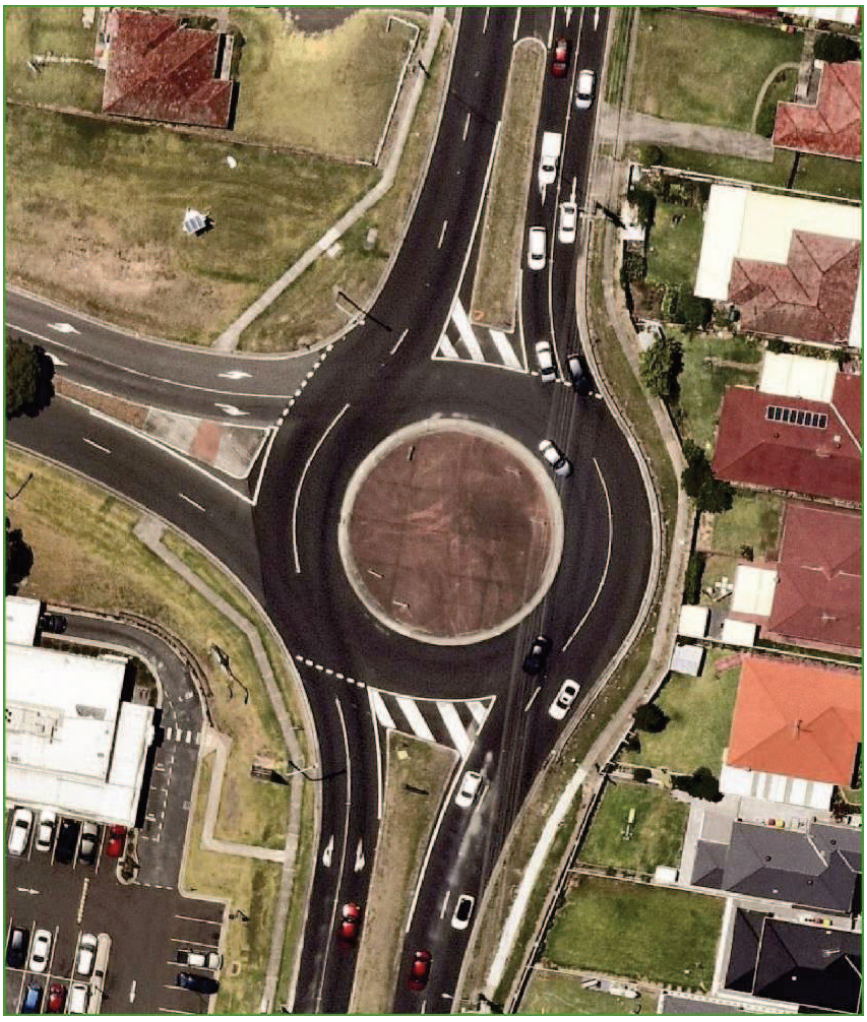


Figure B3: Road Hierarchy

B3.2. Key Intersections

The key intersections in the vicinity of the site are shown below and provide an understanding of the existing road geometry and alignment:

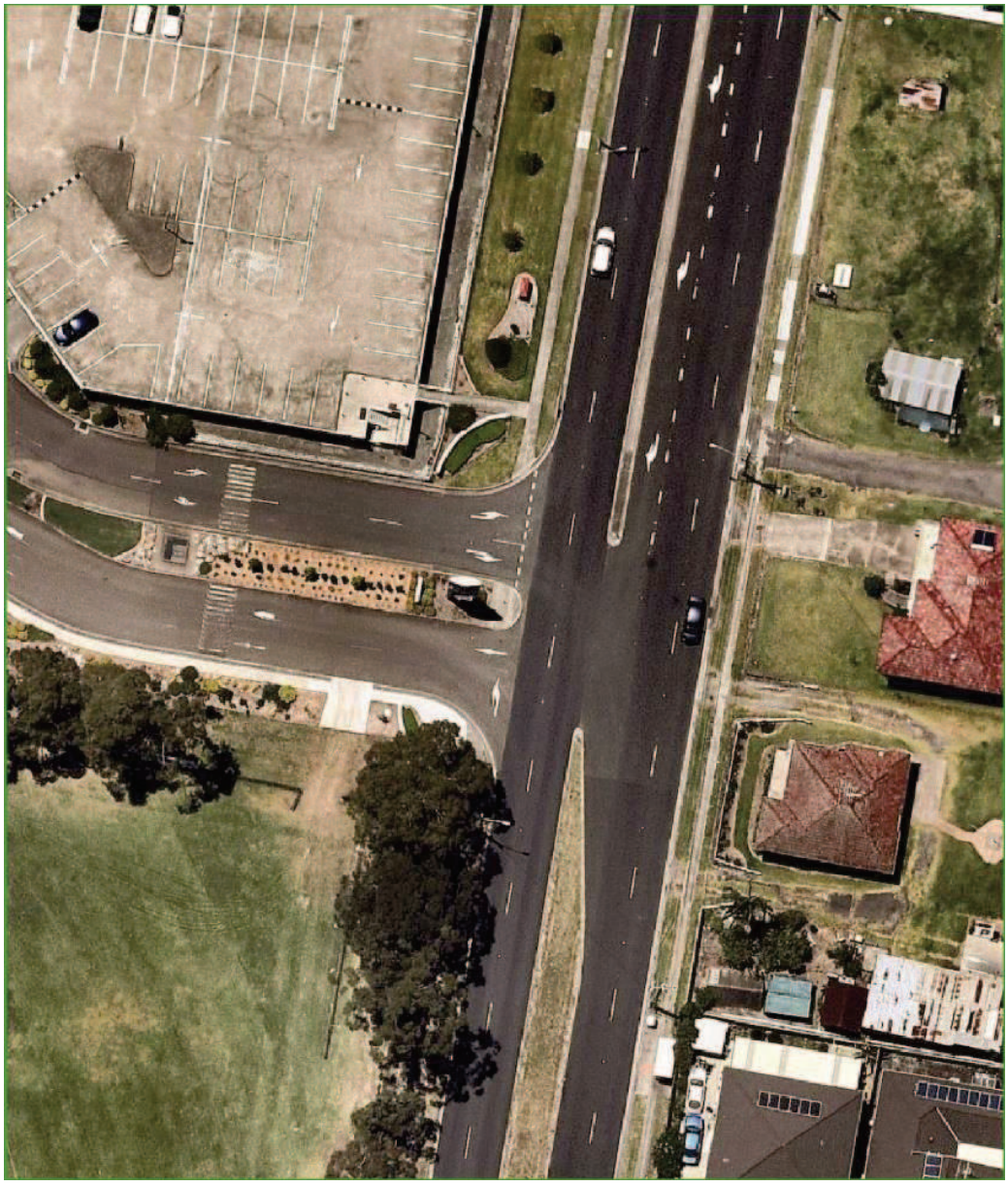


Source: Near Map

Figure B4: Intersection of Reservoir Road and Holbeche Road

It can be seen from **Figure B4** that Reservoir Road and Holbeche Road forms a two-lane roundabout, with two entry and exit lanes provided on each of the three legs of the intersection. Both lanes on the

north and south approaches of Reservoir Road are permitted to proceed straight, whilst left turn only and right turn only lanes are provided on the Holbeche Road approach.



Source: Near Map

Figure B5: BWSC Access and Reservoir Road

It can be seen from **Figure B5** that Reservoir Road and the existing southern access for the BWSC forms a priority controlled 'T' seagull junction. An auxiliary lane is provided for vehicles to turn right from the north approach of Reservoir Road, whilst storage area is provided for a vehicle when turning right from the BWSC access. A left turn only and right turn only lane is provided on the BWSC access approach.

Source: Near Map

Figure B6: BWSC Access and Holbeche Road

It can be seen from **Figure B6** that Holbeche Road and an existing access at 'The Club' section of BWSC forms a priority controlled 'T' junction. As Holbeche Road is divided, the intersection permits left-in / left-out movements only from the existing BWSC access. The intersection operates in a similar arrangement to a proposed BWSC access on Holbeche Road further west as shown in the master plan in **Appendix A**. That proposed intersection will be subject to a separate application.

B3.3. Key Intersections

For the purposes of the assessment of traffic impacts of this development, surveys were undertaken of the following intersections related to the site:

- Reservoir Road / Site Access
- Reservoir Road / Penny Place
- Holbeche Road / (Existing) BWSC Access

These surveys were undertaken on a typical weekday morning between 7:00am-9:00am and afternoon between 4:00pm-6:00pm which corresponds to the expected peak periods of the local road network and the respective peak periods for the future retail and commercial uses. The results of the surveys were analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions. In particular, a SIDRA network model has been prepared to account for the coordination of the two closely spaces signalised intersections and indeed to determine the associated impacts of the existing access locations along Smith Street (all movements permitted) and Eastern Valley Way (left in, left out).

The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown in **Table B1** below:

Table B1: Intersection Performance Characteristics

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided in **Table B2** for the morning (AM) and afternoon (PM) peak hours. Reference should also be made to the SIDRA outputs provided in **Appendix C**, which provide detailed results for individual lanes and approaches.

Table B2: Existing Intersection Performance –SIDRA Network

Intersection Description	Control Type	Period	Degree of Saturation	Average Delay (secs)	Level of Service
Reservoir Road / Site Access	Priority (Seagull)	AM	0.677	43.1	D
		PM	0.567	55.1	D
Reservoir Road / Penny Place	Priority (Seagull)	AM	0.361	27.5	B
		PM	0.415	44.7	D
Holbeche Road / (Future) Site Access	Priority (Left-in Left-out)	AM	0.184	4.6	A
		PM	0.021	5.4	A

* Note: Results shown are for the movement with the highest delay, in accordance with RMS Guidelines.

It can be seen from Table B2 that all key intersections operate satisfactorily under the existing 'base case' scenario, with Level of Service of C or better and with moderate delays during both peak periods. However, the most relevant use of this analysis is to compare the relative change in the performance parameters as a result of the proposed development. This is discussed further in Section 6.

B3.4. Public Transport

The existing public transport services that operate in the locality is shown in **Figure B7**. Bus stops within 400 metres of bus stops on Holbeche Road and Reservoir Road are serviced by the following routes:

- 722/4: Blacktown & Prospect / Arndell Park Loop
- 723: Blacktown & Prospect Loop
- 724: Blacktown to Mt Druitt

These bus services provide links to Blacktown Railway Station and other key regional bus services.

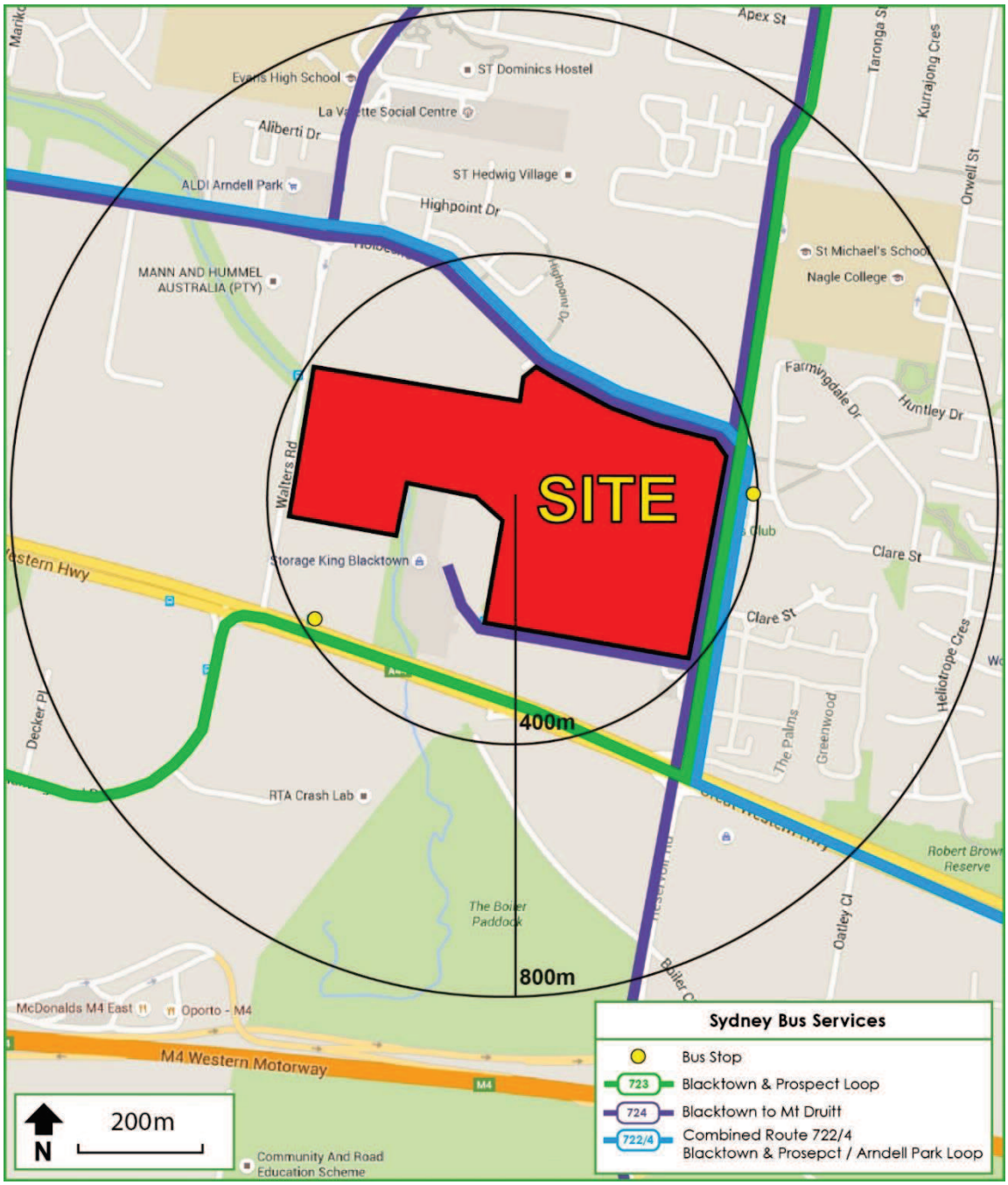


Figure B7: Public Transport

B4. Description of Proposed Development

B4.1. Proposal

A detailed description of the proposed development is provided in the planning report prepared separately in support of the Certification Statement. In summary, the concept development adopted for the purpose of the Certification Statement for which approval is now sought comprises the following components:

- Construction of 12 buildings containing a total of 800 Independent Living Units and consisting of:
  - 80 x one bedroom units;
  - 680 x two bedroom units; and
  - 40 x three bedroom units.
- Construction of a Residential Aged Care Facility (RACF) providing 160 beds and 50 staff;
- 300m^2 gross floor area (GFA) of retail/commercial space; and
- Provision of basement level car parking for a total of 881 spaces with access to Penny Lane and 'The Club' section of BWSC.

The parking requirements and traffic impacts arising from the proposed development are discussed in Sections B5 and B6 respectively. Reference should be made to the master plan presented in **Appendix A**.

B5. Parking Requirements

B5.1. Independent Living Units

The Blacktown Development Control Plan 2015 (DCP) refers car parking rates for Seniors Housing to State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 (Seniors Housing SEPP). Under this planning policy, a consent authority (Council) may not refuse consent to a development application for a self-contained dwelling on parking grounds if the development provides parking in accordance with the minimum provisions reproduced in **Table B3**.

Table B3: Seniors Housing SEPP Parking Rates and Provision

Type	Number	Minimum Parking Rate	Minimum Provision Required[1]
Independent Living Units			
One Bedroom	80	0.5 spaces per bedroom	40
Two Bedroom	680		680
Three Bedroom	40		60
Residential Aged Care Facility			
Beds	160	1 space per 10 beds	16
Staff	50	1 space per 2 staff	25
		Total	**821**

It can be seen from **Table B3**, that the Seniors Housing SEPP requires a minimum of 821 parking spaces to be provided for the above uses to guarantee consent by Council on parking related grounds. In response, the applicant advises that up to 831 parking spaces could be provided in a shared basement level car park which can be confirmed during a subsequent detailed design (DA) phase.

B5.2. Retail/Commercial

The DCP has an identical parking rate for retail and business premises, whereby a minimum of one space per 22m^2 GFA is to be provided for developments proposing 200m^2 GFA or greater and when

they are located outside the Blacktown central business district. Application of this rate to the proposed 300m^2 GFA of retail/commercial space results in a minimum requirement for 14 parking spaces. It is envisaged that this quantum of parking will be provided within the shared basement level car park and can be confirmed during a subsequent detailed design phase.

B5.3. Disabled Parking

Independent Living Units and Residential Aged Care Facility

The DCP requires all parking areas to provide for disabled drivers in accordance with the provisions of the Building Code of Australia. In this respect, the proposed independent living units would fall under the definition for a Class 3(d) building, that is, a building containing 'accommodation for the aged, children or people with a disability'. Whilst no parking rates are provided within the code for this type of building, the DCP states that Council may require additional parking spaces for the disabled where it considers that the proposed land use warrants extra provision. As such, it is envisaged that the development will provide accessible parking in response to any condition of consent imposed by Council.

Retail/Commercial

The BCA categorises commercial and retail developments as Class 5 and Class 6 respectively. These classes of building have a requirement to provide one accessible parking space for every 100 spaces and one accessible space for every 50 spaces, or part thereof, respectively. Accordingly, the development will need to provide as a minimum, a single accessible parking space for this component.

B5.4. Bicycle Facilities

The DCP states the following with respect to bicycle parking:

"Applicants are encouraged to incorporate, in the design of their buildings, safe storage/parking areas for bicycles, with adequate shower and change facilities provided for staff (where appropriate)."

In this regard, bicycle parking rates from 'Planning guidelines for walking and cycling', published by the NSW Department of Planning, have been adopted for aged or disabled self-contained housing. The

guide recommends that bicycle parking be provided at a rate between 3-5% of the overall number of units for residents, and an additional 3-5% of the overall number of units for visitors. This translates into a requirement to provide between 48-80 bicycle parking spaces for this component.

Similarly, the above guide also recommends that for commercial and retail uses, bicycle parking be provided at a rate of 3-5% of the overall number of staff for employees and 5-10% of the number of staff for visitors. This quantum may be confirmed during a subsequent detailed design phase.

B5.5. Servicing

The DCP does not provide service vehicle parking rates however states that these areas should be provided off-street with convenient access. Furthermore in larger developments, service areas should operate independently of other parking areas. If the development will accommodate on-site waste collection, it is considered appropriate that a service vehicle space be a nominated waste collection point. Should Council agree to collect waste on-site, their 11.0 metre waste collection vehicle will require a height clearance of 4.3 metres for circulation, whilst up to 5.8 metres or 6.4 metres height clearance will be required for operation, depending on whether a front or side loading vehicle is used, respectively.

B6. Traffic Impacts

B6.1. Trip Generation

Site B

Independent Living Units

The RMS *Technical Direction TDT 2013/4a* provides traffic generation rates for seniors housing whereby for developments in Sydney an average trip generation rate of 0.4 vehicle trips per dwelling is recommended during AM and PM peak hourly periods. Application of this rate to the proposed 800 Independent Living Units results in the following traffic generation:

- 320 vehicle trips per hour during the AM peak period (64 in, 256 out); and
- 320 vehicle trips per hour during the PM peak period (256 in, 64 out).

Residential Aged Care Facility

It is assumed that residents of the Residential Aged Care Facility will have a reduced need for mobility and therefore a trip generation of 0.2 trips per bed has been adopted during AM and PM peak hourly periods associated with staff and visitor parking. Application of this rate to the proposed 160 beds results in the following traffic generation:

- 32 vehicle trips per hour during the AM peak period (6 in, 26 out); and
- 32 vehicle trips per hour during the PM peak period (26 in, 6 out).

Retail/Commercial

Whilst the allocation of the proposed 300m^2 GFA for either commercial and retail space is yet to be confirmed, any future tenancies are likely to primarily serve residents of the proposed 800 Independent Living Units, as well as patrons of the existing registered club and hotel. They will be neighbourhood facilities such as a hairdresser or grocery store, with a very high proportion of walking trips, as well as 'internal' vehicle trips. Accordingly, the traffic generation potential of this component is considered to

be minimal, with no discernible volumes that would not exceed the daily fluctuations experienced on the surrounding road network.

Combined

In summary, all future development within Site B has been estimated to generate the following traffic:

- 352 vehicle trips per hour during the AM peak period (70 in, 282 out); and
- 352 vehicle trips per hour during the PM peak period (282 in, 70 out).

Total Traffic Generation for BWSC Master Plan

To form a worst case scenario, the trip generation for other developments within in the BWSC master plan has been included to assess the traffic generation for all future development under a cumulative assessment. Reference should be made to the additional volumes established in Section A6 in the first part of this report, where taking into account all future uses, the following traffic will be generated:

- 472 vehicle trips per hour during the AM peak period; and
- 617 vehicle trips per hour during the PM peak period

The above traffic generation forms the basis of the SIDRA modelling undertaken for key intersections impacted by these additional volumes. As the BWSC will have many existing and proposed site access, trip distributions for each development have been estimated as discussed below.

B6.2. Trip Distribution

Having respect to the proximity of each development to site accesses and the general location of the site within the region, the following trip distributions have been adopted for the SIDRA intersection modelling undertaken in Section 6.3.

- ILU and RACF: 60% Reservoir Road / 40% Penny Lane
- Commercial: 60% Reservoir Road / 40% Penny Lane
- Sports Fields: 30% Walters Road / 50% Holbeche Road (new) / 20% Reservoir Road

- Gymnasium: 50% Holbeche Road (new) / 50% Reservoir Road
- Child Care Centre: 10% Holbeche Road (new) / 90% Reservoir Road

Furthermore, as the site is conveniently located between Blacktown to the north and the M4 Motorway / Great Western Highway to the south, a 50% split between left and right movements has been assumed for the Reservoir Road, Penny Lane and Walters Road accesses. Conversely, the proposed Holbeche Road access will be left-in and left-out only.

B6.3. Peak Period Intersection Performances

A summary of the modelling results provided in **Table B4** below. Reference should also be made to the detailed SIDRA outputs which are provided in **Appendix C**.

Table B4: Intersection Performance SIDRA Network: Existing & Future

Intersection Description	Control Type	Period	Degree of Saturation	Average Delay	Level of Service
Reservoir Road / Site Access	Priority (Seagull)	AM	0.677	43.1	D
		PM	0.567	55.1	D
Reservoir Road / Penny Place	Priority (Seagull)	AM	0.361	27.5	B
		PM	0.415	44.7	D
Holbeche Road / (Future) Site Access	Priority (Left-in Left-out)	AM	0.184	4.6	A
		PM	0.021	5.4	A

* Note: Results shown are for the movement with the highest delay, in accordance with RMS Guidelines.

The future development on Site B is estimated to generate 352 vehicle trips per hour during both AM and PM peak periods. The analysis in any case has focussed on the cumulative impacts associated with the proposed sporting facilities on Site B and child care centre in 'The Club' section of the BWSC, which is considered in the first part (Part A) of this report.

The results indicate that full development of BWSC will result in minimal increases in delays for all site accesses, with a Level of Service no worse than D experienced for any intersection. On this basis, it is concluded that the traffic impacts of the proposed Seniors Living Village at Site B are considered to be acceptable and can be more accurately examined in a subsequent development application stage.

B7. Conclusion

In summary:

- The Compatibility Certificate proposes 800 Independent Living Units, a Residential Aged Care Facility for 160 beds and 300m^2 gross floor area of retail/commercial space, all to be constructed across 13 buildings on land designated as Site B within Blacktown Workers Sports Club.

- A parking assessment taking into account the Blacktown Development Control Plan 2015 and State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 results in a requirement for a minimum of 923 parking spaces. The master plan for the site indicates that sufficient area is available for basement level car parking with access to Penny Lane and other areas of the Blacktown Workers Sports Club.

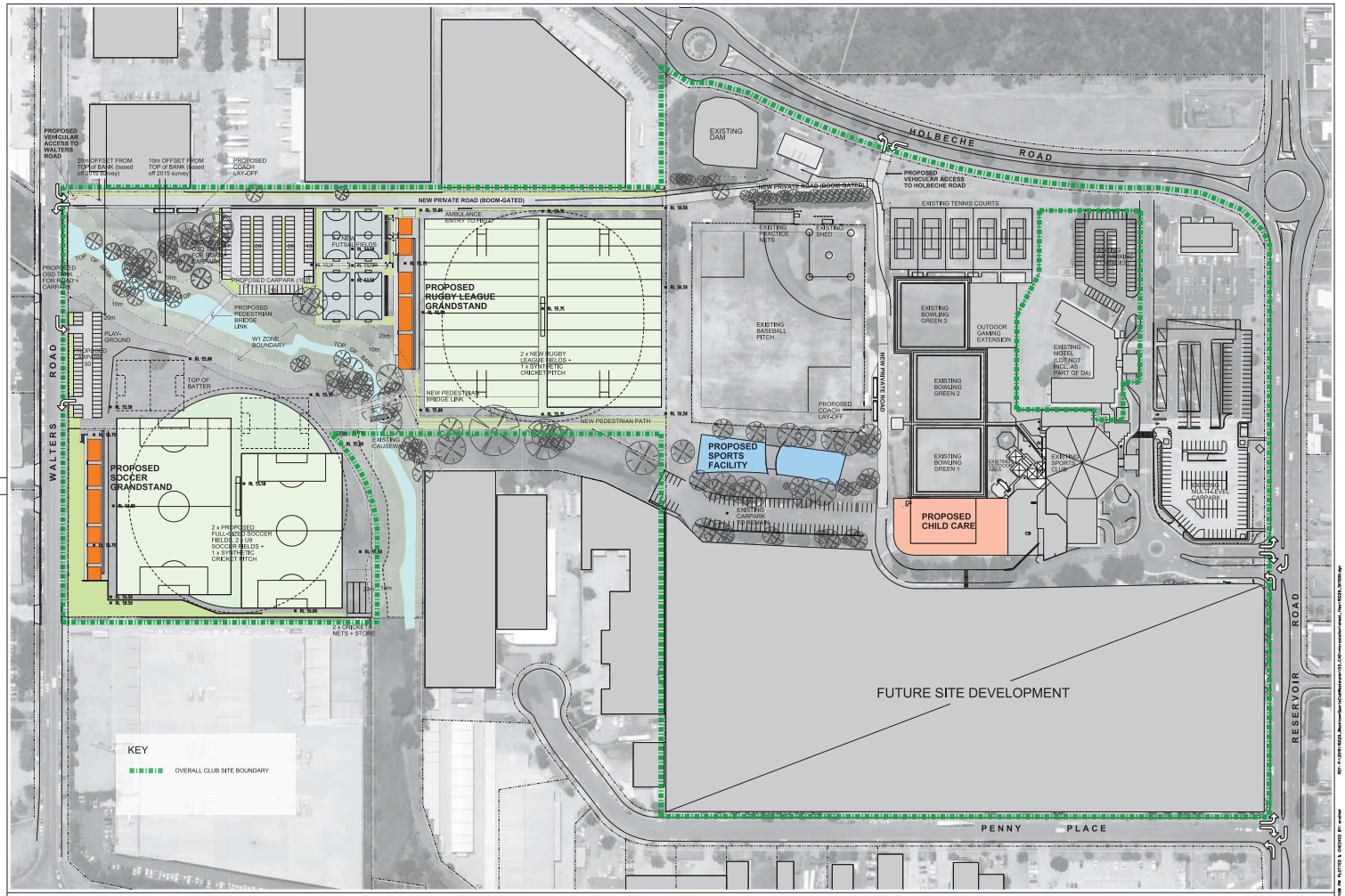
- Future development on Site B has been estimated to generate up to 352 vehicle trips per hour during AM and PM peak periods. Based on the distributions of these volumes across all site accesses, the traffic impacts of this assessment has been modelled using SIDRA for a worst case scenario involving other future developments on-site at the BWDC (the cumulative assessment), with the use of the proposed sports facilities at Site A and proposed child care centre at 'The Club' section taken into account.

- The results indicate that full development of BWSC (with 472 veh/hr and 617 veh/hr during AM and PM peak periods respectively) will result in minimal increases in delays for all site accesses with a Level of Service of no worse than D experienced for every intersection. On this basis, the traffic impacts of the proposed Seniors Living Village at Site B are considered to be acceptable.

It is therefore concluded that the proposed development on Site B is supportable on traffic planning grounds and will operate satisfactorily.

Appendix A

Master Plan



Issue Date	Description	Rev	Dsgn'd
01 04/10/15	CONCEPT DESIGN ISSUE FOR DISCUSSION	01	JW
02 15/12/15	CONCEPT DESIGN ISSUE FOR DISCUSSION	02	JW
03 11/01/16	CONCEPT DESIGN ISSUE FOR PRICE	03	JW

Do not scale drawings. The figured dimensions only. Client & verify levels and dimensions on site prior to the commencement of any work, the preparation of shop drawings or the fabrication of components.

Nominated Architects: Michael Human 5264, Peter Ireland 6607

Site Location Plan

Client
PAYNTER DIXON
Paynter Dixon Constructions Pty Limited
Level 2, 2 Richardson Place
Rhondda Corporate Park
North Ryde SYDNEY NSW 2113

Architect
AJ+C
Allen Jack+Cottier
79 Myrtle Street Chippendale NSW 2008 AUSTRALIA
ph +61 2 9311 8222 fx +61 2 9311 8200 ABN 53 003 782 293

Project
BLACKTOWN WORKERS SPORTS CLUB - PROPOSED SPORTING FACILITIES AND CHILDCARE CENTRE
Site At Outdoor Sports Facilities - 221 Walters Road, Arndell Park.

Proj No. 15029

Drawing Title: SITE PLAN

Drawing Status: NOT FOR CONSTRUCTION

Scale: 1:1000 @ A1

Drawing No: SK1000

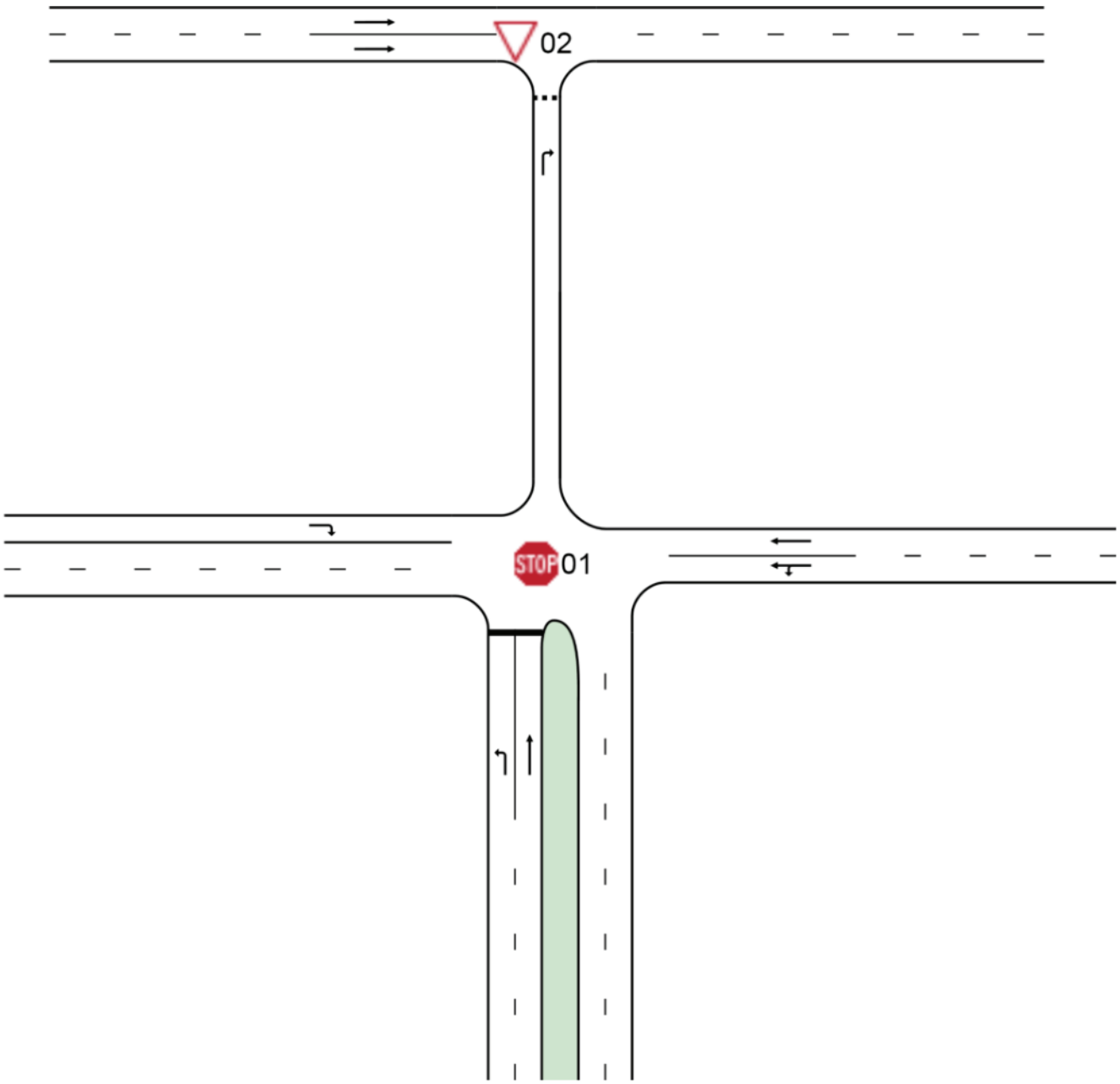
Issue: 03

Appendix B

SIDRA Intersection Modelling (Existing)

NETWORK LAYOUT

Network: Reservoir Road - Site Access EX AM

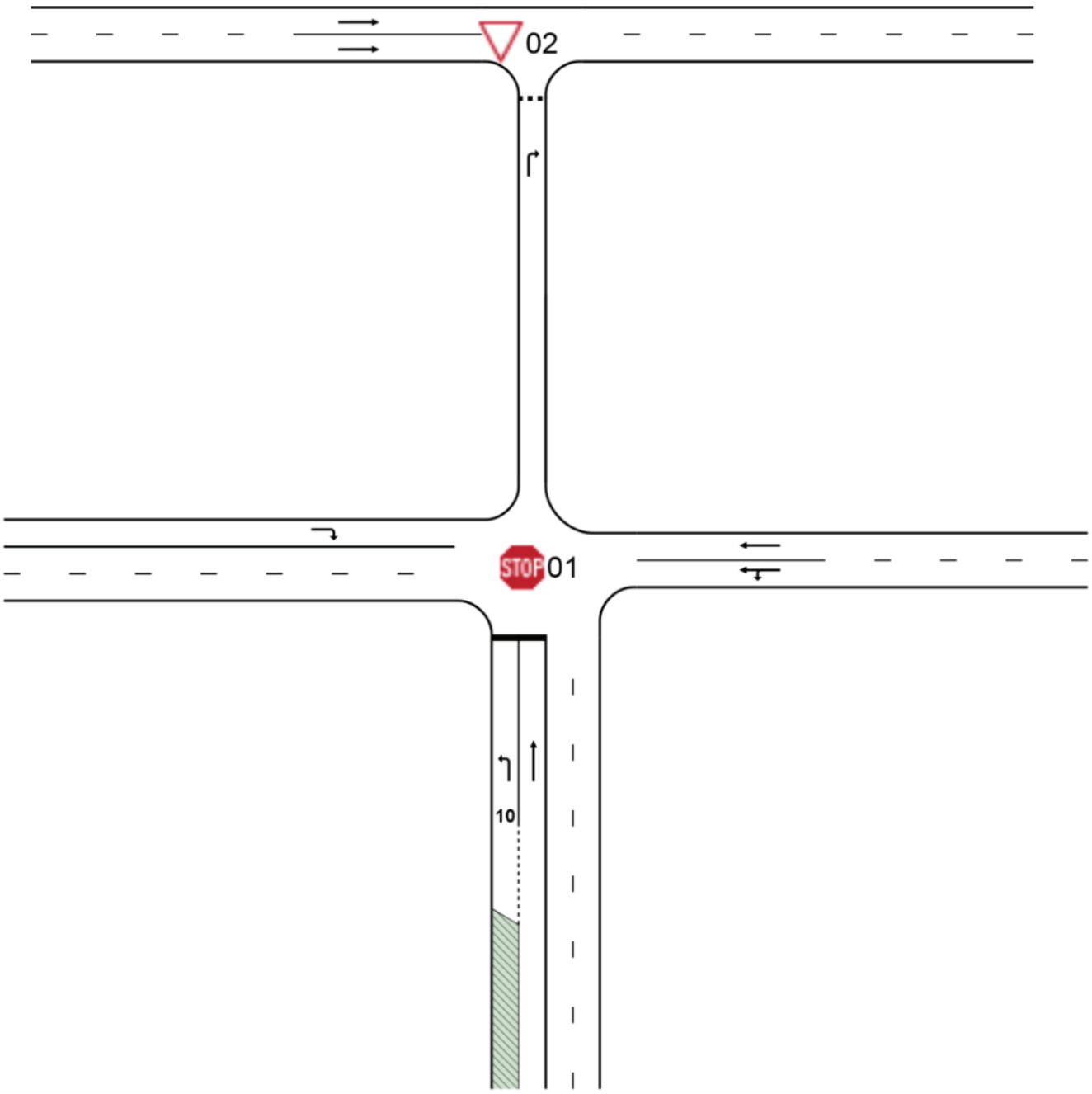


SITES IN NETWORK	
Site ID	**Site Name**
STOP 01	01. Reservoir Road - Site Access EX AM
▽ 02	01. Reservoir Road - Site Access EX AM Storage

Organisation: TRAFFIX | Created: Monday, 21 December 2015 10:15:28 PM
Project: T:\Synergy\Projects\15\15.533\Modelling\15.209m01v1 Kingsway-University.sip6

NETWORK LAYOUT

Network: Reservoir Road - Penny Lane EX AM

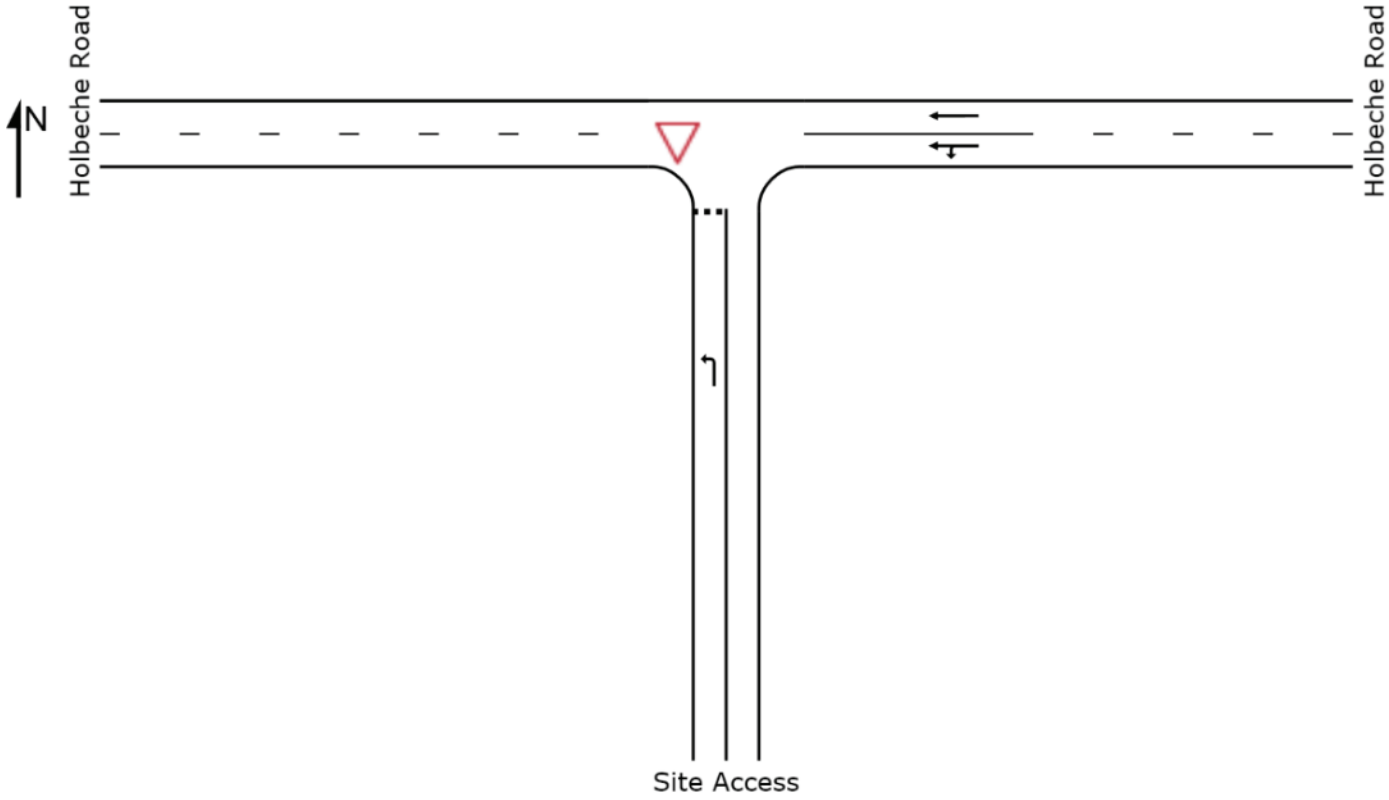


SITES IN NETWORK	
Site ID	**Site Name**
STOP 01	02. Reservoir Road - Penny Lane EX AM
▽ 02	02. Reservoir Road - Penny Lane EX AM Storage

SITE LAYOUT

Site: 04. Holbeche Road - Site Access EX AM

Scenario: Existing
Period: AM
Giveway / Yield (Two-Way)



Organisation: TRAFFIX | Created: Monday, 21 December 2015 10:17:48 PM
Project: T:\Synergy\Projects\15\15.533\Modelling\15.209m01v1 Kingsway-University.sip6

MOVEMENT SUMMARY

Site: 01. Reservoir Road - Site Access EX AM

Network: Reservoir Road - Site Access EX AM

Reservoir Road - Site Access
Scenario: Existing
Period: AM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Site Access													
1	L2	8	0.0	8	0.0	0.011	7.3	LOS A	0.0	0.3	0.54	0.84	20.6
2	T1	13	0.0	13	0.0	0.060	20.6	LOS B	0.2	1.4	0.83	1.00	7.5
Approach		21	0.0	21	0.0	0.060	15.3	LOS B	0.2	1.4	0.71	0.94	12.2
East: Reservoir Road													
4	L2	24	0.0	24	0.0	0.340	5.6	LOS A	0.0	0.0	0.00	0.02	44.2
5	T1	1232	8.4	1232	8.4	0.340	0.0	LOS A	0.0	0.0	0.00	0.01	59.4
Approach		1256	8.2	1256	8.2	0.340	0.1	NA	0.0	0.0	0.00	0.01	59.1
West: Reservoir Road													
12	R2	11	0.0	11	0.0	0.031	15.1	LOS B	0.1	0.7	0.77	0.90	17.5
Approach		11	0.0	11	0.0	0.031	15.1	NA	0.1	0.7	0.77	0.90	17.5
All Vehicles		1287	8.0	1287	8.0	0.340	0.5	NA	0.2	1.4	0.02	0.03	56.9

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: 01. Reservoir Road - Site Access EX AM Storage

Network: Reservoir Road - Site Access EX AM

Reservoir Road - Site Access
Scenario: Existing
Period: AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Median Storage Area													
3	R2	13	0.0	13	0.0	0.021	4.1	LOS A	0.1	0.4	0.59	0.54	32.0
Approach		13	0.0	13	0.0	0.021	4.1	LOS A	0.1	0.4	0.59	0.54	32.0
West: Reservoir Road													
11	T1	918	9.1	918	9.1	0.249	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		918	9.1	918	9.1	0.249	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		931	8.9	931	8.9	0.249	0.1	NA	0.1	0.4	0.01	0.01	59.6

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: 01. Reservoir Road - Site Access EX PM

Network: Reservoir Road - Site Access EX PM

Reservoir Road - Site Access
Scenario: Existing
Period: PM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Site Access													
1	L2	41	0.0	41	0.0	0.059	7.9	LOS A	0.2	1.6	0.57	0.92	20.2
2	T1	15	0.0	15	0.0	0.091	26.2	LOS B	0.3	2.0	0.87	1.00	6.4
Approach		56	0.0	56	0.0	0.091	12.7	LOS A	0.3	2.0	0.65	0.94	15.6
East: Reservoir Road													
4	L2	46	0.0	46	0.0	0.371	5.6	LOS A	0.0	0.0	0.00	0.04	43.8
5	T1	1360	4.5	1360	4.5	0.371	0.0	LOS A	0.0	0.0	0.00	0.02	59.1
Approach		1406	4.3	1406	4.3	0.371	0.2	NA	0.0	0.0	0.00	0.02	58.5
West: Reservoir Road													
12	R2	49	0.0	49	0.0	0.182	18.8	LOS B	0.5	3.8	0.84	0.94	15.6
Approach		49	0.0	49	0.0	0.182	18.8	NA	0.5	3.8	0.84	0.94	15.6
All Vehicles		1512	4.0	1512	4.0	0.371	1.3	NA	0.5	3.8	0.05	0.08	52.6

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: 01. Reservoir Road - Site Access EX PM Storage

Network: Reservoir Road - Site Access EX PM

Reservoir Road - Site Access
Scenario: Existing
Period: PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Median Storage Area													
3	R2	15	0.0	15	0.0	0.028	4.8	LOS A	0.1	0.5	0.64	0.61	30.7
Approach		15	0.0	15	0.0	0.028	4.8	LOS A	0.1	0.5	0.64	0.61	30.7
West: Reservoir Road													
11	T1	1017	6.5	1017	6.5	0.272	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1017	6.5	1017	6.5	0.272	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1032	6.4	1032	6.4	0.272	0.1	NA	0.1	0.5	0.01	0.01	59.5

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: 02. Reservoir Road - Penny Lane EX AM

Network: Reservoir Road - Penny Lane EX AM

Reservoir Road - Penny Lane
Scenario: Existing
Period: AM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Penny Lane													
1	L2	58	10.9	58	10.9	0.077	10.2	LOS A	0.3	2.5	0.54	0.91	24.6
2	T1	20	15.8	20	15.8	0.104	25.4	LOS B	0.3	2.7	0.84	1.01	8.2
Approach		78	12.2	78	12.2	0.104	14.1	LOS A	0.3	2.7	0.62	0.94	19.5
East: Reservoir Road													
4	L2	60	17.5	60	17.5	0.328	5.7	LOS A	0.0	0.0	0.00	0.06	45.3
5	T1	1147	8.3	1147	8.3	0.328	0.0	LOS A	0.0	0.0	0.00	0.03	59.0
Approach		1207	8.8	1207	8.8	0.328	0.3	NA	0.0	0.0	0.00	0.03	58.2
West: Reservoir Road													
12	R2	73	10.1	73	10.1	0.212	16.1	LOS B	0.7	5.3	0.79	0.92	16.3
Approach		73	10.1	73	10.1	0.212	16.1	NA	0.7	5.3	0.79	0.92	16.3
All Vehicles		1358	9.1	1358	9.1	0.328	1.9	NA	0.7	5.3	0.08	0.13	51.0

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: 02. Reservoir Road - Penny Lane EX AM Storage

Network: Reservoir Road - Penny Lane EX AM

Reservoir Road - Penny Lane
Scenario: Existing
Period: PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Median Storage Area													
3	R2	20	15.8	20	15.8	0.034	4.1	LOS A	0.1	0.7	0.56	0.51	32.1
Approach		20	15.8	20	15.8	0.034	4.1	LOS A	0.1	0.7	0.56	0.51	32.1
West: Reservoir Road													
11	T1	921	9.7	921	9.7	0.251	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		921	9.7	921	9.7	0.251	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		941	9.8	941	9.8	0.251	0.1	NA	0.1	0.7	0.01	0.01	59.3

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: 02. Reservoir Road - Penny Lane EX PM

Network: Reservoir Road - Penny Lane EX PM

Reservoir Road - Penny Lane
Scenario: Existing
Period: AM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Penny Lane													
1	L2	71	6.0	71	6.0	0.103	10.9	LOS A	0.4	3.1	0.59	0.95	23.9
2	T1	37	28.6	37	28.6	0.277	39.1	LOS C	1.0	8.4	0.90	1.05	5.5
Approach		107	13.7	107	13.7	0.277	20.6	LOS B	1.0	8.4	0.70	0.98	14.8
East: Reservoir Road													
4	L2	20	26.3	20	26.3	0.357	5.8	LOS A	0.0	0.0	0.00	0.02	45.8
5	T1	1324	5.0	1324	5.0	0.357	0.0	LOS A	0.0	0.0	0.00	0.01	59.7
Approach		1344	5.3	1344	5.3	0.357	0.1	NA	0.0	0.0	0.00	0.01	59.4
West: Reservoir Road													
12	R2	44	7.1	44	7.1	0.149	17.4	LOS B	0.5	3.4	0.81	0.92	15.7
Approach		44	7.1	44	7.1	0.149	17.4	NA	0.5	3.4	0.81	0.92	15.7
All Vehicles		1496	6.0	1496	6.0	0.357	2.1	NA	1.0	8.4	0.07	0.11	51.5

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: 02. Reservoir Road - Penny Lane EX PM Storage

Network: Reservoir Road - Penny Lane EX PM

Reservoir Road - Penny Lane
Scenario: Existing
Period: PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Median Storage Area													
3	R2	37	28.6	37	28.6	0.070	4.9	LOS A	0.2	1.6	0.60	0.59	29.2
Approach		37	28.6	37	28.6	0.070	4.9	LOS A	0.2	1.6	0.60	0.59	29.2
West: Reservoir Road													
11	T1	942	6.8	942	6.8	0.252	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		942	6.8	942	6.8	0.252	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		979	7.6	979	7.6	0.252	0.2	NA	0.2	1.6	0.02	0.02	58.6

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: 04. Holbeche Road - Site Access EX AM

Scenario: Existing
Period: AM
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: Site Access											
1	L2	112	1.9	0.085	0.8	LOS A	0.3	2.5	0.33	0.20	35.1
Approach		112	1.9	0.085	0.8	LOS A	0.3	2.5	0.33	0.20	35.1
East: Holbeche Road											
4	L2	108	0.0	0.184	4.6	LOS A	0.0	0.0	0.00	0.18	23.8
5	T1	567	10.0	0.184	0.0	LOS A	0.0	0.0	0.00	0.07	48.7
Approach		676	8.4	0.184	0.7	NA	0.0	0.0	0.00	0.09	45.3
All Vehicles		787	7.5	0.184	0.7	NA	0.3	2.5	0.05	0.10	43.3

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: 04. Holbeche Road - Site Access EX PM

Scenario: Existing
Period: PM
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: Site Access											
1	L2	109	1.9	0.085	0.9	LOS A	0.3	2.5	0.34	0.21	35.0
Approach		109	1.9	0.085	0.9	LOS A	0.3	2.5	0.34	0.21	35.0
East: Holbeche Road											
4	L2	113	0.9	0.194	4.6	LOS A	0.0	0.0	0.00	0.17	23.8
5	T1	605	8.2	0.194	0.0	LOS A	0.0	0.0	0.00	0.07	48.7
Approach		718	7.0	0.194	0.7	NA	0.0	0.0	0.00	0.09	45.4
All Vehicles		827	6.4	0.194	0.7	NA	0.3	2.5	0.04	0.10	43.5

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.

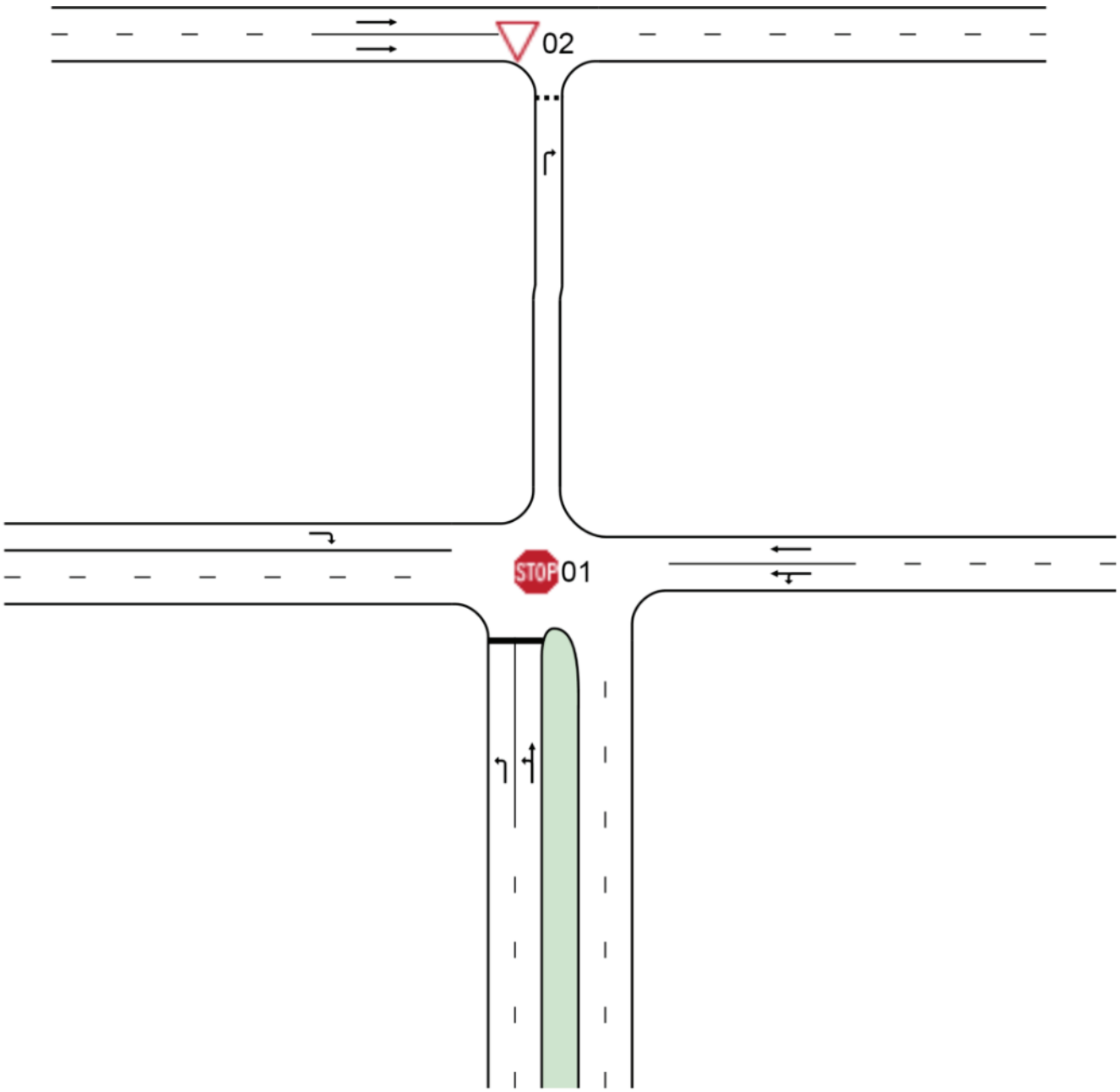
Appendix C

SIDRA Intersection Modelling (Future)

NETWORK LAYOUT

Network: Reservoir Road - Site Access EX + FU AM

New Network

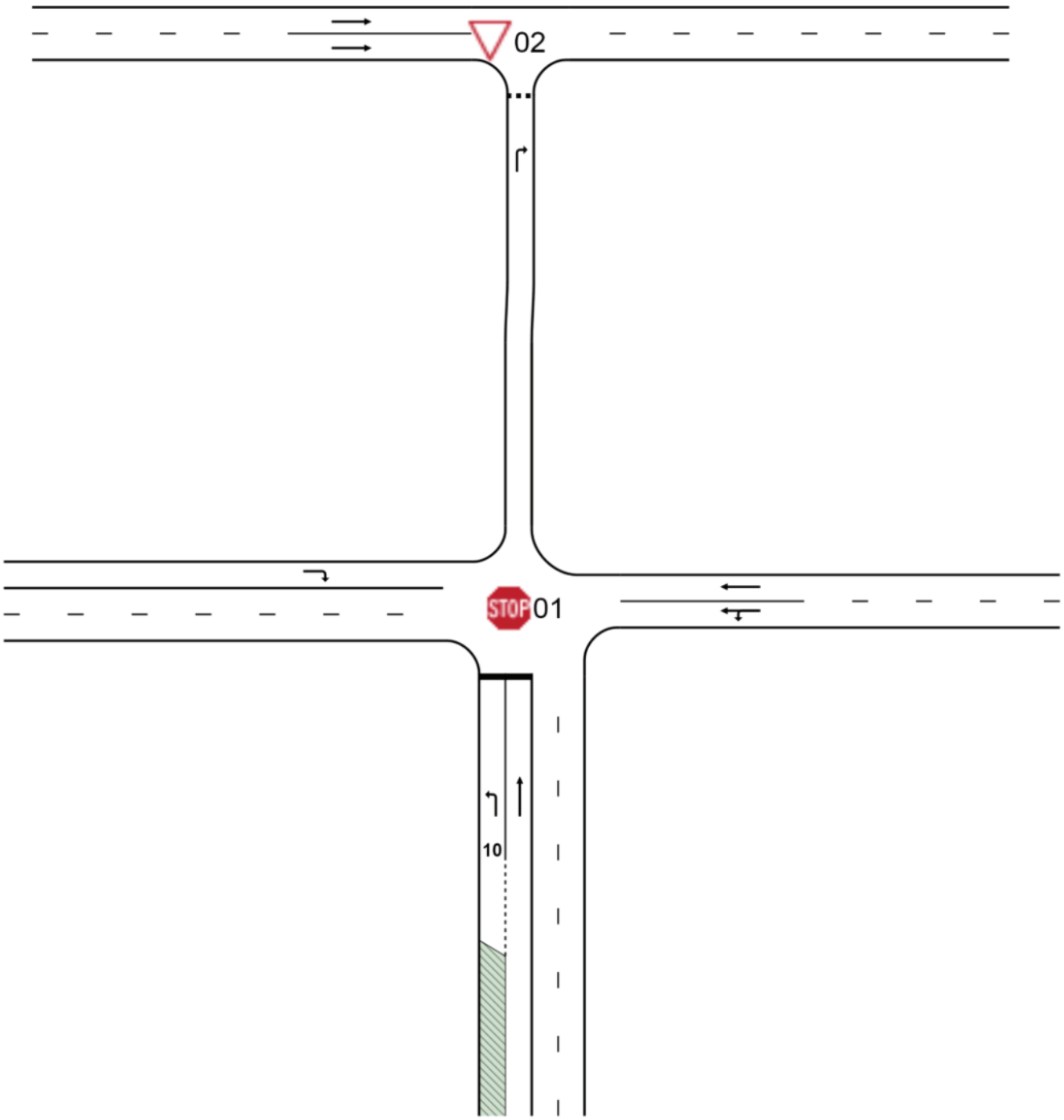


SITES IN NETWORK	
Site ID	**Site Name**
02	09. Reservoir Road - Site Access EX + FU AM
01	09. Reservoir Road - Site Access EX + FU AM

NETWORK LAYOUT

Network: Reservoir Road - Penny Lane EX + FU AM

New Network



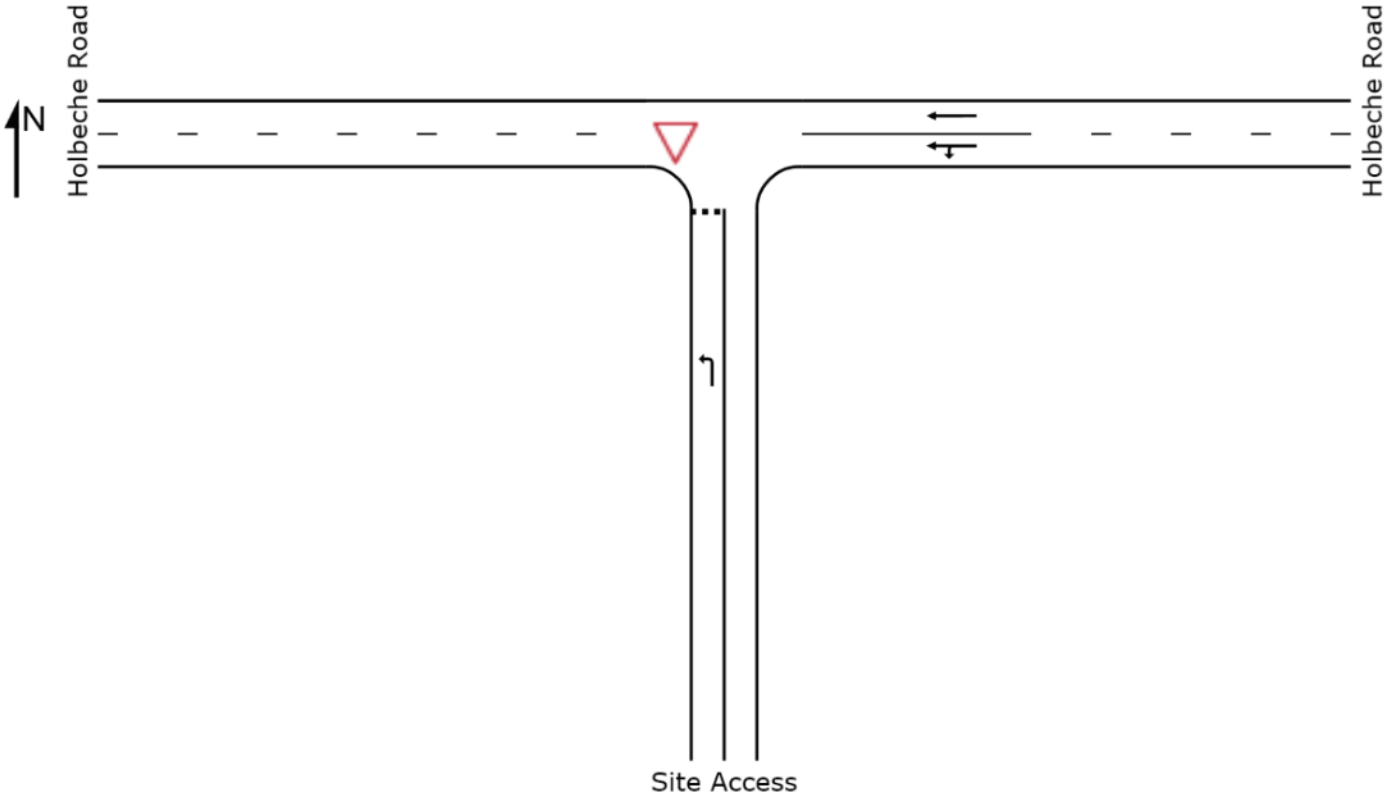
SITES IN NETWORK	
Site ID	**Site Name**
02	10. Reservoir Road - Penny Lane EX + FU AM Storage
01	10. Reservoir Road - Penny Lane EX + FU AM

Organisation: TRAFFIX | Created: Monday, 11 January 2016 12:44:47 PM
Project: \\192.168.3.1\tdata\Synergy\Projects\15\15.533\Modelling\15.209m01v2 Blacktown Workers Sports Club.sip6

SITE LAYOUT

Site: 12. Holbeche Road - Site Access EX + FU AM

Scenario: Existing + Future
Period: AM
Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

Site: 09. Reservoir Road - Site Access EX + FU AM

Network: Reservoir Road - Site Access EX + FU AM

Reservoir Road - Site Access
Scenario: Existing + Future
Period: AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Median Storage Area													
3	R2	126	0.0	126	0.0	0.213	6.3	LOS A	0.7	4.9	0.64	0.81	21.0
Approach		126	0.0	126	0.0	0.213	6.3	LOS A	0.7	4.9	0.64	0.81	21.0
West: Reservoir Road													
11	T1	918	9.1	918	9.1	0.249	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		918	9.1	918	9.1	0.249	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1044	8.0	1044	8.0	0.249	0.8	NA	0.7	4.9	0.08	0.10	53.8

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: 09. Reservoir Road - Site Access EX + FU AM

Network: Reservoir Road - Site Access EX + FU AM

Reservoir Road - Site Access
Scenario: Existing + Future
Period: AM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Site Access													
1	L2	122	0.0	122	0.0	0.160	9.9	LOS A	0.7	4.7	0.57	0.95	25.9
2	T1	126	0.0	126	0.0	0.677	43.1	LOS D	3.3	23.4	0.94	1.19	5.0
Approach		248	0.0	248	0.0	0.677	26.7	LOS B	3.3	23.4	0.76	1.07	11.3
East: Reservoir Road													
4	L2	77	0.0	77	0.0	0.354	5.5	LOS A	0.0	0.0	0.00	0.07	48.0
5	T1	1232	8.4	1232	8.4	0.354	0.0	LOS A	0.0	0.0	0.00	0.03	58.5
Approach		1308	7.9	1308	7.9	0.354	0.3	NA	0.0	0.0	0.00	0.04	57.9
West: Reservoir Road													
12	R2	63	0.0	63	0.0	0.205	17.4	LOS B	0.6	4.5	0.82	0.93	15.7
Approach		63	0.0	63	0.0	0.205	17.4	NA	0.6	4.5	0.82	0.93	15.7
All Vehicles		1620	6.4	1620	6.4	0.677	5.0	NA	3.3	23.4	0.15	0.23	41.9

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: 05. Reservoir Road - Site Access EX + FU PM Storage

Network: Reservoir Road - Site Access EX + FU PM

Reservoir Road - Site Access
Scenario: Existing + Future
Period: PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Median Storage Area													
3	R2	67	0.0	67	0.0	0.127	6.7	LOS A	0.4	2.6	0.66	0.80	23.2
Approach		67	0.0	67	0.0	0.127	6.7	LOS A	0.4	2.6	0.66	0.80	23.2
West: Reservoir Road													
11	T1	1017	6.5	1017	6.5	0.272	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1017	6.5	1017	6.5	0.272	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1084	6.1	1084	6.1	0.272	0.4	NA	0.4	2.6	0.04	0.05	57.2

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: 05. Reservoir Road - Site Access EX + FU PM

Network: Reservoir Road - Site Access EX + FU PM

Reservoir Road - Site Access
Scenario: Existing + Future
Period: PM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Site Access													
1	L2	53	0.0	53	0.0	0.069	9.5	LOS A	0.3	1.9	0.55	0.91	26.5
2	T1	67	0.0	67	0.0	0.567	55.1	LOS D	2.2	15.3	0.95	1.11	3.9
Approach		120	0.0	120	0.0	0.567	35.1	LOS C	2.2	15.3	0.78	1.02	8.7
East: Reservoir Road													
4	L2	168	0.0	168	0.0	0.404	5.5	LOS A	0.0	0.0	0.00	0.13	46.3
5	T1	1360	4.5	1360	4.5	0.404	0.0	LOS A	0.0	0.0	0.00	0.06	57.6
Approach		1528	4.0	1528	4.0	0.404	0.6	NA	0.0	0.0	0.00	0.07	56.3
West: Reservoir Road													
12	R2	172	0.0	172	0.0	0.778	41.2	LOS C	3.8	26.6	0.96	1.22	9.2
Approach		172	0.0	172	0.0	0.778	41.2	NA	3.8	26.6	0.96	1.22	9.2
All Vehicles		1820	3.4	1820	3.4	0.778	6.7	NA	3.8	26.6	0.14	0.24	37.7

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: 10. Reservoir Road - Penny Lane EX + FU AM Storage

Network: Reservoir Road - Penny Lane EX + FU AM

Reservoir Road - Penny Lane
Scenario: Existing + Future
Period: AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Median Storage Area													
3	R2	78	4.1	78	4.1	0.119	5.3	LOS A	0.4	2.7	0.57	0.75	24.6
Approach		78	4.1	78	4.1	0.119	5.3	LOS A	0.4	2.7	0.57	0.75	24.6
West: Reservoir Road													
11	T1	921	9.7	921	9.7	0.251	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		921	9.7	921	9.7	0.251	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		999	9.3	999	9.3	0.251	0.4	NA	0.4	2.7	0.04	0.06	56.2

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: 10. Reservoir Road - Penny Lane EX + FU AM

Network: Reservoir Road - Penny Lane EX + FU AM

Reservoir Road - Penny Lane
Scenario: Existing + Future
Period: AM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Penny Lane													
1	L2	116	5.5	116	5.5	0.146	9.8	LOS A	0.6	4.7	0.55	0.93	25.7
2	T1	78	4.1	78	4.1	0.361	27.5	LOS B	1.4	10.4	0.87	1.06	7.7
Approach		194	4.9	194	4.9	0.361	16.9	LOS B	1.4	10.4	0.68	0.98	16.8
East: Reservoir Road													
4	L2	77	13.7	77	13.7	0.333	5.7	LOS A	0.0	0.0	0.00	0.07	45.0
5	T1	1147	8.3	1147	8.3	0.333	0.0	LOS A	0.0	0.0	0.00	0.03	58.7
Approach		1224	8.7	1224	8.7	0.333	0.4	NA	0.0	0.0	0.00	0.04	57.8
West: Reservoir Road													
12	R2	89	8.2	89	8.2	0.262	16.8	LOS B	0.9	6.8	0.81	0.94	15.9
Approach		89	8.2	89	8.2	0.262	16.8	NA	0.9	6.8	0.81	0.94	15.9
All Vehicles		1507	8.2	1507	8.2	0.361	3.5	NA	1.4	10.4	0.14	0.21	46.1

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: 06. Reservoir Road - Penny Lane EX + FU PM Storage

Network: Reservoir Road - Penny Lane EX + FU PM

Reservoir Road - Penny Lane
Scenario: Existing + Future
Period: PM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Median Storage Area													
3	R2	37	28.6	37	28.6	0.070	6.1	LOS A	0.2	1.8	0.60	0.74	23.0
Approach		37	28.6	37	28.6	0.070	6.1	LOS A	0.2	1.8	0.60	0.74	23.0
West: Reservoir Road													
11	T1	942	6.8	942	6.8	0.252	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		942	6.8	942	6.8	0.252	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		979	7.6	979	7.6	0.252	0.2	NA	0.2	1.8	0.02	0.03	57.9

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: 06. Reservoir Road - Penny Lane EX + FU PM

Network: Reservoir Road - Penny Lane EX + FU PM

Reservoir Road - Penny Lane
Scenario: Existing + Future
Period: AM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival 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: Penny Lane													
1	L2	87	4.8	87	4.8	0.122	10.5	LOS A	0.5	3.7	0.58	0.94	24.6
2	T1	54	19.6	54	19.6	0.415	44.7	LOS D	1.5	12.5	0.92	1.07	4.9
Approach		141	10.4	141	10.4	0.415	23.5	LOS B	1.5	12.5	0.71	0.99	13.3
East: Reservoir Road													
4	L2	78	6.8	78	6.8	0.373	5.6	LOS A	0.0	0.0	0.00	0.07	45.4
5	T1	1324	5.0	1324	5.0	0.373	0.0	LOS A	0.0	0.0	0.00	0.03	58.8
Approach		1402	5.1	1402	5.1	0.373	0.3	NA	0.0	0.0	0.00	0.03	58.0
West: Reservoir Road													
12	R2	102	3.1	102	3.1	0.359	20.9	LOS B	1.3	9.1	0.86	0.99	14.2
Approach		102	3.1	102	3.1	0.359	20.9	NA	1.3	9.1	0.86	0.99	14.2
All Vehicles		1645	5.4	1645	5.4	0.415	3.6	NA	1.5	12.5	0.11	0.17	46.1

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: 12. Holbeche Road - Site Access EX + FU AM

Scenario: Existing + Future
Period: AM
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: Site Access											
1	L2	112	1.9	0.085	2.0	LOS A	0.3	2.5	0.33	0.35	37.3
Approach		112	1.9	0.085	2.0	LOS A	0.3	2.5	0.33	0.35	37.3
East: Holbeche Road											
4	L2	108	0.0	0.184	4.6	LOS A	0.0	0.0	0.00	0.18	23.8
5	T1	567	10.0	0.184	0.0	LOS A	0.0	0.0	0.00	0.07	48.7
Approach		676	8.4	0.184	0.7	NA	0.0	0.0	0.00	0.09	45.3
All Vehicles		787	7.5	0.184	0.9	NA	0.3	2.5	0.05	0.13	43.8

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: 08. Holbeche Road - Site Access EX + FU PM

Scenario: Existing + Future
Period: PM
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: Site Access											
1	L2	25	0.0	0.021	5.4	LOS A	0.1	0.6	0.37	0.57	44.0
Approach		25	0.0	0.021	5.4	LOS A	0.1	0.6	0.37	0.57	44.0
East: Holbeche Road											
4	L2	73	0.0	0.211	4.5	LOS A	0.0	0.0	0.00	0.14	22.5
5	T1	715	6.9	0.211	0.1	LOS A	0.0	0.0	0.00	0.06	49.2
Approach		787	6.3	0.211	0.5	NA	0.0	0.0	0.00	0.07	47.0
All Vehicles		813	6.1	0.211	0.6	NA	0.1	0.6	0.01	0.08	46.9

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.