Spotto CONSULTING

people-oriented traffic and transport solutions

Traffic Impact Assessment

Coptic Orthodox Church

12 Waterhouse Avenue
Lloyd NSW

November 2021

Prepared by:

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For:

Coptic Orthodox Church

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P0082	A	18 August 2021	Draft	SWS
	B	29 November 2021	Final	

CONTENTS

1 INTRODUCTION

Spotto Consulting have been engaged by The Coptic Orthodox Church to complete a Traffic Impact Assessment. The study is in response to a proposed development at 12 Waterhouse Avenue, Lloyd.

The proposed development involves construction of a new church building capable of seating up to 400 persons, as well as a hall and services building (incorporating class rooms, study areas and two accommodation units) plus ancillary outdoor spaces including forecourt/courtyard, basketball court and childrens playground. Off-street parking will be provided for 101 vehicles (including three for persons with a disability), with primary access via Waterhouse Avenue (80 spaces) and secondary access via Ansett Street (20 spaces). The development will be undertaken in stages.

The purpose of the assessment is to review the existing conditions in the vicinity of the site, including traffic, parking and site access, as well as the performance of the surrounding network. An evaluation is then required of the traffic, parking and site access requirements for the proposed development, and the impacts on the surrounding road network.

The assessment concluded that:

- Traffic surveys and modelling on weekdays and Sundays of nearby key intersections show that the intersections currently operate at an excellent Level of Service (LOS A, the highest level) or better. The midblock level of service on all local and subarterial roads in the vicinity of the site is satisfactory (LOS C) or better;
- There are no on-street parking restrictions in the vicinity of the site, and there were very few vehicles observed parked on-street in the vicinity of the site (as most residential properties have off-street parking);
- The proposed development is anticipated to generate 37 vehicle trips per hour/171 vehicle trips per day during a weekday peak hour/daily, and 109 vehicle trips per hour/490 vehicle trips per day on a Sunday peak hour/daily, which will not have a significant impact on the surrounding road network (including nearby intersections);
- The provision of 70 off-street parking spaces at Stage 1 of the development and 100 parking spaces at full development does not meet the minimum requirements of the *Wagga Wagga Development Control Plan*, however it will meet the requirements for the anticipated level of demand;
- The access driveways and car park layout meets the requirements of the *Wagga Wagga Development Control Plan* and *Australian Standard AS2890*. Adequate provision has been made for persons with a disability;
- Adequate provision has been made for servicing and delivery vehicles; and
- There is no significant adverse impact of the proposed development on pedestrians and cyclists.

2 EXISTING CONDITIONS

2.1 Site

The site is located in the suburb of Lloyd, approximately 6km south-west of the Wagga Wagga CBD (as shown in Figure 2-1,below). It is located at 12 Waterhouse Avenue, north-west of the intersection with Ansett Street, and is described as Lot 606 DP1222168.

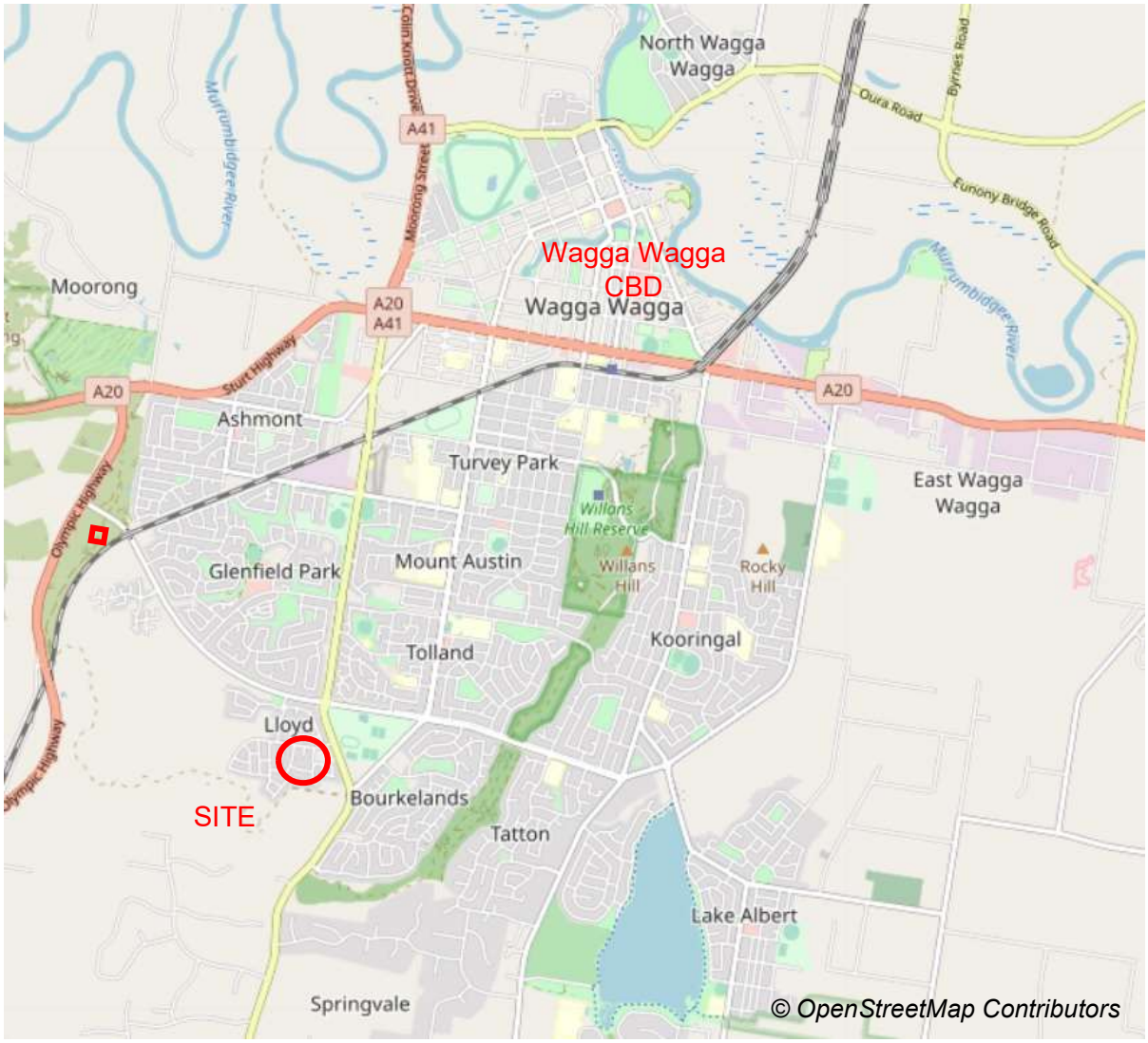


Figure 2-1: Locality Plan

The site has a total area of approximately 1.18 hectares. It is bounded by Waterhouse Avenue to the east, Ansett Street to the south, and by private land to the north and west.

The site is currently vacant, with vehicular access available from both Waterhouse Avenue and Ansett Street. Pedestrian access is also available via a laneway on the northern boundary of the site that connects to Fisher Place

Figure 2-2: Looking north-east across the site from Ansett Street

2.2 Surrounding Land Use

The site and immediate surrounds are currently zoned R1 General Residential under the *Wagga Wagga Local Environmental Plan 2010* (Wagga Wagga LEP), as shown in Figure 2-3, below. The surrounding area consists primarily of residential dwellings (mostly standard density, but with some medium density properties).

Figure 2-3: Land zoning for site and surrounds (Source: City of Wagga Wagga)

2.3 Road Network

2.3.1 Waterhouse Avenue

Waterhouse Avenue runs north-south for a distance of approximately 300m between Deakin Avenue and Ah Ket Avenue. It is a local road under the control of the City of Wagga Wagga. The road's role favours property access over through movement.

In the vicinity of the site, Waterhouse Avenue is a two-lane/two-way sealed urban road that runs north-south and forms the eastern boundary of the site. Contained within a 20m-wide road reserve, the main carriageway is 9.0m in width and defined by upright kerb and gutter. A 1.5m-wide concrete path is located on the eastern side. Overhead street lighting is present, and the default urban speed limit of 50km/h applies.

Figure 2-4: Looking north along Waterhouse Avenue, with the site on the left hand side

Figure 2-5: Looking south along Waterhouse Avenue from the intersection with Deakin Avenue

2.3.2 Ansett Street

Ansett Street runs east-west for a distance of approximately 200m between Waterhouse Avenue and Florey Street. It is a local road under the control of the City of Wagga Wagga. The road's role favours property access over through movement.

In the vicinity of the site, Ansett Street is a two-lane/two-way sealed urban road that runs east-west and forms the southern boundary of the site. Contained within a 14.5m-wide road reserve, the main carriageway is 7.2m in width and defined by rollover kerb and gutter. No off-road paths are located on either side. Overhead street lighting is present, and the default urban speed limit of 50km/h applies.

Figure 2-6: Looking east along Ansett Street, with the site on the left hand side

Figure 2-7: Looking west along Ansett Street from the intersection with Waterhouse Avenue

2.3.3 Other Roads

Deakin Avenue and Hudson Drive are two collector roads that service this part of Lloyd. Their role is to distribute traffic between the higher order subarterial roads and the local roads within the subdivision. They are local roads under the control of the City of Wagga Wagga, and their roles balance property access with through movement.

Both roads are generally contained within a 24m-wide road reserve with 13m carriageways defined by upright kerb and gutter. Footpaths are generally present on one side, with overhead street lighting. The default urban speed limit of 50km/h applies.

Figure 2-8: Looking west along Deakin Avenue west of Holbrook Road

Figure 2-9: Looking south along Hudson Drive south of Red Hill Road

Red Hill Road and Holbrook Road are two subarterial roads located to the north and east of the site, respectively. Their role is to distribute traffic across the broader Wagga Wagga area. They are local roads under the control of the City of Wagga Wagga, and their roles favour through movement over access.

Both roads are contained within road reserves of varying widths (minimum 55m), with main carriageways containing a single lane of travel in each direction with sealed shoulders. An off-road shared path runs parallel to each road. The speed limit on both roads is 70km/h (increasing to 80km/h on Holbrook Road south of Deakin Avenue).

Figure 2-10: Looking east along Red Hill Road near intersection with Hudson Drive

Figure 2-11: Looking south along Holbrook Road near intersection with Deakin Avenue

2.3.4 Intersections

There are several intersections in the vicinity of the site, as shown in Figure 2-12, below.

Figure 2-12: Key intersections in vicinity of site (Source: City of Wagga Wagga)

There are two local intersections within the suburb located in the vicinity of the site, both of which are three-legged “T” intersections:

- Ansett Street and Waterhouse Avenue, located south-east of the site, with priority given to through vehicles on Waterhouse Avenue; and
- Waterhouse Avenue and Deakin Avenue, located north-east of the site, with priority given to through vehicles on Deakin Avenue.

There are also two major intersections that provide access between the surrounding subarterial roads and the urban areas near the site. Both of which are three-legged “T” intersections:

- Holbrook Road and Deakin Avenue, with auxiliary lanes and priority given to through vehicles on Holbrook Road; and
- Red Hill Road and Hudson Avenue, with auxiliary lanes and priority given to through vehicles on Red Hill Road.

2.4 Existing Traffic Conditions

2.4.1 Data Collection

Field work was undertaken on Thursday 20 August 2020. This included inspection of the site and adjacent roads, as well as the suburb of Lloyd more broadly (including the number of occupied and vacant lots). Turning movement counts were also undertaken on Thursday 20 August 2020 at the following key intersections:

- Holbrook Road and Deakin Avenue; and
- Red Hill Road and Hudson Avenue.

These surveys were undertaken across the morning and evening peak periods, allowing the peak hour in each period to be determined. The surveys were within NSW school term dates.

Traffic data was provided by the City of Wagga Wagga, comprising Metrocount traffic surveys undertaken on Holbrook Road between Red Hill Road and Deakin Avenue in November 2018. This data is able to be compared with information extracted for the same section of Holbrook Road from the turning movement counts undertaken by Spotto Consulting. A summary of this comparison, including weekday traffic volumes (in vehicles per day) and peak hour traffic volumes (in vehicles per hour), is provided in Table 2-1, below.

Table 2-1: Midblock traffic data – Holbrook Road (Red Hill Rd to Deakin Ave)

Data Source	Weekday	Weekday AM Peak	Weekday PM Peak
	Veh/d	Veh/h	Veh/h
Council Midblock Counts*	5,705	567	538
Southbound		159	347
Northbound		407	191
Spotto Turn Counts	5,685#	612	525
Southbound		164	344
Northbound		448	181

** Council midblock counts have been increased by 2.5% pa for two years to represent growth in traffic volumes between 2018 and 2020*

 # Daily midblock traffic volume from turning count data is determined by taking the average of the AM and PM peak hour and assuming this represents 10% of the total daily volume (as observed in Council midblock counts)

Table 2-1 shows that in general, peak hour and daily traffic volumes from both sources are within +/- 10% of each other, indicating both data sources are comparable and provide a good indication of existing traffic volumes.

It is also possible to compare the observed traffic volumes with theoretical traffic volumes from traffic generation modelling assumptions to determine the appropriateness of those modelling assumptions. This is important in order to forecast increased future traffic volumes, both from the proposed development and other areas (eg. vacant residential lots). Weekday traffic generation modelling assumes the following:

- Traffic generation for each residential dwelling is 7.4 trips per day, 0.71 trips per hour in the AM peak period and 0.78 trips per hour in the PM peak (as observed in surveys undertaken for residential dwellings in regional areas in the RMS publication *TDT 2013/041 Guide to Traffic Generating Developments – Updated traffic surveys*);
- Traffic generation for each medium density dwelling is 5.0 trips per day, and 0.50 trips per hour in the AM and PM peak period (as observed in surveys undertaken for medium density dwellings in the *RMS Guide to Traffic Generating Developments 2002*); and
- Residential traffic is 2/3 outbound and 1/3 inbound in the AM peak period (in line with typical traffic movements for residential housing, as residents head to work or education in the morning), with the reverse in the PM peak.

Based on these assumptions, a comparison of the estimated traffic for the Lloyd area in the AM peak, PM peak and daily with the observed traffic volumes from turning movement surveys is provided in Table 2-2, below.

Table 2-2: Lloyd area weekday traffic volumes – modelled versus observed

Time Period	Observed	Modelled*	Difference
Weekday AM Peak	307	280	-27 veh/-9%
Weekday PM Peak	300	306	+6 veh/+2%
Weekday Daily	3035	2912	-123 veh/-4%

** Based on 372 occupied residential lots and 32 occupied medium density dwellings, as observed during field work*

Table 2-2 demonstrates that the assumptions used to determine the amount of traffic generated provide a reasonable estimate of observed daily traffic volumes (all modelled estimates are within +/-10% of observed values).

It should also be noted that there are a range of peak traffic generation periods that relate to this assessment. For example, peak usage for residential properties is typically on a weekday in the morning between 8.00-9.30AM and in the evening between 3.30-5.30PM as residents travel to and from work and school. Peak traffic for the proposed development will occur on a Sunday morning, with a lower peak on weekday evenings (as discussed in Section 4.2.1, below). The key peaks for assessment are therefore the Weekday PM and Sunday AM, and the following points are noted in relation to this:

- The level of traffic generation on a Sunday is approximately 70% of that on a typical weekday for the AM peak, PM peak and daily (as observed in Council's Holbrook Road data); and
- Residential traffic is still 2/3 outbound and 1/3 inbound in the weekend AM peak period (with the reverse applying in the weekend PM peak period), noting that the AM peak period occurs later in the morning (between 10AM-12 Midday) and the PM peak period is spread evenly across the afternoon (2PM-6PM).

2.4.2 Intersections

Using the data and methodology detailed in Section 2.4.1, the traffic movements at key intersections in 2020 can be accurately determined. The turning movements for the busiest one-hour period in the AM Peak and PM Peak periods are summarised for the key intersections of Holbrook Road and Deakin Avenue, as well as Red Hill Road and Hudson Avenue, in Figure 2-13 (weekday AM and PM) and Figure 2-14 (Sunday AM and PM), below.

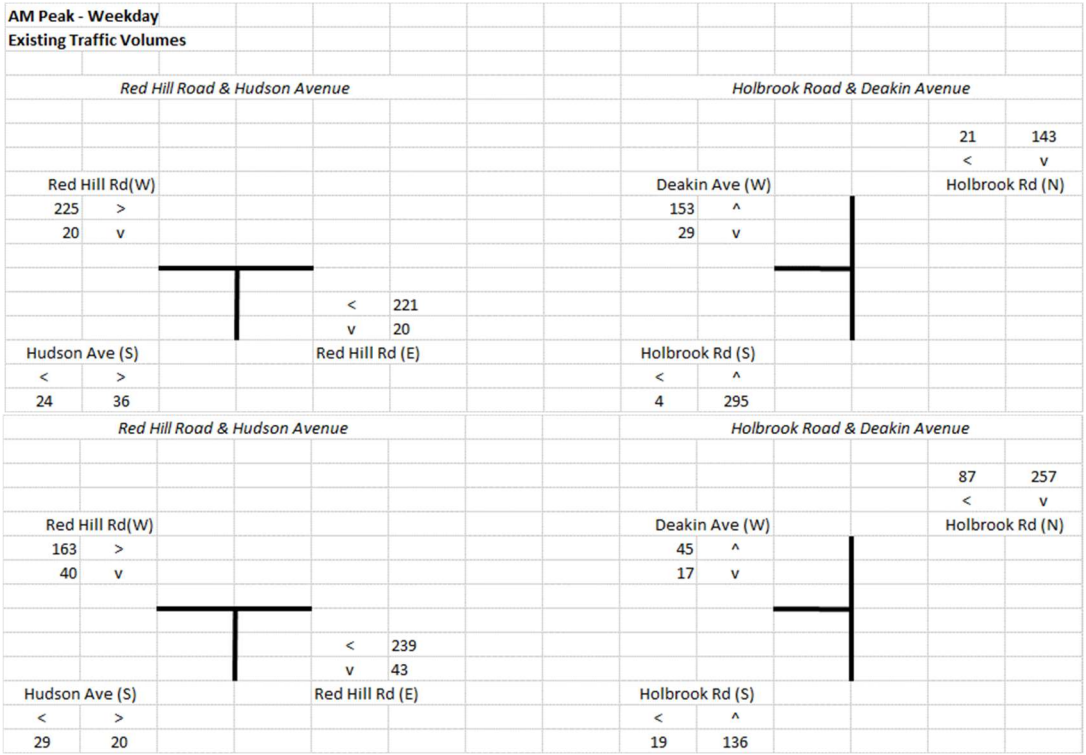


Figure 2-13: Weekday Peak Hour Turning Movements - Existing Conditions

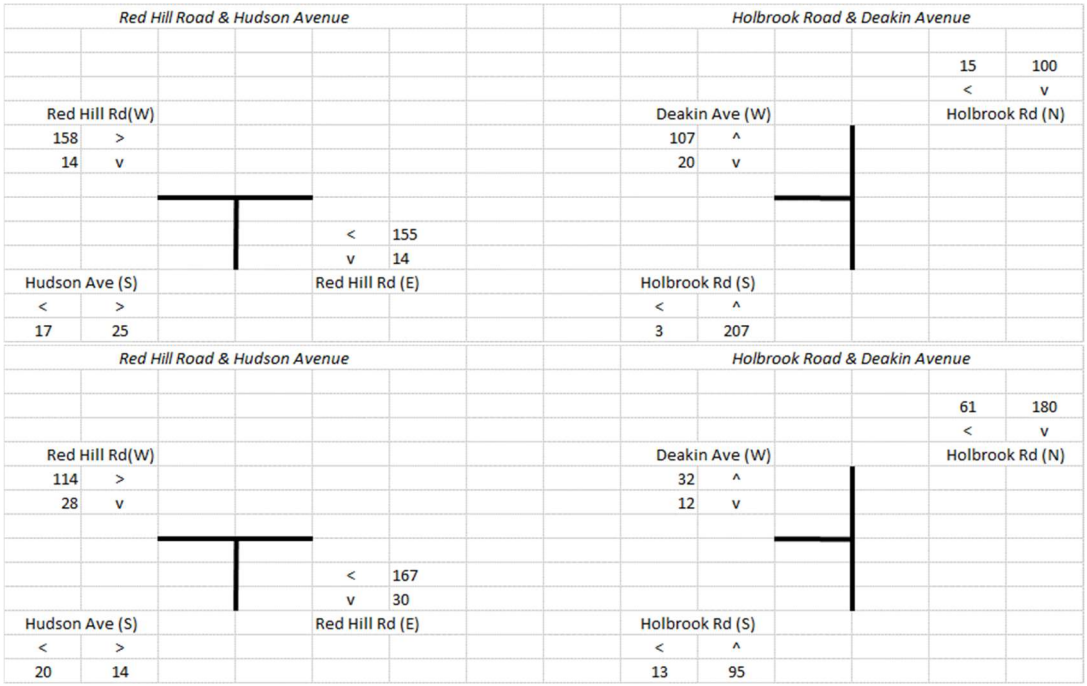


Figure 2-14: Sunday Peak Hour Turning Movements - Existing Conditions

The performance of these intersections was modelled using the intersection analysis program SIDRA Intersection. Full results for the existing AM and PM weekday and Sunday peak periods are included in Appendix A, and summarised in Table 2-3 below.

Table 2-3: Intersection performance summary - existing conditions

Intersection	Total Flow (veh/h)	Degree of Saturation	Average Delay (sec)	Level of Service*
Holbrook & Deakin				
Weekday AM	679	0.228	2.3	A
Weekday PM	591	0.149	2.2	A
Sunday AM	476	0.139	2.0	A
Sunday PM	414	0.103	2.0	A
Red Hill & Hudson				
Weekday AM	575	0.123	1.5	A
Weekday PM	562	0.133	1.9	A
Sunday AM	403	0.086	1.3	A
Sunday PM	393	0.093	1.7	A

** Level of Service (LOS) is a qualitative assessment of the quantitative effect of factors such as speed, volume of traffic, geometric features, traffic interruptions, delays and freedom to manoeuvre. It ranges from A (best) to F (worst), and is calculated using average delay (as per TfNSW Guidelines).*

The analysis demonstrates that with roads operating under existing traffic volumes, both intersections currently operate at an excellent Level of Service (LOS A, the highest level) in both the AM and PM peak periods on weekdays and Sundays. This indicates intersections operating with low levels of delay and saturation, and with ample spare capacity.

2.4.3 Midblock

Using the traffic count data provided by the City of Wagga Wagga, and the methodology detailed in Section 2.4.1, the traffic volumes midblock (ie. between intersections) under existing conditions can be accurately estimated.

A summary of the midblock data for the key sections of roads in the vicinity of the site, including weekday traffic volumes (in vehicles per day), peak hour traffic volumes (in vehicles per hour) and Level of Service (LOS) is provided in Table 2-4 below. It should be noted that LOS depends on whether the road is four lanes or two – as noted in Section 2.4.1, some roads are either being upgraded to four lanes or are proposed to be in future. The figures in brackets represent the LOS for a two-lane road.

Table 2-4: Weekday midblock traffic data – existing conditions

Location	Weekday	Weekday AM Peak		Weekday PM Peak	
	Veh/d	Veh/h	LOS	Veh/h	LOS
Holbrook Road	5,685	612		525	
(Red Hill to Deakin)					
Southbound		164	A	344	B
Northbound		448	C	181	A
Red Hill Road	4,835	502		465	
(Hudson to Holbrook)					
Eastbound		261	B	183	A
Westbound		241	B	282	B
Waterhouse Avenue	378	37		39	
(Deakin to Goldstein)					
Southbound		13	A	26	A
Northbound		24	A	13	A
Ansett Street	52	5		6	
(Waterhouse to Florey)					
Eastbound		3	A	2	A
Westbound		2	A	4	A

Note: Level of Service calculated based on typical midblock capacities for two-lane, two-way roads from Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis.

Table 2-5: Sunday midblock traffic data – existing conditions

Location	Sunday	Sunday AM Peak		Sunday PM Peak	
	Veh/d	Veh/h	LOS	Veh/h	LOS
Holbrook Road	3,985	429		368	
(Red Hill to Deakin)					
Southbound		115	A	241	B
Northbound		314	B	127	A
Red Hill Road	3,385	352		325	
(Hudson to Holbrook)					
Eastbound		183	A	128	A
Westbound		169	A	197	A
Waterhouse Avenue	264	26		26	
(Deakin to Goldstein)					
Southbound		9	A	17	A
Northbound		17	A	9	A
Ansett Street	38	4		4	
(Waterhouse to Florey)					
Eastbound		3	A	1	A
Westbound		1	A	3	A

The analysis shows that roads adjacent to the site (Waterhouse Avenue and Ansett Street) operate at an excellent Level of Service (LOS A, the highest level), with nearby arterial roads (Holbrook Road and Red Hill Road) operating at a satisfactory Level of Service (LOS C) or better. This indicates a road network with adequate midblock capacity at present.

2.5 Parking Supply and Demand

The site and surrounds were assessed as part of a site inspection undertaken on Thursday 20 August 2020 to evaluate the extent of car parking. There are no on-street parking restrictions in the vicinity of the site.

No formal surveys were undertaken, since there were very few vehicles observed parked on-street in the vicinity of the site (as most residential properties have off-street parking).

2.6 Public Transport

Public buses operate in the Wagga Wagga area, with a total of nine town route services operated by Busabout. The 961 route connect Lloyd to the CBD and Wagga Wagga Train Station, and travels along Hargrave Avenue and Deakin Avenue approximately 250m walk north-east of the site. It was also noted that several school buses also utilise this route.

From the CBD, passengers can transfer on to other town bus services to connect to other parts of Wagga Wagga.

From the Wagga Wagga Train Station (located approximately 5km north-east of the site), passengers can transfer on to buses and rail services also provide regional public transport services to locations such as Albury, Melbourne, Sydney and Adelaide.

2.7 Pedestrians and Cyclists

A 1.5m wide concrete footpath is located on the eastern side of Waterhouse Avenue, providing a connection north and south to other footpaths. Ansett Street has no footpath, and there are no dedicated cyclist facilities adjacent to the site.

2.5m-wide shared paths are located on Red Hill Road and Holbrook Road to the north and east of the site, providing access to the broader Wagga Wagga path network.

3 PROPOSED DEVELOPMENT

The proposed development consists of the following components:

- A church building with an area of 975m^2, capable of seating up to 400 persons;
- A hall building (identified on the plans as Sunday School Service Building) with an area of 650m^2, capable of seating up to 400 persons theatre-style or 150 people banquet-style;
- A services building (identified on the plans as Sunday School Building) with a total area of 776m^2 over two levels, with the ground floor incorporating class rooms and study areas, and the upper floor incorporating two accommodation units;
- Off-street parking for 100 vehicles (including three for persons with a disability), with primary access via Waterhouse Avenue (80 spaces) and secondary access via Ansett Street (20 spaces); and
- Ancillary outdoor spaces including forecourt/courtyard, basketball court and childrens playground.

It is proposed that the development be undertaken in stages:

- Stage 1 – Hall, services building and off-street parking for 70 vehicles (parking areas 1, 2 and 3); and
- Stage 2 – Church building and off-street parking for a further 30 vehicles (parking area 4).

The hall and services building will be utilised for worship until the church is completed.

Plans of the proposed development are included in Appendix B.

4 IMPACT OF PROPOSED DEVELOPMENT

4.1 Church Operations

The church is currently located at 18-20 Wooden Street, Turvey Park. The church's primary service is Sunday morning between 8.30AM-11.30AM, with smaller activities on Saturday evening and Friday.

Research from Multicultural NSW states that:

> *From 2011 to 2016, Coptic Orthodox religious affiliated population increased by 1,912 people (12.6%). This represents an average annual population change of 2.41% per year over the period.*

The church in Wagga Wagga has grown from a congregation of 25 in 2003 to approximately 210 in 2020 (comprising 135 adults, 75 under 18s and spanning 50 families). Members are predominantly immigrants from Egypt and Sudan. The majority are located in Tatton, Bourkelands and Lloyd, although approximately 35 are based outside Wagga Wagga. Not all members of the congregation attend services every Sunday, particularly under current COVID-19 restrictions. Car pooling is common (particularly for children's activities), and an occupancy of 3-4 persons per vehicle is typical (along with some walking).

It should be noted that the buildings used by the church (both the current site in Turvey Park and the proposed site in Lloyd) service the one congregation. For example, although the proposed church can seat up to 400, and the proposed hall can also seat up to 400 (theatre-style), it is not the case that there will be 800 persons on site at any one time. In reality, congregation members will attend services in the church, and then use the hall for meals or study afterwards. During regular Sunday services, the maximum number of persons on site at any one time is expected to be 400, and even at current growth rates, this level of congregation size would not be reached for more than 10 years.

4.2 Road Network

4.2.1 Traffic Generation and Distribution

Traffic generation levels for proposed developments can typically be determined by reference to published standards such as the *RTA Guide to Traffic Generating Developments*, with the amount of traffic generated depending on the land use. In some cases, previous studies of similar sites can be used where published standards do not provide clear or up-to-date guidelines.

The guide does not publish rates for churches or places of worship, however the *ITE Trip Generation Manual (10th Edition)* does, noting the following:

- During a Sunday service, a Church generates 0.54 trips per seat, split 50/50 between inbound and outbound. This equates to 0.27 trips per seat inbound (before the service) plus 0.27 trips per seat outbound (after the service);
- The daily traffic generation rate for a Church on a Sunday is 1.21 trips per seat, which is 4.5 times the rate of 0.27 trips per hour in the Sunday peak;
- The daily traffic generation rate for a Church on a weekday is 0.44 trips per sear, which is 1/3 the rate of Sunday; and
- Daily traffic on a Sunday or a weekday is split 50/50 between inbound and outbound.

Spotto Consulting was also able to source surveys undertaken in Western Australia for a Baptist church in Kelmscott, a suburb of Perth. Of the sites surveyed in 2019, the average vehicle occupancy was 3.65 persons per vehicle for a Sunday service, equating to a trip generation rate of 0.55 trips per person inbound + outbound, also split 50/50. The surveys and trip generation rates for the proposed development were endorsed by Main Roads WA, which gives confidence that the ITE rates (which are from a US publication), are similar to those in Australia.

The proposed accommodation units would have similar traffic movement patterns to motel accommodation. The RTA Guide notes the following traffic rates for motels:

- Daily traffic: 3.0 trips per unit per day; and
- AM and PM peak hour: 0.4 trips per unit.

A summary of the trip generation rates used for each component of the proposed development is shown in Table 4-1, below.

Table 4-1: Traffic Generation Rates for Proposed Development

Element	Source	Trip Generation Rate			
		Weekday		Sunday	
		PM Peak	Daily	AM Peak	Daily
Church	ITE	0.09 trips per person	0.41 trips per person	0.27 trips per person	1.21 trips per person
Units	RTA Guide	0.4 trips per unit	3 trips per unit	0.4 trips per unit	3 trips per unit

The total traffic generated by the proposed development at Stage 1 (Hall and Services building with a congregation of 250, slightly larger than existing levels) and ultimately (church, hall and services building with a congregation of 400) is summarised in Table 4-2 and Table 4-3, below.

Table 4-2: Total Traffic Generation – Proposed Development (Stage 1)

Element	Scale	Total Number of Trips			
		Weekday		Sunday	
		PM Peak	Daily	AM Peak	Daily
Church	250 persons	23	103	68	303
Units	2 units	1	6	1	6
Total		*24*	*109*	*69*	*309*

Table 4-3: Total Traffic Generation – Proposed Development (Ultimate)

Element	Scale	Total Number of Trips			
		Weekday		Sunday	
		PM Peak	Daily	AM Peak	Daily
Church	400 persons	36	164	108	484
Units	2 units	1	6	1	6
Total		*37*	*170*	*109*	*490*

Other assumptions used to determine traffic generation and distribution for the proposed development are that:

- Peak traffic will be 100% inbound during Weekday PM peak and Sunday AM peak, 100% outbound for Sunday PM peak;
- Traffic will be split 50/50 between inbound and outbound across the day;
- 70% of traffic will travel to/from the east via Holbrook Road (with this traffic further split 80/20 between north and south, in line with observations of existing traffic flows), with the remaining 30% to/from the north via Red Hill Road (in line with observations of existing traffic volumes, the closer location of Holbrook Road to the site and the distribution of urban areas of Wagga Wagga to the northeast);
- All traffic will travel to and from the site via Waterhouse Avenue, with traffic accessing Car Park 1 also using Ansett Street (assumed to be 20% of the total, based on the split of car parking numbers); and
- Traffic generated in the AM peak will be 60% inbound and 40% outbound, since staff and self-driven students will generally be inbound, but buses and parent-driven students will be evenly split between inbound and outbound travel.

Based on the total traffic generated and origins/destinations of vehicles, a summary of the anticipated traffic flows from the proposed development at key intersections in the Weekday and Sunday AM and PM peak periods is shown in Figure 4-1 for Weekdays, and Figure 4-2 for Sundays, below.

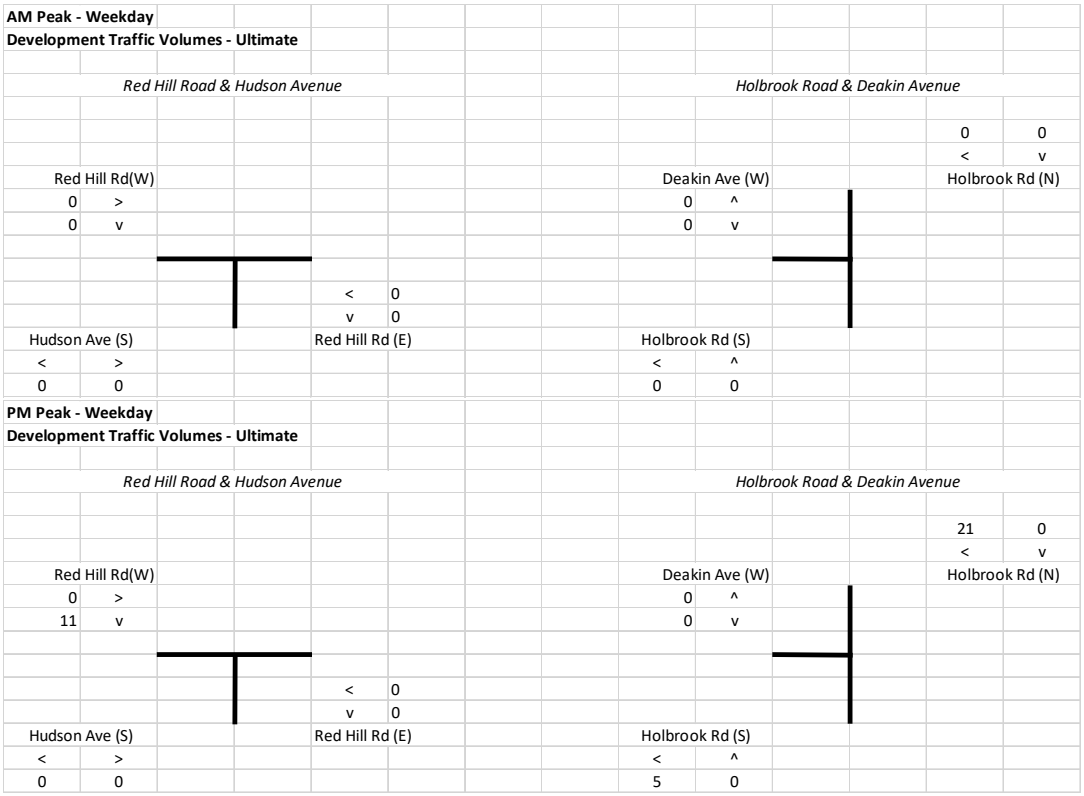


Figure 4-1: AM and PM Peak Hour Turning Movements – Generated by Development (Weekday)

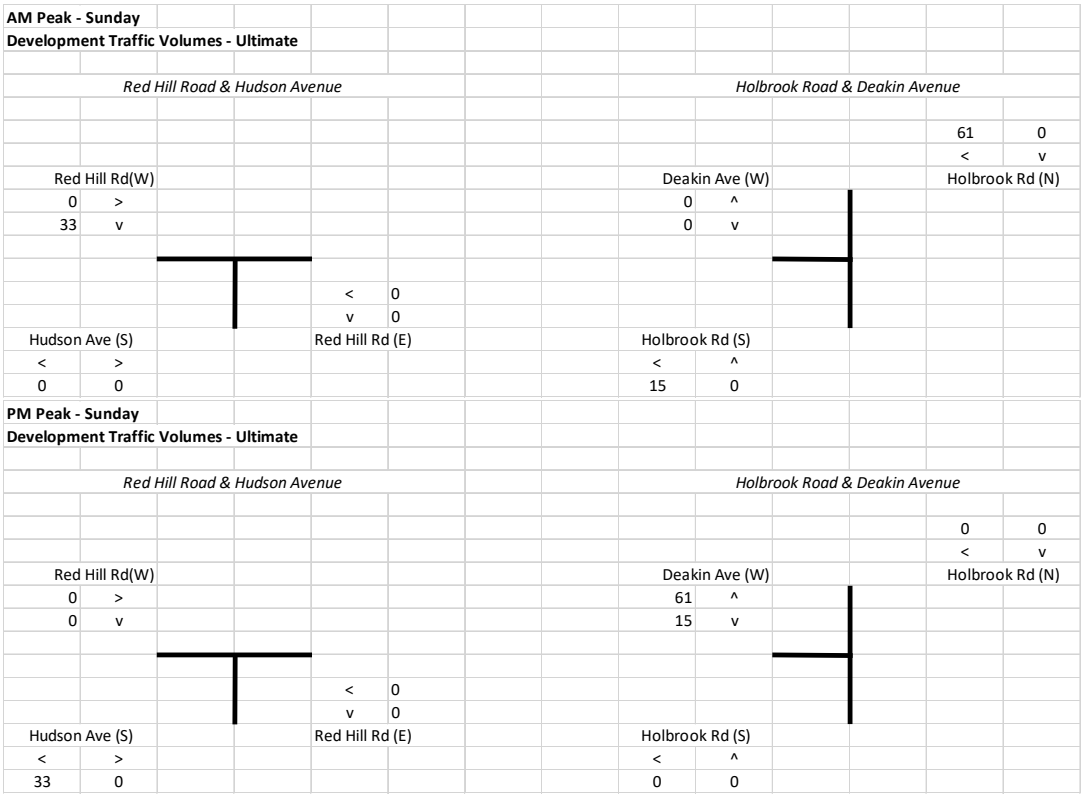


Figure 4-2: AM & PM Peak Hour Turning Movements – Generated by Development (Sunday)

It is also anticipated that traffic growth will occur in the surrounding road network, in addition to that generated by the proposed development. This will include creation of new loads on land yet to be subdivided, construction of additional residential dwellings on vacant lots, and growth in general background traffic on arterial roads. For the purposes of this assessment, the following assumptions have been made in relation to growth in traffic:

- Vacant lots in existing subdivided areas will be developed 90% as single dwellings and 10% as units (in line with the existing split in the subdivision). At the time of the survey, there were a total of 146 vacant lots, indicating a development potential of 131 dwellings plus 15 units;
- Undeveloped areas currently zoned residential and anticipated to utilise the road network impacted under this assessment include 24 hectares south of Deakin Avenue, and 12 hectares west of Barton Avenue. It is assumed that these areas will yield 10 lots per hectare for a total of 140 and 120 lots, respectively. Assuming the same split between single dwellings and medium density, this results in a total of 234 detached dwellings plus 26 units;
- Traffic generation and distribution for residential areas will be as discussed in Section 2.4.1, above; and
- Growth in through traffic on Holbrook Road and Red Hill Road will be 2.5% per annum over a period of 10 years.

It should be noted that the proposed church is only a small amount of the total traffic generated within the area. On weekdays, the church will generate less than 3% of the total traffic, while on a Sunday (the church's busiest day) the corresponding amount is approximately 10%. This is shown in Figure 4-3, below.

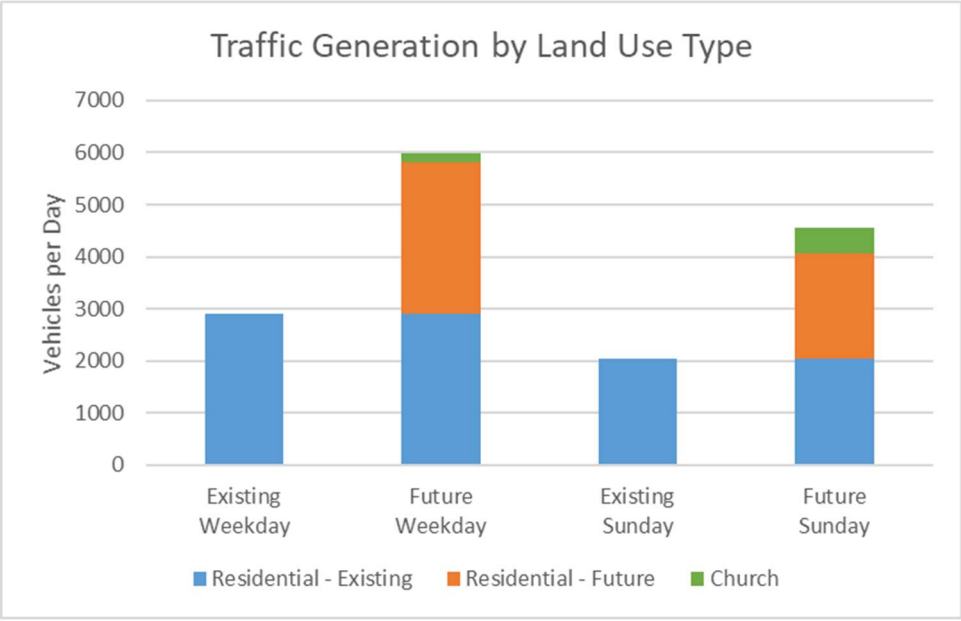


Figure 4-3: Existing and future daily traffic generation in Lloyd area (Weekday and Sunday)

4.2.2 Traffic Impact at Intersections

The additional traffic generated by the proposed development, along with the growth in background traffic volumes, was added to the existing traffic flows at key intersections in the

vicinity of the site. The total flows at each of these intersections in the AM and PM peak periods is shown in Figure 4-4 for Stage 1, and Figure 4-5 for Stages 2 and 3, below.

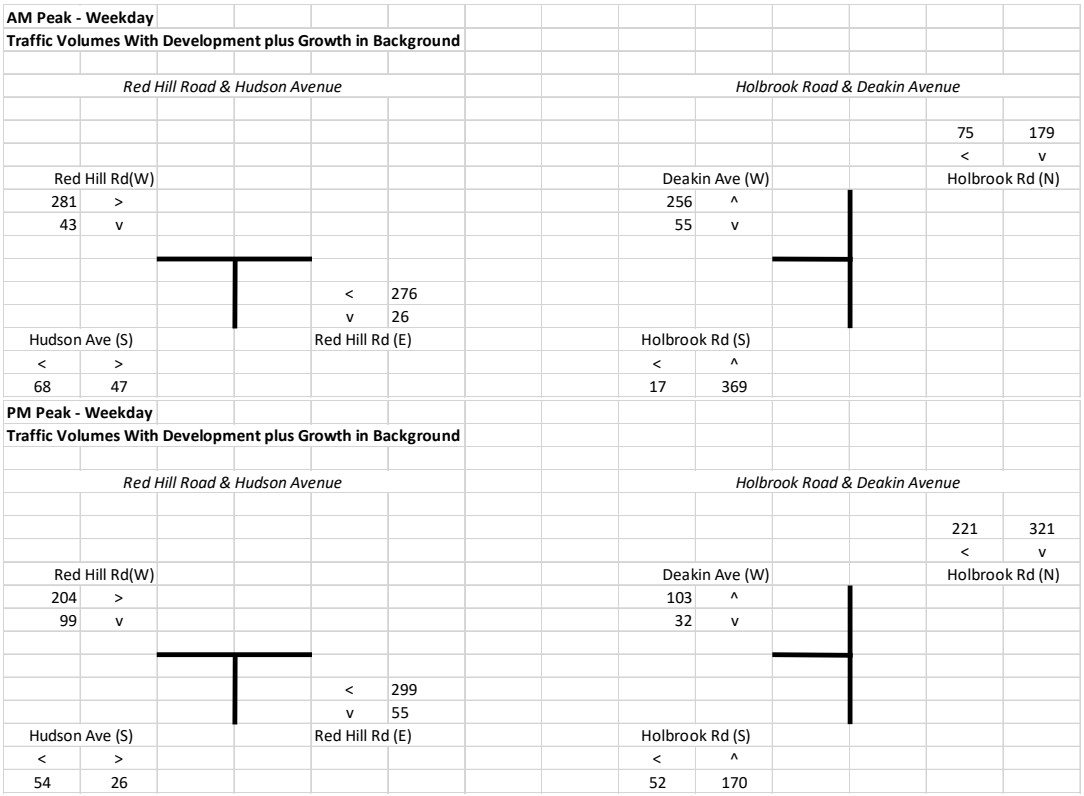


Figure 4-4: AM and PM Peak Hour Turning Movements – Future (Weekday)

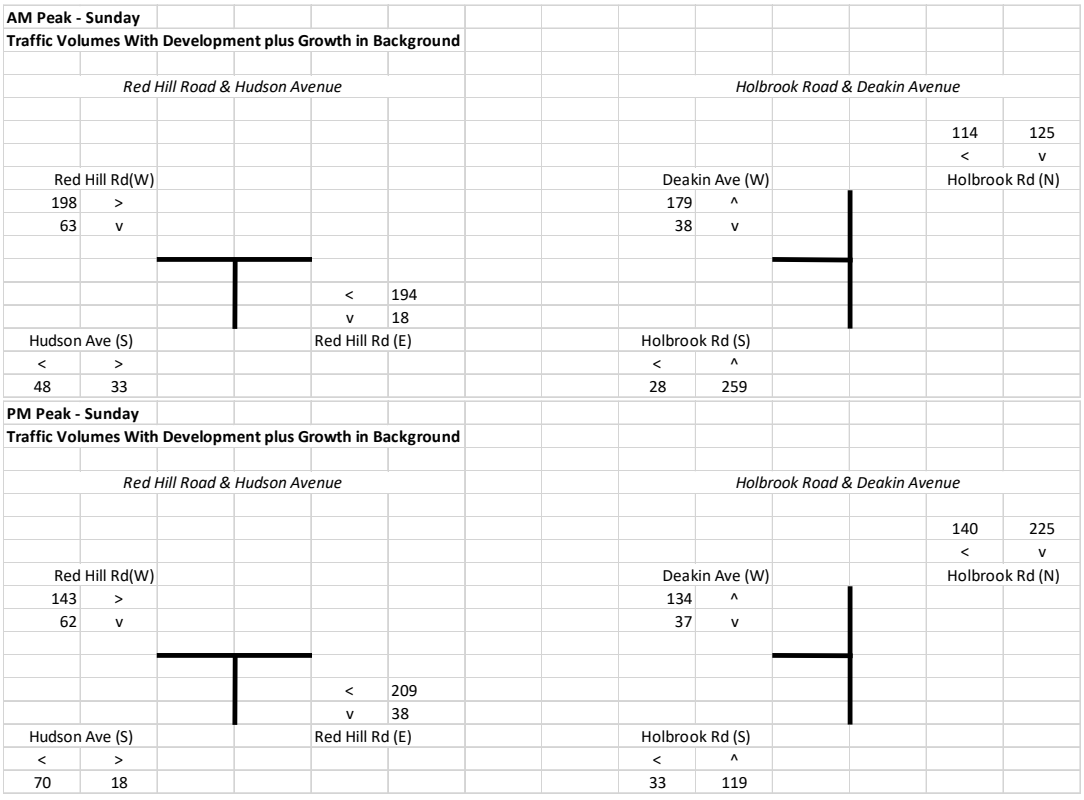


Figure 4-5: AM & PM Peak Hour Turning Movements – Future (Sunday)

The performance of these key intersections were then modelled using the intersection analysis program SIDRA Intersection. Full results for the AM and PM peak periods are included in Appendix B and summarised in Table 4-4, below.

Table 4-4: Intersection performance summary - future conditions

Intersection	Total Flow (veh/h)	Degree of Saturation	Average Delay (sec)	Level of Service
Holbrook & Deakin				
Weekday AM	1,001	0.460	4.2	C
Weekday PM	899	0.263	3.6	B
Sunday AM	782	0.271	3.5	B
Sunday PM	724	0.198	3.4	B
Red Hill & Hudson				
Weekday AM	780	0.191	2.2	A
Weekday PM	776	0.172	2.8	A
Sunday AM	583	0.131	2.2	A
Sunday PM	568	0.116	2.5	A

The analysis demonstrates that even with the additional traffic generated by the proposed development at its ultimate scale, along with the growth in background traffic volumes, the key intersections will operate at a satisfactory Levels of Service (LOS C) or better. The worst performance will occur during a weekday AM peak period, when traffic associated with the church will be very low, indicating that the major impact is the growth in background traffic volumes. During the Sunday AM and PM peak periods (when traffic volumes associated with the church will be highest), both intersections will operate at an excellent Level of Service (LOS A, the highest level). This indicates both intersection will continue to operate with low levels of delay and saturation, and with ample spare capacity.

As vehicles travel further throughout the network, traffic generated by the proposed development becomes more dispersed, and hence has a lower net impact on other intersections. Hence if the impact at nearby intersections is within acceptable limits, then beyond these the impact will be even lower.

It is concluded that traffic from the proposed development can be accommodated at key intersections in the vicinity of the site, and that there will be no significant impacts on intersections as a result of the proposed development.

4.2.3 Traffic Impact Midblock

The additional traffic generated by the proposed development, along with the growth in background traffic volumes, was added to the existing traffic volumes on nearby streets. The total traffic volume on key roads in the vicinity of the site following the proposed development is summarised in Table 4-5 (Weekdays) and Table 4-6 (Sundays), below.

Table 4-5: Weekday midblock traffic data – future conditions

Location	Weekday	Weekday AM Peak		Weekday PM Peak	
	Veh/d	Veh/h	LOS	Veh/h	LOS
Holbrook Road (Red Hill to Deakin)	8,465	878		815	
Southbound		253	B	542	C
Northbound		625	D	273	B
Red Hill Road (Hudson to Holbrook)	6,070	630		584	
Eastbound		328	B	230	B
Westbound		302	B	354	B
Waterhouse Avenue (Deakin to Goldstein)	704	51		93	
Southbound		17	A	73	A
Northbound		34	A	20	A
Ansett Street (Waterhouse to Florey)	92	6		13	
Eastbound		4	A	2	A
Westbound		2	A	11	A

Table 4-6: Sunday midblock traffic data – future conditions

Location	Sunday	Sunday AM Peak		Sunday PM Peak	
	Veh/d	Veh/h	LOS	Veh/h	LOS
Holbrook Road (Red Hill to Deakin)	6,475	677		618	
Southbound		239	B	365	B
Northbound		438	C	253	B
Red Hill Road (Hudson to Holbrook)	4,250	442		408	
Eastbound		230	B	161	A
Westbound		212	B	247	B
Waterhouse Avenue (Deakin to Goldstein)	862	144		144	
Southbound		120	A	24	A
Northbound		24	A	120	A
Ansett Street (Waterhouse to Florey)	138	26		26	
Eastbound		3	A	23	A
Westbound		23	A	3	A

The key points to note from this analysis include:

- All sections of subarterial roads will operate at an acceptable Level of Service (LOS D) or better. The worst performing segment of road is Holbrook Road northbound in the Weekday AM peak period – the proposed development contributes little or no traffic during this period (as noted in Section 4.2.1, above), with the increased traffic volume attributable to growth in through volumes and additional housing;
- All sections sections of subarterial road operate at a satisfactory Level of Service (LOS C) or better during the church's busiest times on Sunday; and
- Sections of local roads will operate at an excellent Level of Service (LOS A, the highest level) across all time periods (including weekdays and the church's busiest times on Sunday). Although the City of Wagga Wagga's *Engineering Guidelines for Subdivisions and Development Standards* do not specify an upper limit of traffic for roads, they do indicate that Local Access roads such as Waterhouse Avenue should service a maximum of 100 lots (implying a daily peak of 1,000 vehicles per day and an AM and PM peak of 100 vehicles per hour), which is not exceeded. Access Streets such as Ansett Street should service a maximum of 10 lots (implying a daily peak of 100 vehicles per day and an AM and PM peak of 10 vehicles per hour), and while the level of traffic exceeds these levels on a Sunday, the impact is only for a relatively short period of time and is considered an acceptable compromise to allow the development of the Car Parking 1 area and provide adequate off-street parking.

Similar to impacts at intersections, as vehicles travel further throughout the network, traffic generated by the proposed development becomes more dispersed, and hence has a lower net impact on other roads. Hence if the impact on the roads in the vicinity of the site is within acceptable limits, then beyond these roads the impact will be even lower.

It is concluded that there will be no significant impact on roads in the vicinity of the site or further afield as a result of the proposed development.

4.3 Parking and Site Access

It is proposed that the site be accessed via three locations: two access driveways on Waterhouse Avenue, and a third access driveway on Ansett Street. Waterhouse Avenue will provide the primary access (catering for 80 spaces), with Ansett Avenue providing the secondary access (catering for 21 spaces). A driveway through the site also provides access to the main church building for special occasions (eg. weddings, funerals), however this driveway will be bollarded off during regular use.

Parking associated with the church is classified as User Class 2 under *Australian Standard AS2890 Part 1: Off-street car parking*. The access driveways are required to be a width of 6.0-9.0m, respectively (as detailed in Table 3.1 of AS2890.1, for a User Class 2 car park with each driveway accessing 25-100 parking spaces and accessed off a local road). All proposed access driveways meet this requirement.

The access driveways are located clear of prohibited locations identified in *AS2890* Figure 3.1. The sight distance required for a vehicle travelling at 50km/h is 69m (*AS2890* Figure 3.2), and sight distance along Waterhouse Avenue and Ansett Street to and from all access driveways exceeds this in all directions.

Wagga Wagga Development Control Plan (DCP) Section 2 specifies the minimum parking spaces required for a development, depending on the land use type. A summary of the number of the minimum number of car parks required under the Wagga Wagga DCP is provided in Table 4-7, below.

Table 4-7: Wagga DCP Car Parking Requirements

Element	Parking Rate	Unit	Spaces Required
Church	1 per 4 seats or 1 per 10m^2 GFA	400 seats 975m^2 GFA	100 (98)
Hall/Services	1 per 4 seats or 1 per 10m^2 GFA	400 seats 1,426m^2 GFA	(100) 143
Units	1.5 per 2 BR unit	2 units	3
Total			***246***

The proposed development incorporates 100 off-street parking spaces, and therefore does not meet the minimum number of spaces required under the Wagga Wagga DCP. However as noted in Section 4.1, above, during typical operations the site does not operate with both the church and the hall/services building occupied at the same time. The maximum number of persons on-site at any one time would only occur with the church at full capacity – that is, 400 persons. In addition, anyone staying at the units on Sundays would be attending the church service, and would not generate additional demand for parking. Based on this, the number of car parks required to cater for typical Sunday church service operations is summarised in Table 4-8, below.

Table 4-8: Anticipated Peak Car Parking Requirements

Element	Parking Rate	Unit	Spaces Required
Church	1 per 4 seats	400 seats	100
Hall/Services	N/A (Included above)	N/A (Included above)	-
Units	N/A (Included above)	N/A (Included above)	-
Total			***100***

When completed, the proposed development therefore provides sufficient off-street parking to meet the anticipated peak parking demands for a typical Sunday service. The proposed development will also provide adequate parking for the first stage of development – 70 off-street parking spaces will be provided, which will be sufficient to meet the anticipated requirement of 63 spaces for a congregation of 250 persons.

As noted in Section 4.2.1, above, traffic levels (and in turn parking demands) through the week are significantly less than on Sundays. Therefore it is considered that the proposed development also provides sufficient off-street parking to meet anticipated weekday parking demands.

Australian Standard AS2890 Part 1: Off-street car parking specifies minimum parking space dimensions of 2.5m wide x 5.4m long with an aisle width of 5.8m for a User Class 2 with 90 degree angle parking (Figure 2.2). All parking spaces and aisles meet this requirement.

Three of the 100 car parking spaces are designated for persons with a disability. The Building Code of Australia specifies a minimum of one space in 50 for this class of building, and the proposal therefore meets this requirement. The spaces are located in several different locations, in close proximity to access points to the church and hall/services building.

It is concluded that the proposed development provides adequate numbers of off-street parking spaces to meet anticipated demand. Access driveways comply with the requirements of AS2890, and all vehicles will be able to enter and exit the site in a forward direction. The internal car parking areas comply with the requirements of the Wagga Wagga DCP and AS2890, and adequate provision has been made for persons with a disability.

4.4 Service and Delivery Vehicles

Service and delivery vehicles include deliveries of goods and services such as trades or maintenance persons, as well as collection of refuse.

Deliveries of goods and services are most likely to be in standard vehicles, able to park in bays in the off-street car park. The majority of these vehicles would be likely to arrive during business hours, when demand for these parks is low and there is ample spare capacity.

Refuse collection and some other occasional service vehicles may be larger vehicles (up to and including a rigid truck). Such vehicles are able to park on-street adjacent to the site, or could access the site during periods of low car parking demand (allowing such vehicles to enter the site in a forward direction, complete a multi-point turn, and exit the site in a forward direction). In some circumstances, reversing may be required into or out of the site, however as these vehicles service the site less than once per day, they would be considered "Occasional Service under *AS2890.2 Parking Facilities – Off-street Commercial Vehicle Facilities*, and therefore permitted to reverse (either on entry or departure) under Section 3.2.2 of AS2890.2.

It is considered that the development provides appropriate facilities for service vehicles.

4.5 Pedestrian and Cyclist Impact

Access to the development for pedestrians will be available from both Ansett Street and Waterhouse Avenue. Cyclists will also be able to access the site from these streets, and parking for up to six bicycles has been provided in a central part of the site (between the hall and the church).

There will be no changes to existing pedestrian and cyclist infrastructure on the street or surrounds.

It is considered that the proposed development provides appropriate facilities for pedestrians and cyclists, with no significant adverse impacts.

5 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that:

- Traffic surveys and modelling on weekdays and Sundays of nearby key intersections show that the intersections currently operate at an excellent Level of Service (LOS A, the highest level) or better. The midblock level of service on all local and subarterial roads in the vicinity of the site is satisfactory (LOS C) or better;
- There are no on-street parking restrictions in the vicinity of the site, and there were very few vehicles observed parked on-street in the vicinity of the site (as most residential properties have off-street parking);
- The proposed development is anticipated to generate 37 vehicle trips per hour/171 vehicle trips per day during a weekday peak hour/daily, and 109 vehicle trips per hour/490 vehicle trips per day on a Sunday peak hour/daily, which will not have a significant impact on the surrounding road network (including nearby intersections);
- The provision of 70 off-street parking spaces at Stage 1 of the development and 100 parking spaces at full development does not meet the minimum requirements of the *Wagga Wagga Development Control Plan*, however it will meet the requirements for the anticipated level of demand;
- The access driveways and car park layout meets the requirements of the *Wagga Wagga Development Control Plan* and *Australian Standard AS2890*. Adequate provision has been made for persons with a disability;
- Adequate provision has been made for servicing and delivery vehicles; and
- There is no significant adverse impact of the proposed development on pedestrians and cyclists.

APPENDIX A – INTERSESCTION ANALYSIS – EXISTING

MOVEMENT SUMMARY

Site: [Red Hill and Hudson_Existing_Sunday PM (Site Folder: General)]

Red Hill Road Road and Hudson Avenue, Lloyd
Existing Conditions
Sunday PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hudson (S)														
1	L2	20	5.0	21	5.0	0.041	5.3	LOS A	0.1	1.1	0.33	0.56	0.33	50.0
3	R2	14	5.0	15	5.0	0.041	7.3	LOS A	0.1	1.1	0.33	0.56	0.33	49.8
Approach		34	5.0	36	5.0	0.041	6.1	LOS A	0.1	1.1	0.33	0.56	0.33	49.9
East: Red Hill (E)														
4	L2	30	5.0	32	5.0	0.018	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
5	T1	167	5.0	176	5.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		197	5.0	207	5.0	0.093	1.0	NA	0.0	0.0	0.00	0.09	0.00	67.9
West: Red Hill (W)														
11	T1	114	5.0	120	5.0	0.069	0.3	LOS A	0.2	1.7	0.13	0.11	0.13	67.8
12	R2	28	5.0	29	5.0	0.069	7.1	LOS A	0.2	1.7	0.19	0.17	0.19	54.9
Approach		142	5.0	149	5.0	0.069	1.7	NA	0.2	1.7	0.14	0.12	0.14	64.8
All Vehicles		373	5.0	393	5.0	0.093	1.7	NA	0.2	1.7	0.08	0.15	0.08	64.6

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

MOVEMENT SUMMARY

Site: [Holbrook and Deakin_Existing_Weekday AM (Site Folder: General)]

Holbrook Road and Deakin Avenue, Lloyd
Existing Conditions
Weekday AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holbrook (S)														
1	L2	4	5.0	4	5.0	0.002	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
2	T1	295	5.0	311	5.0	0.164	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		299	5.0	315	5.0	0.164	0.1	NA	0.0	0.0	0.00	0.01	0.00	69.7
North: Holbrook (N)														
8	T1	143	5.0	151	5.0	0.069	0.4	LOS A	0.2	1.5	0.11	0.08	0.11	68.4
9	R2	21	5.0	22	5.0	0.069	7.7	LOS A	0.2	1.5	0.19	0.13	0.19	55.2
Approach		164	5.0	173	5.0	0.069	1.3	NA	0.2	1.5	0.12	0.08	0.12	66.3
West: Deakin (W)														
10	L2	153	5.0	161	5.0	0.228	6.3	LOS A	0.9	6.6	0.46	0.67	0.46	49.5
12	R2	29	5.0	31	5.0	0.228	9.9	LOS A	0.9	6.6	0.46	0.67	0.46	49.3
Approach		182	5.0	192	5.0	0.228	6.9	LOS A	0.9	6.6	0.46	0.67	0.46	49.5
All Vehicles		645	5.0	679	5.0	0.228	2.3	NA	0.9	6.6	0.16	0.21	0.16	61.8

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Holbrook and Deakin_Existing_Weekday PM (Site Folder: General)]

Holbrook Road and Deakin Avenue, Lloyd
Existing Conditions
Weekday PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holbrook (S)														
1	L2	19	5.0	20	5.0	0.011	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
2	T1	136	5.0	143	5.0	0.076	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		155	5.0	163	5.0	0.076	0.8	NA	0.0	0.0	0.00	0.07	0.00	68.3
North: Holbrook (N)														
8	T1	257	5.0	271	5.0	0.149	0.4	LOS A	0.6	4.7	0.12	0.13	0.12	67.7
9	R2	87	5.0	92	5.0	0.149	6.9	LOS A	0.6	4.7	0.24	0.25	0.24	54.1
Approach		344	5.0	362	5.0	0.149	2.0	NA	0.6	4.7	0.15	0.16	0.15	63.7
West: Deakin (W)														
10	L2	45	5.0	47	5.0	0.076	5.2	LOS A	0.3	2.0	0.30	0.56	0.30	49.9
12	R2	17	5.0	18	5.0	0.076	9.4	LOS A	0.3	2.0	0.30	0.56	0.30	49.7
Approach		62	5.0	65	5.0	0.076	6.4	LOS A	0.3	2.0	0.30	0.56	0.30	49.8
All Vehicles		561	5.0	591	5.0	0.149	2.2	NA	0.6	4.7	0.12	0.18	0.12	62.9

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Holbrook and Deakin_Existing_Sunday AM (Site Folder: General)]

Holbrook Road and Deakin Avenue, Lloyd
Existing Conditions
Sunday AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holbrook (S)														
1	L2	3	5.0	3	5.0	0.002	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
2	T1	207	5.0	218	5.0	0.115	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		210	5.0	221	5.0	0.115	0.1	NA	0.0	0.0	0.00	0.01	0.00	69.7
North: Holbrook (N)														
8	T1	100	5.0	105	5.0	0.047	0.2	LOS A	0.1	0.9	0.09	0.08	0.09	68.5
9	R2	15	5.0	16	5.0	0.047	7.1	LOS A	0.1	0.9	0.15	0.13	0.15	55.3
Approach		115	5.0	121	5.0	0.047	1.1	NA	0.1	0.9	0.10	0.08	0.10	66.4
West: Deakin (W)														
10	L2	107	5.0	113	5.0	0.139	5.7	LOS A	0.5	3.9	0.35	0.59	0.35	50.1
12	R2	20	5.0	21	5.0	0.139	7.6	LOS A	0.5	3.9	0.35	0.59	0.35	49.9
Approach		127	5.0	134	5.0	0.139	6.0	LOS A	0.5	3.9	0.35	0.59	0.35	50.1
All Vehicles		452	5.0	476	5.0	0.139	2.0	NA	0.5	3.9	0.12	0.19	0.12	62.1

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Holbrook and Deakin_Existing_Sunday PM (Site Folder: General)]

Holbrook Road and Deakin Avenue, Lloyd
Existing Conditions
Sunday PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holbrook (S)														
1	L2	13	5.0	14	5.0	0.008	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
2	T1	95	5.0	100	5.0	0.053	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		108	5.0	114	5.0	0.053	0.8	NA	0.0	0.0	0.00	0.07	0.00	68.3
North: Holbrook (N)														
8	T1	180	5.0	189	5.0	0.103	0.2	LOS A	0.4	3.0	0.09	0.12	0.09	67.9
9	R2	61	5.0	64	5.0	0.103	6.7	LOS A	0.4	3.0	0.18	0.24	0.18	54.3
Approach		241	5.0	254	5.0	0.103	1.9	NA	0.4	3.0	0.12	0.15	0.12	63.8
West: Deakin (W)														
10	L2	32	5.0	34	5.0	0.048	5.0	LOS A	0.2	1.3	0.23	0.53	0.23	50.3
12	R2	12	5.0	13	5.0	0.048	7.5	LOS A	0.2	1.3	0.23	0.53	0.23	50.1
Approach		44	5.0	46	5.0	0.048	5.7	LOS A	0.2	1.3	0.23	0.53	0.23	50.3
All Vehicles		393	5.0	414	5.0	0.103	2.0	NA	0.4	3.0	0.10	0.17	0.10	63.0

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Red Hill and Hudson_Existing_Weekday AM (Site Folder: General)]

Red Hill Road Road and Hudson Avenue, Lloyd
Existing Conditions
Weekday AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hudson (S)														
1	L2	24	5.0	25	5.0	0.095	5.7	LOS A	0.4	2.6	0.46	0.66	0.46	48.9
3	R2	36	5.0	38	5.0	0.095	9.3	LOS A	0.4	2.6	0.46	0.66	0.46	48.7
Approach		60	5.0	63	5.0	0.095	7.8	LOS A	0.4	2.6	0.46	0.66	0.46	48.8
East: Red Hill (E)														
4	L2	20	5.0	21	5.0	0.012	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
5	T1	221	5.0	233	5.0	0.123	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		241	5.0	254	5.0	0.123	0.6	NA	0.0	0.0	0.00	0.05	0.00	68.8
West: Red Hill (W)														
11	T1	225	5.0	237	5.0	0.112	0.3	LOS A	0.2	1.5	0.07	0.05	0.07	68.9
12	R2	20	5.0	21	5.0	0.112	7.4	LOS A	0.2	1.5	0.10	0.07	0.10	56.0
Approach		245	5.0	258	5.0	0.112	0.8	NA	0.2	1.5	0.08	0.05	0.08	67.6
All Vehicles		546	5.0	575	5.0	0.123	1.5	NA	0.4	2.6	0.08	0.12	0.08	65.3

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

MOVEMENT SUMMARY

Site: [Red Hill and Hudson_Existing_Weekday PM (Site Folder: General)]

Red Hill Road Road and Hudson Avenue, Lloyd
Existing Conditions
Weekday PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hudson (S)														
1	L2	29	5.0	31	5.0	0.069	5.7	LOS A	0.3	1.8	0.42	0.63	0.42	49.4
3	R2	20	5.0	21	5.0	0.069	9.1	LOS A	0.3	1.8	0.42	0.63	0.42	49.2
Approach		49	5.0	52	5.0	0.069	7.1	LOS A	0.3	1.8	0.42	0.63	0.42	49.3
East: Red Hill (E)														
4	L2	43	5.0	45	5.0	0.025	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
5	T1	239	5.0	252	5.0	0.133	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		282	5.0	297	5.0	0.133	1.0	NA	0.0	0.0	0.00	0.09	0.00	67.8
West: Red Hill (W)														
11	T1	163	5.0	172	5.0	0.102	0.5	LOS A	0.4	2.7	0.16	0.12	0.16	67.6
12	R2	40	5.0	42	5.0	0.102	7.6	LOS A	0.4	2.7	0.24	0.18	0.24	54.6
Approach		203	5.0	214	5.0	0.102	1.9	NA	0.4	2.7	0.18	0.13	0.18	64.6
All Vehicles		534	5.0	562	5.0	0.133	1.9	NA	0.4	2.7	0.11	0.16	0.11	64.4

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Red Hill and Hudson_Existing_Sunday AM (Site Folder: General)]

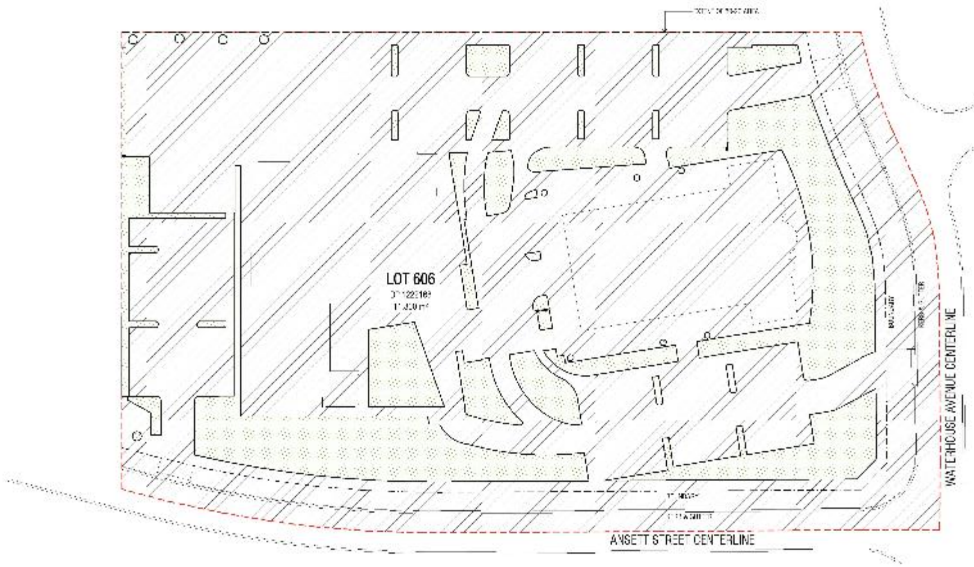
Red Hill Road Road and Hudson Avenue, Lloyd
Existing Conditions
Sunday AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hudson (S)														
1	L2	17	5.0	18	5.0	0.056	5.3	LOS A	0.2	1.5	0.36	0.59	0.36	49.7
3	R2	25	5.0	26	5.0	0.056	7.4	LOS A	0.2	1.5	0.36	0.59	0.36	49.6
Approach		42	5.0	44	5.0	0.056	6.6	LOS A	0.2	1.5	0.36	0.59	0.36	49.6
East: Red Hill (E)														
4	L2	14	5.0	15	5.0	0.008	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
5	T1	155	5.0	163	5.0	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		169	5.0	178	5.0	0.086	0.5	NA	0.0	0.0	0.00	0.05	0.00	68.8
West: Red Hill (W)														
11	T1	158	5.0	166	5.0	0.078	0.2	LOS A	0.1	0.9	0.06	0.05	0.06	69.0
12	R2	14	5.0	15	5.0	0.078	7.0	LOS A	0.1	0.9	0.08	0.07	0.08	56.1
Approach		172	5.0	181	5.0	0.078	0.7	NA	0.1	0.9	0.06	0.05	0.06	67.7
All Vehicles		383	5.0	403	5.0	0.086	1.3	NA	0.2	1.5	0.07	0.11	0.07	65.6

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

APPENDIX B – PLANS OF PROPOSED DEVELOPMENT



LLOYD 80-20 PLAN
SCALE 1:500

LLOYD 80-20 PLAN TABLE

STAIR NOTE - COMMERCIAL

BCA NOTES

CUT & FILL NOTE

SEWER & STORMWATER NOTE

WORKPLACE HEALTH & SAFETY

AMBIGUITY, ERROR OR OMISSION NOTE

BUILDING NOTES

DRAWING SCHEDULE

SHEET No.	SHEET NAME
A00	NOTES & LLOYD 80:20 PLAN
A01	SITE / SITE ANALYSIS PLAN
A02	LANDSCAPING PLAN
A03	FLOOR PLAN - GROUND LEVEL
A04	FLOOR PLAN - FIRST LEVEL
A05	ELEVATIONS
A06	ELEVATION & SECTION
A07	SECTION
A08	NOT USED
A09	DOOR & WINDOW SHEDULE
A10	PLUMBING PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

N W E S

SCALE 1:500 A1 SIZE
SCALE 1:1000 A3 SIZE

icono BUILDING DESIGN

Project
PROPOSED NEW ST. MARY & ST. JOHN THE BELOVED COPTIC ORTHODOX CHURCH
LOT 606, DP 1222168
12 WATERHOUSE AVENUE, WAGGA WAGGA

Client
THE CHURCH OF ST. MARY & ST. JOHN THE BELOVED

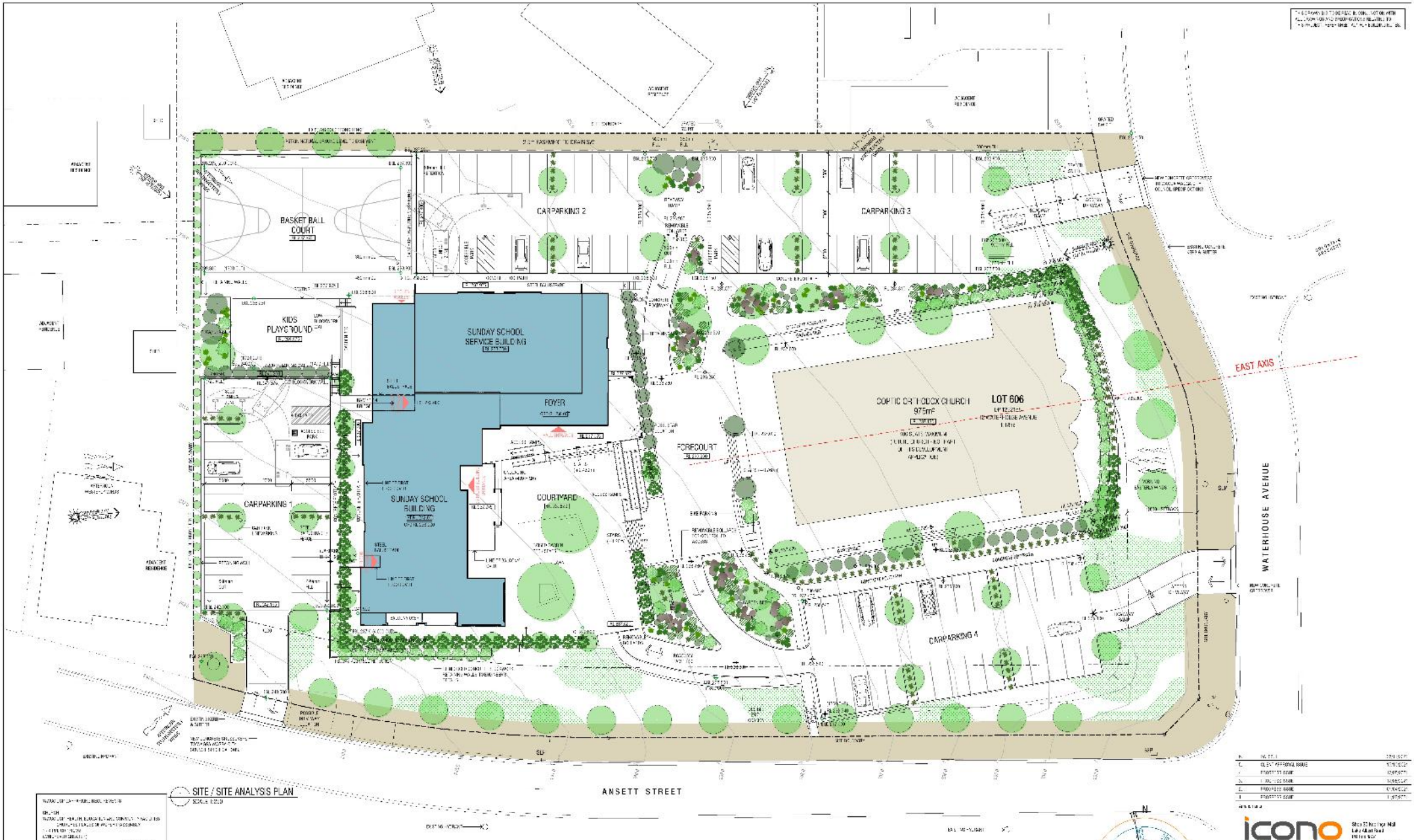
Sheet Title
NOTES & 80:20 PLAN

Scale: AS SHOWN @ A1

Drawn: ICONO

Sheet No. A00

Revision: 1



SITE / SITE ANALYSIS PLAN
SCALE 1:250

PRELIMINARY
NOT FOR CONSTRUCTION

SCALE 1:250 @ A1 SIZE
SCALE 1:500 @ A3 SIZE

C.	CLIENT APPROVAL ISSUE	
B.	PRELIMINARY ISSUE	
A.	PRELIMINARY ISSUE	

icono BUILDING DESIGN

PROPOSED NEW ST. MARY & ST. JOHN THE BELOVED COPTIC ORTHODOX CHURCH
LOT 605 DP 1222168
12 WATERHOUSE AVENUE, WAGGA WAGGA

THE CHURCH OF ST. MARY & ST. JOHN THE BELOVED

SITE / SITE ANALYSIS PLAN

A01

LANDSCAPING PLAN

PRELIMINARY

NOT FOR CONSTRUCTION

SCALE 1:250 A1 SIZE

SCALE 1:500 A3 SIZE

icono BUILDING DESIGN

Project: PROPOSED NEW ST. MARY & ST. JOHN THE BELOVED COPTIC ORTHODOX CHURCH LOT 606, DP 1222168 12 WATERHOUSE AVENUE, WAGGA WAGGA

Client: THE CHURCH OF ST. MARY & ST. JOHN THE BELOVED

Sheet Title: LANDSCAPING PLAN

A02

APPENDIX C – INTERSECTION ANALYSIS – FUTURE

MOVEMENT SUMMARY

Site: [Red Hill and Hudson_Future_Sunday PM (Site Folder: General)]

Red Hill Road Road and Hudson Avenue, Lloyd
Future Conditions (With Proposed Development plus Growth in Background)
Sunday PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hudson (S)														
1	L2	70	5.0	74	5.0	0.104	5.6	LOS A	0.4	2.8	0.36	0.59	0.36	49.9
3	R2	18	5.0	19	5.0	0.104	8.8	LOS A	0.4	2.8	0.36	0.59	0.36	49.7
Approach		88	5.0	93	5.0	0.104	6.3	LOS A	0.4	2.8	0.36	0.59	0.36	49.9
East: Red Hill (E)														
4	L2	38	5.0	40	5.0	0.022	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
5	T1	209	5.0	220	5.0	0.116	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		247	5.0	260	5.0	0.116	1.0	NA	0.0	0.0	0.00	0.09	0.00	67.8
West: Red Hill (W)														
11	T1	143	5.0	151	5.0	0.108	0.6	LOS A	0.5	3.5	0.18	0.16	0.18	67.0
12	R2	62	5.0	65	5.0	0.108	7.4	LOS A	0.5	3.5	0.31	0.28	0.31	53.7
Approach		205	5.0	216	5.0	0.108	2.7	NA	0.5	3.5	0.22	0.20	0.22	62.4
All Vehicles		540	5.0	568	5.0	0.116	2.5	NA	0.5	3.5	0.14	0.21	0.14	62.1

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

MOVEMENT SUMMARY

Site: [Holbrook and Deakin_Future_Weekday AM (Site Folder: General)]

Holbrook Road and Deakin Avenue, Lloyd
Future Conditions (With Proposed Development plus Growth in Background)
Weekday AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holbrook (S)														
1	L2	17	5.0	18	5.0	0.010	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
2	T1	369	5.0	388	5.0	0.206	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		386	5.0	406	5.0	0.206	0.3	NA	0.0	0.0	0.00	0.03	0.00	69.3
North: Holbrook (N)														
8	T1	179	5.0	188	5.0	0.127	0.9	LOS A	0.6	4.6	0.18	0.15	0.18	67.3
9	R2	75	5.0	79	5.0	0.127	8.4	LOS A	0.6	4.6	0.44	0.37	0.44	52.7
Approach		254	5.0	267	5.0	0.127	3.1	NA	0.6	4.6	0.25	0.21	0.25	62.2
West: Deakin (W)														
10	L2	256	5.0	269	5.0	0.460	8.5	LOS A	2.7	20.0	0.60	0.89	0.85	47.6
12	R2	55	5.0	58	5.0	0.460	15.8	LOS C	2.7	20.0	0.60	0.89	0.85	47.5
Approach		311	5.0	327	5.0	0.460	9.8	LOS A	2.7	20.0	0.60	0.89	0.85	47.6
All Vehicles		951	5.0	1001	5.0	0.460	4.2	NA	2.7	20.0	0.26	0.36	0.34	58.7

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Holbrook and Deakin_Future_Weekday PM (Site Folder: General)]

Holbrook Road and Deakin Avenue, Lloyd
Future Conditions (With Proposed Development plus Growth in Background)
Weekday PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holbrook (S)														
1	L2	52	5.0	55	5.0	0.031	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
2	T1	170	5.0	179	5.0	0.095	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		222	5.0	234	5.0	0.095	1.5	NA	0.0	0.0	0.00	0.14	0.00	66.8
North: Holbrook (N)														
8	T1	321	5.0	338	5.0	0.263	0.6	LOS A	1.4	10.2	0.12	0.14	0.12	67.7
9	R2	221	5.0	233	5.0	0.263	7.5	LOS A	1.4	10.2	0.40	0.46	0.40	52.3
Approach		542	5.0	571	5.0	0.263	3.4	NA	1.4	10.2	0.23	0.27	0.23	60.4
West: Deakin (W)														
10	L2	103	5.0	108	5.0	0.198	5.4	LOS A	0.8	5.5	0.38	0.60	0.38	49.0
12	R2	32	5.0	34	5.0	0.198	15.0	LOS B	0.8	5.5	0.38	0.60	0.38	48.8
Approach		135	5.0	142	5.0	0.198	7.7	LOS A	0.8	5.5	0.38	0.60	0.38	48.9
All Vehicles		899	5.0	946	5.0	0.263	3.6	NA	1.4	10.2	0.20	0.29	0.20	59.7

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Holbrook and Deakin_Future_Sunday AM (Site Folder: General)]

Holbrook Road and Deakin Avenue, Lloyd
Future Conditions (With Proposed Development plus Growth in Background)
Sunday AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holbrook (S)														
1	L2	28	5.0	29	5.0	0.016	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
2	T1	259	5.0	273	5.0	0.144	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		287	5.0	302	5.0	0.144	0.7	NA	0.0	0.0	0.00	0.06	0.00	68.6
North: Holbrook (N)														
8	T1	125	5.0	132	5.0	0.126	0.3	LOS A	0.6	4.0	0.06	0.08	0.06	68.7
9	R2	114	5.0	120	5.0	0.126	7.7	LOS A	0.6	4.0	0.41	0.58	0.41	51.5
Approach		239	5.0	252	5.0	0.126	3.8	NA	0.6	4.0	0.23	0.32	0.23	59.2
West: Deakin (W)														
10	L2	179	5.0	188	5.0	0.271	6.1	LOS A	1.1	8.2	0.45	0.66	0.45	49.5
12	R2	38	5.0	40	5.0	0.271	10.9	LOS B	1.1	8.2	0.45	0.66	0.45	49.3
Approach		217	5.0	228	5.0	0.271	7.0	LOS A	1.1	8.2	0.45	0.66	0.45	49.4
All Vehicles		743	5.0	782	5.0	0.271	3.5	NA	1.1	8.2	0.20	0.32	0.20	58.9

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Holbrook and Deakin_Future_Sunday PM (Site Folder: General)]

Holbrook Road and Deakin Avenue, Lloyd
Future Conditions (With Proposed Development plus Growth in Background)
Sunday PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Holbrook (S)														
1	L2	33	5.0	35	5.0	0.019	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
2	T1	119	5.0	125	5.0	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		152	5.0	160	5.0	0.066	1.4	NA	0.0	0.0	0.00	0.13	0.00	67.0
North: Holbrook (N)														
8	T1	225	5.0	237	5.0	0.168	0.4	LOS A	0.8	6.0	0.11	0.14	0.11	67.6
9	R2	140	5.0	147	5.0	0.168	6.9	LOS A	0.8	6.0	0.29	0.39	0.29	52.8
Approach		365	5.0	384	5.0	0.168	2.9	NA	0.8	6.0	0.18	0.24	0.18	61.1
West: Deakin (W)														
10	L2	134	5.0	141	5.0	0.198	5.2	LOS A	0.8	5.8	0.29	0.56	0.29	49.9
12	R2	37	5.0	39	5.0	0.198	10.3	LOS B	0.8	5.8	0.29	0.56	0.29	49.7
Approach		171	5.0	180	5.0	0.198	6.3	LOS A	0.8	5.8	0.29	0.56	0.29	49.9
All Vehicles		688	5.0	724	5.0	0.198	3.4	NA	0.8	6.0	0.16	0.30	0.16	58.9

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [Red Hill and Hudson_Future_Weekday AM (Site Folder: General)]

Red Hill Road Road and Hudson Avenue, Lloyd
Future Conditions (With Proposed Development plus Growth in Background)
Weekday AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hudson (S)														
1	L2	68	5.0	72	5.0	0.191	6.1	LOS A	0.7	5.3	0.50	0.70	0.50	48.4
3	R2	47	5.0	49	5.0	0.191	12.0	LOS A	0.7	5.3	0.50	0.70	0.50	48.3
Approach		115	5.0	121	5.0	0.191	8.5	LOS A	0.7	5.3	0.50	0.70	0.50	48.4
East: Red Hill (E)														
4	L2	26	5.0	27	5.0	0.015	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
5	T1	276	5.0	291	5.0	0.154	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		302	5.0	318	5.0	0.154	0.6	NA	0.0	0.0	0.00	0.05	0.00	68.7
West: Red Hill (W)														
11	T1	281	5.0	296	5.0	0.156	0.5	LOS A	0.5	3.4	0.13	0.08	0.13	68.2
12	R2	43	5.0	45	5.0	0.156	7.9	LOS A	0.5	3.4	0.19	0.12	0.19	55.3
Approach		324	5.0	341	5.0	0.156	1.5	NA	0.5	3.4	0.14	0.09	0.14	66.1
All Vehicles		741	5.0	780	5.0	0.191	2.2	NA	0.7	5.3	0.14	0.17	0.14	63.5

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

MOVEMENT SUMMARY

Site: [Red Hill and Hudson_Future_Weekday PM (Site Folder: General)]

Red Hill Road Road and Hudson Avenue, Lloyd
Future Conditions (With Proposed Development plus Growth in Background)
Weekday PM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hudson (S)														
1	L2	54	5.0	57	5.0	0.127	6.2	LOS A	0.5	3.4	0.49	0.68	0.49	48.7
3	R2	26	5.0	27	5.0	0.127	12.1	LOS A	0.5	3.4	0.49	0.68	0.49	48.5
Approach		80	5.0	84	5.0	0.127	8.1	LOS A	0.5	3.4	0.49	0.68	0.49	48.7
East: Red Hill (E)														
4	L2	55	5.0	58	5.0	0.032	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
5	T1	299	5.0	315	5.0	0.167	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		354	5.0	373	5.0	0.167	1.0	NA	0.0	0.0	0.00	0.09	0.00	67.8
West: Red Hill (W)														
11	T1	204	5.0	215	5.0	0.172	1.0	LOS A	0.9	6.4	0.23	0.18	0.23	66.6
12	R2	99	5.0	104	5.0	0.172	8.3	LOS A	0.9	6.4	0.42	0.34	0.42	53.0
Approach		303	5.0	319	5.0	0.172	3.4	NA	0.9	6.4	0.29	0.23	0.29	61.5
All Vehicles		737	5.0	776	5.0	0.172	2.8	NA	0.9	6.4	0.17	0.22	0.17	62.5

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

MOVEMENT SUMMARY

Site: [Red Hill and Hudson_Future_Sunday AM (Site Folder: General)]

Red Hill Road Road and Hudson Avenue, Lloyd
Future Conditions (With Proposed Development plus Growth in Background)
Sunday AM Peak Period
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hudson (S)														
1	L2	48	5.0	51	5.0	0.111	5.5	LOS A	0.4	3.0	0.40	0.62	0.40	49.4
3	R2	33	5.0	35	5.0	0.111	9.2	LOS A	0.4	3.0	0.40	0.62	0.40	49.2
Approach		81	5.0	85	5.0	0.111	7.0	LOS A	0.4	3.0	0.40	0.62	0.40	49.3
East: Red Hill (E)														
4	L2	18	5.0	19	5.0	0.011	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	58.3
5	T1	194	5.0	204	5.0	0.108	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		212	5.0	223	5.0	0.108	0.6	NA	0.0	0.0	0.00	0.05	0.00	68.8
West: Red Hill (W)														
11	T1	198	5.0	208	5.0	0.131	0.5	LOS A	0.5	3.8	0.16	0.14	0.16	67.4
12	R2	63	5.0	66	5.0	0.131	7.3	LOS A	0.5	3.8	0.25	0.21	0.25	54.4
Approach		261	5.0	275	5.0	0.131	2.1	NA	0.5	3.8	0.18	0.16	0.18	63.7
All Vehicles		554	5.0	583	5.0	0.131	2.2	NA	0.5	3.8	0.14	0.18	0.14	62.8

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.