

Transport and Accessibility Impact Assessment

Hurlstone Agricultural High School (Hawkesbury)

HASH-00-SD-TR-RP-180111 Traffic Impact Assessment

Prepared for NSW Department of Education c/o CGAMW / 11th January 2018

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EXECUTIVE SUMMARY

This transport and accessibility impact assessment has been prepared to examine the proposed Hurlstone Agricultural High School located within the Western Sydney University (WSU) campus in Richmond. The new School will replace an existing school at Glenfield, and is expected to provide capacity for 1,500 students. 110 staff members are expected to be employed at the site.

Subject to separate development approvals, two ancillary developments are also to occur at the site. A boarding school for 300 students is to be constructed, reducing the travelling population to 1,200 students. An existing university car parking area is also to be expanded to provide an increased capacity from 142 spaces to approximately 220 spaces and zones for bus and car drop-off and pick-up.

As a State Significant Development operating within an existing university campus, it is of critical importance to understand the anticipated behaviour of traffic generated by the proposed development to avoid unnecessary impact on students and staff. This report is intended to determine this impact and make recommendations to lessen this impact where appropriate, in addition to assessing the adequacy of the development with regard to standards and legislation.

A review of the current site and campus has been undertaken including traffic counts, modelling, and parking studies. The road network surrounding the site currently operates at a good Level of Service at local intersections. Parking areas across the campus have reasonable volumes of spare capacity available.

The proposed development is expected to utilise WSU campus parking including expansion of an existing campus car park (P47). The P47 car park shall be modified and expanded under a separate development approval and is anticipated to provide a total of approximately 220 parking spaces. With regards to desired parking capacity, the Department of Education recommends 130 parking spaces for a school of this size, whilst existing mode share results in a demand of 225 vehicles and the Hawkesbury DCP recommends provision of 276 spaces. There may be minor overflow into other parking areas within the Campus.

Whilst noting that a high-occupancy scenario can be catered for within the WSU campus as determined by campus-wide parking occupancy surveys, it will result in a reduction in parking availability for University students and staff. Users may be required to park in areas further away from their destinations within the campus, however it is noted that the P47 car park is on the perimeter of the campus and most destinations are located between this and other parking zones. Assuming mode share equivalent to the existing Glenfield site, campus-wide occupancy is calculated at 80%, relative to the currently recorded 69% occupancy. The Department and the School will be required to negotiate parking arrangements with the University regarding access to and usage of campus parking.

Traffic modelling for the future travel demand has been modelled for 10 years of background growth and a total population of 1,200 travelling students and 110 staff. Intersections are shown to continue to operate at acceptable Levels of Service. The most critical delays occur at the intersection of Campus Drive and Blacktown Road, however all delays are internal to the site and it is anticipated that users will avoid this intersection as high levels of delay occur. Any traffic impacts within the Campus related to the School operation are expected to occur over only a short period of time, say 30 minutes or less.

A number of modifications to local infrastructure are recommended for this development to improve safety and operation, including:

- Provision of approximately 5 bus zone spaces and 10-12 car drop-off and pick-up spaces in the modified car park area (in addition to the approximately 220 car parking spaces)

- Widening of Vines Drive and Maintenance Lane to 3.5-metre travel lanes to provide for school buses
- Implementation of a 40km/hr School Zone around the site (noting that the speed limit within the campus is an existing 40km/hr)
- Upgrade of existing pedestrian crossings on Vines Drive to include zebra crossing linemarking and ensure raised crossings are suitable for bus travel
- Physical separation of bus zone and car parking within P47 car park area

A Preliminary Construction Traffic Management Plan (CTMP) has also been prepared as part of this transport study. This Plan is preliminary only, due to the nature of uncertainties regarding the construction methodology for the site. A more detailed plan would be required to be developed prior to construction following appointment of a builder.

Overall the School as proposed is considered to create acceptable levels of impact to the local transport network and parking framework, and should be deemed suitable for approval of further design development.

1 INTRODUCTION

1.1 Background

The NSW Department of Education is proposing to construct a new campus for Hurlstone Agricultural High School. The campus will be located within the Western Sydney University site in Richmond, and will replace the existing Hurlstone Agricultural High School which is located in Glenfield, Campbelltown.

The site is located at 2 College Street Richmond. The School shall be located 50 km northwest of the Sydney CBD and 2 kilometres from Richmond CBD and will have a capacity for up to 1,500 students. A boarding school for 300 students is also to be constructed (subject to a separate application), reducing the travelling population to 1,200 students. 110 staff members are expected to be employed at the school site.

With an estimated capital construction cost of over \$30 million, the proposed School qualifies as a State Significant Development under Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011.

Taylor Thomson Whitting (TTW) has been engaged by Conrad Gargett Ancher Mortlock Woolley (CGAMW) to provide traffic advice and reporting on the proposed new School. This transport and accessibility impact assessment has been developed in response to the Secretary's Environmental Assessment Requirements for the site, which have been detailed in Section 1 of this report.

1.2 Objectives

The key objective of this report is to identify the future impacts the proposed School will have on the local transport network. In order to determine this impact, a thorough understanding of both the existing conditions and anticipated operational requirements are necessary. An impact assessment must consider the impacts for all transport users, including public transport, private vehicles, cyclists, and pedestrians.

This report also aims to assess the adequacy of the proposed development within the context of various standards and legislation, both those that apply directly to the site and those which may form part of a broader or regional context to all types of development.

1.3 Structure

Section 2 – Response to SEARs

Section 2 of this report presents the Secretary's Environmental Assessment Requirements (SEARs) related to traffic for this development, and the relevant sections of this report in which each item has been addressed. Note also that each section of this report provides reference to the relevant SEARs addressed within that section.

Section 3 – Existing Conditions

Section 3 of this report examines the existing conditions at and around the site. The site's role within the context of the broader road and public transport network is explained, along with an overview of vehicular, pedestrian, and cyclist facilities within the Western Sydney University Campus. Traffic counts and modelling have been undertaken to determine the current operation of the external road network.

Section 4 – Proposed Development

Section 4 of this report details the proposed development and its impacts on the local area with regards to traffic and transport. Details of on-site transport infrastructure including car parking, pedestrian facilities, bicycle storage, and service and loading requirements are provided and assessed for their adequacy. Traffic modelling of the projected operational

volumes has been completed to demonstrate the capacity of the road network to cater for additional traffic.

Section 5 – Sustainable Travel

Section 5 of this report discusses travel demand management measures recommended for the site in response to the relevant SEARs.

Section 6 – Construction Traffic

Section 6 of this report introduces the Preliminary Construction Traffic Management Plan that has been developed for the site in response to the relevant SEARs.

Section 7 – Conclusion

Section 7 presents the conclusions of this report, summarising the overall project impacts and key findings.

1.4 References

This report has been prepared in the context of and with knowledge of a variety of relevant documents, standards, and guidelines:

- Australian Standards, including but not limited to:
 - *AS2890 – Parking facilities*
 - *AS1428 – Design for access and mobility*
- *Guide to Traffic Management* (Austroads), including but not limited to:
 - Part 12: Traffic Impacts of Developments (2016)
- *Cycling Aspects of Austroads Guides* (Austroads, 2014)
- *Planning Guidelines for Walking and Cycling* (Department of Infrastructure, Planning and Natural Resources, 2004)
- *EIS Guideline: Roads and Related Facilities* (Department of Urban Affairs and Planning, 1996)
- State Environmental Planning Policies (NSW Government), including:
 - *SEPP (Infrastructure) 2007*
 - *SEPP (State and Regional Development) 2011*
 - *Draft SEPP (Educational Establishments and Child Care Facilities) 2017*
- *Guide to Traffic Generating Developments* (Roads and Traffic Authority, 2002)
- *NSW Long Term Transport Master Plan* (Transport for NSW, 2012)
- Sydney's Future Series (Transport for NSW, 2013), including:
 - *Sydney's Cycling Future*
 - *Sydney's Walking Future*
 - *Sydney's Bus Future*

Additional documentation reviewed from relevant local jurisdictions includes:

- *Hawkesbury Development Control Plan 2002* (Hawkesbury City Council, 2002)
- *Hawkesbury Local Environmental Plan 2012* (NSW Government, 2017)

1.5 Consultation

This report has been prepared following consultation between TTW and relevant stakeholders, including Roads and Maritime Services (RMS) and Transport for New South Wales (TfNSW), in particular relating to the extent of the traffic data and traffic modelling.

Discussions were held with RMS and TfNSW confirming the approach to be used, and an email confirming the approach was forwarded to both departments (dated 18th August 2017). A reply was received from TfNSW supporting the approach and requesting that the report detail all assumptions and provide a description of School operations.

2 RESPONSE TO SEARs

Under application number SSD 8614 we have been provided with Secretary's Environmental Assessment Requirements (SEARs). These requirements were issued on the 8th August 2017 following consultation with relevant stakeholders. The key issues relevant to a Transport and Accessibility Impact Assessment include those shown in Table 2.1 and have been addressed in various sections of this report as referenced.

Note also that each section of this report provides reference back to the relevant SEARs addressed within that section.

Table 2.1: Response to SEARs

Key issues		Comments and references
1	Statutory and Strategic Context	
	<p>Address the statutory provisions contained in all relevant environmental planning instruments, including:</p> <ul style="list-style-type: none"> State Environmental Planning Policy (State & Regional Development) 2011; State Environmental Planning Policy (Infrastructure) 2007; State Environmental Planning Policy No. 55 – Remediation of Land; State Environmental Planning Policy No. 64 – Advertising and Signage; Draft State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017; and Hawkesbury Local Environmental Plan 2012. 	<i>This transport and accessibility impact assessment has been prepared in the context of the relevant planning policies as listed.</i>
2	Policies	
	<p>Address the relevant planning provisions, goals and strategic planning objectives in the following:</p> <ul style="list-style-type: none"> NSW State Priorities; A Plan for Growing Sydney; NSW Long Term Transport Master Plan 2012; Sydney's Cycling Future 2013; Sydney's Walking Future 2013; Sydney Bus Future 2013; Crime Prevention Through Environmental Design (CPTED) Principles; Healthy Urban Development Checklist, NSW Health; and Greater Sydney Commission's Draft West District Plan. 	<i>This transport and accessibility impact assessment has been prepared in the context of the relevant strategies and objectives as listed with the exception of CPTED as addressed by Architect.</i>
5	Transport and Accessibility (Construction and Operation)	
	Include a transport and accessibility impact assessment, which details, but not limited to the following:	
5.1	Accurate details of the current daily and peak hour vehicle, public transport, pedestrian and cycle movement and existing traffic and transport facilities provided on the road network located adjacent to the proposed development;	<i>Section 3.7 – Existing Conditions – Traffic Conditions</i>
5.2	An assessment of the operation of existing and future transport networks including the bus network and their ability to accommodate the forecast number of trips to and from the development;	<i>Section 3.7 – Existing Conditions – Traffic Conditions</i>

Key issues		Comments and references
5.3	Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips based on surveys of the existing and similar schools within the local area;	<i>Section 4.6 – Proposed Development – Traffic Impacts</i>
5.4	The adequacy of public transport, pedestrian and bicycle networks and infrastructure to meet the likely future demand of the proposed development;	<i>Section 4.5 – Proposed Development – Public Transport</i>
5.5	The impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site in consultation with Roads and Maritime Services and Transport for NSW and identify measures to integrate the development with the transport network;	<i>Section 4.5 – Proposed Development – Public Transport</i> <i>Section 4.6 – Proposed Development – Traffic Impacts</i>
5.6	Details of any upgrading or road improvement works required to accommodate the proposed development;	<i>Section 4.5 – Proposed Development – Public Transport</i>
5.7	Details of travel demand management measures to minimise the impact on general traffic and bus operations and to encourage sustainable travel choices and details programs for implementation;	<i>Section 5 – Sustainable Travel</i>
5.8	The impact of trips generated by the development on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvements works, if required. Traffic modelling using but not limited to SIDRA network modelling for current and future years is to be undertaken of the following signalised intersections; <ul style="list-style-type: none"> • Londonderry Road at Vines Drive and Southee Road • Lennox Street/Paget Street • Blacktown Road/Bourke Street 	<i>Section 4.6 – Proposed Development – Traffic Impacts</i>
5.9	The proposed active transport access arrangements and connections to public transport services;	<i>Section 4.5 – Proposed Development – Public Transport</i>
5.10	Details of any proposed school bus routes along bus capable roads (i.e. travel lanes of 3.5 m minimum) and infrastructure (bus stops, bus layovers etc.)	<i>Section 4.5 – Proposed Development – Public Transport</i>
5.11	The proposed access arrangements, including car and bus pick-up/drop-off facilities, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and bicycle networks, including pedestrian crossings and refuges and speed control devices and zones;	<i>Section 4.3 – Proposed Development – Car Parking</i>
5.12	Measures to maintain road and personal safety in line with CPTED principles;	<i>See independent report by architect relating to CPTED principles.</i> <i>Note also this report developed by engineers with Road Safety Audit qualifications.</i>
5.13	Proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance;	<i>Section 4.4 – Proposed Development – Active Transport</i>

Key issues		Comments and references
5.14	Proposed number of on-site car parking spaces and corresponding compliance with existing parking codes and justification for the level of car parking provided on-site;	<i>Section 3.4 – Existing Conditions – Car Parking</i> <i>Section 4.3 – Proposed Development – Car Parking</i>
5.15	Details of emergency vehicle access arrangements;	<i>Section 4.2 – Proposed Development – Site Access</i>
5.16	An assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures;	<i>Section 4.4 – Proposed Development – Active Transport</i> <i>Section 4.6 – Proposed Development – Traffic Impacts</i>
5.17	Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times);	<i>Section 4.7 – Proposed Development – Service and Loading</i>
5.18	In relation to construction traffic: <ul style="list-style-type: none"> Assessment of cumulative impacts associated with other construction activities (if any); An assessment of road safety at key intersections and locations subject to heavy vehicle construction traffic movements and high pedestrian activity; Details of construction program detailing the anticipated construction duration and highlighting significant and milestone stages and events during the construction process; Details of anticipated peak hour and daily construction vehicle movements to and from the site; Details of access routes and arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle; Details of temporary cycling and pedestrian access during construction; Details of proposed construction vehicle access arrangements at all stages of construction; and Traffic and transport impacts during construction, including cumulative impacts associated with other construction activities, and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of the impact. 	<i>Section 6 – Construction Traffic</i>
5.19	Relevant Policies and Guidelines: <ul style="list-style-type: none"> Guide to Traffic Generating Developments (Roads and Maritimes Services) EIS Guidelines – Road and Related Facilities (DoPI) Cycling Aspects of Austroads Guides NSW Planning Guidelines for Walking and Cycling Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development Standards Australia AS2890.3 (Bicycle Parking Facilities) 	<i>This transport and accessibility impact assessment has been prepared in the context of the relevant policies and guidelines as listed.</i>

3 EXISTING CONDITIONS

3.1 Site Location

The subject site is located within the Hawkesbury campus of Western Sydney University at 2 College Street, Richmond (Lot 2 DP 1051798). The site is located within the Hawkesbury City Council LGA. The extent of the site is illustrated in Figure 3.1 below, in the context of the local major road network.

The land is classified under SP1 Education zoning and is currently used for educational agricultural purposes. For the purposes of any new development, the site is largely considered a greenfield site. Directly to the northeast of the site is the P47 car park, an at-grade asphalt car park with capacity for around 142 vehicles. The microbiology building is also located immediately north of the car park. The campus provides courses in environmental health, forensic science, nursing, medical science, natural science (environmental, agricultural, horticultural), and secondary school science teaching.

There are three access points into the Campus from the public road network;

- Vines Drive at Londonderry Drive
- College Drive at Bourke Street
- Campus Drive at Blacktown Road

The site is located close to the NSW state road network. Blacktown Road is approximately 1.8 kilometres and Londonderry Road approximately 650 metres from the site. Blacktown Road provide access to the M7 Motorway (via Richmond Road) at Dean Park. Figure 3.3 illustrates the state and regional roads in the vicinity of the site.



Figure 3.1: Site location

Image source: Nearmap (dated 9th July 2017)



Figure 3.2: Site zoning

Image source: Hawkesbury Local Environmental Plan 202, Sheet LZN_008BA (dated 21st September 2012)



Figure 3.3: State and regional roads

Image source: Nearmap (dated 9th July 2017)

3.2 Site Access

There are currently no formalised vehicular access points to the site development area as it is a greenfield site.

The site has frontage to Vines Drive and Maintenance Lane. Vines Drive allows for two-way traffic, and has a 5.8-metre wide road carriageway and a footpath on the opposite side of the road. Maintenance Lane has a 5-metre carriageway and has no footpaths. Parking is not permitted on Vines Drive due to its narrow width.

3.3 Traffic Generation

The existing site contains no built development and is therefore assumed to generate negligible traffic. Existing traffic volumes are generated by the University campus.

Notwithstanding the above, intersection counts were undertaken at five intersections as detailed below with locations chosen in consultation with RMS and TfNSW.

- Londonderry Road & Vines Drive
- Londonderry Road & Southee Road
- Lennox Street & Paget Street
- Blacktown Road & Bourke Street/Lennox Street
- Blacktown Road & Campus Drive

Further details on traffic conditions are detailed later in this report.

3.4 Car Parking

3.4.1 Campus Parking Availability

The entire Western Sydney University campus is a restricted parking area. Parking on-campus requires a valid parking permit, with a number of different permits are available for staff and students. The campus contains up to 53 labelled parking areas, however only 38 of these are considered open parking areas (when excluding individual driveways and loading zones). These comprise the following:

- 31 general vehicle parking areas containing a total of 1,516 parking spaces
 - Includes a variety of permit areas and accessible parking
- 5 motorbike parking areas containing a total of 34 motorbike parking spaces
- 2 police parking areas containing a total of 46 parking spaces
 - Associated with the NSW Police Leadership Centre

For the purposes of this transport impact assessment, particular consideration is given to the P47 car park, which is adjacent to the site and is most likely to cater for parking demand at the future School development (see Section 4). The capacity of this car park is around 142 spaces. Site observation indicated that users parking at P47 were generally attending either of two adjacent buildings (J4 Microbiology or K12 Chemistry and Biochemistry), and displacement of capacity in this car park may require additional travel distance for users. Figure 3.4 demonstrates the walking distance from the P47 car park to main areas of vacancy across the campus.

A detailed parking occupancy study of the entire campus was undertaken on Thursday 5th and Tuesday 10th October, 2017. All 38 distinct parking zones were observed each hour to record the vehicle occupancy at the time. The two data sets show a high level of consistency, with total vehicle demand across the day being within 1.0% difference (i.e. 6,561 vs. 6,628 total vehicles recorded).

The peak vehicle demands occurred at 11am on the Thursday, and 12pm on the Tuesday. For the purposes of this assessment, the peak occupancy recorded at either 11am or 12pm on either the Thursday or Tuesday is considered. Note that this does not necessarily record

the highest overall occupancy in each zone, but provides a conservative total more than 15% higher than any individual hourly occupancy¹.

When considering the peak occupancy across data sets, a total of 1,044 vehicles are located on the campus (general vehicle parking only, excludes police and motorbike), from a capacity of 1,516 spaces. 472 parking spaces are therefore vacant across the campus and total occupancy is calculated at 69%. Peak occupancy of the P47 car park was 46 vehicles during the survey peak periods (11am and 12pm), from a capacity of 142 spaces.

Figure 3.4 illustrates the number and distribution of these available spaces.

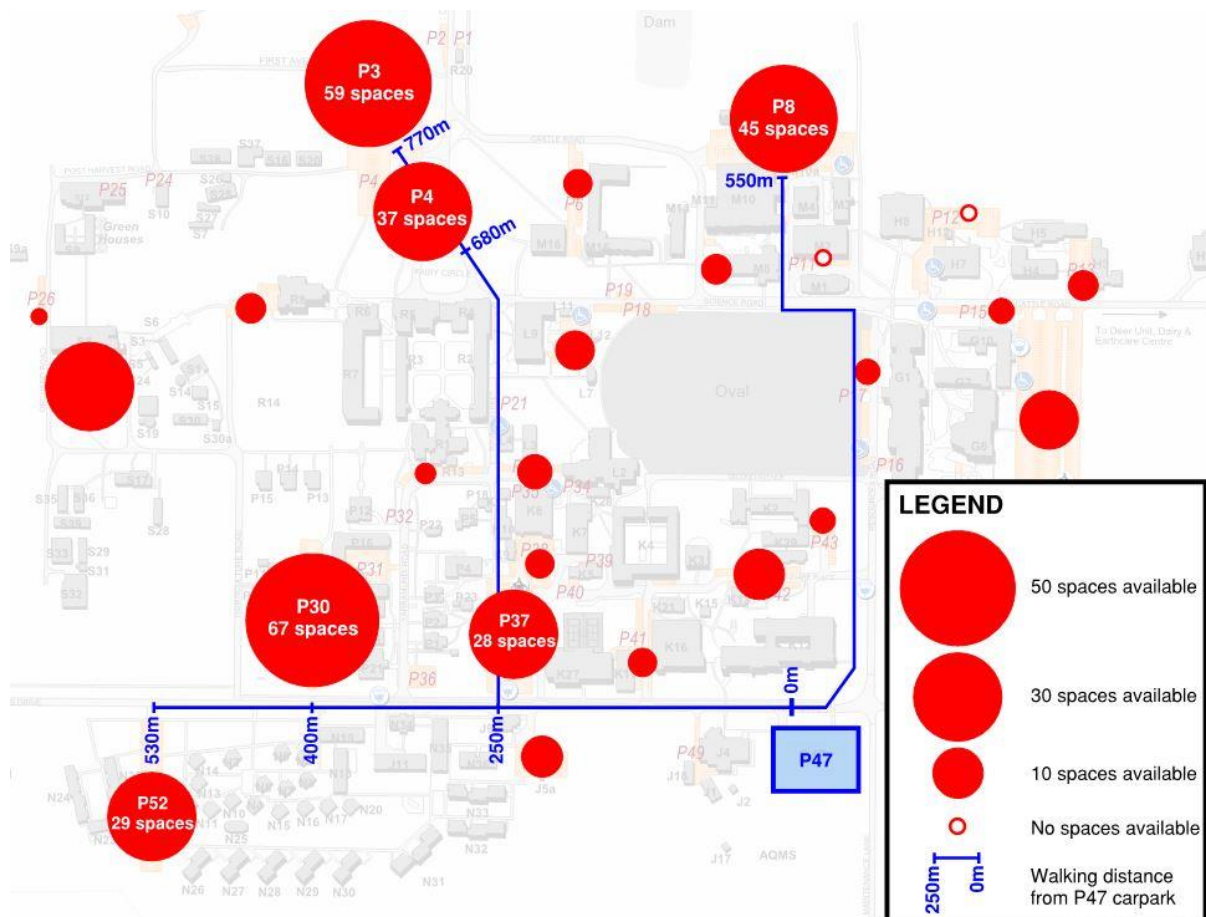


Figure 3.4: Campus parking availability at peak occupancy

Background image source: WSU Hawkesbury campus parking map (dated 4th May 2016)

Based on the distribution of available parking, over 100 vehicles could be accommodated generally within a 400-metre or 5-minute walking distance if required. The P47 car park is on the perimeter of the campus and most destinations are located between this and other parking zones. Note that this does not consider the distribution of certain parking permit restrictions across the campus, which may result in differing availability of parking.

Full occupancy results by section and time of day are attached to this report in **Appendix A**.

3.4.2 P47 Car Park

An analysis of available Nearmap imagery has been undertaken to review historical demand for parking in the P47 car park. Images were typically taken between 12:00pm and 2:00pm, the time during which parking for a school would typically be in demand (excluding drop-off

¹ Highest vehicle occupancy recorded was 896 vehicles at 11am on Thursday 5th October. Sum of peak 11am/12pm values gives total of 1,044 vehicles, or a 17% over-estimate. Higher values for individual zones may have occurred at a different time of day.

and pick-up demands). Analysis was also restricted to images provided on weekdays within school and university teaching periods, to exclude any periods of low demand. Average vehicle demand across the data was 36 vehicles, with an 85th percentile demand of around 61 vehicles. Table 3.1 details the full set of data analysed.

The historical data is generally consistent with data recorded on-site, with average peak occupancy of 33 vehicles in the P47 car park during site surveys.

Table 3.1: Historical occupancy data at P47 car park

Source: Nearmap imagery

Date	Time	Occupancy
Friday 22nd September 2017	1:00pm	18 vehicles
Monday 18th July 2016	1:40pm	43 vehicles
Wednesday 11th May 2016	1:00pm	36 vehicles
Wednesday 2nd March 2016	1:50pm	107 vehicles
Monday 1st September 2014	1:20pm	16 vehicles
Tuesday 17th June 2014	1:20pm	7 vehicles
Friday 16th August 2013	2:20pm	44 vehicles
Wednesday 3rd July 2013	1:30pm	5 vehicles
Tuesday 23rd April 2013	12:50pm	22 vehicles
Thursday 7th February 2013	1:00pm	18 vehicles
Wednesday 24th October 2012	12:20pm	57 vehicles
Monday 15th October 2012	12:00pm	14 vehicles
Monday 24th September 2012	1:10pm	16 vehicles
Thursday 2nd August 2012	1:50pm	20 vehicles
Wednesday 9th May 2012	2:10pm	69 vehicles
Thursday 23rd February 2012	2:10pm	9 vehicles
Monday 16th May 2011	1:50pm	69 vehicles
Tuesday 21st September 2010	1:00pm	14 vehicles
Friday 6th August 2010	2:30pm	44 vehicles
Thursday 13th May 2010	2:20pm	60 vehicles
Wednesday 14th April 2010	12:00pm	61 vehicles
Monday 15th March 2010	-	49 vehicles
Average		36 vehicles

3.5 Active Transport

The *Healthy Kids* initiative (a NSW government joint department initiative) defines active transport as “any kind of transport where you are using physical activity to travel to and from a destination. Walking, cycling, scooting and skateboarding are examples of active transport, as is using public transport (as it almost always includes walking to and from destinations).”

The NSW Department of Education operates a number of initiatives relating to healthy and active choices for high school children. It is critical therefore that area around the proposed School be able to provide for active transport, not only for students but also teachers and visitors as part of a broader health movement.

3.5.1 Pedestrian Facilities

There is currently no pedestrian footpath provided along the site frontage at Vines Drive. A footpath is provided along the opposite (northern) side of the road. A number of crossing facilities are located along the road to provide access to specific areas and buildings.

An at-grade pedestrian (zebra) crossing is located 80 metres east of the proposed School site. This crossing currently provides a connection toward the central sections of the campus from the Microbiology building and P47 car park.

A crossing facility is provided 90 metres west of the proposed School frontage in front of the Campus Safety and Security Office. The facility is in the form of a raised threshold with pedestrian crossing signs, however it should be noted that no zebra crossing line marking is provided. A similar facility is located 160 metres east of the site frontage, connecting the P47 car park through to western sections of the campus.

3.5.2 Cycling Facilities

There are no formalised cycling facilities within the vicinity of the site, although the 40 km/hr campus-wide speed limit provides safe operating speeds for cyclists.

3.6 Public Transport

Further to the availability of active transport infrastructure and services, it is necessary to gain an understanding of the existing public transport network within the vicinity of the site.

Public bus services operate along Londonderry Road and Blacktown Road. Bus route 677 service Londonderry Road at a bus stop around 600 metres from the site, while route 675 services College Street around 1.4 kilometres from the site. All bus services in the area are operated by Busways, and have a low daily frequency. The availability of local bus services is shown in Table 3.2 below.

Table 3.2: Public bus frequencies

Data source: Sydney Buses

Route	Destinations	Daily Services (8am – 5pm)
677	Penrith to Richmond via Londonderry	5 services
675	Windsor to Richmond via RAAF Base & Bligh Park	8 services

3.6.1 School Bus Services

No existing school bus routes operate within the University campus. *Busways* operates school services to a number of local schools in the area, including Richmond High School, Richmond North Public School and Richmond Public School. In addition to servicing residential areas, these services typically provide a connection between each school and local amenities such as Richmond Station.

3.6.2 WSU Shuttle Services

Western Sydney University shuttle buses travel to and from campus via Richmond Market Place and East Richmond railway station. Services have an average frequency of 25 minutes between 7:00am and 10:45pm on weekdays. The shuttle stops at Richmond Marketplace and East Richmond Station and within the campus at Fairy Circle, Residential College, The Stables, and the Library.

3.6.3 Other Public Transport

Public transport available within the vicinity of the site is primarily bus services, however there are other services provided in the broader region.

The nearest train stations to the site are East Richmond (2.0km) and Richmond (2.5km). Walking distances are approximately 24 minutes and 30 minutes respectively. Route 677 also connects Richmond Station to Londonderry Road and could be used as a transfer to the site.

No light rail or ferry infrastructure operates in the area, and there are no major plans published for additional transport infrastructure in the area. The Sydney Metro Northwest project will terminate at Cudgegong Road in Rouse Hill, and shall not connect to the Richmond railway line.

3.7 Traffic Conditions

Intersection movement counts and mid-block tube counts were undertaken at various locations to record background traffic volumes. Analysis and modelling has been undertaken with these results to determine the level of operation of the existing road network. The extent of the traffic data collection and traffic modelling has been determined through a review of the anticipated area of impact. The extent of traffic analysis has been based on the RMS letter dated 4th August 2017 to NSW Department of Planning & Environment and further discussions and correspondence with RMS and TfNSW in preparation of this report.

3.7.1 Traffic Volume Summaries

For seven days between Thursday 31st August and Wednesday 6th September 2017, a 24-hour mid-block tube count was installed to collect traffic volume data on Vines Drive, in front of the Microbiology building. Counts were undertaken during the NSW school term and during semester time for Western Sydney University, to record background traffic during typical times of school operation. Recorded data is attached in **Appendix B** of this report.

The recorded traffic counts demonstrated that traffic flows were reasonably consistent throughout the day. Figure 3.5 demonstrates the behaviour of traffic flows across each weekday, with minimal daily variation from the average. It is noted that a large volume of traffic accessed the site on the Monday evening, resulting in total daily traffic 36% higher than average. Traffic on Friday was generally lower than the remainder of the week, 30% below average. Volumes on weekends were very low as is expected for a university campus.

The tube count data shows an even distribution between eastbound and westbound traffic, indicating that traffic largely enters and exits the site via the same route. In general, Vines Drive carries traffic volumes well within capacity for a two-way two-lane road.

Average vehicle speed at this location was recorded as 41.6 km/hr, with an 85th percentile speed of 48.8 km/hr. Given that the speed limit within the University is 40 km/hr, the recorded speeds are high and the consideration may be given by the University to reduce vehicular speeds in Vines Drive.

A full summary of daily traffic volumes and vehicle speeds is provided in Table 3.3.

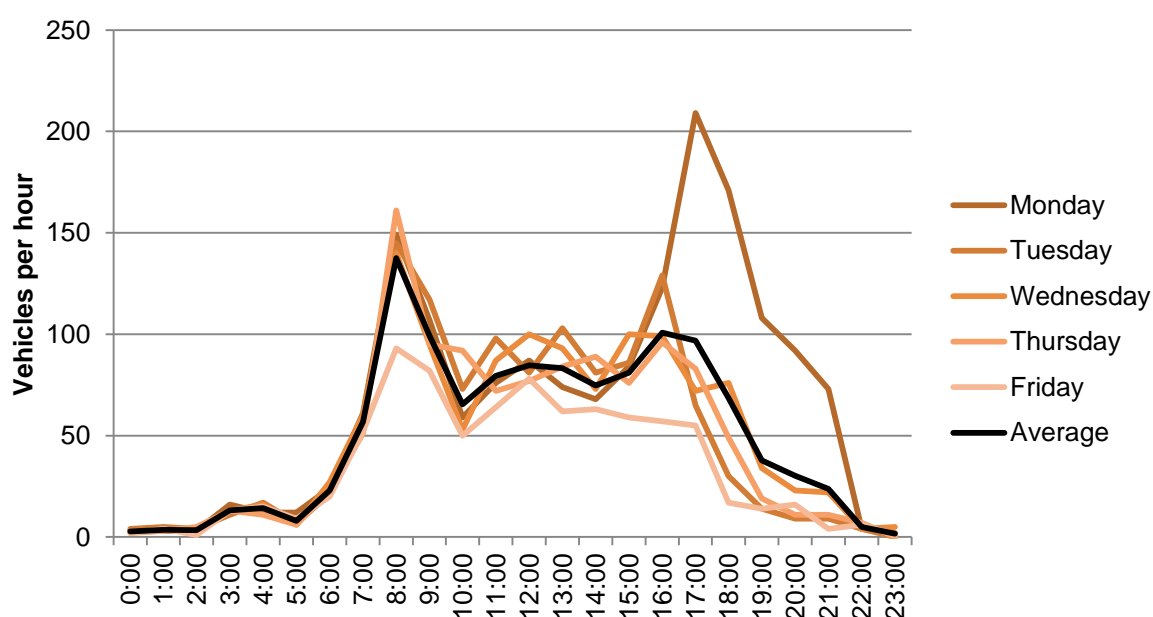


Figure 3.5: Seven-day traffic volumes on Vines Drive

Data source: Traffic counts undertaken Thursday 31st August – Wednesday 6th September 2017

Table 3.3: Seven-day traffic statistics on Vines Drive

Data source: Traffic counts undertaken Thursday 31st August – Wednesday 6th September 2017

Direction	Weekday average (veh/day)	Weekend average (veh/day)	7-day average (veh/day)	Average speed	85 th percentile speed
Eastbound	597	116	460	41.8 km/hr	49.3 km/hr
Westbound	598	124	462	41.4 km/hr	48.2 km/hr
Combined	1,195	240	922	41.6 km/hr	48.8 km/hr

3.7.2 Intersection Modelling

Intersection traffic counts recording vehicle volumes, turning manoeuvres, and pedestrian movements, were undertaken on Thursday 31st August 2017 from 7:30am to 9:30am and 2:30pm to 4:30pm. Recorded data is attached in **Appendix B** of this report.

SIDRA intersection modelling has been completed for the selected intersections under existing conditions and is attached in **Appendix C** of this report. All existing intersections operate at a good Level of Service, with a detailed comparison provided in Section 4.6 with regards to pre- and post-development conditions.

Given that traffic flow is generally consistent on a daily basis (as discussed above), it is expected that these modelling results are a good representation of background traffic behaviour.

Table 3.4: Intersection modelling results – existing

*Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay*

Intersection	Existing Operation		
	DOS	Delay (sec)	LOS
Londonderry Dr / Vines Dr (AM)	0.098	11.0	A
Londonderry Dr / Vines Dr (PM)	0.096	9.6	A
Londonderry Dr / Southee Rd (AM)	0.284	8.6	A
Londonderry Dr / Southee Rd (PM)	0.154	8.7	A
Lennox St / Paget St (AM)	0.423	10.1	A
Lennox St / Paget St (PM)	0.409	10.5	A
Blacktown Rd / Bourke St (AM)	0.458	18.4	B
Blacktown Rd / Bourke St (PM)	0.477	19.4	B
Campus Dr / Blacktown Rd (AM)	0.157	38.0	C
Campus Dr / Blacktown Rd (PM)	0.321	33.3	C

4 PROPOSED DEVELOPMENT

4.1 The Development

The proposal for this State Significant Development (SSD 8614) seeks to construct a new Hurlstone Agricultural High School on land at the Western Sydney University (WSU) Hawkesbury campus in Richmond. The new School will replace the existing school campus at Glenfield and have an increased capacity for 1,500 students. The site will include classrooms, administration areas, a school hall, and other necessary infrastructure.

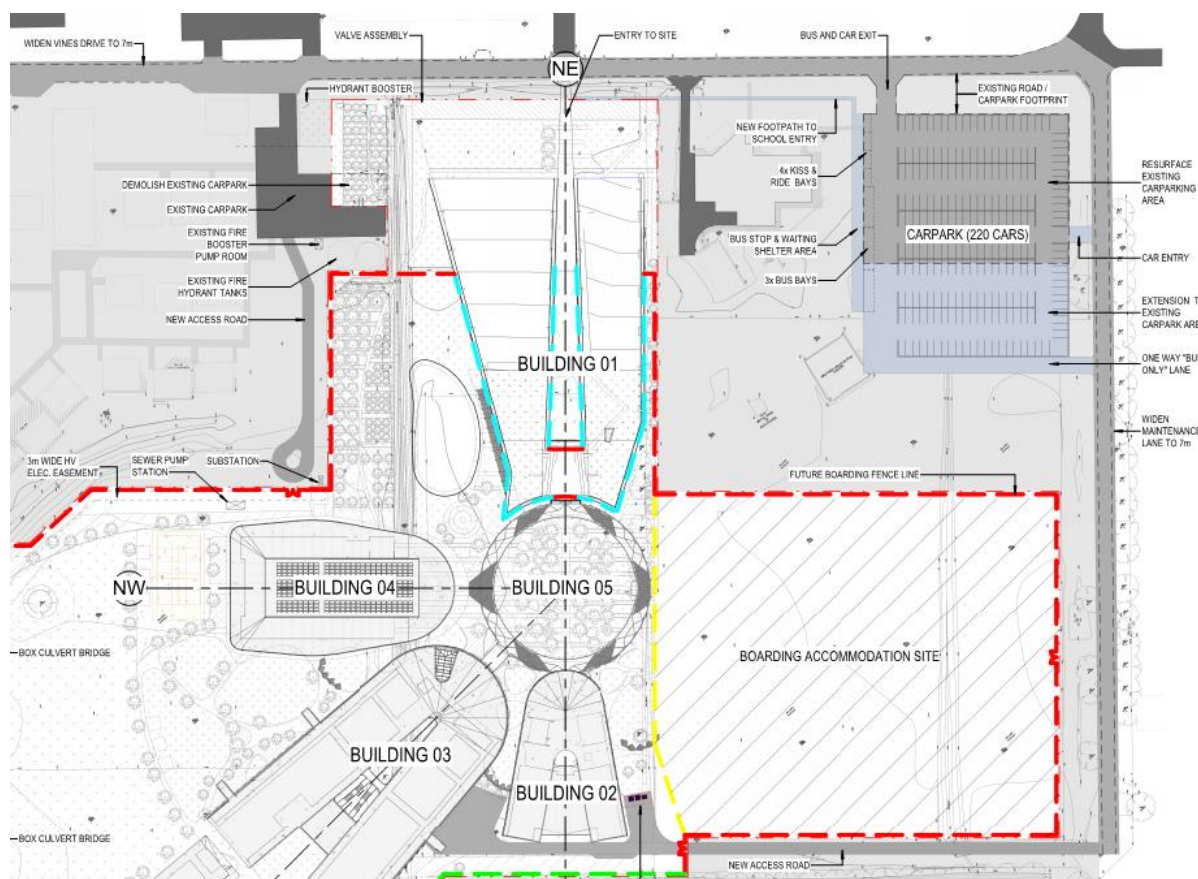


Figure 4.1: Proposed site layout

Source: HAHS-00-SD-AR-DR-1001-H, Conrad Gargett Ancher Mortlock Woolley

Two ancillary developments will also take place separate to the construction of the main School site. The existing WSU car park (P47) is to be expanded to provide increased parking capacity from 142 spaces to approximately 220 spaces plus bus zone and pick-up space, and a boarding house is also to be constructed adjacent to the School with boarding for 300 students. It is assumed that the boarding school will provide for its own parking demands as appropriate. Both the car park and boarding school developments will be undertaken as separate development approvals.

4.2 Site Access

The School site is to be connected to the external network via a pedestrian entry from Vines Drive, however there will be no vehicular access within the site. Modifications are proposed to the P47 car park to provide vehicular access to car parking, bus zones, and drop-off and pick-up areas.

A new service driveway is to be constructed along the southern boundary of the site connecting to Maintenance Lane. The driveway is proposed to be used by maintenance,

service, and delivery vehicles only, with no car parking provided internal to the site (see Section 4.3).

Pedestrian access to the site is proposed via a footpath which connects to Vines Drive. An improved pedestrian link is also proposed along Vines Drive between the School and the modified P47 car park.

Emergency vehicle access to the site shall be via the service vehicle driveway, or the Vines Drive street frontage where required. Driveways and access paths within the adjacent agricultural land can also provide access to various areas of the site depending on the destination and access requirements. It is expected that the most regular emergency access required would be for ambulance vehicles.

The majority of traffic generated by the School will desire access to the P47 car park, which is adjacent to the core site.

4.3 Car Parking

4.3.1 Drop-Off and Pick-Up Facilities

The most significant impacts at any school occur around school start and finish times, particularly during the afternoon pick-up period as families arrive in advance and queue to collect their children. All activity typically clears in a period of 15-20 minutes. Morning drop-off is less impacting to traffic, as activity is spread over a longer time (45-60 minutes) and does not require vehicles to queue and wait.

It is generally recognised that it is not practical to provide facilities such that there shall be zero impact on the local road network. Rather, it is the intention of the design to provide as much capacity as possible to reduce traffic impacts.

Drop-off and pick-up of students should not occur along Vines Drive as the road width does not sufficiently provide for parking lanes. These operations are proposed to be catered for within the modified P47 car park by signposting an area as a No Parking zone during 8:00am – 9:30am and 2:30pm – 4:00pm School Days.

It is recommended that the P47 car park should be designed to cater for the following;

- A bus zone with capacity for approximately 5 buses.
- A drop-off and pick-up zone with capacity for approximately 10-12 cars².
- Physical separation within the car park between bus movements and other vehicle movements where possible.

4.3.2 Parking Requirements

Hawkesbury Council's DCP requires that parking be required generally in accordance with the following rates for schools and educational establishments:

- 1 space for each staff, plus
- Space for delivery vehicles and buses, plus
- 1 space per 5 seats or 1 space per 7m² of floor area in assembly hall, whichever is greater, plus
- 1 space per 3 year 12 students.

On application of the above rates, the following parking would be required:

- | | |
|-----------------------------------|------------|
| • 110 staff members | 110 spaces |
| • 692m ² assembly hall | 99 spaces |

² 160 peak hour trips (see Section 4.6.3) assumed to take place within 30 minutes. At service time of 2 minutes per space, each space can turnover approximately 15 times. This requires around 10.7 spaces to cater for demand at this service rate.

- 200 Year 12 students 67 spaces
- **Total** **276 spaces**

In comparison, the mode share demand for parking based on current mode share split at Glenfield would be:

- 110 staff @ 95% vehicle usage 105 spaces
- 1200 students @ 10% parking usage 120 spaces
- **Total** **225 spaces**

Furthermore, the NSW DOE'S Educational Facilities Standards and Guidelines (EFSG) also provide desired parking provision for schools. The EFSG specifies that for a secondary school with 7 streams, the maximum parking provision is to be 112 spaces. This is the equivalent of 16 spaces per stream, and it is noted that the per-stream parking rate reduced as the number of streams increases. Given that the proposed site is to cater for 9 streams, the following maximum parking allowance would be estimated for EFSG standards:

- **Total** **130 spaces**

4.3.3 Car Parking Provision

Car parking demand for the School is proposed to be catered for within the WSU campus, including modification of the existing P47 car park.

The car park is proposed to be extended to provide increased capacity and cater for bus zones and a drop-off and pick-up area for vehicles. While this modification is proposed to be determined under an alternative approval pathway, it is expected to provide 220 parking spaces (increased from 142 spaces) plus bus zone and drop-off / pick-up.

The three parking demand methodologies discussed above result in varying impacts to the availability of parking within the P47 car park and across the broader campus. Table 4.1 demonstrates the outcomes of these methodologies.

Table 4.1: Comparison of parking demand methodologies

Method	Parking required	P47 parking demand	P47 occupancy (capacity = 220)	Total campus demand	Campus occupancy (cap. = 1,594)
Existing campus	-	46 spaces	32% ³	1,044 spaces	69% ⁴
EFSG rates	130 spaces	176 spaces	80%	1,174 spaces	74%
Mode share demand	225 spaces	271 spaces	>100% (excess = 51)	1,269 spaces	80%
Hawkesbury DCP	276 spaces	322 spaces	>100% (excess = 102)	1,320 spaces	83%

Based on the existing mode share at the Glenfield campus (the most accurate comparison currently available), overflow from the P47 car park into other parking areas would be a total of 51 spaces. This includes the existing P47 parking demand of 46 spaces. Overall campus occupancy remains at 80%, with 325 vacant parking spaces still available throughout the campus.

³ Current P47 parking capacity = 142 spaces

⁴ Current total parking capacity = 1,516 spaces

Where demand for the P47 car park exceeds the capacity (with occupancy of greater than 100%), users may be required to park in other parking locations further from their destination. As noted in Section 3.4.1, these levels of parking demand may generally be relocated within a 5-minute walk of the School and the most common destination buildings. Given that the P47 car park is on the perimeter of the campus, most WSU destinations are located between this and other parking zones.

4.3.4 Accessible Parking

The Building Code of Australia (BCA) specifies that a school (Class 9b) building must provide accessible parking at a rate of 1 space for every 100 car parking spaces or part thereof. In accordance with this specification, 3 accessible parking spaces should be provided within the P47 car park, as the primary parking zone for School users.

4.4 Active Transport

4.4.1 Pedestrian Movements

A pedestrian crossing facility is provided approximately 40 metres north of the School frontage in front of the Campus Safety and Security Office in the form of a raised threshold with pedestrian crossing signs. It should be noted that formalised zebra crossing linemarking is not provided.

An at-grade pedestrian (zebra) crossing is located 20 metres east of the site in front of the Microbiology building.

A pedestrian facility is provided approximately 120 metres east of the School frontage in front of the car park in the form of a raised threshold with pedestrian crossing signs. It should be noted that zebra crossing line marking is not provided.

A footpath is provided on the opposite side of Vines Drive and a new footpath is proposed to link from the bus drop off along Vines Drive to the School entrance.

4.4.2 Cycling Facilities

The EFSG provides desired bicycle storage provision for schools. For a secondary school with 7 streams, storage for 54 bicycles should be provided. Given that the proposed site is to cater for 9 streams, a recommended provision of 70 bicycle spaces would be estimated. Council does not specify any required provisions for bicycle parking.

Bicycle storage is required to be provided in the form of a secure enclosure / bicycle rails. The facilities shall be designed and installed in accordance with AS2890.3 as a Class 2 or Class 3 facility as appropriate.

No additional on-road cyclist facilities are proposed external to the site.

4.5 Public Transport

4.5.1 Public Bus Services

It is not proposed that any changes be made to public bus services with the exception of some local diversions of existing services with spare capacity during drop-off / pick-up times. It is anticipated the existing Routes 677 and 675 connecting to Richmond Station and throughout the northwest will be sufficient to cater for additional student and staff demand.

4.5.2 School Bus Services

A bus zone is proposed within the modified P47 car park (subject to a separate application). When the school opens in 2020 a school bus demand of 4 buses is anticipated which will increase to some 10-12 buses by year 2023. The P47 car park shall be designed to cater for

appropriate bus services. Assuming bus spaces may turnover twice in the afternoon peak period, a capacity of around 5 bus spaces would be considered suitable. It is unlikely to be feasible to cater for all buses arriving and queueing at the same time, and therefore any available capacity that can be provided is considered suitable. Excess capacity will queue within the School and campus laneways only, without impacts to public road networks.

Following discussions with the bus provider, Busways, school buses are expected to travel between the school and Richmond Station via Vines Drive. As detailed above some existing local bus services may also be locally diverted to the school during drop off/pick up times. Dependent on demand a school bus service to Penrith Station may also be required.

In order for buses to service the school Vines Drive needs to be widened to a 7.0 metre carriageway as required by TfNSW.

4.6 Traffic Impacts

4.6.1 Road Safety

In order to provide safe conditions for children at the campus the following road safety measures are recommended:

- Implementation of a 40 km/hr School Zone adjacent to the School in Vines Drive and Maintenance Lane
- Upgrade of existing pedestrian crossing in Vines Drive west of Resources Road to include zebra crossing line marking.
- Physical separation between car parking areas and bus stop area within P47 car park

4.6.2 Traffic Growth

To provide an accurate understanding of the future traffic conditions beyond the opening of the School, future modelling has been undertaken for the year 2027, assuming 10 years of traffic growth beyond the current conditions. Forecasts beyond this date are unlikely to provide accurate information due to uncertainties in the future of the area, long-term transport and road network changes, and changing behaviour of users.

Background traffic growth across the forecast period has been assumed at 1.0% per annum. While this is a typical growth factor used where historical data is unavailable, it is also highly representative of the population growth in the local area. Between 2006 and 2016, the population in the Richmond-Windsor SA3 statistical area grew from 35,366 to 38,163, an annual growth of 0.76%. Population in the greater Outer West and Blue Mountains SA2 statistical area grew from 285,376 to 318,255, an annual growth of 1.10%.

SIDRA intersection modelling has been completed for the selected intersections for projected future conditions due to background growth and is attached in **Appendix C** of this report. See Section 4.6.5 for a full comparison of pre- and post-development operations.

4.6.3 Trip Generation

A typical source of trip generation data, the RMS *Guide to Traffic Generating Developments*, does not provide a trip generation rate specifically for school premises. Trip generation therefore must be developed based on an understanding of the particular site and trip generation at other similar sites.

In order to estimate the likely traffic generation of the School, data was collected from the existing site in Glenfield and this data was applied to the new School, noting a travelling capacity of 1,200 students and 110 teachers. For the purposes of the analysis, the remaining 300 students are assumed to reside at the boarding school which will not generate any drop-off and pick-up activity. The details as provided by the School were:

- Staff
 - Private vehicle (parking): 95%
 - Public transport / cycling: 5%
- Students
 - Private vehicle (parking): 10%
 - Private vehicle (drop-off): 20%
 - Public transport / cycling: 70%

The peak 60-minute periods most relevant to a typical 9am-3pm school day are 8:00am to 9:00am and 2:30pm to 3:30pm.

For staff, it is assumed that 80% arrive within the morning peak hour, and in the afternoon peak hour only 20% of staff depart due to various after-school activities or responsibilities. At a mode share of 95%, this results in 84 arrivals in the morning peak and 21 departures in the afternoon peak.

With regards to families or groups travelling together, a vehicle occupancy of 1.2 students per vehicle is estimated. With 20% of students utilising the drop-off and pick-up areas, 200 trips are generated both inbound and outbound in both the morning and afternoon peak. An additional 10% of students driving to school results in a further 100 inbound morning trips and 100 outbound afternoon trips.

For students, it is assumed that around 20% of students will partake in extra-curricular or other activities before or after school and will therefore travel outside the peak 60-minute periods. This reduces the student travel rates to 160 drop-off and pick-up movements and 80 students travelling to and from parking areas during each peak hour.

When considering all trips across a daily period, an additional 834 vehicle trips are expected to be generated by students and staff⁵, say a total of 900 trips to account for some visitors and deliveries. While these are to be distributed to the broader network in low proportions (e.g. to Richmond) or onto high-capacity roads (e.g. Blacktown Road), the most significant impacts will be noted within the university campus. Current daily traffic volumes along Vines Road are around 600 vehicles per weekday. With 50% of total trips or 450 trips assumed to be generated along Vines Road (see Section 4.6.4 below), traffic is increased by 75% across a whole day.

4.6.4 Trip Distribution

As a selective school, students do not necessarily reside in the local area and therefore the catchment area is not constrained. Trips are generated to and from a broad regional area, including large residential populations surrounding the Penrith, Blacktown, and Windsor regions.

The approach and departure distributions for each intersection chosen for analysis are detailed in Figure 4.2 below.

⁵ 95% staff car mode share = 105 trips inbound and outbound.

70% student bus mode share = 840 students = 12 buses inbound and outbound.

20% student drop-off mode share @ 1.2 per vehicle = 200 trips inbound and outbound.

10% student parking mode share @ 1.2 per vehicle = 100 trips inbound and outbound.

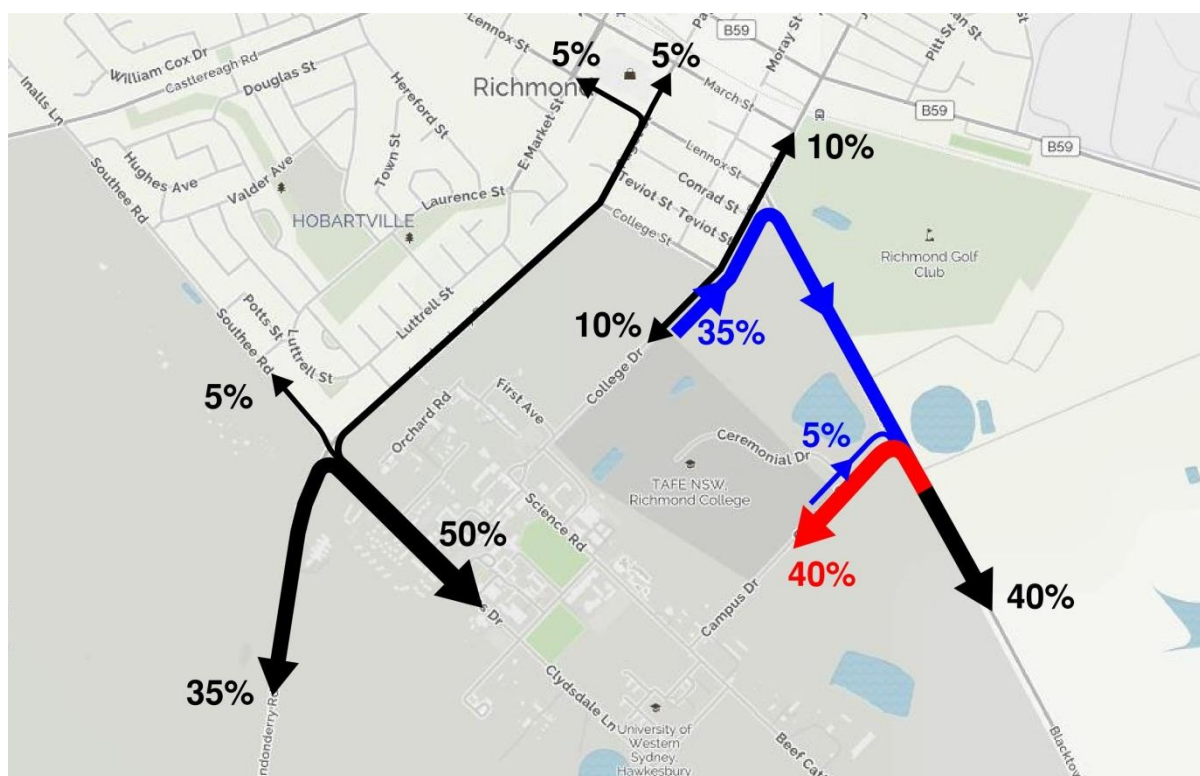


Figure 4.2: Cumulative traffic distribution

Background image source: Mapquest

Note trips along Blacktown Road arrive (red) and depart (blue) on different routes associated with major delays at unsignalised intersection of Campus Drive and Blacktown Road.

4.6.5 Future Traffic Conditions

SIDRA intersection modelling has been completed for the selected intersections for projected future conditions under background growth (10 years) plus School operation and is attached in **Appendix C** of this report.

It is noted that a high level of delay is demonstrated at the intersection of Campus Drive and Blacktown Road for vehicles turning right out of Campus Drive. This delay occurs despite only 5% of overall School traffic being distributed to this intersection. Where delay occurs on Campus Drive, all queuing is maintained within the WSU / School campus site, without creating impact on any public roadways.

It is anticipated that School users will identify this as a poorly performing intersection and avoid travelling on this route, rather utilising Blacktown Road via Bourke Street. A signalised intersection is provided at that location providing greater utility and controlled delays for users. Campus Drive is considered to be suitable for entering vehicles with no delay occurring for the entry movement, and traffic remains allocated to this movement for analysis as demonstrated in Figure 4.2 above.

Table 4.2: Intersection modelling results summary

*Data for signalised intersections is intersection total
Data for unsignalised intersections is manoeuvre with worst delay*

Intersection	2017			2027 + School		
	DOS	Delay	LOS	DOS	Delay	LOS
Londonderry Dr / Vines Dr (AM)	0.098	11.0	A	0.245	14.2	A
Londonderry Dr / Vines Dr (PM)	0.096	9.6	A	0.272	11.3	A
Londonderry Dr / Southee Rd (AM)	0.284	8.6	A	0.375	10.2	A
Londonderry Dr / Southee Rd (PM)	0.154	8.7	A	0.202	9.7	A
Lennox St / Paget St (AM)	0.423	10.1	A	0.499	10.6	A
Lennox St / Paget St (PM)	0.409	10.5	A	0.481	11.0	A
Blacktown Rd / Bourke St (AM)	0.458	18.4	B	0.561	19.9	B
Blacktown Rd / Bourke St (PM)	0.477	19.4	B	0.558	21.0	B
Campus Dr / Blacktown Rd (AM)	0.157	38.0	C	0.466	84.9	F
Campus Dr / Blacktown Rd (PM)	0.321	33.3	C	0.776	96.5	F

4.7 Service and Loading

Loading is proposed via a proposed new service road to be accessed from Maintenance Lane, approximately 250 metres from Vines Drive. The service road provides access to a loading area to be located between Building 02 and Building 03. The service road and loading facility should be designed at a minimum to accommodate a Heavy Rigid Vehicle (HRV). Further assessment is required once the detailed design is undertaken.

The DCP requires that service vehicle access should be provided with convenient access and that it should operate independently of other areas and allow the vehicle to enter and exit the site in a forward manner. The location for servicing is considered appropriate subject to final design considerations.

5 SUSTAINABLE TRAVEL

Given the School will be a new facility, it provides a unique opportunity for promoting active travel and public transport while new students and staff approach their travel method to and from the School.

The below measures are proposed to be developed further in the preparation of a Green Travel Plan which should be undertaken by the School administration.

The key objective of these measures is to reduce the environmental impact of travel to and from the School through recommendations of programs to encourage walking, cycling and public transport use. This list of measures considers the School as a whole, including the travel of both students and staff.

- Organisation of school bus services in association with local bus operators
- Provision of adequate bicycle parking and end-of-trip facilities
- Encourage carpooling for staff with dedicated parking areas or other measures
- Develop a Green Travel Plan for the school including a Transport Access Guide (TAG) brochure or leaflet for all school user groups
- Include travel information into induction procedures for new staff and students/parents
- Provide regular reminders about sustainable travel within School newsletter
- Allocate responsibility for sustainable travel initiatives and documentation to a specific staff member
- Review the adequacy and effectiveness of the Green Travel Plan on a regular basis

6 CONSTRUCTION TRAFFIC

A Preliminary Construction Traffic Management Plan for the site has been developed and is attached in **Appendix D** of this report.

A detailed CTMP cannot be developed without the involvement of a builder and consideration of all final design selections. This Preliminary CTMP is intended to provide a framework within which a future CTMP can be developed and implemented, and to demonstrate the potential operation of the construction site.

7 CONCLUSION

This transport and accessibility impact assessment has been prepared to examine the proposed Hurlstone Agricultural High School to be located within the Western Sydney University campus at Richmond. The proposed development seeks to construct a school with ultimate capacity for 1,500 students.

The current site at the Richmond campus was reviewed with regards to the existing traffic conditions. Traffic modelling at five local intersections was undertaken, demonstrating that these intersections operate at a good Level of Service. Intersections around the site are primarily priority junctions and roundabouts, with limited vehicular delays occurring. The restricted vehicle storage space along Blacktown Road can result in high vehicle delays during peak traffic, however there is generally low demand for vehicles out of Campus Drive.

Parking occupancy surveys were completed for the university campus, demonstrating reasonable availability of parking across the campus. Parking vacancies were noted to be available within campus parking zones near to the School site. A review of historical imagery demonstrated a generally low level of demand in the P47 car park.

The existing P47 car park would be modified to provide increased capacity from 142 spaces to 220 spaces plus drop-off and pick-up and bus access, subject to a separate approval. A boarding school for 300 students is also proposed to be constructed under a separate approval, reducing the travelling population of the School to 1,200 students.

The Hawkesbury DCP recommends a provision of 276 parking spaces based on student and staff population and building area. Mode share at the existing Glenfield site equates to an estimated parking demand of 225 vehicles. The NSW Department of Education's *Educational Facilities Standards & Guidelines* recommend a provision of 130 parking spaces for a school of this size.

There may be overflow into other parking areas within the Campus under a high occupancy scenario, increasing occupancy across the Campus. The current recorded Campus-wide parking occupancy is 69%. The anticipated occupancy is 80%, based on mode share at the existing Glenfield site (the most accurate comparison available).

Whilst noting that this increase in Campus-wide parking demand can be catered for, it will result in some reduction in parking availability for University students and staff. In particular, users may be required to park in areas further away from their destinations within the campus, depending on the time of arrival and day-to-day variation in University demand. Given that the P47 car park is located on the perimeter of the campus, most WSU destinations are located between this and other parking zones. The Department and the School will be required to negotiate parking arrangements with the University regarding access to and usage of campus parking.

After assessment of the expected vehicle trips generated by the development, SIDRA modelling has indicated that these additional trips can be accommodated within the local road network. It should be noted that the Campus Drive approach to Blacktown Road is currently operating at a Level of Service of C and will operate at Level of Service F post development. This will not impact the performance of the road network as the delay is attributed to the right turn out of Campus Drive (within the University grounds) with other movements along the main road performing at acceptable levels of service.

In regards to public transport any roads to be used for school buses should be widened to 3.5-metre wide travel lanes. Vines Drive has a 5.8-metre road carriageway and therefore will need to be widened. Similarly Maintenance Lane will also need to be widened to cater for school buses and other improved access conditions for the car park.

In order to provide safe conditions for children at the campus and improved operation and traffic flow, the following measures and modifications are recommended:

- Provision of approximately 5 bus zone spaces and 10-12 car drop-off and pick-up spaces in the modified P47 car park area
- Widening of Vines Drive and Maintenance Lane to 3.5-metre travel lanes for school bus access
- Implementation of a 40 km/hr School Zone adjacent to the School in Vines Drive and Maintenance Lane
- Upgrade of existing pedestrian crossing in Vines Drive west of Resources Road to include zebra crossing line marking
- Physical separation between car parking areas and bus stop area within modified P47 car park

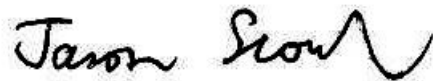
Overall the School as proposed is considered to create acceptable levels of impact to the local transport network and parking framework, and should be deemed suitable for approval of further design development.

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Appendix A – Parking Occupancy

Campus Parking Occupancy Results

THURSDAY, 5th OCTOBER 2017		Occupancy								
Car Park	Capacity	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm
P3	59	0	0	0	0	0	0	0	0	0
P4	90	2	18	22	25	53	42	27	23	22
P6	23	7	16	19	20	19	20	20	21	17
P8	123	1	68	72	69	76	58	56	42	28
P10	8	1	3	4	4	2	3	1	1	1
P11	8	3	6	8	7	8	7	7	7	3
P12	65	3	56	61	56	58	53	25	26	23
P13	27	7	15	18	18	14	11	16	17	14
P14	256	7	124	173	199	186	169	160	136	97
P14 (bike)	10	0	0	0	0	0	0	1	1	1
P15	24	1	18	20	19	19	18	17	14	12
P17	35	5	33	33	33	30	32	28	31	32
P18	27	0	12	19	25	27	20	18	17	13
P19	5	1	5	4	5	5	5	5	5	5
P20	22	8	11	16	16	16	10	7	7	7
P26	15	5	6	5	5	4	5	4	4	3
P27	51	3	5	8	7	7	7	5	6	6
P27 (bike)	10	0	0	0	0	0	0	0	0	0
P28	12	0	1	1	1	8	6	0	0	0
P30	90	27	26	23	23	21	24	22	18	17
P31 (Police)	28	14	17	14	14	11	9	6	4	3
P32	24	7	16	19	19	22	20	19	19	19
P32 (bike)	2	0	0	0	0	0	0	0	0	0
P33	23	3	8	10	11	8	10	11	13	12
P36 (Police)	18	3	4	4	4	4	4	1	1	1
P37	130	36	72	91	102	94	82	92	89	89
P38	19	7	13	16	16	16	15	15	14	11
P38 (bike)	10	0	0	0	0	0	0	0	0	0
P41	34	7	32	33	31	17	31	32	29	20
P42	42	4	29	27	32	25	29	33	30	23
P43	24	7	21	18	22	17	21	24	23	15
P44	13	3	7	8	8	6	6	4	2	1
P45	20	4	10	12	18	14	12	10	4	1
P46	10	3	3	3	3	4	4	2	1	1
P47	142	18	44	51	46	41	28	44	42	38
P52	63	35	32	31	31	34	30	28	31	32
P53	32	26	25	24	25	22	24	25	25	28
P53 (bike)	2	0	0	0	0	0	0	0	0	0
Total	1596	258	756	867	914	888	815	765	703	595
Total excl. bike, Police	1516	241	735	849	896	873	802	757	697	590
Available excl. bike, Police	1516	1275	781	667	620	643	714	759	819	926
Available excl. bike, Police, P47	1374	1133	639	525	478	501	572	617	677	784

TUESDAY, 10th OCTOBER 2017		Occupancy								
Car Park	Capacity	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm
P3	59	0	0	0	0	0	0	0	0	0
P4	90	4	14	29	30	25	26	25	26	20
P6	23	7	17	20	20	19	19	19	20	18
P8	123	3	56	65	71	78	56	61	62	29
P10	8	3	4	3	3	3	2	2	1	1
P11	8	5	6	6	6	7	3	4	4	3
P12	65	24	61	62	61	65	43	38	45	27
P13	27	10	18	21	23	19	22	23	24	19
P14	256	32	137	180	214	243	214	197	185	122
P14 (bike)	10	0	0	0	0	0	0	0	0	0
P15	24	9	22	21	22	19	17	14	19	15
P17	35	7	33	33	32	33	33	26	27	16
P18	27	0	7	21	24	18	20	18	15	11
P19	5	0	3	5	5	5	4	5	5	5
P20	22	3	9	14	15	10	10	10	9	7
P26	15	7	8	14	14	14	11	13	11	4
P27	51	1	6	17	14	21	15	10	12	10
P27 (bike)	10	0	0	0	0	0	0	0	0	0
P28	12	0	0	1	0	0	0	0	0	0
P30	90	25	24	22	17	21	22	21	19	22
P31 (Police)	28	6	10	8	8	7	8	8	6	5
P32	24	18	22	23	19	21	19	20	20	16
P32 (bike)	2	0	0	0	0	0	0	0	0	0
P33	23	7	14	19	16	18	20	18	15	13
P36 (Police)	18	16	17	16	16	14	14	13	12	12
P37	130	47	62	86	81	77	85	87	90	85
P38	19	3	13	16	15	15	14	15	15	11
P38 (bike)	10	0	0	0	0	0	0	0	0	0
P41	34	5	20	21	21	14	16	12	13	5
P42	42	2	25	29	26	22	16	16	17	11
P43	24	5	16	19	19	14	13	15	15	13
P44	13	1	13	13	8	9	9	6	2	2
P45	20	4	5	9	20	19	16	10	3	1
P46	10	2	3	3	4	4	4	3	1	0
P47	142	3	11	15	13	15	15	13	11	11
P52	63	29	29	30	30	33	35	40	37	32
P53	32	26	24	23	24	25	25	23	21	24
P53 (bike)	2	0	0	0	0	0	0	0	0	0
Total	1596	314	709	864	891	907	826	785	762	570
Total excl. bike, Police	1516	292	682	840	867	886	804	764	744	553
Available excl. bike, Police	1516	1224	834	676	649	630	712	752	772	963
Available excl. bike, Police, P47	1374	1082	692	534	507	488	570	610	630	821

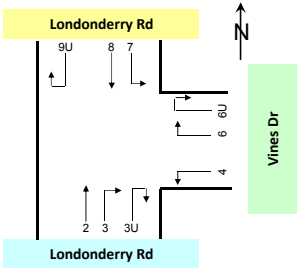
VALUES FOR ANALYSIS		Peak Occupancy
Car Park	Capacity	11am / 12pm
P3	59	0
P4	90	53
P6	23	20
P8	123	78
P10	8	4
P11	8	8
P12	65	65
P13	27	23
P14	256	243
P14 (bike)	10	0
P15	24	22
P17	35	33
P18	27	27
P19	5	5
P20	22	16
P26	15	14
P27	51	21
P27 (bike)	10	0
P28	12	8
P30	90	23
P31 (Police)	28	14
P32	24	22
P32 (bike)	2	0
P33	23	18
P36 (Police)	18	16
P37	130	102
P38	19	16
P38 (bike)	10	0
P41	34	31
P42	42	32
P43	24	22
P44	13	9
P45	20	20
P46	10	4
P47	142	46
P52	63	34
P53	32	25
P53 (bike)	2	0
Total	1596	1074
Total excl. bike, Police	1516	1044
Available excl. bike, Police	1516	472
Available excl. bike, Police, P47	1374	330

Appendix B – Traffic Counts

Local Intersection and Mid-block Traffic Counts

Job No.	: N3516
Client	: TTW
Suburb	: Richmond
Location	: 1. Londonderry Rd / Vines Dr
Day/Date	: Thu, 31st August 2017
Weather	: Fine
Description	: Classified Intersection Count
	: 15 mins Data

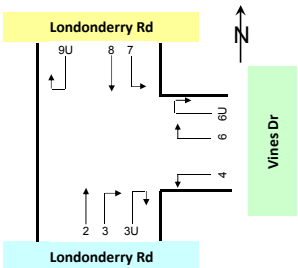
Classifications	Class 1	Class 2
	Lights	Heavies



Approach	Londonderry Rd									Vines Dr								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 7:45	59	4	63	7	0	7	0	0	0	1	0	1	3	1	4	0	0	0
7:45 to 8:00	58	1	59	11	0	11	0	0	0	3	0	3	4	1	5	0	0	0
8:00 to 8:15	62	3	65	13	0	13	0	0	0	7	0	7	9	3	12	0	0	0
8:15 to 8:30	67	2	69	16	0	16	0	0	0	2	0	2	6	1	7	0	0	0
8:30 to 8:45	89	4	93	36	1	37	0	0	0	2	0	2	4	3	7	0	0	0
8:45 to 9:00	103	5	108	16	0	16	0	0	0	4	0	4	12	2	14	0	0	0
9:00 to 9:15	56	2	58	15	0	15	0	0	0	4	0	4	8	0	8	0	0	0
9:15 to 9:30	50	3	53	21	0	21	0	0	0	4	0	4	5	2	7	0	0	0
AM Totals	544	24	568	135	1	136	0	0	0	27	0	27	51	13	64	0	0	0
14:30 to 14:45	67	3	70	7	1	8	0	0	0	7	0	7	5	1	6	0	0	0
14:45 to 15:00	70	2	72	2	0	2	0	0	0	8	1	9	8	3	11	0	0	0
15:00 to 15:15	74	3	77	4	1	5	0	0	0	8	0	8	8	1	9	0	0	0
15:15 to 15:30	68	6	74	1	0	1	0	0	0	9	1	10	10	1	11	0	0	0
15:30 to 15:45	87	4	91	3	0	3	0	0	0	3	0	3	17	3	20	0	0	0
15:45 to 16:00	58	6	64	3	0	3	0	0	0	17	0	17	21	1	22	0	0	0
16:00 to 16:15	80	4	84	1	0	1	0	0	0	19	1	20	14	3	17	0	0	0
16:15 to 16:30	66	2	68	5	0	5	0	0	0	18	0	18	22	1	23	0	0	0
PM Totals	570	30	600	26	2	28	0	0	0	89	3	92	105	14	119	0	0	0

Approach	Londonderry Rd								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 7:45	10	0	10	45	1	46	0	0	0
7:45 to 8:00	12	0	12	69	3	72	0	0	0
8:00 to 8:15	18	0	18	62	3	65	0	0	0
8:15 to 8:30	23	1	24	69	2	71	0	0	0
8:30 to 8:45	22	0	22	52	1	53	0	0	0
8:45 to 9:00	24	0	24	47	2	49	0	0	0
9:00 to 9:15	27	0	27	49	5	54	0	0	0
9:15 to 9:30	10	0	10	49	1	50	0	0	0
AM Totals	146	1	147	442	18	460	0	0	0
14:30 to 14:45	8	0	8	65	1	66	0	0	0
14:45 to 15:00	2	0	2	60	2	62	0	0	0
15:00 to 15:15	11	0	11	83	2	85	0	0	0
15:15 to 15:30	5	0	5	75	6	81	0	0	0
15:30 to 15:45	6	0	6	65	4	69	0	0	0
15:45 to 16:00	8	0	8	69	4	73	0	0	0
16:00 to 16:15	5	0	5	86	4	90	0	0	0
16:15 to 16:30	4	0	4	82	4	86	0	0	0
PM Totals	49	0	49	585	27	612	0	0	0

Job No.	: N3516
Client	: TTW
Suburb	: Richmond
Location	: 1. Londonderry Rd / Vines Dr
Day/Date	: Thu, 31st August 2017
Weather	: Fine
Description	: Classified Intersection Count
	: Hourly Summary



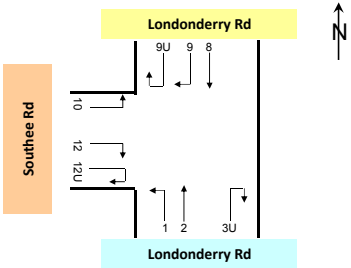
Approach	Londonderry Rd									Vines Dr								
Direction	Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 8:30	246	10	256	47	0	47	0	0	0	13	0	13	22	6	28	0	0	0
7:45 to 8:45	276	10	286	76	1	77	0	0	0	14	0	14	23	8	31	0	0	0
8:00 to 9:00	321	14	335	81	1	82	0	0	0	15	0	15	31	9	40	0	0	0
8:15 to 9:15	315	13	328	83	1	84	0	0	0	12	0	12	30	6	36	0	0	0
8:30 to 9:30	298	14	312	88	1	89	0	0	0	14	0	14	29	7	36	0	0	0
AM Totals	544	24	568	135	1	136	0	0	0	27	0	27	51	13	64	0	0	0
14:30 to 15:30	279	14	293	14	2	16	0	0	0	32	2	34	31	6	37	0	0	0
14:45 to 15:45	299	15	314	10	1	11	0	0	0	28	2	30	43	8	51	0	0	0
15:00 to 16:00	287	19	306	11	1	12	0	0	0	37	1	38	56	6	62	0	0	0
15:15 to 16:15	293	20	313	8	0	8	0	0	0	48	2	50	62	8	70	0	0	0
15:30 to 16:30	291	16	307	12	0	12	0	0	0	57	1	58	74	8	82	0	0	0
PM Totals	570	30	600	26	2	28	0	0	0	89	3	92	105	14	119	0	0	0

Approach	Londonderry Rd								
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 8:30	63	1	64	245	9	254	0	0	0
7:45 to 8:45	75	1	76	252	9	261	0	0	0
8:00 to 9:00	87	1	88	230	8	238	0	0	0
8:15 to 9:15	96	1	97	217	10	227	0	0	0
8:30 to 9:30	83	0	83	197	9	206	0	0	0
AM Totals	146	1	147	442	18	460	0	0	0
14:30 to 15:30	26	0	26	283	11	294	0	0	0
14:45 to 15:45	24	0	24	283	14	297	0	0	0
15:00 to 16:00	30	0	30	292	16	308	0	0	0
15:15 to 16:15	24	0	24	295	18	313	0	0	0
15:30 to 16:30	23	0	23	302	16	318	0	0	0
PM Totals	49	0	49	585	27	612	0	0	0

Job No. : N3516
Client : TTW
Suburb : Richmond
Location : 2. Londonderry Rd / Southee Rd

Day/Date : Thu, 31st August 2017
Weather : Fine
Description : Classified Intersection Count
: 15 mins Data

	Class 1	Class 2
Classifications	Lights	Heavies

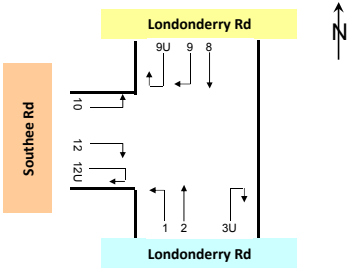


Approach	Londonderry Rd									
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3U (U Turn)			
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 7:45	12	1	13	50	4	54	0	0	0	
7:45 to 8:00	10	0	10	52	2	54	0	0	0	
8:00 to 8:15	20	1	21	51	5	56	0	0	0	
8:15 to 8:30	13	0	13	60	3	63	0	0	0	
8:30 to 8:45	29	1	30	64	6	70	0	0	0	
8:45 to 9:00	35	1	36	80	6	86	0	0	0	
9:00 to 9:15	16	0	16	48	2	50	0	0	0	
9:15 to 9:30	7	0	7	48	5	53	0	0	0	
AM Totals	142	4	146	453	33	486	0	0	0	
14:30 to 14:45	28	0	28	44	4	48	0	0	0	
14:45 to 15:00	15	0	15	63	5	68	0	0	0	
15:00 to 15:15	20	0	20	62	4	66	0	0	0	
15:15 to 15:30	32	1	33	46	6	52	0	0	0	
15:30 to 15:45	40	1	41	64	6	70	0	0	0	
15:45 to 16:00	24	1	25	55	6	61	0	0	0	
16:00 to 16:15	30	3	33	64	4	68	0	0	0	
16:15 to 16:30	31	0	31	57	3	60	0	0	0	
PM Totals	220	6	226	455	38	493	0	0	0	

Approach	Londonderry Rd										Southee Rd									
Direction	Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)				Direction 12 (Right Turn)			Direction 12U (U Turn)			
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total		Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 7:45	25	1	26	2	0	2	0	0	0	9	0	9		30	0	30	0	0	0	
7:45 to 8:00	36	2	38	2	0	2	0	0	0	10	0	10		45	1	46	0	0	0	
8:00 to 8:15	32	2	34	7	0	7	0	0	0	11	0	11		48	1	49	0	0	0	
8:15 to 8:30	38	1	39	5	0	5	0	0	0	14	0	14		54	2	56	0	0	0	
8:30 to 8:45	36	0	36	2	0	2	0	0	0	9	0	9		38	1	39	0	0	0	
8:45 to 9:00	42	2	44	4	0	4	0	0	0	16	1	17		29	0	29	0	0	0	
9:00 to 9:15	38	3	41	5	0	5	0	0	0	13	0	13		38	2	40	0	0	0	
9:15 to 9:30	37	0	37	4	0	4	0	0	0	10	0	10		22	1	23	0	0	0	
AM Totals	284	11	295	31	0	31	0	0	0	92	1	93		304	8	312	0	0	0	
14:30 to 14:45	54	1	55	8	0	8	0	0	0	6	1	7		19	0	19	0	0	0	
14:45 to 15:00	47	1	48	7	1	8	0	0	0	10	2	12		15	1	16	0	0	0	
15:00 to 15:15	71	2	73	7	0	7	0	0	0	9	2	11		23	0	23	0	0	0	
15:15 to 15:30	59	4	63	16	1	17	0	0	0	7	0	7		21	2	23	0	0	0	
15:30 to 15:45	60	3	63	16	0	16	0	0	0	2	1	3		11	1	12	0	0	0	
15:45 to 16:00	61	3	64	14	0	14	0	0	0	6	0	6		16	1	17	0	0	0	
16:00 to 16:15	79	3	82	18	0	18	0	0	0	7	0	7		12	1	13	0	0	0	
16:15 to 16:30	71	4	75	24	0	24	0	0	0	7	0	7		15	0	15	0	0	0	
PM Totals	502	21	523	110	2	112	0	0	0	54	6	60		132	6	138	0	0	0	

Job No. : N3516
Client : TTW
Suburb : Richmond
Location : 2. Londonderry Rd / Southee Rd

Day/Date : Thu, 31st August 2017
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



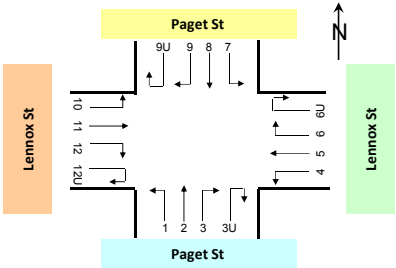
Approach	Londonderry Rd									
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3U (U Turn)			
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 8:30	55	2	57	213	14	227	0	0	0	
7:45 to 8:45	72	2	74	227	16	243	0	0	0	
8:00 to 9:00	97	3	100	255	20	275	0	0	0	
8:15 to 9:15	93	2	95	252	17	269	0	0	0	
8:30 to 9:30	87	2	89	240	19	259	0	0	0	
AM Totals	142	4	146	453	33	486	0	0	0	
14:30 to 15:30	95	1	96	215	19	234	0	0	0	
14:45 to 15:45	107	2	109	235	21	256	0	0	0	
15:00 to 16:00	116	3	119	227	22	249	0	0	0	
15:15 to 16:15	126	6	132	229	22	251	0	0	0	
15:30 to 16:30	125	5	130	240	19	259	0	0	0	
PM Totals	220	6	226	455	38	493	0	0	0	

Approach	Londonderry Rd										Southee Rd									
Direction	Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 12 (Right Turn)			Direction 12U (U Turn)				
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total		
7:30 to 8:30	131	6	137	16	0	16	0	0	0	44	0	44	177	4	181	0	0	0		
7:45 to 8:45	142	5	147	16	0	16	0	0	0	44	0	44	185	5	190	0	0	0		
8:00 to 9:00	148	5	153	18	0	18	0	0	0	50	1	51	169	4	173	0	0	0		
8:15 to 9:15	154	6	160	16	0	16	0	0	0	52	1	53	159	5	164	0	0	0		
8:30 to 9:30	153	5	158	15	0	15	0	0	0	48	1	49	127	4	131	0	0	0		
AM Totals	284	11	295	31	0	31	0	0	0	92	1	93	304	8	312	0	0	0		
14:30 to 15:30	231	8	239	38	2	40	0	0	0	32	5	37	78	3	81	0	0	0		
14:45 to 15:45	237	10	247	46	2	48	0	0	0	28	5	33	70	4	74	0	0	0		
15:00 to 16:00	251	12	263	53	1	54	0	0	0	24	3	27	71	4	75	0	0	0		
15:15 to 16:15	259	13	272	64	1	65	0	0	0	22	1	23	60	5	65	0	0	0		
15:30 to 16:30	271	13	284	72	0	72	0	0	0	22	1	23	54	3	57	0	0	0		
PM Totals	502	21	523	110	2	112	0	0	0	54	6	60	132	6	138	0	0	0		

Job No. : N3516
Client : TTW
Suburb : Richmond
Location : 3. Lennox St / Paget St

Day/Date : Thu, 31st August 2017
Weather : Fine
Description : Classified Intersection Count
: 15 mins Data

Classifications	Class 1	Class 2
	Lights	Heavies

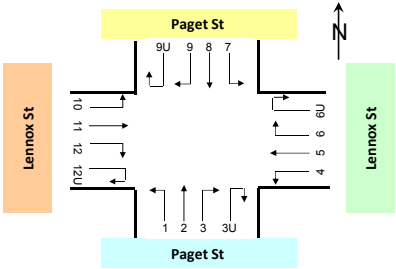


Approach	Paget St												Lennox St											
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 7:45	4	1	5	17	4	21	10	0	10	0	0	0	3	0	3	48	10	58	9	0	9	0	0	0
7:45 to 8:00	13	0	13	25	1	26	10	0	10	0	0	0	1	0	1	58	13	71	8	0	8	0	0	0
8:00 to 8:15	17	2	19	34	3	37	9	1	10	0	0	0	5	0	5	72	5	77	12	0	12	0	0	0
8:15 to 8:30	27	2	29	20	2	22	8	0	8	0	0	0	2	0	2	109	6	115	16	0	16	0	0	0
8:30 to 8:45	10	1	11	30	4	34	4	2	6	0	0	0	2	1	3	79	8	87	23	0	23	0	0	0
8:45 to 9:00	22	3	25	32	3	35	9	0	9	0	0	0	3	0	3	66	6	72	21	1	22	0	0	0
9:00 to 9:15	17	1	18	13	1	14	13	2	15	0	0	0	1	1	2	68	2	70	11	0	11	0	0	0
9:15 to 9:30	9	2	11	31	3	34	8	0	8	0	0	0	0	0	0	54	6	60	17	1	18	0	0	0
AM Totals	119	12	131	202	21	223	71	5	76	0	0	0	17	2	19	554	56	610	117	2	119	0	0	0
14:30 to 14:45	12	1	13	24	3	27	1	3	4	0	0	0	10	0	10	89	8	97	12	1	13	0	0	0
14:45 to 15:00	20	3	23	24	1	25	6	1	7	0	0	0	6	0	6	90	14	104	11	0	11	0	0	0
15:00 to 15:15	16	3	19	30	2	32	3	1	4	0	0	0	5	0	5	97	7	104	20	1	21	0	0	0
15:15 to 15:30	14	1	15	28	2	30	6	1	7	0	0	0	2	1	3	94	8	102	25	0	25	0	0	0
15:30 to 15:45	11	2	13	33	3	36	10	0	10	0	0	0	4	0	4	86	12	98	19	0	19	0	0	0
15:45 to 16:00	19	1	20	28	3	31	4	2	6	0	0	0	5	0	5	113	6	119	17	0	17	0	0	0
16:00 to 16:15	17	3	20	31	3	34	12	1	13	0	0	0	5	0	5	96	10	106	15	0	15	0	0	0
16:15 to 16:30	16	1	17	24	1	25	9	0	9	0	0	0	7	0	7	103	3	106	22	0	22	0	0	0
PM Totals	125	15	140	222	18	240	51	9	60	0	0	0	44	1	45	768	68	836	141	2	143	0	0	0

Approach	Paget St												Lennox St											
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12 (Right Turn)			Direction 12U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 7:45	7	0	7	12	1	13	1	0	1	0	0	0	8	0	8	117	6	123	2	0	2	0	0	0
7:45 to 8:00	5	0	5	12	0	12	3	0	3	0	0	0	8	1	9	132	5	137	6	2	8	0	0	0
8:00 to 8:15	11	0	11	9	1	10	3	0	3	0	0	0	11	0	11	116	8	124	5	2	7	0	0	0
8:15 to 8:30	6	2	8	14	1	15	2	0	2	0	0	0	23	0	23	123	11	134	8	0	8	0	0	0
8:30 to 8:45	12	0	12	13	1	14	9	0	9	0	0	0	16	0	16	98	7	105	6	0	6	0	0	0
8:45 to 9:00	9	0	9	17	1	18	7	0	7	0	0	0	25	0	25	103	2	105	8	1	9	0	0	0
9:00 to 9:15	15	0	15	19	0	19	4	4	8	0	0	0	19	1	20	97	9	106	8	2	10	0	0	0
9:15 to 9:30	27	2	29	18	0	18	5	0	5	0	0	0	16	2	18	84	5	89	5	1	6	0	0	0
AM Totals	92	4	96	114	5	119	34	4	38	0	0	0	126	4	130	870	53	923	48	8	56	0	0	0
14:30 to 14:45	17	1	18	27	1	28	11	0	11	0	0	0	13	0	13	95	2	97	11	1	12	0	0	0
14:45 to 15:00	14	2	16	33	1	34	8	0	8	0	0	0	13	0	13	89	9	98	13	0	13	0	0	0
15:00 to 15:15	18	3	21	39	1	40	10	0	10	0	0	0	37	0	37	93	10	103	9	2	11	0	0	0
15:15 to 15:30	24	1	25	50	1	51	7	0	7	0	0	0	13	0	13	76	5	81	5	3	8	0	0	0
15:30 to 15:45	15	0	15	33	0	33	24	0	24	0	0	0	17	0	17	81	11	92	8	1	9	0	0	0
15:45 to 16:00	27	1	28	35	0	35	11	0	11	0	0	0	19	1	20	65	7	72	16	1	17	0	0	0
16:00 to 16:15	26	0	26	44	3	47	15	1	16	0	0	0	20	1	21	73	3	76	16	1	17	0	0	0
16:15 to 16:30	11	0	11	46	3	49	16	1	17	0	0	0	9	0	9	79	4	83	9	1	10	0	0	0
PM Totals	152	8	160	307	10	317	102	2	104	0	0	0	141	2	143	651	51	702	87	10	97	0	0	0

Job No. : N3516
Client : TTW
Suburb : Richmond
Location : 3. Lennox St / Paget St

Day/Date : Thu, 31st August 2017
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

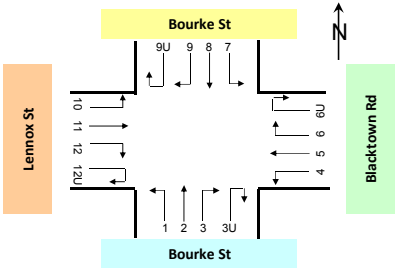


Approach	Paget St												Lennox St											
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 8:30	61	5	66	96	10	106	37	1	38	0	0	0	11	0	11	287	34	321	45	0	45	0	0	0
7:45 to 8:45	67	5	72	109	10	119	31	3	34	0	0	0	10	1	11	318	32	350	59	0	59	0	0	0
8:00 to 9:00	76	8	84	116	12	128	30	3	33	0	0	0	12	1	13	326	25	351	72	1	73	0	0	0
8:15 to 9:15	76	7	83	95	10	105	34	4	38	0	0	0	8	2	10	322	22	344	71	1	72	0	0	0
8:30 to 9:30	58	7	65	106	11	117	34	4	38	0	0	0	6	2	8	267	22	289	72	2	74	0	0	0
AM Totals	119	12	131	202	21	223	71	5	76	0	0	0	17	2	19	554	56	610	117	2	119	0	0	0
14:30 to 15:30	62	8	70	106	8	114	16	6	22	0	0	0	23	1	24	370	37	407	68	2	70	0	0	0
14:45 to 15:45	61	9	70	115	8	123	25	3	28	0	0	0	17	1	18	367	41	408	75	1	76	0	0	0
15:00 to 16:00	60	7	67	119	10	129	23	4	27	0	0	0	16	1	17	390	33	423	81	1	82	0	0	0
15:15 to 16:15	61	7	68	120	11	131	32	4	36	0	0	0	16	1	17	389	36	425	76	0	76	0	0	0
15:30 to 16:30	63	7	70	116	10	126	35	3	38	0	0	0	21	0	21	398	31	429	73	0	73	0	0	0
PM Totals	125	15	140	222	18	240	51	9	60	0	0	0	44	1	45	768	68	836	141	2	143	0	0	0

Approach	Paget St												Lennox St											
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12 (Right Turn)			Direction 12U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 8:30	29	2	31	47	3	50	9	0	9	0	0	0	50	1	51	488	30	518	21	4	25	0	0	0
7:45 to 8:45	34	2	36	48	3	51	17	0	17	0	0	0	58	1	59	469	31	500	25	4	29	0	0	0
8:00 to 9:00	38	2	40	53	4	57	21	0	21	0	0	0	75	0	75	440	28	468	27	3	30	0	0	0
8:15 to 9:15	42	2	44	63	3	66	22	4	26	0	0	0	83	1	84	421	29	450	30	3	33	0	0	0
8:30 to 9:30	63	2	65	67	2	69	25	4	29	0	0	0	76	3	79	382	23	405	27	4	31	0	0	0
AM Totals	92	4	96	114	5	119	34	4	38	0	0	0	126	4	130	870	53	923	48	8	56	0	0	0
14:30 to 15:30	73	7	80	149	4	153	36	0	36	0	0	0	76	0	76	353	26	379	38	6	44	0	0	0
14:45 to 15:45	71	6	77	155	3	158	49	0	49	0	0	0	80	0	80	339	35	374	35	6	41	0	0	0
15:00 to 16:00	84	5	89	157	2	159	52	0	52	0	0	0	86	1	87	315	33	348	38	7	45	0	0	0
15:15 to 16:15	92	2	94	162	4	166	57	1	58	0	0	0	69	2	71	295	26	321	45	6	51	0	0	0
15:30 to 16:30	79	1	80	158	6	164	66	2	68	0	0	0	65	2	67	298	25	323	49	4	53	0	0	0
PM Totals	152	8	160	307	10	317	102	2	104	0	0	0	141	2	143	651	51	702	87	10	97	0	0	0

Job No. : N3516
Client : TTW
Suburb : Richmond
Location : 4, Blacktown Rd / Bourke St / Lennox St
Day/Date : Thu, 31st August 2017
Weather : Fine
Description : Classified Intersection Count
: 15 mins Data

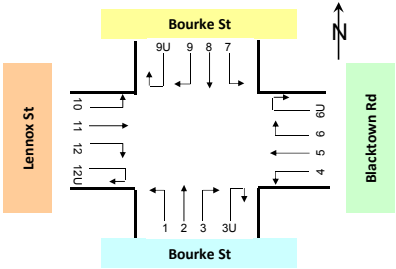
Class 1	Class 2
Lights	Heavies



Approach	Bourke St												Blacktown Rd											
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 7:45	0	0	0	40	0	40	9	1	10	0	0	0	3	1	4	58	10	68	19	2	21	0	0	0
7:45 to 8:00	1	0	1	31	0	31	7	0	7	0	0	0	2	0	2	72	11	83	24	2	26	0	0	0
8:00 to 8:15	0	0	0	32	0	32	7	2	9	0	0	0	4	1	5	82	6	88	17	2	19	0	0	0
8:15 to 8:30	0	0	0	28	0	28	8	0	8	0	0	0	3	0	3	103	5	108	24	1	25	0	0	0
8:30 to 8:45	1	0	1	42	1	43	4	0	4	0	0	0	7	1	8	99	7	106	41	0	41	0	0	0
8:45 to 9:00	0	0	0	40	2	42	5	1	6	0	0	0	5	0	5	81	8	89	23	2	25	0	0	0
9:00 to 9:15	1	0	1	30	0	30	7	0	7	0	0	0	8	1	9	75	4	79	21	0	21	0	0	0
9:15 to 9:30	1	0	1	18	0	18	13	0	13	0	0	0	5	0	5	66	5	71	22	2	24	0	0	0
AM Totals	4	0	4	261	3	264	60	4	64	0	0	0	37	4	41	636	56	692	191	11	202	0	0	0
14:30 to 14:45	0	0	0	20	0	20	6	0	6	0	0	0	8	0	8	96	10	106	18	0	18	0	0	0
14:45 to 15:00	2	0	2	32	1	33	4	1	5	0	0	0	6	0	6	95	11	106	37	1	38	0	0	0
15:00 to 15:15	2	0	2	32	1	33	7	0	7	0	0	0	3	0	3	104	8	112	32	2	34	0	0	0
15:15 to 15:30	0	1	1	22	0	22	4	0	4	0	0	0	3	0	3	101	7	108	25	1	26	0	0	0
15:30 to 15:45	3	1	4	24	0	24	2	0	2	0	0	0	8	0	8	82	9	91	26	0	26	0	0	0
15:45 to 16:00	5	0	5	25	2	27	6	0	6	0	0	0	5	1	6	111	4	115	30	5	35	0	0	0
16:00 to 16:15	1	0	1	25	0	25	3	1	4	0	0	0	11	1	12	105	9	114	37	2	39	0	0	0
16:15 to 16:30	3	0	3	24	2	26	6	1	7	0	0	0	7	2	9	93	6	99	31	0	31	0	0	0
PM Totals	16	2	18	204	6	210	38	3	41	0	0	0	51	4	55	787	64	851	236	11	247	0	0	0

Approach	Bourke St												Lennox St											
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12 (Right Turn)			Direction 12U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 7:45	18	1	19	17	1	18	3	0	3	0	0	0	28	0	28	119	6	125	0	0	0	0	0	0
7:45 to 8:00	25	1	26	15	2	17	5	1	6	0	0	0	33	0	33	128	4	132	0	0	0	0	0	0
8:00 to 8:15	33	0	33	20	1	21	11	0	11	0	0	0	20	0	20	134	11	145	0	0	0	0	0	0
8:15 to 8:30	30	1	31	33	2	35	15	0	15	0	0	0	25	1	26	129	12	141	2	0	2	0	0	0
8:30 to 8:45	25	5	30	40	1	41	9	2	11	0	0	0	25	2	27	86	5	91	2	0	2	0	0	0
8:45 to 9:00	34	0	34	27	2	29	11	0	11	0	0	0	22	0	22	97	3	100	1	0	1	0	0	0
9:00 to 9:15	36	2	38	34	2	36	7	0	7	0	0	0	21	2	23	110	10	120	2	0	2	0	0	0
9:15 to 9:30	34	1	35	29	2	31	5	2	7	0	0	0	12	0	12	102	6	108	1	0	1	0	0	0
AM Totals	235	11	246	215	13	228	66	5	71	0	0	0	186	5	191	905	57	962	8	0	8	0	0	0
14:30 to 14:45	27	5	32	20	1	21	19	0	19	0	0	0	18	4	22	104	4	108	0	0	0	0	0	0
14:45 to 15:00	32	0	32	24	2	26	16	0	16	0	0	0	16	1	17	92	10	102	1	0	1	0	0	0
15:00 to 15:15	37	0	37	29	2	31	21	2	23	0	0	0	12	1	13	102	12	114	0	0	0	0	0	0
15:15 to 15:30	34	3	37	35	3	38	25	0	25	0	0	0	15	0	15	87	6	93	1	0	1	0	0	0
15:30 to 15:45	23	3	26	38	2	40	21	1	22	0	0	0	14	2	16	97	10	107	0	0	0	0	0	0
15:45 to 16:00	20	0	20	28	4	32	25	1	26	0	0	0	13	3	16	90	7	97	1	1	2	0	0	0
16:00 to 16:15	30	1	31	59	3	62	21	0	21	0	0	0	17	1	18	104	4	108	0	0	0	0	0	0
16:15 to 16:30	34	2	36	45	3	48	27	1	28	0	0	0	21	0	21	77	5	82	3	0	3	0	0	0
PM Totals	237	14	251	278	20	298	175	5	180	0	0	0	126	12	138	753	58	811	6	1	7	0	0	0

Job No. : N3516
Client : TTW
Suburb : Richmond
Location : 4, Blacktown Rd / Bourke St / Lennox St
Day/Date : Thu, 31st August 2017
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



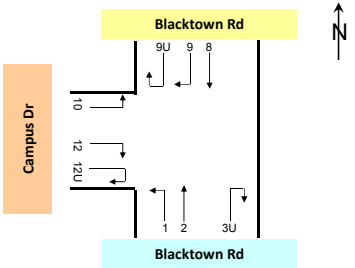
Approach	Bourke St												Blacktown Rd											
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3 (Right Turn)			Direction 3U (U Turn)			Direction 4 (Left Turn)			Direction 5 (Through)			Direction 6 (Right Turn)			Direction 6U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 8:30	1	0	1	131	0	131	31	3	34	0	0	0	12	2	14	315	32	347	84	7	91	0	0	0
7:45 to 8:45	2	0	2	133	1	134	26	2	28	0	0	0	16	2	18	356	29	385	106	5	111	0	0	0
8:00 to 9:00	1	0	1	142	3	145	24	3	27	0	0	0	19	2	21	365	26	391	105	5	110	0	0	0
8:15 to 9:15	2	0	2	140	3	143	24	1	25	0	0	0	23	2	25	358	24	382	109	3	112	0	0	0
8:30 to 9:30	3	0	3	130	3	133	29	1	30	0	0	0	25	2	27	321	24	345	107	4	111	0	0	0
AM Totals	4	0	4	261	3	264	60	4	64	0	0	0	37	4	41	636	56	692	191	11	202	0	0	0
14:30 to 15:30	4	1	5	106	2	108	21	1	22	0	0	0	20	0	20	396	36	432	112	4	116	0	0	0
14:45 to 15:45	7	2	9	110	2	112	17	1	18	0	0	0	20	0	20	382	35	417	120	4	124	0	0	0
15:00 to 16:00	10	2	12	103	3	106	19	0	19	0	0	0	19	1	20	398	28	426	113	8	121	0	0	0
15:15 to 16:15	9	2	11	96	2	98	15	1	16	0	0	0	27	2	29	399	29	428	118	8	126	0	0	0
15:30 to 16:30	12	1	13	98	4	102	17	2	19	0	0	0	31	4	35	391	28	419	124	7	131	0	0	0
PM Totals	16	2	18	204	6	210	38	3	41	0	0	0	51	4	55	787	64	851	236	11	247	0	0	0

Approach	Bourke St												Lennox St											
Direction	Direction 7 (Left Turn)			Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 11 (Through)			Direction 12 (Right Turn)			Direction 12U (U Turn)		
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total
7:30 to 8:30	106	3	109	85	6	91	34	1	35	0	0	0	106	1	107	510	33	543	2	0	2	0	0	0
7:45 to 8:45	113	7	120	108	6	114	40	3	43	0	0	0	103	3	106	477	32	509	4	0	4	0	0	0
8:00 to 9:00	122	6	128	120	6	126	46	2	48	0	0	0	92	3	95	446	31	477	5	0	5	0	0	0
8:15 to 9:15	125	8	133	134	7	141	42	2	44	0	0	0	93	5	98	422	30	452	7	0	7	0	0	0
8:30 to 9:30	129	8	137	130	7	137	32	4	36	0	0	0	80	4	84	395	24	419	6	0	6	0	0	0
AM Totals	235	11	246	215	13	228	66	5	71	0	0	0	186	5	191	905	57	962	8	0	8	0	0	0
14:30 to 15:30	130	8	138	108	8	116	81	2	83	0	0	0	61	6	67	385	32	417	2	0	2	0	0	0
14:45 to 15:45	126	6	132	126	9	135	83	3	86	0	0	0	57	4	61	378	38	416	2	0	2	0	0	0
15:00 to 16:00	114	6	120	130	11	141	92	4	96	0	0	0	54	6	60	376	35	411	2	1	3	0	0	0
15:15 to 16:15	107	7	114	160	12	172	92	2	94	0	0	0	59	6	65	378	27	405	2	1	3	0	0	0
15:30 to 16:30	107	6	113	170	12	182	94	3	97	0	0	0	65	6	71	368	26	394	4	1	5	0	0	0
PM Totals	237	14	251	278	20	298	175	5	180	0	0	0	126	12	138	753	58	811	6	1	7	0	0	0

Job No. : N3516
Client : TTW
Suburb : Richmond
Location : 5. Campus Dr / Blacktown Rd

Day/Date : Thu, 31st August 2017
Weather : Fine
Description : Classified Intersection Count
: 15 mins Data

Classifications	Class 1	Class 2
	Lights	Heavies

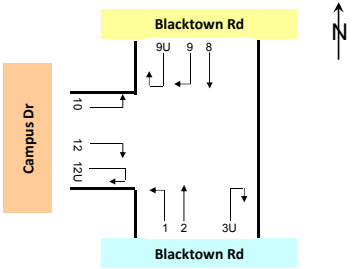


Approach	Blacktown Rd									
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3U (U Turn)			
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 7:45	16	0	16	79	11	90	0	0	0	
7:45 to 8:00	14	1	15	91	14	105	0	0	0	
8:00 to 8:15	29	0	29	102	9	111	0	0	0	
8:15 to 8:30	24	0	24	127	6	133	0	0	0	
8:30 to 8:45	57	0	57	150	7	157	0	0	0	
8:45 to 9:00	59	0	59	108	9	117	0	0	0	
9:00 to 9:15	25	0	25	100	5	105	0	0	0	
9:15 to 9:30	22	0	22	90	9	99	0	0	0	
AM Totals	246	1	247	847	70	917	0	0	0	
14:30 to 14:45	2	1	3	124	10	134	0	0	0	
14:45 to 15:00	2	0	2	136	12	148	0	0	0	
15:00 to 15:15	3	0	3	125	12	137	0	0	0	
15:15 to 15:30	6	0	6	120	9	129	0	0	0	
15:30 to 15:45	2	0	2	115	7	122	0	0	0	
15:45 to 16:00	3	0	3	133	9	142	0	0	0	
16:00 to 16:15	4	0	4	140	11	151	0	0	0	
16:15 to 16:30	1	0	1	124	7	131	0	0	0	
PM Totals	23	1	24	1,017	77	1,094	0	0	0	

Approach	Blacktown Rd										Campus Dr									
Direction	Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)				Direction 12 (Right Turn)			Direction 12U (U Turn)			
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total		Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 7:45	139	8	147	8	0	8	0	0	0	1	0	1		0	0	0	0	0	0	
7:45 to 8:00	153	5	158	7	0	7	0	0	0	3	0	3		6	0	6	0	0	0	
8:00 to 8:15	172	12	184	5	0	5	0	0	0	3	0	3		4	0	4	0	0	0	
8:15 to 8:30	150	12	162	11	0	11	0	0	0	3	0	3		4	0	4	0	0	0	
8:30 to 8:45	103	9	112	14	0	14	0	0	0	2	0	2		3	0	3	0	0	0	
8:45 to 9:00	118	3	121	20	0	20	0	0	0	0	0	0		4	1	5	0	0	0	
9:00 to 9:15	143	13	156	16	0	16	0	0	0	3	0	3		2	0	2	0	0	0	
9:15 to 9:30	119	5	124	28	0	28	0	0	0	5	0	5		6	0	6	0	0	0	
AM Totals	1,097	67	1,164	109	0	109	0	0	0	20	0	20		29	1	30	0	0	0	
14:30 to 14:45	134	11	145	1	0	1	0	0	0	2	0	2		13	0	13	0	0	0	
14:45 to 15:00	122	11	133	7	0	7	0	0	0	2	0	2		14	0	14	0	0	0	
15:00 to 15:15	140	12	152	3	0	3	0	0	0	15	0	15		8	0	8	0	0	0	
15:15 to 15:30	122	10	132	0	0	0	0	0	0	5	0	5		9	0	9	0	0	0	
15:30 to 15:45	120	14	134	2	0	2	0	0	0	10	0	10		10	0	10	0	0	0	
15:45 to 16:00	114	6	120	2	0	2	0	0	0	16	0	16		24	0	24	0	0	0	
16:00 to 16:15	137	6	143	1	0	1	0	0	0	11	0	11		28	0	28	0	0	0	
16:15 to 16:30	118	8	126	0	0	0	0	0	0	7	0	7		21	0	21	0	0	0	
PM Totals	1,007	78	1,085	16	0	16	0	0	0	68	0	68		127	0	127	0	0	0	

Job No. : N3516
Client : TTW
Suburb : Richmond
Location : 5. Campus Dr / Blacktown Rd

Day/Date : Thu, 31st August 2017
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



Approach	Blacktown Rd									
Direction	Direction 1 (Left Turn)			Direction 2 (Through)			Direction 3U (U Turn)			
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	
7:30 to 8:30	83	1	84	399	40	439	0	0	0	
7:45 to 8:45	124	1	125	470	36	506	0	0	0	
8:00 to 9:00	169	0	169	487	31	518	0	0	0	
8:15 to 9:15	165	0	165	485	27	512	0	0	0	
8:30 to 9:30	163	0	163	448	30	478	0	0	0	
AM Totals	246	1	247	847	70	917	0	0	0	
14:30 to 15:30	13	1	14	505	43	548	0	0	0	
14:45 to 15:45	13	0	13	496	40	536	0	0	0	
15:00 to 16:00	14	0	14	493	37	530	0	0	0	
15:15 to 16:15	15	0	15	508	36	544	0	0	0	
15:30 to 16:30	10	0	10	512	34	546	0	0	0	
PM Totals	23	1	24	1,017	77	1,094	0	0	0	

Approach	Blacktown Rd										Campus Dr									
Direction	Direction 8 (Through)			Direction 9 (Right Turn)			Direction 9U (U Turn)			Direction 10 (Left Turn)			Direction 12 (Right Turn)			Direction 12U (U Turn)				
Time Period	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total	Lights	Heavies	Total		
7:30 to 8:30	614	37	651	31	0	31	0	0	0	10	0	10	14	0	14	0	0	0		
7:45 to 8:45	578	38	616	37	0	37	0	0	0	11	0	11	17	0	17	0	0	0		
8:00 to 9:00	543	36	579	50	0	50	0	0	0	8	0	8	15	1	16	0	0	0		
8:15 to 9:15	514	37	551	61	0	61	0	0	0	8	0	8	13	1	14	0	0	0		
8:30 to 9:30	483	30	513	78	0	78	0	0	0	10	0	10	15	1	16	0	0	0		
AM Totals	1,097	67	1,164	109	0	109	0	0	0	20	0	20	29	1	30	0	0	0		
14:30 to 15:30	518	44	562	11	0	11	0	0	0	24	0	24	44	0	44	0	0	0		
14:45 to 15:45	504	47	551	12	0	12	0	0	0	32	0	32	41	0	41	0	0	0		
15:00 to 16:00	496	42	538	7	0	7	0	0	0	46	0	46	51	0	51	0	0	0		
15:15 to 16:15	493	36	529	5	0	5	0	0	0	42	0	42	71	0	71	0	0	0		
15:30 to 16:30	489	34	523	5	0	5	0	0	0	44	0	44	83	0	83	0	0	0		
PM Totals	1,007	78	1,085	16	0	16	0	0	0	68	0	68	127	0	127	0	0	0		

Job No N3519 - Western Sydney University Richmond
Client Taylor Thompson Whitting
Site Vines Drive (north Resources Road)
Location Richmond
Site No 1
Start Date 31-Aug-17
Description Volume Summary
Direction Combined



Hour Starting	Day of Week							W'Day Ave 1195	7 Day Ave 922
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	4-Sep	5-Sep	6-Sep	31-Aug	1-Sep	2-Sep	3-Sep		
AM Peak	149	145	140	161	93	36	20		
PM Peak	209	129	100	96	78	34	19		
0:00	3	4	3	2	2	0	1	3	2
1:00	3	5	3	3	4	1	0	4	3
2:00	3	4	4	5	1	0	0	3	2
3:00	16	11	13	13	13	1	0	13	10
4:00	12	17	16	11	15	2	1	14	11
5:00	12	7	6	6	9	0	0	8	6
6:00	24	21	27	23	20	1	4	23	17
7:00	61	60	60	51	52	2	4	57	41
8:00	149	145	140	161	93	19	14	138	103
9:00	107	117	95	95	82	24	17	99	77
10:00	59	73	53	92	50	34	20	65	54
11:00	76	98	87	72	64	36	8	79	63
12:00	87	81	100	77	78	33	12	85	67
13:00	74	103	93	84	62	34	19	83	67
14:00	68	81	73	89	63	20	18	75	59
15:00	84	86	100	76	59	23	17	81	64
16:00	123	129	99	96	57	28	9	101	77
17:00	209	65	72	83	55	23	13	97	74
18:00	171	30	76	49	17	6	5	69	51
19:00	108	14	34	19	14	2	1	38	27
20:00	92	9	23	11	16	5	7	30	23
21:00	73	9	22	11	4	1	4	24	18
22:00	4	4	4	7	6	3	1	5	4
23:00	2	0	5	0	1	5	2	2	2
Total	1620	1173	1208	1136	837	303	177	1195	922

7-19	1268	1068	1048	1025	732	282	156	1028	797
6-22	1565	1121	1154	1089	786	291	172	1143	883
6-24	1571	1125	1163	1096	793	299	175	1150	889
0-24	1620	1173	1208	1136	837	303	177	1195	922

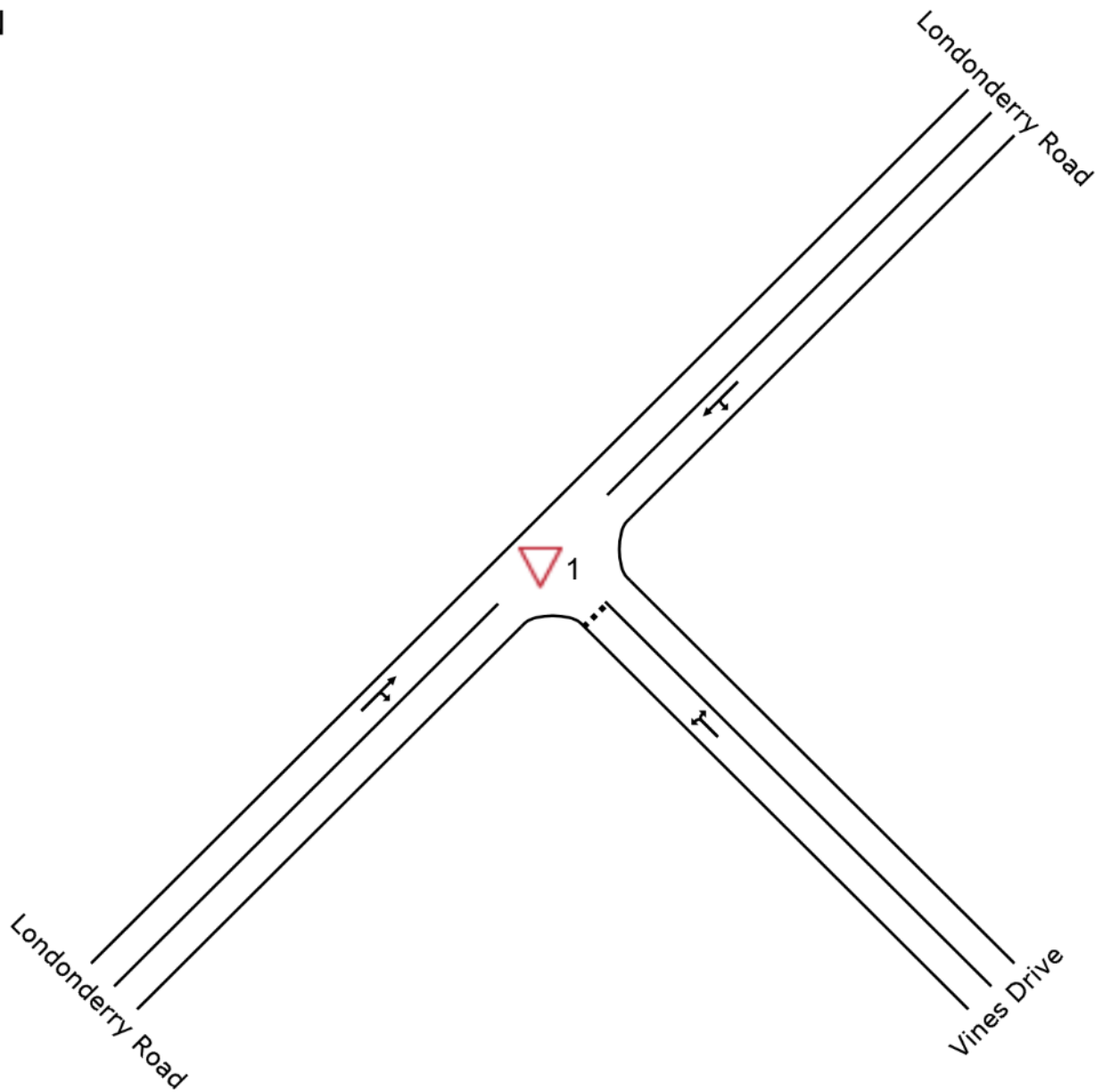
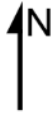
Appendix C – Traffic Modelling

SIDRA Intersection Modelling Results

SITE LAYOUT

Site: 1 [Londonderry x Vines 2017 AM]

Londonderry Road x Vines Drive
2017: Existing Conditions
AM School Time: 8:00-9:00
Giveaway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 1 [Londonderry x Vines 2017 AM]

Londonderry Road x Vines Drive
 2017: Existing Conditions
 AM School Time: 8:00-9:00
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
SouthEast: Vines Drive											
21	L2	16	0.0	0.098	6.4	LOS A	0.3	2.5	0.48	0.73	50.6
23	R2	42	22.5	0.098	11.0	LOS A	0.3	2.5	0.48	0.73	49.3
Approach		58	16.4	0.098	9.7	LOS A	0.3	2.5	0.48	0.73	49.6
NorthEast: Londonderry Road											
24	L2	93	1.1	0.182	5.6	LOS A	0.0	0.0	0.00	0.16	56.9
25	T1	251	3.4	0.182	0.0	LOS A	0.0	0.0	0.00	0.16	58.5
Approach		343	2.8	0.182	1.5	NA	0.0	0.0	0.00	0.16	58.1
SouthWest: Londonderry Road											
31	T1	353	4.2	0.254	0.5	LOS A	0.8	5.8	0.22	0.13	58.0
32	R2	86	1.2	0.254	7.1	LOS A	0.8	5.8	0.22	0.13	55.8
Approach		439	3.6	0.254	1.8	NA	0.8	5.8	0.22	0.13	57.6
All Vehicles		840	4.1	0.254	2.2	NA	0.8	5.8	0.15	0.18	57.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 1 [Londonderry x Vines 2017 PM]

Londonderry Road x Vines Drive
2017: Existing Conditions
PM School Peak: 14:30-15:30
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		veh	m		per veh	km/h
SouthEast: Vines Drive											
21	L2	36	5.9	0.096	6.8	LOS A	0.3	2.6	0.45	0.70	51.4
23	R2	39	16.2	0.096	9.6	LOS A	0.3	2.6	0.45	0.70	50.5
Approach		75	11.3	0.096	8.2	LOS A	0.3	2.6	0.45	0.70	50.9
NorthEast: Londonderry Road											
24	L2	27	0.0	0.177	5.6	LOS A	0.0	0.0	0.00	0.05	57.9
25	T1	309	3.7	0.177	0.0	LOS A	0.0	0.0	0.00	0.05	59.5
Approach		337	3.4	0.177	0.5	NA	0.0	0.0	0.00	0.05	59.4
SouthWest: Londonderry Road											
31	T1	308	4.8	0.178	0.1	LOS A	0.2	1.3	0.06	0.03	59.5
32	R2	17	12.5	0.178	7.2	LOS A	0.2	1.3	0.06	0.03	56.6
Approach		325	5.2	0.178	0.5	NA	0.2	1.3	0.06	0.03	59.3
All Vehicles		737	5.0	0.178	1.3	NA	0.3	2.6	0.07	0.11	58.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 1 [Londonderry x Vines 2027 AM]

Londonderry Road x Vines Drive
 2027: Future Growth + School
 AM School Time: 8:00-9:00
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Vines Drive											
21	L2	77	0.0	0.245	6.7	LOS A	0.9	6.5	0.50	0.72	50.2
23	R2	71	13.4	0.245	14.2	LOS A	0.9	6.5	0.50	0.72	49.2
Approach		147	6.4	0.245	10.3	LOS A	0.9	6.5	0.50	0.72	49.7
NorthEast: Londonderry Road											
24	L2	154	0.7	0.227	5.6	LOS A	0.0	0.0	0.00	0.21	56.5
25	T1	276	3.1	0.227	0.0	LOS A	0.0	0.0	0.00	0.21	58.0
Approach		429	2.2	0.227	2.0	NA	0.0	0.0	0.00	0.21	57.5
SouthWest: Londonderry Road											
31	T1	388	3.8	0.390	1.7	LOS A	2.6	18.6	0.46	0.28	56.2
32	R2	215	0.5	0.390	8.2	LOS A	2.6	18.6	0.46	0.28	54.2
Approach		603	2.6	0.390	4.0	NA	2.6	18.6	0.46	0.28	55.5
All Vehicles		1180	2.9	0.390	4.1	NA	2.6	18.6	0.30	0.31	55.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 1 [Londonderry x Vines 2027 PM]

Londonderry Road x Vines Drive
2027: Future Growth + School
PM School Peak: 14:30-15:30
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Vines Drive											
21	L2	136	1.6	0.272	7.1	LOS A	1.1	7.9	0.50	0.73	51.2
23	R2	83	7.6	0.272	11.3	LOS A	1.1	7.9	0.50	0.73	50.5
Approach		219	3.8	0.272	8.7	LOS A	1.1	7.9	0.50	0.73	50.9
NorthEast: Londonderry Road											
24	L2	56	0.0	0.209	5.6	LOS A	0.0	0.0	0.00	0.08	57.6
25	T1	341	3.4	0.209	0.0	LOS A	0.0	0.0	0.00	0.08	59.2
Approach		397	2.9	0.209	0.8	NA	0.0	0.0	0.00	0.08	58.9
SouthWest: Londonderry Road											
31	T1	339	4.3	0.245	0.6	LOS A	0.8	5.6	0.23	0.12	58.1
32	R2	77	2.7	0.245	7.4	LOS A	0.8	5.6	0.23	0.12	55.8
Approach		416	4.1	0.245	1.9	NA	0.8	5.6	0.23	0.12	57.6
All Vehicles		1032	3.6	0.272	2.9	NA	1.1	7.9	0.20	0.24	56.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

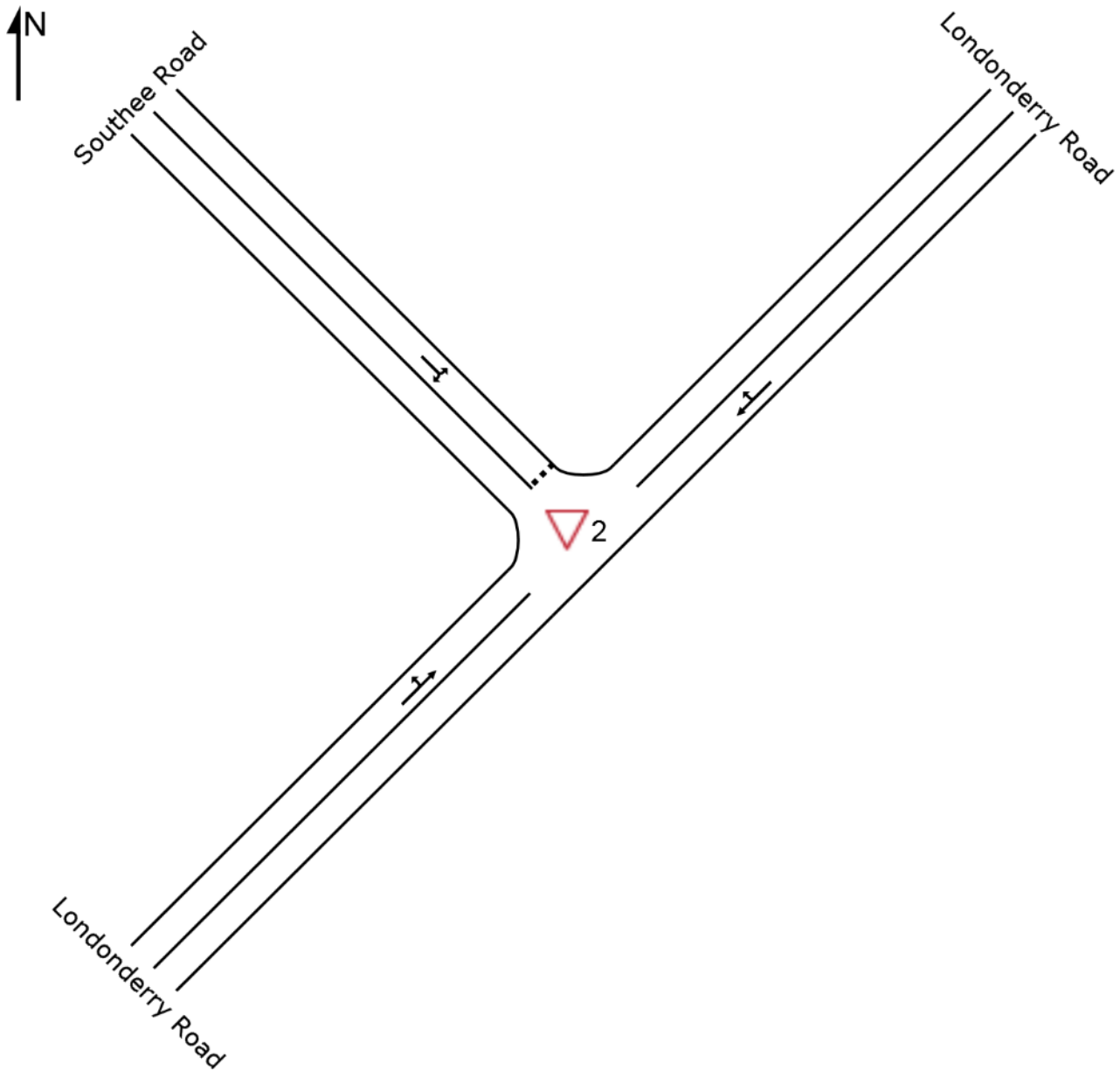
▽ Site: 2 [Londonderry x Southee 2017 AM]

Londonderry Road x Southee Road

2017: Existing Conditions

AM School Peak: 8:00-9:00

Giveaway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 2 [Londonderry x Southee 2017 AM]

Londonderry Road x Southee Road
 2017: Existing Conditions
 AM School Peak: 8:00-9:00
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
NorthEast: Londonderry Road											
25	T1	161	3.3	0.100	0.3	LOS A	0.2	1.2	0.12	0.07	58.9
26	R2	19	0.0	0.100	7.0	LOS A	0.2	1.2	0.12	0.07	56.7
Approach		180	2.9	0.100	1.0	NA	0.2	1.2	0.12	0.07	58.7
NorthWest: Southee Road											
27	L2	54	2.0	0.284	6.9	LOS A	1.1	8.1	0.49	0.78	51.5
29	R2	182	2.3	0.284	8.6	LOS A	1.1	8.1	0.49	0.78	51.0
Approach		236	2.2	0.284	8.2	LOS A	1.1	8.1	0.49	0.78	51.1
SouthWest: Londonderry Road											
30	L2	105	3.0	0.213	5.6	LOS A	0.0	0.0	0.00	0.16	56.8
31	T1	289	7.3	0.213	0.0	LOS A	0.0	0.0	0.00	0.16	58.5
Approach		395	6.1	0.213	1.5	NA	0.0	0.0	0.00	0.16	58.0
All Vehicles		811	4.3	0.284	3.3	NA	1.1	8.1	0.17	0.32	56.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 2 [Londonderry x Southee 2017 PM]

Londonderry Road x Southee Road
 2017: Existing Conditions
 PM School Peak: 14:30-15:30
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
NorthEast: Londonderry Road											
25	T1	252	3.3	0.167	0.4	LOS A	0.4	2.8	0.16	0.09	58.6
26	R2	42	5.0	0.167	7.1	LOS A	0.4	2.8	0.16	0.09	56.2
Approach		294	3.6	0.167	1.3	NA	0.4	2.8	0.16	0.09	58.2
NorthWest: Southee Road											
27	L2	39	13.5	0.154	6.7	LOS A	0.5	4.0	0.44	0.72	51.2
29	R2	85	3.7	0.154	8.7	LOS A	0.5	4.0	0.44	0.72	51.1
Approach		124	6.8	0.154	8.1	LOS A	0.5	4.0	0.44	0.72	51.1
SouthWest: Londonderry Road											
30	L2	101	1.0	0.188	5.6	LOS A	0.0	0.0	0.00	0.17	56.7
31	T1	246	8.1	0.188	0.0	LOS A	0.0	0.0	0.00	0.17	58.3
Approach		347	6.1	0.188	1.6	NA	0.0	0.0	0.00	0.17	57.9
All Vehicles		765	5.2	0.188	2.6	NA	0.5	4.0	0.13	0.23	56.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 2 [Londonderry x Southee 2027 AM]

Londonderry Road x Southee Road
 2027: Future Growth + School
 AM School Peak: 8:00-9:00
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
NorthEast: Londonderry Road											
25	T1	212	2.5	0.129	0.3	LOS A	0.2	1.5	0.12	0.06	59.0
26	R2	21	0.0	0.129	7.5	LOS A	0.2	1.5	0.12	0.06	56.8
Approach		233	2.3	0.129	1.0	NA	0.2	1.5	0.12	0.06	58.8
NorthWest: Southee Road											
27	L2	59	1.8	0.375	7.7	LOS A	1.8	12.5	0.56	0.85	50.5
29	R2	218	1.9	0.375	10.2	LOS A	1.8	12.5	0.56	0.85	50.0
Approach		277	1.9	0.375	9.6	LOS A	1.8	12.5	0.56	0.85	50.1
SouthWest: Londonderry Road											
30	L2	124	2.5	0.247	5.6	LOS A	0.0	0.0	0.00	0.16	56.8
31	T1	335	6.3	0.247	0.0	LOS A	0.0	0.0	0.00	0.16	58.5
Approach		459	5.3	0.247	1.5	NA	0.0	0.0	0.00	0.16	58.0
All Vehicles		968	3.6	0.375	3.7	NA	1.8	12.5	0.19	0.33	55.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 2 [Londonderry x Southee 2027 PM]

Londonderry Road x Southee Road
 2027: Future Growth + School
 PM School Peak: 14:30-15:30
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
NorthEast: Londonderry Road											
25	T1	294	2.9	0.196	0.5	LOS A	0.5	3.5	0.18	0.09	58.5
26	R2	46	4.5	0.196	7.6	LOS A	0.5	3.5	0.18	0.09	56.1
Approach		340	3.1	0.196	1.4	NA	0.5	3.5	0.18	0.09	58.2
NorthWest: Southee Road											
27	L2	42	12.5	0.202	7.0	LOS A	0.7	5.3	0.50	0.76	50.7
29	R2	102	3.1	0.202	9.7	LOS A	0.7	5.3	0.50	0.76	50.5
Approach		144	5.8	0.202	8.9	LOS A	0.7	5.3	0.50	0.76	50.6
SouthWest: Londonderry Road											
30	L2	125	0.8	0.227	5.6	LOS A	0.0	0.0	0.00	0.18	56.7
31	T1	298	6.7	0.227	0.0	LOS A	0.0	0.0	0.00	0.18	58.3
Approach		423	5.0	0.227	1.7	NA	0.0	0.0	0.00	0.18	57.8
All Vehicles		907	4.4	0.227	2.7	NA	0.7	5.3	0.15	0.24	56.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

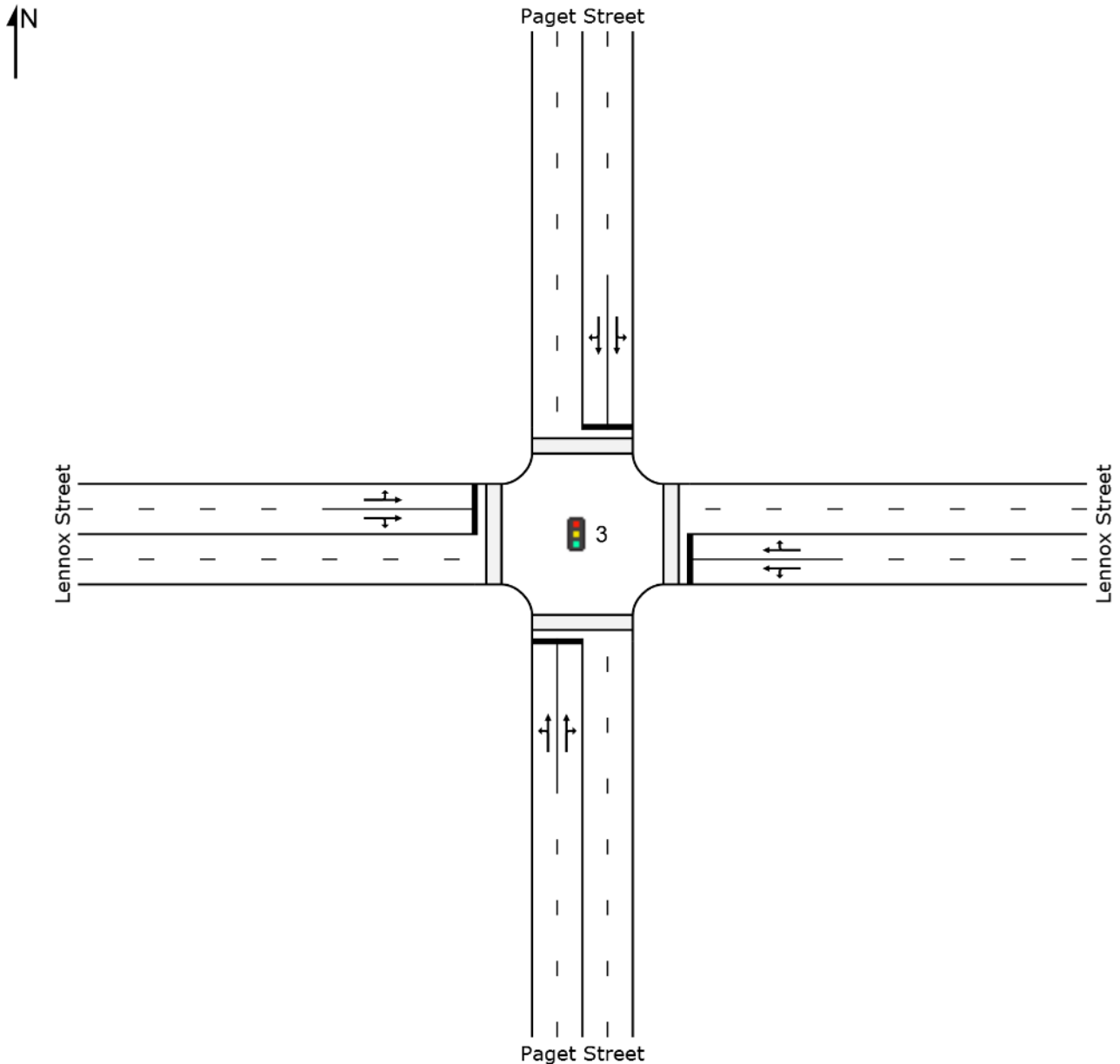
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3 [Paget x Lennox 2017 AM]

Paget Street x Lennox Street
2017: Existing Conditions
AM School Peak: 8:00-9:00
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

 **Site: 3 [Paget x Lennox 2017 AM]**

Paget Street x Lennox Street

2017: Existing Conditions

AM School Peak: 8:00-9:00

Signals - Fixed Time Isolated Cycle Time = 30 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Paget Street											
1	L2	88	9.5	0.382	17.9	LOS B	1.9	14.3	0.91	0.75	42.4
2	T1	135	9.4	0.382	12.3	LOS A	1.9	14.3	0.91	0.74	44.4
3	R2	35	9.1	0.382	18.0	LOS B	1.7	13.0	0.91	0.73	46.4
Approach		258	9.4	0.382	15.0	LOS B	1.9	14.3	0.91	0.74	44.0
East: Lennox Street											
4	L2	14	7.7	0.365	12.8	LOS A	2.9	21.8	0.74	0.63	51.1
5	T1	369	7.1	0.365	7.4	LOS A	2.9	21.8	0.75	0.64	49.7
6	R2	77	1.4	0.365	13.6	LOS A	2.2	15.9	0.77	0.69	44.7
Approach		460	6.2	0.365	8.6	LOS A	2.9	21.8	0.75	0.65	48.9
North: Paget Street											
7	L2	42	5.0	0.185	16.2	LOS B	0.9	6.5	0.86	0.70	36.8
8	T1	60	7.0	0.185	11.7	LOS A	0.9	6.5	0.86	0.69	39.1
9	R2	22	0.0	0.185	16.3	LOS B	0.8	5.5	0.86	0.68	34.6
Approach		124	5.1	0.185	14.1	LOS A	0.9	6.5	0.86	0.69	37.7
West: Lennox Street											
10	L2	79	0.0	0.423	12.9	LOS A	3.5	25.6	0.76	0.68	43.1
11	T1	493	6.0	0.423	7.4	LOS A	3.5	25.6	0.76	0.67	49.6
12	R2	32	10.0	0.423	13.1	LOS A	3.2	23.7	0.76	0.66	49.0
Approach		603	5.4	0.423	8.4	LOS A	3.5	25.6	0.76	0.67	48.9
All Vehicles		1445	6.3	0.423	10.1	LOS A	3.5	25.6	0.80	0.68	46.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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	
P1	South Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P2	East Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P3	North Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P4	West Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
All Pedestrians		211	9.6	LOS A			0.80	0.80	

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: 3 [Paget x Lennox 2017 PM]**

Paget Street x Lennox Street

2017: Existing Conditions

PM School Peak: 14:30-15:30

Signals - Fixed Time Isolated Cycle Time = 30 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Paget Street											
1	L2	74	11.4	0.321	17.7	LOS B	1.5	11.8	0.89	0.74	42.4
2	T1	120	7.0	0.321	12.1	LOS A	1.5	11.8	0.89	0.72	45.0
3	R2	23	27.3	0.321	18.0	LOS B	1.4	11.0	0.89	0.71	46.2
Approach		217	10.7	0.321	14.7	LOS B	1.5	11.8	0.89	0.72	44.2
East: Lennox Street											
4	L2	25	4.2	0.407	12.9	LOS A	3.3	24.9	0.76	0.65	51.0
5	T1	428	9.1	0.407	7.6	LOS A	3.3	24.9	0.77	0.66	49.4
6	R2	74	2.9	0.407	13.7	LOS A	2.7	19.8	0.79	0.69	44.9
Approach		527	8.0	0.407	8.7	LOS A	3.3	24.9	0.77	0.67	48.9
North: Paget Street											
7	L2	84	8.8	0.409	17.0	LOS B	2.1	15.3	0.91	0.75	36.6
8	T1	161	2.6	0.409	12.4	LOS A	2.1	15.3	0.91	0.74	39.0
9	R2	38	0.0	0.409	17.0	LOS B	1.9	13.5	0.91	0.73	34.5
Approach		283	4.1	0.409	14.4	LOS A	2.1	15.3	0.91	0.74	37.8
West: Lennox Street											
10	L2	80	0.0	0.386	12.8	LOS A	3.1	23.0	0.75	0.67	43.0
11	T1	399	6.9	0.386	7.3	LOS A	3.1	23.0	0.75	0.66	49.4
12	R2	46	13.6	0.386	13.0	LOS A	2.6	19.7	0.75	0.65	48.6
Approach		525	6.4	0.386	8.6	LOS A	3.1	23.0	0.75	0.66	48.5
All Vehicles		1553	7.1	0.409	10.5	LOS A	3.3	24.9	0.81	0.69	45.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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	
P1	South Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P2	East Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P3	North Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P4	West Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
All Pedestrians		211	9.6	LOS A			0.80	0.80	

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: 3 [Paget x Lennox 2027 AM]

Paget Street x Lennox Street
 2027: Future Growth + School
 AM School Peak: 8:00-9:00
 Signals - Fixed Time Isolated Cycle Time = 30 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Paget Street											
1	L2	105	8.0	0.435	18.1	LOS B	2.2	16.4	0.92	0.76	42.4
2	T1	156	8.1	0.435	12.5	LOS A	2.2	16.4	0.92	0.75	44.4
3	R2	38	8.3	0.435	18.1	LOS B	2.0	15.2	0.92	0.74	46.4
Approach		299	8.1	0.435	15.2	LOS B	2.2	16.4	0.92	0.75	43.9
East: Lennox Street											
4	L2	15	7.1	0.409	12.9	LOS A	3.4	25.0	0.76	0.64	51.0
5	T1	405	6.5	0.409	7.8	LOS A	3.4	25.0	0.77	0.66	49.3
6	R2	85	1.2	0.409	14.5	LOS B	2.4	17.7	0.81	0.72	43.8
Approach		505	5.6	0.409	9.1	LOS A	3.4	25.0	0.78	0.67	48.4
North: Paget Street											
7	L2	46	4.5	0.238	16.4	LOS B	1.2	8.5	0.88	0.71	37.0
8	T1	92	4.6	0.238	11.9	LOS A	1.2	8.5	0.88	0.70	39.2
9	R2	24	0.0	0.238	16.5	LOS B	1.0	7.2	0.88	0.69	34.7
Approach		162	3.9	0.238	13.8	LOS A	1.2	8.5	0.88	0.70	38.1
West: Lennox Street											
10	L2	87	0.0	0.499	13.2	LOS A	4.3	31.5	0.80	0.70	42.9
11	T1	541	5.4	0.499	7.7	LOS A	4.3	31.5	0.79	0.70	49.1
12	R2	60	5.3	0.499	13.4	LOS A	3.7	26.9	0.79	0.69	48.6
Approach		688	4.7	0.499	8.9	LOS A	4.3	31.5	0.79	0.70	48.4
All Vehicles		1655	5.5	0.499	10.6	LOS A	4.3	31.5	0.82	0.70	46.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Vehicle movement LOS values are based on average delay per movement.
 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	
P1	South Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P2	East Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P3	North Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P4	West Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
All Pedestrians		211	9.6	LOS A			0.80	0.80	

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: 3 [Paget x Lennox 2027 PM]

Paget Street x Lennox Street

2027: Future Growth + School

PM School Peak: 14:30-15:30

Signals - Fixed Time Isolated Cycle Time = 30 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h
South: Paget Street											
1	L2	95	8.9	0.389	17.9	LOS B	1.9	14.5	0.91	0.75	42.4
2	T1	145	5.8	0.389	12.3	LOS A	1.9	14.5	0.91	0.73	44.8
3	R2	25	25.0	0.389	18.2	LOS B	1.8	13.4	0.91	0.73	46.2
Approach		265	8.7	0.389	14.9	LOS B	1.9	14.5	0.91	0.74	44.1
East: Lennox Street											
4	L2	27	3.8	0.453	13.1	LOS A	3.8	28.3	0.78	0.66	50.9
5	T1	471	8.3	0.453	7.8	LOS A	3.8	28.3	0.79	0.68	49.2
6	R2	81	2.6	0.453	13.9	LOS A	2.9	21.6	0.80	0.71	44.7
Approach		579	7.3	0.453	8.9	LOS A	3.8	28.3	0.79	0.68	48.7
North: Paget Street											
7	L2	93	8.0	0.481	17.2	LOS B	2.5	18.3	0.93	0.76	36.6
8	T1	200	2.1	0.481	12.6	LOS A	2.5	18.3	0.93	0.76	38.9
9	R2	42	0.0	0.481	17.2	LOS B	2.3	16.1	0.93	0.75	34.4
Approach		335	3.5	0.481	14.5	LOS A	2.5	18.3	0.93	0.76	37.8
West: Lennox Street											
10	L2	88	0.0	0.456	13.0	LOS A	3.9	28.1	0.78	0.69	42.9
11	T1	438	6.3	0.456	7.9	LOS A	3.9	28.1	0.79	0.70	48.6
12	R2	73	8.7	0.456	14.0	LOS A	3.1	22.8	0.80	0.70	47.5
Approach		599	5.6	0.456	9.4	LOS A	3.9	28.1	0.79	0.70	47.8
All Vehicles		1778	6.2	0.481	11.0	LOS A	3.9	28.3	0.83	0.71	45.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate		
		ped/h	sec		Pedestrian ped	Distance m		per ped	
P1	South Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P2	East Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P3	North Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
P4	West Full Crossing	53	9.6	LOS A	0.0	0.0	0.80	0.80	
All Pedestrians		211	9.6	LOS A			0.80	0.80	

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

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

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

SITE LAYOUT

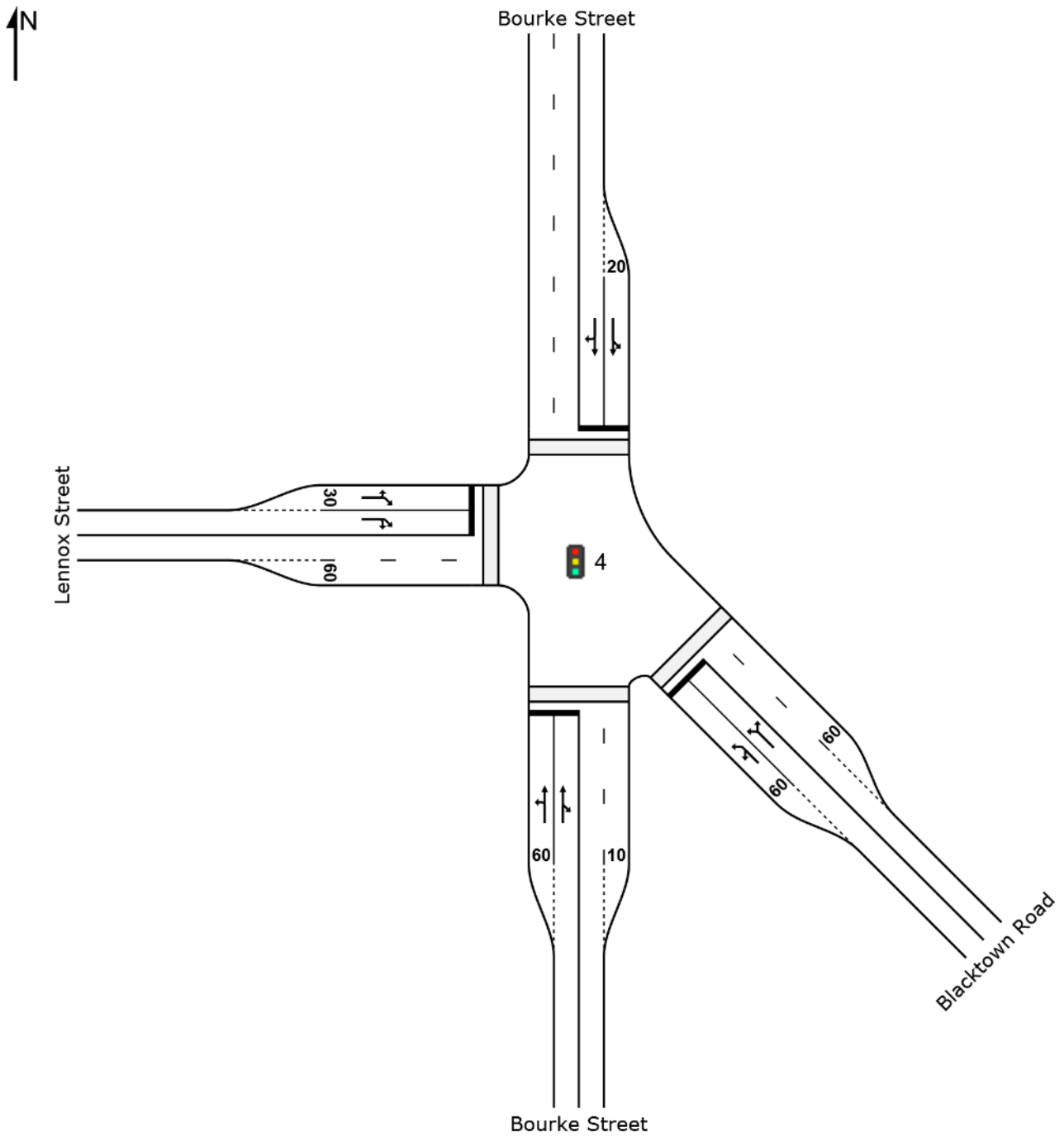
Site: 4 [Blacktown x Bourke 2017 AM]

Blacktown Road x Bourke Street x Lennox Street

2017: Existing Conditions

AM School Peak: 8:00-9:00

Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 4 [Blacktown x Bourke 2017 AM]

Blacktown Road x Bourke Street x Lennox Street

2017: Existing Conditions

AM School Peak: 8:00-9:00

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Bourke Street											
1	L2	1	0.0	0.193	28.9	LOS C	3.2	22.6	0.79	0.63	36.9
2	T1	153	2.1	0.193	23.9	LOS B	3.2	22.6	0.80	0.65	33.4
3b	R3	28	11.1	0.193	31.7	LOS C	2.3	17.1	0.81	0.69	36.4
Approach		182	3.5	0.193	25.2	LOS B	3.2	22.6	0.80	0.65	34.0
SouthEast: Blacktown Road											
21b	L3	22	9.5	0.143	15.5	LOS B	2.6	19.4	0.50	0.68	44.3
21a	L1	412	6.6	0.395	14.6	LOS B	8.9	65.5	0.57	0.72	46.4
23a	R1	116	4.5	0.395	15.1	LOS B	8.9	65.5	0.60	0.73	43.4
Approach		549	6.3	0.395	14.7	LOS B	8.9	65.5	0.58	0.72	45.8
North: Bourke Street											
7a	L1	135	4.7	0.253	28.5	LOS C	4.1	29.8	0.81	0.76	35.9
8	T1	133	4.8	0.450	26.0	LOS B	6.0	43.3	0.86	0.73	31.8
9	R2	51	4.2	0.450	31.6	LOS C	6.0	43.3	0.86	0.73	34.5
Approach		318	4.6	0.450	28.0	LOS B	6.0	43.3	0.84	0.74	34.2
West: Lennox Street											
10	L2	100	3.2	0.181	14.7	LOS B	3.5	25.5	0.52	0.68	42.7
12a	R1	502	6.5	0.458	14.7	LOS B	9.3	68.9	0.59	0.71	47.1
12	R2	5	0.0	0.458	16.2	LOS B	9.3	68.9	0.61	0.71	42.5
Approach		607	5.9	0.458	14.7	LOS B	9.3	68.9	0.58	0.70	46.4
All Vehicles		1657	5.5	0.458	18.4	LOS B	9.3	68.9	0.65	0.71	42.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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 Pedestrian	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	12.7	LOS B	0.1	0.1	0.56	0.56	
P5	SouthEast Full Crossing	53	28.1	LOS C	0.1	0.1	0.84	0.84	
P3	North Full Crossing	53	12.7	LOS B	0.1	0.1	0.56	0.56	
P4	West Full Crossing	53	28.1	LOS C	0.1	0.1	0.84	0.84	
All Pedestrians		211	20.4	LOS C			0.70	0.70	

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: 4 [Blacktown x Bourke 2017 PM]

Blacktown Road x Bourke Street x Lennox Street

2017: Existing Conditions

PM School Peak: 14:30-15:30

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h
South: Bourke Street											
1	L2	5	20.0	0.128	25.5	LOS B	2.2	16.0	0.73	0.58	38.2
2	T1	114	1.9	0.128	20.3	LOS B	2.2	16.0	0.73	0.60	35.6
3b	R3	23	4.5	0.128	27.8	LOS B	1.7	12.2	0.75	0.65	38.4
Approach		142	3.0	0.128	21.7	LOS B	2.2	16.0	0.74	0.61	36.3
SouthEast: Blacktown Road											
21b	L3	21	0.0	0.171	17.6	LOS B	3.2	24.0	0.57	0.70	43.7
21a	L1	455	8.3	0.473	17.3	LOS B	11.1	82.3	0.65	0.75	44.6
23a	R1	122	3.4	0.473	18.1	LOS B	11.1	82.3	0.69	0.77	41.6
Approach		598	7.0	0.473	17.5	LOS B	11.1	82.3	0.66	0.75	44.1
North: Bourke Street											
7a	L1	145	5.8	0.234	25.3	LOS B	4.1	30.2	0.76	0.75	37.5
8	T1	122	6.9	0.477	23.1	LOS B	6.5	47.5	0.83	0.73	32.9
9	R2	87	2.4	0.477	28.7	LOS C	6.5	47.5	0.83	0.73	35.6
Approach		355	5.3	0.477	25.4	LOS B	6.5	47.5	0.80	0.74	35.7
West: Lennox Street											
10	L2	71	9.0	0.166	16.8	LOS B	3.1	23.4	0.56	0.69	40.7
12a	R1	439	7.7	0.419	16.7	LOS B	8.5	63.7	0.63	0.72	45.7
12	R2	2	0.0	0.419	18.3	LOS B	8.5	63.7	0.65	0.72	41.0
Approach		512	7.8	0.419	16.7	LOS B	8.5	63.7	0.62	0.71	45.1
All Vehicles		1606	6.6	0.477	19.4	LOS B	11.1	82.3	0.68	0.72	42.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate		
		ped/h	sec		Pedestrian ped	Distance m		per ped	
P1	South Full Crossing	53	15.0	LOS B	0.1	0.1	0.61	0.61	
P5	SouthEast Full Crossing	53	24.9	LOS C	0.1	0.1	0.79	0.79	
P3	North Full Crossing	53	15.0	LOS B	0.1	0.1	0.61	0.61	
P4	West Full Crossing	53	24.9	LOS C	0.1	0.1	0.79	0.79	
All Pedestrians		211	20.0	LOS B			0.70	0.70	

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: 4 [Blacktown x Bourke 2027 AM]

Blacktown Road x Bourke Street x Lennox Street

2027: Future Growth + School

AM School Peak: 8:00-9:00

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Bourke Street											
1	L2	1	0.0	0.297	27.4	LOS B	5.5	38.9	0.79	0.65	37.7
2	T1	185	1.7	0.297	21.9	LOS B	5.5	38.9	0.79	0.65	35.1
3b	R3	91	3.5	0.311	34.5	LOS C	3.0	21.8	0.86	0.78	33.5
Approach		277	2.3	0.311	26.0	LOS B	5.5	38.9	0.81	0.69	34.4
SouthEast: Blacktown Road											
21b	L3	24	8.7	0.167	17.1	LOS B	3.2	23.3	0.55	0.69	43.2
21a	L1	452	6.1	0.462	16.6	LOS B	10.9	80.1	0.64	0.74	45.1
23a	R1	127	4.1	0.462	17.4	LOS B	10.9	80.1	0.67	0.76	42.0
Approach		603	5.8	0.462	16.8	LOS B	10.9	80.1	0.64	0.74	44.4
North: Bourke Street											
7a	L1	148	4.3	0.246	26.1	LOS B	4.3	31.1	0.77	0.76	37.1
8	T1	180	3.5	0.559	24.3	LOS B	7.6	54.5	0.85	0.74	32.8
9	R2	56	3.8	0.559	29.9	LOS C	7.6	54.5	0.85	0.74	35.5
Approach		384	3.8	0.559	25.8	LOS B	7.6	54.5	0.82	0.74	35.1
West: Lennox Street											
10	L2	111	2.9	0.222	16.5	LOS B	4.4	32.3	0.57	0.70	41.4
12a	R1	552	5.9	0.561	16.8	LOS B	11.2	82.4	0.66	0.73	45.7
12	R2	6	0.0	0.561	18.4	LOS B	11.2	82.4	0.68	0.74	40.9
Approach		668	5.4	0.561	16.8	LOS B	11.2	82.4	0.64	0.73	45.1
All Vehicles		1933	4.7	0.561	19.9	LOS B	11.2	82.4	0.70	0.73	41.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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 Pedestrian	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	53	14.4	LOS B	0.1	0.1	0.60	0.60	
P5	SouthEast Full Crossing	53	25.7	LOS C	0.1	0.1	0.80	0.80	
P3	North Full Crossing	53	14.4	LOS B	0.1	0.1	0.60	0.60	
P4	West Full Crossing	53	25.7	LOS C	0.1	0.1	0.80	0.80	
All Pedestrians		211	20.0	LOS C			0.70	0.70	

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: 4 [Blacktown x Bourke 2027 PM]

Blacktown Road x Bourke Street x Lennox Street

2027: Future Growth + School

PM School Peak: 14:30-15:30

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h
South: Bourke Street											
1	L2	5	20.0	0.219	24.1	LOS B	4.2	29.9	0.72	0.59	39.1
2	T1	153	1.4	0.219	18.4	LOS B	4.2	29.9	0.72	0.59	37.6
3b	R3	122	0.9	0.346	30.7	LOS C	3.9	27.2	0.82	0.78	35.2
Approach		280	1.5	0.346	23.8	LOS B	4.2	29.9	0.76	0.68	36.3
SouthEast: Blacktown Road											
21b	L3	23	0.0	0.202	19.6	LOS B	3.9	28.6	0.61	0.71	42.4
21a	L1	498	7.6	0.558	19.8	LOS B	13.6	100.1	0.72	0.77	43.2
23a	R1	135	3.1	0.558	20.8	LOS B	13.6	100.1	0.77	0.80	40.0
Approach		656	6.4	0.558	20.0	LOS B	13.6	100.1	0.73	0.77	42.6
North: Bourke Street											
7a	L1	160	5.3	0.231	23.1	LOS B	4.3	31.4	0.72	0.75	38.6
8	T1	151	5.6	0.540	21.9	LOS B	7.5	54.7	0.82	0.73	33.7
9	R2	96	2.2	0.540	27.5	LOS B	7.5	54.7	0.82	0.73	36.4
Approach		406	4.7	0.540	23.7	LOS B	7.5	54.7	0.78	0.74	36.5
West: Lennox Street											
10	L2	77	8.2	0.203	18.7	LOS B	3.9	29.1	0.62	0.71	39.5
12a	R1	481	7.0	0.513	19.0	LOS B	10.1	74.9	0.69	0.74	44.4
12	R2	2	0.0	0.513	20.6	LOS B	10.1	74.9	0.71	0.75	39.5
Approach		560	7.1	0.513	18.9	LOS B	10.1	74.9	0.68	0.74	43.8
All Vehicles		1902	5.5	0.558	21.0	LOS B	13.6	100.1	0.73	0.74	40.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

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	Average Delay	Level of Service	Average Back of Queue	Prop. Queued	Effective Stop Rate		
		ped/h	sec		Pedestrian ped	Distance m	per ped		
P1	South Full Crossing	53	16.9	LOS B	0.1	0.1	0.65	0.65	
P5	SouthEast Full Crossing	53	22.5	LOS C	0.1	0.1	0.75	0.75	
P3	North Full Crossing	53	16.9	LOS B	0.1	0.1	0.65	0.65	
P4	West Full Crossing	53	22.5	LOS C	0.1	0.1	0.75	0.75	
All Pedestrians		211	19.7	LOS B			0.70	0.70	

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

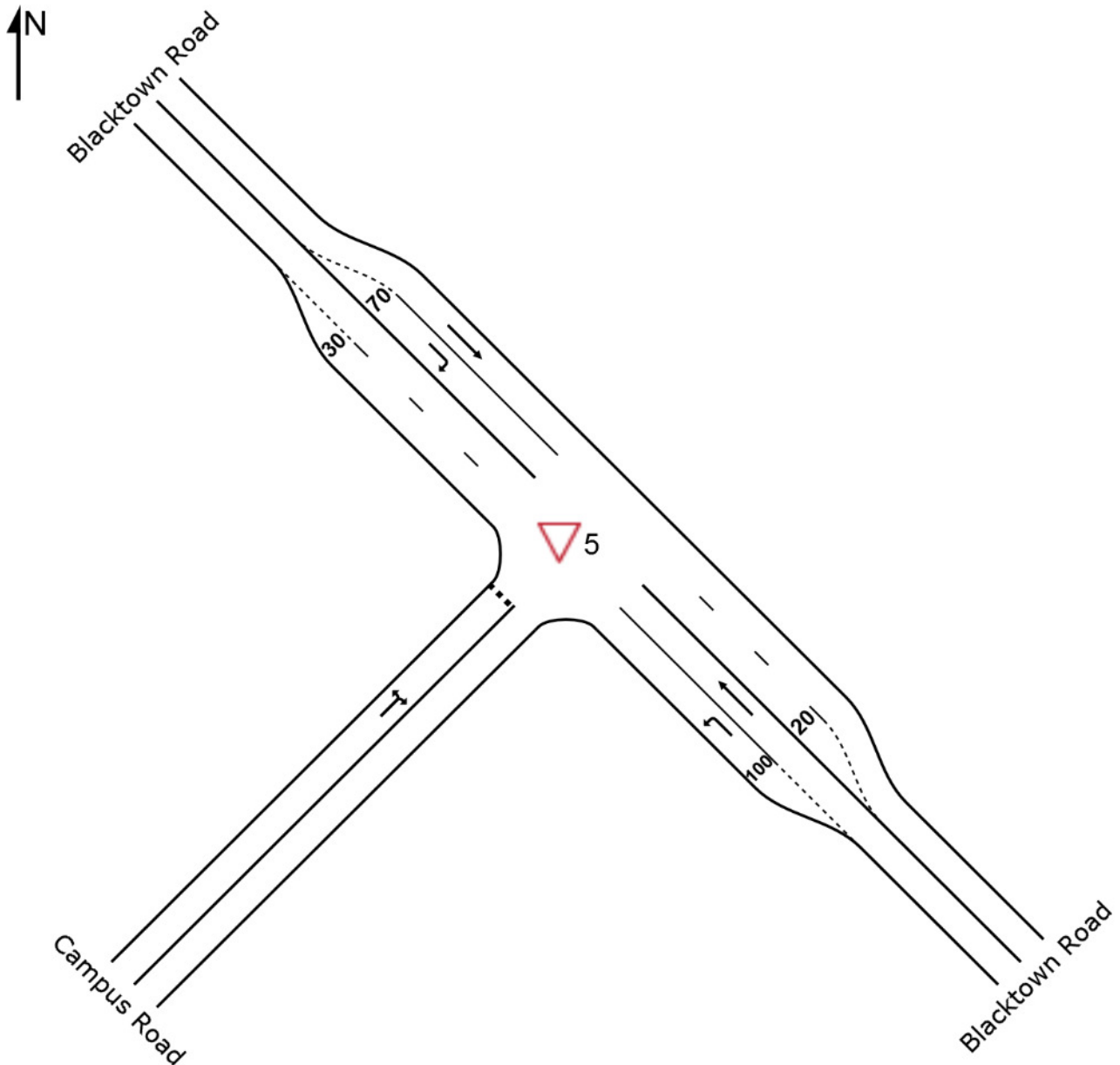
Pedestrian movement LOS values are based on average delay per pedestrian movement.

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

SITE LAYOUT

▽ Site: 5 [Blacktown x Campus 2017 AM]

Blacktown Road x Campus Drive
2017: Existing Conditions
AM School Peak: 8:00-9:00
Giveaway / Yield (Two-Way)



MOVEMENT SUMMARY

▽ Site: 5 [Blacktown x Campus 2017 AM]

Blacktown Road x Campus Drive
2017: Existing Conditions
AM School Peak: 8:00-9:00
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road											
21	L2	178	0.0	0.096	7.0	LOS A	0.0	0.0	0.00	0.63	65.4
22	T1	545	6.0	0.290	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		723	4.5	0.290	1.7	NA	0.0	0.0	0.00	0.15	75.7
NorthWest: Blacktown Road											
28	T1	624	8.4	0.338	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
29	R2	38	0.0	0.062	11.2	LOS A	0.2	1.6	0.59	0.81	55.0
Approach		662	7.9	0.338	0.7	NA	0.2	1.6	0.03	0.05	77.8
SouthWest: Campus Road											
30	L2	8	0.0	0.157	5.5	LOS A	0.5	3.3	0.00	0.58	43.6
32	R2	17	6.3	0.157	38.0	LOS C	0.5	3.3	0.00	0.58	42.6
Approach		25	4.2	0.157	27.2	LOS B	0.5	3.3	0.00	0.58	42.9
All Vehicles		1411	6.1	0.338	1.7	NA	0.5	3.3	0.02	0.11	75.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: TAYLOR THOMSON WHITTING (TTW) PTY LTD | Processed: Tuesday, 12 September 2017 2:43:49 PM

Project: P:\2016\1611\161108\Reports\TTW\Traffic\Modelling\Hurlstone Hawkesbury.sip7

MOVEMENT SUMMARY

▽ Site: 5 [Blacktown x Campus 2017 PM]

Blacktown Road x Campus Drive
2017: Existing Conditions
PM School Peak: 14:30-15:30
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road											
21	L2	15	7.1	0.008	7.1	LOS A	0.0	0.0	0.00	0.63	63.0
22	T1	577	7.8	0.311	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		592	7.8	0.311	0.2	NA	0.0	0.0	0.00	0.02	79.3
NorthWest: Blacktown Road											
28	T1	592	7.8	0.319	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
29	R2	12	0.0	0.016	10.1	LOS A	0.1	0.4	0.54	0.71	56.0
Approach		603	7.7	0.319	0.2	NA	0.1	0.4	0.01	0.01	79.2
SouthWest: Campus Road											
30	L2	25	0.0	0.321	8.4	LOS A	1.1	7.9	0.00	0.58	45.0
32	R2	46	0.0	0.321	33.3	LOS C	1.1	7.9	0.00	0.58	44.9
Approach		72	0.0	0.321	24.5	LOS B	1.1	7.9	0.00	0.58	44.9
All Vehicles		1266	7.3	0.321	1.6	NA	1.1	7.9	0.01	0.05	76.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 5 [Blacktown x Campus 2027 AM]

Blacktown Road x Campus Drive
2027: Future Growth + School
AM School Peak: 8:00-9:00
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road											
21	L2	333	0.0	0.179	7.0	LOS A	0.0	0.0	0.00	0.63	65.4
22	T1	599	5.4	0.318	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		932	3.5	0.318	2.5	NA	0.0	0.0	0.00	0.22	74.0
NorthWest: Blacktown Road											
28	T1	743	7.1	0.399	0.1	LOS A	0.0	0.0	0.00	0.00	79.8
29	R2	58	0.0	0.127	13.8	LOS A	0.4	3.1	0.71	0.90	52.9
Approach		801	6.6	0.399	1.1	NA	0.4	3.1	0.05	0.06	77.0
SouthWest: Campus Road											
30	L2	9	0.0	0.466	25.3	LOS B	1.5	11.0	0.00	0.58	28.8
32	R2	28	3.7	0.466	84.9	LOS F	1.5	11.0	0.00	0.58	28.5
Approach		38	2.8	0.466	70.0	LOS E	1.5	11.0	0.00	0.58	28.6
All Vehicles		1771	4.9	0.466	3.3	NA	1.5	11.0	0.02	0.16	72.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: 5 [Blacktown x Campus 2027 PM]

Blacktown Road x Campus Drive
2027: Future Growth + School
PM School Peak: 14:30-15:30
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Blacktown Road											
21	L2	83	1.3	0.045	7.0	LOS A	0.0	0.0	0.00	0.63	65.0
22	T1	633	7.2	0.340	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
Approach		716	6.5	0.340	0.8	NA	0.0	0.0	0.00	0.07	77.8
NorthWest: Blacktown Road											
28	T1	745	6.2	0.398	0.1	LOS A	0.0	0.0	0.00	0.00	79.8
29	R2	13	0.0	0.021	11.2	LOS A	0.1	0.5	0.59	0.76	55.0
Approach		758	6.1	0.398	0.2	NA	0.1	0.5	0.01	0.01	79.2
SouthWest: Campus Road											
30	L2	28	0.0	0.776	50.2	LOS D	4.0	28.0	0.00	0.58	26.3
32	R2	65	0.0	0.776	96.5	LOS F	4.0	28.0	0.00	0.58	26.2
Approach		94	0.0	0.776	82.4	LOS F	4.0	28.0	0.00	0.58	26.2
All Vehicles		1567	5.9	0.776	5.4	NA	4.0	28.0	0.00	0.07	70.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D – Construction Traffic

Preliminary Construction Traffic Management Plan

See separate documentation