Amber

Traffic & Transportation Direction

St Mary's Rainbow Preschool

Farrer Road, Charles Sturt University

Updated Traffic Impact Assessment

28 March 2025

Reference: 845 rep02 250328 final

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Prepared for: Anglican Diocese of Canberra and Goulburn (ADCG)

Status: Final report

Date: 28 March 2025

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Revision	Date	Description	Author	Reviewed	Approved
A	26/04/2024	Draft	W Cavey	O Mihaila	M Willson
B	03/05/2024	Final 01	W Cavey	O Mihaila	M Willson
C	27/06/2024	Updated DA Plans	W Cavey	O Mihaila	M Willson
D	01/08/2024	Updated Boundary	W Cavey	O Mihaila	O Mihaila
E	28/03/2025	Updated Report including Response to Council comments	W Cavey	T Dwyer	T Dwyer

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1. Introduction

Amber Organisation Pty Ltd has been engaged by Anglican Diocese of Canberra and Goulburn to advise on the traffic and parking matters of the proposed preschool development (St Mary's Rainbow Preschool) located on Farrer Road in Charles Sturt University.

The preschool is proposed to operate with a capacity of 90 children with opening hours from 8:30am-4:00pm on weekdays. A total of 23 car parking spaces are proposed on-site including one accessible space, which would be accessed via a new double-width crossover to Farrer Road. It is proposed to provide a short Channelised Right Turn (CHR(s)) treatment at the site access to allow vehicles to safely enter the site from Farrer Road.

This report has been prepared to address the traffic and parking impacts of the proposed development. It is based on surveys and observations at the site and our experience of similar developments elsewhere.

1.1 Authority Consultation

A previous revision of this report (Rev. D) was shared as part of the Development Consent application with representatives from the City of Wagga Wagga.

Council officers provided comments in relation the assessment the proposal as part of a Request for Information (Ref No: D/2024/0374, dated 7 March 2025). Matters relevant to be addressed in a revised Traffic Impact Assessment (this document) are summarised in Table 1 along with a response and reference location.

Table 1: Wagga Wagga Comments and Response

Matter	Wagga Wagga Comment	Response	Reference Location
Traffic Data	*The traffic data referenced under part 2.3.2 of the report was undertaken on Thursday 7 December. At this time of the year university has finished, year 12 students are finished and as the last week of school the trip numbers recorded are not considered representative of a normal day. The figures are therefore, as expected, much lower than the traffic volumes that were collected during term time in May.* *Update the traffic report to reflect existing movements at the Farrer Road/Boorooma Street roundabout and determine where traffic is coming from and going to during peak drop-off periods that will correlate with the peak drop off period of the proposed preschool.*	A comparison of the data recorded in May 2023 (seven day counts on Farrer Road) and those undertaken in December 2023 at the intersection of Farrer Road Boorooma Street has been undertaken. This showed that the data recorded at the intersection was generally higher that that recorded in May. Nevertheless, to ensure that the baseline traffic data at the intersection reflects road conditions during the school and university year, the traffic intersection survey has been factored by 20%. It should be noted that revised traffic counts are not able to be undertaken and processed within the RFI response timeframe.	Section 2.3.3, Table 3 and Figure 4

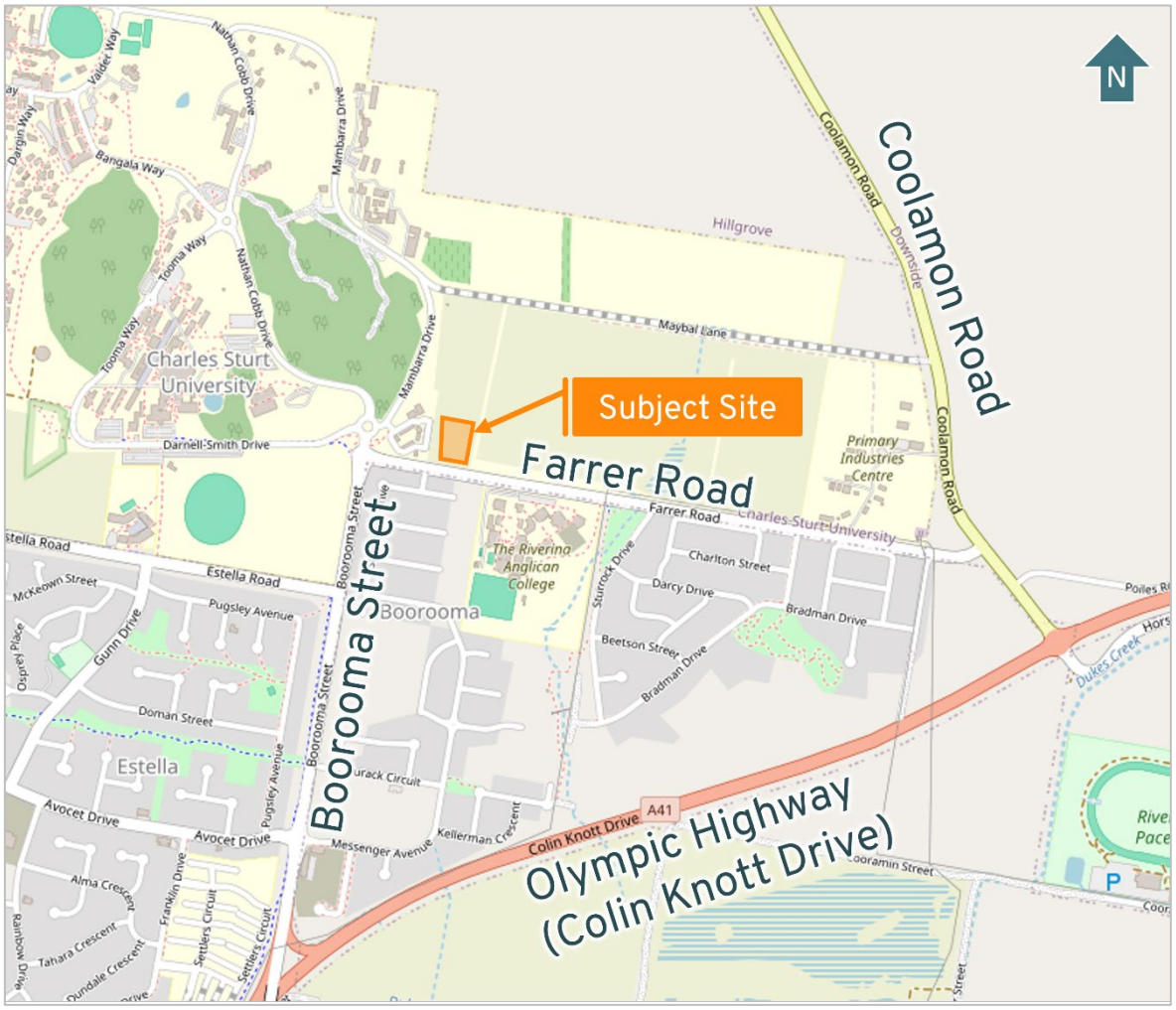
Matter	Wagga Wagga Comment	Response	Reference Location
Right turn egress from proposal	*It is anticipated that the majority of parents leaving the centre will want to turn right either back towards the university or onto Boorooma Street and into the CBD. The right hand turn out of the centre onto Farrer Road is of concern and the use of an internal road within the university campus remains the preferred outcome for access in and out of the centre.* *It is unclear if the existing traffic assessment of vehicles exiting the site has fully considered the proposed right turn movements during peak hour when vehicle numbers travelling east are high and vehicles travelling west may also be waiting to turn into the site. The commentary under section 4.2.1 is that there is likely to be minimal queuing within the site for vehicles waiting to exit onto Farrer Road during both the morning and evening peak hours. Provide greater clarity to justify this statement and determine whether right turns out of the site can be or need to be restricted. In addition, confirm that the school zone restrictions in this location have been factored into the analysis.*	Additional commentary has been added in relation to the anticipated performance of right turns from the proposal which outline the expected delays and queuing impacts. The average queue at the site egress is expected to be less that one vehicle. A scenario has been modelled that would restrict egress movements from the proposal to left turns only. This shows similar intersection performance as full access to and from the site, noting the delays for motorists departing the site would be reduced. An indicative plan has been prepared on how a left turn only arrangement could operate. Ultimately, the assessment shows that the site access would operate in a satisfactory manner with or without right turn egress. The school zone speed limits have been applied in the SIDRA analysis. It is recommended that the school zone restrictions of Farrer Road be modified to suit the proposed access and shifted west to reduce road safety risks, subject to approvals and consideration by Council and TfNSW.	Section 4.2.2, (below Table 8) for performance of right turn egress movements. Section 4.1.2, 4.2 for assessment and commentary on left turn only egress. Section 6.3 outlines an indicative plan on how left turn only arrangements could be implemented. Section 6.4.1 for comments on the school zone.
Road Safety Risks	*A new access road onto Farrer Road for a pre-school in such close proximity to the Riverina Anglican College introduces safety concerns. Families with children at the school may try to cross the road with them or older children may leave the pre-school car-park to walk to school themselves both of which would create a hazard for the pedestrians, vehicles and buses that are so prevalent on this road during peak hours. There is not a safe crossing point provided on Farrer Road as driveways are historically restricted on the northern side of the road. This concern further dictates the need to explore a safe access within the university boundaries.*	Road safety risks to pedestrians are considered to be low noting the lack of pedestrian connection from the site to Farrer Road, the physical separation of the car park and entry to the frontage road, and the nature of the use and anticipated behaviour of parents and guardians.	Section 6.4.2.

2. Transport Environment

2.1 Site Location

The site is located at Lot 153 in DP 751407 which is on the northern side of Farrer Road in Charles Sturt University, approximately 170 metres east of Boorooma Street. Figure 1 shows the location of the site in relation to the surrounding transport network.

Figure 1: Site Location



Source: OpenStreetMap

The site and the adjacent areas on the northern side of Farrer Road are zoned SP2 - Educational Establishment associated with Charles Sturt University. Land on the south side of Farrer Road is predominantly zoned R1 – General Residential and is occupied by residential properties.

Figure 2 shows an aerial photograph view of the site and the surrounding area. The site is currently undeveloped and consists of a grassed field with several trees scattered throughout. It has a frontage to Farrer Road of approximately 92 metres however does not currently have access to the road network. The Charles Sturt University Performing Arts School is located adjacent to the site on the western side, with the adjoining lots to the east currently undeveloped. Other key land use in the area includes the Riverina Anglican College which is situated approximately 100 metres east of the site, on the south side of Farrer Road.

Figure 2: Aerial Photograph

Source: Nearmap

2.2 Road Network

Farrer Road is a municipal road which runs in an east-west alignment between Boorooma Street and Coolamon Road. Along the site frontage and to the east, it provides 2 traffic lanes in each direction and has a 70 km/h speed limit with a 40 km/h school zone applicable between 8:00am-9:30am and 2:30pm-4:00pm on school days. A single lane is provided in each direction to the west of the site. A shared cycling and walking path is provided along the southern side of the road.

Boorooma Street is a collector road that is under the care and management of Council. It runs in a north-south alignment between Farrer Road and Gardiner Street. It has a typical carriageway width of 6.5 metres which accommodates one lane of traffic in each direction. A shared cycling and walking path is provided along the western side of the road. The road has a speed limit of 70km/hr.

The intersection of Boorooma Street and Farrer Road is controlled by a roundabout forming a three-leg intersection which also provides access to Charles Sturt University to the north. The current design of the roundabout provides separate circulating lanes for through traffic along Boorooma Street and traffic turning right onto Farrer Drive.

2.3 Traffic Volumes

2.3.1 Farrer Road

Amber commissioned a tube count on Farrer Road west of Sturrock Drive in order to determine the existing road environment. The tube count was undertaken from Tuesday 23 May to Tuesday 30 May 2023. The survey results are presented in Appendix A with a summary provided in Table 2.

Table 2: Farrer Road Traffic Volumes

Direction	Weekday Traffic (vpd)*	Weekday AM Peak 8:00 (vph)*	Weekday PM Peak 15:00 (vph)*	Average Speed (km/h)	85th Percentile Speed (km/h)	Heavy Vehicles
Westbound	1,320	228	137	58.9	67.3	6.0 %
Eastbound	1,114	81	145	63.2	70.2	5.2 %
Both Directions	2,434	310	282	61.0	68.7	5.6 %

** vpd = Vehicles Per Day, vph = Vehicles Per Hour*

The survey data indicates that Farrer Road currently experiences most traffic movements during the morning peak hour which occurs from 8:00am to 9:00am and the evening peak hour between 3:00pm to 4:00pm. The data also indicates the road experiences a relatively even distribution of traffic in both travel directions.

The recorded proportion of heavy vehicle traffic along Farrer Road is 5.6% with a maximum hourly volume of 20 heavy vehicles during the weekday afternoon peak hour. The majority of heavy vehicle traffic consists of small trucks, and it is noted that Farrer Road is not currently classified as an approved route for B-doubles or Class 1 Oversize Overmass Load Carrying Vehicles (OSOM).

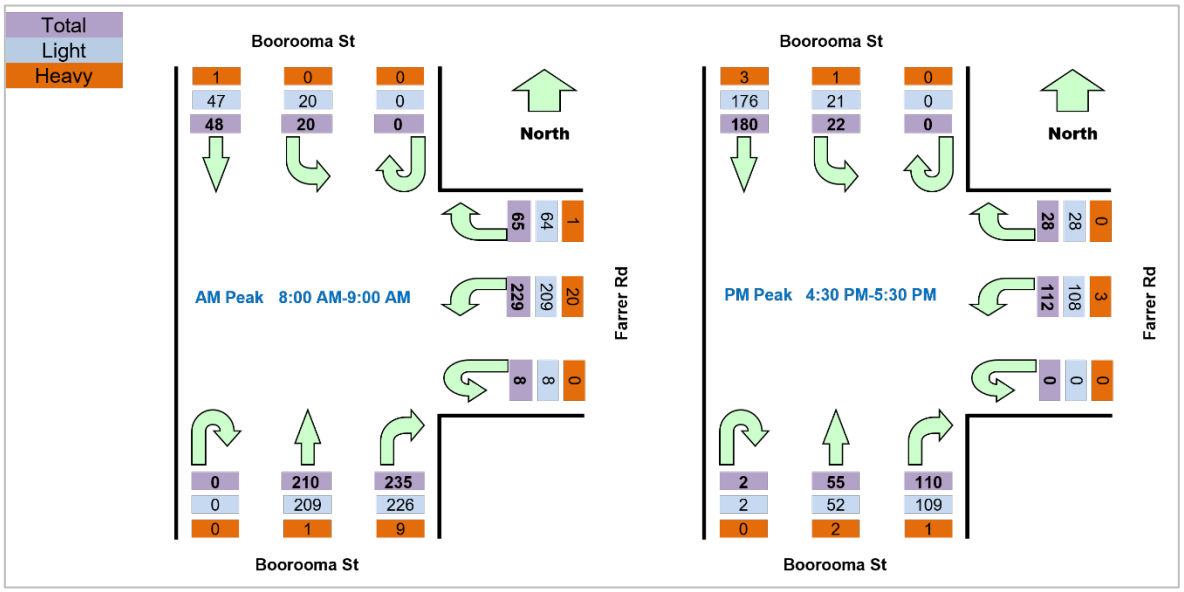
Overall, the survey results indicate Farrer Road currently accommodates a moderate level of traffic for its road classification with a relatively low proportion of heavy vehicle traffic.

2.3.2 Turning Movement Counts

Amber commissioned a turning movement count at the roundabout intersection of Farrer Road and Boorooma Street in order to determine the existing traffic conditions. The survey was undertaken on Thursday 7th December 2023 from 7:00am to 9:00am and 3:30pm to 6:30pm. A summary of the results is presented below with the full survey data provided in Appendix B.

The survey results indicate that the roundabout currently accommodates a moderate level of traffic in the order of 815 vehicles during the morning peak and 509 vehicles during the afternoon peak hour. Vehicle movements recorded along Boorooma Street were predominantly northbound in the morning peak and southbound in the afternoon peak. A high proportion of traffic was also recorded turning between Farrer Road and the southern leg of Boorooma Street. Overall, the results indicate that the roundabout currently accommodates a moderate level of traffic with a relatively even split of traffic in each direction along Farrer Road.

Figure 3: Turning Movement Count Peak Hour Survey Results



2.3.3 Commentary on Traffic Survey Results

The results of the intersection survey (recorded in December 2023) have been compared against the seven-day survey results recorded on Farrer Road in May 2023 (during the school and university year) as outlined in Table 3.

Table 3: Comparison of May and December Traffic Volumes – Farrer Road

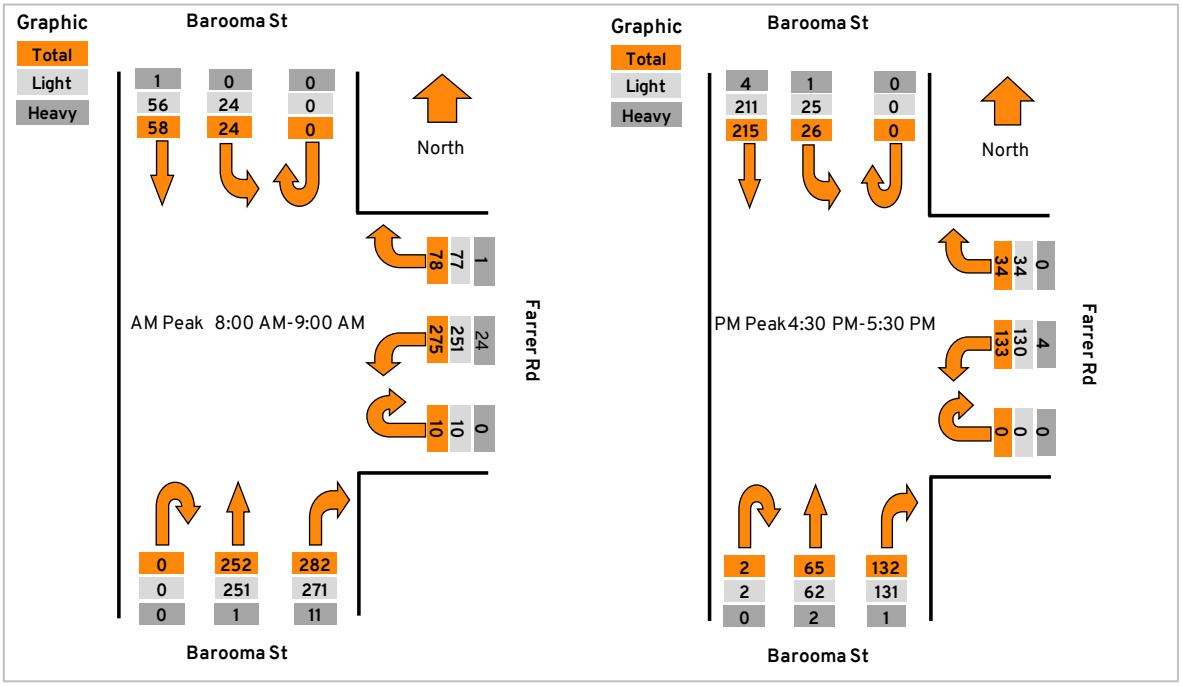
Survey	Morning Peak Hour (vph*)		Evening Peak Hour (vph*)	
	Eastbound	*Westbound*	*Eastbound*	*Westbound*
7-day Survey (May 2023)	81	228	145	137
Intersection Survey (December 2023)	255	302	132	150
Difference	*+174*	*+74*	*-13*	*+13*

** vph = Vehicles Per Hour*

As shown in Table 3, the results recorded at the intersection during the peak hours were generally higher than that recorded on Farrer Road in May 2023.

Nevertheless, to ensure that the intersection traffic surveys are reflective of typical conditions at the intersection to reflect the operation of the University and Anglican College, the results of the intersection survey have been factored up by 20% as shown in Figure 4.

Figure 4: Turning Movement Count Peak Hour Survey Results – Factored Up by 20%



The factored-up values shown in Figure 4 have been used for the purposes of the traffic assessment as outlined in Section 4 below.

2.4 Sustainable Transport

A shared walking and cycling path is provided on the southern side of Farrer Road and the western side of Boorooma Street. It is noted that no footpaths are currently provided on the northern side of Farrer Road. Pedestrian refuge islands are provided at the Farrer Road / Boorooma Street roundabout to the west of the site.

The site has access to the public transport network via the bus routes that operate in the surrounding area. The nearest bus stop is located at the entrance to the Charles Sturt University which services Routes 960 (Lake Albert to Wagga Wagga, Estella and University) and 966 (Wagga Wagga - Estelle - Wagga Wagga). The 960 bus route provides weekday services approximately every hour from 7:30am to 10:00pm, while the 966 bus route provides weekday services every 2 hours from 7:00am to 8:30pm. Reduced services are also provided for both routes on weekends.

2.5 Crash Statistics

Amber has conducted a review of the TfNSW Centre for Road Safety Crash and Casualty Statistics database for all crashes within the following search area:

- The entire length of Farrer Road;
- Boorooma Street between Farrer Road and Olympic Highway; and
- All respective intersections.

The crash database provides the location and severity of all casualty crashes for the latest available five-year period which is currently between 2018 and 2022. The search revealed the following crashes within the search area:

- Boorooma Street / Messenger Avenue / Avocet Drive intersection -
    - One non-casualty 'off road to the right on left bend, hitting object' crash.
    - One moderate injury 'other same direction' crash.
- Farrer Road / Coolamon Road intersection –
    - One moderate injury 'out of control on bend' crash.
    - One moderate injury 'right rear' crash.

Given the search area and lack of crash trends with no identified 'Black Spots', it is concluded that the road network surrounding the site is currently operating in a relatively safe manner.

3. Development Proposal

It is proposed to develop a preschool (St Mary's Rainbow Preschool) on the northern side of Farrer Road in Charles Sturt University.

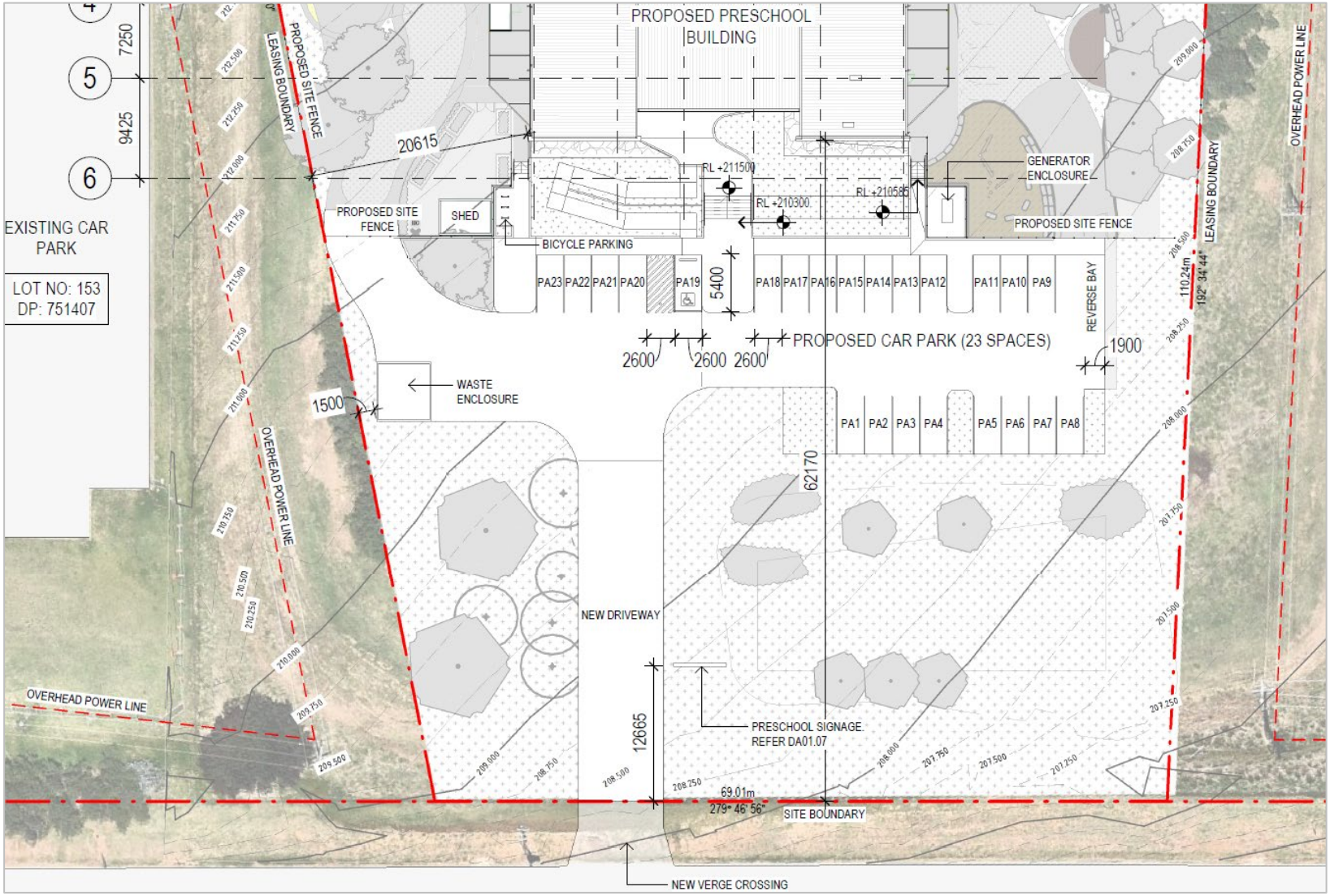
The preschool is proposed to operate with a capacity of 90 children with opening hours from 8:30am-4:00pm on weekdays. A total of 23 car parking spaces are proposed on-site including one accessible space, which would be accessed via a new double-width crossover to Farrer Road. It is proposed to provide a short Channelised Right Turn (CHR(s)) treatment at the site access to allow vehicles to safely enter the site from Farrer Road.

A total of three bicycle hoops (six spaces) are proposed near the car park for use by staff and parents/caregivers.

Refuse and recycling bins are provided within a dedicated area at the western end of the car park. Waste is proposed to be collected within the car park via private waste collection services outside of peak times.

The proposed car park layout is shown in Figure 5.

Figure 5: Car Park Layout



Source: Gray Puksand

4. Traffic Assessment

4.1 Traffic Generation and Distribution

4.1.1 St Mary's Rainbow Preschool

The *Roads & Maritime Services Validation Trip Generation Surveys - Child Care Centres* (Analysis Report), dated September 2015, provides surveyed trip generation data for one preschool within a regional area which is the Nords Wharf Community Preschool located approximately 30km southwest of Newcastle. The surveyed trip generation rates were found to be 1.25 and 1.10 vehicle movements per child during the morning and evening peak hours, respectively.

Application of these rates to the proposed capacity of 90 children generates a total of 113 and 99 vehicle movements during the morning and evening peak hours, respectively. It is noted that a vehicle movement is defined as a trip in one direction (i.e. a vehicle accessing the site would generate one movement toward the site when it arrives and another movement away from the site when it departs).

The majority of traffic associated with the site is expected to occur during morning drop-off and afternoon pick-up times. For the purposes of the assessment, it has conservatively been assumed that the peak traffic generating hours for the site would coincide with the peak hours on the road network which occur from 8:00am-9:00am and 3:00pm-4:00pm.

Vehicle movements will be distributed to/from the site via Farrer Road and the wider road network. It is expected that the majority of traffic movements will be associated with the drop-off and pick-up of children which would generally occur during the morning and evening, with minimal traffic entering or exiting the site throughout the remainder of the day.

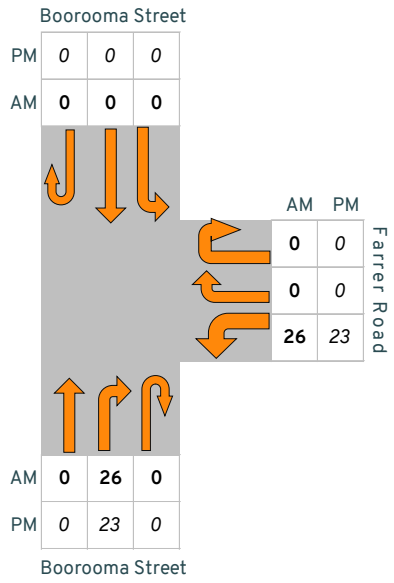
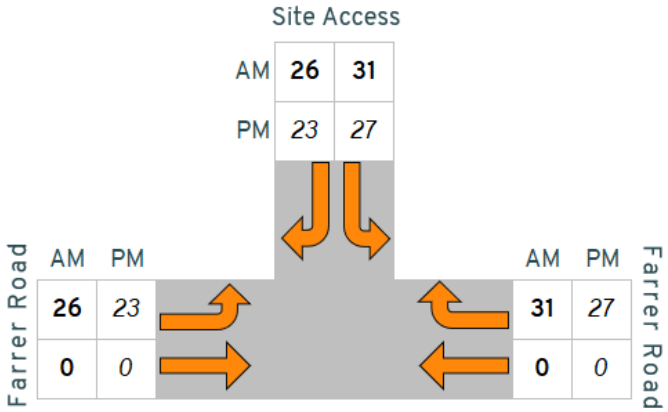
The following distributions are outlined in Table 4 and have been assumed based on the tube count data for Farrer Road presented in Appendix A. It is assumed that the vehicle movements in each of the peak hours would be split evenly between arriving and departing trips.

Table 4: Assumed Traffic Distributions

Direction	Morning Peak Hour		Evening Peak Hour	
	Arriving	Departing	Arriving	Departing
West	**26** (46%)	**26** (46%)	**23** (46%)	**23** (46%)
East	**31** (54%)	**31** (54%)	**27** (54%)	**27** (54%)
Total	**57** (100%)	**57** (100%)	**50** (100%)	**50** (100%)

The resulting traffic volumes generated by the site are outlined in Figure 6 for the site access on Farrer Road and the Farrer Road / Boorooma Street roundabout.

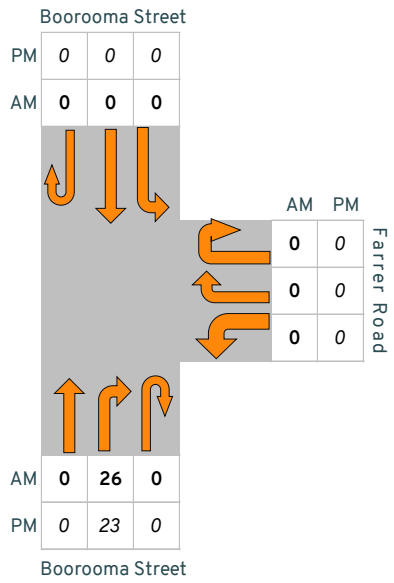
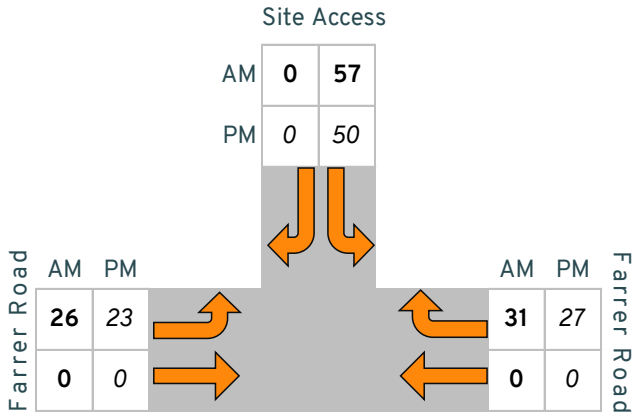
Figure 6: Estimated Traffic Volumes Generated by Proposed Development

Farrer Road / Boorooma Street	Site Access on Farrer Road
	

4.1.2 Left Turn Egress Only

In response to feedback received from Council in March 2025, an alternative scenario has been developed where motorists must depart the site via left turns only, which would be via appropriate signage and on-road treatments as described in Section 6.3. The model assumptions and distributions are otherwise identical to that outlined above. The resulting traffic volumes generated by the site are outlined in for the site access on Farrer Road and the Farrer Road / Boorooma Street roundabout where all egress from the site is via left turns only.

Figure 7: Estimated Traffic Volumes Generated by Proposed Development – Left Turn Egress Only

Farrer Road / Boorooma Street	Site Access on Farrer Road
	

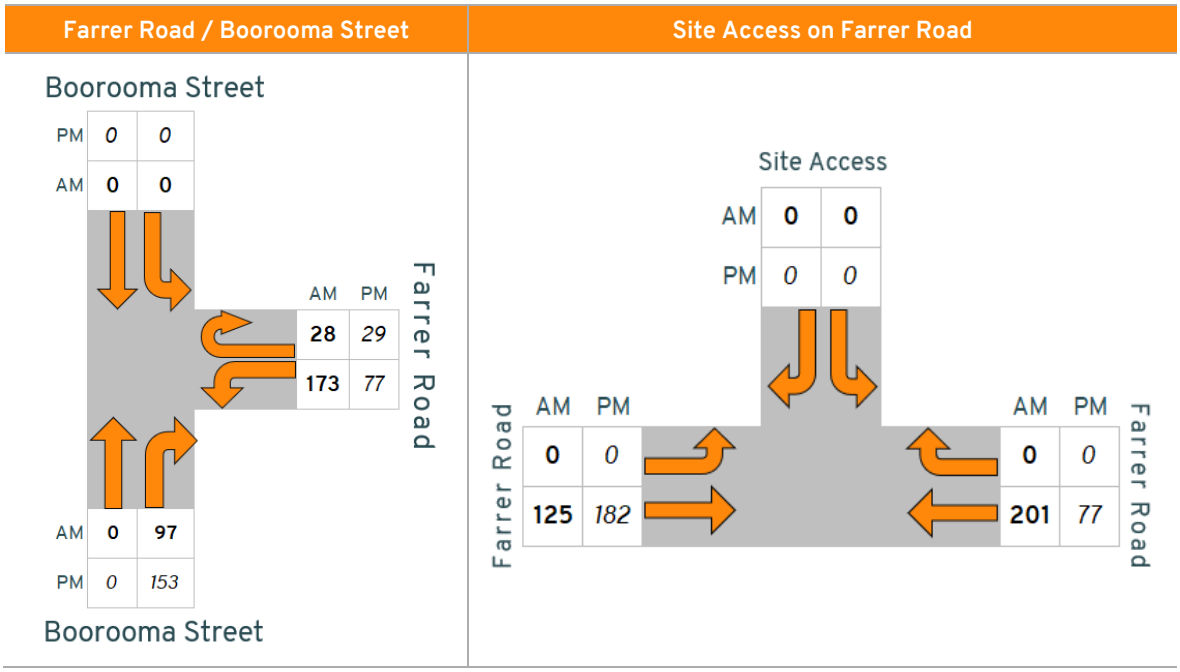
As shown in the figure above, were egress limited to left turns only, all traffic departing the site in the peaks hours would be distributed to the east and would not generate additional traffic through the Farrer Road / Boorooma Street roundabout.

4.1.3 The Riverina Anglican School Concept Masterplan

Amber completed a Traffic Impact Assessment dated 6 December 2022 for The Riverina Anglican School (TRAC) Concept Masterplan located along Farrer Road to the east of the site. The Concept Masterplan proposed to provide an additional 505 primary and secondary school students on-site which requires an increase of 20 staff. In addition, a new ELC is proposed which would accommodate 120 children.

The resulting traffic volumes anticipated along Farrer Road at the proposed site access and the Boorooma Street roundabout are outlined in Figure 8.

Figure 8: Traffic Volumes Generated by TRAC Masterplan



4.1.4 Total Traffic Generation Summary

The total traffic volumes expected at the site access and the Boorooma Street / Farrer Road roundabout are shown in figures below Figure 9 and include:

- Existing weekday traffic volumes as outlined in Section 2.3, inclusive of the increase at the Boorooma Street / Farrer Road described in Section 2.3.3 and shown in Figure 4;
- Traffic generated by the proposed preschool development; and
- Traffic generated by the TRAC Masterplan.

The expected traffic volumes for the scenarios described above are presented below in Figure 9 (full access from site – Scenario #1) and Figure 10 (left turn egress from site only – Scenario #2), respectively.

Figure 9: Total Expected Traffic Volumes – Full Access from Site – Scenario #1

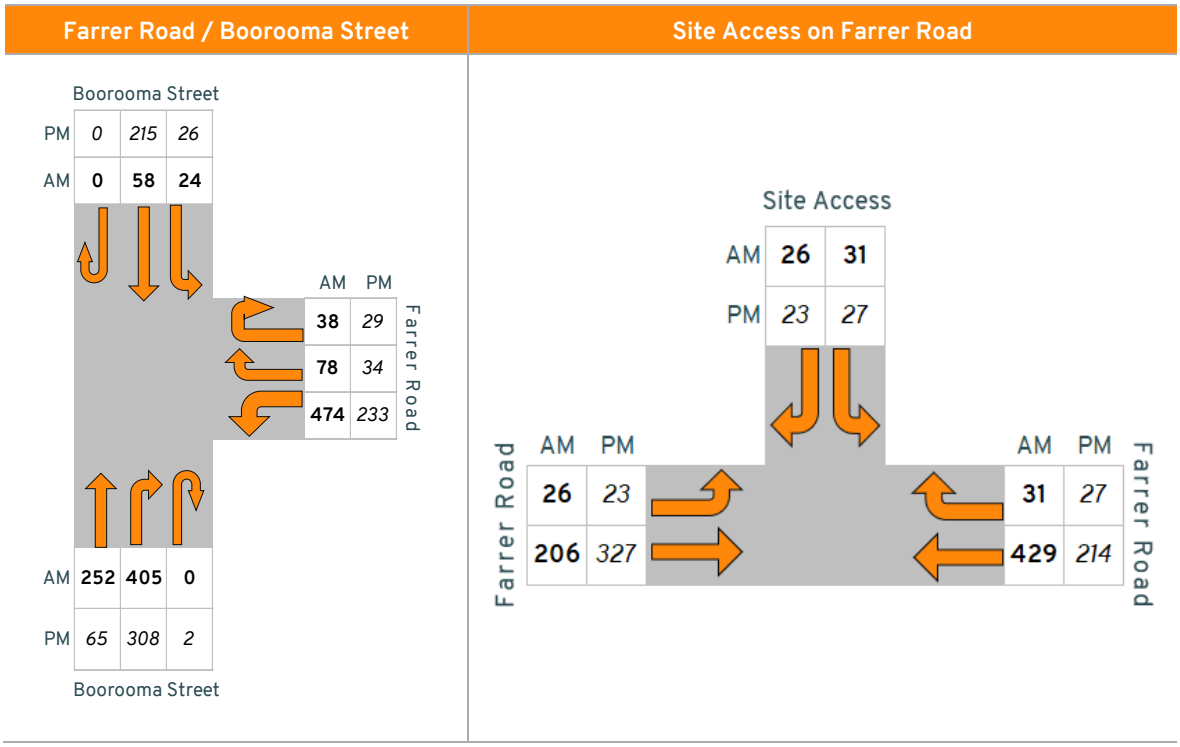
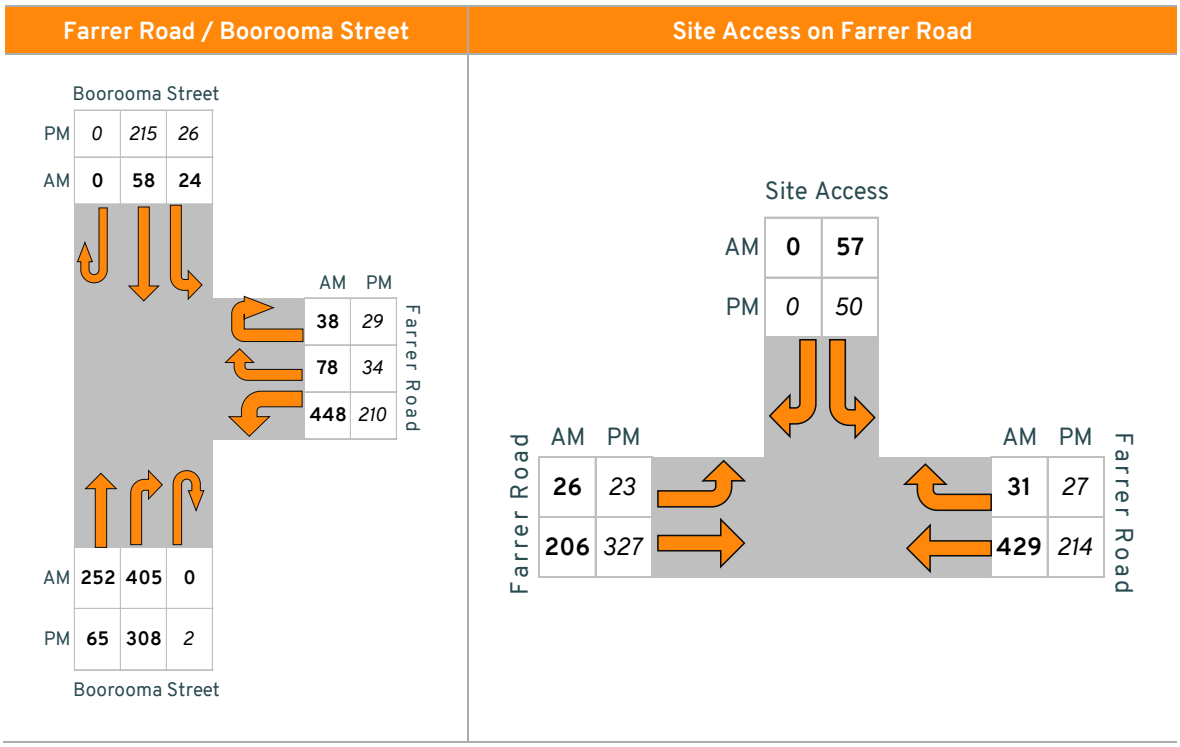


Figure 10: Total Expected Traffic Volumes – Left Turn Egress Only – Scenario #2



A review of the figures shows that the results are similar with changes that reflect potential site access arrangements.

4.2 Traffic Modelling

In order to review the traffic implications of the proposal, a traffic modelling exercise has been undertaken using the SIDRA intersection modelling software. The SIDRA software is an advanced lane-based micro-analytical tool for design and evaluation of individual intersections and networks of intersections including modelling of separate movement classes.

A key indicator of intersection performance is Level of Service which is a qualitative measure used to describe the operating conditions of a section of road or an intersection. Levels of Service are designated from A to F from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) and represent the perception of the road conditions by motorists including speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

The best indicator of the level of service at an intersection is the average delay experienced by vehicles at that intersection. For priority-controlled intersections including T-intersections the critical movement for level of service assessment should be the movement with the highest average delay. Table 5 sets out average delays for different levels of service.

Table 5: Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (sec/veh)	Give Way and Stop Signs
A	Less than 14	Good operation
B	15 – 28	Acceptable delays and spare capacity
C	29 – 42	Satisfactory, but accident study required
D	43 – 56	Near capacity and accident study required
E	57 - 70	At capacity, require other control mode

The assessment reviewed the ability of the proposed site access on Farrer Road and nearby roundabout at Boorooma Road to accommodate the traffic expected to be generated by the site during the morning and evening peak hours. This is based on the two scenarios for access from the site as outlined in Section 4.1.4.

The SIDRA assessment includes consideration to the operational speed of the road network noting the school zoning speed that applies during peak periods. Otherwise, the default SIDRA settings have been adopted for the modelling analysis.

4.2.1 Farrer Road and Boorooma Street Roundabout

The traffic volumes at the roundabout used for the SIDRA modelling are provided in Figure 9 and Figure 10.

The results of the SIDRA analysis for the morning and evening peak hours are summarised below with the full results presented within Appendix C.

Table 6: SIDRA Analysis Results Summary – Full Access from Site – Scenario #1

Approach / Movement		Morning Peak Hour				Evening Peak Hour			
		DoS[1]	Average Delay (sec)	95% Queue (m)	Level of Service	DoS	Average Delay (sec)	95% Queue (m)	Level of Service
Boorooma Street (South)	Through	0.232	1.1	7.8	A	0.082	1	2.5	A
	Right	0.319	6	12	A	0.232	5.7	8.5	A
	U-Turn	0.319	7.4	12	A	0.232	7.2	8.5	A
Farrer Road (East)	Left	0.424	2.1	24.7	A	0.276	3.4	12.9	A
	Right	0.424	5.8	24.7	A	0.276	6.6	12.9	A
	U-Turn	0.424	7.5	24.7	A	0.276	8.7	12.9	A
Boorooma Street (North)	Left	0.093	4.3	3.7	A	0.243	3.9	10	A
	Through	0.093	3.8	3.7	A	0.243	3.4	10	A
	U-Turn	0.093	9	3.7	A	0.243	8.7	10	A

Table 7: SIDRA Analysis Results Summary – Left Turn Egress Only – Scenario #2

Approach / Movement		Morning Peak Hour				Evening Peak Hour			
		DoS	Average Delay (sec)	95% Queue (m)	Level of Service	DoS	Average Delay (sec)	95% Queue (m)	Level of Service
Boorooma Street (South)	Through	0.232	1.1	7.8	A	0.082	1	2.5	A
	Right	0.319	6	12	A	0.232	5.7	8.5	A
	U-Turn	0.319	7.4	12	A	0.232	7.2	8.5	A
Farrer Road (East)	Left	0.406	2.1	23.2	A	0.256	3.4	11.8	A
	Right	0.406	5.8	23.2	A	0.256	6.6	11.8	A
	U-Turn	0.406	7.5	23.2	A	0.256	8.7	11.8	A
Boorooma Street (North)	Left	0.093	4.3	3.7	A	0.243	3.9	10	A
	Through	0.093	3.8	3.7	A	0.243	3.4	10	A
	U-Turn	0.093	9	3.7	A	0.243	8.7	10	A

The SIDRA analysis indicates the following:

- The intersection is expected to operate with minimal queue lengths and delays on all legs for both scenarios;
- The overall average delay at the intersection is in the order of 4-5 seconds during the AM and PM peak hours, respectively, for both scenarios, which is considered to be minor; and
- The intersection is expected to continue to operate with a good level of service (LOS A).

Accordingly, the intersection is expected to continue to operate efficiently with minimal queuing and delays expected for both access scenarios.

4.2.2 Site Access

The traffic volumes at the site access used for the SIDRA modelling are provided in Figure 9. and Figure 10 for the respective scenarios.

[1] DoS is the Degree of Saturation, which is the ratio of traffic demand to capacity.

The results of the SIDRA analysis for the morning and evening peak hours are summarised below with the full results presented within Appendix C.

Table 8: SIDRA Analysis Results Summary – Full Access from Site – Scenario #1

Approach / Movement		Morning Peak Hour				Evening Peak Hour			
		DoS	Average Delay (sec)	95% Queue (m)	Level of Service	DoS	Average Delay (sec)	95% Queue (m)	Level of Service
Farrer Road (East)	Through	0.12	0	0	A	0.06	0	0	A
	Right	0.023	4.3	0.7	A	0.023	4.8	0.7	A
Site Access (North)	Left	0.097	4.3	2.5	A	0.083	5	2.1	A
	Right	0.097	10.9	2.5	A	0.083	9.5	2.1	A
Farrer Road (West)	Left	0.13	3.4	0	A	0.196	3.5	0	A
	Through	0.13	0	0	A	0.196	0.1	0	A

The SIDRA analysis indicates that the delay and queueing for right turning vehicles would be very minor with an average delay for motorists departing the site and turning right being 2.5 seconds and 9.5 seconds for the morning and afternoon peak hour, respectively. The average queue length for right turning vehicles would be expected to be less than one vehicle.

Table 9: SIDRA Analysis Results Summary – Left Turn Egress Only – Scenario #2

Approach / Movement		Morning Peak Hour				Evening Peak Hour			
		DoS	Average Delay (sec)	95% Queue (m)	Level of Service	DoS	Average Delay (sec)	95% Queue (m)	Level of Service
Farrer Road (East)	Through	0.12	0	0	A	0.06	0	0	A
	Right	0.023	4.3	0.7	A	0.023	4.8	0.7	A
Site Access (North)	Left	0.097	4.3	2.5	A	0.057	5	1.4	A
Farrer Road (West)	Left	0.13	3.4	0	A	0.196	3.5	0	A
	Through	0.13	0	0	A	0.196	0.1	0	A

The SIDRA analysis indicates the following:

- The left and right turn movements into the site from Farrer Road are suitably accommodated by the proposed intersection layout with no delays expected for through traffic along Farrer Road in the morning or evening peak hours for both scenarios.
- Delays for right turning motorists are expected to be very low as outlined above, with an average delay for motorists departing the site and turning right being 2.5 seconds and 9.5 seconds for the morning and afternoon peak hour, respectively.
- Delays would be reduced for departing motorists for scenario #2 when only left turn egress movements are available.
- There is likely to be minimal queuing within the site for vehicles waiting to exit onto Farrer Road during both the morning and evening peak hours for both scenarios. The expected

95th percentile queue lengths equate to approximately one vehicle in each of the peak hours which can be safely accommodated within the site.

Accordingly, the site access on Farrer Road is expected to operate efficiently with a negligible impact on the existing road environment.

4.2.3 Summary

Overall, the increase in traffic generated by the proposal is expected to have minimal impact on the surrounding road network which is anticipated to continue to operate with a good level of service. This applies to both scenarios that have been analysed.

Therefore, the surrounding road network is able to accommodate the increase in vehicle traffic which is not expected to create any notable adverse impacts on the road environment for both access scenarios.

5. Parking Assessment

5.1 Parking Requirement

The Wagga Wagga Development Control Plan 2010 (DCP) specifies the parking requirement for different land uses. The parking requirement applicable to a preschool is *1 space per 4 children in attendance*. Application of this rate to the proposed capacity of 90 children results in a parking requirement of 23 spaces.

A total of 23 spaces are proposed on-site which meets the statutory parking requirements of the DCP.

5.2 Car Park Design

A total of 23 car parking spaces are proposed on site within an open-air ground-level car park at the site frontage, including one accessible parking space. Access to the car park is proposed from Farrer Road via a new double-width vehicle crossover.

Section 2 of The Wagga Wagga DCP states that the design and layout of parking is to be in accordance with the relevant Australian Standard at the time of lodgement of an application. The following provides a review of the car park layout and access arrangements against the design requirements of AS/NZS 2890.1:2004 and AS/NZS 2890.6:2022. Key elements of the design are detailed as follows:

- All car spaces are proposed to be line marked as 2.6m wide by 5.4m long and accessed from a 7.0m wide aisle which exceeds the requirements of AS/NZS 2890.1:2004.
- One accessible parking space is proposed with an adjacent shared areas which has been designed in accordance with AS/NZS 2890.6:2022.
- All car parking spaces are provided with adequate clearances for car door opening in accordance with Figure 5.2 of AS/NZS 2890.1:2004.
- A turning area is provided at the eastern end of the car park to allow vehicles to turn around with a 3-point manoeuvre.
- The car parking aisle is extended by 1.9m to allow all vehicles to exit the car park with a single manoeuvre.
- Proposed grades across the car park are relatively flat and do not exceed the grades outlined within AS/NZS 2890.1:2004 and AS/NZS 2890.6:2022.
- There are no headroom restrictions within the car park as it is 'open-air' (i.e. no structure is proposed above the car park).

Overall, the car park and vehicle access arrangements have been suitably designed in accordance with the requirements of AS/NZS 2890.1:2004 and AS/NZS 2890.6:2022.

6. Access Arrangements

6.1 Design Review

AS/NZS 2890.1:2004 specifies the requirements for accessways to off-street car parking facilities. A review of the proposed access arrangements is provided as follows:

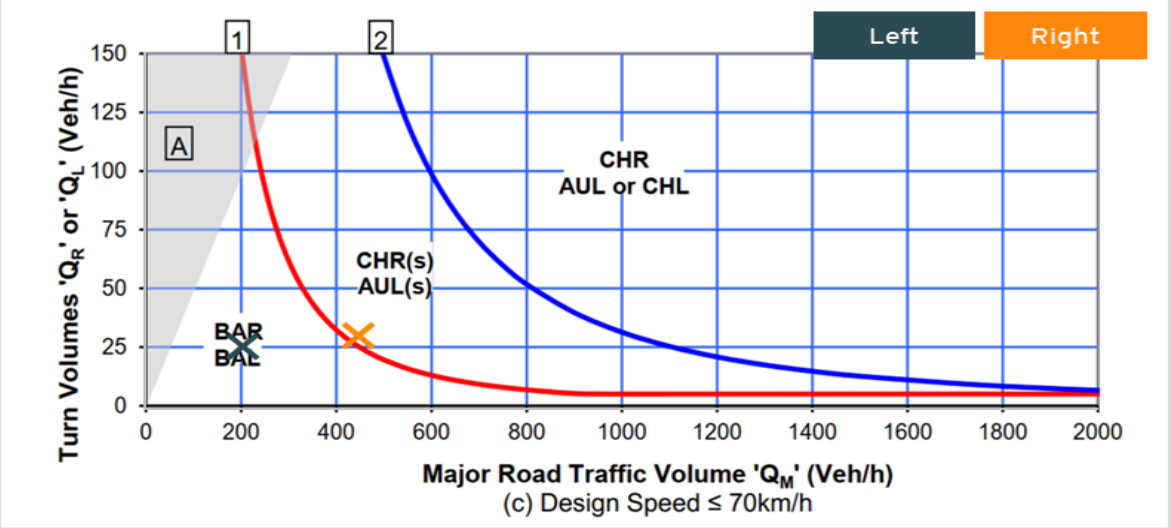
- The car parking facility is considered a User Class 3 (short-term parking) and connects to a local road with fewer than 25 spaces provided. Accordingly, the proposed driveway is a Category 1 access facility which can be suitably provided along Farrer Road.
- The crossover is 8 metres wide which exceeds the width requirement of 3.0-5.5m as specified in AS/NZS 2890.1:2004 for a Category 1 access facility.
- The crossover is located with an offset of approximately 26m from the property boundary at the intersection of Lindrum Way which greatly exceeds the 6.0m offset requirement specified in Figure 3.1 of AS/NZS 2890.1:2004.
- The crossover has been designed to allow all vehicles to enter and exit the site in a forward direction and accommodates simultaneous turning manoeuvres.
- The accessway is approximately 37m long between the property boundary and the car parking aisle which can accommodate a queue length of up to 6 vehicles. Accordingly, the design provides adequate queueing space for entering and exiting vehicles to store internally within the site if required.
- The sight distance provided for vehicles exiting the site exceeds the requirements of Figure 3.2 of AS/NZS 2890.1:2004 given the relatively straight and flat alignment of Farrer Road. The required minimum sight distance is 85m in both directions based on a frontage road speed of 70 km/h.
- A pedestrian sight splay is provided on both sides of the crossover to Farrer Road in accordance with Figure 3.3 of AS/NZS 2890.1:2004.

6.2 Turn Treatment Assessment

Given the multi-lane road environment, traffic volumes and vehicle speeds along Farrer Road, turn treatments should be considered to accommodate traffic entering the site. *Austroads Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings* specifies the turn treatments required at intersections. A design speed of 70 km/hr has been adopted for Farrer Road based on the average recorded speed of 61 km/hr and 85th percentile speed of 69km/hr as outlined within the survey data provided in Appendix A.

Figure 3.25 of the guide specifies the required turn treatments on the major road at unsignalised intersections and is provided below for the morning peak hour based on a design speed of 70 km/hr or less.

Figure 11: Figure 3.25 of Austroads Guide to Traffic Management Part 6 – AM Peak Hour



Turning Treatment	Traffic Volume (vph)		Requirement
	Turn Volume	Major Road	
Right Turn	31	446	CHR(s)
Left Turn	26	206	BAL

Based on the above assessment, a Basic Left Turn (BAL) and short Channelised Right Turn (CHR(s)) are the recommended treatments that should be provided for the site. It is considered that a BAL treatment is not required for the following reasons:

- The eastbound approach along Farrer Road provides a single traffic lane which is expected to operate with no notable delays as demonstrated within the SIDRA modelling results provided in Section 4.2.1.
- The relatively straight and flat alignment of Farrer Road provides suitable sight distance for following vehicles to clearly identify any vehicles turning left into the site and slow down if required.
- A 40 km/h school zone is applicable along Farrer Road between 8:00am-9:30am and 2:30pm-4:00pm on school days which is expected to coincide with the peak traffic generating hours of the site.
- The risk of a rear-end crash is considered to be low based on the factors identified above.

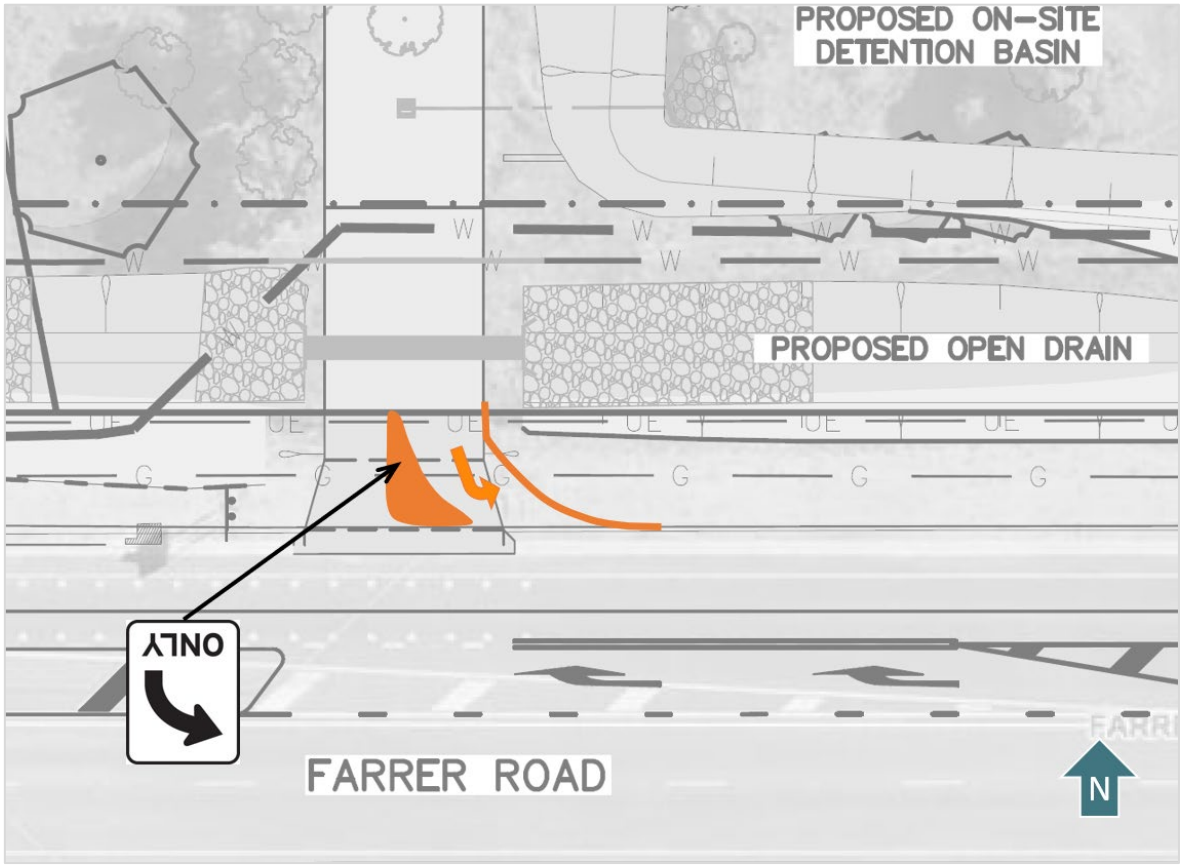
It is proposed to provide a short Channelised Right Turn (CHR(s)) treatment at the site access to integrate with the existing road layout and improve safety and efficiency along Farrer Road. The CHR(S) has been designed with a total length of 43m including 8m storage in accordance with the requirements of the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.* The proposed layout is provided in Appendix D.

A swept path assessment has been prepared by Xeros Piccolo Consulting Engineers and is provided in Appendix E. The assessment indicates that the site access has been suitably designed to accommodate the vehicles expected to access the site including simultaneous entry and exit manoeuvres for the B99 design vehicle.

6.3 Left Turn Egress Only

In response to feedback received by Council, and to reduce risks and delays on the surrounding road network a restriction could be placed on motorists departing the site so that all departing motorists undertake left turns only. This could be implemented by way of an island at the site access along with supporting signage as indicatively shown in Figure 12.

Figure 12: Left Turn Egress Only – Indicative Plan



As described in Section 4.2.3, traffic modelling shows that limiting access from the site to left turns only results in similar performance to full access, with reduced delays for departing motorists. The implementation of a left turn only would also be expected to reduce conflict and risk at the site access.

Equally, the implementation of the restriction may result in downstream impacts by way of u-turns on Farrer Road of the use of nearby local streets that could increase risks elsewhere. However, given the access to the surrounding road network to both the east and west and connection to the Olympic Highway, these risks would be expected to be low.

Overall, the implementation of access arrangements like that outlined in Figure 11 are considered suitable and likely to align with the longer term operation of Farrer Road.

6.4 Commentary on Road Safety

6.4.1 Speed Zoning

The proposed site access is located immediately adjacent to the commencement of an existing School Zone on Farrer Road. It is recommended that the zone be relocated to formally commence on the western side of Lindrum Way, which would result in reduce speeds past the site and reduce risks during peak periods. It is noted that this may require the addition of signs to Lindrum Way.

The implementation of this change would be subject to approvals and consideration by Council and TfNSW.

6.4.2 Pedestrian Risks

Council officers have raised concerns about the risks posed to pedestrians during peak times given the proximity to the nearby school.

These risks are relatively low given that:

- There are no proposed or existing pedestrian facilities that would connect to the proposal and enable access to Farrer Road.
- The site access and car parking area are set back significant distance from Farrer Road in order to accommodate drainage infrastructure, physically separating children from frontage Road.
- Children are expected to be well supervised by parents/guardians and staff and not be allowed to undertake informal crossing movements.

7. Bicycle Parking

The provisions set out under the Wagga Wagga Development Control Plan (DCP) do not specify bicycle parking rates for childcare centres.

Notwithstanding the above, three bicycle hoops (6 spaces) are proposed as part of the development adjacent to the car park for use by staff and parents. Each bicycle hoop has been designed with a minimum clearance of 560mm from a wall or obstruction, access aisle width of 1.9m and spacing of 1.0m between hoops.

Accordingly, the proposed bicycle parking provision exceeds the requirements of the DCP and has been suitably designed.

8. Waste Collection and Loading

Refuse and recycling bins are provided within a waste shed at the western end of the car park. Waste is proposed to be collected outside peak times via private waste collection services utilising a rigid truck up to 10.0m long.

A swept path assessment has been prepared by Xeros Piccolo Consulting Engineers and is provided in Appendix E. The assessment indicates the waste collection vehicle is able to suitably access and egress the site in a forward direction. It is noted that waste collection would be undertaken during off-peak times to limit the impact on the operation of the car park.

Loading is also proposed to be undertaken within the on-site car park using vehicles up to an 8.8m long rigid vehicle. A swept path assessment is included in Appendix E for the loading vehicle.

Accordingly, the proposed waste collection and loading procedures are considered acceptable and the vehicles are expected to be able to readily access the site.

9. Conclusion

It is proposed to construct a preschool (St Mary's Rainbow Preschool) on the northern side of Farrer Road in Charles Sturt University. The preschool is proposed to operate with a capacity of 90 children with opening hours from 8:30am-4:00pm on weekdays. A total of 23 car parking spaces are proposed on-site which would be accessed via a new double-width crossover to Farrer Road. It is proposed to provide a short Channelised Right Turn (CHR(s)) treatment at the site access to allow vehicles to safely enter the site from Farrer Road.

Based on the above, the following conclusions are provided:

- The proposal generates a parking requirement of 23 car parking spaces under the DCP and as such, the parking provision meets the requirements of the DCP.
- The proposal is expected to generate a total of 113 and 99 vehicle movements during the morning and evening peak hours, respectively.
- The increase in traffic generated by the proposal is expected to have a minimal impact to the operation of the surrounding road network including Farrer Road which is expected to continue operating with a good level of service. This includes consideration to
  - Allowing for an increase in traffic volumes recorded at the intersection of Farrer Road and Boorooma Street Roundabout to those recorded in December 2023.
  - An alternative access scenario which would limit access from the site to left turns only.
- The car park layout and access arrangements have been designed in accordance with AS/NZS 2890.1:2004 and AS/NZS 2890.6:2022 (noting that an arrangement for left turn access only from the site would be subject to further design refinement, should it be implemented on the design).
- It is proposed to provide a short Channelised Right Turn (CHR(s)) treatment at the site access to integrate with the existing road layout and improve safety and efficiency along Farrer Road.
- Risks to pedestrians and children would be expected to be relatively low given the lack of pedestrian connection from the site to Farrer Road, the physical separation of the car park and entry to the frontage road, and the nature of the use and anticipated behaviour of parents and guardians.
- Three bicycle hoops (6 spaces) are proposed as part of the development. The bicycle parking provision exceeds the requirements of the DCP and has been suitably designed.
- Waste is proposed to be collected by private waste collection services outside of peak times to limit the impact to the operation of the car park. The vehicle is able to suitably access and egress the site in a forward direction.

Therefore, it is concluded that the traffic and parking aspects of the proposed development are satisfactory, and the development will have a minimal impact on the surrounding road environment.

Appendix A

Tube Count Data – Farrer Road

TRANS TRAFFIC SURVEY

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AUTOMATIC COUNT SUMMARY

Street Name :	Farrer Rd	**Location :**	West of Sturrock Dr
Suburb :	Wagga Wagga	**Start Date :**	00:00 Tue 23/May/2023
Machine ID:	NW160KF7/P	**Finish Date :**	00:00 Tue 30/May/2023
Site ID:	2503	**Speed Zone :**	70 km/h
Prepared By :	Vo Son Binh	**Email:**	binh@trafficsurvey.com.au

GPS information		Lat 35° 4' 0.61 South Long 147° 22' 3.90 East	Direction of Travel		
			Both directions	**Westbound**	**Eastbound**
Traffic Volume :		Weekdays Average	2,434	1,320	1,114
(Vehicles/Day)		7 Day Average	2,183	1,174	1,009
Weekday	**AM**	08:00	310	228	81
Peak hour start	**PM**	15:00	282	137	145
Speeds :		85th Percentile	68.7	67.3	70.2
(Km/Hr)		Average	61.0	58.9	63.2
Classification % :		Light Vehicles up to 5.5m	94.4%	94.0%	94.8%

Location

GPS Information	Load Google Map (internet required)
(Latitude, Longitude)	-35.066835, 147.367750

Speed Data	Speed Graph	Speed Bin
Volume Data	Volume Graph	Classification

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001

SAFETY SYSTEM CERTIFICATION DNV·GL AS/NZS 4801

ENVIRONMENTAL SYSTEM CERTIFICATION DNV·GL ISO 14001

QUALITY ASSURED COMPANY BY ISO 9001:2015
OH&S SYSTEM CERTIFIED TO ISO 4801:2001
ENVIRONMENT MANAGEMENT SYSTEM CERTIFIED TO ISO14001:2015

TRANS TRAFFIC SURVEY
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Site Farrer Rd

Direction Eastbound

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Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	7 days		Weekday		Weekend	
Date	29/05/2023	23/05/2023	24/05/2023	25/05/2023	26/05/2023	27/05/2023	28/05/2023	Total	Average	Total	Average	Total	Average
AM Peak	08:00	08:00	08:00	08:00	08:00	11:00	10:00	N/A	08:00	N/A	08:00	N/A	10:00
PM Peak	15:00	15:00	15:00	15:00	15:00	12:00	14:00	N/A	15:00	N/A	15:00	N/A	16:00
00:00	1	2	0	5	3	8	7	26	4	11	2	15	8
01:00	6	2	0	5	1	3	5	22	3	14	3	8	4
02:00	2	1	1	4	1	1	2	12	2	9	2	3	2
03:00	1	1	2	1	2	1	4	12	2	7	1	5	3
04:00	4	4	2	6	3	2	0	21	3	19	4	2	1
05:00	21	20	23	21	19	8	9	121	17	104	21	17	9
06:00	30	36	45	30	30	16	8	195	28	171	34	24	12
07:00	71	68	60	71	74	17	14	375	54	344	69	31	16
08:00	82	81	85	78	80	37	29	472	67	406	81	66	33
09:00	62	55	55	71	58	41	28	370	53	301	60	69	35
10:00	39	50	47	61	48	46	63	354	51	245	49	109	55
11:00	42	49	46	55	54	54	48	348	50	246	49	102	51
12:00	57	49	55	46	68	80	56	411	59	275	55	136	68
13:00	43	63	43	62	66	64	62	403	58	277	55	126	63
14:00	60	61	50	57	89	70	68	455	65	317	63	138	69
15:00	137	137	144	151	158	70	53	850	121	727	145	123	62
16:00	119	129	135	125	119	75	68	770	110	627	125	143	72
17:00	120	117	129	131	111	67	49	724	103	608	122	116	58
18:00	51	67	69	71	56	43	29	386	55	314	63	72	36
19:00	29	53	54	39	39	24	26	264	38	214	43	50	25
20:00	26	27	29	28	45	26	23	204	29	155	31	49	25
21:00	18	24	17	20	14	22	12	127	18	93	19	34	17
22:00	8	15	10	18	18	17	13	99	14	69	14	30	15
23:00	4	1	6	5	4	10	6	36	5	20	4	16	8
Total	1033	1112	1107	1161	1160	802	682	7057	1009	5573	1114	1484	747
% Heavy	6.39%	5.76%	5.78%	5.60%	5.95%	3.24%	2.93%	5.30%		5.89%		3.10%	

TRANS TRAFFIC SURVEY
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Site Farrer Rd

Direction Westbound

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Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	7 days		Weekday		Weekend	
Date	29/05/2023	23/05/2023	24/05/2023	25/05/2023	26/05/2023	27/05/2023	28/05/2023	Total	Average	Total	Average	Total	Average
AM Peak	08:00	08:00	08:00	08:00	08:00	11:00	10:00	N/A	08:00	N/A	08:00	N/A	11:00
PM Peak	15:00	15:00	15:00	15:00	16:00	17:00	17:00	N/A	15:00	N/A	15:00	N/A	17:00
00:00	0	5	2	3	0	4	4	18	3	10	2	8	4
01:00	0	1	0	0	4	3	5	13	2	5	1	8	4
02:00	0	1	0	1	1	2	1	6	1	3	1	3	2
03:00	0	1	1	2	0	0	0	4	1	4	1	0	0
04:00	4	5	6	7	5	1	0	28	4	27	5	1	1
05:00	8	17	13	15	12	10	5	80	11	65	13	15	8
06:00	44	41	47	41	50	15	11	249	36	223	45	26	13
07:00	105	88	100	80	98	29	16	516	74	471	94	45	23
08:00	214	230	246	239	213	51	30	1223	175	1142	228	81	41
09:00	91	92	78	85	99	62	44	551	79	445	89	106	53
10:00	53	66	62	69	64	63	61	438	63	314	63	124	62
11:00	50	59	47	61	47	85	61	410	59	264	53	146	73
12:00	67	49	65	68	63	64	62	438	63	312	62	126	63
13:00	67	43	58	58	88	66	53	433	62	314	63	119	60
14:00	99	82	73	71	92	66	57	540	77	417	83	123	62
15:00	124	142	153	143	123	77	57	819	117	685	137	134	67
16:00	116	115	131	106	133	63	50	714	102	601	120	113	57
17:00	85	106	113	122	91	80	67	664	95	517	103	147	74
18:00	62	71	52	62	62	49	51	409	58	309	62	100	50
19:00	33	32	41	38	38	28	28	238	34	182	36	56	28
20:00	24	34	31	23	20	20	19	171	24	132	26	39	20
21:00	16	18	12	19	16	19	11	111	16	81	16	30	15
22:00	8	10	15	9	12	20	8	82	12	54	11	28	14
23:00	7	8	7	3	6	7	6	44	6	31	6	13	7
Total	1277	1316	1353	1325	1337	884	707	8199	1174	6608	1320	1591	801
% Heavy	6.89%	5.47%	5.91%	6.42%	6.28%	4.98%	5.09%	5.96%		6.19%		5.03%	

Appendix B

Turning Movement Count Data – Farrer Road and Boorooma Street

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

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Intersection of Boorooma St and Farrer Rd, Charles Sturt University

GPS *-35.065661, 147.359808*

Date:	Thu 07/12/23
Weather:	Overcast
Suburb:	Charles Sturt Universit
Customer:	Amber

North:	Boorooma St
East:	Farrer Rd
South:	Boorooma St
West:	N/A

Survey Period	AM:	7:00 AM-9:00 AM
	PM:	3:30 PM-6:30 PM
Traffic Peak	AM:	8:00 AM-9:00 AM
	PM:	4:30 PM-5:30 PM

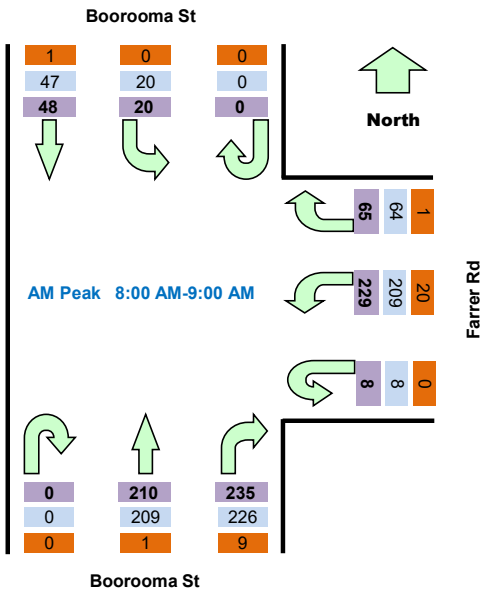
All Vehicles

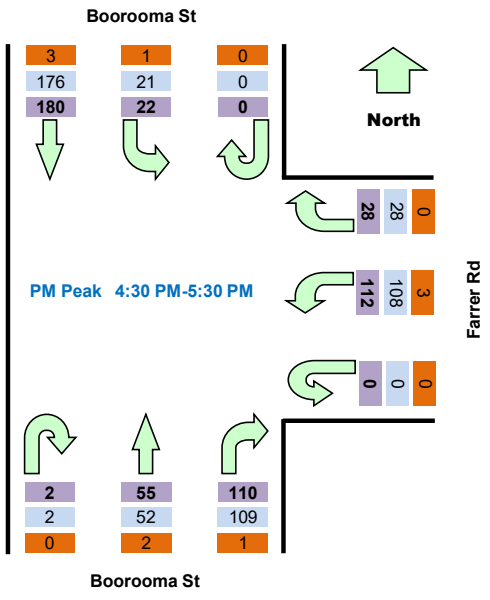
Time		North Approach Boorooma St			East Approach Farrer Rd			South Approach Boorooma St			Hourly Total	
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	Hour	Peak
7:00	7:15	0	3	2	0	4	15	0	8	11	272	
7:15	7:30	0	1	1	0	5	15	0	18	14	357	
7:30	7:45	0	3	3	0	6	23	0	24	12	502	
7:45	8:00	0	2	4	0	7	30	0	36	25	680	
8:00	8:15	0	5	3	0	8	44	0	36	32	815	Peak
8:15	8:30	0	5	7	2	18	53	0	56	58		
8:30	8:45	0	21	9	3	22	58	0	77	59		
8:45	9:00	0	17	1	3	17	74	0	66	61		
15:30	15:45	0	31	5	0	3	59	0	23	8	444	
15:45	16:00	0	20	7	0	2	32	0	31	9	437	
16:00	16:15	0	32	5	0	4	51	0	13	4	450	
16:15	16:30	0	33	3	0	1	35	1	27	5	485	
16:30	16:45	0	50	2	0	2	31	0	24	13	509	Peak
16:45	17:00	0	42	5	0	5	20	0	29	13	505	
17:00	17:15	0	60	5	0	9	33	1	22	14	471	
17:15	17:30	0	28	10	0	12	28	1	35	15	412	
17:30	17:45	0	28	7	1	13	20	0	29	20	331	
17:45	18:00	0	18	6	0	7	14	0	24	11		
18:00	18:15	0	12	3	0	2	25	1	33	9		
18:15	18:30	0	6	1	0	0	9	0	28	4		

Peak Time		North Approach Boorooma St			East Approach Farrer Rd			South Approach Boorooma St			Peak total
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	
8:00	9:00	0	48	20	8	65	229	0	235	210	815
16:30	17:30	0	180	22	0	28	112	2	110	55	509

Graphic

Total
Light
Heavy





Light Vehicles

Time		North Approach Boorooma St			East Approach Farrer Rd			South Approach Boorooma St		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	3	2	0	3	14	0	7	11
7:15	7:30	0	0	1	0	5	13	0	17	12
7:30	7:45	0	3	3	0	6	19	0	21	12
7:45	8:00	0	2	3	0	7	29	0	33	25
8:00	8:15	0	4	3	0	8	40	0	36	32
8:15	8:30	0	5	7	2	18	44	0	51	58
8:30	8:45	0	21	9	3	21	55	0	77	58
8:45	9:00	0	17	1	3	17	70	0	62	61
15:30	15:45	0	30	5	0	3	57	0	21	8
15:45	16:00	0	20	7	0	2	28	0	27	8
16:00	16:15	0	31	5	0	4	48	0	12	4
16:15	16:30	0	33	3	0	0	34	1	25	5
16:30	16:45	0	49	2	0	2	30	0	23	12
16:45	17:00	0	41	5	0	5	19	0	29	12
17:00	17:15	0	59	5	0	9	32	1	22	13
17:15	17:30	0	27	9	0	12	27	1	35	15
17:30	17:45	0	28	7	1	13	20	0	29	20
17:45	18:00	0	17	6	0	7	14	0	23	9
18:00	18:15	0	12	3	0	2	25	1	32	9
18:15	18:30	0	6	1	0	0	9	0	28	4

Peak Time		North Approach Boorooma S			East Approach Farrer Rd			South Approach Boorooma S			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
8:00	9:00	0	47	20	8	64	209	0	226	209	783
16:30	17:30	0	176	21	0	28	108	2	109	52	496

Heavy Vehicles

Time		North Approach Boorooma St			East Approach Farrer Rd			South Approach Boorooma St		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
7:00	7:15	0	0	0	0	1	1	0	1	0
7:15	7:30	0	1	0	0	0	2	0	1	2
7:30	7:45	0	0	0	0	0	4	0	3	0
7:45	8:00	0	0	1	0	0	1	0	3	0
8:00	8:15	0	1	0	0	0	4	0	0	0
8:15	8:30	0	0	0	0	0	9	0	5	0
8:30	8:45	0	0	0	0	1	3	0	0	1
8:45	9:00	0	0	0	0	0	4	0	4	0
15:30	15:45	0	1	0	0	0	2	0	2	0
15:45	16:00	0	0	0	0	0	4	0	4	1
16:00	16:15	0	1	0	0	0	3	0	1	0
16:15	16:30	0	0	0	0	1	1	0	2	0
16:30	16:45	0	1	0	0	0	1	0	1	1
16:45	17:00	0	1	0	0	0	1	0	0	1
17:00	17:15	0	1	1	0	0	1	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0
17:30	17:45	0	1	0	0	0	0	0	1	2
17:45	18:00	0	0	0	0	0	0	0	1	0
18:00	18:15	0	0	0	0	0	0	0	0	0
18:15	18:30	0	1	0	0	0	0	0	0	0

Peak Time		North Approach Boorooma St			East Approach Farrer Rd			South Approach Boorooma St			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
8:00	9:00	0	1	0	0	1	20	0	9	1	32
16:30	17:30	0	3	1	0	0	3	0	1	2	10

Appendix C

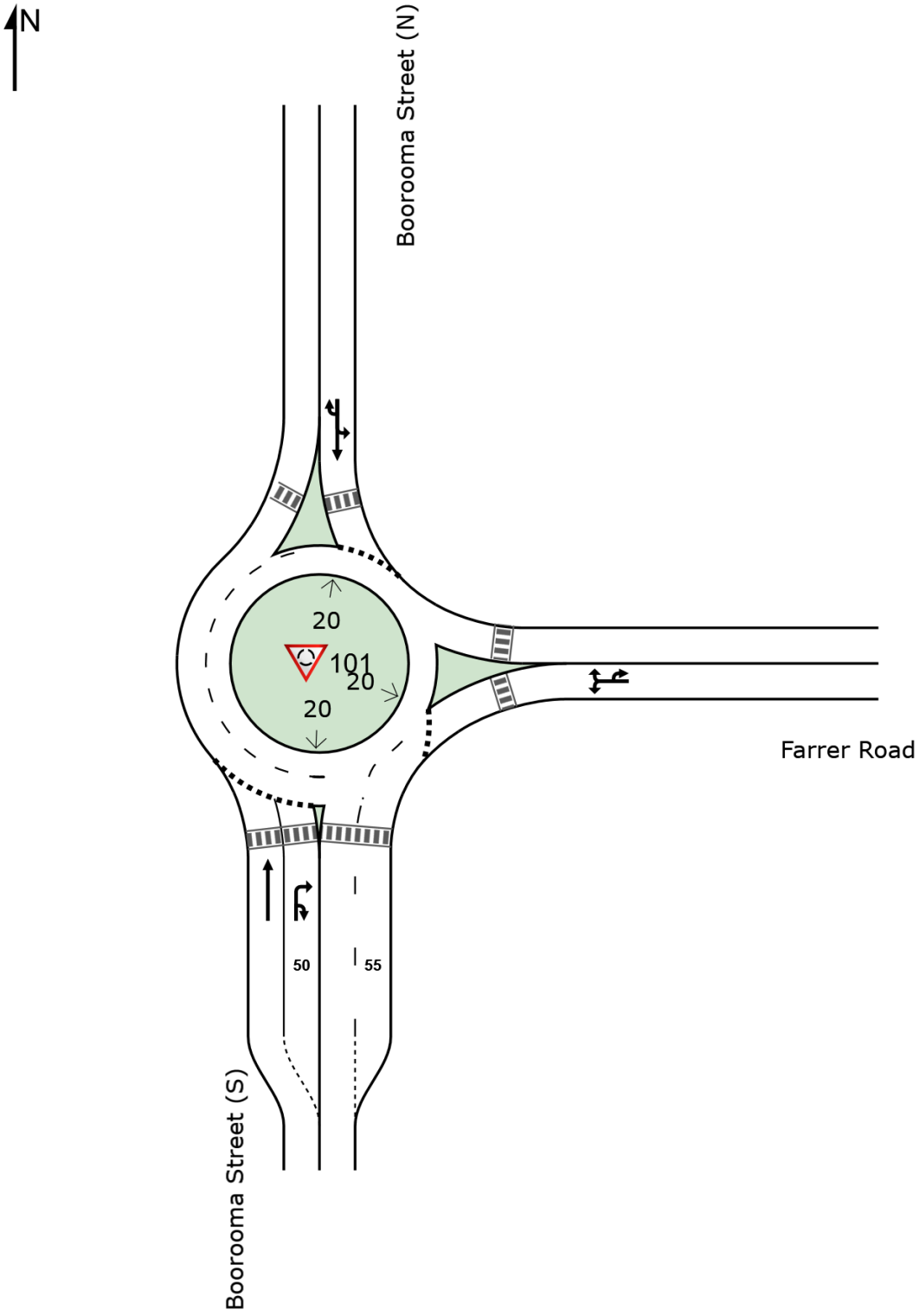
SIDRA Results

SITE LAYOUT

Site: 101 [Farrer Road and Boorooma Street - AM (Site Folder: General - Scenario #1)]

New Site
Site Category: Existing Design
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Farrer Road and Boorooma Street - AM (Site Folder: General - Scenario #1)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: Existing Design
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Boorooma Street (S)															
2	T1	All MCs	265	0.0	265	0.0	0.232	1.1	LOS A	1.1	7.8	0.29	0.16	0.29	38.6
3	R2	All MCs	426	0.2	426	0.2	0.319	6.0	LOS A	1.7	12.0	0.30	0.53	0.30	44.4
3u	U	All MCs	1	0.0	1	0.0	0.319	7.4	LOS A	1.7	12.0	0.30	0.53	0.30	44.4
Approach			693	0.2	693	0.2	0.319	4.1	LOS A	1.7	12.0	0.29	0.39	0.29	42.7
East: Farrer Road															
4	L2	All MCs	499	2.3	499	2.3	0.424	2.1	LOS A	3.4	24.7	0.30	0.35	0.30	46.4
6	R2	All MCs	82	0.0	82	0.0	0.424	5.8	LOS A	3.4	24.7	0.30	0.35	0.30	27.2
6u	U	All MCs	40	21.1	40	21.1	0.424	7.5	LOS A	3.4	24.7	0.30	0.35	0.30	42.9
Approach			621	3.2	621	3.2	0.424	2.9	LOS A	3.4	24.7	0.30	0.35	0.30	43.7
North: Boorooma Street (N)															
7	L2	All MCs	25	4.2	25	4.2	0.093	4.3	LOS A	0.5	3.7	0.56	0.50	0.56	50.9
8	T1	All MCs	61	5.2	61	5.2	0.093	3.8	LOS A	0.5	3.7	0.56	0.50	0.56	51.4
9u	U	All MCs	1	0.0	1	0.0	0.093	9.0	LOS A	0.5	3.7	0.56	0.50	0.56	11.3
Approach			87	4.8	87	4.8	0.093	4.0	LOS A	0.5	3.7	0.56	0.50	0.56	50.9
All Vehicles			1401	1.8	1401	1.8	0.424	3.6	LOS A	3.4	24.7	0.31	0.38	0.31	43.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Farrer Road and Boorooma Street- PM (Site Folder: General - Scenario #1)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: Existing Design
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Boorooma Street (S)															
2	T1	All MCs	68	3.1	68	3.1	0.082	1.0	LOS A	0.3	2.5	0.23	0.15	0.23	38.9
3	R2	All MCs	324	0.3	324	0.3	0.232	5.7	LOS A	1.2	8.5	0.21	0.51	0.21	44.5
3u	U	All MCs	2	0.0	2	0.0	0.232	7.2	LOS A	1.2	8.5	0.21	0.51	0.21	44.6
Approach			395	0.8	395	0.8	0.232	4.9	LOS A	1.2	8.5	0.21	0.45	0.21	43.9
East: Farrer Road															
4	L2	All MCs	245	4.7	245	4.7	0.276	3.4	LOS A	1.8	12.9	0.48	0.46	0.48	45.5
6	R2	All MCs	36	0.0	36	0.0	0.276	6.6	LOS A	1.8	12.9	0.48	0.46	0.48	26.9
6u	U	All MCs	31	27.6	31	27.6	0.276	8.7	LOS A	1.8	12.9	0.48	0.46	0.48	41.5
Approach			312	6.4	312	6.4	0.276	4.3	LOS A	1.8	12.9	0.48	0.46	0.48	43.1
North: Boorooma Street (N)															
7	L2	All MCs	27	3.8	27	3.8	0.243	3.9	LOS A	1.4	10.0	0.53	0.45	0.53	51.1
8	T1	All MCs	226	1.4	226	1.4	0.243	3.4	LOS A	1.4	10.0	0.53	0.45	0.53	52.9
9u	U	All MCs	1	0.0	1	0.0	0.243	8.7	LOS A	1.4	10.0	0.53	0.45	0.53	11.7
Approach			255	1.7	255	1.7	0.243	3.4	LOS A	1.4	10.0	0.53	0.45	0.53	52.6
All Vehicles			961	2.8	961	2.8	0.276	4.3	LOS A	1.8	12.9	0.39	0.46	0.39	44.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Farrer Road and Boorooma Street - AM (Site Folder: General - Scenario #2)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: Existing Design
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Boorooma Street (S)															
2	T1	All MCs	265	0.0	265	0.0	0.232	1.1	LOS A	1.1	7.8	0.29	0.16	0.29	38.6
3	R2	All MCs	426	0.2	426	0.2	0.319	6.0	LOS A	1.7	12.0	0.30	0.53	0.30	44.4
3u	U	All MCs	1	0.0	1	0.0	0.319	7.4	LOS A	1.7	12.0	0.30	0.53	0.30	44.4
Approach			693	0.2	693	0.2	0.319	4.1	LOS A	1.7	12.0	0.29	0.39	0.29	42.7
East: Farrer Road															
4	L2	All MCs	472	2.5	472	2.5	0.406	2.1	LOS A	3.2	23.2	0.29	0.35	0.29	46.3
6	R2	All MCs	82	0.0	82	0.0	0.406	5.8	LOS A	3.2	23.2	0.29	0.35	0.29	27.2
6u	U	All MCs	40	21.1	40	21.1	0.406	7.5	LOS A	3.2	23.2	0.29	0.35	0.29	42.9
Approach			594	3.4	594	3.4	0.406	3.0	LOS A	3.2	23.2	0.29	0.35	0.29	43.6
North: Boorooma Street (N)															
7	L2	All MCs	25	4.2	25	4.2	0.093	4.3	LOS A	0.5	3.7	0.56	0.50	0.56	50.9
8	T1	All MCs	61	5.2	61	5.2	0.093	3.8	LOS A	0.5	3.7	0.56	0.50	0.56	51.4
9u	U	All MCs	1	0.0	1	0.0	0.093	9.0	LOS A	0.5	3.7	0.56	0.50	0.56	11.3
Approach			87	4.8	87	4.8	0.093	4.0	LOS A	0.5	3.7	0.56	0.50	0.56	50.9
All Vehicles			1374	1.8	1374	1.8	0.406	3.6	LOS A	3.2	23.2	0.31	0.38	0.31	43.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Farrer Road and Boorooma Street- PM (Site Folder: General - Scenario #2)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: Existing Design
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Boorooma Street (S)															
2	T1	All MCs	68	3.1	68	3.1	0.082	1.0	LOS A	0.3	2.5	0.23	0.15	0.23	38.9
3	R2	All MCs	324	0.3	324	0.3	0.232	5.7	LOS A	1.2	8.5	0.21	0.51	0.21	44.5
3u	U	All MCs	2	0.0	2	0.0	0.232	7.2	LOS A	1.2	8.5	0.21	0.51	0.21	44.6
Approach			395	0.8	395	0.8	0.232	4.9	LOS A	1.2	8.5	0.21	0.45	0.21	43.9
East: Farrer Road															
4	L2	All MCs	221	5.2	221	5.2	0.256	3.4	LOS A	1.6	11.8	0.47	0.46	0.47	45.4
6	R2	All MCs	36	0.0	36	0.0	0.256	6.6	LOS A	1.6	11.8	0.47	0.46	0.47	26.9
6u	U	All MCs	31	27.6	31	27.6	0.256	8.7	LOS A	1.6	11.8	0.47	0.46	0.47	41.5
Approach			287	7.0	287	7.0	0.256	4.3	LOS A	1.6	11.8	0.47	0.46	0.47	42.8
North: Boorooma Street (N)															
7	L2	All MCs	27	3.8	27	3.8	0.243	3.9	LOS A	1.4	10.0	0.53	0.45	0.53	51.1
8	T1	All MCs	226	1.4	226	1.4	0.243	3.4	LOS A	1.4	10.0	0.53	0.45	0.53	52.9
9u	U	All MCs	1	0.0	1	0.0	0.243	8.7	LOS A	1.4	10.0	0.53	0.45	0.53	11.7
Approach			255	1.7	255	1.7	0.243	3.4	LOS A	1.4	10.0	0.53	0.45	0.53	52.6
All Vehicles			937	2.9	937	2.9	0.256	4.3	LOS A	1.6	11.8	0.38	0.46	0.38	44.8

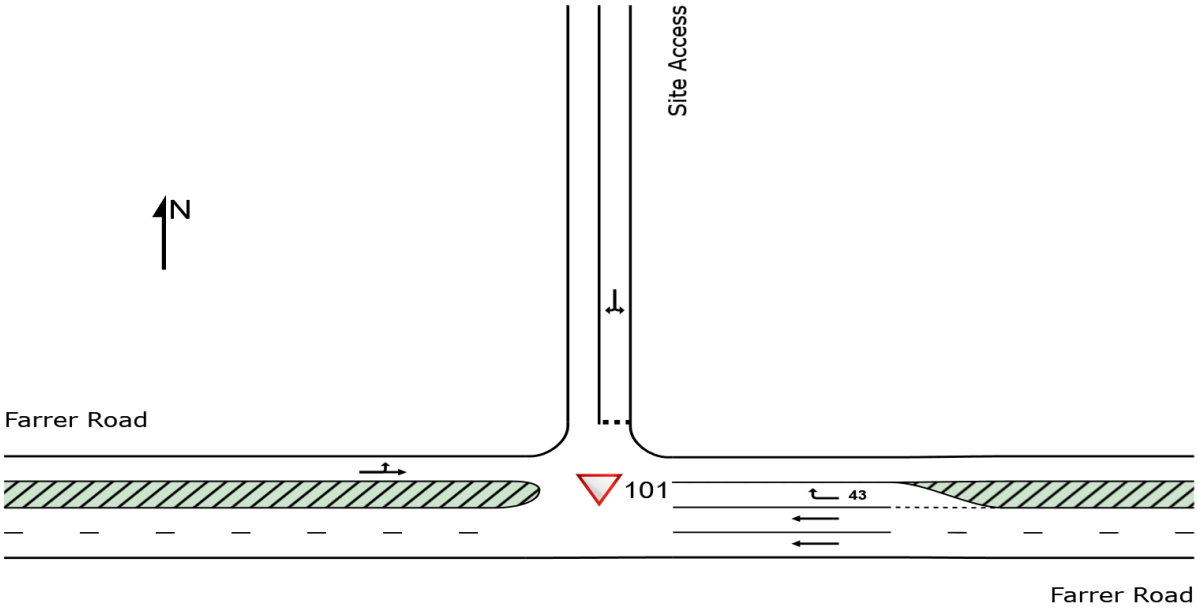
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 101 [Farrer Road and Site Access - AM (Site Folder: General - Scenario #1)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [Farrer Road and Site Access - AM (Site Folder: General - Scenario #1)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Farrer Road															
5	T1	All MCs	452	6.0	452	6.0	0.120	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
6	R2	All MCs	33	0.0	33	0.0	0.023	4.3	LOS A	0.1	0.7	0.34	0.50	0.34	37.5
Approach			484	5.6	484	5.6	0.120	0.3	NA	0.1	0.7	0.02	0.03	0.02	39.8
North: Site Access															
7	L2	All MCs	33	0.0	33	0.0	0.097	4.3	LOS A	0.4	2.5	0.50	0.61	0.50	44.1
9	R2	All MCs	27	0.0	27	0.0	0.097	10.9	LOS A	0.4	2.5	0.50	0.61	0.50	44.0
Approach			60	0.0	60	0.0	0.097	7.3	LOS A	0.4	2.5	0.50	0.61	0.50	44.1
West: Farrer Road															
10	L2	All MCs	27	0.0	27	0.0	0.130	3.4	LOS A	0.0	0.0	0.00	0.05	0.00	39.3
11	T1	All MCs	217	5.2	217	5.2	0.130	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	39.8
Approach			244	4.6	244	4.6	0.130	0.4	NA	0.0	0.0	0.00	0.05	0.00	39.7
All Vehicles			788	4.9	788	4.9	0.130	0.9	NA	0.4	2.5	0.05	0.08	0.05	40.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Farrer Road and Site Access - PM (Site Folder: General - Scenario #1)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Farrer Road															
5	T1	All MCs	225	6.0	225	6.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
6	R2	All MCs	28	0.0	28	0.0	0.023	4.8	LOS A	0.1	0.7	0.43	0.55	0.43	37.3
Approach			254	5.3	254	5.3	0.060	0.6	NA	0.1	0.7	0.05	0.06	0.05	39.7
North: Site Access															
7	L2	All MCs	28	0.0	28	0.0	0.083	5.0	LOS A	0.3	2.1	0.52	0.66	0.52	44.3
9	R2	All MCs	24	0.0	24	0.0	0.083	9.5	LOS A	0.3	2.1	0.52	0.66	0.52	44.2
Approach			53	0.0	53	0.0	0.083	7.1	LOS A	0.3	2.1	0.52	0.66	0.52	44.2
West: Farrer Road															
10	L2	All MCs	24	0.0	24	0.0	0.196	3.5	LOS A	0.0	0.0	0.00	0.03	0.00	39.4
11	T1	All MCs	344	5.2	344	5.2	0.196	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	39.8
Approach			368	4.9	368	4.9	0.196	0.3	NA	0.0	0.0	0.00	0.03	0.00	39.8
All Vehicles			675	4.7	675	4.7	0.196	0.9	NA	0.3	2.1	0.06	0.09	0.06	40.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Farrer Road and Site Access - AM (Site Folder: General - Scenario #2)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Farrer Road															
5	T1	All MCs	452	6.0	452	6.0	0.120	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
6	R2	All MCs	33	0.0	33	0.0	0.023	4.3	LOS A	0.1	0.7	0.34	0.50	0.34	37.5
Approach			484	5.6	484	5.6	0.120	0.3	NA	0.1	0.7	0.02	0.03	0.02	39.8
North: Site Access															
7	L2	All MCs	60	0.0	60	0.0	0.056	4.3	LOS A	0.2	1.4	0.31	0.50	0.31	45.6
Approach			60	0.0	60	0.0	0.056	4.3	LOS A	0.2	1.4	0.31	0.50	0.31	45.6
West: Farrer Road															
10	L2	All MCs	27	0.0	27	0.0	0.130	3.4	LOS A	0.0	0.0	0.00	0.05	0.00	39.3
11	T1	All MCs	217	5.2	217	5.2	0.130	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	39.8
Approach			244	4.6	244	4.6	0.130	0.4	NA	0.0	0.0	0.00	0.05	0.00	39.7
All Vehicles			788	4.9	788	4.9	0.130	0.7	NA	0.2	1.4	0.04	0.08	0.04	40.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Farrer Road and Site Access - PM (Site Folder: General - Scenario #2)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Farrer Road															
5	T1	All MCs	225	6.0	225	6.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	40.0
6	R2	All MCs	28	0.0	28	0.0	0.023	4.8	LOS A	0.1	0.7	0.43	0.55	0.43	37.3
Approach			254	5.3	254	5.3	0.060	0.6	NA	0.1	0.7	0.05	0.06	0.05	39.7
North: Site Access															
7	L2	All MCs	53	0.0	53	0.0	0.057	5.0	LOS A	0.2	1.4	0.40	0.56	0.40	45.4
Approach			53	0.0	53	0.0	0.057	5.0	LOS A	0.2	1.4	0.40	0.56	0.40	45.4
West: Farrer Road															
10	L2	All MCs	24	0.0	24	0.0	0.196	3.5	LOS A	0.0	0.0	0.00	0.03	0.00	39.4
11	T1	All MCs	344	5.2	344	5.2	0.196	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	39.8
Approach			368	4.9	368	4.9	0.196	0.3	NA	0.0	0.0	0.00	0.03	0.00	39.8
All Vehicles			675	4.7	675	4.7	0.196	0.8	NA	0.2	1.4	0.05	0.08	0.05	40.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

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

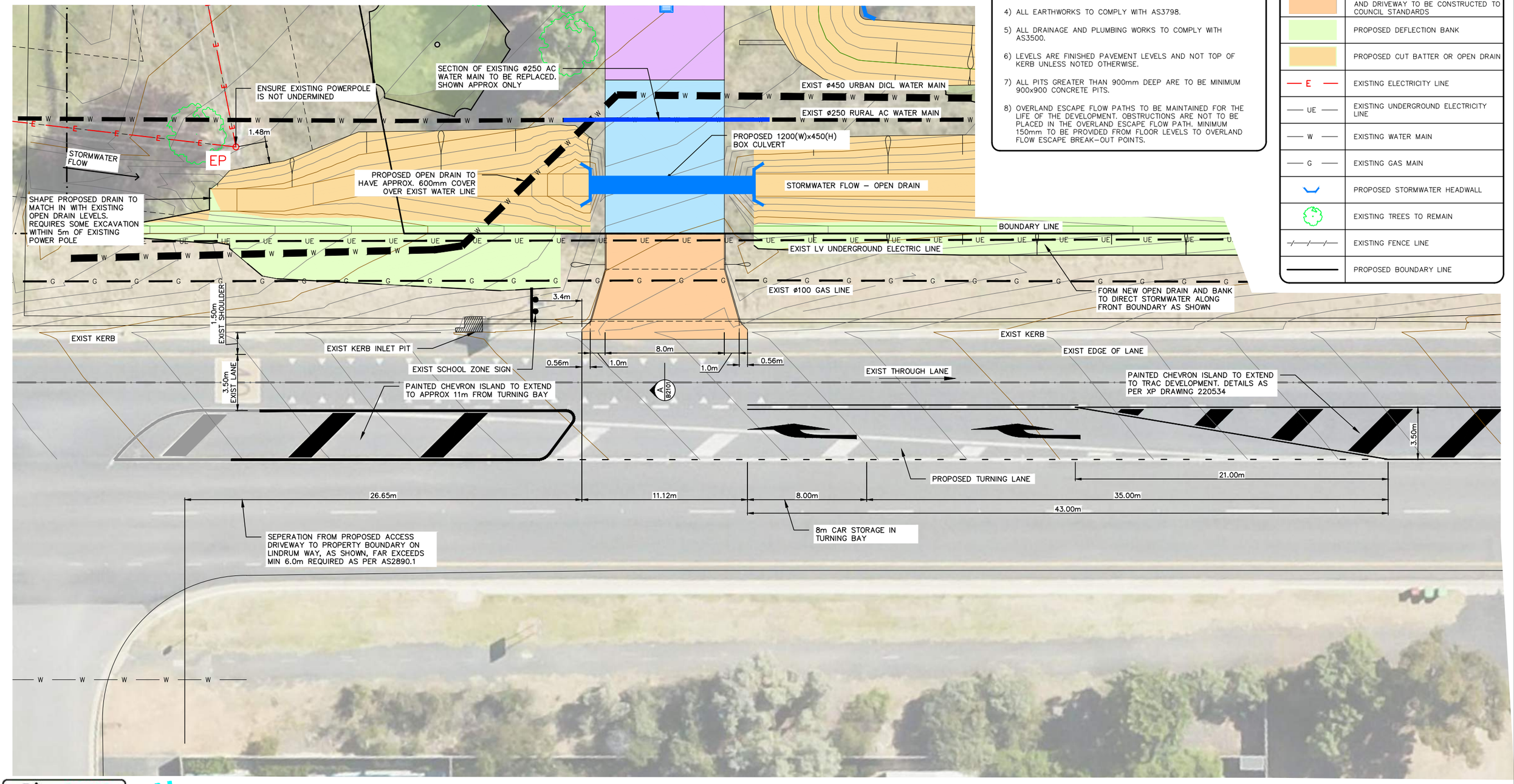
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix D

Site Access Design - CHR(s)

NOTE: ALL EXIST SERVICES IN NATURESTRIP ON FARRER ROAD HAVE BEEN LOCATED USING VACUUM TRUCK POTHOLING TO CONFIRM EXACT LOCATIONS AND DEPTHS



NOTES

1) CONTRACTOR TO CONFIRM DEPTH AND LOCATION OF EXISTING SERVICES PRIOR TO EXCAVATION AND ORDERING MATERIALS.
2) DO NOT SCALE OFF DRAWINGS. DRAWINGS ARE FOR ENGINEERING PURPOSES ONLY. REFER TO ARCHITECTURALS FOR SETOUT OF BUILDING AND RELEVANT REGULATORY PLANS FOR RELEVANT INFORMATION.
3) REFER TO LANDSCAPE DRAWINGS FOR DETAILS OF LANDSCAPING AND CROSS REFERENCING OF LEVELS
4) ALL EARTHWORKS TO COMPLY WITH AS3798.
5) ALL DRAINAGE AND PLUMBING WORKS TO COMPLY WITH AS3500.
6) LEVELS ARE FINISHED PAVEMENT LEVELS AND NOT TOP OF KERB UNLESS NOTED OTHERWISE.
7) ALL PITS GREATER THAN 900mm DEEP ARE TO BE MINIMUM 900x900 CONCRETE PITS.
8) OVERLAND ESCAPE FLOW PATHS TO BE MAINTAINED FOR THE LIFE OF THE DEVELOPMENT. OBSTRUCTIONS ARE NOT TO BE PLACED IN THE OVERLAND ESCAPE FLOW PATH. MINIMUM 150mm TO BE PROVIDED FROM FLOOR LEVELS TO OVERLAND FLOW ESCAPE BREAK-OUT POINTS.

LEGEND

MARK	ITEM
	PROPOSED CONCRETE PAVING
	PROPOSED BITUMEN PAVING
	PROPOSED CONCRETE VEHICLE CROSSING AND DRIVEWAY TO BE CONSTRUCTED TO COUNCIL STANDARDS
	PROPOSED DEFLECTION BANK
	PROPOSED CUT BATTER OR OPEN DRAIN
E	EXISTING ELECTRICITY LINE
UE	EXISTING UNDERGROUND ELECTRICITY LINE
W	EXISTING WATER MAIN
G	EXISTING GAS MAIN
	PROPOSED STORMWATER HEADWALL
	EXISTING TREES TO REMAIN
	EXISTING FENCE LINE
	PROPOSED BOUNDARY LINE

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N

0 1 2 5 7.5 10 12.5
SCALE 1:125 (A1) METRES

NOT FOR CONSTRUCTION

No.	DATE	DETAILS	BY
P10	26.07.2024	UPDATED FOR DA	S.X
P9	JULY 2024	UPDATED ARCHI – FINAL SKETCH PLANS	N.T
P8	JUNE 2024	UPDATED FINAL SKETCH PLANS	S.X
P7	29.04.2024	FINAL SKETCH PLANS	S.X

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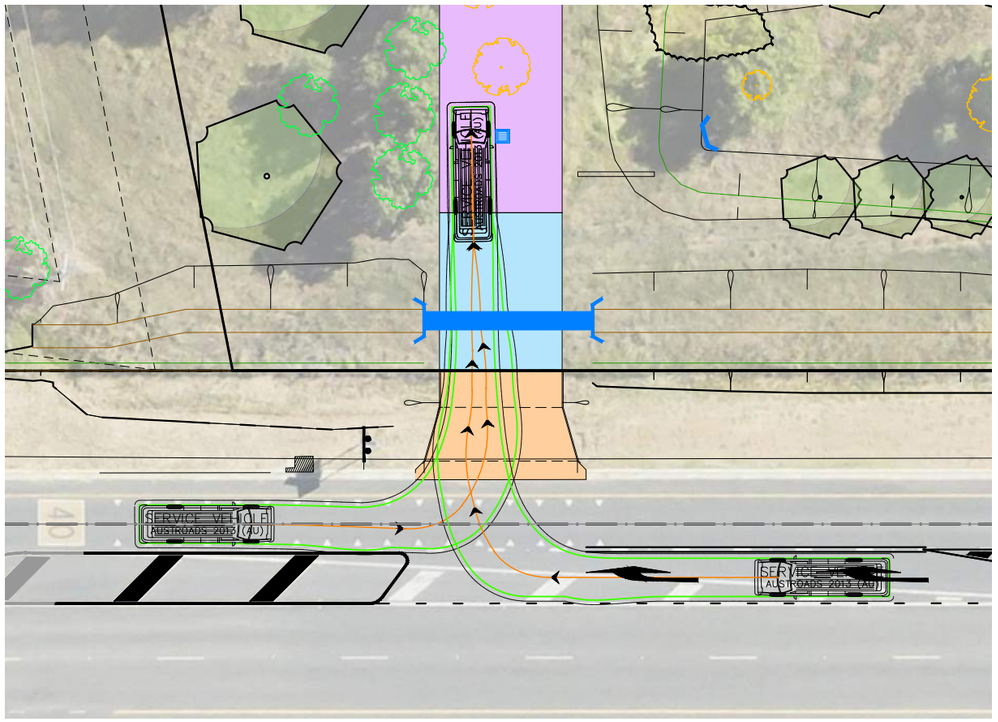
Project:
PROPOSED CIVIL WORKS
ST. MARY'S RAINBOW PRESCHOOL
FARRER ROAD
CHARLES STURT UNIVERSITY NSW 2678

Sheet Title: ACCESS LAYOUT PLAN
Client: COLLIERS INTERNATIONAL
Checked:
Scale: 1:125 (A1) 1:250 (A3)
Approved:
Design: S.X
Drawn: N.T
Date: MAR 2024
Project Number: 230728
Sheet Number: B2001
Revision Number: P10

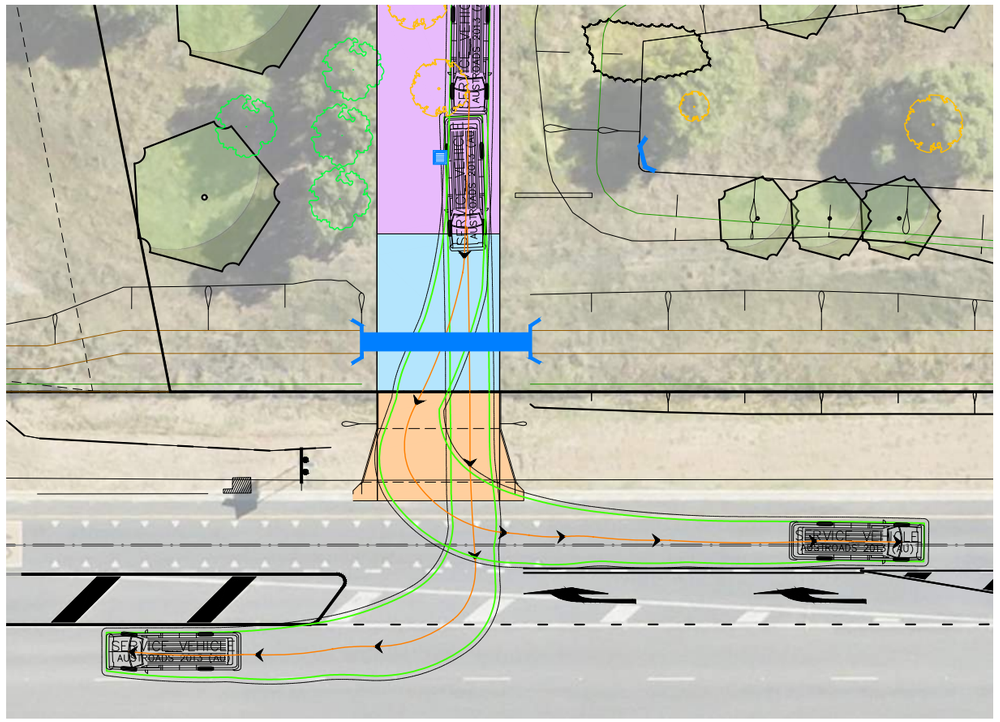
Appendix E

Swept Path Assessment

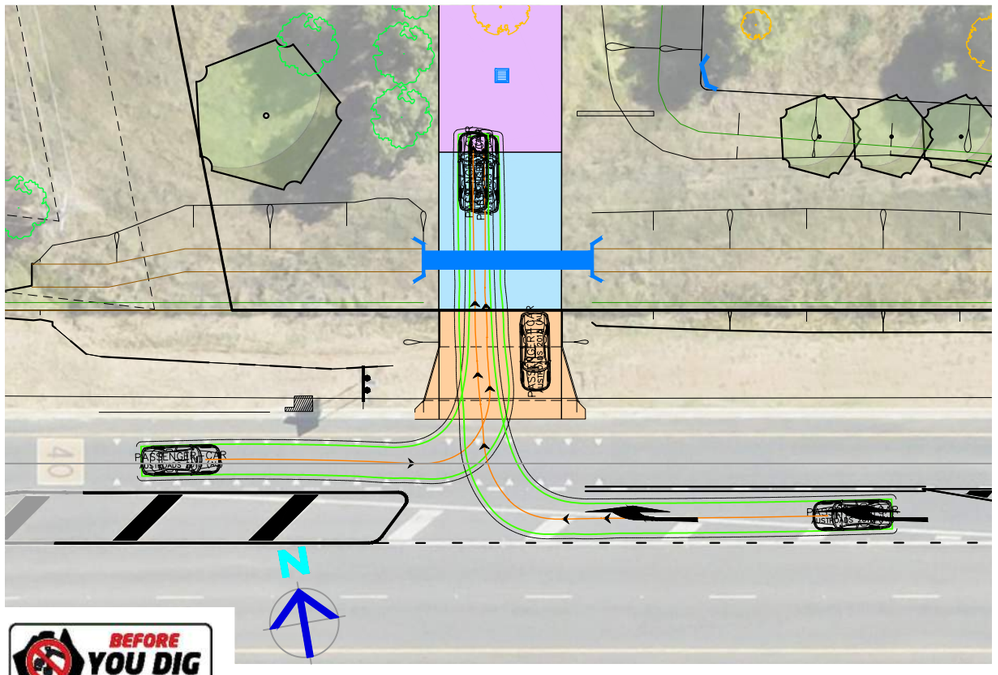
8.8m SERVICE VEHICLE ENTRY TURNING PATH



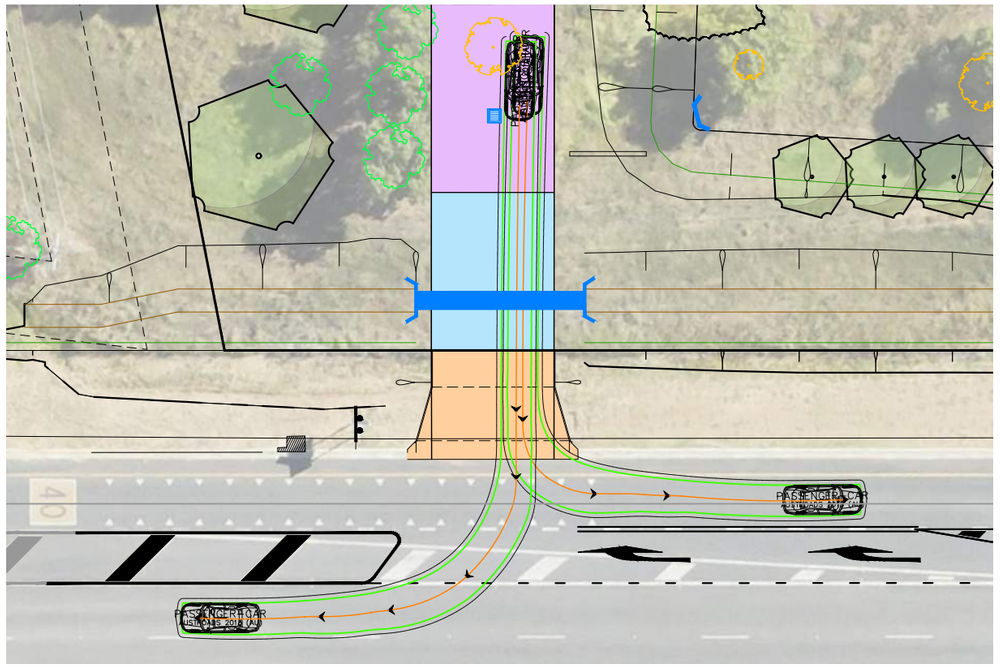
8.8m SERVICE VEHICLE EXIT TURNING PATH



5.20m PASSENGER CAR ENTRY TURNING PATH



5.20m PASSENGER CAR EXIT TURNING PATH



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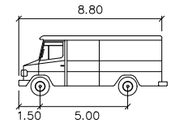
LEGEND

MARK	ITEM
	CENTRELINE OF VEHICLE TURNING PATH
	OUTER EXTREMITY OF BODY OVERHANG FOR VEHICLE TURNING PATH
	VEHICLE CROSSING AND DRIVEWAY TO BE CONSTRUCTED TO COUNCIL STANDARDS
	PROPOSED CONCRETE PAVING
	PROPOSED BITUMEN PAVING

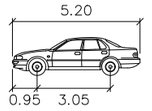
TURNING PATH NOTES

1) TURNING PATHS PRODUCED USING AUTOTURN
2) TURNING PATHS ARE FOR
- 5.20m PASSENGER CAR (AUSTROADS 2013) TRAVEL SPEEDS 5km/h
- 8.80m SERVICE VEHICLE (AUSTROADS 2013) TRAVEL SPEEDS 5km/h



SERVICE VEHICLE

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



PASSENGER–CAR

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.6

0 2 5 7.5 10 15 20
SCALE 1:200 (A1) METRES

NOTES

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3) REFER TO LANDSCAPE DRAWINGS FOR DETAILS OF LANDSCAPING AND CROSS REFERENCING OF LEVELS
4) ALL EARTHWORKS TO COMPLY WITH AS3798.
5) ALL DRAINAGE AND PLUMBING WORKS TO COMPLY WITH AS3500.
6) LEVELS ARE FINISHED PAVEMENT LEVELS AND NOT TOP OF KERB UNLESS NOTED OTHERWISE.
7) ALL PITS GREATER THAN 900mm DEEP ARE TO BE MINIMUM 900x900 CONCRETE PITS.
8) OVERLAND ESCAPE FLOW PATHS TO BE MAINTAINED FOR THE LIFE OF THE DEVELOPMENT. OBSTRUCTIONS ARE NOT TO BE PLACED IN THE OVERLAND ESCAPE FLOW PATH. MINIMUM 150mm TO BE PROVIDED FROM FLOOR LEVELS TO OVERLAND FLOW ESCAPE BREAK–OUT POINTS.

NOT FOR CONSTRUCTION

No.	DATE	DETAILS	BY
P10	26.07.2024	UPDATED FOR DA	S.X
P9	JULY 2024	UPDATED ARCHI – FINAL SKETCH PLANS	N.T
P8	JUNE 2024	UPDATED FINAL SKETCH PLANS	S.X
P7	29.04.2024	FINAL SKETCH PLANS	S.X

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Project:
PROPOSED CIVIL WORKS
ST. MARY'S RAINBOW PRESCHOOL
FARRER ROAD
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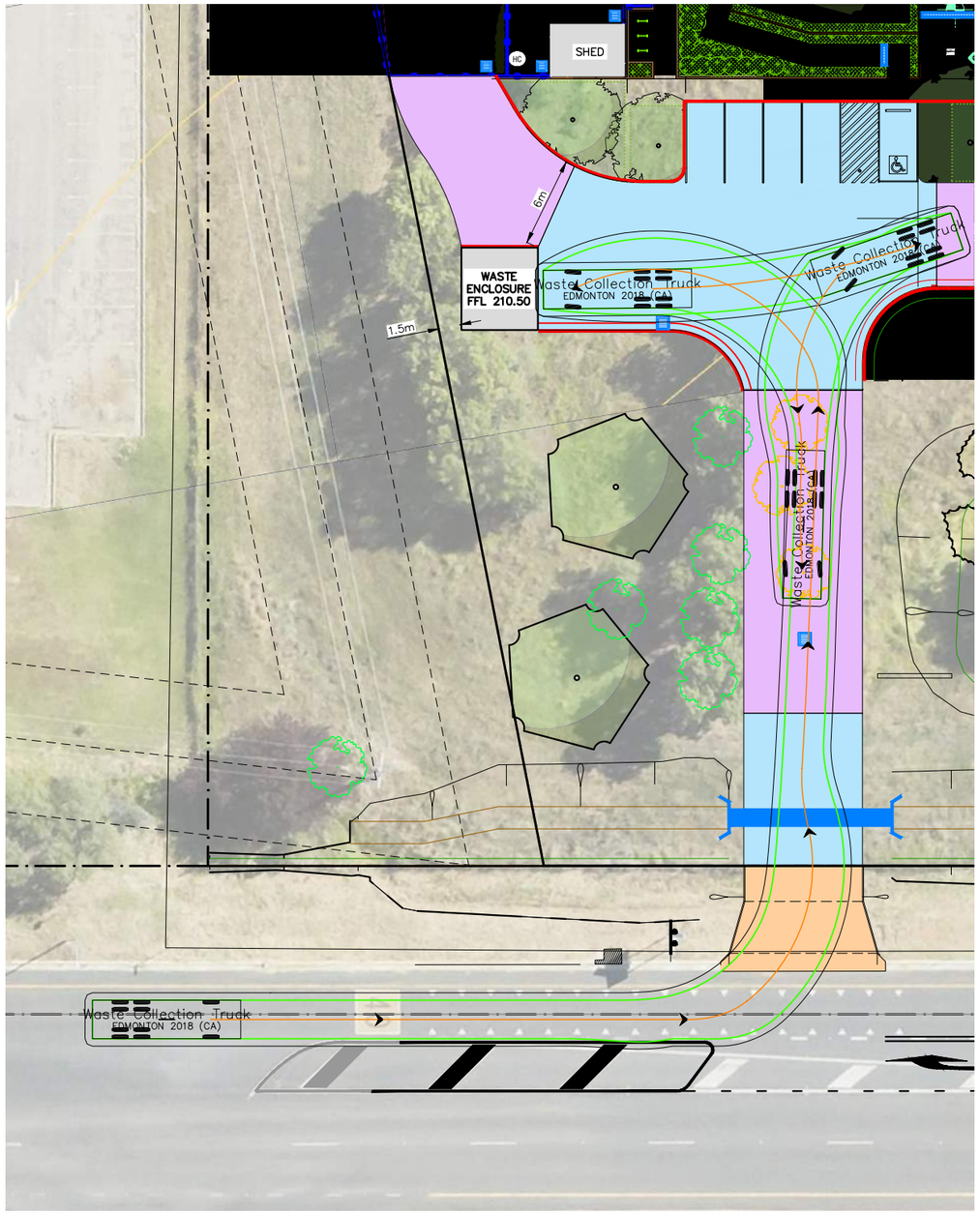
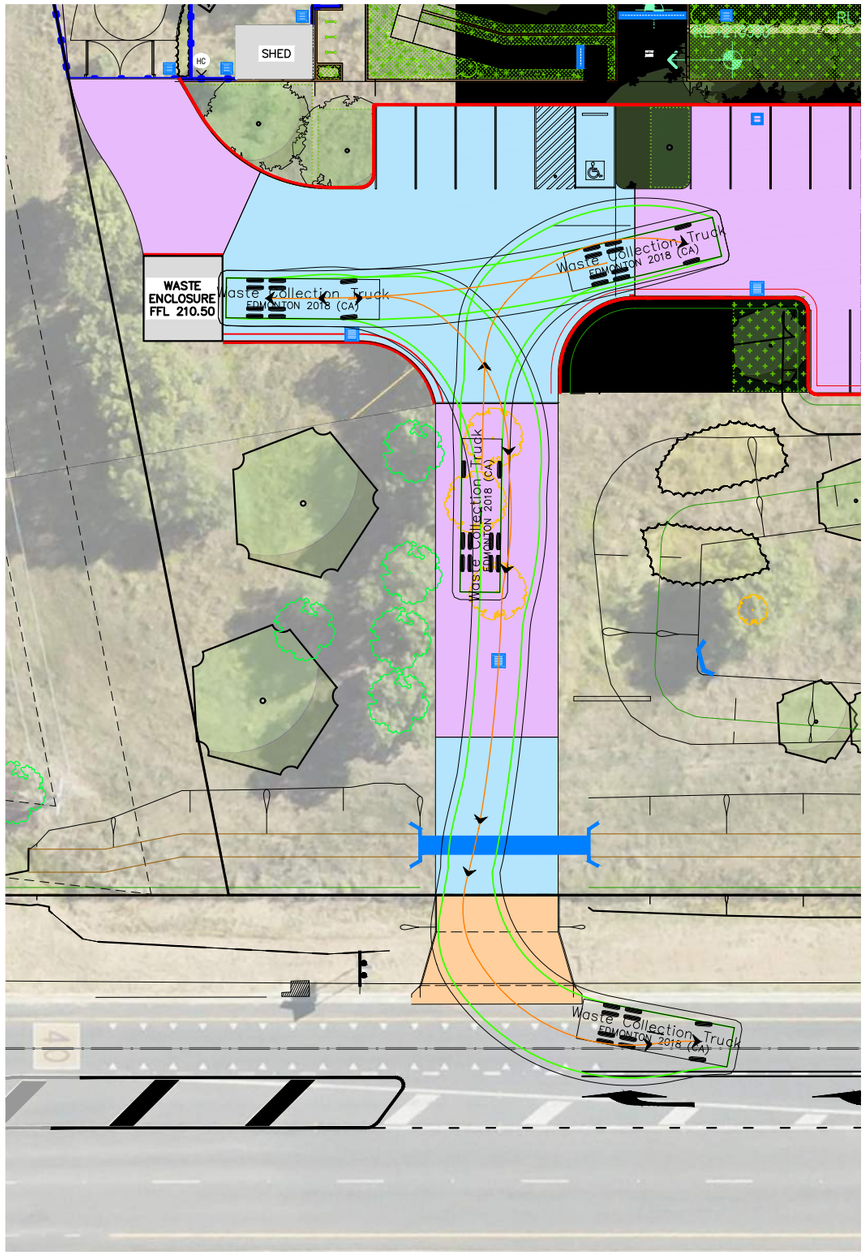
Sheet Title: TURNING PATHS PLAN 1/2
Client: COLLIERS INTERNATIONAL
Scale: 1:200 (A1) 1:400 (A3)
Design: S.X | Drawn: N.T | Date: MAR 2024
Checked:
Approved:
Project Number: 230728
Sheet Number: TP001
Revision Number: P10

10.0m GARBAGE TRUCK ENTRY TURNING PATH



10.0m GARBAGE TRUCK EXIT TURNING PATH



LEGEND

MARK	ITEM
	CENTRELINE OF VEHICLE TURNING PATH
	OUTER EXTREMITY OF BODY OVERHANG FOR VEHICLE TURNING PATH
	VEHICLE CROSSING AND DRIVEWAY TO BE CONSTRUCTED TO COUNCIL STANDARDS
	PROPOSED CONCRETE PAVING
	PROPOSED BITUMEN PAVING
	PROPOSED GRAVEL PAVING, REFER LANDSCAPE DRAWINGS

TURNING PATH NOTES

1) TURNING PATHS PRODUCED USING AUTOTURN
2) TURNING PATHS ARE FOR
   - 10.0m FRONT LOADING WASTE COLLECTING TRUCK (CA)

   TRAVEL SPEEDS 5km/h

0 2 5 7.5 10 15 20
SCALE 1:200 (A1) METRES

NOTES

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P8	JUNE 2024	UPDATED FINAL SKETCH PLANS	S.X
P7	29.04.2024	FINAL SKETCH PLANS	S.X

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CHARLES STURT UNIVERSITY NSW 2678

Sheet Title: TURNING PATHS PLAN 2/2
Client: COLLIERS INTERNATIONAL
Scale: 1:200 (A1) 1:400 (A3)
Design: S.X | Drawn: N.T | Date: MAR 2024
Checked:
Approved:
Project Number: 230728
Sheet Number: B3001
Revision Number: P10