Catherine McAuley Catholic College

Diocese of Maitland-Newcastle

Traffic Impact Assessment

May 2018

SECA solution

Catherine McAuley Catholic College

Mixed-use development, Medowie Road, Medowie

Traffic Impact Assessment

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1. Introduction

1.1 Background

Seca Solution Pty Ltd has been commissioned by Webber Architects, on behalf of the Diocese of Maitland-Newcastle, to prepare a traffic, access and parking assessment for a proposed Education Development to be located at 2 Kingfisher Close, Medowie. The plans for the development include educational and child care facilities, as well as a chapel. Parking will be provided on site with vehicle access off Medowie Road via two separate access points, one providing entry only (200 metres to the south of South Street) and the other being an upgraded signalised intersection of Medowie Road and South Street. An additional slip lane for buses only is proposed off the northern roadside of Medowie Road in between the two intersections.

As part of the project, Seca Solution have collected current traffic data at the key locations and have observed the traffic operations in the locality of the site during peak periods.

1.2 Scope of Report

The scope of this report is to review the external traffic movements associated with the proposed development and to review the parking demands and internal circulation. The report provides advice on access issues and green travel opportunities.

1.3 Issues and Objectives of the study

The issues relative to the proposal are:

- Assess impact on the local road network due to the additional traffic flows;
- Assess the impact of the additional parking generated by the proposed development;
- Review the access arrangements for the development;
- Review the service arrangement for the development; and
- Assess any other transport impacts associated with the development.

The objective of the report is to document the impacts of the proposed development and provide advice on any infrastructure work required as part of the development.

1.4 Planning Context

In preparing this document, the following guides and publications were used:

- RMS Guide to Traffic Generating Developments, Version 2.2 Dated October 2002
- Austroads Guide to Road Design
- Port Stephens Council Development Control Plan
- Australian / New Zealand Standard – Parking Facilities Part 1: off-street car parking (AS2890.1:2004)
- Medowie Planning Strategy (December 2016)
- Medowie Traffic and Transport Study (URaP 2017)

1.5 Authority Requirements

The Department of Planning and Environment have provided a set of SEAR's (Secretary's Environmental Assessment Requirements) that provide advice on what is to be assessed for the project and the information that is required to be provided. Relevant to traffic are the following sections:

Table 1-1 – Department of Planning and Environment SEARs

Requirement	Relevant Section of Seca Solution report
Accurate details of the current daily and peak hour vehicle, public transport, pedestrian and cycle movement and existing traffic and transport facilities provided on the road network located adjacent to the proposed development;	Section 2.5
An assessment of the operation of existing and future transport networks including public transport networks, and their ability to accommodate existing trips and the forecast number of trips to and from the development;	Section 2.7, Section 3.2.6
Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips based on surveys of similar schools within the local area;	Section 4.1
The adequacy of public transport, pedestrian and bicycle networks and associated infrastructure to meet the likely future demand of the proposed development;	Section 3.4.6, Section 4.1.2, Section 4.6
The impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site in consultation with Council, Roads and Maritime Services and Transport for NSW and identify measures to integrate the development with the transport network;	Section 3.2.6, Section 4.5
The identification of infrastructure required to ameliorate any impacts on traffic efficiency and road safety impacts associated with the proposed development, including details on improvements required to affected intersections including Medowie Road at Richardson Road and Blueberry Road, and Kingfisher Close at Blueberry Road;	Section 5
Details of travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location-specific sustainable travel plan and the provision of facilities to increase the non-car mode share for travel to and from the site;	Section 3.3.3
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, and details of, upgrades or road improvement works, Traffic modelling is to be undertaken using SIDRA network modelling for current and future years;	Section 4.4
The proposed walking and cycling access arrangements and connections to public transport services;	Section 4.5
Details of any proposed school bus routes along bus capable roads (i.e. travel lanes of 3.5m minimum) and infrastructure (bus stops, bus layovers etc.);	Detailed Design
The proposed access arrangements, including car and bus pick-up/drop-off facilities, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and bicycle networks, including pedestrian crossings and refuges and speed control devices and zones;	Section 3.2.4, Section 3.3.3, Section 4.4
Measures to maintain road and personal safety in line with CPTED principles;	To be dealt with by other report
The proposed car and bicycle parking provision, including end of trip facilities, which must be taken into consideration of the availability of public transport and the requirements of Council's relevant parking codes and Australian Standards;	Section 3.4
Proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance;	Section 3.4.6
Proposed number of on-site car parking spaces for teaching staff and visitors and corresponding compliance with existing parking codes and justification for the level of car parking provided on-site;	Section 3.4
An assessment of the cumulative on-street parking impacts of cars and bus pick-up/drop-off, staff parking and any other parking demands associated with the existing and proposed development;	Section 3.4.1

Details of emergency vehicle access arrangements;	Other Consultant
An assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures;	Section 4.3
Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times);	Section 3.1.2, Section 3.2.3, Section 3.3.4, Section 3.4.5
In relation to construction traffic: • assessment of cumulative impacts associated with other construction activities (if any); • 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 anticipated peak hour and daily construction vehicle movements to and from the site; • details of on-site car parking and 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; 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 in line with Council's Construction Management Plan Checklist to demonstrate the proposed management of the impact.	Section 4.4.4 *Construction traffic management plan to be completed as part of the detailed design phase

The Roads and Maritime Services have provided separate details on their requirements for the project and are provided below:

Table 1-2 – Roads and Maritime Services requirements

Requirement	**Relevant Section of Seca Solution report**
Assessment of all relevant vehicular traffic routes and intersections for access to / from the subject properties.	Section 2.4.1, Section 2.5.1
Current traffic counts for all of the traffic routes and intersections.	Section 2.5, Appendix D
The anticipated additional vehicular traffic generated from both the construction and operational stages of the project.	Section 4
The distribution on the road network of the trips generated by the proposed development. It is requested that the predicted traffic flows are shown diagrammatically to a level of detail sufficient for easy interpretation.	Section 4.2
Consideration of the traffic impacts on existing and proposed intersections and the capacity of the local and classified road network to safely and efficiently cater for the additional vehicular traffic generated by the proposed development during both the construction and operational stages. The traffic impact shall also include the cumulative traffic impact of other proposed developments in the area.	Section 4.4
Identify the necessary road network infrastructure upgrades that are required to maintain existing levels of service on both the local and classified road network for the development. In this regard, preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be noted that any identified road infrastructure upgrades will need to be to the satisfaction of Roads and Maritime and Council.	Section 3.2.1, Section 5

Traffic analysis of any major / relevant intersections impacted, using Sidra or similar model, including: • Current traffic counts and 10 year traffic growth projections • With and without development scenarios • 95th percentile back of queue lengths • Delays and level of service on all legs for the relevant intersections • Electronic data for RMS review	Section 4.4
Any other impacts on the regional and state road network including consideration of pedestrian, cyclist and public transport facilities and provision for service vehicles.	Section 3.1.2, Section 3.2.3, Section 3.2.6, Section 3.3.4, Section 3.4.6, Section 4.5, Section 4.6

Further to the above requirements Roads and Maritime Services have provided additional commentary on the project, as part of a pre DA meeting on the 5th April 2018. A summary of the key issues raised are listed below:

Table 1-3 – Roads and Maritime Services commentary

Requirement	Comment	Relevant Section of Seca Solution report
RMS seek clarification over the nominated bus capacities (27 buses, 50 Students per bus) as historic precedent indicates some bus companies serve multiple schools, and buses are not all at full capacity.	Traffic generation adjusted: Number of buses amended	Section 4.1.1.3
RMS seek clarification over the percentage applied for students travelling by light vehicle to the site (currently 14% of the total population). RMS indicated historic precedent would at least double this ratio. This may require survey of existing school data with a similar catchment. RMS refer to traffic issues at Nulkaba.	Traffic generation adjusted: Light vehicle travel percentage amended	Section 4.1.1.2
RMS query comprises on pedestrian safety and internal vehicular circulation given that this is a new 'greenfield' development. A reduction in risk by the design methodology to traffic conflict between buses and pedestrians (approx. 100 students) is noted. RMS suggests the pedestrian crossing at the bus bay and staff carpark entry should be designated clearly as a level crossing to avoid confusion. Pedestrian crossings should not occur over two lane widths due to safety. A bus drop off on the Medowie Road side of the bus drop off loop road is not desired as it increases the numbers of students utilising the pedestrian crossing. RMS acknowledge comments from previous Pre-DA meeting that pedestrian traffic conflict should be managed on-site in a 'low speed' environment rather than impact on the road network.		Section 3.4.6
RMS suggest the internal circulation must be efficient for all users to avoid poor behavioural outcomes such as parents dropping students off on the Medowie road verge which is unsafe.		Section 3.3.1
There is no visitor or parent parking indicated in the design. Webber notes the overflow parking areas will be managed so that staff utilise these areas if a function is anticipated on that day to allow parents to use sealed carparking areas.	Parking provided in final design	Section 3.4.3
RMS currently reviewing SIDRA data and have some forthcoming comments on traffic light phasing to reduce queuing exiting the site.	No comments received	Section 4.4.2
RMS suggest further justification of South-bound buses entering the site via the southbound roundabout		Section 3.2.4

Pedestrian access to the public bus stops in South Street should be considered.	Pedestrian phasing on all legs at signalised intersection of Medowie Road and South Street.	Section 3.4.6
RMS seek clarification of access to overflow carparks, and how this may impact on queuing of the internal roadway.	One overflow car park on the revised plan. Access to this car park is not located off the internal roadway.	Appendix A - Site Plan
RMS recommend meeting with Council to discuss	Completed	See meeting minutes attach in Appendix F

2. Existing Situation

2.1 Site Description and Proposed Activity

The subject site is located in Medowie and is currently occupied by a rural residential dwelling. The majority of the site is vacant land and the existing infrastructure is to be removed as part of the proposal, to make way for an education precinct and a chapel.

2.2 Site Location

The subject site has frontage onto Medowie Road to the east and Kingfisher Close to the north. It incorporates two lots, 2 Kingfisher Close, Medowie and 507 Medowie Road, Medowie. The location of the site is shown below in Figure 2-1.

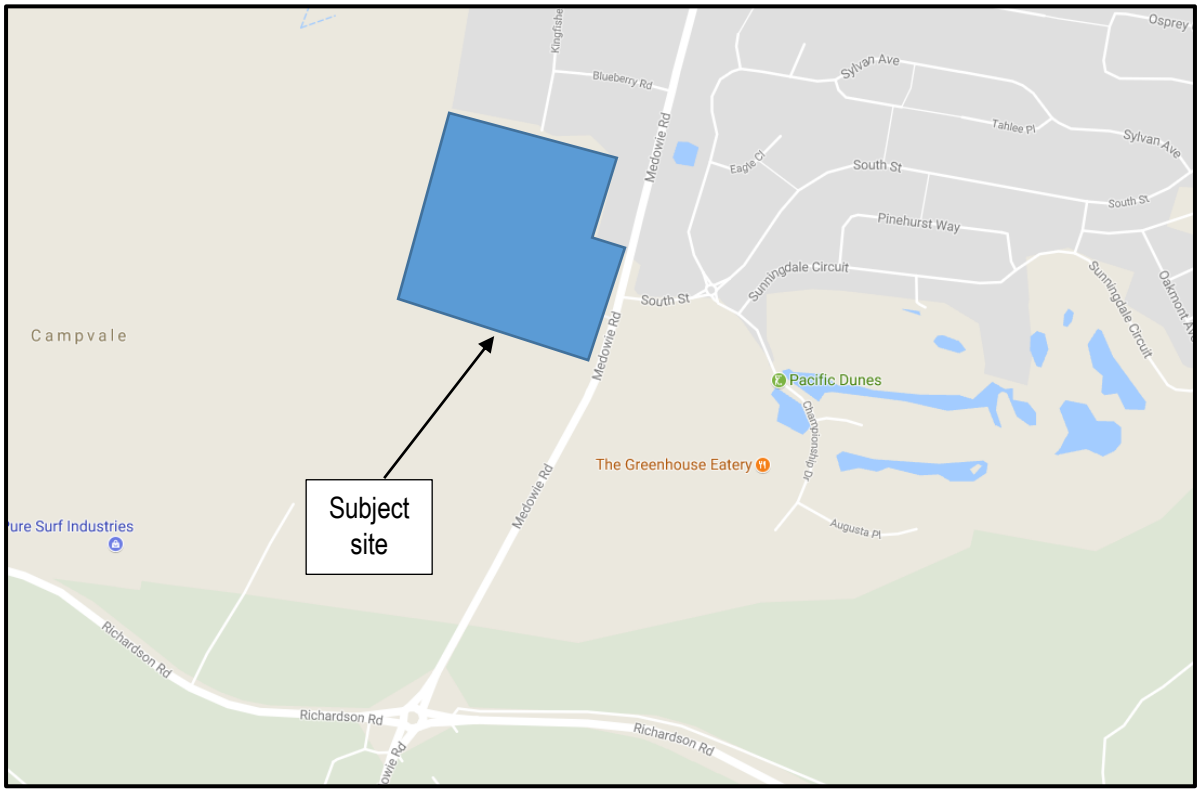


Figure 2-1 – Site Location (Source: Google maps)

2.2.1 Zoning and Adjacent Land Use

The majority of the subject site is zoned Low Density Residential (R2), whilst part of the site is zoned Rural Landscape (RU2). The adjacent land use is low density residential.

2.3 Site Access

Vehicle access is currently available off Medowie Road, with a driveway located 50 metres to the south of the intersection of Medowie Road and South Street. As a domestic driveway, all movements in / out are available.

This access will not be retained as part of the proposed development.

2.4 Existing Traffic Conditions

2.4.1 Road Hierarchy

Medowie Road

The main road through the locality is **Medowie Road**, which is a regional road (MR518) that runs along the eastern boundary of the site in a north / south orientation. It provides one lane of travel in each direction with a wide (15-17 metres) pavement width in the area passing the subject site, due to the channelled turn lanes provided for turning movements (right and left) into South Street. The posted speed limit in the vicinity of the subject site is 80km/hr, with limited sealed shoulder width available. Street lighting is provided at the intersection of Medowie Road and South Street, however there are no footpaths in the locality.

South Street

South Street is a local collector road, operating under a speed limit of 50km/hr. It intersects with Medowie Road at a priority controlled T-intersection, with Medowie Road having priority and allowing for all turn movements. There is a short acceleration lane (50 metres), provided for the left turn movement onto Medowie Road, with minimal assistance for the right turn movement available (13 metre lane) prior to merging.

South Street provides one lane of travel in each direction, with wide shoulders available but no pedestrian footpaths. The road width is 11 metres for the majority of its length however, the road widens at the intersection with Medowie Road with 31 metres available. At the give-way control for turning movements onto Medowie Road the road width is 11 metres allowing room for two vehicles to sit side by side. There is a 20m central median on South Street from the intersection with Medowie Road.

Port Stephens Council is the road authority for any new works on Medowie Road and South Street however the RMS will need to review and provide concurrence for all roads works and the intersection upgrade given the classification of Medowie Road.

2.4.2 Roadworks and Traffic Management Works

A review of the Port Stephens Council and RMS websites shows there are currently no road works occurring in the immediate vicinity of the subject site.

From the Medowie Planning Strategy (December 2016) there is a long term (10+ years) investigation of the strategic feasibility of upgrading Medowie Road to four lanes of travel. This is reiterated in the Medowie Traffic and Transport Study (URaP 2017), which refers to retaining the existing road reserve width of Medowie Road to facilitate the long-term investigation of using this road as a potential 4 lane road.

The Medowie Planning Strategy also refers to plans for Medowie Road to the south of South Street to become a gateway treatment for the entry to Medowie, with a change in speed limit to 70km/hr. These works have been included in the current Port Stephens Council Section 94A Development Contributions Plan Amendment No 8 (Project Number 20).

2.4.3 Pedestrian and Cycling Facilities

There are no pedestrian pathways provided in the immediate locality of the subject site, reflecting the low density of development along Medowie Road in the surrounding area. Cyclists are able to ride on the local roads, with some shoulder widening and cycling lanes also marked in the locality of the site. The Medowie Planning Strategy (December 2016) proposes an off-road shared path to the east side of Medowie Road, from Ferodale Road to South Street.

2.5 Traffic Flows

2.5.1 Peak Hour Flows

The proposed development provides education services. It is considered that the development will predominately generate traffic movements during the traditional school start and finish times. As part of the project work, Seca Solution collected traffic data at the intersection of Medowie Road with South Street on Wednesday 2nd August 2017, the outputs for which are provided in Attachment D.

The surveys were undertaken from 7:30-9:30 in the morning and 2:45-6 in the afternoon to include typical school drop off and pick up times, with the peak hours determined as being 8:15-9:15AM and 3.45-4:45PM.

A summary of the current traffic flows during the peak hours is provided below in Table 2-1.

Table 2-1 – Peak hour flows

Location		Peak Flow	
		AM	PM
Medowie Road (South of South Street)	Northbound	341	946
	Southbound	620	378
South Street	Eastbound	119	260
	Westbound	200	157

The peak hour traffic flows recorded along South Street in the AM peak were 319 vehicles (two-way), which increased to 417 vehicles in the PM.

South Street operates as a collector road for a residential subdivision in this area. The RMS Guide to Traffic Generating Developments provides recommended environmental capacities for collector streets, with 500 vehicles per hour maximum. As such, South Street currently operates within the recommended environmental capacity.

The RMS Guide also provides advice with regard to mid-block road capacity for urban roads, with the following applicable to Medowie Road as a two-lane, undivided urban carriageway:

- 900 vehicles per hour per direction

The traffic data collected for the project shows that northbound flows along Medowie Road in the afternoon peak exceeds this capacity, with 946 vehicles recorded. Under the RMS Guide this equates to a Level of Service (LoS) E, slightly exceeding the limit of LoS D (900 vehicles per hour). This LoS indicates drivers have little freedom to select their desired speed and manoeuvre within the traffic stream.

2.5.2 Daily Traffic Flows

The RMS Guide to Traffic Generating Developments indicates that peak hour flows typically represent between 8-12% of the daily flows (average 10%). Taking the average of the morning and afternoon peak flows recorded, the daily flows in the locality would be in the order of:

- Medowie Road - 13, 020 vehicles per day,
- South Street - 3,680 vehicles per day

2.5.3 Daily Traffic Flow Distribution

It can be seen from Table 2-1 above that there is a dominant flow southbound along Medowie Road in the AM, representing commuters travelling to work in the Newcastle Area. In the afternoon the flows reverse, with a bias northbound, representing workers within the surrounding area travelling home at the end of the day. Similarly, along South Street the majority of vehicles are outbound onto Medowie Road in the AM, with the reverse applying in the PM.

2.5.4 Vehicle Speeds

No speed surveys were completed as part of the study work. However, the volume of traffic in the peak periods does not encourage drivers to speed. Out of the peak periods when the traffic flows are much lower the road alignment could allow drivers to speed.

2.5.5 Existing Site Flows

There is currently one residential dwelling on site which is accessed off Medowie Road via a private driveway. As such there are currently negligible flows associated with the site.

2.5.6 Heavy Vehicle Flows

There were minimal heavy vehicle movements recorded during both the morning and afternoon peak periods, with 49 heavy vehicles in the morning, equating to 4% of the peak traffic flow and 42 heavy vehicles in the afternoon equating to 3% of the afternoon peak flow. A number of these related to public and school buses in the locality.

2.5.7 Current Road Network Operation

Observations on site show that the road network in the vicinity of the subject site operates reasonably well. Delays were observed out of South Street, for the right turn in particular, with vehicle queues forming in this location. Drivers were able to find gaps in the traffic flow with maximum delays observed to be less than 1 minute.

2.5.8 Traffic Safety and Accident History

A review of accident data provided by the Transport for NSW Centre for Road Safety shows 14 crashes have been recorded in the local area in the period between October 2011 and September 2016 (**Appendix B**). This incorporates accidents at the roundabout intersection of Medowie Road and Richardson Road, and to the north along Medowie Road from the roundabout to Blueberry Road.

Of these accidents, 7 occurred at the roundabout intersection, with the main cause in this location being cross traffic collision with 4 recorded. The 3 remaining roundabout accidents had varying causes including a rear end, off-road and other crash type. Given the high volume of traffic through this roundabout, it is considered to operate at a suitable level of safety given the number of accidents recorded.

Along Medowie Road between the roundabout and South Street 4 accidents occurred, with a range of causes including a U-turn manoeuvre collision, a vehicle turning right out of a domestic driveway colliding with a southbound vehicle and two vehicles going off-road.

The remaining 3 accidents involved vehicle movements at the intersection of Medowie Road and South Street. These included a right-far crash involving a vehicle turning right out of South Street colliding with a northbound vehicle in Medowie Road, as well as two rear end collisions involving northbound vehicles approaching the intersection. Given the low number of accidents at this intersection, it is considered the road in this location provides an adequate level of safety for road users. The roads and intersections are well laid out allowing drivers to operate in a safe manner.

2.6 Parking Supply and Demand

2.6.1 On-street Parking Provision

There is limited shoulder width available to allow vehicles to pull over on the side of Medowie Road in the locality.

Along South Street kerbside parking is generally available, with the typical restrictions at intersections and relating to the bus zones present on both sides of the road. There are additional restrictions on the southern side of the road relating to school bus zones. This includes a no stopping area in close proximity to the intersection for approximately 22 metres, with an additional no parking area adjacent running for 17 metres, followed by a bus zone for 70 metres. The signage for these areas stipulate operation between 7-9AM on school days.

2.6.2 Off-Street Parking Provision

None in the locality along Medowie Road.

2.6.3 Parking Demand and Utilisation

There is currently no demand for parking along Medowie Road in this location. Vehicles were observed to park along both sides of South Street during the afternoon traffic survey, in close proximity to the intersection. These vehicles related to pick-ups for children departing school buses that set down in this location.

2.6.4 Short term Set down or pick up areas

There are no set down or pick up areas in the immediate locality of the site.

2.7 Public Transport

2.7.1 Rail Station Locations

There are no train services in the locality, with the nearest rail station located in Hexham 30km to the south of the site.

2.7.2 Bus Routes and Associated Facilities

There are bus stops located on both sides of South Street, 150 metres east of the subject site. These stops provide no seating or shelter.

2.7.3 Rail and Bus Service Frequencies

Bus services in the locality are provided by Hunter Valley Buses. There are two routes provided that run along Medowie Road in the vicinity of the subject site which include:

- 136 – Raymond Terrace to Stockton: Operates 7 days a week with frequent trips throughout the day.
- 137 – Raymond Terrace to Lemon Tree Passage: Operates daily, with frequent trips Monday-Friday and limited trips on weekends and public holidays.

The bus routes are shown in Figure 2-2 to follow.

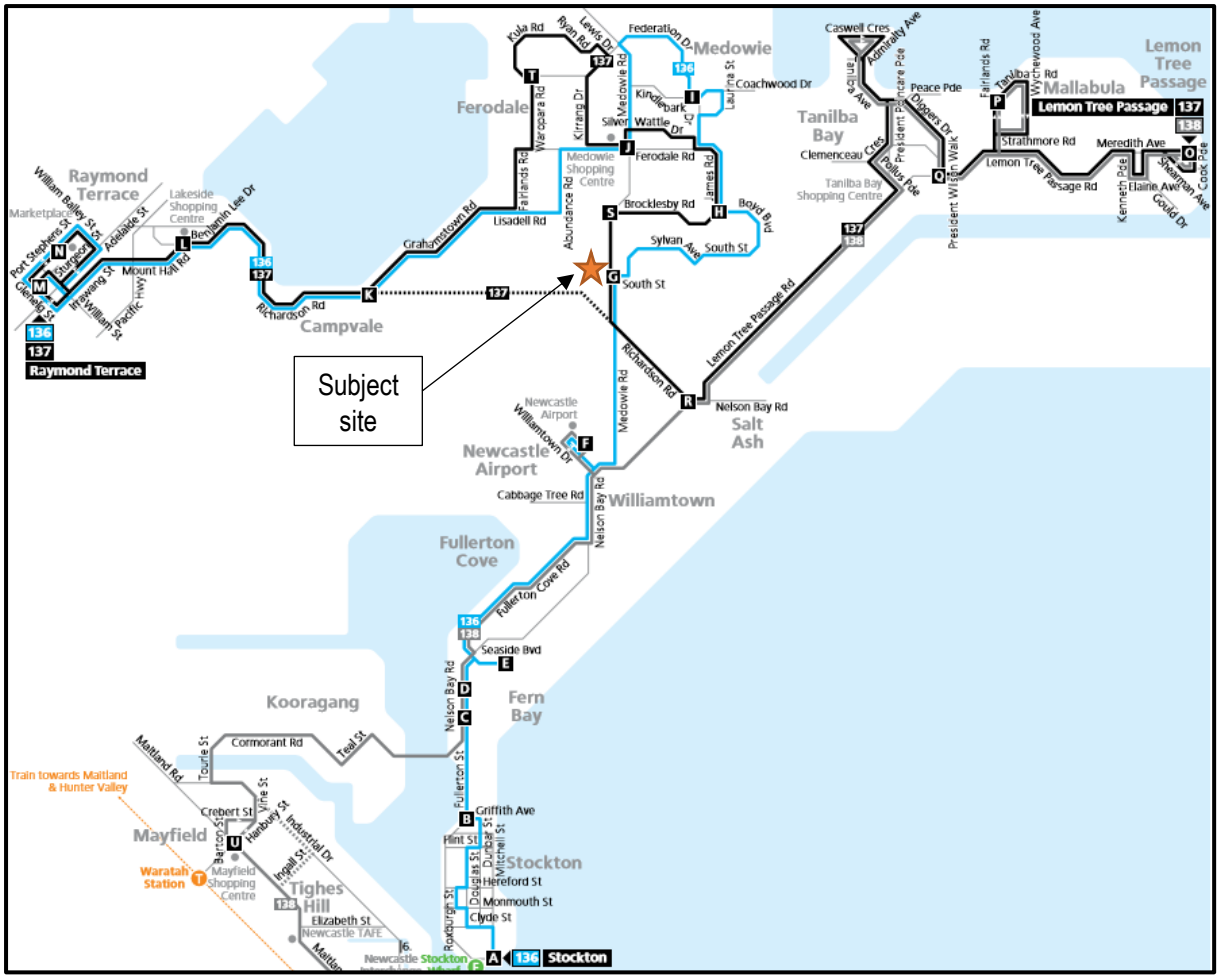


Figure 2-2 – Bus routes passing the subject site

There are also a number of school buses that pick up / drop off along South Street. The Medowie Traffic and Transport Study (2017) states there are 5 school buses which currently service the area.

2.8 Pedestrian Network

There are no footpaths on Medowie Road or South Street in the locality, reflecting the low demands in the area.

2.9 Other Proposed Developments

There are no other significant developments currently proposed in the vicinity of the subject site.

3. Proposed Development

3.1 The Development

The proposal details an educational development, including Catherine McAuley Catholic College, an Early Learning Centre and a chapel. It includes the following, to be implemented as a staged construction:

- Seven stream secondary school (1190 students, 125 staff)
- Three stream primary school (630 students, 35 staff)
- Early learning centre (124 spaces, 22 staff)
- Chapel (500 seats)

The development will cater for parking and pick up / drop off demands for the site. The site plan for the development is provided in **Appendix A**.

3.1.1 Phasing and Timing

The development is to be implemented as a staged construction. The staging plan for the development is provided in **Appendix A**.

Works along the road corridor (Medowie Road) and the bulk of the internal road layout for circulation and parking will be completed as part of the early works. The early learning centre and part of the secondary school will be constructed for the first stage, with the internal layout completed at this stage adequate to cater for the initial demands. The remainder of the internal road layout will be completed across the various stages, as required in conjunction with the development expansion.

Sufficient parking will be provided to ensure the DCP requirements are satisfied throughout the staging, this is discussed further in Section 3.4.4 to follow.

3.1.2 Selection of appropriate design vehicles for access and circulation requirements

In conjunction with light vehicles there will be a requirement for delivery vehicles to access the site with loading areas to cater for up to heavy rigid vehicles (up to 12.5 metres). Waste servicing will also be completed on site, which is typically completed by 10.5 metre medium rigid vehicles. School buses will access the site, with the internal road for buses to be designed to cater for these movements.

The layout of the car park will be designed to ensure appropriate circulation of service vehicles, allowing vehicles to enter and exit the site in a forward direction, as per AS2890 and Council requirements.

3.2 Access

3.2.1 Driveway Location

There will be an entry only driveway located at the southern boundary of the site on Medowie Road. This driveway will allow both left turns and right turns into the site, with sheltered turn lanes provided for both movements. To the north of this access driveway, there is a slip lane provided for buses only to enter the site.

A further site access will be provided via an upgrade to the intersection of Medowie Road and South Street. The existing priority controlled T-intersection shall become a signalised four-way intersection, with a new internal road for the site located directly opposite South Street. This new leg of the intersection will provide for outbound movements only, with all vehicles to exit the subject site at this location.

3.2.2 Sight Distances

Sight distance requirements for a signalised intersection are to be provided in accordance with Section 4 of the Road Design Guide. For the posted speed limit of 80km/hr along Medowie Road an Approach Sight Distance (ASD) of 100 metres is required. To the north of the proposed intersection there is 140 metres of ASD available,

whilst to the south there is good visibility with at least 150 metres available. For the speed limit of 50km/hr along South Street ASD of 45 metres is required, which is satisfied with in excess of 100 metres available. As such, there is adequate ASD for the signalised intersection.

There is a crest to the north of the intersection that creates a short length of Medowie Road where stopping sight distance is not available. A vehicle can disappear from a drivers view for a brief moment. This could impact upon the traffic signals and the ability for drivers to observe a queue. This can be mitigated by providing a high mast arm for the signals and a flashing yellow sign to advise of queues ahead.

3.2.3 Service Vehicle Access

Buses will access the site via the dedicate entry lane off Medowie Road, which provides efficient access to the bus bays on site. An internal roundabout is provided to allow buses to turn around on site and then exit the site in a forward direction at the signalised intersection of Medowie Road and South Street.

The internal roads for the development will be designed to allow for the appropriate movements of service vehicles. All waste collection will be completed outside of school drop off and pick up times to ensure that there is no conflict between waste collection and student / parent / teacher vehicle movements.

3.2.4 Queuing at entrances

Given the type of development there will be a significant number of vehicle movements generated during the school drop off and pick up periods. The demands associated with school drop off and pick up times can be intense, particularly during the afternoon which will often occur over a 15-minute period. Thus, there is the potential for delays and queues occurring on site during this time.

The site layout allows for an internal loop road and a drop off / pick up zone for light vehicles, as well as a separate zone for bus pick up / drop off.

The student drop off / pick up area is located well within the site to reduce the opportunity for any delays to create a queue back onto Medowie Road. The proposed road layout allows 502 metres queuing from the site entry off Medowie Road to the end of the drop zone, equating to the provision for 84 vehicles to queue on site. Additional visitor parking is to be allocated for pick ups thereby reducing the need for vehicles to queue on the circulation road. There are 41 spaces to be provided equating to a total provision for 125 vehicles to queue on site during the school pick up period.

Vehicle queues on site are to be monitored over the course of the staged development, with the operation of the drop zone to be examined to confirm that the layout is sufficient. Areas have been identified for internal road upgrades to provide additional queuing if required. These are noted on the attached site plan (refer to hatched line showing road extension around the retention pond). This layout would allow for 625 metres of queuing, being a provision for 104 vehicles to queue on the circulation road, giving a total provision for 145 vehicles to queue on site including the visitor parking.

The bus zone includes 5 spaces for loading, as well as provision for an additional 7 spaces for buses to hold along the internal road (slip lane), to prevent impacting on traffic along Medowie Road. To achieve this provision for queuing (12 total spaces) all buses are required to access the development from the south, with buses approaching from the north along Medowie Road to utilise the roundabout intersection with Richardson Road (1km south) to undertake a U-turn to access the bus zone. Discussion with Hunter Valley Buses has indicated the afternoon period will likely see all buses approach from the south along Richardson Road, thereby not requiring the U-turn, with only the morning period requiring the manoeuvre. Given the distance to the roundabout it is considered the manoeuvre is workable in principle. Further discussion with bus companies will be required as part of the ongoing development, once the enrolment of students and origins is determined, in order to assign appropriate bus services.

A management plan will be developed for the site to assist in the morning and afternoon drop off and pick up periods, with different operational hours proposed for the start and finish of each school, thereby reducing the peak

number of traffic movements. It is recognised however that there will be demand for families with students in both schools who may need to wait on site for the duration of both primary and secondary school pick up times.

For traffic exiting the site, the queues will be contained within the site and will not impact upon the external traffic movements.

3.2.5 Current access compared with proposed access

The existing access to the site is in the form of a domestic driveway, with a gravel surface, located off Medowie Road 50 metres south of the intersection with South Street. As a domestic driveway, all turning movements in / out of this access are available. This access will be removed as part of this project.

3.2.6 Access to Public Transport

There are existing bus stops located on South Street. There are currently no pedestrian pathways in the immediate area providing access to these stops.

The school will support a number of different school bus runs to and from the site and encourages students to use these buses rather than general public transport or private vehicles. The operation of existing bus services on South Street will be able to continue, with all services relating to the proposed development utilising Medowie Road and completing pick up / drop off internal to the site. The site will include a designated internal bus area to cater for school buses associated with the development.

3.3 Circulation

3.3.1 Pattern of circulation

All vehicles (excluding buses) will be required to enter the site at the access located on the southern boundary of the site, off Medowie Road. The internal roads allow for circulation through the site, providing access to the various parking areas on site, as well as the school drop zone. The circulation road has been designed to cater for the high demand for vehicles on site during school pick up, with storage provided to ensure queuing does not extend back onto Medowie Road. This includes a loop road along the southern boundary requiring drivers to complete a U-turn at an internal roundabout and travel back in the same direction. Outside of the peak periods a short cut has been provided for more efficient access to parking areas on site, with this shortcut to be controlled by a gate which is to be closed during peak school demands to ensure drivers utilise the full length of the circulation road.

The implementation of the staged development, with school expansion over a number of years, will allow for the travel habits and drop off / pick up operation to be established and controlled as the development progresses. At the beginning the traffic demands will be much lower, thus enabling drop off and pick ups to occur on-site in an efficient manner. The proper use of the infrastructure will be monitored to ensure parents / students are engaging in safe drop off, with no drop off to be permitted on Medowie Road.

It is considered the opportunity to establish safe practice when the capacity and easier to control, will then enable a suitable culture to develop over the course of the development.

Turning bays are provided on site where required, to ensure forward circulation through parking aisles. All vehicles will exit the site at the proposed signalised intersection of Medowie Road and South Street.

Buses will enter the site from the south using the slip lane off Medowie Road. The internal road allows for buses to pull into the dedicated bus bays, with a roundabout provided on site for buses to turn around and exit the site in a forward direction at the signalised intersection of Medowie Road and South Street.

3.3.2 Internal Road width (driveway)

The width of the internal driveways shall allow for two-way traffic movements in accordance with AS2890.

3.3.3 Internal Bus Movements

There is a designated bus area to be provided internal to the site, with access via a left slip lane off Medowie Road to be designated for bus use only. All buses will access the site from the south and utilise the slip lane provided, allowing buses to hold in this area if required without impacting upon through movements along Medowie Road. The internal roads for the development allow sufficient width for bus movements, with a roundabout on-site allowing buses to turn around on site and exit in a forward direction.

The layout of this bus bay allows for efficient loading and unloading of students, in close proximity to the forecourt area of the precinct. The design of a safe and efficient layout provides peace of mind for parents sending their children to school on buses as an alternative to private vehicle use.

3.3.4 Service Area Layout

There is a bin loading zone along the internal road near the Early Learning Centre, which allows for waste collection to occur off the circulation road. This zone allows for service vehicle access in and out in a forward direction, with drivers able to proceed to the site exit (signalised intersection of Medowie Road and South Street) and leave the site in a forward direction.

There is a further loading zone off the circulation roadway to the north of the site adjacent to the secondary school buildings. There is a turning bay provided upon exiting this zone to allow vehicles to turn around in one movement and proceed to exit the site in a forward direction.

3.4 Parking

3.4.1 Proposed Supply

The plans allow for the provision of 272 parking spaces over a number of bays, with 12 of these spaces to be designated as accessible parking across the site. All parking demands for the development will be catered for on site, with no on street parking. Accessible parking will be provided to satisfy Council DCP requirements and designed in accordance with AS2890.6 Off-street Parking for People with Disabilities.

There are a further 8 spaces to be provided for Primary School and Secondary School drop off and pick up. Outside of drop off and pick up periods, these 8 spaces are to be utilised for parking for the chapel. The school bus zones are proposed to operate in a similar manner with the bus zone along the western kerb (adjacent to the chapel) to be used to provide 8 accessible parking spaces, during periods when this area is not required for bus services. Accessible parking is to be provided in accordance with AS2890.6 for parallel parking.

3.4.2 Council code and local parking policies and plans

Parking requirements for educational establishments under the Port Stephens DCP are as follows:

- 1 car space per employee +
- 1 car space per 8 senior high school students +
- 2 bike spaces per 20 employees and students +
- 1 Accessible car space per 20 car spaces

Parking requirements for Child Care Centres under the Port Stephens DCP are:

- 1 car space for every 4 childcare places +
- 1 Accessible car space

The Port Stephens DCP requires a merit based assessment for the purposes of calculating the general parking requirements for a chapel. For the purpose of these parking calculations, we have adopted a parking rate of 1 car space per 3 seats. This is consistent with the DCP rate set by the adjoining Newcastle City Council and also Lake Macquarie Council. Port Stephens Council does specify bike and accessible parking requirements, which are:

- 2 bike spaces per 20 employees and visitors +
- 1 accessible car space per 20 car spaces

3.4.3 Parking Layout

A review of the site plan (**Appendix A**) shows there are four formal parking areas designated on site, with parking provision as per Table 3-1.

Table 3-1 – Parking layout

Parking Area	Allocation
Car Park 1	• 10 spaces for early learning centre drop off, including 1 accessible space • 12 spaces for the early learning centre staff • 41 spaces for visitor use • 38 spaces for secondary school students, including 2 accessible spaces • 2 accessible spaces for primary school use • 1 accessible space for visitor use • 8 spaces for drop off/pick up
Car Park 2	10 spaces for early learning centre staff
Car Park 3	16 spaces for primary school staff
Car Park 4	• 125 spaces for secondary school staff, including 6 accessible spaces • 17 spaces for primary school staff

There is a further potential parking area, marked as Car Park 5 on the site plan, which could provide 50 informal overflow spaces. This parking area is only to be provided if needed in the future.

As discussed in Section 3.4.1 the school drop zone in car park 1 and the bus drop zone are also to be utilised for chapel parking during the day, providing a combined total of 16 additional parking spaces, with 8 of these to be designated accessible.

3.4.4 Projected demand

Parking demands for the development will be highest during the week in school periods, relating to staff and senior student parking. Based on the DCP rates outlined previously in Section 3.4.2, the development will need to cater for the parking demands listed below in Table 3-2.

Table 3-2 – DCP Parking requirements for Schools and Child Care Centre

	Capacity	Number of Staff	Total DCP Requirement	Accessible Parking Requirement	Number of Bike Spaces
Secondary School	1190 (Assume 25% Seniors)	125	125+38 = 163	8 of 163	132
Primary School	630	35	35	2 of 35	66
Early Learning Centre	124	22	30	1 of 30	0
Total Parking			**228**	**11 of 228**	**198**

The bike parking requirements outlined in the DCP are excessive for the site. Given the catchment of this site it is considered that cycling will not be a major attractor for students and staff, with a significant reduction in spaces as

to that required by the DCP considered appropriate. A reduction to 50 bike spaces is therefore proposed for the site.

The proposed parking supply for the educational services of 230 spaces (11 of which are designated accessible), sees an excess of 2 spaces over the DCP requirement.

In regard to parking demand for the chapel, applying the parking rates outlined in Section 3.4.2 would see a requirement for 167 parking spaces. Shared use of the parking on site will be practical with peak parking demand for the chapel use occurring separate to the school use. Mass occurs of a Saturday evening and Sunday when the school and early learning centre are closed, thus demand will be catered for within the school parking. Wedding services of a Saturday can also make use of school parking facilities.

General parking demands associated with mid-week chapel use, during school hours, will be accommodated within additional parking on site provided for visitors. There are 42 spaces allocated for visitors on site including 1 accessible space. The school and bus drop zones are also to be used for chapel parking, providing an additional 16 parking spaces (with 8 accessible) during the day, outside of the school drop off and pick up period. This equates to between 42-58 spaces to cater for school period demands for the chapel and visitors, which is considered adequate to cater for demand.

The parking provision on site across the staging of the development has been assessed to ensure there is sufficient parking to cater for the parking demand at each stage, based on the development capacity for each stage. This assessment is shown in Table 3-3 below, which includes a demand for 16 spaces for the chapel on top of the DCP requirements for the school uses. The breakdown of development operations at each stage used to determine the parking demand can be found in Appendix B.

Table 3-3 – Parking provision throughout the staging of the development

Stage	Parking Demand	Parking Provision
1	61	120
2	71	120
3	101	130
4	116	129
5	165	272
6	244	272

3.4.5 Service Vehicle Parking

Loading bays are provided on site for service vehicles, allowing servicing to be completed without impacting upon internal circulation for the site.

3.4.6 Pedestrian and Bicycle Facilities

The proposed signalised intersection of Medowie Road and South Street is to include provision for pedestrian crossing on all legs of the intersection.

Based on the existing development in the area the pedestrian demands for the site are predominately from the east (along South Street), with some additional demands from the north along Medowie Road toward the Medowie Town Centre. There is negligible demand from the south along Medowie Road and there are currently no plans for future development in this area, with the Pacific Dunes Golf Course encompassing the majority of the land on the opposite side of Medowie Road. The upgraded intersection will provide pedestrian crossing on all legs, with the development including a pedestrian pathway linking the site to the intersection. This pathway travels along the north of the school access road, meeting Medowie Road at the location of the crossing on the northern leg of the intersection.

The internal pathway includes a clearly specified pedestrian crossing of the internal access road. During school start and finish times this location will see traffic demands for buses entering the internal bus zone, with minimal

demand for light vehicles passing through the crossing area. This roadway provides access to the bus pick up area and primarily to staff parking. Staff are typically on site prior to the start and finish of school, minimising vehicle movements at this time. This crossing can operate in a safe manner in conjunction with the low vehicle speeds on site and shall be part of the onsite management plan for the school.

There is a wide network of further internal pedestrian paths for the site, linking the various developments to the surrounding parking areas, enabling all internal movements to occur in a safe manner.

Bicycle storage facilities will be provided within the school grounds to cater for both staff and student cycling demands.

4. Transportation Analysis

4.1 Traffic Generation

4.1.1 Primary School and Secondary School Mode of Transport

The RMS Guide to Traffic Generating Developments does not provide a traffic generation rate for educational facilities. A traffic generation rate for the site has been applied based on the expected demands / operations of each school in regard to student mode of transport, with consideration given to comparable schools in the Hunter Region.

It is expected that a high percentage of students will access the development by bus, given the semi-rural nature of the subject site and the extent of the student catchment area, thus significantly reducing the private car travel demands. The school will also actively promote and support this, discouraging students from driving or being dropped off. Allowing for an education precinct with all age groups catered for on the one site will enable families with children across various school years to access the site together, further reducing traffic demands.

4.1.1.1 Pedestrian / Cyclist Movements

Given the extent of development in the surrounding area the opportunity for walking and cycling is low for this development. Based on data provided by the Catholic Schools Office regarding the expected origins of students for both the primary and secondary schools (Detailed in Section 4.2.2 to follow), there will be in the order of 270 primary school students residing in the Medowie area and approximately 300 secondary school students. Assuming 40% of these students will be within walking / cycling distance of the development (based on residential development in Medowie) this would see the potential for 108 primary and 120 secondary students able to walk / cycle. It is recognised however that younger students (primary school) are less likely to walk to school, therefore allowing for 30% of the primary students to walk/cycle could see in the order of 32 pedestrian / cyclist movements. For the secondary school students in the locality it has been assumed up to 60% would walk / cycle, equating to approximately 72 students.

The development could therefore see pedestrian / cyclist demands for 5% of the primary school population and 6% of secondary school population.

4.1.1.2 Bus Travel Demand

Student travel data has been provided by the Catholic Schools Office detailing the modal split for a number of existing primary schools (4) and secondary schools (4) in the Hunter region, a summary of which is provided in **Attachment C**. It is noted the data provided applies to student arrival method during the morning which typically sees a higher percentage of private vehicle drop offs, with parents able to drop children off on the way to work with them travelling home by bus in the afternoon, resulting in a higher percentage of bus patronage in the afternoon. It is therefore considered this data provides the worst case for the percentage of students travelling via private vehicles.

Based on the data provided the bus occupancy for secondary schools is between 63-84% of the student population. As detailed below the application of 68.6% for the senior element of this development is therefore consistent with observed schools in the surrounding area.

The mode of travel data provided for the existing primary schools has been used to determine an appropriate modal split for the primary school use. The percentage of students arriving via bus across the 4 surveyed primary schools was between 36 – 50%, with each of these schools providing K-6 classes only. Based on this development providing K-12 classes across the whole of site, the use of bus travel by younger primary school children is anticipated to be higher than the average as they will have the opportunity to travel with older (secondary school aged) siblings. Furthermore, the encouragement of children travelling via bus from the outset of the staged development, will allow for a culture to be developed of bus travel as the primary mode of transport.

Given this, the higher end of the range was selected with a slight increase to provide for sibling travel. Therefore 55% of primary school students are anticipated to travel via bus for this development.

4.1.1.3 Private Vehicle

Given that there is no vehicle trip rate for schools this project has been benchmarked against a similar school configuration being St Aloysius Catholic Primary School and St Benedicts College (Chisholm). For the primary school the traffic generation outlined as part of the DA approval was 80 vehicles, for a capacity of 420 students, indicating a rate of 0.19 vehicle trips per student. This rate was subsequently applied to assess the traffic generation for a proposed 7 stream secondary school (St Benedicts College, capacity 1350 students) on the site adjacent and was accepted by Maitland City Council.

For the proposed secondary school capacity of 1190 students this rate was applied and equates to 226 vehicle movements in the AM drop off period (113 inbound and 113 outbound movements) with the same in the PM pick up period. Additional trips have been allowed for senior students driving to school. There are 38 parking spaces to be provided under the DCP for senior students on site, assuming full use, senior student movements in the AM (inbound) and PM (outbound) will be 38 vehicles.

For the secondary school this gives a total of 151 vehicles inbound and 113 outbound in the AM, with the reverse applying in the PM. Allowing for an average occupancy of 2 students per vehicle, 302 students are therefore being transported to/from the secondary school by private motor vehicles, equating to 25.4% of the total secondary student population. Accounting for walking/cycling of 6% would see the remaining 68.6% of secondary school students travel via bus.

For the primary school, accounting for the walking/cycling movements outlined previously of 5%, and primary bus travel of 55% the remaining 40% of primary school students' travel shall be via private vehicle. For the proposed primary school capacity of 630 students this equates to 252 students and applying a vehicle occupancy rate of 2 students per vehicle, indicates in the order 126 inbound and 126 outbound movements in the AM with the same in the PM pick up period.

4.1.1.4 Modal Split

Based on the traffic generation outlined previously, the overall modal split for the schools are shown in Table 4-1.

Table 4-1 – Number and percentage of primary school and secondary school students by mode of travel

	Primary School	Secondary School	Total
Number of Students	630	1190	1820
Private Vehicle Travel	252 (40%)	302 (25.4%)	554
Walk/Cycle	32 (5%)	72 (6%)	104
Bus Travel	346 (55%)	816 (68.6%)	1162
Buses Required	6.9	16.3	24

The number of buses required assumes a capacity of 50 seats per bus. In the long term (site at full development) it is anticipated the demand for buses for the school will be such that dedicated services will be provided servicing this development only. It is noted that if shared services are provided there could be demand for additional buses. Any demand for shared services is anticipated to be minimal, in the event shared services are provided these will be incorporated as part of the bus management plan and scheduling to ensure efficient operation of the bus zone.

Observations of other schools (St Paul's Catholic College Booragul, and Mount St Benedict College, Pennant Hills) show that bus demand can represent 55-75% of student enrolments. Operationally these schools see a demand for 40-50% of buses being loaded at one time. Applying this rate for the development with 24 total services, would see the potential for 10-12 buses required to hold in the bus bay during peak PM loading. Morning drop offs typically occur over a wider time period.

4.1.1.5 *Staff Movements*

Staff movements typically do not correspond with the peak movement of students, as the vast majority of staff will arrive at the school before the student arrival periods and leave after the students have departed. Allowing for the full complement of staff on site across the two schools, there would be 160 staff arriving in the AM and 160 departing in the PM. This would give total school flows of 438 vehicles in both the morning and afternoon. The staff movements have not been included in the traffic modelling for peak vehicle movements, with the student related trips determined to generate the peak demands for this development.

4.1.2 Early Learning Centre (ELC)

The RMS guide provides traffic generation rates for child care centres. For a long day care centre, the following rates apply:

- 0.8 peak hour trips per child during the morning peak (7:00am to 9:00am) and
- 0.7 peak hour trips per child during the afternoon / evening peak (4:00pm to 6:00pm).

For the proposed capacity of 124 children, the childcare centre would therefore generate up to 100 peak hour trips during the morning peak hour (50 inbound / 50 outbound) and 87 trips during the afternoon / evening peak (44 inbound / 43 outbound). Note that these rates do not allow for reduced demand associated with absenteeism, holidays/leave and shared trips with siblings at the ELC. It also doesn't allow for shared trips associated with siblings at the primary or high school. It is therefore considered the peak traffic generation for the proposed child care centre could be less than that calculated.

For daily trips, allowing 2 vehicle movements per child across the morning drop-off and afternoon pickup periods, and up to 22 staff, to arrive in the morning and depart in the afternoon, the proposed childcare centre could generate up to 540 vehicle movements per day.

4.1.3 Chapel

The RMS Guide does not provide trip rates for chapels. Equating the suggested parking rate of 1 space per three seats, to vehicle trips will see 1 vehicle trip per three seats, being 167 vehicle movements for full capacity events (500 seats). These vehicle movements will occur outside of the traditional drop off and pick up times associated with schools, with peak chapel demands occurring of a weekend or during the daytime (after 9.30am) associated with funerals, all being outside of the peak periods for the road network. As such, traffic impacts for the chapel are much less significant than that relating to the school use on site and will be accommodated by the road network assessed to cater for school traffic. This traffic has therefore not been included in the cumulative peak hour assessments.

4.1.4 Cumulative Traffic Generation – Education Uses

The total peak vehicle movements for the development (Early Learning Centre, Primary School and Secondary School uses - excluding school staff movements occurring school start and finish times) are shown in Table 4-2.

Table 4-2 – Peak vehicle movements for the development

	Secondary School		**Primary School**		**Early Learning Centre**		**Total**	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM	151	113	126	126	50	50	327	289
PM	113	151	126	126	44	43	283	320

It is recognised the majority of vehicle movements for the Early Learning Centre will not coincide with the school use, particularly in the PM, where the identified peak in the RMS Guide is 4pm-6pm. There will also be demand for cross use between school and child care, thereby not generating additional traffic demands. The vehicle movements for the Early Learning Centre have however been included in the peak movements above to ensure a robust assessment of the site.

4.1.5 Daily and Seasonal Factors

Traffic flows associated with this development will have significant variation for both daily flows and seasonal flows. For school developments the majority of weekday traffic movements occur in the morning and afternoon before and after school, with staff and students arriving and departing during this period. The traffic flows outside of these times during the day is typically minimal for schools, with infrequent variation through the week due to sports carnivals, excursions etc.

There will be virtually no flows relating to the high school and primary school during school holidays and weekends. The child care centre will also experience no traffic demand of a weekend, however there will be weekend traffic relating to the Chapel. Similarly, there shall be some additional daytime traffic throughout the day associated with the chapel with higher traffic demands associated with the occasional funeral.

4.1.6 Pedestrian Movements

The development shall generate pedestrian movements relating to local students and staff walking to school. Given the extent of residential development (existing and future) in the area, it is expected 5-6% of students will reside within walking/cycling distance of the development. Pedestrian demands are to the north and east of the subject site. The upgrade of the intersection of Medowie Road and South Street to a signalised intersection, will incorporate pedestrian phasing on all legs to allow pedestrians to safely cross Medowie Road.

The internal site layout allows for the safe and efficient movement of pedestrians through the site.

4.2 Traffic Distribution and Assignment

4.2.1 Hourly Distribution of Trips

The traffic demands associated with schools typically occur over a short period of time (20-30 minute peak) relating to pick up with a longer but lower peak of a morning for the drop off period. Outside of these periods the site is expected to generate low flows during the week. There will be intermittent periods of high demand relating to the chapel for functions including funerals and weddings, however regular church services will generate lower demands.

4.2.2 Origin / Destinations Assignment

Data has been provided by the Catholic Schools Office in regard to the catchment area for the proposed schools and the expected origins of students to attend. The data provided for the primary school is outlined in Table 4-3 below.

Table 4-3 – Existing Primary School students in Medowie feed zone.

	Existing Student Origins	Percentage of Capacity	Extrapolated to Maximum Capacity	Site Approach
Medowie	57	42.9%	270	From the north (90%) From the east (10%)
Karuah	16	12%	76	From the north
Tea Gardens	12	9%	57	From the north
Salt Ash	10	7.5%	47	From the south
Williamtown	9	6.8%	43	from the south
Hawks Nest	8	6.0%	38	From the north
North Arm Cove	5	3.8%	24	From the north
Pindimar	5	3.8%	24	From the north
Tanilba Bay	4	3.0%	19	From the south
Lemon Tree Passage	3	2.3%	14	From the south
Swan Bay	2	1.5%	9	From the north
Limeburners Creek	2	1.5%	9	From the north
TOTAL	133	100%	630	

The data provided for the 133 primary school students in the Medowie catchment zone has been extrapolated, assuming even growth in all areas (simplified), to predict the origin of future students for the school operating at full capacity (630 students). The direction of approach has been assigned depending on the most efficient route. Based on the table above the total distribution of primary school students approaching the subject site will be:

- 480 from the north (76%)
- 123 from the south (20%)
- 27 from the east (4%)

A summary of the data provided for the secondary school is outlined in Table 4-4 below.

Table 4-4 – Existing Secondary School students in Medowie feed zone.

	Existing Student Origins	Percentage of Capacity	Extrapolated to Maximum Capacity	Site Approach
Williamtown - Medowie - Karuah	153	29.2%	347	From the north (80%) From the east (10%) From the south (10%)
Stockton - Fullerton Cove	118	22.5%	268	From the south
Nelson Bay Peninsula	130	24.8%	295	From the south
Lemon Tree Passage - Tanilba Bay	61	11.6%	139	From the south
Anna Bay	36	6.9%	82	From the south
Tea Gardens - Hawks Nest	8	1.5%	18	From the north
Bulahdelah - Stroud	18	3.4%	41	From the north
TOTAL	524	100%	1190	

The secondary school data was interpreted in the same manner as that of the primary school. Based on the table above the distribution of secondary school students approaching the subject site will be:

- 337 from the north (28%)
- 818 from the south (69%)
- 35 from the east (3%)

The summaries of the directional splits outlined in Table 4-3 and Table 4-4 represent the AM inbound distribution for the school use of the site. For the AM outbound movements, the following has been applied:

- 50% returning in the same direction as approach and
- 50% continuing their journey as a diverted trip. For drivers travelling to work, 80% will have destinations to the south, with 20% assumed working to the north.

In the afternoon pick up period, PM inbound movements will be the reverse of the AM outbound movements and PM outbound movements will be the reverse of AM inbound movements.

Applying this split of movements to the traffic generation outlined previously in Table 4-2**Error! Reference source not found.**, will see the distribution outlined below in Table 4-5.

Table 4-5 – Distribution of Primary School and Secondary School traffic in AM and PM

AM						
	Primary School		Secondary School		Total	
Origin / Destination	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND
To / From the north	96	61	43	27	139	88
To / From the south	25	62	105	85	130	147
To / From the east	5	3	4	2	9	5
Total	126	126	152	114	278	240
PM						
	Primary School		Secondary School		Total	
Origin / Destination	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND
To / From the north	27	43	61	96	88	139
To / From the south	85	105	62	25	147	130
To / From the east	2	4	3	5	5	9
Total	114	152	126	126	240	278

Traffic associated with the Early Learning Centre has been allocated based on the residential development in the area, as well as the likelihood of dual purpose trips dropping off school students.

- 60% from the north
- 20% from the south
- 20% from the east

The same allowance has been made as that for the school movements regarding returning home and travelling to work. Applying this split to the traffic generation outlined previously in Table 4-2, will see the distribution outlined to follow in Table 4-6.

Table 4-6 – Distribution of Early Learning Centre Traffic in AM and PM

AM		
Origin / Destination	INBOUND	OUTBOUND
To / From the north	30	20
To / From the south	10	25
To / From the east	10	5
Total	50	50
PM		
Origin / Destination	INBOUND	OUTBOUND
To / From the north	18	26
To / From the south	22	9
To / From the east	4	8
Total	44	43

Combining the schools and early learning centre, sees the following distribution of traffic during the AM (

Figure 4-1) and PM (Figure 4-2) peak periods:

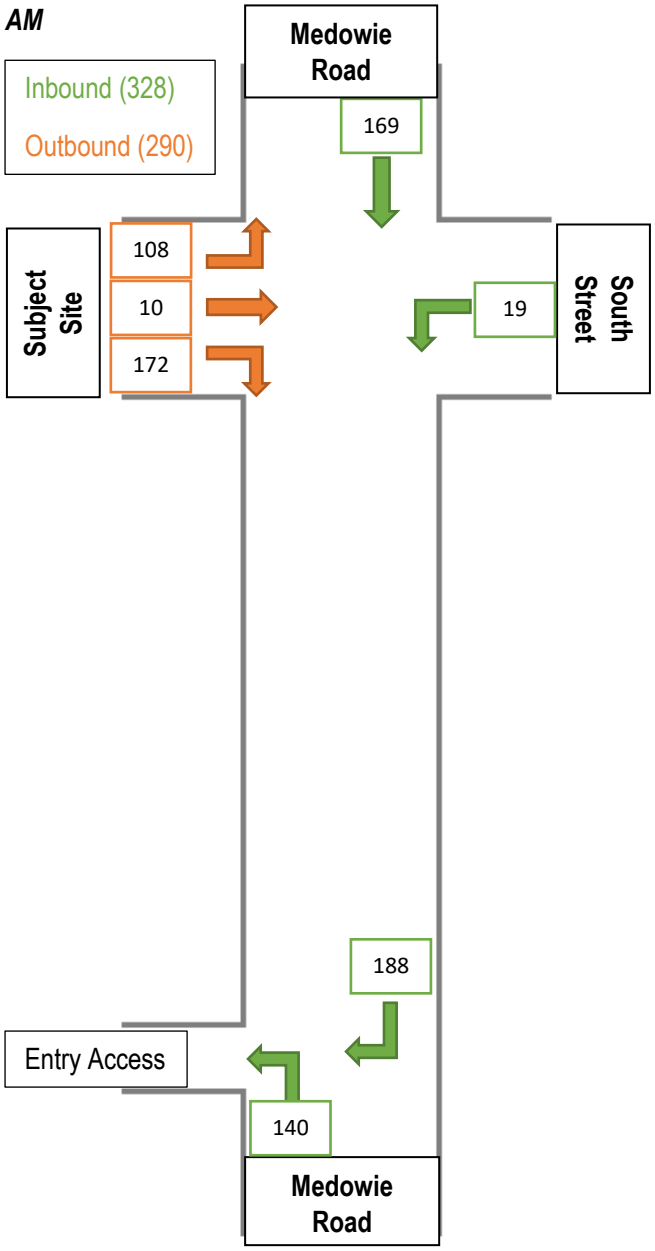


Figure 4-1 – Distribution of traffic during the AM peak period

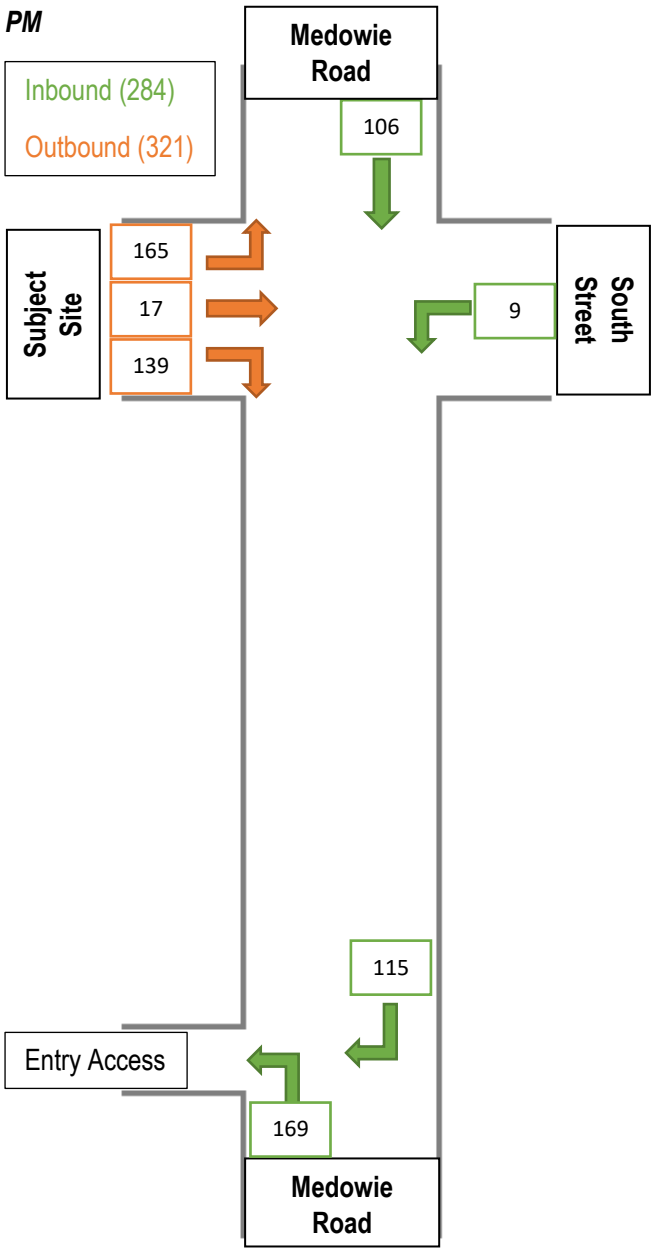


Figure 4-2 – Distribution of traffic during the PM peak period

There will be additional movements relating to buses for the development, utilising the dedicated slip lane to enter the subject site. Bus movements for the development (24) have been distributed based on the origin of students outlined previously, with 11 with origins from the north and 13 with origins from the south. All buses will access the site from the south, with buses originating from the north travelling through the intersection of Medowie Road and South Street and turning around at the Richardson Road roundabout 1 kilometre south of the site.

4.3 Impact on Road Safety

The installation of traffic signals at the existing intersection of Medowie Road and South Street will increase the level of safety for turning movements over the existing give-way controlled T-intersection. Traffic signals will ensure safety is maximised for both road users and pedestrians.

The development will include a new entry only access off Medowie Road. The proposed left turn into this access will include a channelised left turn deceleration lane designed to RMS standards. The right turn into this access will also provide a sheltered turn lane, with sufficient length to cater for any potential vehicle queues. It is considered that the additional traffic flows will not have an adverse impact upon the road capacity or safety in this location, with the development flows accommodated by the proposed upgrades.

A 40 km/h school speed zone will be in place during the busy drop off and pick up periods associated with the school which will also improve road safety for all users.

4.4 Impact of Generated Traffic

4.4.1 Impact on Daily Traffic Flows

The overall impact upon daily traffic flows in the locality will be relatively low, as outside of the drop off and pick up periods the traffic movements associated with the school are minimal. Traffic associated with the drop off and pick up period will also include a high percentage of local traffic already on the local road, diverted into the site and then re-joining Medowie Road as part of the daily commute.

For the critical northbound PM peak which currently exceeds 900vph (3:45 – 4:45PM) the additional traffic generated by the proposed development will occur prior to 3:45PM therefore not impacting upon its current level of service. Any additional movements during the peak period will be minor and have a relatively low impact upon the existing operation of the road. Outside of this peak demand period there will be no impact on the overall flows along Medowie Road.

The additional lanes provided at the upgraded intersection will increase the capacity in this location as well as road safety and will cater for the turn movements associated with the outbound traffic movements from the school. The signals provide certainty for traffic entering or exiting South Street.

The existing peak hour traffic adjacent to the site is well within acceptable limits for the classification as local urban roads, as demonstrated in Section 3.5.1 above. The current traffic flows have been compared with the capacity of these roads and all of the road in the vicinity of the subject site currently have significant spare capacity. It is considered that as these roads have spare capacity during the critical peak periods, then there is spare capacity to cater for the additional traffic movements associated with the development for the daily impact.

4.4.2 Peak Hour Impacts on Intersections

As part of the assessment for the proposed development, the intersection analysis program SIDRA has been used. The upgraded intersection of Medowie Road and South Street has been assessed along with the proposed entry access to the south of this intersection. The peak traffic flows associated with the development have been assigned as per Section 4.2.2 above.

The SIDRA analysis has reviewed the operation of the road layout with the proposed upgrades for the following scenarios:

- Existing situation based on surveyed traffic flows (2017) + Full development flows
- Future design year (2027) allowing for 2.4% growth along Medowie Road + Full development flows

The results of the SIDRA modelling follow:

Table 4-7 – SIDRA results Medowie Road and South Street AM/PM peak flows, existing 2017 + development flows

Approach	Level of service (Approach)	Average Delay (seconds)	95% Back of Queue (metres)
South: Medowie Road	B / B	16.5 / 18.6	35.9 / 80.8
East: South Street	C / C	35.8 / 36.6	28.4 / 20.6
North: Medowie Road	B / B	23.3 / 27.0	124.0 / 82.2
West: South Street	C / C	37.5 / 37.7	57.8 / 59.8
All Vehicles	B / B	26.1 / 26.0	124.0 / 82.2

Table 4-8 – SIDRA results school entry AM/PM peak flows, existing 2017 + development flows

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
South: Medowie Road	Left Turn	A / A	8.0 / 7.7	3.1 / 3.6
North: Medowie Road	Right Turn	A / A	7.1 / 10.6	5.2 / 5.1

It can be seen that the proposed intersection upgrades are sufficient to cater for the existing flows, and full development flows. The road network will operate to an adequate standard along Medowie Road, with the signalised intersection of Medowie Road and South Street operating at LoS B and the school entry access operating at LoS A in both the AM and PM. Delays and queues on all approaches are within acceptable limits.

As per normal RMS requirements, the intersection was then assessed allowing for 2.4% annual background growth along Medowie Road to 2027. This growth rate is consistent with that assigned for the high growth scenario in the Medowie Traffic and Transport Study (URaP 2017). A 50% increase in school related traffic was also included to ensure a rigorous assessment of the proposed intersections.

Table 4-9 – SIDRA results Medowie Road and South Street AM/PM peak flows, future growth (2027) + development flows

Approach	Level of service (Approach)	Average Delay (seconds)	95% Back of Queue (metres)
South: Medowie Road	B / B	16.2 / 21.3	46.0 / 107.6
East: South Street	C / C	37.1 / 37.3	29.5 / 20.6
North: Medowie Road	B / C	27.9 / 29.2	187.3 / 110.0
West: South Street	C / C	39.6 / 35.8	94.9 / 90.4
All Vehicles	C / B	29.1 / 26.2	187.3 / 110.0

Table 4-10 – SIDRA results school entry AM/PM peak flows, existing 2017 + development flows

Approach	Movement	Level of service	Average Delay (seconds)	95% Back of Queue (metres)
South: Medowie Road	Left Turn	A / A	8.4 / 8.0	5.3 / 6.0
North: Medowie Road	Right Turn	A / A	8.0 / 17.0	9.3 / 13.4

The above results show that accounting for future growth, both intersections will operate at LoS B or C, with minor increases in average delays and queues for all movements.

4.4.3 Impact of Queuing

A key consideration for this development will be associated with the queuing provision on-site in the PM peak. Typical school operation sees the majority of vehicles arriving in the 15 minutes prior to school finishing and therefore being required to hold on site until school finishes, as opposed to the morning drop off period which occurs more efficiently with parents dropping off and leaving with minimal delay. Sufficient queuing is required to ensure that traffic generated by the development does not impact upon the operation of the proposed school entry access on Medowie Road.

The traffic generation outlined in Section 4.1 shows PM pick up will see peak demands for 284 inbound vehicles over the full development, with 240 relating to school pick up and the remainder (44) for child care which will be dispersed over a wider time period. Staggered finish times will also allow for school related demands to occur at separate intervals, reducing the queuing demand on site. Assuming each school pick up operates autonomously, the primary school will have the highest demand for pickups (126 vehicles) given the higher reliance on private vehicle travel.

Allowing for 90% of these 126 vehicles to arrive in the 15 minutes prior to school finishing (with the remaining 10% arriving later) could see potential demand for up to 114 vehicles on site in this period. Based on this breakdown of vehicle trips in the PM pick up, the development would require provision for 114 vehicles to queue between the site access and the drop zone or alternatively park on site. The proposed layout provides 502 metres of queuing (84 vehicles) and 41 parking spaces to accommodate pick up demands for up to 125 vehicles, being 11 spaces over that anticipated.

The operation of pick up / drop offs will be monitored over the initial stages of the development, whilst the school capacity is lower and so are travel demands. The modal split for students travelling to the school during early operation will be assessed to determine the actual reliance on private vehicle use. Pending this data, the proposed layout, has the potential to be upgraded (as discussed previously in Section 3.2.4) to provide up to 625 metres, or total queuing/parking for up to 145 vehicles.

4.4.4 Impact of Construction Traffic

Staged construction shall limit the impact of construction traffic on the local road network.

The construction work will require a number of trucks, to deliver materials including concrete to the site. This will occur over a number of weeks and months as the site is developed, thereby reducing the impact of this traffic during the peak periods. An important factor for the construction will be the impact of construction workers and their vehicles. All construction vehicles related to the site works will be able to park on site. This can be determined during the detailed design stage of the project.

The development will require upgrade of the road corridor along Medowie Road, which shall require a Construction Traffic Management Plan (CTMP). A formal CTMP will be completed as part of the detailed design phase and within the requirements of a WAD for the construction work along Medowie Road.

All works on site will be governed by the relevant EP&A rules and as stipulated within any development consent granted. This will include hours of work.

4.4.5 Background traffic and other developments

There are no other significant developments underway in the locality that will be affected by this proposal.

4.5 Public Transport

4.5.1 Options for improving services

Limited options. The site is not a major generator / attractor for public transport. The school will be well serviced by dedicated school bus services, with routes to service the extended catchment area proposed for the school. It is not expected that the school services would impact on the public bus services within the vicinity of the site.

4.5.2 Pedestrian Access to Bus Stops

The inclusion of pedestrian phases on the signalised intersection at South Street shall improve access to bus stops in this area.

School bus services shall be contained within the site with access along the internal pathways.

4.6 Pedestrian and Cyclists

The site will provide internal connections to the dedicated bus zone and to the signalised intersection.

A cycle lane shall be incorporated into the intersection design of Medowie Road and South Street.

5. Improvement Analysis

5.1 Improvements to Accommodate Existing Traffic

Observations on site indicate the intersection of Medowie Road and South Street operates with delays for turning movements out of South Street and the right turn into South Street. It is noted that traffic flows northbound along Medowie Road in the PM peak period slightly exceed the capacity of 900 vehicles per hour.

The upgrades proposed along Medowie Road to cater for the development, including the signalised intersection of Medowie Road and South Street with dual lanes through this intersection, will ensure that existing and future traffic flows can be accommodated in this location. This upgrade will also improve the safety of turning movements into and out of South Street

5.2 Improvements to Accommodate Background Traffic

The Sidra analysis allowed for 2.4% background growth, which was consistent with the value determined in the Medowie Traffic and Transport Study (URaP 2017) for the high growth scenario. The proposed upgrades along Medowie Road are sufficient to cater for this growth over the next 10 years.

5.3 Additional Improvements to Accommodate Development Traffic

The proposed upgrades along Medowie Road outlined previously are considered sufficient to accommodate the future flows, as shown in the Sidra analysis.

5.4 Alternative Improvements

No alternatives are put forward for consideration.

6. Summary and Recommendations

6.1 Summary

The site access is located on Medowie Road, with the existing intersection of Medowie Road and South Street to be upgraded to traffic signals, with a new leg to the west allowing for vehicle egress from the subject site. The operation of these traffic signals has been assessed with SIDRA, based upon the current traffic numbers surveyed as part of this project and confirm that the installation of traffic signals can accommodate the future development flows and background growth, with acceptable delays and congestion.

The further site access will allow for safe and appropriate access to the subject site, with good visibility available for drivers entering the subject site from both directions. Channelised turn lanes will minimise the impact of these turning movements on through traffic along Medowie Road. The bus slip lane off Medowie Road and the internal road layout will allow for the efficient movements of buses into the site and safe movements for buses travelling back onto the external road network, controlled by the proposed traffic signals.

The layout of the access points and internal roads has been designed to allow for two-way traffic movements in accordance with AS2890. Allowing for the application of the Council DCP the overall parking demand for the educational component is 228 parking spaces. Port Stephens DCP allows for a merit-based assessment of parking requirements for chapels. Peak parking demand for this use has been assessed based on Newcastle City Council and Lake Macquarie Council DCP rates, which would require 167 spaces for this development. The peak parking demands for the chapel will primarily be of a weekend when school parking is available for use. As such, parking for the chapel has been provided to cater for mid-week demands.

The project proposes a total supply of 272 parking spaces, including 230 spaces designated for the schools and early learning centre, being 2 spaces in excess of the DCP requirements, and a further 42 spaces to cater for school visitors and mid-week demands for the chapel. In addition to this allocated parking, the school and bus drop zones can be utilised for parking outside of the pickup and drop off periods. This provides a further 16 parking spaces for visitors/chapel patrons, 8 of which are to be accessible.

The additional traffic movements generated by the development will have a manageable impact on the surrounding road network, with the use of bus services limiting the volume of traffic for this development. The typical parking demands associated with the development can be accommodated on site, with the parking provided in accordance with the Port Stephens Council DCP, and as such will not impact upon the adjacent road network.

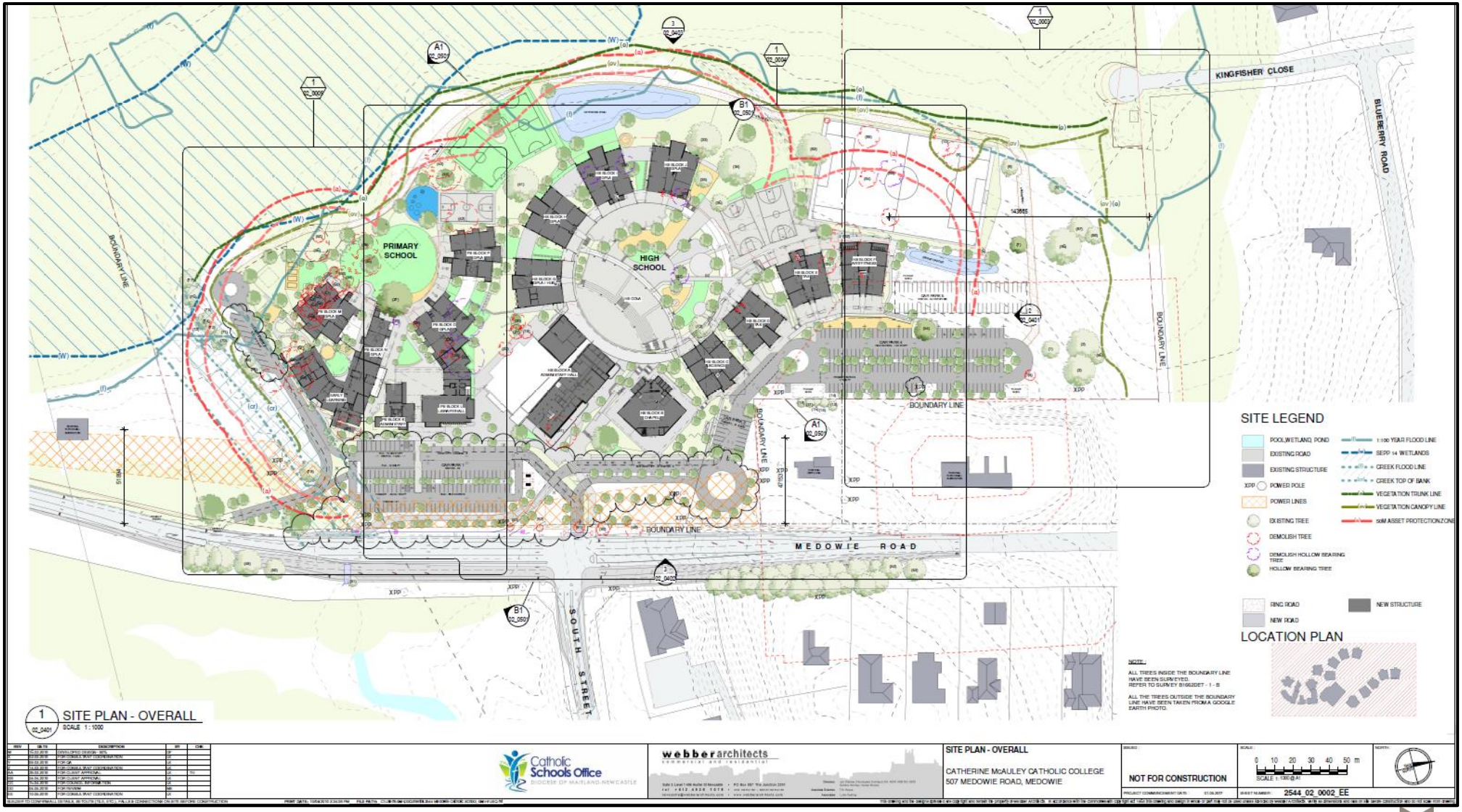
It is considered that the development is therefore consistent with the intention of the Development Control Plan in relation to traffic, parking and access.

6.2 Recommendations

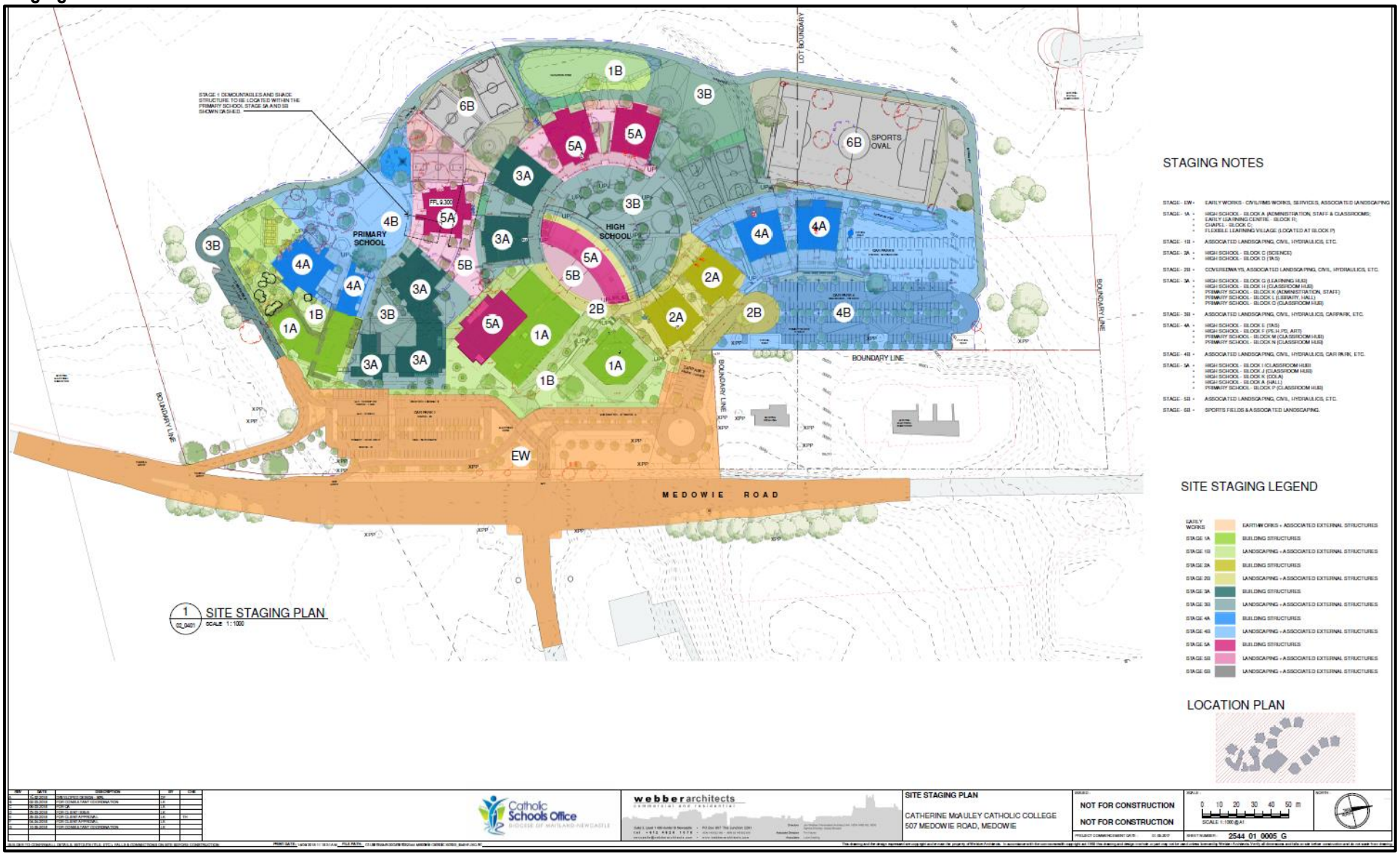
From the site work undertaken and the review of the development proposal and associated plans against the requirements of the RMS Guide to Traffic Generating Developments, Austroads Guide to Traffic Management, and the Port Stephens DCP, it is considered that the proposed development application should be approved on traffic and access grounds.

Appendix A Plans

Site Plan



Staging Plan



Appendix B Parking Requirements Throughout Staging

MEDOWIE CATHOLIC COLLEGE ESTIMATED STAGING AND NUMBERS											
Stage	Year of Opening	Buildings Operational	Comment	Car Parks Visitors (required)	Attending Students (max)	Car Parks Students (max)	Car Parks Staff (Max)	Car Parks Required	Car Parks Total Required	Car Parks Total Supplied	Surplus Car Parks for Visitors
1	2020	HS - Block A	Year 7	0	150	0	15	15	61	120	59
		PS	NA	0	0	0	0	0			
		ELC	Full capacity	0	124	0	25	30			
		Chapel	500 seat	16	0	0	0	16			
2	TBC	HS - Block C & D	Year 7 & 8	0	330	0	25	25	71	120	49
		PS	NA	0	0	0	0	0			
		ELC	Full capacity	0	124	0	25	30			
		Chapel	500 seat	16	0	0	0	16			
3	TBC	HS - Block G & H	Year 7, 8 & 9	0	510	0	40	40	101	130	29
		PS - Block K, L & O	Year K, 2	0	180	0	15	15			
		ELC	Full capacity	0	124	0	25	30			
		Chapel	500 seat	16	0	0	0	16			
4	TBC	HS - Block E & F	Year 7, 8, 9 & 10	0	690	0	50	50	116	129	13
		PS - Block M & N	Year K, 1, 2, 3	0	360	0	20	20			
		ELC	Full capacity	0	124	0	25	30			
		Chapel	500 seat	16	0	0	0	16			
5	TBC	HS - Block I, J, Hall & COLA	Year 7, 8, 9, 10 & 11	0	870	19	70	89	165	272	107
		PS - Block P	Year K, 1, 2, 3, 4 & 5	0	540	0	30	30			
		ELC	Full capacity	0	124	0	25	30			
		Chapel	500 seat	16	0	0	0	16			
6	TBC	HS	Years 7 to 12	0	1050	38	125	163	244	272	28
		PS	Years K to 6	0	630	0	35	35			
		ELC	Full capacity	0	124	0	25	30			
		Chapel	500 seat	16	0	0	0	16			

Red text cells (stages 3, 4, 5) are estimates only and have not been confirmed with the CSO

Car park calculations above exclude Loading Zones; Drop Off Zone (8); Bus Drop Off / Chapel Accessible Car Parks (8); and Overflow (50).

High School car parks have been proportional distributed across stages 5 and 6 when year 11 and 12 are in attendence.

Appendix C Student Travel Data

	St Paul's Booragul	St Pius Adamstown	St Joseph's Lochinvar	St Clemente Mayfield	St Joseph's Kilaben Bay	St Patrick's Lochinvar	St Patrick's Cessnock	St Brigid's Raymond Terrace
Sample Schools	Secondary 7 – 11 857 students	Secondary 7 – 10 1019 students	Secondary 7 – 12 908 students	Secondary 7 – 10 742 students	Primary K – 6 253 students	Primary K – 6 472 students	Primary K – 6 390 students	Primary K – 6 403 students
% of students who arrive at school by car	27-35%	8%	25%	11%	40%	58%	45%	58%
% of students who arrive by bus	63-71%	67%	70%	84%	50%	37%	45%	36%
% of students who walk or arrive by bicycle	2%	25%	5%	5%	0%	5%	10%	6%
% of students who use Out of School Hours (OOSH) Service					10%			

Appendix D Site Photos

Photo 1- Existing intersection of South Street and Medowie Road

Photo 2 - Cross-section of South Street to the east

Photo 3 - Cross-section of South Street to the west, showing median at intersection

Photo 4 - Cross-section of Medowie Road to the north

Photo 5 - Existing site access off Medowie Road

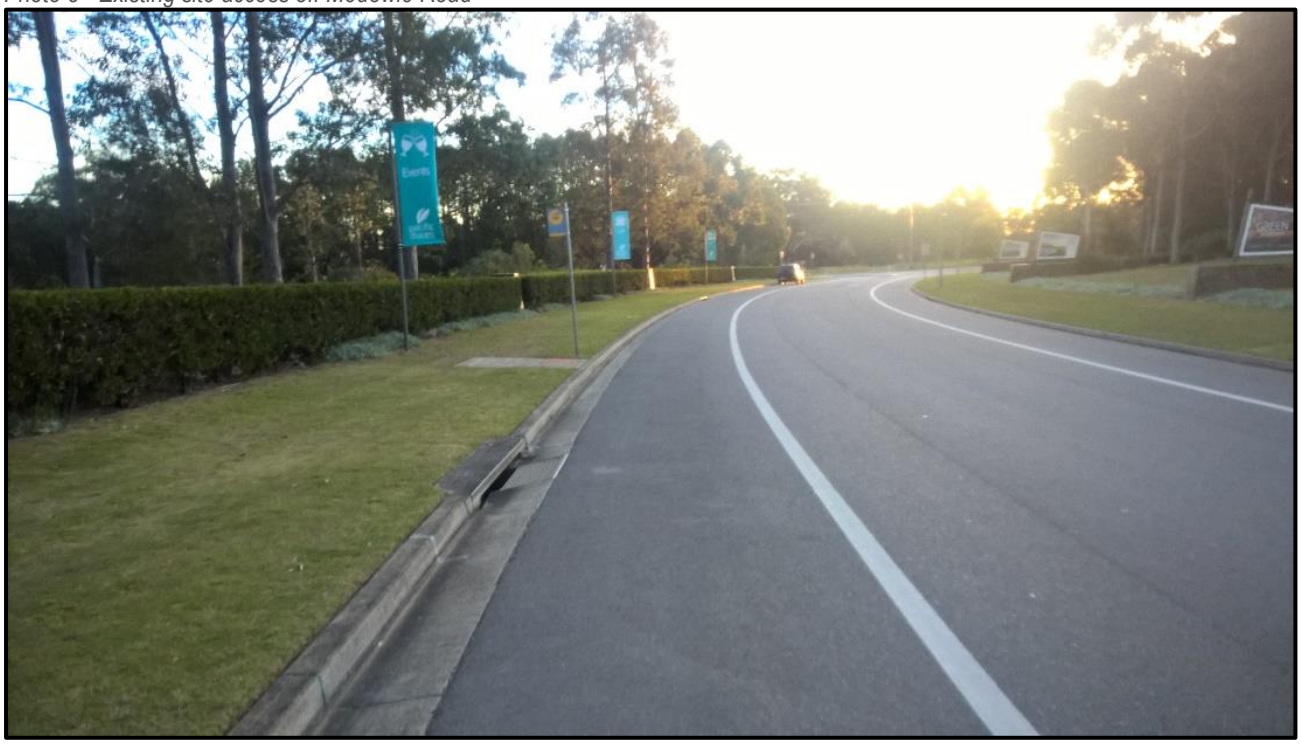


Photo 6 - Bus stop on southern side of South Street looking west

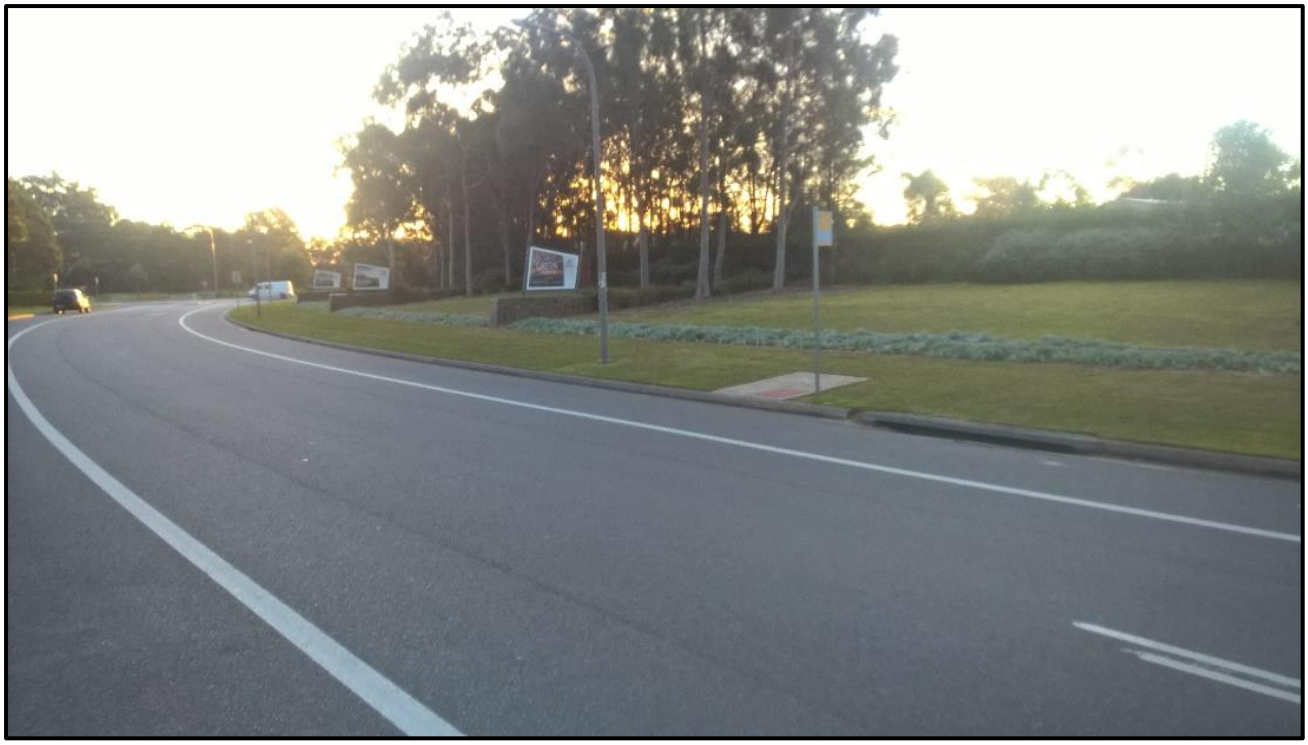
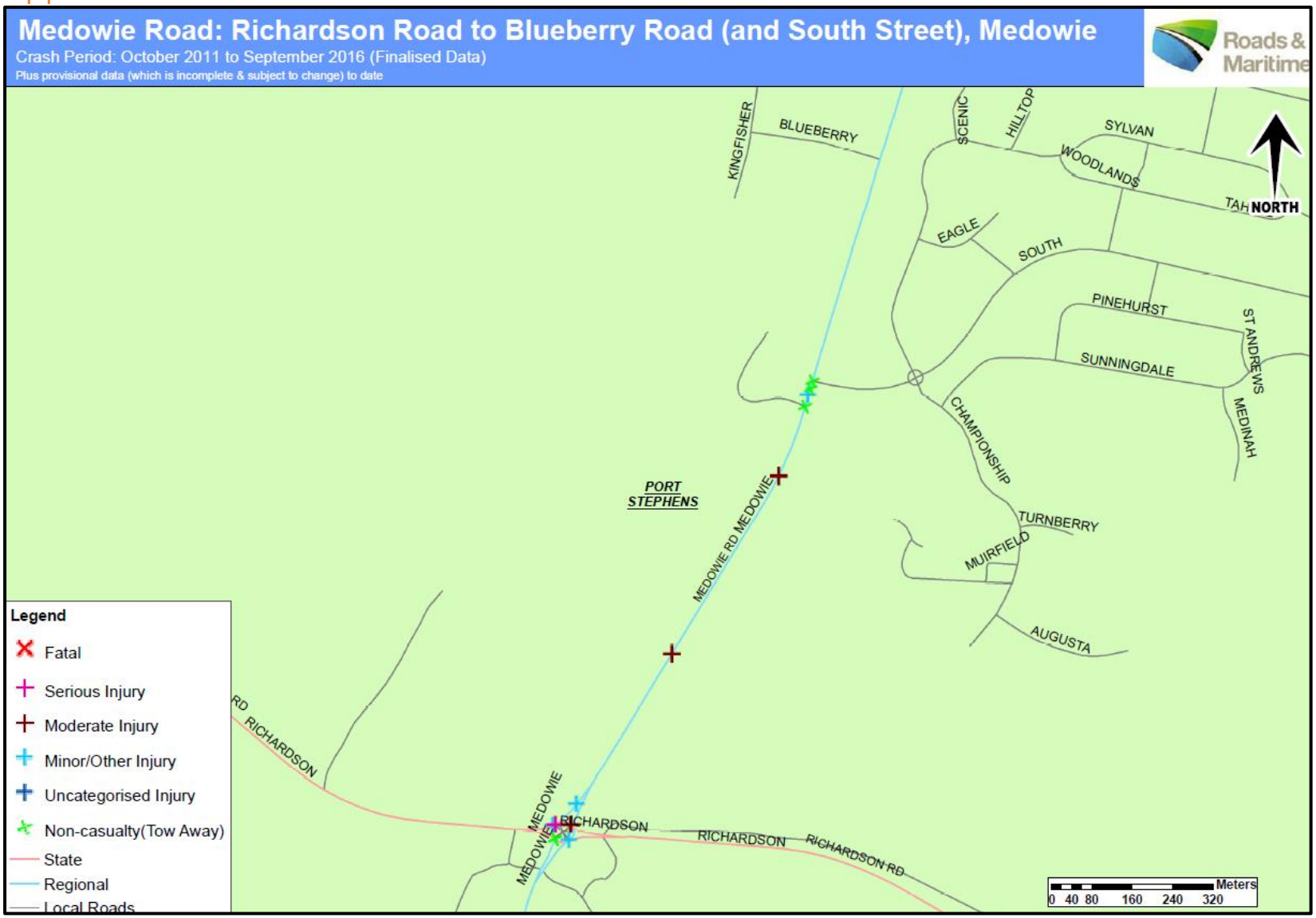


Photo 7 - Bus stop on northern side of South Street looking west

Appendix E Accident Data



Detailed Crash Report - sorted

Transport for NSW — Centre for Road Safety

Crash No. / Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region			**Port Stephens LGA**				**Medowie**							**Medowie Rd**						
786319 P	10/02/2012	Fri	13:40	1 km N	RICHARDSON RD	2WY	STR	Fine	Dry	80	3	CAR	M36	N in MEDOWIE RD	60	Proceeding in lane	N	0	0	
E47404868			Daylight			RUM: 30	Rear end					WAG	F44	N in MEDOWIE RD	0	Stationary				
												CAR	M33	N in MEDOWIE RD	0	Stationary				
Hunter Region			**Port Stephens LGA**				**Medowie**							**Medowie Rd**						
786841 P	20/02/2012	Mon	15:20	50 m N	RICHARDSON RD	2WY	STR	Fine	Dry	80	2	CAR	M88	N in MEDOWIE RD	10	Perform U-turn	I	0	3	
E48971380			Daylight			RUM: 42	Leaving parking					CAR	F18	N in MEDOWIE RD	40	Proceeding in lane				
Hunter Region			**Port Stephens LGA**				**Campvale**							**Richardson Rd**						
796977 P	03/03/2012	Sat	03:10	at	MEDOWIE RD	RDB	STR	Raining	Wet	80	1	M/C	M23	E in RICHARDSON RD	Unk	Proceeding in lane	I	0	1	
E163206996			Darkness			RUM: 72	Off road to right													
Hunter Region			**Port Stephens LGA**				**Campvale**							**Richardson Rd**						
812177 P	29/09/2012	Sat	10:50	5 m W	MEDOWIE RD	RDB	STR	Fine	Dry	80	2	4WD	M32	E in RICHARDSON RD	20	Proceeding in lane	I	0	2	
E49017932			Daylight			RUM: 30	Rear end					4WD	M59	E in RICHARDSON RD	20	Proceeding in lane				
Hunter Region			**Port Stephens LGA**				**Campvale**							**Richardson Rd**						
1005757 P	09/12/2013	Mon	13:30	at	MEDOWIE RD	RDB	STR	Fine	Dry	80	2	4WD	M47	N in MEDOWIE RD	Unk	Proceeding in lane	N	0	0	
E52991824			Daylight			RUM: 10	Cross traffic					CAR	M32	W in RICHARDSON RD	20	Proceeding in lane				
Hunter Region			**Port Stephens LGA**				**Medowie**							**Medowie Rd**						
1021039 P	27/02/2014	Thu	16:00	400 m N	RICHARDSON RD	2WY	STR	Fine	Dry	80	1	WAG	F22	N in MEDOWIE RD	50	Proceeding in lane	I	0	1	
E54274427			Daylight			RUM: 71	Off rd left => obj					Utility pole								
Hunter Region			**Port Stephens LGA**				**Campvale**							**Richardson Rd**						
1019603 P	17/03/2014	Mon	07:10	at	MEDOWIE RD	RDB	STR	Fine	Dry	80	2	CAR	F28	W in RICHARDSON RD	10	Proceeding in lane	I	0	1	
E54288507			Daylight			RUM: 10	Cross traffic					P/C	M34	S in MEDOWIE RD		Proceeding in lane				
Hunter Region			**Port Stephens LGA**				**Medowie**							**Medowie Rd**						
1034198 P	03/07/2014	Thu	17:05	at	SOUTH ST	TJN	STR	Fine	Dry	50	2	TRK	M42	W in SOUTH ST	15	Turning right	N	0	0	S
E106470801			Dusk			RUM: 11	Right far					TRK	M48	N in MEDOWIE RD	75	Proceeding in lane				
Hunter Region			**Port Stephens LGA**				**Medowie**							**Medowie Rd**						
1047437 P	05/10/2014	Sun	07:25	200 m S	SOUTH ST	2WY	STR	Fine	Dry	80	1	CAR	F43	N in MEDOWIE RD	80	Proceeding in lane	I	0	1	F
E55862145			Daylight			RUM: 73	Off rd rght => obj					Tree/bush								
Hunter Region			**Port Stephens LGA**				**Campvale**							**Medowie Rd**						
1054263 S	25/10/2014	Sat	22:00	at	RICHARDSON RD	RDB	STR	Fine	Dry	80	2	CAR	M21	N in MEDOWIE RD	Unk	Other forward	N	0	0	
E57100178			Darkness			RUM: 39	Other same direction					WAG	F52	N in MEDOWIE RD	Unk	Other forward				

Detailed Crash Report - sorted

Transport for NSW — Centre for Road Safety

Crash No. / Data Source	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
Natural Lighting																				**S F**
Hunter Region	**Port Stephens LGA**				**Medowie**									**Medowie Rd**						
1083344 P	27/09/2015	Sun	15:00		at NUMBER 507 HN	2WY	STR	Fine	Dry	80	2	UTE	F60	E in MEDOWIE RD	20 Forward from drive		N	0	0	
E59668951					Daylight	RUM:	47	Emerging from drive				CAR	M71	S in MEDOWIE RD	50 Proceeding in lane					
Hunter Region	**Port Stephens LGA**				**Campvale**									**Richardson Rd**						
1083617 P	29/09/2015	Tue	08:51		at MEDOWIE RD	RDB	STR	Fine	Dry	80	2	CAR	M69	S in MEDOWIE RD	20 Proceeding in lane		I	0	1	
E355818592					Daylight	RUM:	10	Cross traffic				TRK	M29	E in RICHARDSON RD	30 Proceeding in lane					
Hunter Region	**Port Stephens LGA**				**Medowie**									**Medowie Rd**						
1082804 S	01/10/2015	Thu	11:30	30 m S	SOUTH ST	2WY	STR	Fine	Dry	80	2	WAG	F59	N in MEDOWIE RD	Unk Proceeding in lane		I	0	1	
E59097036					Daylight	RUM:	30	Rear end				TRK	F23	N in MEDOWIE RD	Unk Proceeding in lane					
Hunter Region	**Port Stephens LGA**				**Campvale**									**Richardson Rd**						
1125013 P	07/12/2016	Wed	18:00		at MEDOWIE RD	RDB	STR	Fine	Dry	80	2	M/C	M23	E in RICHARDSON RD	40 Proceeding in lane		I	0	1	
E63875929					Daylight	RUM:	10	Cross traffic				TRK	M41	S in MEDOWIE RD	0 Stationary					

Report Totals: Total Crashes: 14 Fatal Crashes: 0 Injury Crashes: 9 Killed: 0 Injured: 12

Crashid dataset Medowie Road: Richardson Road to Blueberry Road (and South Street), Medowie - October 2011 to 2017*

Note: *Ordered by: Crash Date. Data for the 9 month period prior to the generated date of this report are incomplete and are subject to change.*

Crash self reporting, including self reported injuries began in Oct 2014. Trends from 2014 are expected to vary from previous years. More unknowns are expected in self reported data. For further information refer to Data Manual or report provider.

Appendix F Traffic Data

AM Peak

Intersection Peak Hour

08:15 - 09:15

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	79	503	0	117	0	83	0	301	40	0	0	0	1124
Factor	0.79	0.89	0.00	0.81	0.00	0.80	0.00	0.96	0.67	0.00	0.00	0.00	0.96
Approach Factor	0.95			0.81			0.94			0.00			

Peak Hour Vehicle Summary

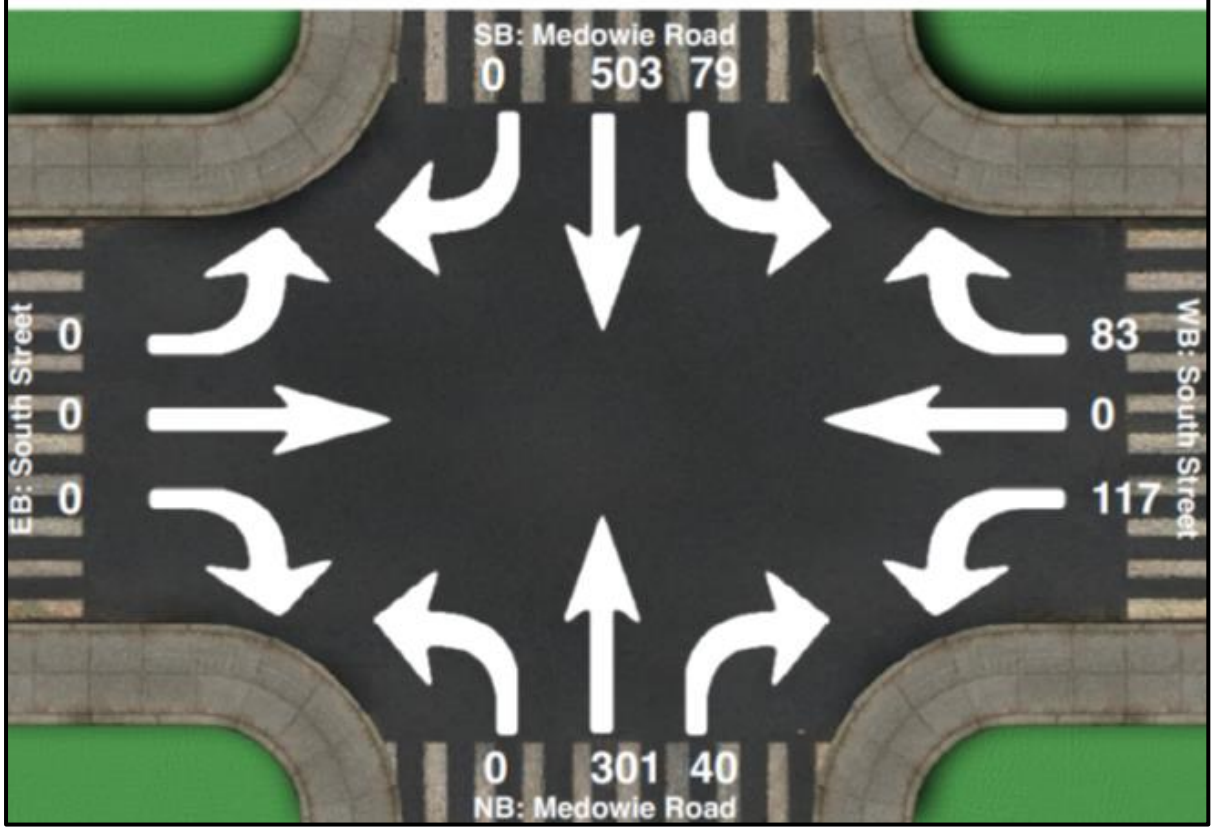
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	77	483	0	115	0	82	0	281	36	0	0	0	1075
Truck	2	20	0	2	0	1	0	20	4	0	0	0	49

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location:	Medowie Road at South Street, Medowie
GPS Coordinates:	
Date:	2017-08-02
Day of week:	Wednesday
Weather:	
Analyst:	TN



PM Peak

Intersection Peak Hour

15:45 - 16:45

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	91	286	0	89	0	68	0	777	169	0	0	0	1481
Factor	0.81	0.84	0.00	0.77	0.00	0.85	0.00	0.94	0.96	0.00	0.00	0.00	0.97
Approach Factor	0.84			0.85			0.95			0.00			

Peak Hour Vehicle Summary

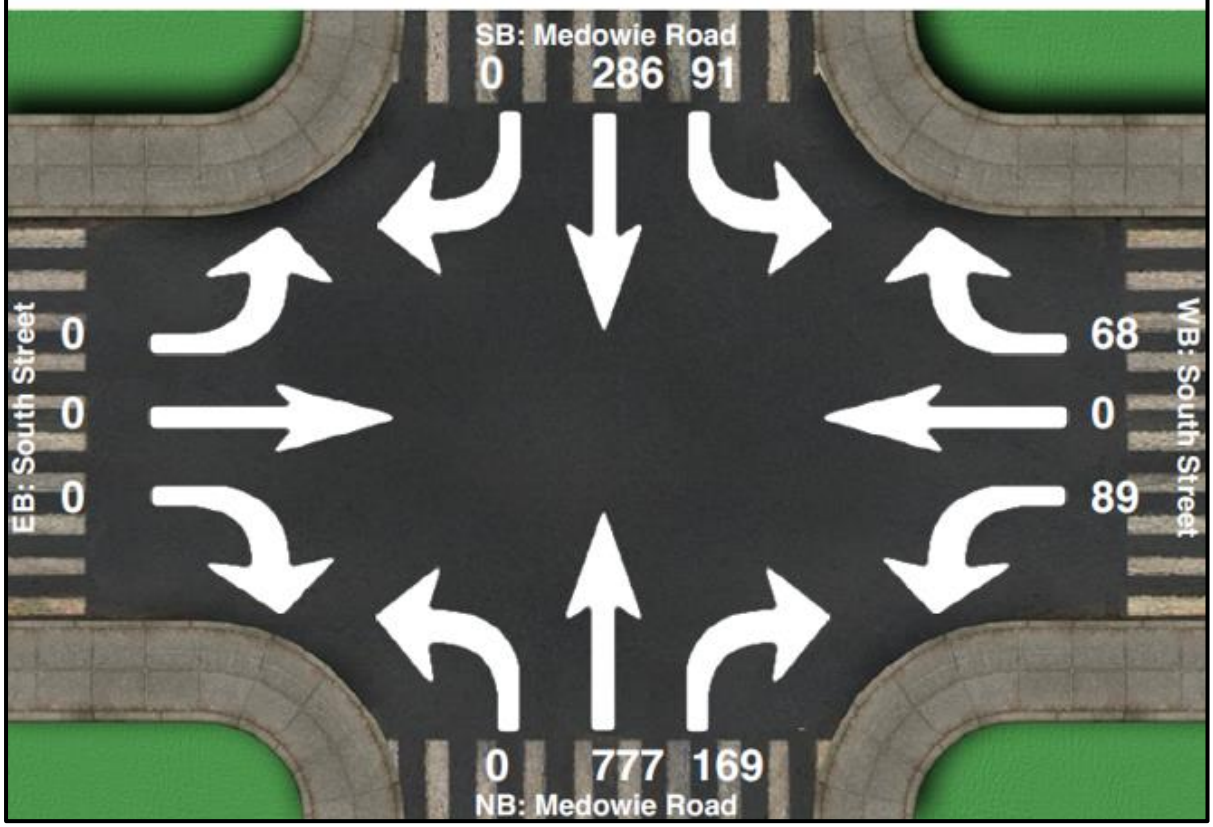
Vehicle	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Car	91	274	0	83	0	67	0	757	166	0	0	0	1439
Truck	0	12	0	6	0	1	0	20	3	0	0	0	42

Peak Hour Pedestrians

	NE			NW			SW			SE			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Intersection Peak Hour

Location: Medowie Road at South Street, Medowie
GPS Coordinates:
Date: 2017-08-02
Day of week: Wednesday
Weather:
Analyst: TN



Appendix G SIDRA Analysis

Interpreting SIDRA Results:

1-Level of Service (LoS)

LoS	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Good	Good
B	Good, with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but requires accident study
D	Operating near capacity	Near capacity and requires accident study
E	At capacity, excessive delay: roundabout requires other control method	At capacity, requires other control mode
F	Unsatisfactory, requires other control mode or additional capacity	Unsatisfactory, requires other control mode

2-Average Vehicle Delay (AVD)

The AVD is a measure of operational performance of an intersection relating to its LoS. The average delay should be taken as a guide only for an average intersection. Longer delays may be tolerated at some intersections where delays are expected by motorists (e.g. those in inner city areas or major arterial roads).

LoS	Average Delay / Vehicle (secs)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 15	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	28 to 42	Satisfactory	Satisfactory but accident study required
D	42 to 56	Operating near capacity	Near capacity, accident study required
E	56 to 70	At capacity, excessive delays: roundabout requires other control mode	At capacity; requires other control mode
F	Exceeding 70	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode

3-Degree of Saturation (D/S)

The D/S of an intersection is usually taken as the highest ratio of traffic volumes on an approach to an intersection compared with the theoretical capacity, and is a measure of the utilisation of available green time. For intersections controlled by traffic signals, both queues and delays increase rapidly as DS approaches 1.0. An intersection operates satisfactorily when its D/S is kept below 0.75. When D/S exceeds 0.9, queues are expected.

MOVEMENT SUMMARY

Site: 101 [2017AM - School Egress / South Street]

Medowie Road / South Street
No allowance for cross-use, staggered start/finish times.
Medowie Road duplicated for 100 metres each way.
Signals - Fixed Time Isolated Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Medowie Road											
1	L2	25	100.0	0.023	6.2	LOS A	0.0	0.0	0.00	0.57	38.9
2	T1	317	6.6	0.213	12.6	LOS A	4.9	35.9	0.57	0.47	55.3
3	R2	42	10.0	0.364	52.4	LOS D	1.9	14.5	0.99	0.73	14.9
Approach		384	13.2	0.364	16.5	LOS B	4.9	35.9	0.58	0.51	47.4
East: South Street											
4	L2	143	1.5	0.539	26.2	LOS B	3.8	26.7	0.97	0.78	21.9
6	R2	87	1.2	0.610	51.4	LOS D	4.0	28.4	1.00	0.80	27.3
Approach		231	1.4	0.610	35.8	LOS C	4.0	28.4	0.98	0.79	24.8
North: Medowie Road											
7	L2	83	2.5	0.087	18.4	LOS B	1.8	12.9	0.53	0.72	45.2
8	T1	719	4.5	0.653	23.8	LOS B	17.1	124.0	0.84	0.73	43.3
Approach		802	4.3	0.653	23.3	LOS B	17.1	124.0	0.81	0.73	43.5
West: School Access											
10	L2	125	9.2	0.366	36.9	LOS C	5.2	39.2	0.90	0.77	29.7
11	T1	11	0.0	0.366	33.4	LOS C	5.2	39.2	0.90	0.77	15.9
12	R2	195	7.0	0.522	38.1	LOS C	7.8	57.8	0.94	0.80	12.2
Approach		331	7.6	0.522	37.5	LOS C	7.8	57.8	0.92	0.79	20.0
All Vehicles		1747	6.5	0.653	26.1	LOS B	17.1	124.0	0.80	0.70	36.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	48	25.7	LOS C	0.1	0.1	0.76	0.76
P3	North Full Crossing	97	39.4	LOS D	0.2	0.2	0.94	0.94
P4	West Full Crossing	5	17.4	LOS B	0.0	0.0	0.62	0.62
All Pedestrians		156	34.4	LOS D			0.87	0.87

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2017AM - School Access]

School Access
No allowance for cross-use, staggered start/finish times.
Medowie Road duplicated for 100 metres each way.
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: Medowie Road											
1	L2	147	0.0	0.107	8.0	LOS A	0.4	3.1	0.30	0.60	56.3
2	T1	386	13.6	0.216	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		534	9.9	0.216	2.2	LOS A	0.4	3.1	0.08	0.17	71.6
North: Medowie Road											
8	T1	859	5.6	0.457	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
9	R2	198	0.0	0.165	7.1	LOS A	0.7	5.2	0.48	0.71	35.7
Approach		1057	4.6	0.457	1.4	NA	0.7	5.2	0.09	0.13	72.9
All Vehicles		1591	6.4	0.457	1.6	NA	0.7	5.2	0.09	0.14	72.4

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.

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MOVEMENT SUMMARY

Site: 101 [2017PM - School Egress / South Street]

Medowie Road / South Street
No allowance for cross-use, staggered start/finish times.
Medowie Road duplicated for 100 metres each way.
Signals - Fixed Time Isolated Cycle Time = 90 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Medowie Road											
1	L2	25	100.0	0.023	6.2	LOS A	0.0	0.0	0.00	0.57	38.9
2	T1	653	3.5	0.421	13.5	LOS A	11.2	80.8	0.63	0.54	54.1
3	R2	140	6.8	0.508	44.6	LOS D	5.9	43.4	0.96	0.80	16.8
Approach		818	7.1	0.508	18.6	LOS B	11.2	80.8	0.67	0.59	44.8
East: South Street											
4	L2	60	3.5	0.149	20.9	LOS B	1.3	9.2	0.84	0.72	24.5
6	R2	62	3.4	0.514	51.9	LOS D	2.9	20.6	1.00	0.76	26.9
Approach		122	3.4	0.514	36.6	LOS C	2.9	20.6	0.92	0.74	26.2
North: Medowie Road											
7	L2	104	1.0	0.130	23.3	LOS B	2.7	19.2	0.63	0.74	41.5
8	T1	476	4.2	0.537	27.8	LOS B	11.3	82.2	0.86	0.72	40.3
Approach		580	3.6	0.537	27.0	LOS B	11.3	82.2	0.82	0.73	40.5
West: School Access											
10	L2	185	6.3	0.537	38.3	LOS C	8.1	59.8	0.94	0.80	29.2
11	T1	18	0.0	0.537	34.9	LOS C	8.1	59.8	0.94	0.80	15.5
12	R2	160	8.6	0.433	37.3	LOS C	6.3	47.0	0.92	0.78	12.3
Approach		363	7.0	0.537	37.7	LOS C	8.1	59.8	0.93	0.79	22.2
All Vehicles		1883	5.8	0.537	26.0	LOS B	11.3	82.2	0.78	0.68	36.8

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	5	39.2	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	48	31.3	LOS D	0.1	0.1	0.84	0.84
P3	North Full Crossing	97	39.4	LOS D	0.2	0.2	0.94	0.94
P4	West Full Crossing	5	16.8	LOS B	0.0	0.0	0.61	0.61
All Pedestrians		156	36.1	LOS D			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2017PM - School Access]

School No Medowie Road Giveway / Yield (Two-Way) allowance for cross-use, duplicated for 100 metres staggered start/finish times. Access each 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: Medowie Road											
1	L2	178	0.0	0.120	7.7	LOS A	0.5	3.6	0.23	0.58	56.8
2	T1	820	7.1	0.440	0.1	LOS A	0.0	0.0	0.00	0.00	79.8
Approach		998	5.8	0.440	1.4	LOS A	0.5	3.6	0.04	0.10	74.4
North: Medowie Road											
8	T1	575	7.7	0.309	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
9	R2	121	0.0	0.189	10.6	LOS A	0.7	5.1	0.69	0.89	30.8
Approach		696	6.4	0.309	1.9	NA	0.7	5.1	0.12	0.16	71.9
All Vehicles		1694	6.0	0.440	1.6	NA	0.7	5.1	0.07	0.12	73.4

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.

2027 Development (With Road Upgrades) with 2.4% growth along Medowie Road (up to 50% increase in school total)

MOVEMENT SUMMARY

Site: 101 [2027AM - School Egress / South Street]

Medowie Road / South Street
Applying 2.4% pa growth on Medowie Road, allowing 50% increase in school traffic.
Signals - Fixed Time Isolated Cycle Time = 90 seconds (User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

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: Medowie Road											
1	L2	25	100.0	0.023	6.2	LOS A	0.0	0.0	0.00	0.57	38.9
2	T1	393	6.6	0.264	12.9	LOS A	6.2	46.0	0.59	0.49	54.8
3	R2	42	10.0	0.364	52.4	LOS D 11	1.9	14.5	0.99	0.73	14.9
Approach		460	12.1	0.364	16.2	LOS B	6.2	46.0	0.59	0.52	48.4
East: South Street											
4	L2	143	1.5	0.584	26.9	LOS B	3.8	27.1	0.98	0.79	21.6
6	R2	87	1.2	0.712	53.9	LOS D 11	4.2	29.5	1.00	0.85	26.5
Approach		231	1.4	0.712	37.1	LOS C	4.2	29.5	0.99	0.81	24.2
North: Medowie Road											
7	L2	83	2.5	0.089	18.9	LOS B	1.8	13.2	0.54	0.72	44.8
8	T1	891	4.5	0.823	28.7	LOS C	25.8	187.3	0.91	0.84	39.6
Approach		975	4.4	0.823	27.9	LOS B	25.8	187.3	0.88	0.83	40.1
West: School Access											
10	L2	188	9.2	0.522	37.4	LOS C	8.1	60.6	0.93	0.80	29.5
11	T1	16	0.0	0.522	34.0	LOS C	8.1	60.6	0.93	0.80	15.8
12	R2	292	7.0	0.743	41.4	LOS C	12.8	94.9	0.99	0.90	11.4
Approach		496	7.6	0.743	39.6	LOS C	12.8	94.9	0.96	0.86	19.3
All Vehicles		2161	6.4	0.823	29.1	LOS C	25.8	187.3	0.85	0.77	34.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	6	39.2	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	58	25.8	LOS C	0.1	0.1	0.76	0.76
P3	North Full Crossing	116	39.4	LOS D	0.3	0.3	0.94	0.94
P4	West Full Crossing	6	17.4	LOS B	0.0	0.0	0.62	0.62
All Pedestrians		187	34.4	LOS D			0.87	0.87

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

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2027AM - School Access]

School Access
Applying 2.4% pa growth on Medowie Road, allowing 50% increase in school traffic.
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

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: Medowie Road											
1	L2	221	0.0	0.177	8.4	LOS A	0.8	5.3	0.39	0.65	55.7
2	T1	479	13.6	0.267	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		700	9.3	0.267	2.7	LOS A	0.8	5.3	0.12	0.21	70.2
North: Medowie Road											
8	T1	1065	5.6	0.566	0.0	LOS A	0.0	0.0	0.00	0.00	79.6
9	R2	297	0.0	0.279	8.0	LOS A	1.3	9.3	0.57	0.80	34.4
Approach		1362	4.4	0.566	1.8	NA	1.3	9.3	0.12	0.17	71.2
All Vehicles		2062	6.1	0.566	2.1	NA	1.3	9.3	0.12	0.18	70.8

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 [2027PM - School Egress / South Street]

Medowie Road / South Street
Applying 2.4% pa growth on Medowie Road, allowing 50% increase in school traffic.
Signals - Fixed Time Isolated Cycle Time = 90 seconds (User-Given Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

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: Medowie Road											
1	L2	25	100.0	0.023	6.2	LOS A	0.0	0.0	0.00	0.57	38.9
2	T1	809	3.5	0.639	16.9	LOS B	14.9	107.6	0.72	0.63	50.0
3	R2	140	6.8	0.647	49.0	LOS D 11	6.2	46.3	1.00	0.82	15.7
Approach		975	6.5	0.647	21.3	LOS B	14.9	107.6	0.74	0.65	42.9
East: South Street											
4	L2	60	3.5	0.175	22.1	LOS B	1.2	9.0	0.87	0.73	23.9
6	R2	62	3.4	0.514	51.9	LOS D 11	2.9	20.6	1.00	0.76	26.9
Approach		122	3.4	0.514	37.3	LOS C	2.9	20.6	0.94	0.74	26.0
North: Medowie Road											
7	L2	104	1.0	0.134	24.0	LOS B	2.8	19.6	0.64	0.74	41.0
8	T1	590	4.2	0.693	30.1	LOS C	15.2	110.0	0.91	0.78	38.7
Approach		694	3.7	0.693	29.2	LOS C	15.2	110.0	0.87	0.77	39.1
West: School Access											
10	L2	278	6.3	0.665	36.6	LOS C	12.3	90.4	0.95	0.84	29.9
11	T1	27	0.0	0.665	33.2	LOS C	12.3	90.4	0.95	0.84	16.0
12	R2	240	8.6	0.537	35.0	LOS C	9.3	69.7	0.91	0.80	12.9
Approach		545	7.0	0.665	35.8	LOS C	12.3	90.4	0.94	0.82	23.0
All Vehicles		2336	5.6	0.693	27.8	LOS B	15.2	110.0	0.84	0.73	35.5

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	6	39.2	LOS D	0.0	0.0	0.93	0.93
P2	East Full Crossing	58	32.2	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	116	37.5	LOS D	0.3	0.3	0.92	0.92
P4	West Full Crossing	6	19.3	LOS B	0.0	0.0	0.66	0.66
All Pedestrians		187	35.3	LOS D			0.89	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2027PM - School Access]

School Access
Applying 2.4% pa growth on Medowie Road, allowing 50% increase in school traffic.
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

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: Medowie Road											
1	L2	267	0.0	0.191	8.0	LOS A	0.9	6.0	0.30	0.60	56.3
2	T1	1017	7.1	0.545	0.1	LOS A	0.0	0.0	0.00	0.00	79.6
Approach		1284	5.6	0.545	1.7	LOS A	0.9	6.0	0.06	0.13	73.3
North: Medowie Road											
8	T1	713	7.7	0.384	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
9	R2	182	0.0	0.430	17.0	LOS B	1.9	13.4	0.85	1.01	24.7
Approach		894	6.1	0.430	3.5	NA	1.9	13.4	0.17	0.21	67.3
All Vehicles		2178	5.8	0.545	2.4	NA	1.9	13.4	0.11	0.16	70.9

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.

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Appendix H Council Meeting Minutes

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Design Meeting Agenda

Date	Monday, 16 April 2018	
Project	2544	Catherine McAuley Catholic College, Medowie
Meeting Location	Port Stephens Council, Tomaree Room, Raymond Terrace	
Present	Council	Matthew Borsato (MB) Senior Strategic Planner
		Joe Gleeson (JG) Traffic Engineer
		Andrew Behrens (AB) Engineering Services Manager
	ARCHITECT (WA)	Tim Hayes (TH)
		Luke Keating (LK)
	Traffic Consultant	Cathy Thomas (CT) Seca Solutions
		Tyler Neve (TN) Seca Solutions
Apologies	Matt Snelson (MPC Engineers)	
Distribution	All present, Rohan McDonald (MN Diocese), Matt Snelson (MPC)	

Corrections to Previous Minutes

Please contact our office if there are any omissions or should there be any adjustments required to these minutes.

ITEM		ACTION	DATE
01	**Site Design**		
01.01	Webber Architects presented Architectural site plan 2544-02-0002-CC and MPC Engineers civil roadway upgrade drawings 17-828-R01 to R08 Rev 1.		
01.02	TH briefly explained the design process to date, including two Pre-Da meetings with the Government Architect's Office and the RMS. Several design options have been explored to address the comments of both authorities to promote walk/ride/bus, safe pedestrian access, efficient vehicular drop off/pick up, DCP parking requirements and a negligible impact on the road network.		
01.03	TH noted no footpath or stormwater upgrades along the road verge was proposed by the MPC design. JG indicated this would be acceptable. MB noted a shared cycleway/pathway is proposed within the Section 94 plan along the east side of Medowie Road, from the North terminating at the South Street Intersection. There is no requirement to extend the footpath south of Medowie Road as there is no development to connect to.		

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Sandra Hinchey, Kelran Brooks
Associate Director Tim Hayes
Associate Luke Keating

ITEM		ACTION	DATE
01.04	MB indicated that Kingfisher Close could be extended to the North to connect with future urban release areas, and that this could provide an informal path for walk/cycle to school and connection between the School development and the cul-de-sac of Kingfisher close should be explored by the proposal. TH advised this is possible in later stages, and a future residential subdivision with common concrete driveway may be proposed by the developer in the future which would facilitate this connection.		
01.05	JG queried traffic delays at the traffic light intersection, as the local residents have indicated they would be adverse to traffic lights in Medowie. TN advised during the traffic study, minor delays turning left and right were experienced at the intersection. CT advised these delays would be consistent with the traffic light phasing, if not for the first one or two cars but for the following cars queued at the intersection.		
01.06	CT notes that the traffic lights make a safer right turn out of South Street, as well as a level pedestrian crossing, and that this methodology should be noted to residents to support the traffic light intersection. CT also noted any presumed delay by residents of the Pacific Dunes development heading North to the town centre could be mitigated by travel via the Brockelsby Road intersection to avoid the lights.		
01.07	TH advised a representative of the Diocese had attended a community meeting in Medowie and the traffic lights were on item raised, along with negligent driving within unattended carparks at night. TH advised boom gate controls to carparks have been implemented based on this feedback. Residents were also advised during the meeting that a traffic engineer has been engaged to design the intersection, and that the traffic lights were the most preferred option for a safe pedestrian crossing for students. The resident group seemed responsive to this.		
01.08	CT noted that the impact of the traffic volumes generated by the School as well as the traffic lights would be limited to the peak AM & PM periods of drop off and pick up, which occurs over a 15-20 minutes period twice a day. This is typical of all schools and cannot be avoided due to the nature of the development. This is considered limited impact to the surrounding area and is negligible in comparison to a development such as a shopping centre.		
01.09	MB advised that the existing public bus stop in South street was currently acting as an interchange drop off/pick up point for up to 5 private shared school buses for local schools. TN advised that due to the draw and numbers of the proposed school, it is assumed it will be served by dedicated buses and will not impact on the South Street bus stop. In any case the traffic light pedestrian crossing will improve safety of the existing South Street bus stop for school users. SECA will review the current routes and volumes at the south street bus stop to determine if the South Street bus stop could be utilised by students attending the proposed school.	SECA Solutions	
01.10	CT advised the planning of the development is now reaching a stage where private bus companies can be consulted regarding servicing the development. Council recommend this approach.	SECA Solutions	

ITEM		ACTION	DATE
01.11	Council query the U-turn for buses travelling south at the Richardson Road roundabout to enter the site. This could be conceived as a safety risk due to traffic flows at this roundabout and cause for objection. CT did not see a safety issue with this proposal and the Richardson Road roundabout is within proximity to the site entry point (less than 1 km) that it was not considered a major detour.		
01.12	Internal vehicular and pedestrian circulation was discussed. TH advised up to 12 site planning options were investigated, with the preferred scheme being developed into the current design. This aimed to bring bus & vehicle drop off/pick up into the front of the school. Any vehicular/pedestrian conflict was limited to the buses & pedestrian crossing, which could be manned/supervised as part of the traffic management plan for the School.		
01.13	TH advised schemes incorporating two separate site entry/exit points were considered, however distances for merge/decal lanes did not permit this to occur.		
02	**Planning Controls to Consider**		
02.01	MB advised that the 'URAP Medowie Traffic & Transport Study' is applicable to the development. This publication references the South Street intersection as servicing a future school.		
02.02	MB advised the current Section 94 contributions plan does not note the South Street intersection as an item that contributions are collected for. Therefore there is no instrument for the developer to seek contributions for the road upgrades.		
02.03	MB advised there is a draft Section 94 contributions plan that is anticipated for release on exhibition within the next month or two. This plan identifies $3M for upgrade of three intersections along Medowie Road. The South Street intersection is one of those intersections identified in the plan. MB could not confirm the apportionment of the S94 funding, but it would not be as simple as splitting the contributions into three equal sums.		
02.04	MB advised the draft Section 94 contributions plan includes the entire LGA, not just Medowie. It's adoption date cannot be confirmed but MB anticipates this would occur within 12 months, subject to responses received within the exhibition period.		
02.05	MB advised the draft S94 plan indicates a future roundabout at the South Street intersection, but this is not to be taken as an indication of preference by Council. MB suggests traffic lights have not been indicated in the plan to avoid objection by local residents as there are currently no traffic light intersections in the Medowie area.		
02.06	MB suggested the State Infrastructure Contributions scheme may be an avenue for the client to explore a contribution towards the cost of roadway upgrades. MB could not comment on it's applicability to the proposal.		