Traffic Assessment

Proposed Armidale Secondary College
Traffic Transport and Accessibility Impact Assessment Report

NBRS Architecture

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Revision Record

No.	Author	Reviewed		Description	Date
1.	Baqir Husain	Calum Hutcheson		Rev00	21.06.2018
2.	Baqir Husain	Calum Hutcheson		Rev01	02.07.2018
3.	Baqir Husain	Calum Hutcheson		Rev02	05.07.2018
4.	Baqir Husain	Calum Hutcheson		Rev03	06.07.2018
5.	Baqir Husain	Calum Hutcheson		Rev04	16.07.2018
6.	Baqir Husain	Calum Hutcheson		Rev05	30.07.2018
7.	Baqir Husain	Calum Hutcheson		Rev06	21.08.2018
8.	Baqir Husain	Calum Hutcheson		Rev07	16.10.2018
9.	Baqir Husain	Paul Cai		Rev08	08.02.2019
10.	Baqir Husain	Paul Cai		Rev09	25.02.2019
11.	Baqir Husain	Paul Cai		Rev10	15.03.2019
12.	Brendan Baker	Richard V Jones		Rev11	19.08.2020
12.	Brendan Baker	Richard V Jones		Rev11b	28.08.2020

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1 Introduction

1.1 Background

TTM Consulting was engaged by NBRS Architecture on behalf of NSW Department of Education to prepare a Traffic Transport and Accessibility Impact Assessment Report for the proposed Armidale Secondary College project. The project meets the criteria for State Significant Development (SSD) and is required to meet Secretary's Environmental Assessment Requirements (SEARs) in the form of an Environmental Impact Assessment (EIS) to achieve SSD approval. The Traffic Transport and Accessibility Impact Assessment Report will be a part of the EIS. A SEARs application was launched in January 2018 and a response received in March 2018.

1.2 SEARS requirements

Planning NSW has specified the SEARs in relation to the proposed development in their letter dated 8 March 2018 and reissued on 27 March 2018. Details of the SEARS requirements are presented below. Table 1-1 identifies how the requirements have been addressed.

The requirements of the SEARs include:

- details of the current vehicle, public transport, pedestrian and cycle movements and existing traffic and transport facilities provided on the road network located adjacent to the proposed development;
- an assessment of the operation of the existing and future transport networks including the bus network and their ability to accommodate the forecast number of trips to and from the development;
- details of estimated 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;
- details of any proposed school bus routes along bus capable roads (i.e. travel lanes of 3.5 metres minimum) and supporting infrastructure (bus stops, bus bays etc);
- the adequacy of public transport, pedestrian and bicycle networks and infrastructure to meet the likely future demand of the proposed development;
- 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;
- an assessment of road safety at key intersections and locations subject to heavy vehicle construction traffic movements and high pedestrian activity;
- identification of suitable infrastructure required to ameliorate any impacts on traffic efficiency and to maximise road safety at affected intersections;

- the proposed access arrangements (normal and emergency as well as interim access arrangements during any required upgrade works), including car and bus pick-up/drop-off movements on Butler Street, estimated service vehicle movements, and parking areas for all car user groups (e.g. visitor parking, disabled parking and car share);
- sustainable travel initiatives for staff, students and visitors, particularly for the provision of a Green Travel Plan and wayfinding strategies;
- safe pedestrian and bicycle connections, including pedestrian crossings and refuges and speed control devices and zones;
- consideration of the railway pedestrian crossing facility in Lambs Avenue/Mann Street;
- details of any upgrading or road improvement works required to accommodate the proposed development;
- 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, including the preparation of a Green Travel Plan;
- 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 improvement works, if required. Traffic modelling is to be undertaken using, but not limited to, SIDRA network modelling for current and future years;
- prioritisation of active transport initiatives through provision of walking and cycling infrastructure) e.g segregated paths, bicycle parkin, etc) to and within the site, considering connections and availability of public transport;
- 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;
- proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance;
- 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;
- details of emergency vehicle access arrangements;
- an assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures;
- an assessment of cumulative on-street parking impacts of car and bus pick-up/drop-off, staff parking and any other parking demands associated with the development during weekdays and special events;

- measures to maintain road and personal safety in line with CPTED principles;
- in relation to construction traffic:
  - an assessment of road safety at key intersection 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 the anticipated daily and peak hour construction vehicle movements to and from the site, so as to not impact current traffic operations on the road network;
  - details of access 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.

Table 1-1: SEARS requirements

Issue	Response
Existing traffic and transport facilities	Documented in Section 2
Existing and future transport networks	No upgrades required Future trips by an updated school bus network
Development trip generation	Documented in Section 4.4
Proposed school bus routes Proposed supporting infrastructure	Bus operator were consulted to determine information on existing operations Further consultation with bus operator required to reschedule bus routes and timetables Up to 7 additional buses may be required to accommodate additional students 6 bus bays to be provided on Butler Street See Section 3.5
Development impact on Public Transport	No action needed

Issue	Response
Adequacy of public transport	School bus services plus route 483 will service the school.
Impact on existing and future public transport infrastructure	No impact
Road Safety due to heavy vehicle movements	Addressed in CTMP
Access and Parking arrangements	See Section 3.2 See Section 3.3 See Section 3.4 See Section 3.6
Green Travel Plan	See Section 6
Safe pedestrian crossing	School zones and pedestrian crossing facilities are already provided. The design proposal is to remove two children's crossings and introduce a formal pedestrian crossing. Additional safety issues addressed in Road Safety Audit report in Appendix D.
Railway Pedestrian Crossing	See Section 2.4
Road improvement works and upgrades	Kerb extensions proposed in Butler Street to be used to separate bus parking and student drop off / pick up areas. Relocation of crossings. Coloring existing refuge blisters on Kentucky Street to increase visibility. Installing advance warning signs on Kentucky Street to increase awareness of crossings.
Details of travel demand management measures	Covered in Section 6 and elsewhere in the report
Traffic impact including SIDRA modelling	See Section 4.3 See Section 4.4
Prioritization of active transport	See Section 6
On-site car parking	See Section 3.3
On-street parking	See Section 2.5 See Section 2.6
Proposed bicycle provision	See Figure 3-1 Provision of up to 100 bicycle racks on site and nominated masterplan area for additional growth should it be needed.
Emergency vehicle access	See Section 5.2

Issue	Response
Road and personal safety	Addressed in the review of existing conditions See Section 4.3.6 Additional safety issues addressed in Road Safety Audit report in Appendix D.
Road and personal safety (CPTED principles)	See Section 5.4
Construction traffic	Addressed in CTMP

1.3 Site location

Armidale High School is located at Butler Street, Armidale NSW 2350. The school is within the Armidale-Dumaresq Local Government Area in the NSW Northern Tablelands. Armidale Bicentennial Arboretum is located south of the school site. Armidale Train Station is located to the north. The site is predominantly surrounded by residential land uses with commercial activities taking place along Mann Street and other streets to the west of the site.

The site context showing surrounding locations is shown in Figure 1-1. An aerial image of the site along with surrounding street information is shown in Figure 1-2. The school has primary access from Butler Street for staff and students. Other access points are located along Lambs Avenue. A bus zone operating before and after school is present on Butler Street.

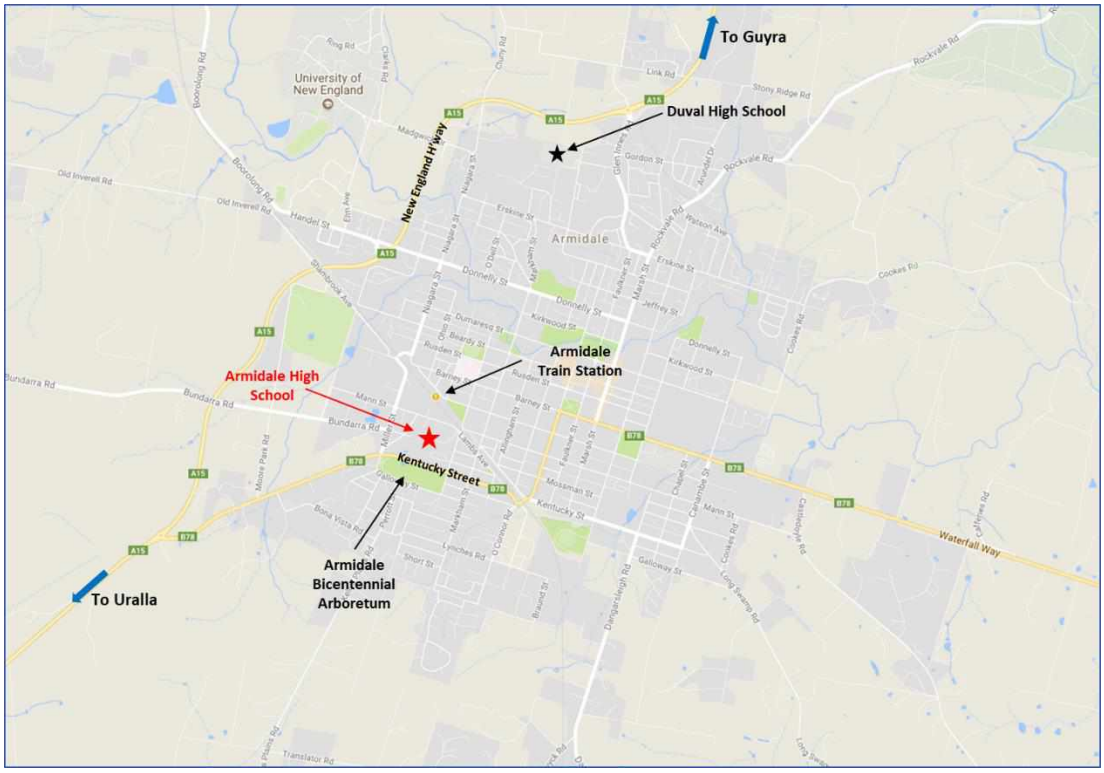


Figure 1-1: Site Context

Figure 1-2: Aerial image of the site

1.4 Existing development profile

The existing Armidale High School site has a land area of approximately 18.3 ha. The school has 14 buildings comprising general learning classrooms, specialist classrooms, administration/office area, gymnasium, school hall, library and amenities. There are three sports fields, basketball courts and an agricultural plot with dam.

The current student population of Armidale High School is 571 students, 51 teaching staff and 14 admin staff. Duval High School is currently catering for 626 students, 50 teaching staff and 13 admin staff. The redeveloped Armidale Secondary college will accommodate up to 1,580 students and 110 FTE teaching staff.

The school has two designated car parking areas located inside the school plot limits. The car parking area located south of the school buildings has 67 car parking spaces. The car park to the north has 23 car parking spaces. Cars are also parked along Hargrave Street inside the school as well as in unmarked areas throughout the school.

2 Existing Transport Infrastructure

2.1 Road network

The subject site has frontage to Butler Street which provides access to the staff car parking areas. The roads surrounding the site are maintained and controlled by Armidale Regional Council except for Kentucky Street which is RMS controlled.

The road characteristics are shown in Table 2-1.

Table 2-1: Road characteristics

Road	Speed Limit	Lanes	Road Authority
Kentucky Street	50kph	2 (undivided)	RMS
Butler Street	50kph	2 (undivided)	Council
Lambs Avenue-Mann Street	50kph	2 (undivided)	Council
Barry Street	50kph	2 (undivided)	Council
Miller Street	50kph	2 (undivided)	Council

School zones are present along Kentucky Street, Butler Street, Hargrave Street, Mossman Street and Lambs Avenue-Mann Street with a maximum speed of 40kph. School zones near the school site are shown in Figure 2-1 and Figure 2-2.

A “Bus Zone” (8:00 am – 9:30 am and 2:30 pm – 4 pm, School Days) is present on Butler Street. Bus zone along Butler Street is shown in Figure 2-3.

“No Parking” (8:00 am – 9:30 am and 2:30 pm – 4 pm, School Days) areas are present along the school side of Butler Street allowing car drop-off and pick-ups. No Parking areas along Butler Street are shown in Figure 2-4.

There are two children’s crossings on Butler Street. A pedestrian crossing is present on Lambs Avenue which connects the school with the railway crossing.

Unrestricted parking areas are present along Hargrave Street, Mossman Street and Barry Street.

Part of Stephens Street and Mossman Street are unsealed towards north-east of the existing Armidale High School. Stephen Street has an electricity pole whereas Mossman Street has a tree present on the street carriageway.

Figure 2-1: School zone along Kentucky Street

Figure 2-2: School zone along Hargrave Street

Figure 2-3: Bus zone along Butler Street

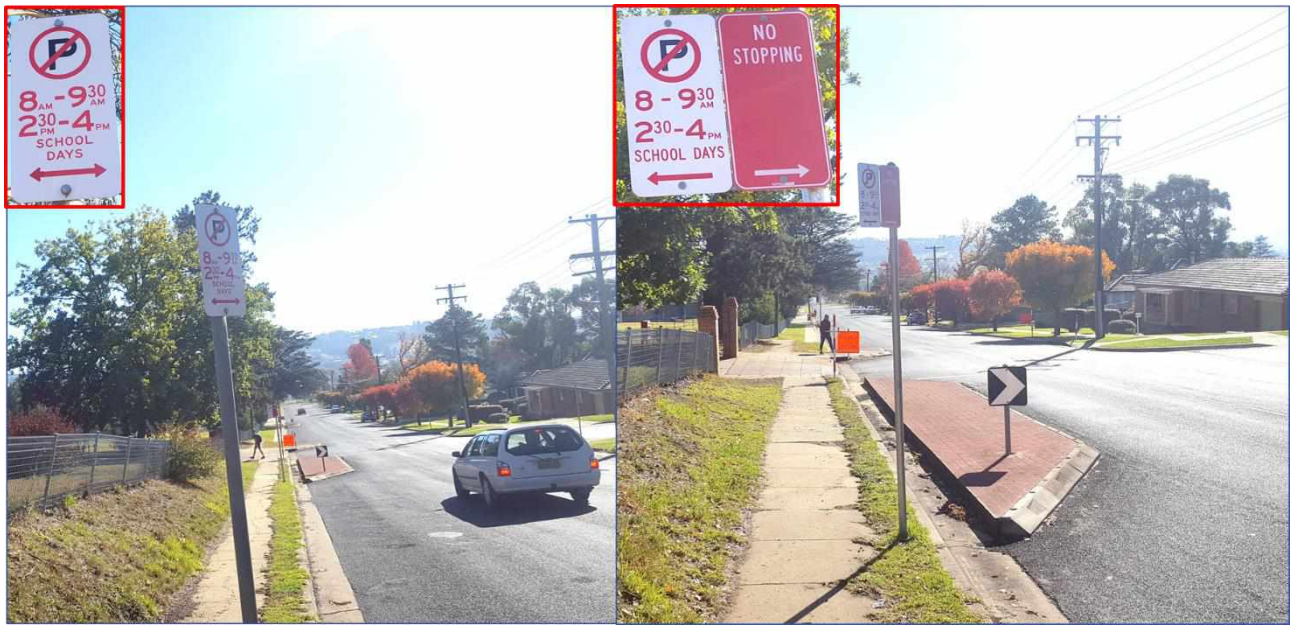


Figure 2-4: No Parking area along Butler Street

2.2 Public transport

The closest (non-school bus) bus stop is located on Miller Street approximately 900m from the school. It is serviced by Edwards bus route number 483. Bus route 483 is a loop service both starting and ending at Armidale Courthouse on Faulkner Street. It is a long route having 11 stops in its loop and covering areas like North Hill, Ben Venue, South Hill, Soudan Heights etc. The bus route has a frequency of 2 hours starting from 8 am up to 5 pm.

Armidale train station is located north of the site approximately 800 metres from the school. The station is serviced by passenger trains only. It is serviced by one passenger train per day as per information received from TfNSW. It arrives in evening from Sydney at 17:35 and returns to Sydney the following day at 08:40.

The location of the bus stop and train station is shown in Figure 2-5. Figure 2-6 shows the route of bus number 483.

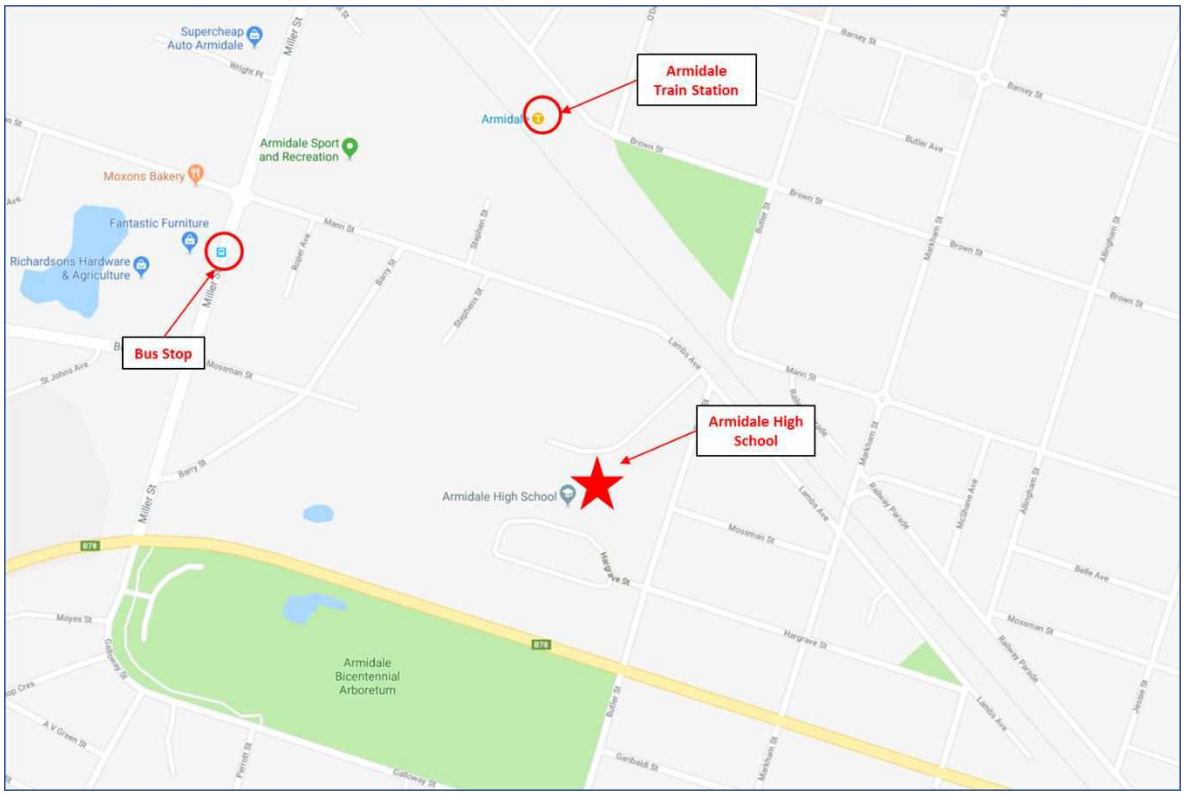


Figure 2-5: Bus stop and train station near the subject site

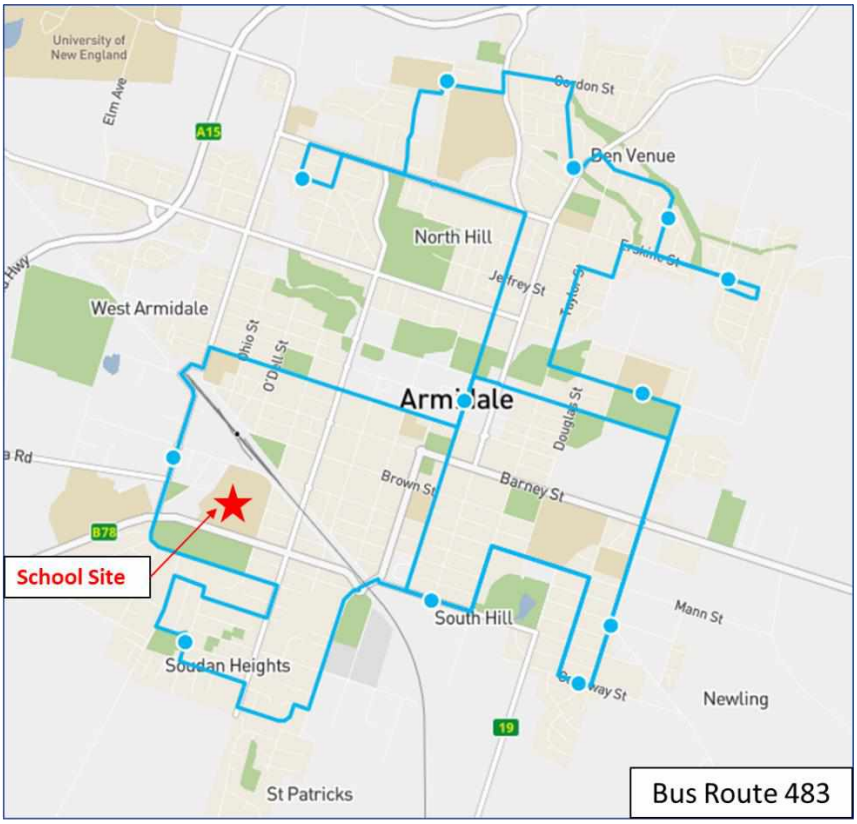


Figure 2-6: Bus route 483

2.3 Walking infrastructure

Walking infrastructure includes pedestrian footpaths, children's crossings and pedestrian crossings in the vicinity of the Armidale High School.

Pedestrian footpath widths vary on the school side of Butler Street with minimum pedestrian footpath width being one metre (see Figure 2-7: Pedestrian footpath along Butler Street.

There are two children's crossings present across Butler Street. There is a children's crossing near Butler Street – Mossman Street intersection and another one near Butler Street – Hargrave Street intersection. The crossings are shown in Figure 2-8.

There is a pedestrian crossing on Lambs Avenue which further leads to a railway crossing (see Figure 2-9).

Another pedestrian crossing is present across Kentucky Street south of the school site. The southern boundary of the school along Kentucky Street is without a footpath and is fenced. The fence is open in front of the pedestrian crossing providing access in to the school.

A survey was conducted over the Kentucky Street pedestrian crossing to determine the number of students using this crossing. Survey results showed that:

- A total of 9 students crossed the pedestrian crossing in the morning between 07:00am-09:45am
- A total of 6 students crossed the pedestrian crossing in the afternoon between 14:00-16:45

The location and image of the pedestrian crossing is shown in Figure 2-10.

Figure 2-7: Pedestrian footpath along Butler Street

Figure 2-8: Children's crossing across Butler Street

Figure 2-9: Pedestrian crossing on Lambs Avenue

Figure 2-10: Pedestrian crossing across Kentucky Street

2.4 Pedestrian Railway Crossing

A pedestrian railway crossing is present north of the Armidale High School boundary near Butler Street – Lambs Avenue intersection. The pedestrian railway crossing is accessed from Lambs Avenue and leads on the other side to Mann Street. The pedestrian railway crossing provides opportunity for pedestrians to travel north of the railway tracks. The location of pedestrian railway crossing is shown in Figure 2-11 and Figure 2-12.

The access to the pedestrian railway crossing has a narrow entry and is protected by fencing. This only allows the pedestrians to access the crossing in a single line.

A survey was conducted over the pedestrian railway crossing to determine the number of students using this facility. Survey results show:

- A total of 61 students cross the pedestrian railway crossing in the morning (07:00am – 09:45am), 45 students of which cross during the morning peak hour (08:15am-09:15am)
- A total of 85 students cross the railway crossing in the afternoon (0:200pm – 04:45pm), 73 students of which cross during the afternoon peak hour (03:15pm – 04:15pm)

There is a conflict in morning peak only with the only train of the day passing the pedestrian railway crossing at 08:40 am. The arrival time of the train was provided by representative of TfNSW and confirmed through survey video footage.

The railway crossing was observed during TTM's site visit to Armidale High School. The pedestrian railway crossing does not have any flashing lights or ringing bells. It is recommended that a hazard assessment is undertaken for this facility by the asset owner/operator. The crossing options may be reviewed as per the pedestrian crossing data presented above.

An alternative route via the Markham Street crossing could be a safer alternative. The Markham street pedestrian path exists on one side of the road.

A survey was undertaken at Markham Street railway crossing intersections at the request of TfNSW. The survey results showed that:

- A total of 7 students cross the pedestrian railway crossing in the morning (07:00am – 10:00am), 3 students of which cross during the morning peak hour (08:00am-09:00am)
- A total of 22 students cross the railway crossing in the afternoon (0:200pm – 05:00pm), 9 students of which cross during the afternoon peak hour (03:15pm – 04:15pm)

Figure 2-13 and Figure 2-14 show the existing pedestrian path along Markham Street and its travel path towards Armidale High School.

There is no dedicated pedestrian path to the north of the railway tracks. This is a matter for Council to address should the need arise for such a path.

Whilst TTM have recommended a hazard review assessment plus community consultation, this is related to the existing use (including non school students). It is noted that the abovementioned railway crossings are not a Department of Education asset and SINSW has no jurisdiction to impose any works on the asset owner.

Figure 2-11: Location of railway crossings

Figure 2-12: Railway crossing accessible from Lambs Avenue and Mann Street.

Figure 2-13: Railway crossing along both sides of Markham Street

Figure 2-14: Pedestrian pathway from Markham Street railway crossing to Armidale High School

2.5 On-street parking

A review was undertaken of on-street parking around the site. Parking controls are shown in Figure 2-15.

Figure 2-15: On-street parking near the site

2.6 Existing on-street / on-site parking occupancy

TTM have conducted parking surveys near the subject site from 7:30 am to 10:00 am and from 2:00pm to 4:30pm on 04/5/2018.

The surrounding on-street / on-site parking has been divided into four different areas:

- Area A: Butler Street
- Area B: Mossman Street
- Area C: Hargrave Street
- Area D: Lambs Avenue

Figure 2-16 indicates the area surveyed.

Figure 2-16: Parking survey areas

Out of the total surveyed area, there were 21 car parking spaces for 'Kiss and Ride' on Butler Street. A total of 149 car parking spaces were available for on-street parking. The results of the existing on-street / on-site parking surveys are summarised in Table 2-2.

Table 2-2: Existing parking occupancy

	Time	Total Occupied	% Occupied	Total Vacant	Vacant Spaces		
					Butler Street	Mossman Street	Hargrave Street
AM Peak (149 total parking spaces)	**7:30**	15	10%	134	52	46	36
	8:00	17	11%	132	50	46	36
	8:30	19	13%	130	48	47	35
	9:00	28	19%	121	47	40	34
	9:30	29	19%	120	49	40	31
	10:00	29	19%	120	50	40	30
PM Peak (149 total parking spaces)	**14:00**	28	19%	121	47	42	32
	14:30	29	19%	120	48	40	32
	15:00	23	15%	126	47	46	33
	15:30	46	31%	103	37	37	29
	16:00	10	7%	139	51	48	40

As per comments received from Council a conservative total availability of 140 on-street car parking spaces is used for this report.

The overall survey results show that existing on-street parking demands near the school is low. The parking facilities around the school had a maximum occupancy of 19% in the morning from 9:00 am to 10:00 am. The survey results for the afternoon period show that parking occupancy reached a maximum of 31% at 3:30 pm. Parking demands dropped significantly after 3:30pm, as most parents picked up their children at 3:25pm when school finished.

It was observed that the majority of the Year 11 and 12 students who drove to school parked their cars on Mossman Street. A few were parked on Hargrave Street. There were 7 students parked on Mossman Street and 3 parked on Hargrave Street. Surveys at Duval High School showed that 14 students drove to and from Duval High School. This is with current student population of 571 students for Armidale High School and 626 students for Duval High School. This adds up to 1200 students approximately.

With the future Armidale Secondary College accommodating up to 1580 students, student parking is estimated to increase to 30 students. The parking rates in section 3.6 calculate student parking requirement of 47 car parking spaces for students which if compared with existing data is still overestimating the parking requirement of students. The provision of 56 on-site student parking spaces near the existing gym area will sufficiently address this issue and minimise any on-street student parking usage.

2.7 Existing on-site parking

There are currently two on-site dedicated staff parking areas. Staff car parking also takes place at other unmarked spots throughout the school.

The bigger car parking area (car park A) has a total capacity of 67 car parking spaces approximately. It is accessed from Butler Street. During the site visit 26 cars were observed to be parked there at 10:00 am.

The smaller car parking area (car park B) has 23 car parking spaces including 2 disabled car parking spaces. Car park B is accessed from Lambs Avenue.

Other areas where car parking was observed included near the science and library building (6 cars parked), behind demountables (3 cars parked) and along the extension of Hargraves Street inside school (16 cars parked).

The location of existing car parking areas is shown in Figure 2-17.

Figure 2-17: Existing on-site car parking areas

3 Proposed Development

3.1 Development profile

The proposed development is a major redevelopment of the existing Armidale High School with a capacity of approximately 1,580 students and 110 FTE teaching staff. The new school will combine students of Duval High School and Armidale High School.

The new school will have up to 79 teaching/learning spaces including:

- General learning classrooms;
- Specialist learning spaces;
- Multi purpose performing spaces;
- Multi purpose hall;
- Covered outdoor learning area;
- Administration facilities
- Library;
- New sports courts;
- Canteen;
- Car parking.

The construction work for the new school will commence in 2019 and expected to be complete in late 2020, for the school start Term 1 in 2021.

3.2 Access points to Armidale Secondary College

The redeveloped Armidale Secondary College will have one additional vehicle access point (near the existing "Den/Gym"). The increase in access points helps to separate students and vehicular movement.

The existing vehicular access point on Butler Street - Hargrave Street will be maintained. This access point will be used by staff to get to the staff car parking area and by refuse collection vehicles.

A new access point is being added further north of the existing Butler Street - Mossman Street access point. This new access point will provide access to "Den/Gym" car parking area.

There will be two access points for emergency vehicles. An access point will be maintained in front of Mossman Street which will also be used by canteen drop-off vans. The existing access off Lambs Avenue will also be used by emergency vehicles.

Pedestrian access points will be from near admin/visitor parking and from near den/gym parking on Butler Street. The existing access point from Lambs Avenue and Kentucky Street result in a total of four access points. The existing pedestrian refuge on Kentucky Street is expected to remain. It will be further improved by recolouring of refuge blisters to increase visibility and installation of advance warning signs to increase awareness of pedestrian crossing.

There are two existing children's crossing on Butler Street which are proposed to be replaced with one marked zebra crossing. The existing crossings are close to a street corner and in the middle of the proposed drop off zone. The new pedestrian crossing is proposed for increased pedestrian safety, being further away from street corners and designated drop-off zones. Additional traffic islands are proposed to define the drop off, bus bay and pedestrian crossing zones.

All access points to the Armidale Secondary College are shown in Figure 3-1.

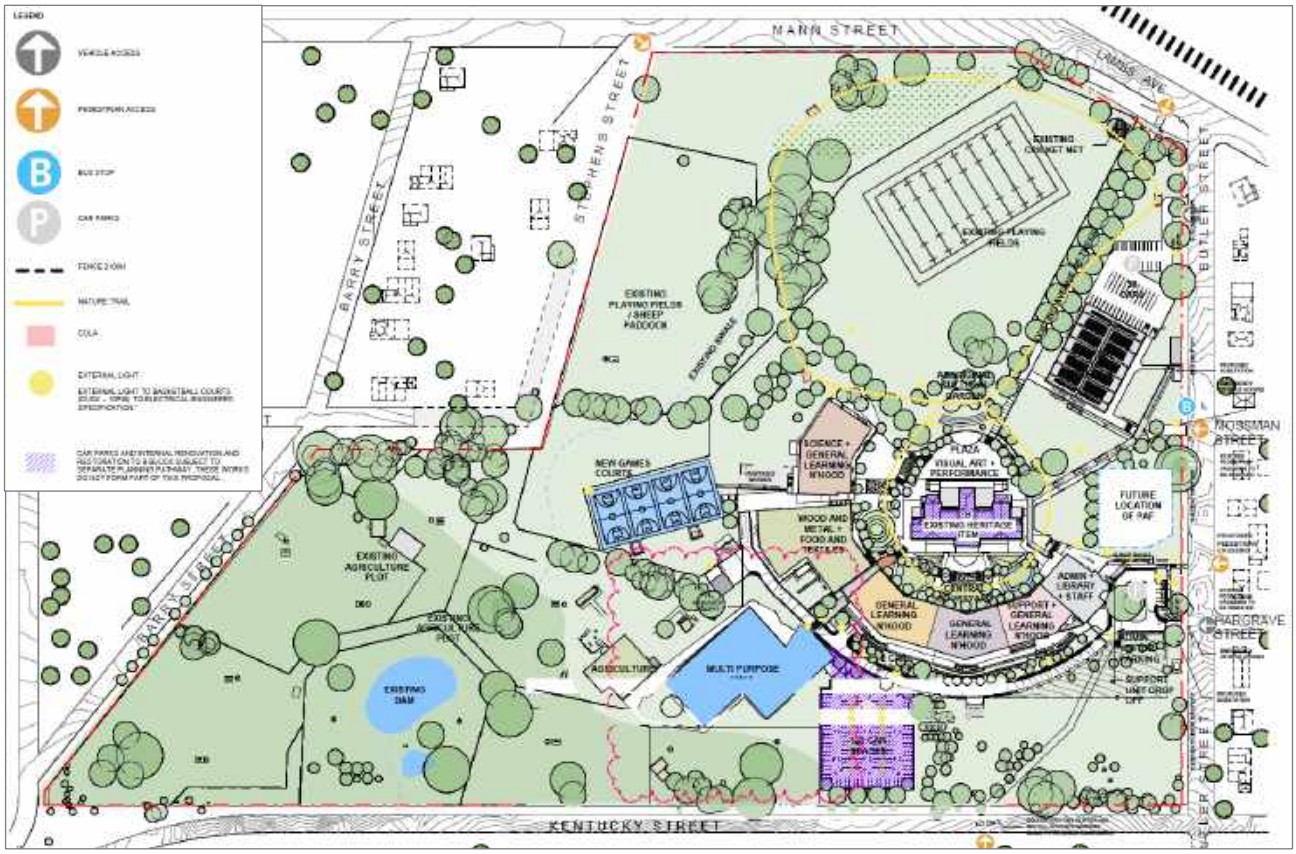


Figure 3-1: Access points to Armidale Secondary College

3.3 Proposed on-site parking

There are three different parking areas provided for the new Armidale Secondary College. The three parking areas provide a combined 188 parking spaces. Access to the car parking areas will be from Butler Street. An extension to the existing staff car parking area has been provided increasing its total capacity to 124 car parking spaces including two accessible parking spaces.

A parking and drop-off/pick-up area has been provided at the entrance to the school site from Butler Street. This area has 8 parking spaces including two accessible space and with drop-off and pick-up area. This parking area will primarily be used by admin staff, visitors and special needs students.

A third parking area is provided near O Block (the existing gym and its extension). This building is referred to as "Den/Gym". The adjacent parking area has 56 car parking spaces including one accessible parking space. These parking spaces are allocated for student parking and for activities that occur within O Block.

Provision of excess student parking on-site is not recommended as it is in direct contradiction to the green travel plan initiatives which promotes higher use of public and active transport.

On-site parking areas for the redeveloped Armidale Secondary College are shown in Figure 3-3.

3.4 Pick-up and drop-off facilities

There are "No Parking (8:00 – 9:30 am & 2:30 – 4:00 pm, school days)" areas along the school side of Butler Street. These areas are being used for drop-off and pick-up activities. As per site inspection it was observed that unrestricted parking areas in Mossman Street, Hargrave Street and opposite the school side on Butler Street are also being used for drop-off and pick-up activities.

There were a few occurrences of pick-up also taking place on Lambs Avenue, although No Stopping restrictions apply here. Parking areas and restrictions are shown in Figure 2-15.

The new Armidale Secondary College will have a dedicated student drop-off area between Butler – Hargrave Street and Butler – Mossman Street intersections. Additional drop-off and pick-up activities will continue to take place on Butler Street, Hargrave Street and Mossman Street.

Signage for these zones are specified by the NSW Roads and Maritime Services. The No Parking signage could be supplemented by a standard "Kiss and Ride" sign for the students drop-off area as shown in Figure 3-2.

"No Stopping" zones are currently present at the driveway entrances to the existing Armidale High School. It is recommended that 15 metre "No Stopping" zones be provided on either side of the driveway entrances for the proposed Armidale Secondary College to ensure sufficient sight distances for exiting vehicles.

Figure 3-2: Students drop-off area signage

3.5 School shuttle bus service

Armidale High School and Duval High School are currently serviced by Edwards and Jeffreys buses via several school buses and general routes. There are 25 buses operating for both Duval High School and Armidale High School as per information received from bus operators. School bus drop-off and pick-up takes place inside the bus zone on Butler Street. On-site observances showed that a maximum of 2 buses at Duval High School and 3 buses at Armidale High School were present at the same time during the peak hours.

The existing bus zone at Armidale High School is shown in Figure 2-3.

There will be an increase in the number of buses required for Armidale Secondary College.

The increase in bus demands will be from students who currently walk from Duval High School in the afternoon. There are currently, 41.3% students walking from Duval High School in the afternoon. This calculates up to 250 students which can be accommodated in 5 additional buses.

There will be additional demand for buses due to the increase in population of Armidale Secondary College. The whole population of the Armidale Secondary College is expected to increase by 25% to cater up to 1580 students. The current population of both Duval and Armidale High Schools combined is approximately 1200 students. This will be an increase of 380 students for the Armidale Secondary College. There are currently on average 26% students using bus transport to Armidale and Duval High Schools. This calculates to an additional bus demand for 100 students which can be accommodated in 2 additional buses. A maximum of 7 additional buses may be required for the new Armidale Secondary College.

The redeveloped Armidale Secondary College will be provided with 5 on-street bus bays in the proposed bus-bay area. The 5 bus bays are accommodated in a total bus zone length of 60 metres. The bus zone length is adequate for manoeuvring in and out of up to 5 buses.

With an average bus usage of 26% derived from Armidale and Duval High Schools surveys, 411 students are expected to use bus transport. A maximum of 32 buses are expected to serve Armidale Secondary College. This calculates to approximately 6 buses using each bus bay during peak hour(equating to a total of 30 buses per hour in the proposed bus bay area). This leaves sufficient time for each bus to pickup/drop-off students.

In line with council's request a sixth 'overflow' bus bay has been added along Butler Street north of the Gymnasium car park entrance. This will mitigate any issues due to schedule variance/early arrivals/late departures.

The existing bus timetable allows staggering of bus times. A reschedule of the bus timetables and routes will be undertaken to cater for the Armidale Secondary College. The staggering of bus times in the bus timetable will allow the peak bus parking demands to not exceed 5 buses an any point in time.

The proposed bus laybys for Armidale Secondary College are shown in Figure 3-4.

3.6 Car parking requirements

The development of Armidale Secondary College is a State Significant Development. Consequently, the provisions presented in the council's development control plan are not effective for this development. Nevertheless, an assessment of parking requirements against councils parking controls has been carried out and used as a guide.

Car parking requirements for schools are specified in the 'Armidale Dumaresq Development Control Plan 2012 Section 2 Site Analysis and General Controls Chapter 2.9 Parking'. Council's parking requirements are presented below.

Table 3-1: Council car parking rates

Educational establishments	Minimum Parking Spaces Required
Schools	1 per FTE employee + 1 for every ten Year 11 and 12 Students + pick up/set down areas for parents, buses

Armidale Secondary College is being built with a capacity of approximately 1,580 students and 110 FTE teaching staff. The car parking requirement of the new Armidale Secondary College is shown in Table 3-2.

Table 3-2: Parking requirement

Description	Quantity	Parking Spaces Requirement
Staff	110	110
Year 11 and 12 students	472	47
Total		157

Proposed parking areas for the Armidale Secondary College are shown in Figure 3-3. The three parking areas will provide a total of 188 car parking spaces. Staff car parking requirements can be accommodated on site within the dedicated staff and admin parking areas as well as some of the den/gym/O block parking area.

The construction of the staff car park will be part of a separate early works package approved under a separate Review of Environmental Factors (REF) approval process.

The student parking requirement can be accommodated near the existing gym "The Den" parking area. The gym parking area will have a total of 56 car parking spaces. These parking spaces will not be utilised by external parties during school hours and will be most appropriate for student parking.

The use of on-site and on-street parking spaces will be adequate for the Armidale Secondary College parking requirements.

The proposed parking areas are designed in accordance with Australian Standards AS2890.1 Off Street Car Parking. Cars accessing the site will be able to enter and exit in a forward direction. Compliance of service vehicles has been checked through a swept path analysis. A swept path analysis was conducted showing

successful manoeuvring of a refuse collection vehicle accessing the site. Swept path results are shown in Appendix C.

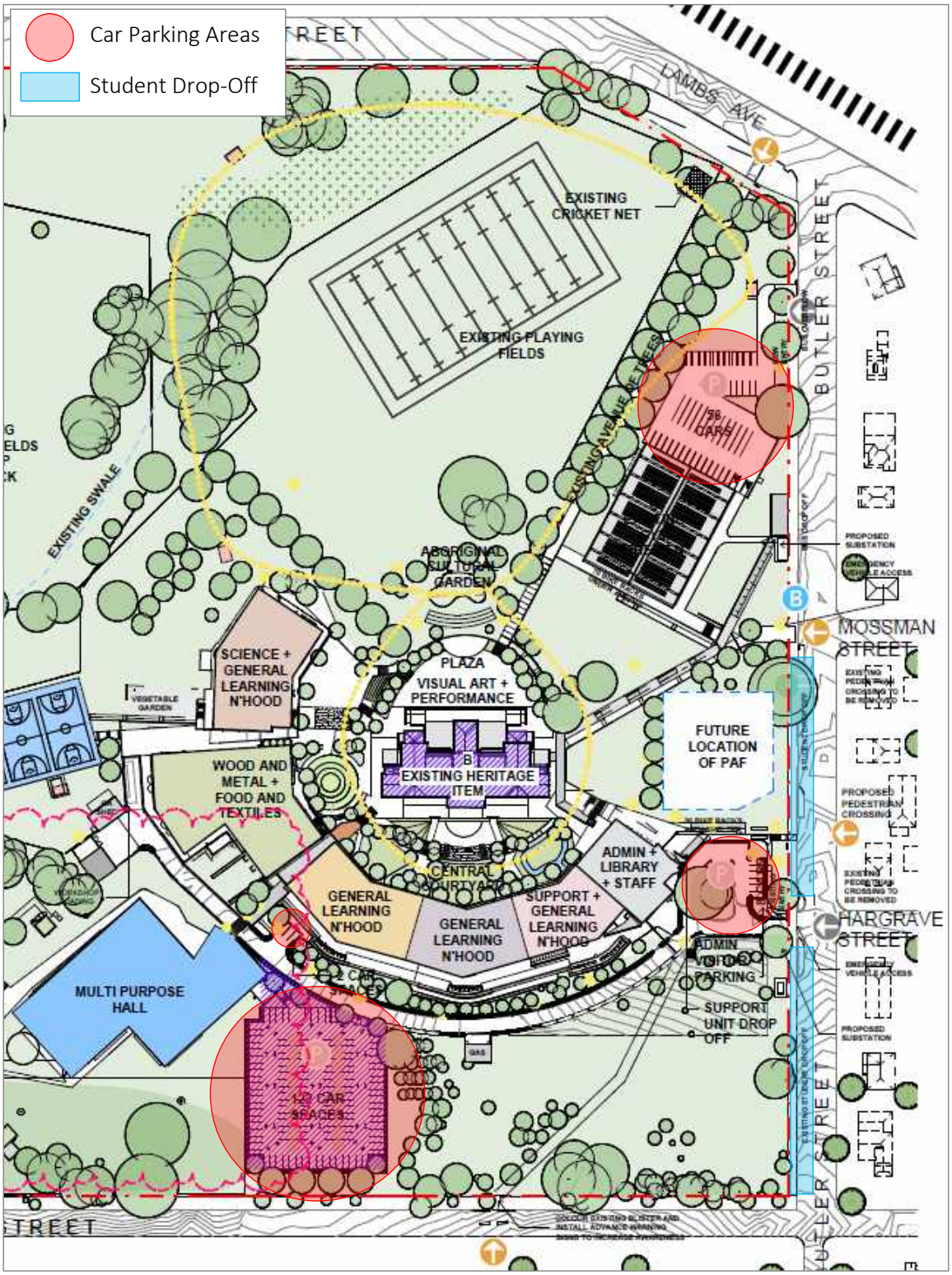


Figure 3-3: Proposed parking areas in Armidale Secondary College

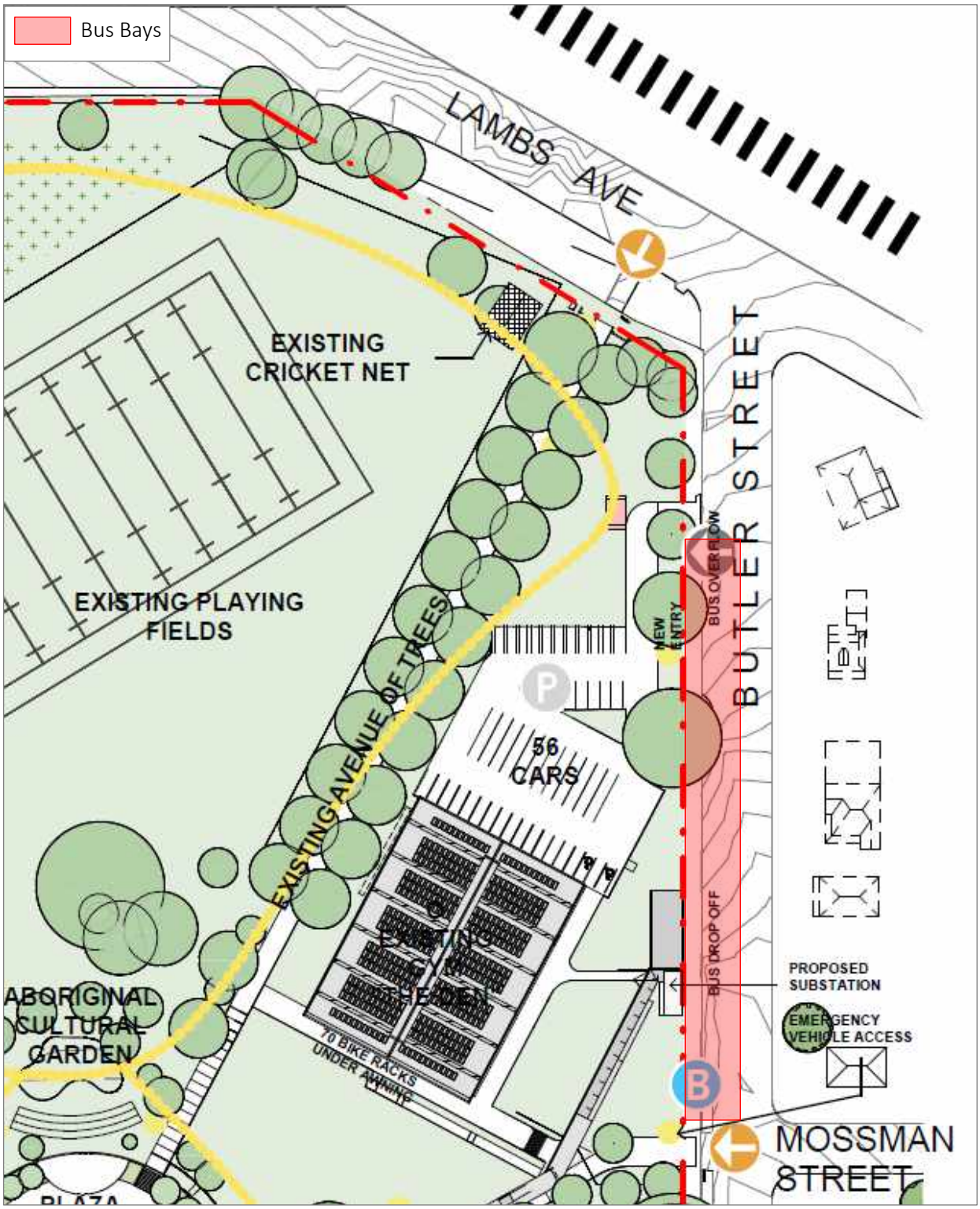


Figure 3-4: Proposed bus bays for Armidale Secondary College

3.7 Multi Purpose Hall – Revision 11

TTM's TIA revision 11 (this document dated: 18 August 2020) has been updated to reflect the proposed changes associated with the addition of the multi purpose hall.

TTM understands that since TTM's TIA revision 10, dated: 15 March 2019, construction of the school has commenced.

The proposal for Armidale Secondary College has been modified to include a multi purpose hall and remove the 'fitness and movement' extensions to the existing gym 'The Den,' as shown in Figure 3-5.

The multi purpose hall is to provide the school with a gymnasium (i.e. indoor sporting area which can be configured with versatile uses – auditorium etc), teaching spaces and gymnasium support facilities.

The multi purpose hall is to be ancillary to the operations of the school i.e. by providing sporting facilities, additional teaching spaces and providing versatile space for larger events hosted by the school.

The overall student population and FTE staff of Armidale Secondary School are not to increase with the proposed multi purpose hall. Therefore, the car parking demand and associated trip generation to/from the school would be remain unchanged from the assessment undertaken in TTM's TIA revision 10 and the same conclusions are drawn.

TTM understands that the is opportunity for the gymnasium area within the multi purpose hall to host larger events i.e. speech night, musicals etc – which would see increased parking demand and trip generation. However, such events are generally held outside of school periods and would not significantly impact the sites peak car parking demand and peak hour trip generation.

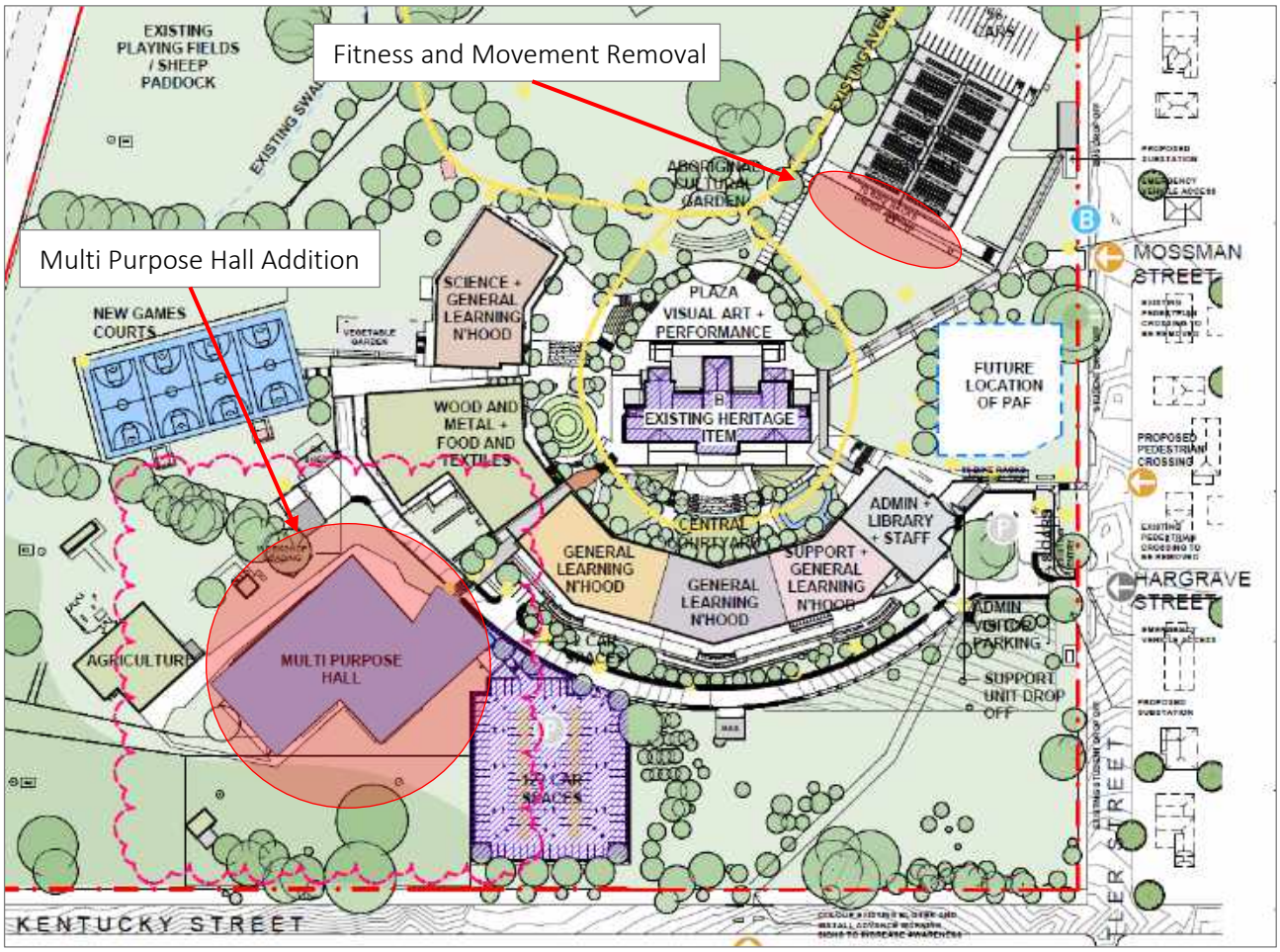


Figure 3-5: Proposed Armidale Secondary College Amendments – Multi Purpose Hall

4 Traffic Impacts

4.1 Surveys of existing student and staff travel

Questionnaire surveys have been conducted among the students and staff in both Duval High School and Armidale High School on 10th May 2018.

4.1.1 Student travel mode

Duval High School

Table 4-1 presents a summary the existing modes used by students to travel to and from Duval High School. A separation has been provided for arrivals and departures during school peak hour (8 to 9 am & 3:00 to 4:00 pm) and other times.

The weighted percentages of student arriving and departing as car passengers are presented. This weighted average provides an allowance for car occupancies where some parents drive more than one student to or from school. We have been advised that approximately 14 students drove themselves to and from Duval High School.

Table 4-1: Existing student mode of travel to and from Duval High School (2018)

	Travel Mode					
	Bus	**Bicycle**	**Car Passenger**	**Drove**	**Walked**	**Total**
Morning Peak						
Student Arrivals in Peak (8:00 to 9:00 am)	26.4%	0.7%	50.7%	0.7%	15.9%	95%
Student Arrivals outside Peak Hour	0.0%	0.0%	2.9%	0%	2.5%	5.4%
All Student Arrivals	26.4%	0.7%	53.6%	0.7%	18.5%	100.0%
Weighted Car Passengers in Peak			39%			
Evening Peak						
Student Departures in General Peak (3.00 to 4.00 pm)	22.5%	0.7%	30.1%	0.4%	41.3%	94.9%
Student Departures outside General Peak Hour	3.6%	0.0%	0.0%	0.4%	1%	5.1%
All Student Departures	26.1%	0.7%	30.1%	0.7%	42.4%	100.0%
Weighted Car Passengers in Peak			22.7%			

The survey results show that the number of car passengers decreases in the afternoon, as more than 41% of students chose to walk home and 22.5% of students catch the school buses. Majority of the pick-up activities occur between 3:25 and 3:30 pm.

Armidale High School

Table 4-1 presents a summary the existing modes used by students to travel to and from Armidale High School. A separation has been provided for arrivals and departures during school peak hour (8 to 9 am & 3:00 to 4:00 pm) and other times.

The weighted percentages of student arriving and departing as car passengers are presented. We have been advised that approximately 13 students drove themselves to and from Armidale High School.

Table 4-2: Existing student mode of travel to and from Armidale High School (2018)

	Travel Mode					
	Bus	**Bicycle**	**Car Passenger**	**Drove**	**Walked**	**Total**
Morning Peak						
Student Arrivals in Peak (8:00 to 9:00 am)	26%	3%	43%	1%	19%	91%
Student Arrivals outside Peak Hour	0.7%	0.7%	3.4%	0%	4.1%	9.0%
All Student Arrivals	26.2%	3.4%	46.2%	1.4%	22.8%	100.0%
Weighted Car Passengers in Peak			35%			
Evening Peak						
Student Departures in General Peak (3.00 to 4.00 pm)	22%	3%	36%	1%	25%	88%
Student Departures outside Peak Hour	4.8%	0.7%	2.8%	0.0%	4%	12.4%
All Student Departures	26.9%	4.1%	38.6%	1.4%	29.0%	100.0%
Weighted Car Passengers in Peak			26.4%			

The survey results also show that percentage of weighted car passenger reduces to 26% in the afternoon when students are departing. Approximately 46% of students are driven to school in the morning and 38% of students are driven from school in the afternoon. Percentage of students catching bus to and from school is approximately 25%.

About 20% of students walk to and from the school in Armidale. Majority of these students are expected to catch school bus to the temporary school at Duval High School.

4.1.2 Staff travel mode

Duval High School

Table 4-3 presents a summary of the existing staff travel patterns as surveyed in May 2018. The number of staff on site at any one time varies from day to day, particularly in relation to part time staff.

Table 4-3: Existing staff travel patterns in Duval High School (2018)

	Thursday
Staff present	41
Staff who drove	36
Car drivers (%)	88%
Staff who parked on-site	36
Staff Parked on-street	0

Staff of Duval High School predominantly drove to school (88%). All the staff parked the car in the existing school carpark.

Armidale High School

Table 4-4 presents a summary of the existing staff travel patterns as surveyed in May 2018. The number of staff on site at any one time varies from day to day, particularly in relation to part time staff.

Table 4-4: Existing staff travel patterns in Armidale High School (2018)

	Thursday
Staff present	32
Staff who drove	30
Car drivers (%)	94%
Staff who parked on-site	26
Staff Parked on-street	4

Staff of Armidale High School predominantly drove to school (94%). Four staff parked the car in the surrounding streets. It was observed that the school carpark was not fully occupied.

4.2 Traffic surveys

Traffic Surveys were conducted in order to determine traffic volumes required for intersection assessment of existing and future traffic. As part of SEARs consultation requirements, Armidale Council, RMS and TfNSW were consulted in this regard. A red flag report was issued to all the relevant authorities highlighting the locations and schedules of traffic surveys. Comments received were duly addressed before the start of the surveys.

TTM Data conducted traffic surveys at the intersections of Kentucky Street-Butler Street, Butler Street-Hargrave Street, Butler Street-Mossman Street and Butler Street-Lambs Avenue from 6:00 to 10:00 am and 2:00 to 6:00 pm on Friday 4th May 2018.

The morning and evening school peak hours were found to be between 8:15 to 9:15 am and 2:45 to 4:15 pm for the intersections near Armidale High School.

Additional traffic surveys were conducted at Markham Street / Lambs Avenue and Markham Street / Railway Parade intersections from 7:00 to 10:00 am and 2:00 to 5:00 pm on Wednesday 6th June 2018.

The morning and evening school peak hours were found to be between 8:00 to 9:00 am and 3:15 to 5:00 pm for the intersections along Markham Street.

The peak hour traffic survey data for the surveyed intersection is presented in Appendix A.

4.3 Assessment of existing traffic conditions

TTM has assessed the performance of the intersections using the SIDRA Intersection Analysis Software. Traffic volumes used for SIDRA analysis are peak hour volumes determined from traffic surveys. Performance criteria for intersections are based on the RTA (RMS) Guide to Traffic Generating Developments. A qualitative rating and its corresponding Level of Service (LoS) are applied to the average delay per vehicle as shown in Table 4-5**.**

Table 4-5: Level of Service Criteria for Intersections

Level of Service (LoS)	Average Delay per Vehicle (seconds)	Traffic Signals, Roundabouts
A	Less than 15	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity; at signals incidents will cause excessive delays

For signals, average delays per vehicle are for the intersection as a whole. If the average delay for the worst movement is greater than the cycle time, a Level of Service F is assigned, regardless of the average delay for the intersection as a whole. For Roundabouts / Give Way / Stop Signs, average delay per vehicle is for the worst movement.

4.3.1 Analysis of Kentucky Street / Butler Street intersection

Table 4-6 and Table 4-7 give a summary of the SIDRA results for the current volumes applied to the existing intersection configuration.

Table 4-6: Summary of SIDRA Outputs for Kentucky Street / Butler Street Intersection – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.027	12.2	A
East: Kentucky Street	0.176	1.6	A
North: Butler Street	0.034	10.5	A
West: Kentucky Street	0.211	0.6	A

Table 4-7: Summary of SIDRA Outputs for Kentucky Street / Butler Street Intersection – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.016	12.4	A
East: Kentucky Street	0.167	0.6	A
North: Butler Street	0.060	10.8	A
West: Kentucky Street	0.192	0.5	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.3.2 Analysis of Butler Street / Hargrave Street intersection

Table 4-8 and Table 4-9 give a summary of the SIDRA results for the current volumes applied to the existing intersection configuration.

Table 4-8: Summary of SIDRA Outputs for Butler Street / Hargrave Street Intersection – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.049	2.6	A
East: Hargrave Street	0.040	5.3	A
North: Butler Street	0.025	2.5	A
West: Hargrave Street	0.015	5.3	A

Table 4-9: Summary of SIDRA Outputs for Butler Street / Hargrave Street Intersection – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.030	1.0	A
East: Hargrave Street	0.022	5.7	A
North: Butler Street	0.018	1.6	A
West: Hargrave Street	0.040	5.1	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.3.3 Analysis of Butler Street / Mossman Street intersection

Table 4-10 and Table 4-11 give a summary of the SIDRA results for the current volumes applied to the existing intersection configuration.

Table 4-10: Summary of SIDRA Outputs for Butler Street / Mossman Street Intersection – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.046	1.4	A
East: Mossman Street	0.029	5.9	A
North: Butler Street	0.026	1.9	A

Table 4-11: Summary of SIDRA Outputs for Butler Street / Mossman Street Intersection – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.036	0.9	A
East: Mossman Street	0.019	5.8	A
North: Butler Street	0.020	2.1	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.3.4 Analysis of Butler Street / Lambs Avenue intersection

Table 4-12 and Table 4-13 give a summary of the SIDRA results for the current volumes applied to the existing intersection configuration.

Table 4-12: Summary of SIDRA Outputs for Butler Street / Lambs Avenue Intersection – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.083	7.2	A
East: Lambs Avenue	0.107	0.6	A
West: Lambs Avenue	0.124	1.0	A

Table 4-13: Summary of SIDRA Outputs for Butler Street / Lambs Avenue Intersection – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.087	8.2	A
East: Lambs Avenue	0.126	0.5	A
West: Lambs Avenue	0.133	0.6	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.3.5 AADT of site surrounding roads

A clause regarding educational establishments present in State Environmental Planning Policy (Infrastructure) 2007 is as follows:

Impact of road noise or vibration on non-road development

(1) This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of RMS) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

(a) residential accommodation,

(b) a place of public worship,

(c) a hospital,

(d) an educational establishment or centre-based child care facility.

The roads surrounding the school site are all local roads, the only exception being Kentucky Street which is a major road and under RMS control. It is understood that Average Annual Daily Traffic Volume (AADT) is a term usually used to describe highways and major roads. The local roads have low traffic volumes and cannot be considered to exceed AADT of 40,000 vehicles.

The average annual daily traffic volume for Kentucky Street was determined to be 3,680 vehicles per day[1]. As per council's records of a classifier survey conducted in February/March 2014 indicated AADT volume of 4,758 vehicles. Nevertheless, it is believed that this volume will not exceed AADT 40,000 vehicles per day even if seasonal variations were included. It can be satisfactorily said that no roads surrounding the site currently experience an AADT volume of more than 40,000 vehicles and therefor Clause 102 of the Infrastructure SEPP does not apply.

4.3.6 Road safety of site surrounding intersections

The road safety of site surrounding intersections is covered by a detailed Road Safety Audit. The Road Safety audit is presented in Appendix D.

4.4 Assessment of future traffic conditions

TTM has assessed the performance for intersections along Butler Street using SIDRA Intersection Analysis Software, for the redeveloped school scenario applied over the existing road network.

Traffic Scenario 1: Redeveloped School (Duval High School + Armidale High School)

This scenario includes the 2018 traffic volumes modelled over the existing road network with the additional traffic generation. Currently Armidale High School caters 571 students. The redeveloped Armidale Secondary College is proposed to accommodate up to 1580 students. This leads to an additional traffic generation of 1009 students.

The additional traffic of 1009 students corresponds to 394 vehicle trips in the morning school peak and 232 vehicle trips in the afternoon. The student vehicle trips are derived from the product of additional number of students and weighted car passengers in peak in Table 4-1.

There will be an additional 63 staff in Armidale Secondary College from Duval High School. This further calculates up to 55 vehicle trips. The staff vehicle trips are derived from the product of additional staff and % car drivers in Table 4-3.

[1] WATERFALL WAY DRAFT CORRIDOR STRATEGY July 2017

A combined total of 449 vehicle trips during the morning peak and 288 vehicle trips for the afternoon peak are modelled for the future scenario.

Assumption of the distributions of additional vehicle trips are presented in Figure 4-1.

Figure 4-1: Assumption of the distributions of additional vehicle trips

The traffic distribution is derived on the basis that major access routes to Armidale High School from Duval High School are via Niagara Street, Markham Street and Kentucky Street. Trips from Markham Street are further distributed among Lambs Avenue, Mossman Street and Hargrave Street.

4.4.1 Analysis of Kentucky Street / Butler Street intersection (Redeveloped School)

Table 4-14 and Table 4-15 give a summary of the SIDRA results for the current volumes plus additional traffic volumes of Duval High School applied to the existing intersection configuration.

Table 4-14: Summary of SIDRA Outputs for Kentucky Street / Butler Street Intersection (Redeveloped School) – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.029	12.6	A
East: Kentucky Street	0.215	2.6	A
North: Butler Street	0.035	10.7	A
West: Kentucky Street	0.211	0.6	A

Table 4-15: Summary of SIDRA Outputs for Kentucky Street / Butler Street Intersection (Redeveloped School) – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.016	12.6	A
East: Kentucky Street	0.186	1.3	A
North: Butler Street	0.062	10.9	A
West: Kentucky Street	0.192	0.5	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

The comments received from council state higher traffic flows along Kentucky Street indicating an AADT volume of 4,758 vehicles. In light of council's comments, the SIDRA analysis of Kentucky-Butler Street has been redone. The additional analysis includes doubling Kentucky Street surveyed peak hour volumes for through movements. The use of increased volumes provides a conservative analysis taking in to consideration higher AADT volumes as suggested by Council.

Table 4-16 and Table 4-17 give a summary of the SIDRA results for redeveloped school scenario plus doubled through traffic volumes on Kentucky Street.

Table 4-16: Summary of SIDRA Outputs for Kentucky Street / Butler Street Intersection (Redeveloped School) plus doubled Kentucky Street volume – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.084	26.5	B
East: Kentucky Street	0.393	4.0	A
North: Butler Street	0.079	17.5	B
West: Kentucky Street	0.390	0.3	A

Table 4-17: Summary of SIDRA Outputs for Kentucky Street / Butler Street Intersection (Redeveloped School) plus doubled Kentucky Street volume – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.047	26.0	B
East: Kentucky Street	0.346	1.6	A
North: Butler Street	0.144	18.6	B
West: Kentucky Street	0.359	1.6	A

The results indicate that increased through volumes on Kentucky Street do not significantly affect the Kentucky-Butler street intersection. There is a subtle change in LOS from A to B. However, this is still satisfactory by all traffic engineering standards.

4.4.2 Analysis of Butler Street / Hargrave Street intersection (Redeveloped School)

Table 4-18 and Table 4-19 give a summary of the SIDRA results for the current volumes plus additional traffic volumes of Duval High School applied to the existing intersection configuration.

Table 4-18: Summary of SIDRA Outputs for Butler Street / Hargrave Street Intersection (Redeveloped School) – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.079	4.0	A
East: Hargrave Street	0.180	6.6	A
North: Butler Street	0.103	4.9	A
West: Hargrave Street	0.017	5.8	A

Table 4-19: Summary of SIDRA Outputs for Butler Street / Hargrave Street Intersection (Redeveloped School) – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.043	2.7	A
East: Hargrave Street	0.092	6.5	A
North: Butler Street	0.051	4.1	A
West: Hargrave Street	0.090	5.2	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.4.3 Analysis of Butler Street / Mossman Street intersection (Redeveloped School)

Table 4-20 and Table 4-21 give a summary of the SIDRA results for the current volumes plus additional traffic volumes of Duval High School applied to the existing intersection configuration.

Table 4-20: Summary of SIDRA Outputs for Butler Street / Mossman Street Intersection (Redeveloped School) – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.128	4.6	A
East: Mossman Street	0.109	5.9	A
North: Butler Street	0.127	4.3	A

Table 4-21: Summary of SIDRA Outputs for Butler Street / Mossman Street Intersection (Redeveloped School) – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.079	3.3	A
East: Mossman Street	0.058	5.8	A
North: Butler Street	0.072	4.6	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.4.4 Analysis of Butler Street / Lambs Avenue intersection (Redeveloped School)

Table 4-22 and Table 4-23 give a summary of the SIDRA results for the current volumes plus additional traffic volumes of Duval High School applied to the existing intersection configuration.

Table 4-22: Summary of SIDRA Outputs for Butler Street / Lambs Avenue Intersection (Redeveloped School) – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.102	8.3	A
East: Lambs Avenue	0.201	1.7	A
West: Lambs Avenue	0.204	3.5	A

Table 4-23: Summary of SIDRA Outputs for Butler Street / Lambs Avenue Intersection (Redeveloped School) – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Butler Street	0.108	8.7	A
East: Lambs Avenue	0.176	1.2	A
West: Lambs Avenue	0.172	2.0	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.5 Traffic impacts

The traffic impact for the existing traffic and additional traffic from Duval High School has been determined.

Table 4-24 gives a summary of the SIDRA outputs for the base case and scenario 1 Redeveloped School for the surveyed intersections.

Table 4-24: SIDRA Intersection Performance Results

Intersection	Scenarios	Morning Peak Hour		Afternoon Peak Hour	
		Average Delay	Level of Service	Average Delay	Level of Service
Kentucky Street and Butler Street	Base Case	12.2	A	12.4	A
	Redeveloped School	12.6	A	12.6	A
Butler Street and Hargrave Street	Base Case	5.3	A	5.7	A
	Redeveloped School	6.6	A	6.5	A
Butler Street and Mossman Street	Base Case	5.9	A	5.8	A
	Redeveloped School	5.9	A	5.8	A
Butler Street and Lambs Avenue	Base Case	7.2	A	8.2	A
	Redeveloped School	8.3	A	8.7	A

The increase in traffic flows have negligible impact on the intersection operations. The additional traffic generated from the proposed development is considered acceptable.

The detailed outputs for this analysis are provided in Appendix B.

4.6 Assessment of traffic impacts on Markham Street / Lambs Avenue intersection

Additional surveys were conducted at Markham Street – Lambs Avenue and Markham Street – Railway Parade intersections. It was advised that these intersections would be accommodating significant additional traffic from Duval High School. It is therefore necessary to understand the impacts of additional traffic with the railway crossing.

4.6.1 Analysis of Markham Street / Lambs Avenue intersection

Table 4-25 and Table 4-26 give a summary of the SIDRA results for the current volumes applied to the existing intersection configuration.

Table 4-25: Summary of SIDRA Outputs for Markham Street / Lambs Avenue Intersection – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Markham Street	0.188	0.2	A
East: Lambs Avenue	0.006	8.3	A
North: Markham Street	0.221	4.6	A
West: Lambs Avenue	0.222	7.4	A

Table 4-26: Summary of SIDRA Outputs for Markham Street / Lambs Avenue Intersection – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Markham Street	0.076	0.3	A
East: Lambs Avenue	0.011	7.9	A
North: Markham Street	0.225	3.2	A
West: Lambs Avenue	0.145	6.2	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.6.2 Analysis of Markham Street / Lambs Avenue intersection (Redeveloped School)

Table 4-27 and Table 4-28 give a summary of the SIDRA results for the current volumes plus additional traffic volumes of Duval High School applied to the existing intersection configuration.

Table 4-27: Summary of SIDRA Outputs for Markham Street / Lambs Avenue Intersection (Redeveloped School) – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Markham Street	0.377	0.7	A
East: Lambs Avenue	0.016	17.0	B
North: Markham Street	0.556	9.1	A
West: Lambs Avenue	0.329	10.5	A

Table 4-28: Summary of SIDRA Outputs for Markham Street / Lambs Avenue Intersection (Redeveloped School) – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Markham Street	0.211	0.8	A
East: Lambs Avenue	0.018	11.8	A
North: Markham Street	0.366	4.3	A
West: Lambs Avenue	0.185	7.3	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.6.3 Analysis of Markham Street / Railway Parade intersection

Table 4-29 and Table 4-30 give a summary of the SIDRA results for the current volumes applied to the existing intersection configuration.

Table 4-29: Summary of SIDRA Outputs for Markham Street / Railway Parade Intersection – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Markham Street	0.313	0.0	A
East: Railway Parade	0.048	6.6	A
North: Markham Street	0.147	0.4	A

Table 4-30: Summary of SIDRA Outputs for Markham Street / Railway Parade Intersection – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Markham Street	0.169	0.0	A
East: Railway Parade	0.053	7.1	A
North: Markham Street	0.211	0.7	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

4.6.4 Analysis of Markham Street / Railway Parade intersection (Redeveloped School)

Table 4-31 and Table 4-32 give a summary of the SIDRA results for the current volumes plus additional traffic volumes of Duval High School applied to the existing intersection configuration.

Table 4-31: Summary of SIDRA Outputs for Markham Street / Railway Parade Intersection (Redeveloped School) – Morning Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Markham Street	0.462	0.1	A
East: Railway Parade	0.072	8.5	A
North: Markham Street	0.316	0.2	A

Table 4-32: Summary of SIDRA Outputs for Markham Street / Railway Parade Intersection (Redeveloped School) – Afternoon Peak

Direction	Degree of Saturation (%)	Average Delay (sec)	Level of Service (LoS)
South: Markham Street	0.278	0.0	A
East: Railway Parade	0.065	8.1	A
North: Markham Street	0.298	0.7	A

The results indicate that the current intersection configuration has ample capacity for future traffic demands from the proposed development.

Table 4-24 gives a summary of the SIDRA outputs for the base case and scenario 1 Redeveloped School for the additional intersections.

Table 4-33: SIDRA Intersection Performance Results

Intersection	Scenarios	Morning Peak Hour		Afternoon Peak Hour	
		Average Delay	Level of Service	Average Delay	Level of Service
Markham Street and Lambs Avenue	Base Case	8.3	A	7.9	A
	Redeveloped School	17.0	B	11.8	A
Markham Street and Railway Parade	Base Case	6.6	A	7.1	A
	Redeveloped School	8.5	A	8.1	A

Video footage from additional traffic surveys showed that the railway crossing is closed for approximately one minute for the morning peak train crossing. This brings to stop all movements of traffic on both Markham Street – Lambs Avenue and Markham Street – Railway Parade intersections. This reduces the

capacity by approximately 1.67%. This reduction in capacity will have minimal impact and is considered acceptable.

The increase in traffic flows have a negligible impact on the intersection operations. The additional traffic generated from the proposed development is considered acceptable.

The detailed outputs for this analysis are provided in Appendix B.

5 Additional Transport Related Issues

5.1 Service vehicle arrangement

Service vehicle movements will take place from the existing entries on the Butler – Hargrave Street intersection and the Butler – Mossman Street intersection.

Refuse collection vehicles will travel along the newly proposed 6m wide circular road and stop at two locations. Waste will be collected from waste store inside the staff car parking area and from further up near workshop loading area.

Canteen drop-off vans will use existing entry from Butler – Mossman Street intersection.

Service vehicle paths are shown in Figure 3-1.

A swept path analysis was performed with an 8.9m refuse collection vehicle. The turning movements were found to be satisfactory. Swept path results are shown in Appendix C.

5.2 Emergency vehicle access

Emergency vehicle access will take place from existing entry points at Butler – Mossman Street intersection and from Lambs Avenue. Emergency vehicle paths are shown in Figure 3-1.

5.3 Bicycle parking

The bicycle parking requirements for the proposed development have been determined from Armidale Dumaresq DCP 2012, section 2.9 Parking. The DCP identifies a minimum bicycle parking requirement of 1 space per 5 pupils above Year 4. With Armidale Secondary College being able to accommodate up to 1,580 students, a minimum of 316 bicycle spaces are required in accordance with the DCP.

Armidale High School currently allows for approximately 20 bicycle spaces on site. The proposed Armidale Secondary College is designed to be provided with 100 bicycle racks. 70 bicycle racks will be provided along the existing gym building which will primarily be used by students. 30 bicycle spaces will be next to the admin/visitor parking area and are expected to be used by the teaching and admin staff. The site allows for suitable expansion of these facilities should this be required in the future.

Suitable end of trip facilities including changing rooms and showers are provided as follows:

Student facilities in the gymnasium change room:

- Male 4 showers and 5 wc's
- Female 4 showers and 13 wc's

Teachers in the Admin area and staff study facilities

- Admin area: 4 unisex wc's and 1 accessible wc and shower
- Staff study: 4 unisex wc's and 1 accessible wc and shower

The location of bicycle racks is shown in Figure 5-1.

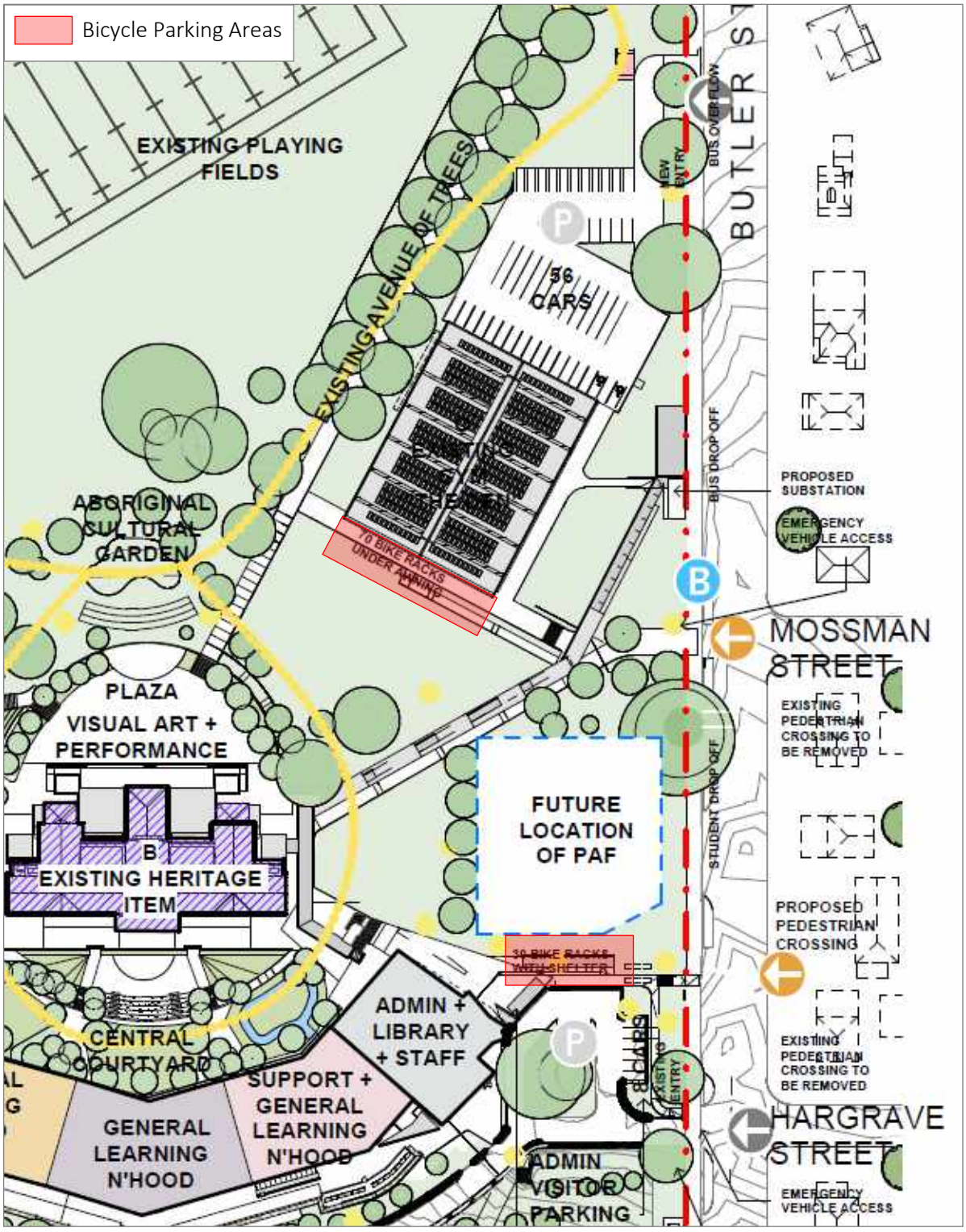


Figure 5-1: Location of bicycle parking spaces

5.4 Crime Prevention Through Environmental Design (CPTED)

A separate CPTED report has been prepared by NBRS architecture. TTM has reviewed the CPTED report. The design recommendations put forward in the CPTED report in terms of carpark security, site and car park layout, entry/exit points are satisfactory.

6 Green Travel Plan

6.1 The plan

A Green Travel Plan will be developed by the school to encourage travel behaviour change through raising awareness of other alternatives to using a private vehicle.

The Green Travel Plan is a collection of initiatives and actions to encourage travel behaviour change. The plan will provide students, staff and parents with information on sustainable transport and encourages them to make alternative transport choices than the use of a private vehicle. The implementation of the Green Travel Plan will reduce traffic congestion and parking problems.

This Green Travel Plan has been prepared in the interests of providing guidance to current/future members, staff and visitors of the proposed development to reduce car trips and encourage the use of sustainable transport.

To provide guidance for the preparation of a Green Travel Plan for members, staff and visitors of the development, the following 'generic' Green Travel Plan includes:

Carpooling

Carpooling is considered as an opportunity to significantly reduce cars on the road network. The school would set up a system to manage and display the real-time carpool information from participants. This system can be a cloud, google maps or various smartphone applications.

Carpooling should be a long-term initiative which requires consistent promotion of this travel mode and incentives. It is recommended to have the initiative operated through parents on a carpooling forum. The school will manage and encourage parents to be proactive in offering carpooling services. The benefits of carpooling can be promoted in parent teacher meetings, school newsletters and by educating students.

A range of free apps are currently available online to assist with the implementation of carpooling. Examples are presented below. The School would need to consider the Child Protection Policies before promoting the initiative.

Carpool – School Edition

This app is designed specifically for students who carpool to school. Parents can form a carpool group and add members into the group manually or import from contacts. This app let parents manually create a schedule, or it will automatically generate one based on the driver's preferences. For example, if one person likes to drop off in the morning or prefers pick-up.

This app is free for iOS devices. Parents can also email the carpool schedule to those members who do not have an iOS device. They can view it on their computers and print it.

Cozi

Cozi is a free mobile app for iOS and Android devices. It allows parents to create shared calendars jam-packed with information. Parents can make a calendar of driving assignments and share the calendar with other parents in the carpool.

Provide Information on Public Transport Services

The proposed development has limited access to public transport with few public transport buses within close proximity to the subject site. The closest (non-school bus) bus stop is located on Miller Street which is approximately 900m from Armidale High School.

The detailed Green Travel Plan will include the following information on the public transport services:

Bus Services

Details of conveniently accessible bus services to include:

- Route Service Number and School bus routes
- Origin and Destination
- Travel route along streets near the site
- Bus stops located around the site
- A map showing the shortest and safest pedestrian route from the site to various bus stop locations

Provide Information on Active Transport Options

Bicycle Access

The proposed development site will include 100 bicycle racks and suitable end of trip facilities. The detailed Green Travel Plan will provide the following information on the cycle network:

- The location of designated bicycle parking spaces for staff/students for the proposed development
- A map showing cycle routes conveniently accessible from the site and the surrounding facilities

The Armidale Dumaresq Council Bicycle Strategy identifies existing and future bicycle routes.

Walking Access

The detailed Green Travel Plan will highlight all the Armidale Secondary College access points from Kentucky Street, Butler Street and Lambs Avenue. All pedestrian crossing points should be highlighted to inform students, parents and staff of the appropriate crossing locations.

6.2 Implementation

The success of a green travel plan depends on the participation of school staff, students, and parents. These people accessing the school must have ownership of the plan.

Just prior to the initial expansion of the development, the Green Travel Plan will be finalised with the inclusion of relevant information such as train and bus timetables, illustrations showing the shortest and most convenient routes between the site and various destinations.

Hard copies of the Green Travel Plan will be produced for distribution.

The school website will have a link to the Green Travel Plan. The administration staff will be responsible for updating the Travel Plan on a regular basis.

7 Summary and Conclusions

7.1 Development access

The Armidale Secondary College access points will remain primarily from Butler Street. Most of the existing entry points will be maintained. There will be two access points each for vehicles and students/pedestrians from Butler Street. A third access points for students/pedestrians will be from Lambs Avenue. There will be two access points for emergency vehicles, one from Butler Street and one from Lambs Avenue.

7.2 Car parking arrangements

There are three proposed car parking areas to cater the parking requirements of Armidale Secondary College. 188 car parking spaces including 5 accessible parking spaces have been provided on-site which are adequate. Any additional parking demand can be accommodated on surrounding streets.

7.3 Impact on surrounding road network

SIDRA analysis has been conducted on six study intersections near Armidale High School. Analysis was conducted for two scenarios including existing traffic and future development traffic. All intersections were found to be operating at LOS A for both the scenarios. The redevelopment of new Armidale Secondary College will not have significant traffic impacts on the surrounding road network.

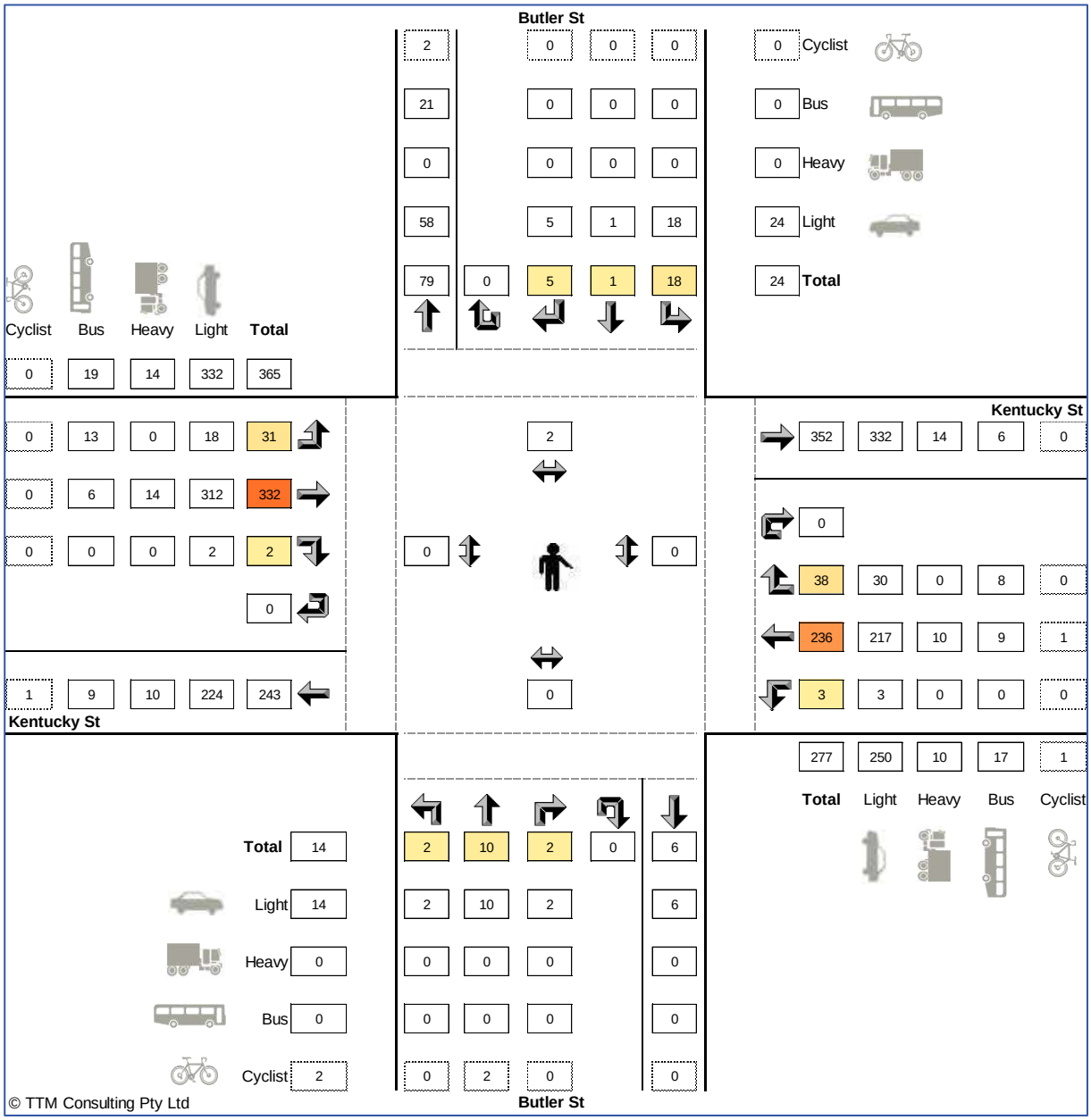
7.4 Railway crossings

The conditions of pedestrian railway crossings along with their usage has been described in the report. It is recommended that a hazard assessment is undertaken for the facilities by the asset owner/operator. The crossing options may be reviewed as per the provided pedestrian crossing data.

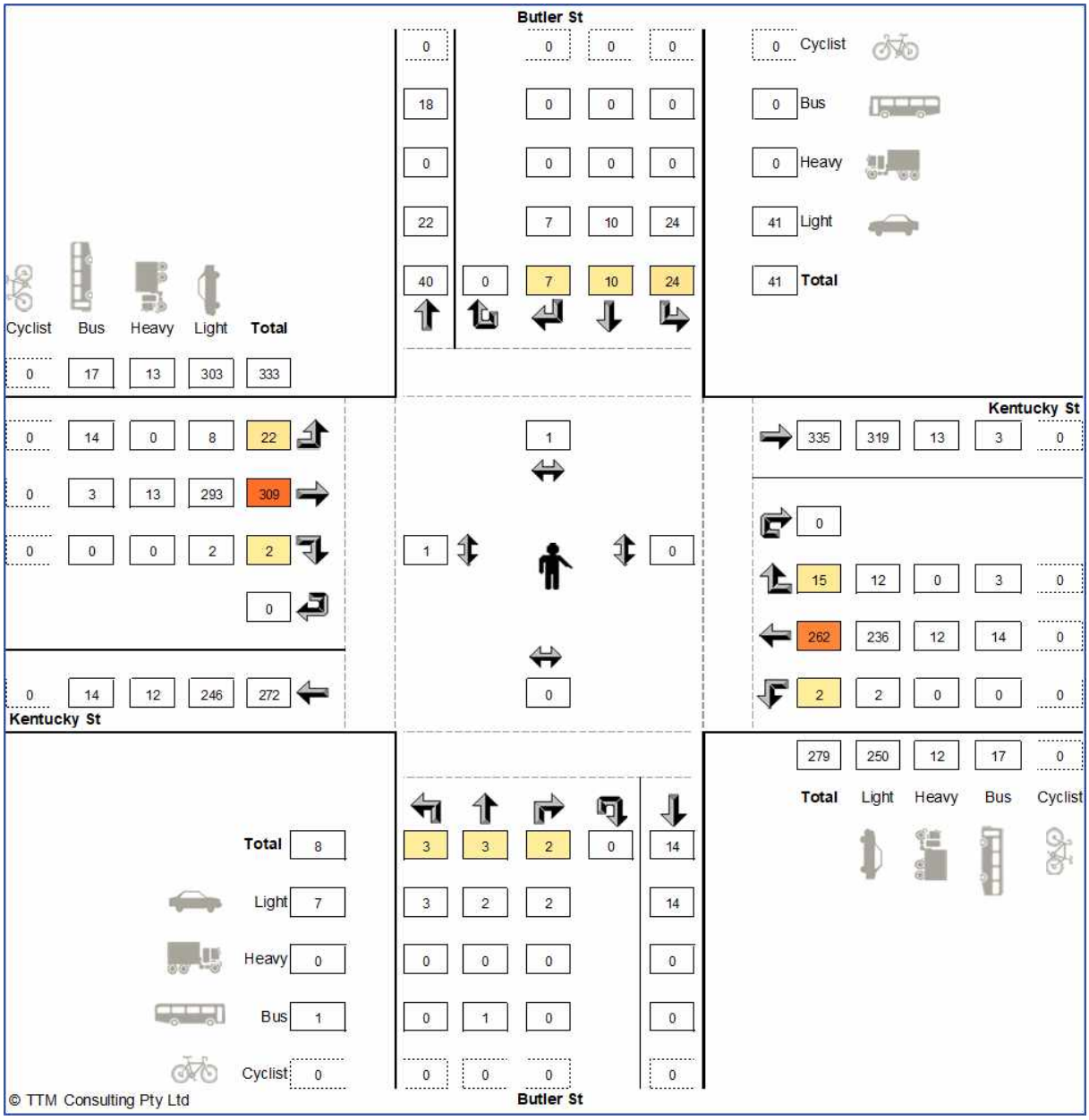
7.5 Conclusion

TTM see no traffic engineering reason why the relevant approvals should not be granted.

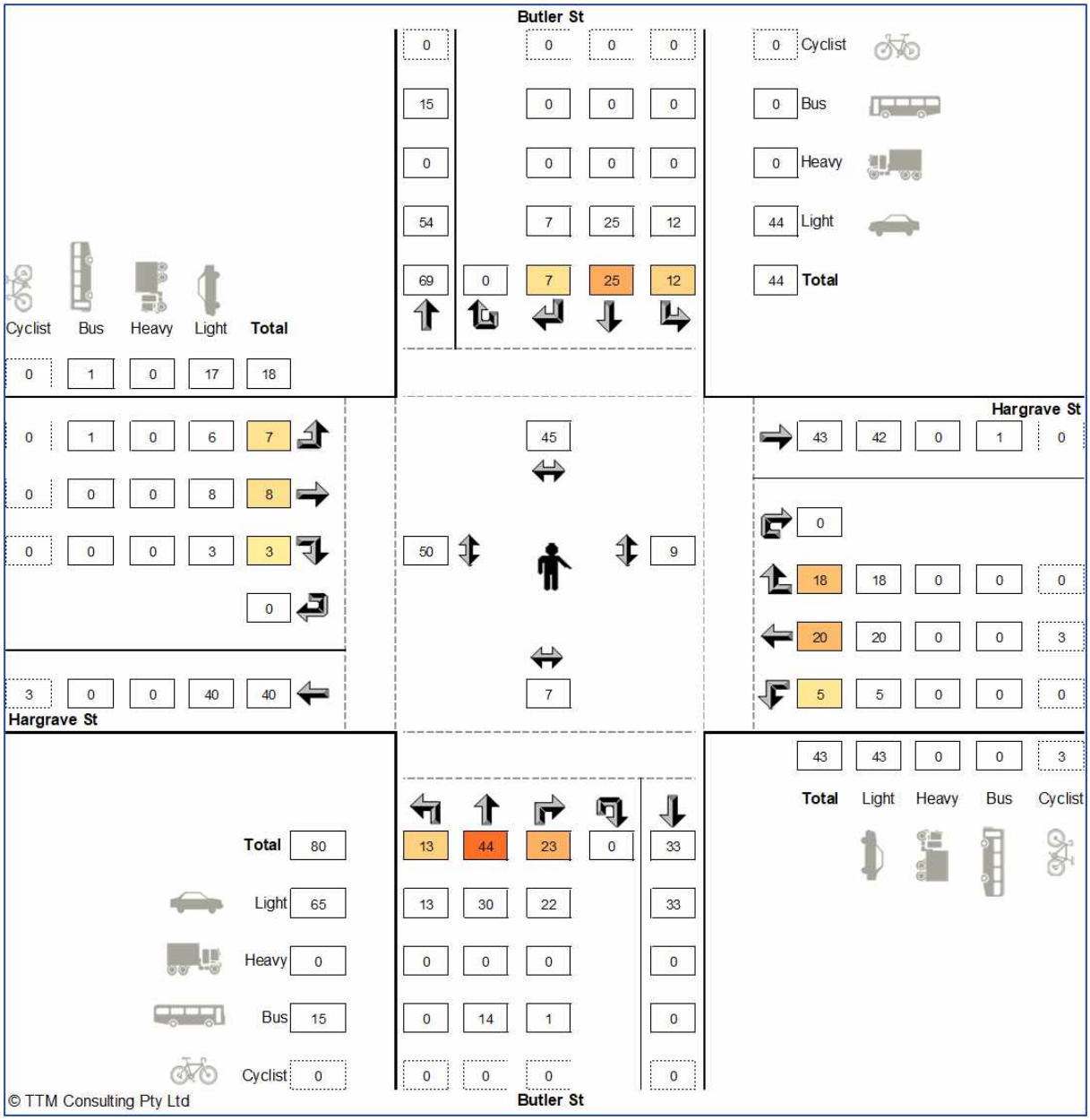
Appendix A Peak Hour Traffic Survey Data



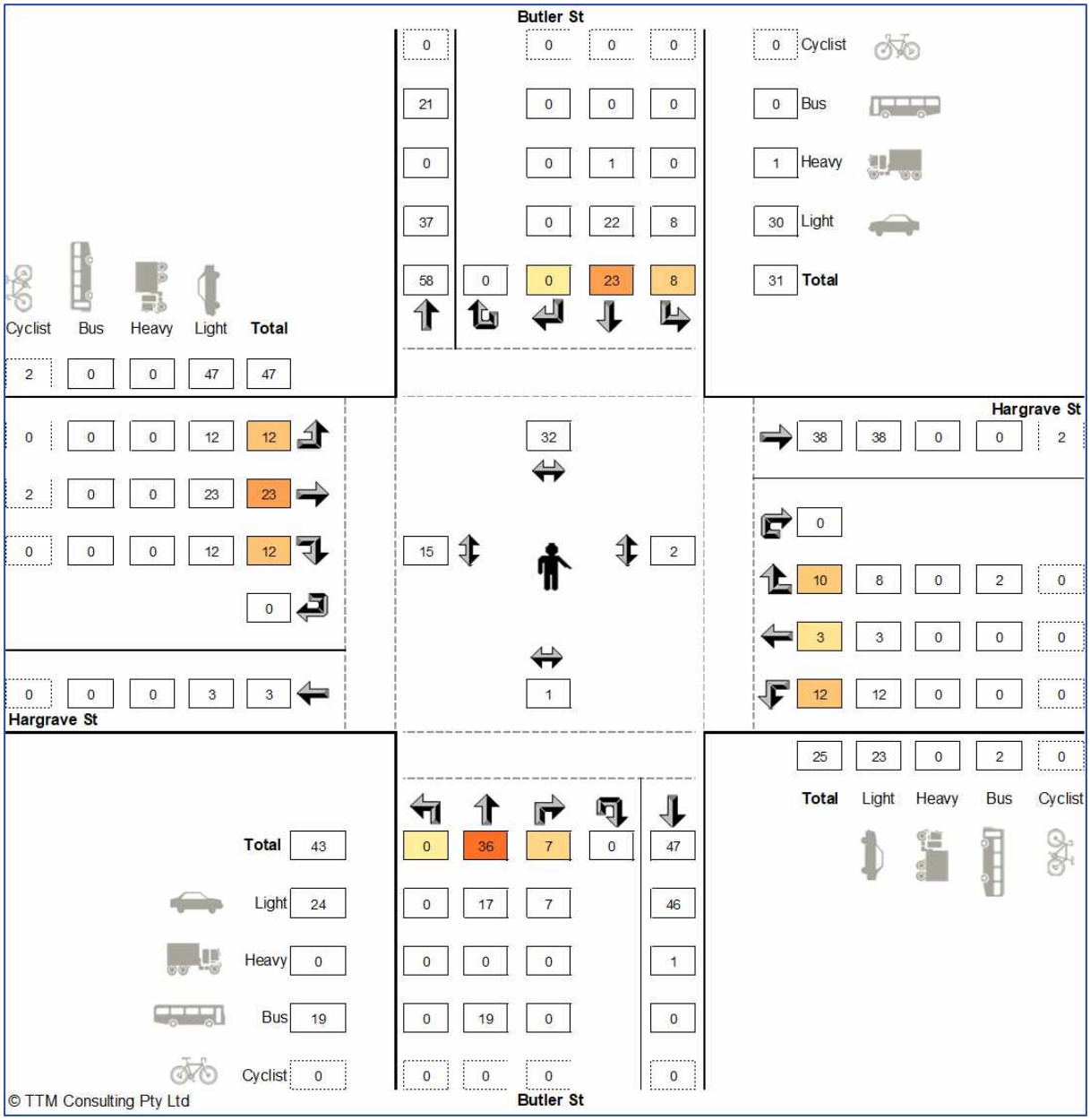
Morning School Peak – Kentucky Street / Butler Street intersection (8:00 to 9:00 am)



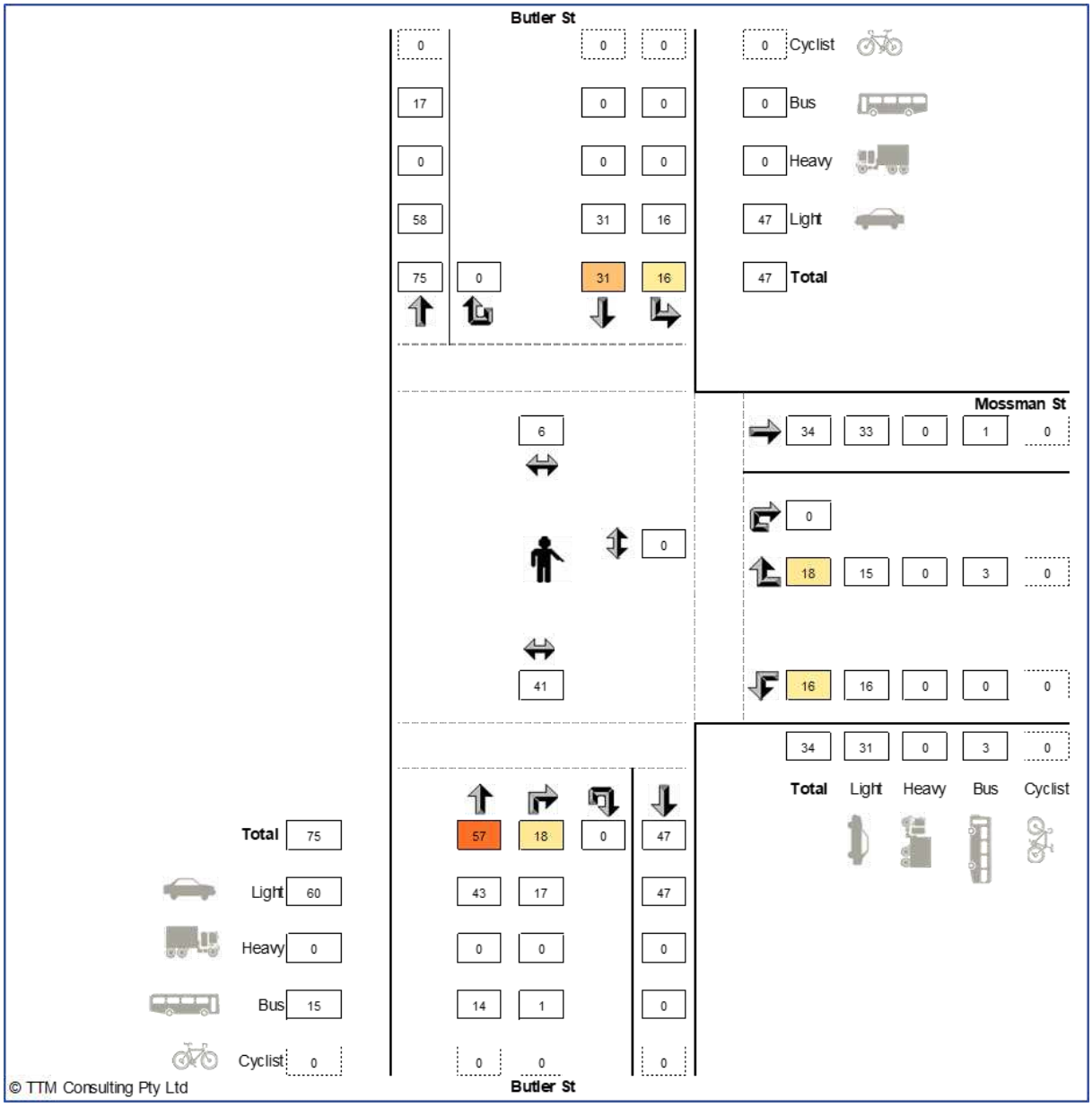
Afternoon School Peak – Kentucky Street / Butler Street intersection (3:00 to 4:00 pm)



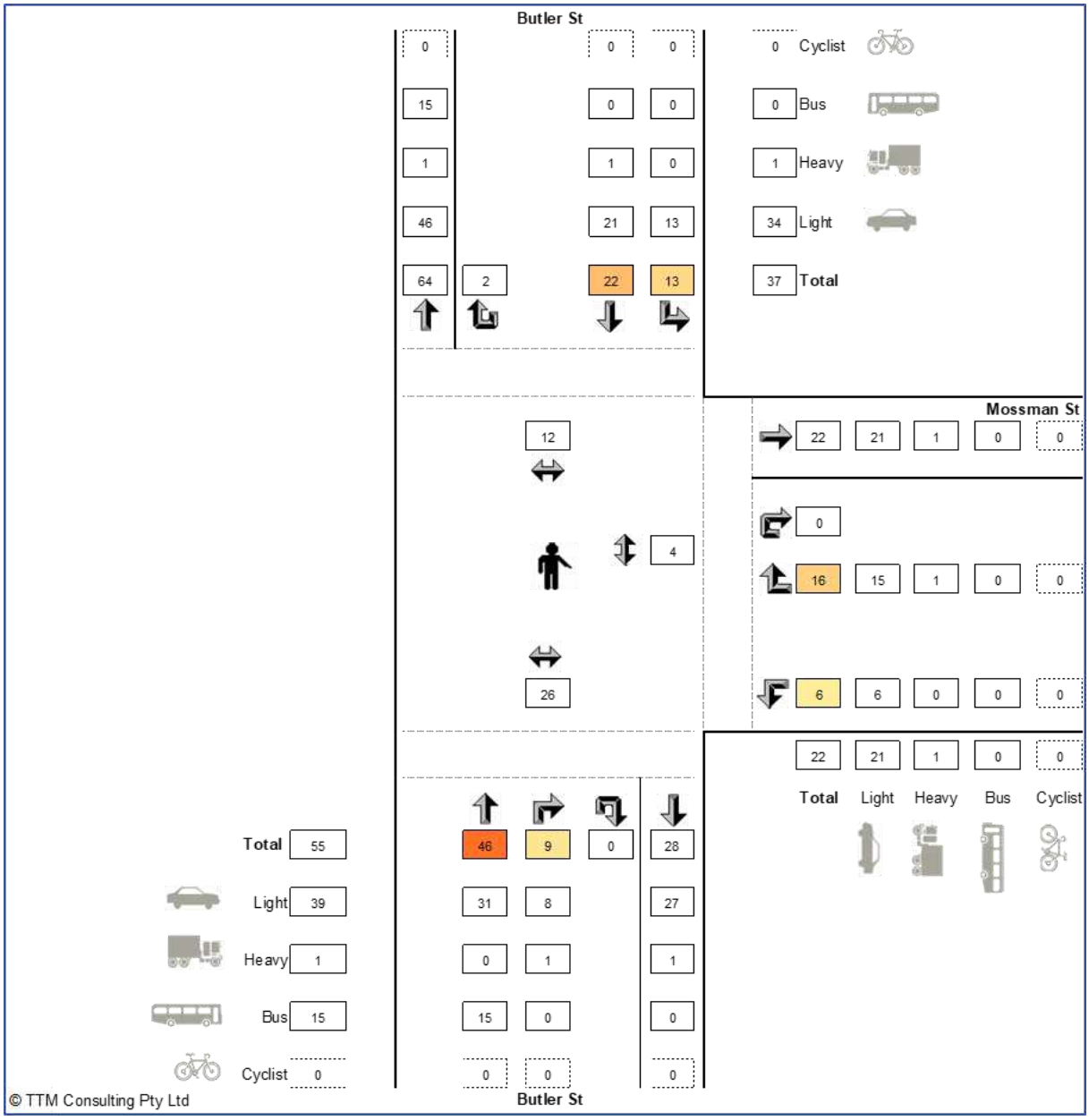
Morning School Peak – Butler Street / Hargrave Street intersection (8:15 to 9:15 am)



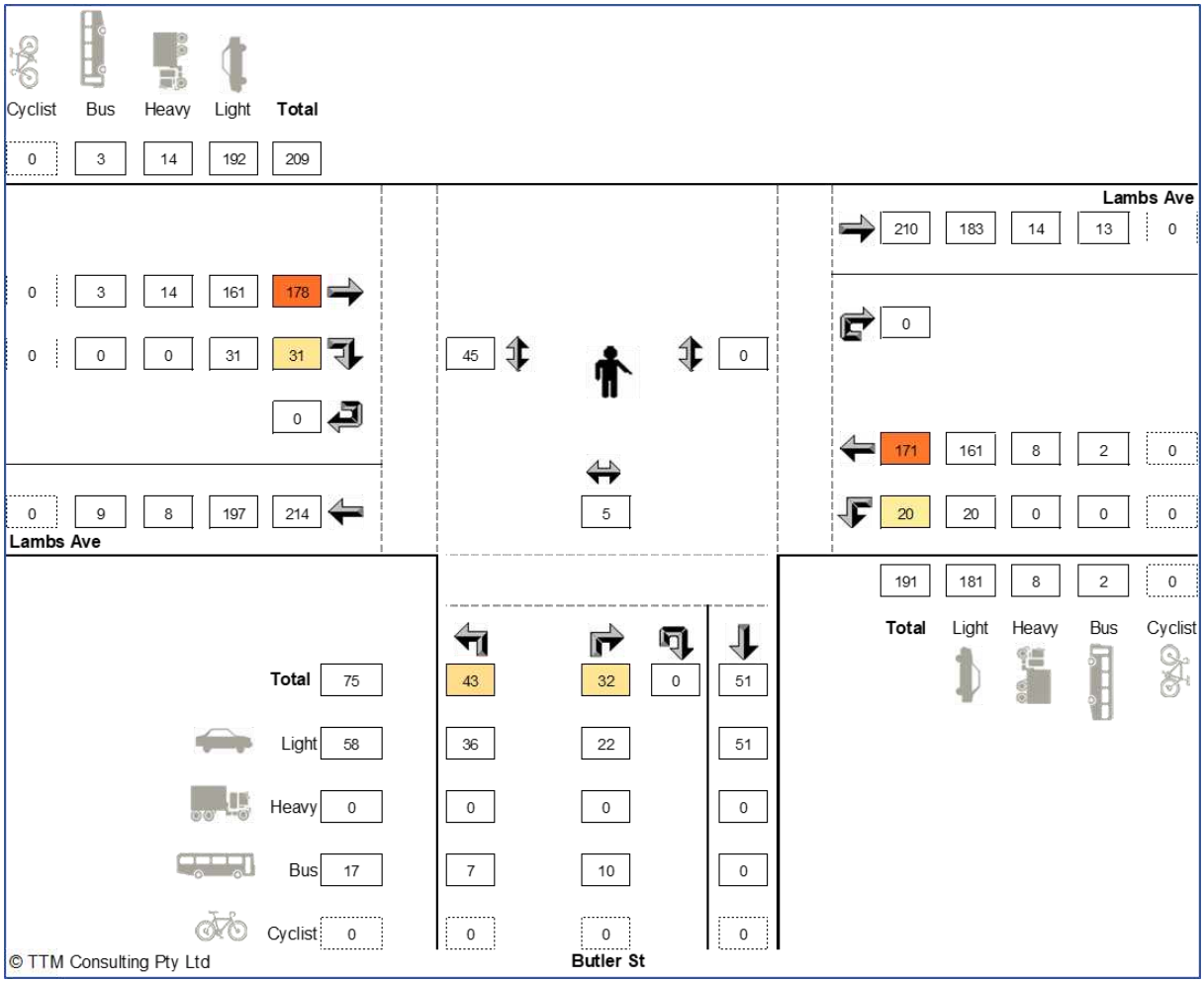
Afternoon School Peak – Butler Street / Hargrave Street intersection (3:15 to 4:15 pm)



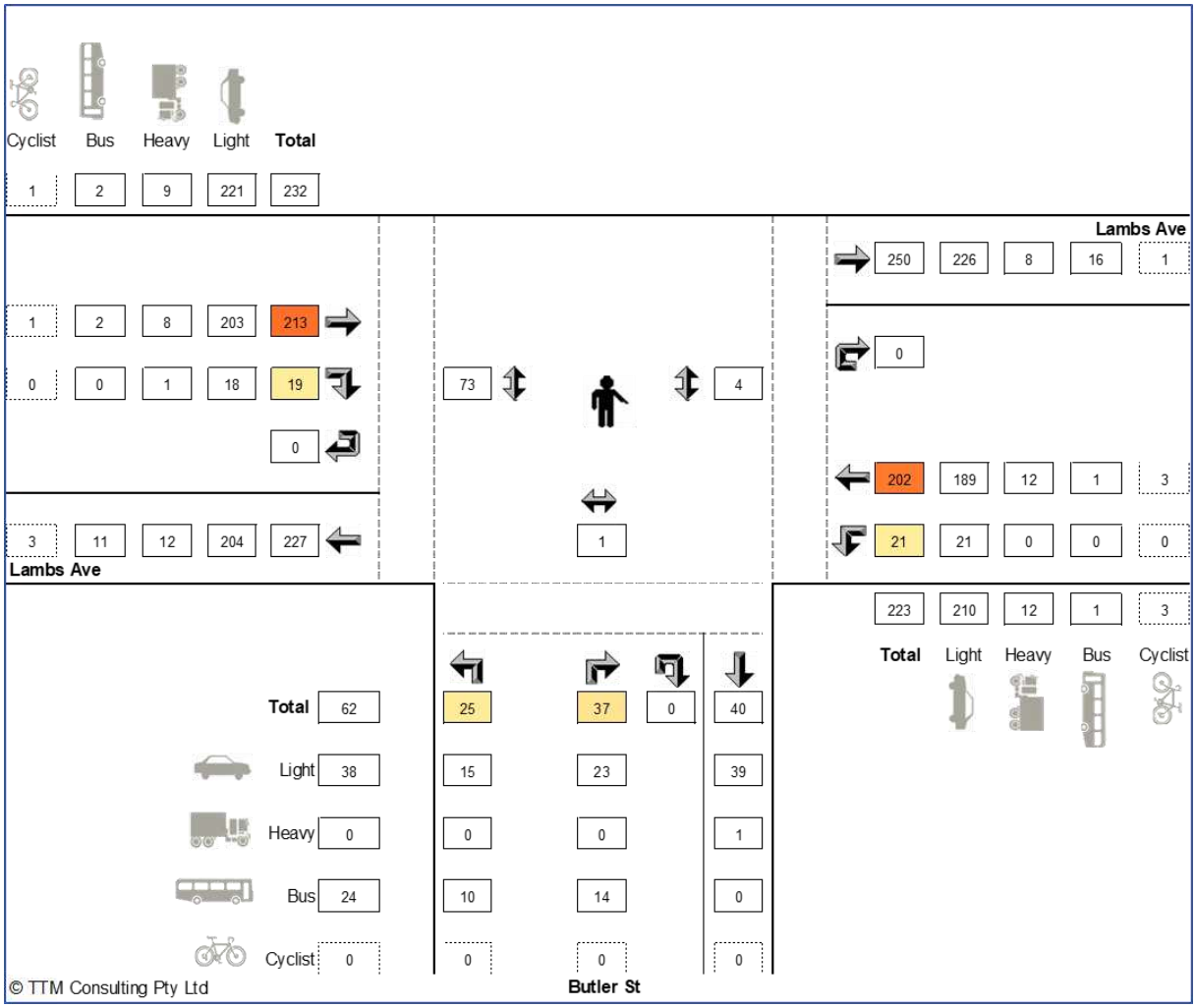
Morning School Peak – Butler Street / Mossman Street intersection (8:15 to 9:15 am)



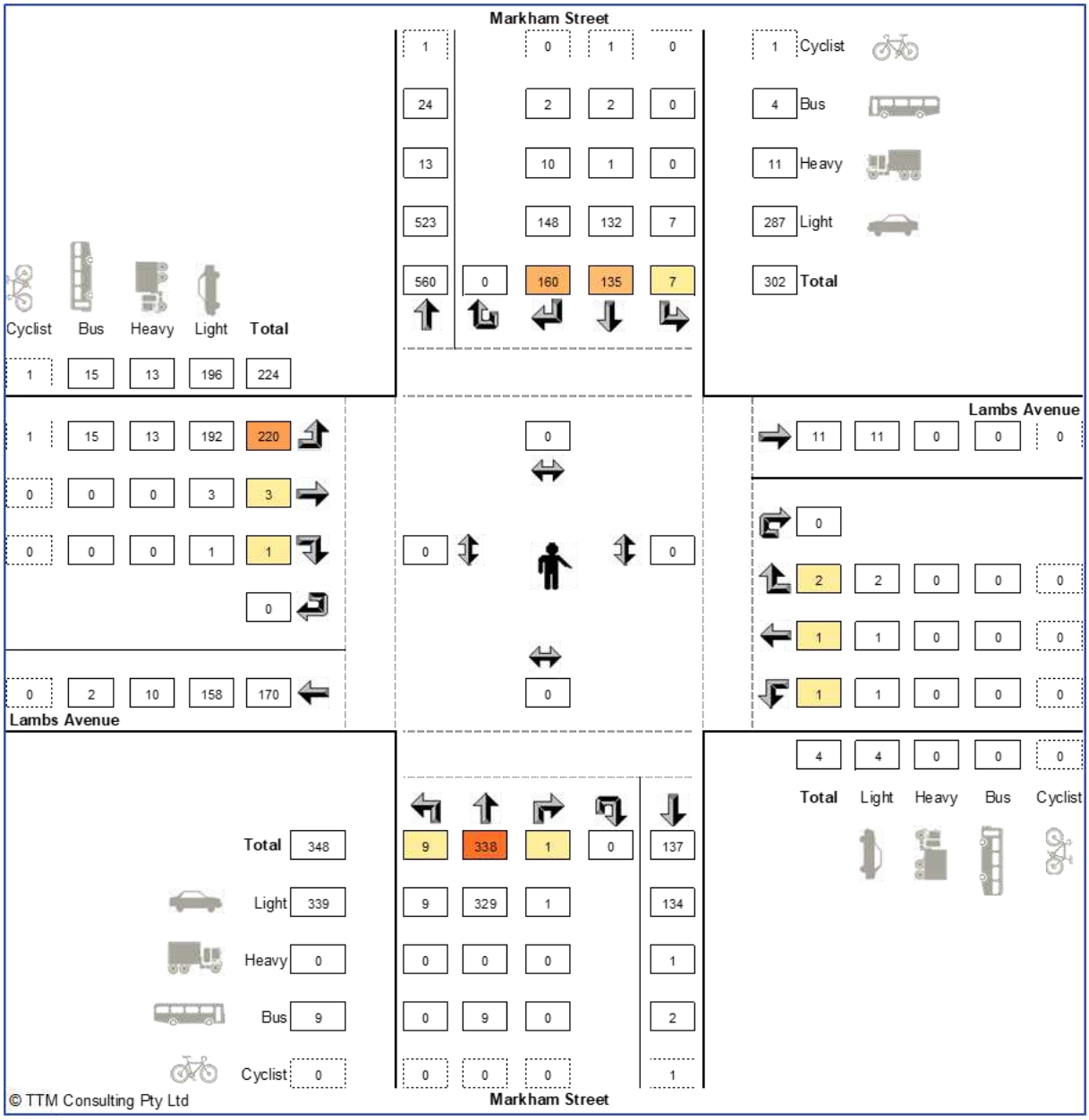
Afternoon School Peak – Butler Street / Mossman Street intersection (2:45 to 3:45 pm)



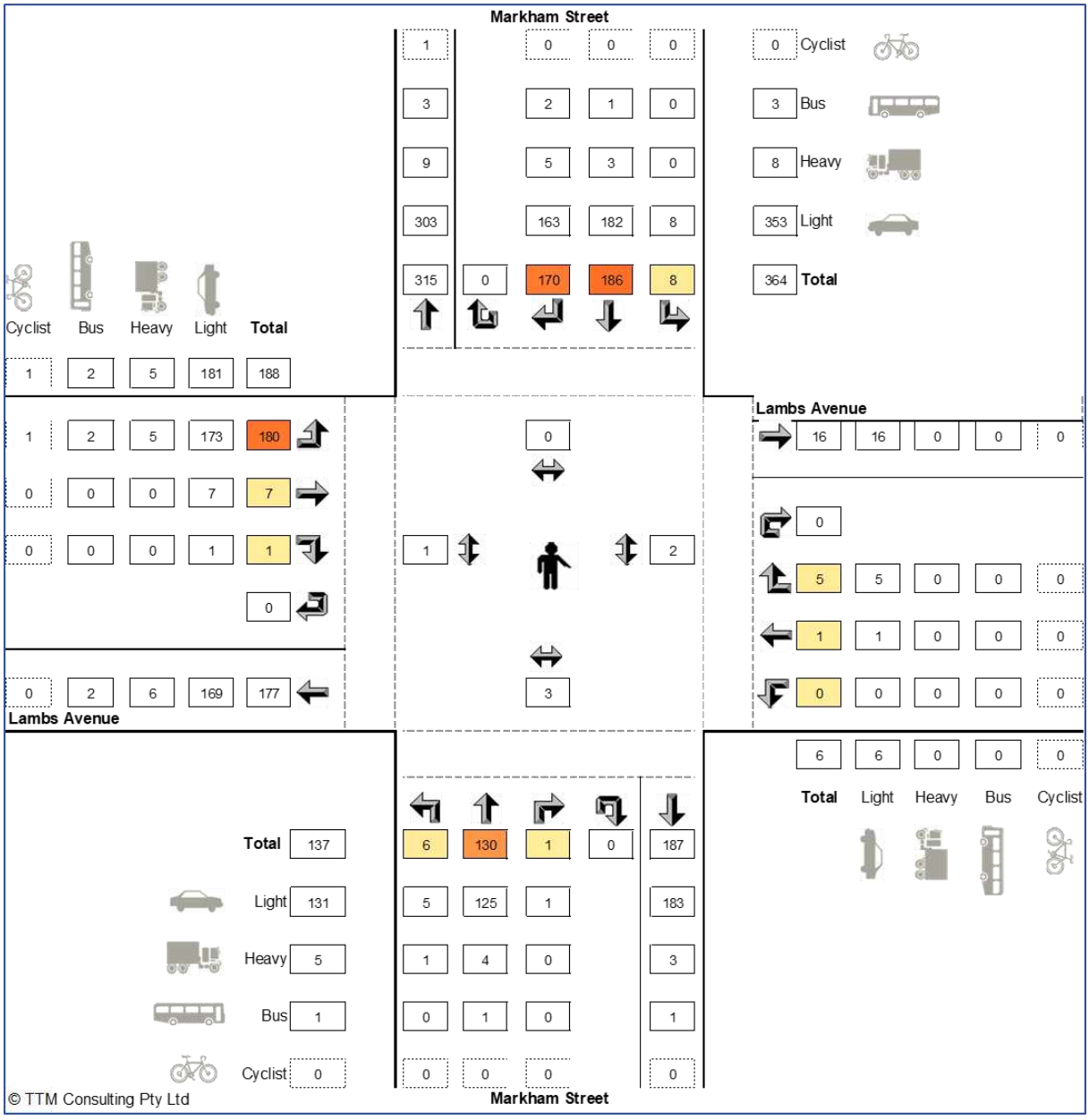
Morning School Peak – Butler Street / Lambs Avenue intersection (8:15 to 9:15 am)



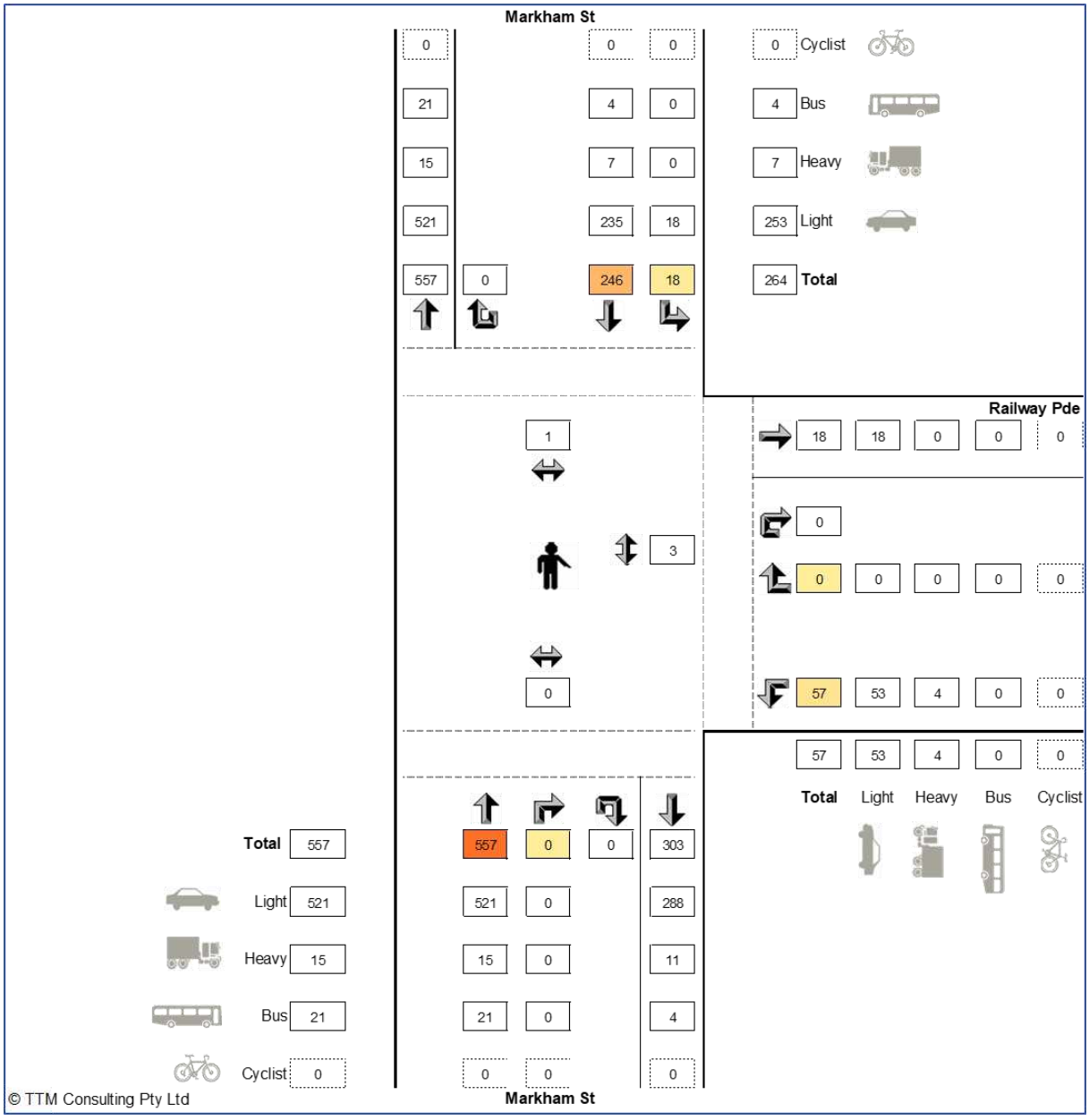
Afternoon School Peak – Butler Street / Mossman Street intersection (3:15 to 4:15 pm)



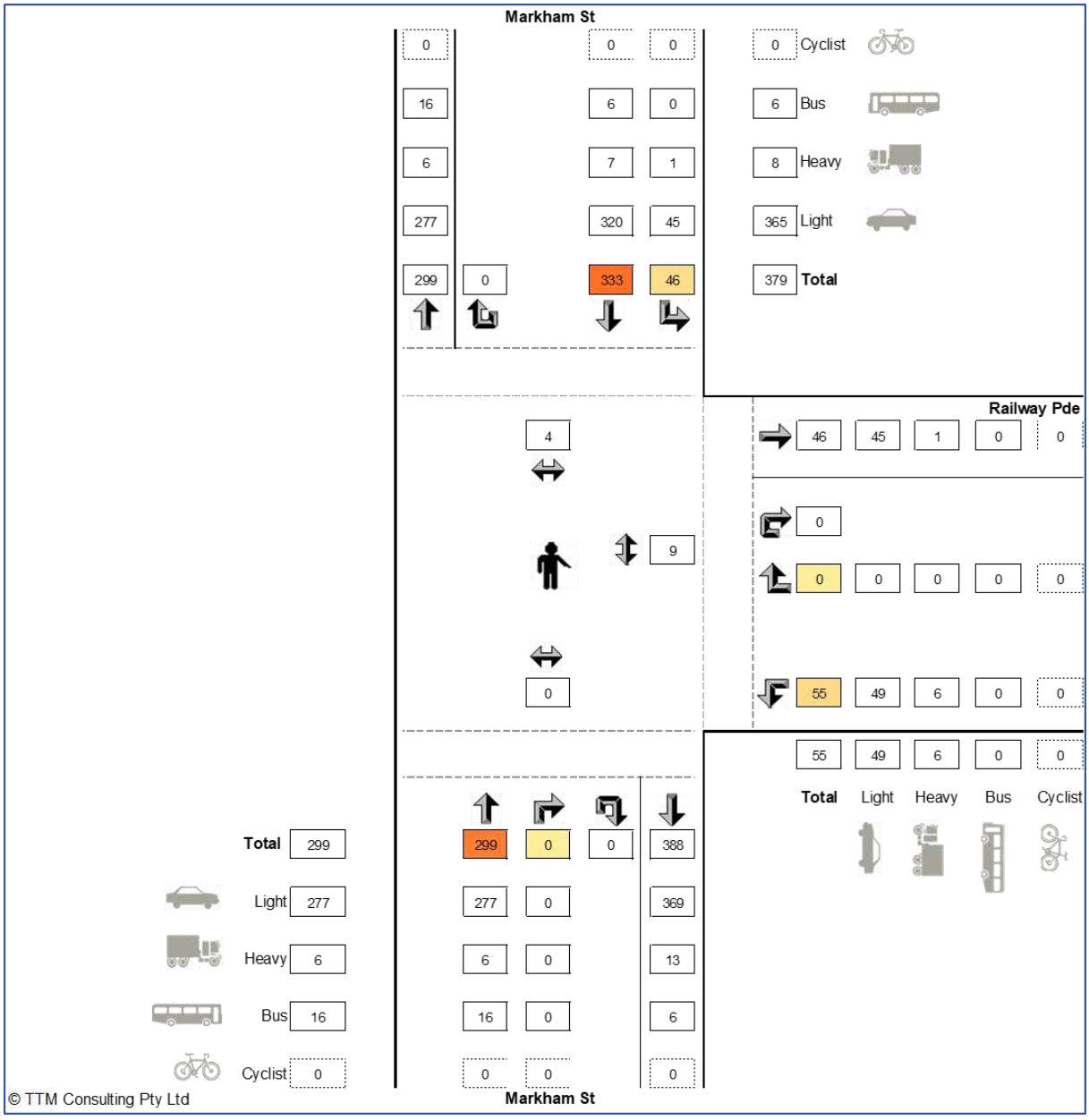
Morning School Peak – Markham Street / Lambs Avenue intersection (8:00 to 9:00 am)



Afternoon School Peak – Markham Street / Lambs Avenue intersection (4:00 to 5:00 pm)



Morning School Peak – Markham Street / Railway Parade (8:00 to 9:00 am)



Afternoon School Peak – Markham Street / Railway Parade intersection (3:15 to 4:15 pm)

Appendix B SIDRA Intersection Analysis

MOVEMENT SUMMARY

Site: 101 [Base Case: Kentucky - Butler St - Morning School Peak]

Base Case: Kentucky - Butler St
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	2	0.0	0.027	9.0	LOS A	0.1	0.6	0.52	0.95	49.6
2	T1	11	0.0	0.027	12.6	LOS A	0.1	0.6	0.52	0.95	49.4
3	R2	2	0.0	0.027	13.2	LOS A	0.1	0.6	0.52	0.95	49.2
Approach		15	0.0	0.027	12.2	LOS A	0.1	0.6	0.52	0.95	49.4
East: Kentucky Street East											
4	L2	3	0.0	0.176	7.6	LOS A	0.5	3.5	0.19	0.09	57.0
5	T1	248	8.1	0.176	0.5	LOS A	0.5	3.5	0.19	0.09	58.5
6	R2	40	21.1	0.176	7.8	LOS A	0.5	3.5	0.19	0.09	55.9
Approach		292	9.7	0.176	1.6	NA	0.5	3.5	0.19	0.09	58.1
North: Butler Street North											
7	L2	19	0.0	0.034	9.6	LOS A	0.1	0.8	0.46	0.88	50.6
8	T1	1	0.0	0.034	12.4	LOS A	0.1	0.8	0.46	0.88	50.4
9	R2	5	0.0	0.034	13.5	LOS A	0.1	0.8	0.46	0.88	50.2
Approach		25	0.0	0.034	10.5	LOS A	0.1	0.8	0.46	0.88	50.5
West: Kentucky Street West											
10	L2	33	41.9	0.211	6.0	LOS A	0.0	0.2	0.01	0.05	57.1
11	T1	349	6.0	0.211	0.0	LOS A	0.0	0.2	0.01	0.05	59.6
12	R2	2	0.0	0.211	6.5	LOS A	0.0	0.2	0.01	0.05	57.4
Approach		384	9.0	0.211	0.6	NA	0.0	0.2	0.01	0.05	59.4
All Vehicles		716	8.8	0.211	1.6	NA	0.5	3.5	0.11	0.12	58.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Base Case: Kentucky - Butler St - Evening School Peak]

Base Case: Kentucky - Butler St
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	3	0.0	0.016	9.2	LOS A	0.1	0.4	0.50	0.90	49.7
2	T1	3	33.3	0.016	15.3	LOS B	0.1	0.4	0.50	0.90	49.2
3	R2	2	0.0	0.016	12.9	LOS A	0.1	0.4	0.50	0.90	49.2
Approach		8	12.5	0.016	12.4	LOS A	0.1	0.4	0.50	0.90	49.4
East: Kentucky Street East											
4	L2	2	0.0	0.167	7.3	LOS A	0.2	1.4	0.07	0.04	57.8
5	T1	276	9.9	0.167	0.2	LOS A	0.2	1.4	0.07	0.04	59.4
6	R2	16	20.0	0.167	7.5	LOS A	0.2	1.4	0.07	0.04	56.7
Approach		294	10.4	0.167	0.6	NA	0.2	1.4	0.07	0.04	59.2
North: Butler Street North											
7	L2	25	0.0	0.060	9.5	LOS A	0.2	1.5	0.47	0.92	50.5
8	T1	11	0.0	0.060	12.2	LOS A	0.2	1.5	0.47	0.92	50.2
9	R2	7	0.0	0.060	13.1	LOS A	0.2	1.5	0.47	0.92	50.0
Approach		43	0.0	0.060	10.8	LOS A	0.2	1.5	0.47	0.92	50.3
West: Kentucky Street West											
10	L2	23	63.6	0.192	6.3	LOS A	0.0	0.2	0.01	0.04	56.7
11	T1	325	5.2	0.192	0.0	LOS A	0.0	0.2	0.01	0.04	59.8
12	R2	2	0.0	0.192	6.6	LOS A	0.0	0.2	0.01	0.04	57.5
Approach		351	9.0	0.192	0.5	NA	0.0	0.2	0.01	0.04	59.6
All Vehicles		696	9.1	0.192	1.3	NA	0.2	1.5	0.07	0.10	58.6

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.

MOVEMENT SUMMARY

Site: 101 [Base Case: Butler - Hargrave St - Morning School Peak]

Base Case: Butler - Hargrave St
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	14	0.0	0.049	5.6	LOS A	0.1	1.2	0.08	0.26	55.5
2	T1	46	31.8	0.049	0.0	LOS A	0.1	1.2	0.08	0.26	56.9
3	R2	24	4.3	0.049	5.6	LOS A	0.1	1.2	0.08	0.26	54.9
Approach		84	18.8	0.049	2.6	NA	0.1	1.2	0.08	0.26	56.1
East: Hargrave Street East											
4	L2	5	0.0	0.040	5.6	LOS A	0.1	1.0	0.16	0.55	53.7
5	T1	21	0.0	0.040	4.6	LOS A	0.1	1.0	0.16	0.55	53.8
6	R2	19	0.0	0.040	6.1	LOS A	0.1	1.0	0.16	0.55	53.1
Approach		45	0.0	0.040	5.3	LOS A	0.1	1.0	0.16	0.55	53.5
North: Butler Street North											
7	L2	13	0.0	0.025	5.6	LOS A	0.1	0.4	0.07	0.24	56.0
8	T1	26	0.0	0.025	0.1	LOS A	0.1	0.4	0.07	0.24	57.5
9	R2	7	0.0	0.025	5.6	LOS A	0.1	0.4	0.07	0.24	55.4
Approach		46	0.0	0.025	2.5	NA	0.1	0.4	0.07	0.24	56.7
West: Hargrave Street West											
10	L2	7	14.3	0.015	5.8	LOS A	0.1	0.4	0.16	0.53	53.6
11	T1	8	0.0	0.015	4.6	LOS A	0.1	0.4	0.16	0.53	53.8
12	R2	3	0.0	0.015	6.1	LOS A	0.1	0.4	0.16	0.53	53.1
Approach		19	5.6	0.015	5.3	LOS A	0.1	0.4	0.16	0.53	53.6
All Vehicles		195	8.6	0.049	3.4	NA	0.1	1.2	0.10	0.35	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: 101 [Base Case: Butler - Hargrave St - Evening School Peak]

Base Case: Butler - Hargrave St
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	1	0.0	0.030	5.6	LOS A	0.0	0.4	0.04	0.11	56.6
2	T1	38	52.8	0.030	0.0	LOS A	0.0	0.4	0.04	0.11	58.2
3	R2	7	0.0	0.030	5.5	LOS A	0.0	0.4	0.04	0.11	56.0
Approach		46	43.2	0.030	1.0	NA	0.0	0.4	0.04	0.11	57.8
East: Hargrave Street East											
4	L2	13	0.0	0.022	5.6	LOS A	0.1	0.6	0.09	0.56	53.5
5	T1	3	0.0	0.022	4.4	LOS A	0.1	0.6	0.09	0.56	53.7
6	R2	11	20.0	0.022	6.3	LOS A	0.1	0.6	0.09	0.56	52.8
Approach		26	8.0	0.022	5.7	LOS A	0.1	0.6	0.09	0.56	53.2
North: Butler Street North											
7	L2	8	0.0	0.018	5.6	LOS A	0.0	0.1	0.01	0.17	56.9
8	T1	24	4.3	0.018	0.0	LOS A	0.0	0.1	0.01	0.17	58.4
9	R2	1	0.0	0.018	5.6	LOS A	0.0	0.1	0.01	0.17	56.3
Approach		34	3.1	0.018	1.6	NA	0.0	0.1	0.01	0.17	57.9
West: Hargrave Street West											
10	L2	13	0.0	0.040	5.7	LOS A	0.1	1.0	0.15	0.53	53.7
11	T1	24	0.0	0.040	4.5	LOS A	0.1	1.0	0.15	0.53	53.9
12	R2	13	0.0	0.040	5.9	LOS A	0.1	1.0	0.15	0.53	53.2
Approach		49	0.0	0.040	5.1	LOS A	0.1	1.0	0.15	0.53	53.7
All Vehicles		156	14.9	0.040	3.2	NA	0.1	1.0	0.08	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: 101 [Base Case: Butler - Mossman St - Morning School Peak]

Base Case: Butler - Mossman St
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
2	T1	60	24.6	0.046	0.0	LOS A	0.1	0.9	0.07	0.14	58.2
3	R2	19	5.6	0.046	5.6	LOS A	0.1	0.9	0.07	0.14	56.1
Approach		79	20.0	0.046	1.4	NA	0.1	0.9	0.07	0.14	57.7
East: Mossman Street East											
4	L2	17	0.0	0.029	5.6	LOS A	0.1	0.7	0.11	0.56	53.3
6	R2	19	16.7	0.029	6.1	LOS A	0.1	0.7	0.11	0.56	52.7
Approach		36	8.8	0.029	5.9	LOS A	0.1	0.7	0.11	0.56	53.0
North: Butler Street North											
7	L2	17	0.0	0.026	5.5	LOS A	0.0	0.0	0.00	0.20	56.7
8	T1	33	0.0	0.026	0.0	LOS A	0.0	0.0	0.00	0.20	58.2
Approach		49	0.0	0.026	1.9	NA	0.0	0.0	0.00	0.20	57.7
All Vehicles		164	11.5	0.046	2.5	NA	0.1	0.9	0.06	0.25	56.6

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.

MOVEMENT SUMMARY

Site: 101 [Base Case: Butler - Mossman St - Evening School Peak]

Base Case: Butler - Mossman St
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
2	T1	48	32.6	0.036	0.0	LOS A	0.1	0.5	0.04	0.10	58.8
3	R2	9	11.1	0.036	5.7	LOS A	0.1	0.5	0.04	0.10	56.5
Approach		58	29.1	0.036	0.9	NA	0.1	0.5	0.04	0.10	58.4
East: Mossman Street East											
4	L2	6	0.0	0.019	5.6	LOS A	0.1	0.5	0.10	0.57	53.4
6	R2	17	6.3	0.019	5.8	LOS A	0.1	0.5	0.10	0.57	52.5
Approach		23	4.5	0.019	5.8	LOS A	0.1	0.5	0.10	0.57	52.8
North: Butler Street North											
7	L2	14	0.0	0.020	5.5	LOS A	0.0	0.0	0.00	0.22	56.4
8	T1	23	4.5	0.020	0.0	LOS A	0.0	0.0	0.00	0.22	58.0
Approach		37	2.9	0.020	2.1	NA	0.0	0.0	0.00	0.22	57.4
All Vehicles		118	16.1	0.036	2.2	NA	0.1	0.5	0.04	0.23	56.9

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Base Case: Butler - Lambs Av - Morning School Peak]

Base Case: Butler - Lambs Av
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	45	16.3	0.083	6.4	LOS A	0.3	2.5	0.33	0.61	52.4
3	R2	34	31.3	0.083	8.2	LOS A	0.3	2.5	0.33	0.61	51.8
Approach		79	22.7	0.083	7.2	LOS A	0.3	2.5	0.33	0.61	52.1
East: Lambs Av East											
4	L2	21	0.0	0.107	5.6	LOS A	0.0	0.0	0.00	0.06	57.8
5	T1	180	5.8	0.107	0.0	LOS A	0.0	0.0	0.00	0.06	59.4
Approach		201	5.2	0.107	0.6	NA	0.0	0.0	0.00	0.06	59.2
West: Lambs Av West											
11	T1	187	9.6	0.124	0.2	LOS A	0.2	1.8	0.11	0.09	58.7
12	R2	33	0.0	0.124	6.2	LOS A	0.2	1.8	0.11	0.09	56.5
Approach		220	8.1	0.124	1.0	NA	0.2	1.8	0.11	0.09	58.4
All Vehicles		500	9.3	0.124	1.8	NA	0.3	2.5	0.10	0.16	57.6

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.

MOVEMENT SUMMARY

Site: 101 [Base Case: Butler - Lambs Av - Evening School Peak]

Base Case: Butler - Lambs Av
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	26	48.0	0.087	7.1	LOS A	0.3	2.9	0.40	0.67	51.5
3	R2	39	37.8	0.087	8.9	LOS A	0.3	2.9	0.40	0.67	51.1
Approach		65	41.9	0.087	8.2	LOS A	0.3	2.9	0.40	0.67	51.3
East: Lambs Av East											
4	L2	22	0.0	0.126	5.6	LOS A	0.0	0.0	0.00	0.06	57.8
5	T1	213	6.4	0.126	0.0	LOS A	0.0	0.0	0.00	0.06	59.4
Approach		235	5.8	0.126	0.5	NA	0.0	0.0	0.00	0.06	59.3
West: Lambs Av West											
11	T1	224	4.7	0.133	0.1	LOS A	0.2	1.2	0.07	0.05	59.3
12	R2	20	5.3	0.133	6.4	LOS A	0.2	1.2	0.07	0.05	56.8
Approach		244	4.7	0.133	0.6	NA	0.2	1.2	0.07	0.05	59.0
All Vehicles		544	9.7	0.133	1.5	NA	0.3	2.9	0.08	0.13	58.1

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: 101 [Base Case: Markham - Lambs Avenue - Morning School Peak]

Base Case: Markham - Lambs Avenue
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Markham Street											
1	L2	9	0.0	0.188	5.6	LOS A	0.0	0.1	0.00	0.02	58.2
2	T1	356	0.0	0.188	0.0	LOS A	0.0	0.1	0.00	0.02	59.8
3	R2	1	0.0	0.188	6.0	LOS A	0.0	0.1	0.00	0.02	57.6
Approach		366	0.0	0.188	0.2	NA	0.0	0.1	0.00	0.02	59.8
East: Lambs Avenue											
4	L2	1	0.0	0.006	5.9	LOS A	0.0	0.1	0.39	0.61	51.5
5	T1	1	0.0	0.006	7.6	LOS A	0.0	0.1	0.39	0.61	51.7
6	R2	2	0.0	0.006	9.8	LOS A	0.0	0.1	0.39	0.61	51.0
Approach		4	0.0	0.006	8.3	LOS A	0.0	0.1	0.39	0.61	51.3
North: Markham Street											
7	L2	7	0.0	0.221	7.2	LOS A	1.2	8.7	0.45	0.37	54.2
8	T1	142	2.2	0.221	1.4	LOS A	1.2	8.7	0.45	0.37	55.7
9	R2	168	7.5	0.221	7.2	LOS A	1.2	8.7	0.45	0.37	53.4
Approach		318	5.0	0.221	4.6	NA	1.2	8.7	0.45	0.37	54.4
West: Lambs Avenue											
10	L2	232	12.7	0.222	7.4	LOS A	1.0	7.4	0.46	0.66	52.5
11	T1	3	0.0	0.222	8.6	LOS A	1.0	7.4	0.46	0.66	52.2
12	R2	1	0.0	0.222	11.1	LOS A	1.0	7.4	0.46	0.66	51.6
Approach		236	12.5	0.222	7.4	LOS A	1.0	7.4	0.46	0.66	52.4
All Vehicles		924	4.9	0.222	3.6	NA	1.2	8.7	0.28	0.30	55.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Base Case: Markham - Lambs Avenue - Evening School Peak]

Base Case: Markham - Lambs Avenue
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Markham Street											
1	L2	6	16.7	0.076	5.8	LOS A	0.0	0.1	0.01	0.03	57.4
2	T1	137	3.8	0.076	0.0	LOS A	0.0	0.1	0.01	0.03	59.7
3	R2	1	0.0	0.076	6.1	LOS A	0.0	0.1	0.01	0.03	57.5
Approach		144	4.4	0.076	0.3	NA	0.0	0.1	0.01	0.03	59.6
East: Lambs Avenue											
4	L2	1	0.0	0.011	6.1	LOS A	0.0	0.2	0.43	0.64	51.8
5	T1	1	0.0	0.011	6.6	LOS A	0.0	0.2	0.43	0.64	51.9
6	R2	5	0.0	0.011	8.6	LOS A	0.0	0.2	0.43	0.64	51.3
Approach		7	0.0	0.011	7.9	LOS A	0.0	0.2	0.43	0.64	51.5
North: Markham Street											
7	L2	8	0.0	0.225	6.1	LOS A	1.1	8.1	0.26	0.28	55.1
8	T1	196	2.2	0.225	0.4	LOS A	1.1	8.1	0.26	0.28	56.6
9	R2	179	4.1	0.225	6.1	LOS A	1.1	8.1	0.26	0.28	54.4
Approach		383	3.0	0.225	3.2	NA	1.1	8.1	0.26	0.28	55.5
West: Lambs Avenue											
10	L2	189	3.9	0.145	6.1	LOS A	0.6	4.5	0.26	0.54	53.3
11	T1	7	0.0	0.145	7.2	LOS A	0.6	4.5	0.26	0.54	52.9
12	R2	1	0.0	0.145	9.2	LOS A	0.6	4.5	0.26	0.54	52.3
Approach		198	3.7	0.145	6.2	LOS A	0.6	4.5	0.26	0.54	53.3
All Vehicles		733	3.4	0.225	3.5	NA	1.1	8.1	0.21	0.31	55.6

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.

MOVEMENT SUMMARY

Site: 101 [Base Case: Markham - Railway Parade - Morning School Peak]

Base Case: Markham - Railway Parade
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Markham Street											
2	T1	586	6.5	0.313	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		586	6.5	0.313	0.0	NA	0.0	0.0	0.00	0.00	59.9
East: Railway Parade											
4	L2	60	7.0	0.048	6.6	LOS A	0.2	1.4	0.34	0.57	52.8
Approach		60	7.0	0.048	6.6	LOS A	0.2	1.4	0.34	0.57	52.8
North: Markham Street											
7	L2	19	0.0	0.147	5.6	LOS A	0.0	0.0	0.00	0.04	58.0
8	T1	259	4.5	0.147	0.0	LOS A	0.0	0.0	0.00	0.04	59.6
Approach		278	4.2	0.147	0.4	NA	0.0	0.0	0.00	0.04	59.5
All Vehicles		924	5.8	0.313	0.6	NA	0.2	1.4	0.02	0.05	59.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Base Case: Markham - Railway Parade - Evening School Peak]

Base Case: Markham - Railway Parade
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Markham Street											
2	T1	315	7.4	0.169	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		315	7.4	0.169	0.0	NA	0.0	0.0	0.00	0.00	60.0
East: Railway Parade											
4	L2	58	10.9	0.053	7.1	LOS A	0.2	1.6	0.41	0.60	52.4
Approach		58	10.9	0.053	7.1	LOS A	0.2	1.6	0.41	0.60	52.4
North: Markham Street											
7	L2	48	2.2	0.211	5.6	LOS A	0.0	0.0	0.00	0.07	57.6
8	T1	351	3.9	0.211	0.0	LOS A	0.0	0.0	0.00	0.07	59.3
Approach		399	3.7	0.211	0.7	NA	0.0	0.0	0.00	0.07	59.1
All Vehicles		772	5.7	0.211	0.9	NA	0.2	1.6	0.03	0.08	58.9

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Scenario 1 (Redeveloped School): Kentucky - Butler St - Morning School Peak]

Scenario 1 (Redeveloped School): Kentucky - Butler St
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	2	0.0	0.029	9.0	LOS A	0.1	0.7	0.54	0.96	49.4
2	T1	11	0.0	0.029	13.1	LOS A	0.1	0.7	0.54	0.96	49.1
3	R2	2	0.0	0.029	13.8	LOS A	0.1	0.7	0.54	0.96	48.9
Approach		15	0.0	0.029	12.6	LOS A	0.1	0.7	0.54	0.96	49.1
East: Kentucky Street East											
4	L2	3	0.0	0.215	7.5	LOS A	0.9	6.4	0.31	0.18	55.9
5	T1	248	8.1	0.215	0.9	LOS A	0.9	6.4	0.31	0.18	57.4
6	R2	87	9.6	0.215	7.5	LOS A	0.9	6.4	0.31	0.18	55.1
Approach		339	8.4	0.215	2.6	NA	0.9	6.4	0.31	0.18	56.8
North: Butler Street North											
7	L2	19	0.0	0.035	9.6	LOS A	0.1	0.8	0.46	0.89	50.5
8	T1	1	0.0	0.035	12.9	LOS A	0.1	0.8	0.46	0.89	50.3
9	R2	5	0.0	0.035	14.1	LOS A	0.1	0.8	0.46	0.89	50.1
Approach		25	0.0	0.035	10.7	LOS A	0.1	0.8	0.46	0.89	50.4
West: Kentucky Street West											
10	L2	33	41.9	0.211	6.0	LOS A	0.0	0.2	0.01	0.05	57.1
11	T1	349	6.0	0.211	0.0	LOS A	0.0	0.2	0.01	0.05	59.6
12	R2	2	0.0	0.211	6.5	LOS A	0.0	0.2	0.01	0.05	57.4
Approach		384	9.0	0.211	0.6	NA	0.0	0.2	0.01	0.05	59.4
All Vehicles		763	8.3	0.215	2.1	NA	0.9	6.4	0.17	0.15	57.6

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.

MOVEMENT SUMMARY

Site: 101 [Scenario 1 (Redeveloped School): Kentucky - Butler St - Evening School Peak]

Scenario 1 (Redeveloped School): Kentucky - Butler St
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	3	0.0	0.016	9.2	LOS A	0.1	0.4	0.50	0.90	49.5
2	T1	3	33.3	0.016	15.7	LOS B	0.1	0.4	0.50	0.90	49.0
3	R2	2	0.0	0.016	13.2	LOS A	0.1	0.4	0.50	0.90	49.1
Approach		8	12.5	0.016	12.6	LOS A	0.1	0.4	0.50	0.90	49.2
East: Kentucky Street East											
4	L2	2	0.0	0.186	7.2	LOS A	0.4	3.0	0.15	0.08	57.1
5	T1	276	9.9	0.186	0.3	LOS A	0.4	3.0	0.15	0.08	58.6
6	R2	40	7.9	0.186	7.2	LOS A	0.4	3.0	0.15	0.08	56.3
Approach		318	9.6	0.186	1.3	NA	0.4	3.0	0.15	0.08	58.3
North: Butler Street North											
7	L2	25	0.0	0.062	9.5	LOS A	0.2	1.5	0.47	0.92	50.4
8	T1	11	0.0	0.062	12.5	LOS A	0.2	1.5	0.47	0.92	50.1
9	R2	7	0.0	0.062	13.5	LOS A	0.2	1.5	0.47	0.92	49.9
Approach		43	0.0	0.062	10.9	LOS A	0.2	1.5	0.47	0.92	50.3
West: Kentucky Street West											
10	L2	23	63.6	0.192	6.3	LOS A	0.0	0.2	0.01	0.04	56.7
11	T1	325	5.2	0.192	0.0	LOS A	0.0	0.2	0.01	0.04	59.8
12	R2	2	0.0	0.192	6.6	LOS A	0.0	0.2	0.01	0.04	57.5
Approach		351	9.0	0.192	0.5	NA	0.0	0.2	0.01	0.04	59.6
All Vehicles		720	8.8	0.192	1.6	NA	0.4	3.0	0.10	0.12	58.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Scenario 1 (Redeveloped School): Butler - Hargrave St - Morning School Peak]

Scenario 1 (Redeveloped School): Butler - Hargrave St
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	20	0.0	0.079	6.0	LOS A	0.4	2.7	0.23	0.36	54.1
2	T1	46	31.8	0.079	0.3	LOS A	0.4	2.7	0.23	0.36	55.5
3	R2	65	1.6	0.079	5.9	LOS A	0.4	2.7	0.23	0.36	53.6
Approach		132	12.0	0.079	4.0	NA	0.4	2.7	0.23	0.36	54.3
East: Hargrave Street East											
4	L2	5	0.0	0.180	5.6	LOS A	0.7	4.7	0.31	0.63	52.8
5	T1	36	0.0	0.180	5.4	LOS A	0.7	4.7	0.31	0.63	52.9
6	R2	122	0.0	0.180	7.0	LOS A	0.7	4.7	0.31	0.63	52.3
Approach		163	0.0	0.180	6.6	LOS A	0.7	4.7	0.31	0.63	52.4
North: Butler Street North											
7	L2	116	0.0	0.103	5.6	LOS A	0.3	2.2	0.10	0.46	53.9
8	T1	26	0.0	0.103	0.2	LOS A	0.3	2.2	0.10	0.46	55.3
9	R2	45	0.0	0.103	5.7	LOS A	0.3	2.2	0.10	0.46	53.4
Approach		187	0.0	0.103	4.9	NA	0.3	2.2	0.10	0.46	54.0
West: Hargrave Street West											
10	L2	7	14.3	0.017	5.8	LOS A	0.1	0.5	0.17	0.55	53.4
11	T1	8	0.0	0.017	5.4	LOS A	0.1	0.5	0.17	0.55	53.7
12	R2	3	0.0	0.017	6.6	LOS A	0.1	0.5	0.17	0.55	53.0
Approach		19	5.6	0.017	5.8	LOS A	0.1	0.5	0.17	0.55	53.4
All Vehicles		501	3.4	0.180	5.2	NA	0.7	4.7	0.21	0.49	53.5

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.

MOVEMENT SUMMARY

Site: 101 [Scenario 1 (Redeveloped School) Butler - Hargrave St - Evening School Peak]

Scenario 1 (Redeveloped School): Butler - Hargrave St
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	1	0.0	0.043	5.8	LOS A	0.2	1.3	0.16	0.28	54.8
2	T1	38	52.8	0.043	0.2	LOS A	0.2	1.3	0.16	0.28	56.2
3	R2	32	0.0	0.043	5.7	LOS A	0.2	1.3	0.16	0.28	54.2
Approach		71	28.4	0.043	2.7	NA	0.2	1.3	0.16	0.28	55.3
East: Hargrave Street East											
4	L2	13	0.0	0.092	5.6	LOS A	0.3	2.3	0.17	0.60	52.9
5	T1	3	0.0	0.092	4.7	LOS A	0.3	2.3	0.17	0.60	53.0
6	R2	72	2.9	0.092	6.7	LOS A	0.3	2.3	0.17	0.60	52.3
Approach		87	2.4	0.092	6.5	LOS A	0.3	2.3	0.17	0.60	52.5
North: Butler Street North											
7	L2	69	0.0	0.051	5.5	LOS A	0.0	0.1	0.00	0.43	54.7
8	T1	24	4.3	0.051	0.0	LOS A	0.0	0.1	0.00	0.43	56.1
9	R2	1	0.0	0.051	5.6	LOS A	0.0	0.1	0.00	0.43	54.2
Approach		95	1.1	0.051	4.1	NA	0.0	0.1	0.00	0.43	55.1
West: Hargrave Street West											
10	L2	24	0.0	0.090	5.7	LOS A	0.3	2.4	0.19	0.54	53.8
11	T1	71	0.0	0.090	4.8	LOS A	0.3	2.4	0.19	0.54	54.0
12	R2	13	0.0	0.090	6.0	LOS A	0.3	2.4	0.19	0.54	53.3
Approach		107	0.0	0.090	5.2	LOS A	0.3	2.4	0.19	0.54	53.8
All Vehicles		360	6.4	0.092	4.7	NA	0.3	2.4	0.13	0.47	54.1

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: 101 [Scenario 1 (Redeveloped School): Butler - Mossman St - Morning School Peak]

Scenario 1 (Redeveloped School): Butler - Mossman St
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
2	T1	60	24.6	0.128	0.8	LOS A	0.6	4.7	0.35	0.43	55.1
3	R2	137	0.8	0.128	6.3	LOS A	0.6	4.7	0.35	0.43	53.2
Approach		197	8.0	0.128	4.6	NA	0.6	4.7	0.35	0.43	53.7
East: Mossman Street East											
4	L2	135	0.0	0.109	5.7	LOS A	0.4	3.2	0.13	0.55	53.2
6	R2	19	16.7	0.109	7.4	LOS A	0.4	3.2	0.13	0.55	52.6
Approach		154	2.1	0.109	5.9	LOS A	0.4	3.2	0.13	0.55	53.1
North: Butler Street North											
7	L2	182	0.0	0.127	5.6	LOS A	0.0	0.0	0.00	0.45	54.6
8	T1	56	0.0	0.127	0.0	LOS A	0.0	0.0	0.00	0.45	56.1
Approach		238	0.0	0.127	4.3	NA	0.0	0.0	0.00	0.45	55.0
All Vehicles		588	3.2	0.128	4.8	NA	0.6	4.7	0.15	0.47	54.1

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: 101 [Scenario 1 (Redeveloped School): Butler - Mossman St - Evening School Peak]

Scenario 1 (Redeveloped School): Butler - Mossman St
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
2	T1	60	26.3	0.079	0.3	LOS A	0.3	2.7	0.22	0.32	56.1
3	R2	71	1.5	0.079	5.9	LOS A	0.3	2.7	0.22	0.32	54.1
Approach		131	12.9	0.079	3.3	NA	0.3	2.7	0.22	0.32	55.0
East: Mossman Street East											
4	L2	67	0.0	0.058	5.6	LOS A	0.2	1.6	0.07	0.56	53.4
6	R2	17	6.3	0.058	6.4	LOS A	0.2	1.6	0.07	0.56	52.6
Approach		84	1.3	0.058	5.8	LOS A	0.2	1.6	0.07	0.56	53.3
North: Butler Street North											
7	L2	112	0.0	0.072	5.5	LOS A	0.0	0.0	0.00	0.48	54.3
8	T1	23	4.5	0.072	0.0	LOS A	0.0	0.0	0.00	0.48	55.8
Approach		135	0.8	0.072	4.6	NA	0.0	0.0	0.00	0.48	54.6
All Vehicles		349	5.4	0.079	4.4	NA	0.3	2.7	0.10	0.44	54.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Scenario 1 (Redeveloped School): Butler - Lambs Av - Morning School Peak]

Scenario 1 (Redeveloped School): Butler - Lambs Av
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	45	16.3	0.102	6.8	LOS A	0.4	3.0	0.42	0.67	51.6
3	R2	34	31.3	0.102	10.3	LOS A	0.4	3.0	0.42	0.67	51.0
Approach		79	22.7	0.102	8.3	LOS A	0.4	3.0	0.42	0.67	51.3
East: Lambs Av East											
4	L2	116	0.0	0.201	5.6	LOS A	0.0	0.0	0.00	0.18	56.7
5	T1	263	4.0	0.201	0.0	LOS A	0.0	0.0	0.00	0.18	58.3
Approach		379	2.8	0.201	1.7	NA	0.0	0.0	0.00	0.18	57.8
West: Lambs Av West											
11	T1	187	9.6	0.204	1.1	LOS A	1.0	7.1	0.39	0.28	56.4
12	R2	127	0.0	0.204	7.1	LOS A	1.0	7.1	0.39	0.28	54.4
Approach		315	5.7	0.204	3.5	NA	1.0	7.1	0.39	0.28	55.5
All Vehicles		773	6.0	0.204	3.1	NA	1.0	7.1	0.20	0.27	56.1

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: 101 [Scenario 1 (Redeveloped School): Butler - Lambs Av - Evening School Peak]

Scenario 1 (Redeveloped School): Butler - Lambs Av
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Butler Street South											
1	L2	38	33.3	0.108	7.1	LOS A	0.4	3.5	0.44	0.69	51.2
3	R2	39	37.8	0.108	10.2	LOS A	0.4	3.5	0.44	0.69	50.7
Approach		77	35.6	0.108	8.7	LOS A	0.4	3.5	0.44	0.69	51.0
East: Lambs Av East											
4	L2	71	0.0	0.176	5.6	LOS A	0.0	0.0	0.00	0.13	57.2
5	T1	261	5.2	0.176	0.0	LOS A	0.0	0.0	0.00	0.13	58.8
Approach		332	4.1	0.176	1.2	NA	0.0	0.0	0.00	0.13	58.4
West: Lambs Av West											
11	T1	224	4.7	0.172	0.5	LOS A	0.6	4.1	0.24	0.15	57.8
12	R2	68	1.5	0.172	6.9	LOS A	0.6	4.1	0.24	0.15	55.6
Approach		293	4.0	0.172	2.0	NA	0.6	4.1	0.24	0.15	57.3
All Vehicles		701	7.5	0.176	2.4	NA	0.6	4.1	0.15	0.20	57.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Scenario 1 (Redeveloped School): Markham - Lambs Avenue - Morning School Peak]

Base Case: Markham - Lambs Avenue
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Markham Street											
1	L2	93	0.0	0.377	5.6	LOS A	0.0	0.1	0.00	0.08	57.7
2	T1	636	0.0	0.377	0.0	LOS A	0.0	0.1	0.00	0.08	59.3
3	R2	1	0.0	0.377	7.7	LOS A	0.0	0.1	0.00	0.08	57.1
Approach		729	0.0	0.377	0.7	NA	0.0	0.1	0.00	0.08	59.1
East: Lambs Avenue											
4	L2	1	0.0	0.016	6.8	LOS A	0.0	0.3	0.74	0.82	45.9
5	T1	1	0.0	0.016	19.0	LOS B	0.0	0.3	0.74	0.82	46.0
6	R2	2	0.0	0.016	21.1	LOS B	0.0	0.3	0.74	0.82	45.5
Approach		4	0.0	0.016	17.0	LOS B	0.0	0.3	0.74	0.82	45.7
North: Markham Street											
7	L2	7	0.0	0.556	13.2	LOS A	5.8	41.3	0.76	0.43	51.0
8	T1	378	0.8	0.556	6.2	LOS A	5.8	41.3	0.76	0.43	52.2
9	R2	263	4.8	0.556	13.2	LOS A	5.8	41.3	0.76	0.43	50.4
Approach		648	2.4	0.556	9.1	NA	5.8	41.3	0.76	0.43	51.4
West: Lambs Avenue											
10	L2	232	12.7	0.329	10.2	LOS A	1.5	11.8	0.63	0.88	50.5
11	T1	3	0.0	0.329	22.0	LOS B	1.5	11.8	0.63	0.88	50.3
12	R2	1	0.0	0.329	28.3	LOS B	1.5	11.8	0.63	0.88	49.7
Approach		236	12.5	0.329	10.5	LOS A	1.5	11.8	0.63	0.88	50.5
All Vehicles		1618	2.8	0.556	5.5	NA	5.8	41.3	0.40	0.34	54.5

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.

MOVEMENT SUMMARY

Site: 101 [Scenario 1 (Redeveloped School): Markham - Lambs Avenue - Evening School Peak]

Base Case: Markham - Lambs Avenue
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Markham Street											
1	L2	55	1.9	0.211	5.6	LOS A	0.0	0.1	0.00	0.08	57.6
2	T1	348	1.5	0.211	0.0	LOS A	0.0	0.1	0.00	0.08	59.2
3	R2	1	0.0	0.211	6.9	LOS A	0.0	0.1	0.00	0.08	57.0
Approach		404	1.6	0.211	0.8	NA	0.0	0.1	0.00	0.08	59.0
East: Lambs Avenue											
4	L2	1	0.0	0.018	6.5	LOS A	0.1	0.4	0.62	0.77	49.1
5	T1	1	0.0	0.018	10.7	LOS A	0.1	0.4	0.62	0.77	49.2
6	R2	5	0.0	0.018	13.0	LOS A	0.1	0.4	0.62	0.77	48.7
Approach		7	0.0	0.018	11.8	LOS A	0.1	0.4	0.62	0.77	48.8
North: Markham Street											
7	L2	8	0.0	0.366	7.9	LOS A	2.4	17.2	0.48	0.31	54.5
8	T1	318	1.3	0.366	1.7	LOS A	2.4	17.2	0.48	0.31	56.0
9	R2	227	3.2	0.366	7.9	LOS A	2.4	17.2	0.48	0.31	53.9
Approach		554	2.1	0.366	4.3	NA	2.4	17.2	0.48	0.31	55.1
West: Lambs Avenue											
10	L2	189	3.9	0.185	7.1	LOS A	0.8	5.5	0.44	0.65	52.7
11	T1	7	0.0	0.185	11.8	LOS A	0.8	5.5	0.44	0.65	52.3
12	R2	1	0.0	0.185	15.1	LOS B	0.8	5.5	0.44	0.65	51.6
Approach		198	3.7	0.185	7.3	LOS A	0.8	5.5	0.44	0.65	52.6
All Vehicles		1163	2.2	0.366	3.7	NA	2.4	17.2	0.31	0.29	55.9

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Scenario 1 (Redeveloped School): Markham - Railway Parade - Morning School Peak]

Base Case: Markham - Railway Parade
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Markham Street											
2	T1	876	4.3	0.462	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		876	4.3	0.462	0.1	NA	0.0	0.0	0.00	0.00	59.9
East: Railway Parade											
4	L2	60	7.0	0.072	8.5	LOS A	0.3	2.0	0.53	0.72	51.9
Approach		60	7.0	0.072	8.5	LOS A	0.3	2.0	0.53	0.72	51.9
North: Markham Street											
7	L2	19	0.0	0.316	5.6	LOS A	0.0	0.0	0.00	0.02	58.1
8	T1	589	2.0	0.316	0.0	LOS A	0.0	0.0	0.00	0.02	59.8
Approach		608	1.9	0.316	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		1544	3.5	0.462	0.5	NA	0.3	2.0	0.02	0.04	59.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

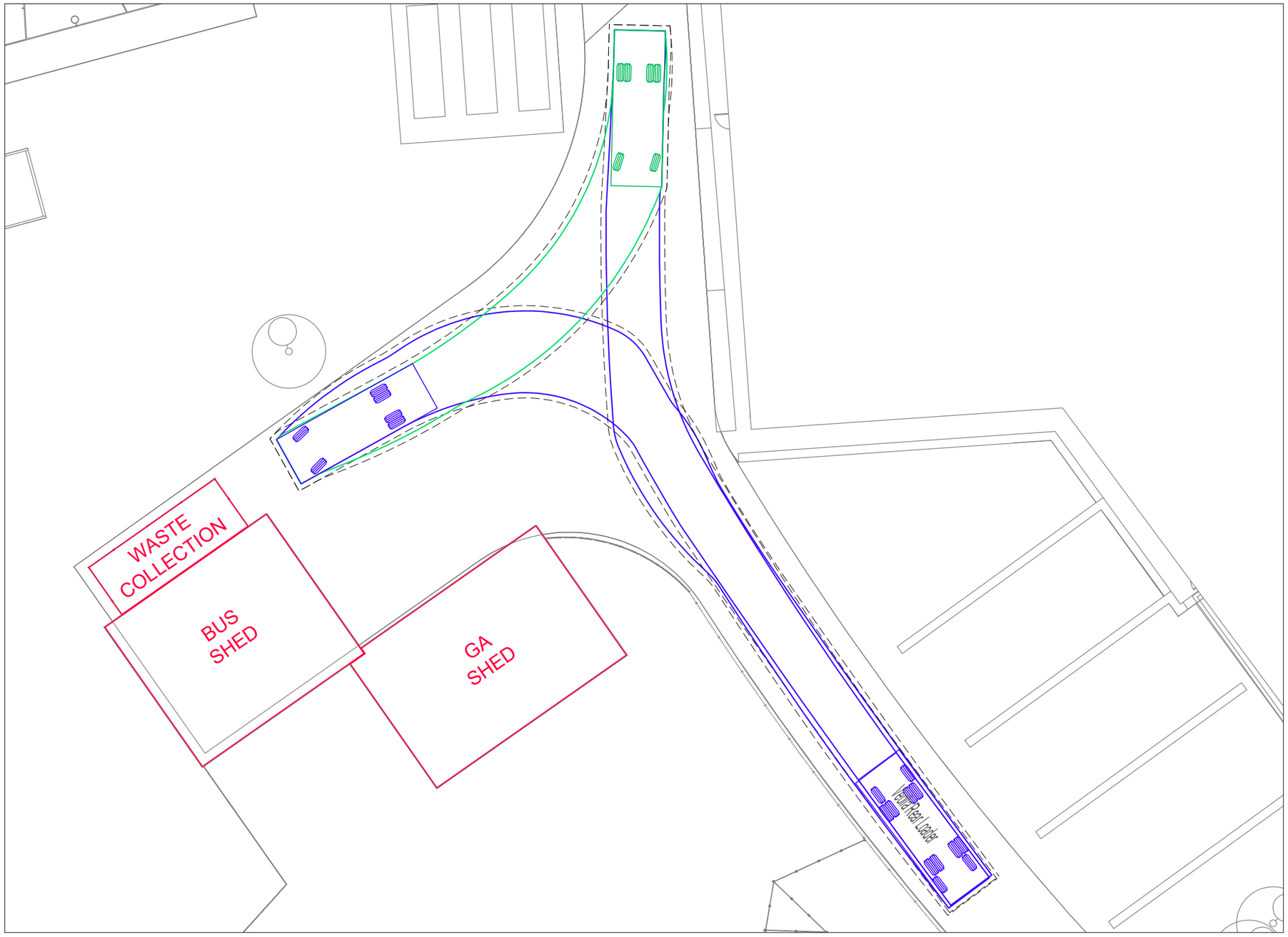
Site: 101 [Scenario 1 (Redeveloped School): Markham - Railway Parade - Evening School Peak]

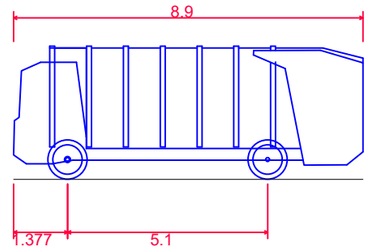
Base Case: Markham - Railway Parade
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Markham Street											
2	T1	526	4.4	0.278	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		526	4.4	0.278	0.0	NA	0.0	0.0	0.00	0.00	59.9
East: Railway Parade											
4	L2	58	10.9	0.065	8.1	LOS A	0.2	1.9	0.50	0.69	52.0
Approach		58	10.9	0.065	8.1	LOS A	0.2	1.9	0.50	0.69	52.0
North: Markham Street											
7	L2	48	2.2	0.298	5.6	LOS A	0.0	0.0	0.00	0.05	57.8
8	T1	521	2.6	0.298	0.0	LOS A	0.0	0.0	0.00	0.05	59.5
Approach		569	2.6	0.298	0.5	NA	0.0	0.0	0.00	0.05	59.3
All Vehicles		1154	3.8	0.298	0.7	NA	0.2	1.9	0.03	0.06	59.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix C Swept Path Analysis





Veolia Rear Loader

Overall Length	8.900m
Overall Width	2.900m
Overall Body Height	3.394m
Min Body Ground Clearance	0.366m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.700m

GARBAGE TRUCK - ENTRY & EXIT MANOEUVRE

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
B	16-10-18	ORIGINAL ISSUE	LD	BH	CH
A	19-06-18	ORIGINAL ISSUE	BH	CH	CH

SCALE 0 2.5 5 7.5 10 12.5m
SCALE 1:250 AT ORIGINAL SIZE

NORTH

CLIENT
NBRS
ARCHITECTURE

TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 5, Suite 501, 174 Pacific Highway
Greenwich NSW 2065
T: (02) 9418 3033 F: (02) 9418 3112
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

PROJECT
Armidale High School Redevelopment - Traffic Assessment

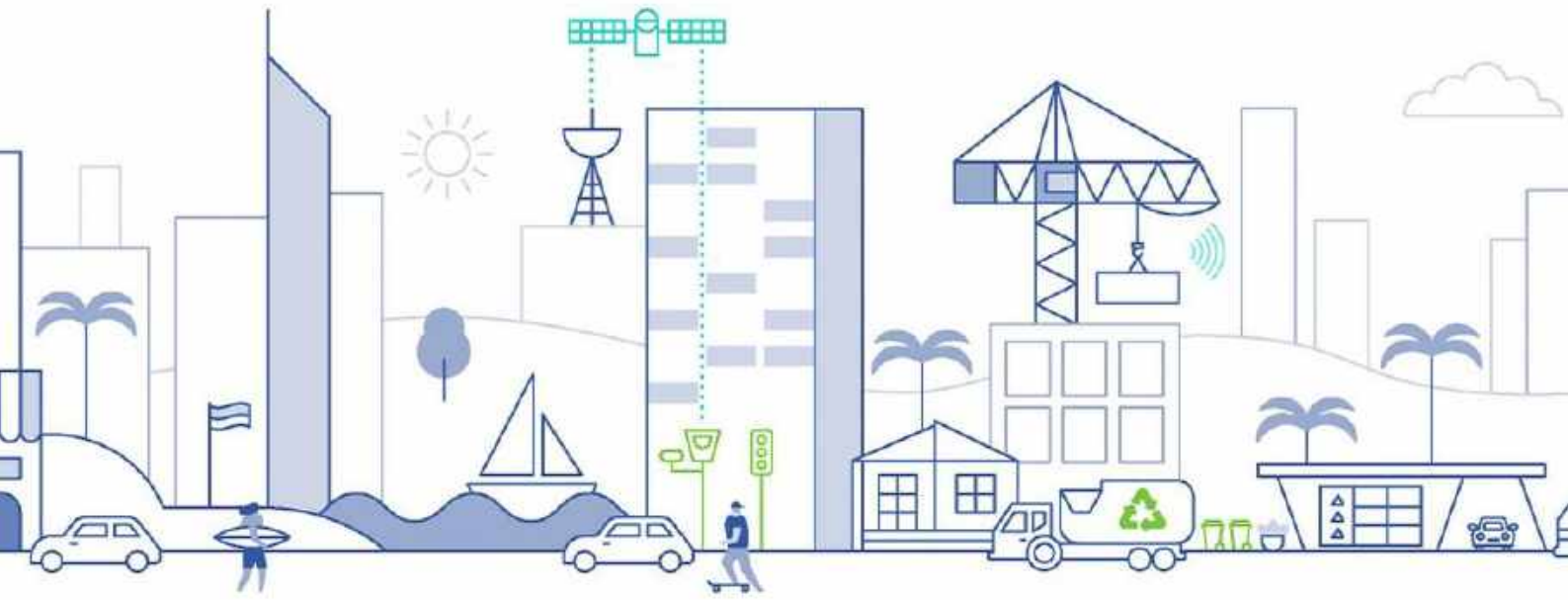
DRAWING TITLE
SWEPT PATH ANALYSIS
Garbage Truck 8.9m

PROJECT NUMBER	18SYT0036
ORIGINAL SIZE	A3
DRAWING NUMBER	18SYT0036-01
REVISION	B
DATE	16 Oct 2018
SHEET	1 OF 1

Appendix D Road Safety Audit

Traffic Engineering

Proposed Armidale Secondary College,
Armidale NSW
Road Safety Audit



About TTM

For 30 years, we've been at the centre of the Australian development and infrastructure industry. Our unique combination of acoustics, data, traffic and waste services is fundamental to the success of any architectural or development project.

We have over 50 staff, with an unrivalled depth of experience. Our industry knowledge, technical expertise and commercial insight allow us to deliver an exceptional and reliable service.

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Accoustics Data Traffic Waste

Revision Record

No.	Author	Reviewed/Approved	Description	Date
1.	R V Jones / B Williamson	R. Jones	Road Safety Audit Report	19/02/19
2.	R V Jones / B Williamson	R Jones	Road Safety Audit Report - Final	26/02/19
3.	B Husain	B Husain	Response to RSA Findings	13/03/19
4.				
5.				

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Contents

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1 Introduction

1.1 Background

TTM Consulting has been engaged by NBRS Architecture on behalf of NSW Department of Education to prepare a Road Safety Audit Report for the proposed Armidale Secondary College. The audit covered the concept design stage and existing infrastructure for the proposed college on Butler Street, Armidale NSW. This Concept and Existing Stage Road Safety Audit was requested by Armidale Regional Council and RMS.

This Road Safety Audit includes the following areas.

- Advanced warning signage for the pedestrian crossing near Butler Street
- Intersection of Lambs Avenue / Mann Street and Butler Street
- Existing pedestrian crossing
- Stopping restrictions on both sides of Lambs Avenue / Mann Street
- Placement of vegetation
- Review of Concept Design – Proposed Site Plan (Dwg No. – NBRS-AR-DWG-DA-012 Rev 1)

This report identifies possible safety issues, and these are noted by the audit team using a combination of onsite investigations and a review of background material. Recommendations for potential remedial treatments will be made in response to each safety issue that is raised as part of this audit process.

1.2 Site Location

Armidale High School is located at Butler Street, Armidale NSW 2350. The school is within the Armidale-Dumaresq Local Government Area in the NSW Northern Tablelands. Armidale Bicentennial Arboretum is located south of the school site. Armidale Train Station is located to the north. The site is predominantly surrounded by residential land uses with commercial activities taking place along Mann Street and other streets to the west of the site.

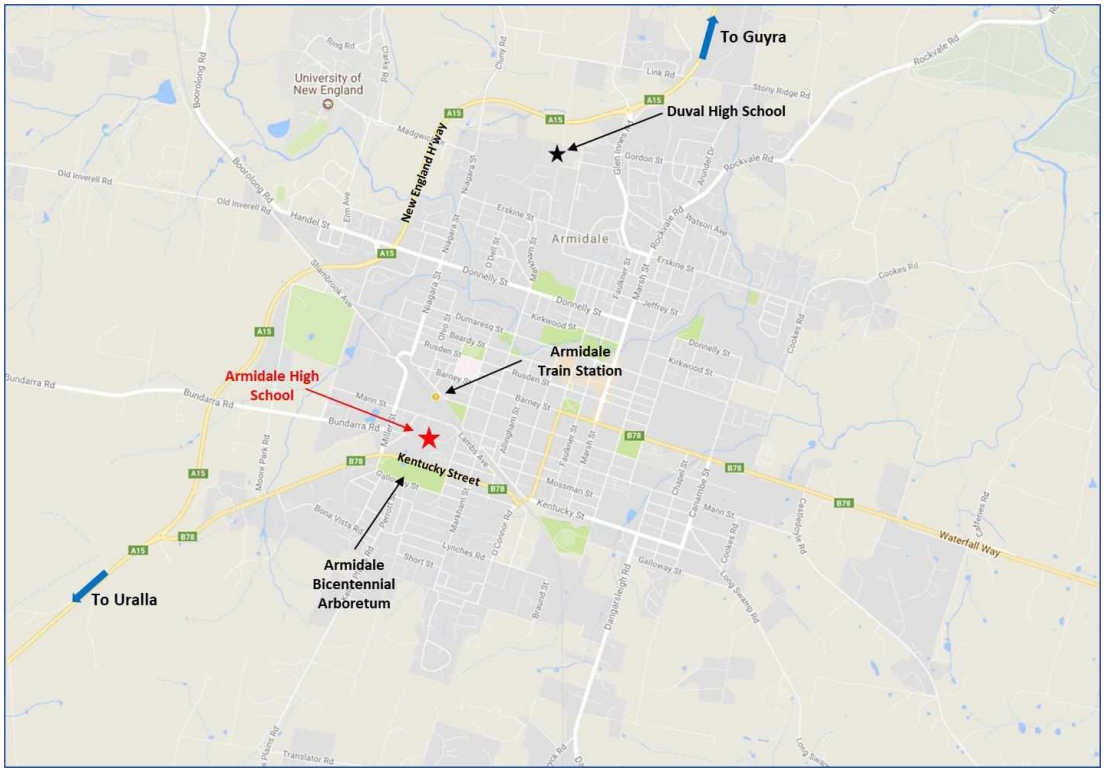


Figure 1-1: Site Context

The site context showing surrounding locations is shown in Figure 1-1. An aerial image of the site along with surrounding street information is shown in Figure 1-2. The school has primary access from Butler Street for staff and students. Other access points are located along Lambs Avenue. A bus zone operating before and after school is present on Butler Street.

Figure 1-2: Aerial image of the site

1.3 Audit Stage

This report results from a combined Concept Design and Existing Stage Road Safety Audit, which has been undertaken in accordance with the requirements of Austroads' Guide to Road Safety: Part 6; Road Safety Audit Third Edition (2009). The audit report generally follows the format and topics outlined in the Austroads Checklist 2 and 6 for Concept Design and Existing stage audits.

This audit covers only the study area and has sought to identify potential safety hazards. The auditors would like to point out that no guarantee is made that every deficiency or hazard has been identified. If all recommendations in this report were to be followed, this would not guarantee that the study area is 'safe'; rather, adoption of the recommendations should improve the level of safety at this location.

1.4 Audit Team

The persons undertaking in this road safety audit are;

- Richard V Jones – Senior Road Safety Auditor (Team Leader); TTM Consulting Pty Ltd
- Ben Williamson – Senior Road Safety Auditor, TTM Consulting Pty Ltd
- Ryan Bradley – Road Safety Auditor, TTM Consulting Pty Ltd

1.5 Site Inspection

A site inspection of the audit area was conducted on Tuesday 12 February 2019. The inspection was conducted in the *day and night* to assess the conditions in accordance with Austroads guidelines. The weather condition during the inspection was dry with clear skies. The inspection was carried out on foot and by car.

1.6 Proposed Layout

The proposed concept site layout is shown in Figure 1-3.

Figure 1-3: Proposed Site Layout

2 Existing Road Environment

2.1 Road Network

The Road Safety Audit was carried out in the area that covers the following roads and their classification:

Table 2-1: Road Classifications

Road	Speed Limit	Lanes	Road Authority
Kentucky Street	50kph	2 (undivided)	RMS
Butler Street	50kph	2 (undivided)	Council
Lambs Avenue-Mann Street	50kph	2 (undivided)	Council
Barry Street	50kph	2 (undivided)	Council
Miller Street	50kph	2 (undivided)	Council

There is existing street lighting at the intersections within this area. The roads noted in Table 2-1 are not sign posted and therefore are assumed to have an urban speed limit of 50km per hour. There is a 40km/h restriction during School term days.

2.2 Crash History

TTM obtained crash data for the past five years from the Transport for NSW Centre for Road Safety crash and casualty statistics website for the locality of the area. The extent of the crashes in the area are indicated in Figure 2-1.

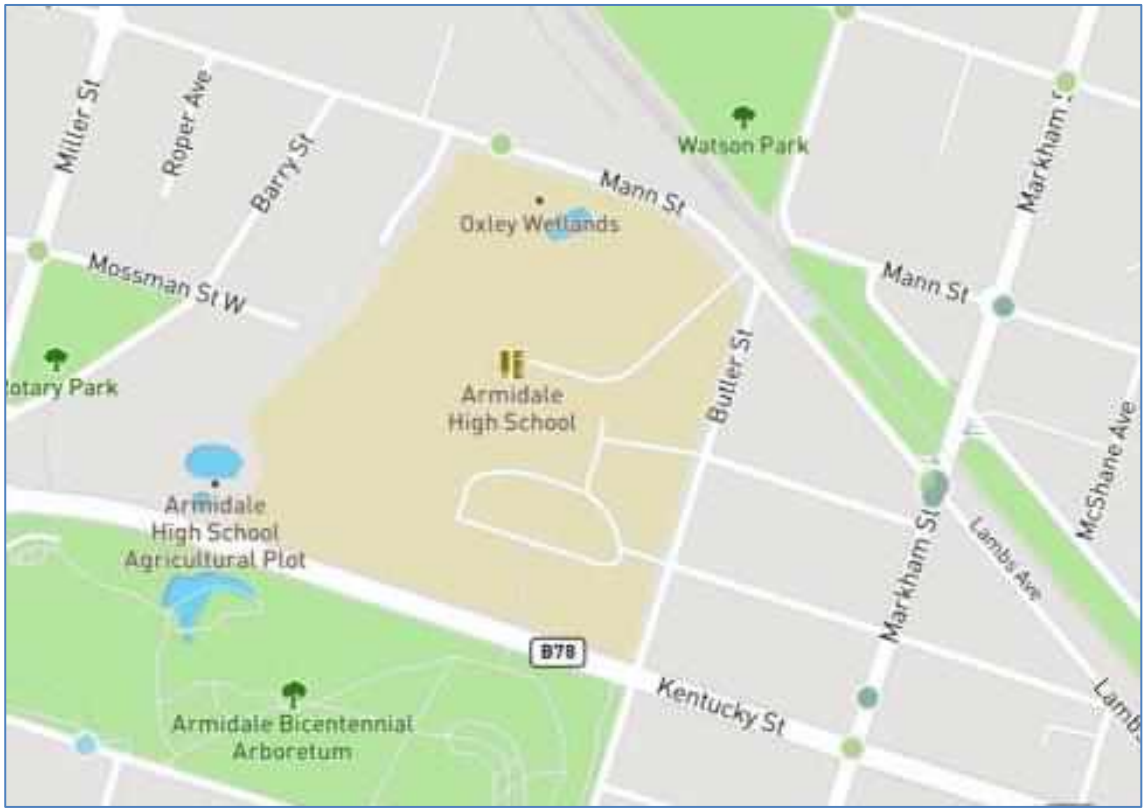


Figure 2-1: RMS 5 Year Crash Data (2013 to 2017) – Armidale Secondary College

There have been zero (0) crashes within the study area. One crash occurred on Mann Street at the north western end of the school site, but away from any vehicle or pedestrian access. This crash was a non-casualty, head on crash.

A table of these results are attached in Appendix B.

2.3 Design Plans

TTM have been provided concept design plans for the proposed school's site circulation, vehicle and pedestrian plan, which is shown in Appendix C.

3 Road Safety Audit Findings

3.1 Audit Criteria

A ranking system for each of the issues has been adopted using the following priority ratings in Table 3-1:

Table 3-1: Road Safety Audit – Priority Ratings

Priority	Risk Ranking	Suggested Treatment Approach
A	High	Highest priority for action from a safety view point
B	Medium	Action needs to be taken from safety view point
C	Low	Action is desirable from a safety view point
D	Comment	An observation which may improve overall performance or safety, Be of wider significance and possibly outside the scope of this RSA, but where action should be considered

It is noted that the priority ranking is based on the subjective assessment of the audit team.

4 Formal Statement

4.1 Audit Team Statement

We, the undersigned, declare that we have reviewed the material and data listed in this report and identified the safety and operational deficiencies outlined in the preceding sections.

It should be noted that while every effort has been made to identify potential safety hazards, no guarantee can be made that every deficiency has been identified. We recommend that points of concern be investigated, and necessary corrective actions are undertaken.

Richard V Jones – Senior Road Safety Auditor (Team Leader)  22/02/19

Ben Williamson – Senior Road Safety Auditor  22/02/19

Ryan Bradley – Road Safety Auditor  22/02/19

Appendix A Road Safety Audit Findings

Reviewer:	Richard V Jones (TTM Consulting)	Responder: Baqir Husain (TTM Consulting)	
Date:	22/02/19	Date: 12/03/19	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
1		The footpath along Butler Street is only 1.0m wide, which is likely to increase the risk of trip hazards when pedestrians wish to pass each other. This will likely be when children are arriving and departing to and from school. Children are likely to be looking for their parents' car than where they're walking. There is insufficient width for wheelchair use or a person with a pushchair. Again, this is likely to increase the risk of a trip and fall, resulting in possible injury.  *It is recommended that the footpath be widened to accommodate the amount of pupil foot traffic in this busy area.*	Medium		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
2		The existing kerb ramp crossing at the intersection of Butler Street and Kentucky Street does not conform to standard, is not aligned correctly and has an uneven verge between the kerb ramp and road. This will increase the risk of a trip at this location where people are waiting to cross. In addition to this, the crossing does not align with the adjacent kerb ramp on the opposite side of Kentucky Street. This will guide the blind and partially sighted to the wrong location where there would be further risk of injury. Pedestrians may trip into the path of oncoming traffic.  *It is recommended that the crossing be redesigned and constructed correctly to reduce the risk of a trip and injury.*	Medium		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
3		When drivers at waiting at the intersection of Butler Street with Kentucky Street the tree on their right obscures' visibility to oncoming vehicles on Kentucky Street. There is an increased risk of a side swipe crash at his location when a driver will pull out from Butler Street. It is also likely that some high school students will cycle to and from school, thus increasing the probability of cyclists turning at this intersection.  *It is recommended that the lower branches of the tree be removed. Further investigation should be carried out to assess if the tree is required to be removed.*	High		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

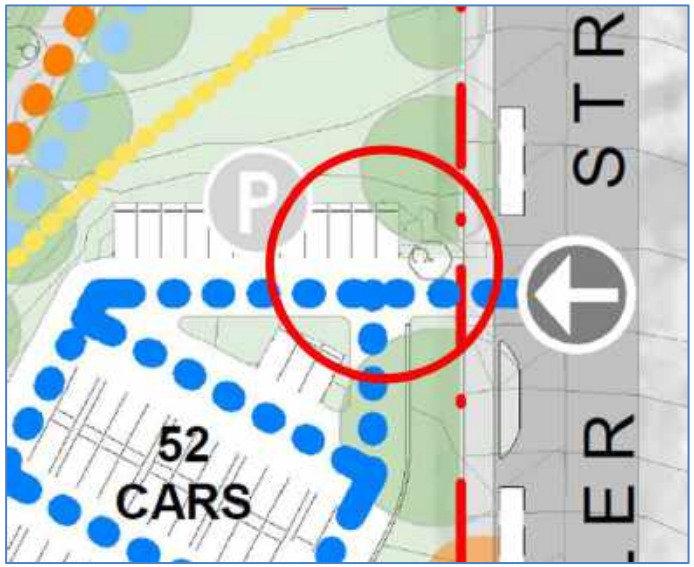
Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
4		The kerb ramps at the existing school crossing at the intersection of Hargrave Street do not align directly opposite each other. Also, there is only tactile surface treatment on one side of the crossing. There is a risk of a trip hazard for children crossing at this location, also for the blind or partially sighted. The crossing is also close to the intersection of Hargraves Street and drivers turning at this intersection are likely to be focused on their turning movement rather than pedestrians crossing.  *Consideration should be given to relocating the crossing away from the intersection to improve visibility to the crossing.and ensure that the crossing is designed to the current standards and guidelines.*	Low		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
5		The verge and the drainage channel on the western side of the existing school crossing at the intersection of Hargrave Street creates a trip hazard, as they are in the direct alignment of the crossing. There is a risk of people tripping / falling due the open drainage channel and also the uneven verge.  *It is recommended that this area of the crossing be improved to address the safety issues noted above.*	Low		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
6		The proposed school crossing location on Butler Street is located further north from Hargrave Street and will include the removal of the two existing crossing points. The road is wide at this location and would require the children to cross for a longer period of time, thus increasing the risk of an incident, especially where this will be a busy and congested area with other drivers focussing on dropping off or picking up their child. Children congregating to cross the road may also block the footpath, and may encourage others to walk onto the road to pass. The footpath on the school side is narrow and not sufficient to accommodate the amount of foot traffic during school hours. This will increase the risk of a trip / fall when walking on the verge.  *Consideration should be given to reduce the crossing width by providing kerb build outs on each side of the road. This will also create more space for children to congregate and wait to cross. Also, the footpath will require widening to accommodate the number of pedestrians here.*	Medium		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
7		There are no kerb ramps at the existing school crossing at the intersection of Mossman Street, and there is not footpath connection from the crossing to the existing footpath on Butler Street. These safety issues cause a trip hazard to those who will be using the crossing, and therefore increasing the risk of injury by possibly falling or tripping towards the road. Parents with pushchairs or pedestrians with wheelchairs will also have difficulty using this school crossing. The crossing is also close to the intersection of Mossman Street and drivers turning at this intersection are likely to be focused on their turning movement rather than pedestrians crossing.  *Consideration should be given to relocating the crossing away from the intersection to improve visibility to the crossing. To ensure that the crossing is designed to the current standards and guidelines.*	Medium		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
8		The existing bus stop zone for the school has a wide concrete paved footpath, but many of these are uneven and create a trip hazard to pedestrians walking along here. There is a risk of injury from a fall or trip at this location. The extent of the bus stop is proposed to be extended to the north, therefore the existing narrow footpath will encourage pedestrian to use the verge, leading to a trip hazard.  *It is recommended this area be correctly maintained to remove any trip hazards and that any bus stop zone area to have a full width footpath. Consideration should also be given to providing a shelter within the school grounds to allow children to wait in safety from the sun / rain. Also, suitable access should be provided near the bus stop zone.*	Low		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
9		The proposed 52 space car park for the "The Den" has a conflict point close to Butler Street. There is a risk of cars queuing while other drivers are manoeuvring to enter or exit form a parking space and also for vehicles waiting at the other parking aisle. The queuing vehicles will block the footpath and encourage pedestrians to walk between vehicles or on Butler Street. Also, vehicles may queue back into Butler Street causing a hazard and thus increasing the risk of a rear end or T-bone crash.  *Consideration should be given to redesigning the car park to relocate the conflict point further from the Butler Street access.*	Low		The car park has excess car parking spaces against the required student parking numbers. It is more likely for students to fill up the car parking spaces near to the gym first resulting in few parking manoeuvres at the conflict point. Vehicles waiting inside the parking aisle will give way to vehicles entering the car park to avoid chances of queuing. There is minimal pedestrian/student activity expected near this driveway access. This is because all students from bus drop-offs will enter the school via Mossman Street access. On the rare occasions where there is an overflow bus drop-off, students can enter school via Lambs Avenue access. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
10		The existing zebra controlled crossing at the intersection of Bulter Street / Lamb Avenue / Mann Street is located close to Butler Street and is angled diagonally across the road. This makes the crossing slightly longer to cross, thus pedestrians will be on the road for a longer time, which will increase the risk of being struck. The main safety issue is that vehicles turning left from Butler Street will look right for a gap in traffic and then turn without looking right for pedestrians waiting or crossing the road. The angle of the intersection would also encourage cars to perform left turn at speed (possibly without stopping) right into path of peds crossing. There is a risk of a pedestrian being struck by a turning vehicle at this location.  *It is recommended the crossing be relocated further west if suitable, or to consider providing a kerb build out on Butler Street to provide more separation between turning vehicles and the crossing. Also, to consider making the crossing more perpendicular to shorten the crossing width. Other measures may be required to improve safety for the proposed design. Provide tactile paving.*	Medium		The installation of 'Give Way/Stop' sign and line marking on Butler Street at the intersection of Butler / Lamb and Mann Streets is recommended. This slows down/stops left turning vehicles from Butler Street. An additional 'Left Turn Watch for Pedestrians' which is now superseded by 'Give Way to Pedestrians' sign is recommended on the approach of Lambs Avenue from Butler Street. The above recommendations significantly reduce risks posed to pedestrians from oncoming vehicles. Relocation of pedestrian crossing is not recommended as there is an existing driveway crossover to the west of the crossing. It would also increase the walking distance for students resulting in increased likelihood of students jaywalking to stay on the shortest path. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

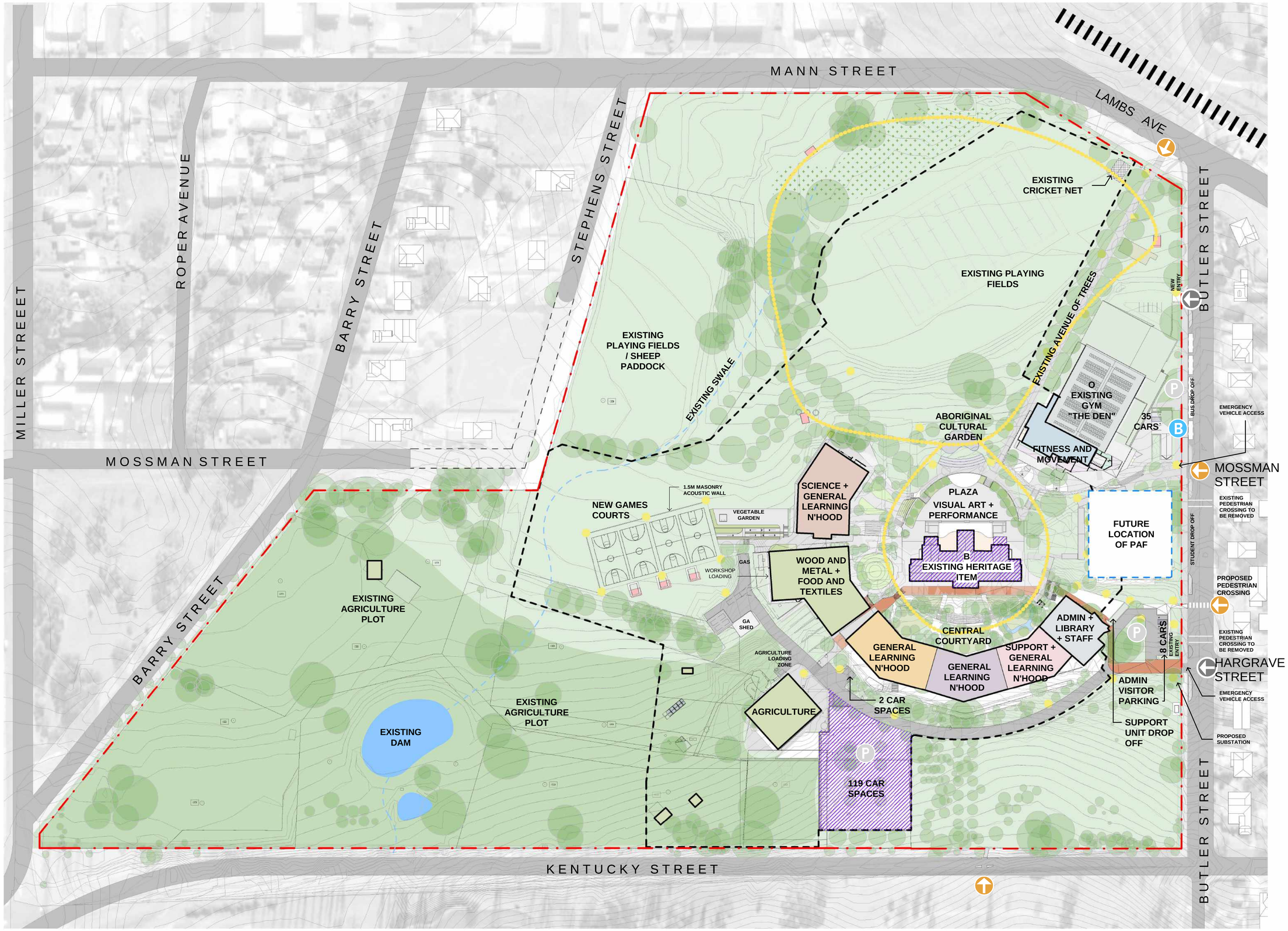
Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
11		The zebra controlled crossing on Mann Street / Lamb Avenue / Butler Street does not have any external lighting to clearly highlight the crossing area and pedestrians crossing and waiting to cross. There is a risk that pedestrians will not be seen during the hours of darkness and will increase the risk of being struck by a passing or turning vehicle.  *It is recommended that lighting to the current standards be provided at this crossing.*	Medium		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
12		The sign to the south west of the pedestrian crossing at the rail line may obscure visibility to approaching trains at this location. There is a risk that pedestrians may attempt to cross here when a train is approaching, especially when children from the school may just be following each other. No tactile paving has been provided for the blind and partially sighted.  *It is recommended that the sight distance requirements be checked at this crossing and that consideration should be given to installing lights to warn pedestrians of when a train is approaching.* *A missing "cyclists dismount" sign should be reinstated on the south western approach.* *Consider TGSI's if applicable to the crossing in this area.*	Medium		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
13		The crossing on Mann Street (north east side of the rail line) is located on a sharp bend in a residential 50km/h speed zone. There is no advisory speed sign on the southbound approach to the bend, but there is a 35km/h advisory sign on the westbound approach. The sight distance along Butler Street for pedestrians crossing form the north side seems to be obscured by bushes and fencing. There is an increased risk that a pedestrian could be struck by a vehicle at this crossing due to insufficient sight distance.  *It is recommended that the sight distance requirements be checked at this crossing and that consideration should be given relocating the crossing to a suitable location and providing a kerb build out to reduce the crossing width and improve sight distance. It is recommended that all signs, tactile paving and kerb ramps in the vicinity of the crossing be reviewed.*	Medium		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Item	DRG	Audit Findings/Recommendations	Rankings	Road Traffic Engineer		
				Accept Yes/No	Response	Status
14		Some of the intersections within the school area do not have any road line markings to provide guidance to drivers as to where to give way or stop. These intersections are Hargraves Street, Mossman Street and Lambs Avenue with Butler Street. There is a risk that drivers may position themselves further into the intersection when waiting to turn, which could lead to a side swipe crash or a cyclist swerving into a passing vehicle.  *It is recommended line marking at intersections are reviewed and provided where necessary. Consideration should also be given to providing line marking along Butler Street to assist with reducing speeds and reduces risk of conflicts.*	Low		No technical input required by Traffic Engineer. Refer to document 'SINSW response to TTM Report, dated 25/02/2018' for SINSW's position on RSA finding.	

Appendix B Design Plans



LEGEND

- VEHICLE ACCESS
- PEDESTRIAN ACCESS
- BUS STOP
- CAR PARKS
- FENCE 2100H
- NATURE TRAIL
- COLA
- EXTERNAL LIGHT

  EXTERNAL LIGHT TO BASKETBALL COURTS (DUSK – 10PM). TO ELECTRICAL ENGINEERS SPECIFICATION."
- CAR PARKS AND INTERNAL RENOVATION AND RESTORATION TO B BLOCK SUBJECT TO SEPARATE PLANNING PATHWAY. THESE WORKS DO NOT FORM PART OF THIS PROPOSAL

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SECURITY
DEPARTMENT OF EDUCATION NSW

Issue

No.	Date	Description	Chkd
1	04.10.2018	DEVELOPMENT APPLICATION	

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Project
ARMIDALE SECONDARY COLLEGE

at
BUTLER STREET, ARMIDALE, NSW, 2350

for
NSW Department of Education

Drawing Title
PROPOSED SITE PLAN

Printed 21/02/2019 5:43:45 PM
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Drawing Reference NBRS-AR-DWG-DA-012
Revision 1

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