



PLANNING PROPOSAL - ROWAN VILLAGE, 7066 HOLBROOK ROAD - TRANSPORT IMPACT ASSESSMENT

Prepared for
DEVCORE DEVELOPMENTS PTY LTD
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INTRODUCTION

1.1. OVERVIEW

This Transport Impact Assessment has been prepared by Urbis Pty Ltd (Urbis) on behalf of DevCore Developments Pty Ltd (the Applicant) to support a planning proposal for the rezoning at the site of the proposed Rowan Village (the site) to support the development of circa 2,100 residential dwellings and a village centre.

1.2. REPORT STRUCTURE

This report outlines the assessment of the potential transport impacts of the proposed development, including consideration of the following

- Existing transport and traffic networks serving the site.
- Existing travel behaviours and land use in the surrounding area.
- The traffic generating characteristics of the proposed development.
- Trip distribution from the proposed development onto the surrounding road network.
- The transport and traffic implications of the proposed development and mitigation measures required to support the redevelopment.

1.3. INFORMATION UNDER FURTHER INVESTIGATION

There is information under continued investigation that is required to finalise this report. **Table 1** outlines the outstanding information and how it will be addressed.

Table 1 Outstanding information

Outstanding information	Section	Description of activities to be undertaken	Timing of update
Intersection turning movement counts	2.3.4	<p>Intersection turning movement counts will be undertaken at the following intersections to determine existing volumes and support SIDRA INTERSECTION modelling</p> <ul style="list-style-type: none">▪ Holbrook Road / Lloyd Road.▪ Holbrook Road / Bourke Street.▪ Holbrook Road / Red Hill Road.▪ Glenfield Road / Dalman Parkway.▪ Glenfield Road / Fernleigh Road.▪ Glenfield Road / Urana Street.▪ Bourke Street / Red Hill Road.▪ Bourke Street / Leavenworth Drive.▪ Bourke Street / Fernleigh Road.▪ Bourke Street / Urana Street.▪ Lloyd Road / Plumpton Road.▪ Plumpton Road / Gregadoo Road.▪ Plumpton Road / Stirling Boulevard.▪ Plumpton Road / Lake Albert Road.▪ Lake Albert Road / Stanley Street.▪ Lake Albert Road / Fay Avenue.▪ Lake Albert Road / Lord Baden Powell Drive.	End of May 2022.

Outstanding information	Section	Description of activities to be undertaken	Timing of update
		<ul style="list-style-type: none"> ▪ Lake Albert Road / Koorringal Road. ▪ Koorringal Road / Vincent Road. ▪ Koorringal Road / Fay Avenue. 	
SIDRA INTERSECTION MODELLING – Complete development.	2.3.5 4.3	<p>SIDRA INTERSECTION modelling will be undertaken at the entrance points to the site and relevant intersections described above to determine the impacts of the planning proposal on the surrounding road network. The following SIDRA INTERSECTION scenarios will be tested</p> <ul style="list-style-type: none"> ▪ Existing Conditions AM / PM peak, weekday/weekend. ▪ Development completion year AM / PM peak, weekday/weekend. ▪ 10 years after development completion AM / PM peak, weekday/weekend. 	End of May 2022
Midblock Capacity Assessment	2.5 5.1	<p>Using the collected traffic counts, complete Austroads equation 23 for the relevant roads</p> <ul style="list-style-type: none"> ▪ Holbrook Road between Lloyd Road and Urana Street. ▪ Bourke Street Between Holbrook Road and Urana Street. ▪ Plumpton Road between Lloyd Road and Urana Street. ▪ Koorringal Road between Plumpton Road and Fay Avenue. 	End of May 2022
Detailed trip distribution	4.4	Develop a figure which provides detailed trip distribution away from the site as far north as Urana Street for traffic exiting the site from Holbrook and Plumpton Roads.	End of May 2022
SIDRA INTERSECTION staging assessment.	5.2	<p>Any assessment that may arise to consider part of the development being completed without an east-west connection, The following scenarios will be developed during each stage of completion without the east-west connection running through to Plumpton Road</p> <ul style="list-style-type: none"> ▪ Development stage completion year AM / PM peak, weekday/weekend. 	End of May 2022
Mitigation measures	6	Using the results from any SIDRA INTERSECTION modelling and lane capacity assessment, recommend any mitigation measures to manage the impact of any traffic generated by the development on the surrounding road network.	End of May 2022

EXISTING CONDITIONS

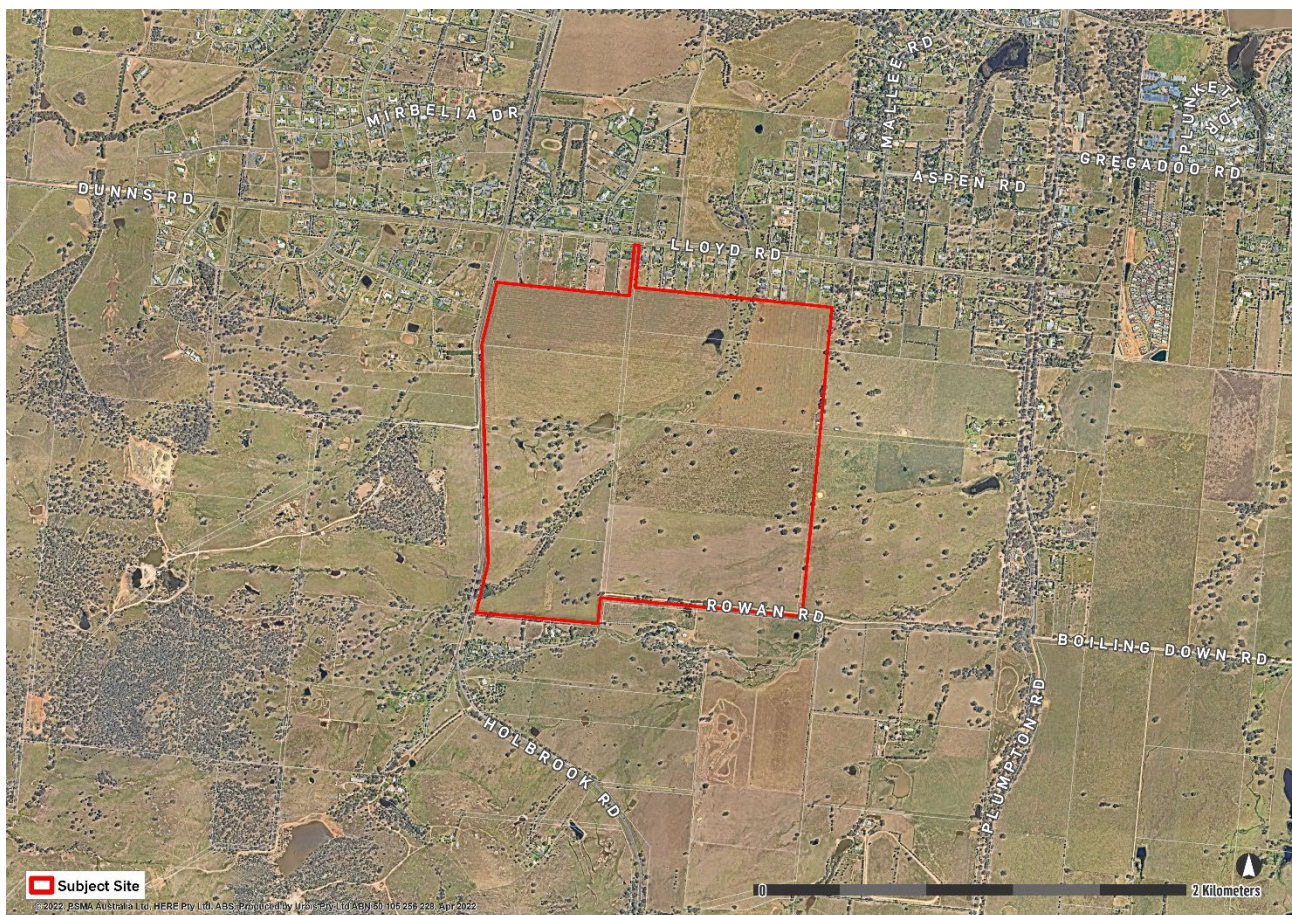
2.1. THE SITE

The site is located approximately a nine-kilometre drive south of the Wagga Wagga CBD and backs onto the fringes of the surrounding suburb of Springvale. The site is surrounded by four roads, these are Plumpton Road, Rowan Road, Lloyd Road and Holbrook Road. The site measures approximately 225.02 ha in size.

The site is currently being used as farmland and is reasonably flat.

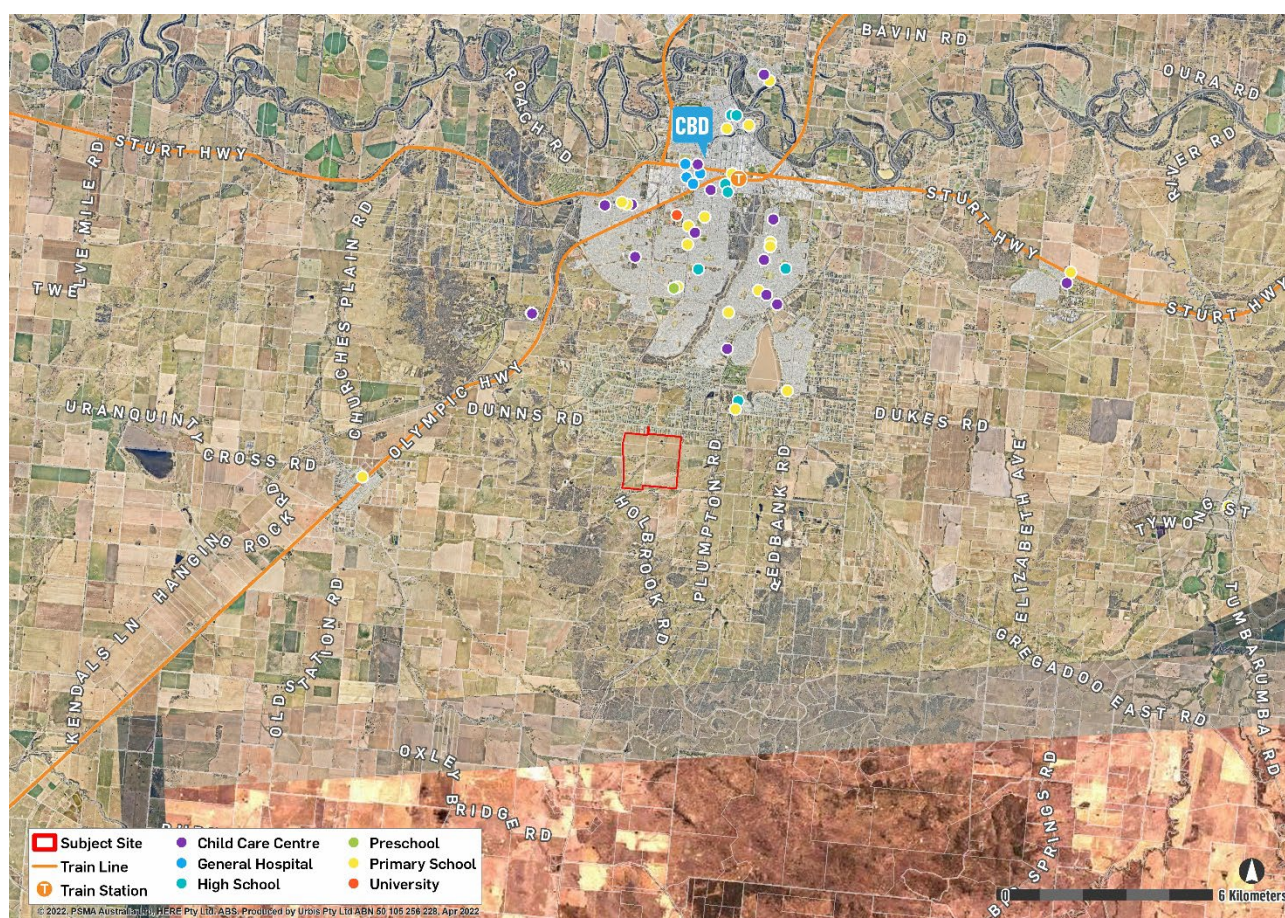
Vehicular access to the site for all vehicles is currently from Rowan Road and Holbrook Road via existing entry and exit driveways. The site is dotted with small farming-related buildings. **Figure 1** details the subject site.

Figure 1 Subject site



Source: Urbis

Figure 2 Site Context



Source: Urbis

2.2. LAND USE PATTERNS

The site is located on the urban fringes of Wagga Wagga and is currently zoned RU1 Primary Production, reflecting the agricultural nature of the site. The site surrounds more RU1 land to the east, west and south of the site, reflective of the surrounding farmland. The land to the north is zoned R5 Large Lot Residential and is part of the outer Wagga suburb of Springvale. The adjacent site to the east of the subject site is proposed to be rezoned for predominantly residential and commercial uses associated with a town centre.

The closest regional centre to the site is Wagga Wagga CBD which is approximately a 9 km drive from the site. Wagga Wagga town centre contains a train station, hospital, retail shopping and various amenities such as doctors and schools.

2.3. EXISTING TRANSPORT NETWORK

2.3.1. Road Hierarchy

Roads within NSW are categorised in the following two ways

- By Classification (ownership).
- By the function that they perform.

Road Classification

Roads are classified (as defined by the Roads Act 1993) based on their importance to the movement of people and goods within NSW (as a primary means of communication).

The classification of a road allows Transport for NSW (TfNSW) to exercise authority on all or part of the road. Classified roads include Main Roads, State Highways, Tourist Roads, Secondary Roads, Tollways, Freeways and Transitways.

For management purposes, TfNSW has three administrative classes of roads. These are

- **State Roads** – Major arterial links through NSW and within major urban areas. They are the principal traffic-carrying roads and are fully controlled by TfNSW with maintenance fully funded by TfNSW. State Roads include all Tollways, Freeways and Transitways; and all or part of a Main Road, Tourist Road or State Highway.
- **Regional Roads** – Roads of secondary importance between State Roads and Local Roads which, with State Roads provide the main connections to and between smaller towns and perform a sub arterial function in major urban areas. Regional roads are the responsibility of councils for maintenance funding, though TfNSW funds some maintenance based on traffic and infrastructure. Traffic management on Regional Roads is controlled under the delegations to local government from TfNSW. Regional Roads may be all or part of a Main Road, Secondary Road, Tourist Road or State Highway; or other roads as determined by TfNSW.
- **Local Roads** – The remainder of the council-controlled roads. Local Roads are the responsibility of councils for maintenance funding. TfNSW may fund some maintenance and improvements based on specific programs (e.g. urban bus routes and road safety programs). Traffic management on Local Roads is controlled under the delegations to local government from TfNSW.

Functional Hierarchy

Functional road classification involves the relative balance of mobility and access functions. TfNSW defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility to high accessibility and low mobility. These road classes are

- **Arterial Roads** – generally controlled by TfNSW, typically no flow limit and are designed to carry vehicles long distances between regional centres.
- **Sub-Arterial Roads** – can be managed by either TfNSW or the local council. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day. The aim is to carry through traffic between specific areas in a sub-region or provide connectivity from arterial road routes (regional links).
- **Collector Roads** – provide connectivity between local roads and the arterial road network and typically carry between 2,000 and 10,000 vehicles per day.
- **Local Roads** – provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

2.3.2. Surrounding Roads

The characteristics of the surrounding road network are detailed in **Table 2**. The surrounding road network is shown in **Figure 3**.

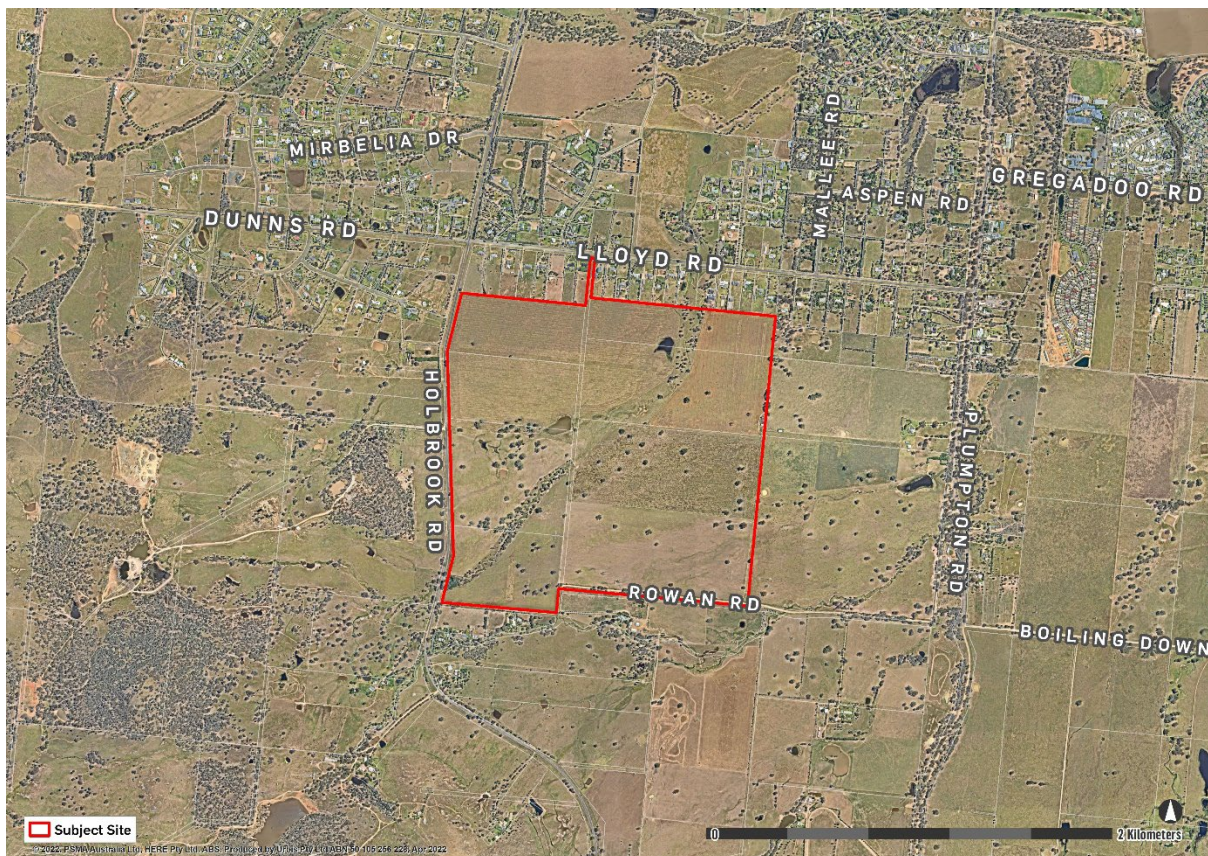
Table 2 Characteristics of surrounding roads

Road	Holbrook Road	Rowan Road	Plumpton Road	Lloyd Road
Classification	Regional	Local	Local	Local
Functional hierarchy	Sub – Arterial	Local	Collector	Local

Road	Holbrook Road	Rowan Road	Plumpton Road	Lloyd Road
Sealed (yes / no)	Yes	No	Yes	Yes
Movement lanes	One lane in each direction.	One lane in each direction.	One lane in each direction.	One lane in each direction.
Parking lanes	No	No	No	No
Carriageway width (approx.)	7.5 m	7.5 m	13 m	7 m
Signposted speed	80	Not posted	80	80
Line marking / divided lanes	Yes	No	No	No
Pedestrian pathways	No	No	No	No
Bus stops	No	No	No	No
Other features	N/A	N/A.	N/A	N/A

Source: Urbis

Figure 3 Surrounding Road Network



Source: Urbis

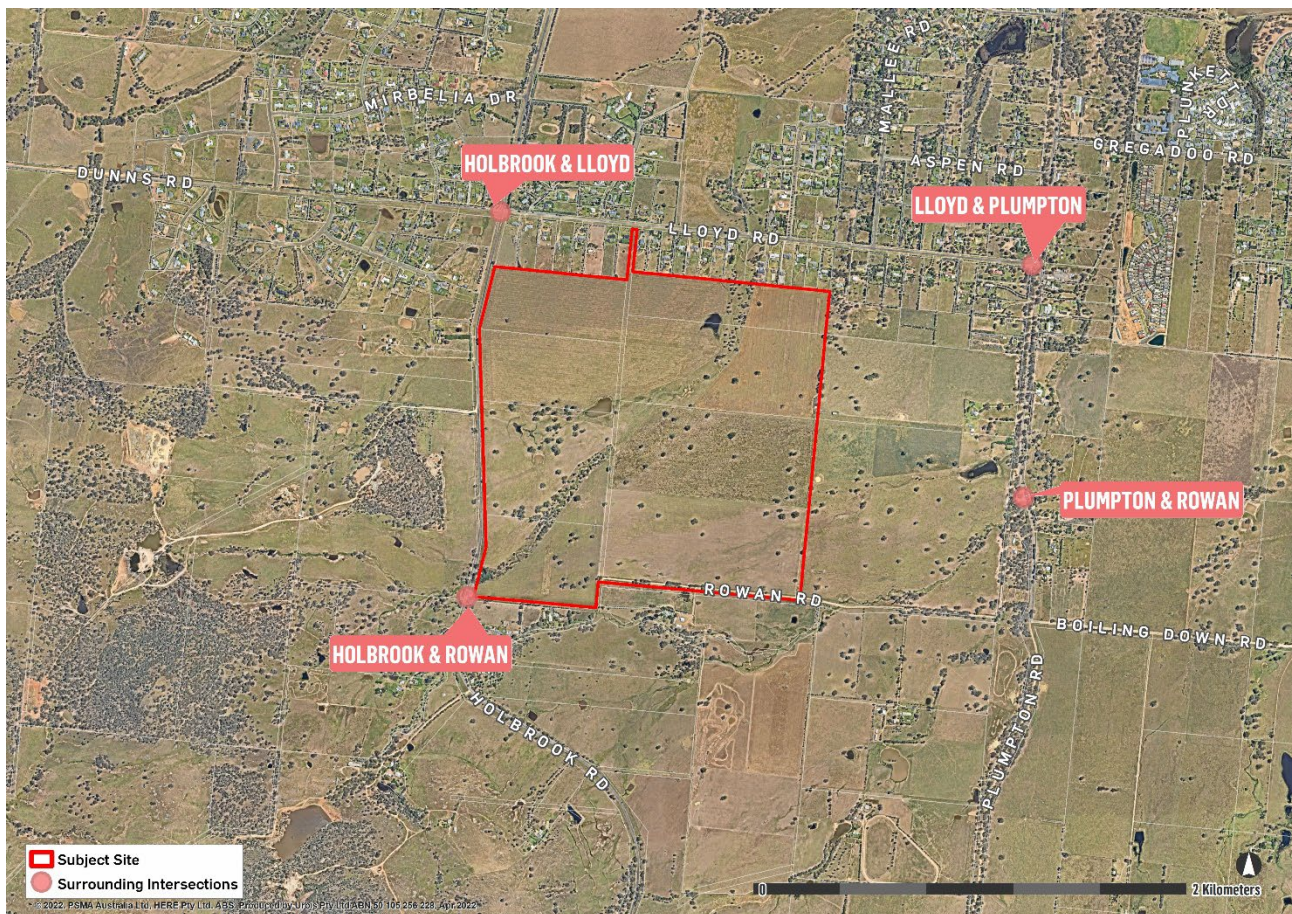
2.3.3. Surrounding Intersections

The intersections controlling access in the vicinity of the site include

- Holbrook Road and Rowan Road (priority controlled).
 - Southwest corner of the site.
- Plumpton Road and Rowan Road (priority controlled).
 - Southeast corner of the site.
- Holbrook Road and Lloyd / Dunns Road (priority controlled).
 - Northwest corner of the site.
- Plumpton Road and Lloyd Road (priority controlled).
 - Northeast corner of the site.

These intersections are shown in **Figure 4**.

Figure 4 Surrounding intersections

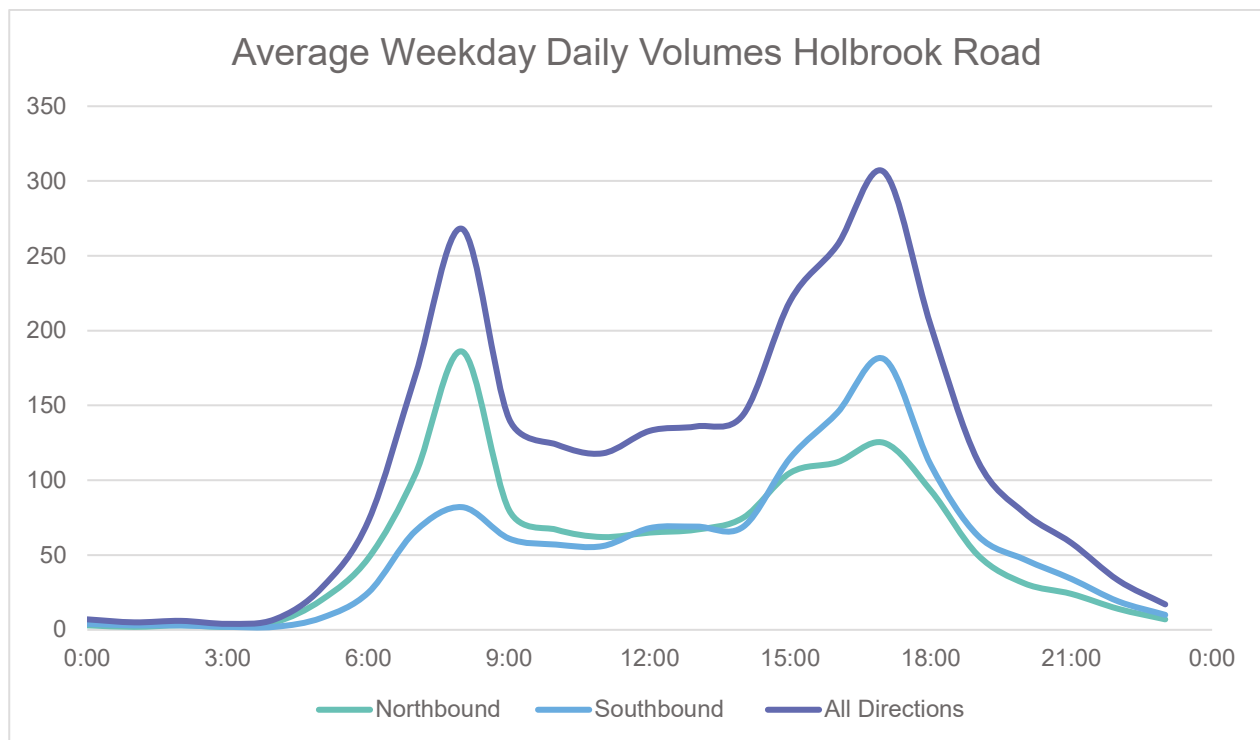


Source: Urbis

2.3.4. Traffic Volume

Traffic Volumes for Holbrook Road were identified from the TfNSW Traffic Volume Viewer and were collected in 2010. These volumes were collected 350 m north of Rowan Road. **Figure 5** demonstrates the traffic volumes in each direction for Holbrook Road in 2010

Figure 5 Holbrook Road Traffic Volumes



Source: TfNSW Traffic Volume Viewer

The peak periods are identified below

- AM Peak Period: 08:00 – 09:00.
- PM Peak Period: 17:00 – 18:00.

Average daily traffic volumes were provided by Council along segments of Lloyd, Plumpton and Holbrook Road for 2018, 2019 and 2021. The volumes provided by Council are displayed in **Table 3**. Note that these volumes are not split by direction.

Table 3 Plumpton Road Traffic Volumes

Location	Average Daily Weekday Traffic	Collection Period	Heavy Vehicle Percentage
Lloyd Road between Holbrook Road & Iron Bark Place	1,730	12/12/2018 – 20/12/2018	21.8%
Holbrook Road Between Lloyd Road & Merbelia Drive	2,520	27/11/2019 – 9/12/2019	16.7%
Plumpton Road Between Lloyd Road and Gregadoo Road	2,098	18/11/2021 – 22/12/2021	22.6%

Source: Wagga City Council

More detailed traffic counts are to be collected at a later date. A description of the locations where intersection counts are to be collected from is shown in **Table 1**.

2.3.5. Midblock Capacity Assessment

Table 7.4 of *Austroads Guide to Traffic Management Part 3 Transport Study and Analysis Methods* outlines the lane capacity limits for different environmental classes and lane types. The definitions of these environmental classes and lane types, defined by Austroads, are shown below.

- *“Class A – ideal or nearly ideal conditions for the free movement of vehicles on both approach and exit sides, including good visibility, very few pedestrians and almost no interference due to loading and unloading of goods vehicles or parking turnover (typically, but not necessarily, on a suburban residential or parkland area).*
- *Class B – average conditions, including adequate intersection geometry, small to moderate numbers of pedestrians, some interference by loading and unloading of goods vehicles or parking turnover and vehicles entering and leaving premises (typically, but not necessarily, in an industrial or shopping area).*
- *Class C – poor conditions, including large numbers of pedestrians, poor visibility, interference from standing vehicles, loading and unloading of goods vehicles, taxis and buses and high parking turnover (typically, but not necessarily, in a central city area).*
- *Type 1 – through lane – a lane containing through vehicles only.*
- *Type 2 – turning lane – a lane that contains any type of turning traffic, such as an exclusive left-turn lane, an exclusive right-turn lane, or a shared lane from which vehicles may turn left or right or continue straight through. There should be an adequate turning radius and negligible pedestrian interference to turning vehicles.*
- *Type 3 – restricted turning lane – a lane similar to a type 2 lane, but with turning vehicles subject to a small turning radius and some pedestrian interference.”*

Currently, Holbrook Road near the site can be classed as Class A Type 1. Table 7.4 from Austroads, detailing the lane capacity limits is shown in **Table 4**.

Table 4 Midblock capacity limits

Environmental Class	Lane Type 1	Lane Type 2	Lane Type 3
Class A	1,850	1,810	1,700
Class B	1,700	1,670	1,570
Class C	1,580	1,550	1,270

Source: *Austroads Guide to Traffic Management Part 3 Transport Study and Analysis Methods*

The base saturation (lane capacity limits) must be adjusted to certain environmental conditions. Equation 23 from Austroads achieves this. Equation 23 is outlined below.

Equation 23
$$S = f_w f_g S_b / f_c$$

Where

S = the estimated saturation flow in vehicles per hour.

S_b = the relevant base saturation flow in through-car units per lane, from Table 7.4.

f_w = lane width factor.

f_c = traffic composition factor.

The lane width factor, w, is as follows

- 0.55 + 0.14w for lane widths between 2.4 and 3.0 m

1.00 for lane f_g = gradient factor.

- widths between 3.0 and 3.7 m
- $0.83 + 0.05w$ for lane widths between 3.7 and 4.6 m.

For a varying lane width, use the width at the narrowest point within 30 m of the stop line. The exit lane must be at least as wide as the approach lane – if it is narrower use its width.

The gradient factor is given by Austroads Equation 24.

Equation 24
$$f_g = 1 \pm 0.5 (\text{per cent gradient}) / 100.$$

The traffic composition factor is given by Austroads Equation 25.

Equation 24
$$f_c = \sum e_i Q_i / Q$$

Where

Q_i = flow in vehicles per hour per vehicle type and movement i .

Q = total movement flow in vehicles per hour.

E_i through-car equivalent of vehicle traffic and movement, from Austroads Table 7.5

Table 7.5 is shown in **Table 5**.

Table 5 Austroads table 7.5 through car equivalents (through-car units per vehicle) for different types of vehicle movements

Vehicle	Through	Unopposed turn		Opposed turn
		Normal	Restricted	
Car	1	1	1.25	e_o
Heavy Vehicles	2	2	2.5	$e_o + 1$

Source: Austroads Guide to Traffic Management Part 3 Transport Study and Analysis Methods.

Equation 23 will be applied to Holbrook Road, Plumpton Road, Lloyd Road, Bourke Street and Koorlingal Road upon the receipt of traffic counts. The results from Equation 23 will determine the existing lane capacities. The key activities and timing of this are outlined in **Table 1**.

2.3.6. Intersection Operation

The operation of the key intersections surrounding the site has been assessed using SIDRA INTERSECTION. The commonly used measure of intersection performance, as defined by Transport for New South Wales (TfNSW) is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service (LOS).

Table 6 shows the criteria derived from the *TfNSW Guide to Traffic Generating Developments* from which level of service is derived.

Table 6 Intersection Level of Service Criteria

Level of Service	Average Delay (sec/vehicle)	Signals or Roundabout	Give Way or Stop Sign
A	<14	Good operation	Good operation
B	15-28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29-42	Satisfactory	Satisfactory
D	43-56	Operating near capacity	Near capacity and accident study required
E	57-70	At capacity at signals, incidents will cause excessive delays. Roundabouts require another control model	At capacity, requires another control mode
F	>70	Overcapacity	Overcapacity

Source: TfNSW Guide to Traffic Generating Developments 2002 and Technical Direction TDT 2013/ 04 Guide to Traffic Generating Developments Updated traffic surveys (TDT 2013/ 04).

SIDRA INTERSECTION results for key intersections surrounding the site will be completed at a later date with a description of tasks to be undertaken and approximate timing shown in **Table 1**. **Table 7** will show a summary of the operation of the surveyed intersections, with full results to be presented in **Appendix A** of this report.

Table 7 Existing intersection operation (subject to site confirmation)

A table will be inserted at this point showing the results from the SIDRA modelling for the existing situation when the results of the modelling are available.

Source: SIDRA INTERSECTION

2.3.7. Midblock Capacity Assessment

Midblock capacity assessment was completed for Holbrook Road, Plumpton Road, Lloyd Road, Bourke Street and Koorngal Road. **Table 8** will show the midblock volumes and capacity for these roads under the existing conditions.

Table 8 Midblock capacity assessment.

A table will be inserted at this point showing the results from the analysis of lane capacity for the existing situation when the results of the modelling are available.

Source: Urbis

2.3.8. Crash History

Crash and casualty statistics from TfNSW's Centre for Road Safety were analysed in the area immediately surrounding the site for the five years between 2016 and 2020. There were seven crashes recorded in the five years. The detail of these crashes is outlined in **Table 9**.

Table 9 Crashes in the vicinity of the site between 2016 and 2020

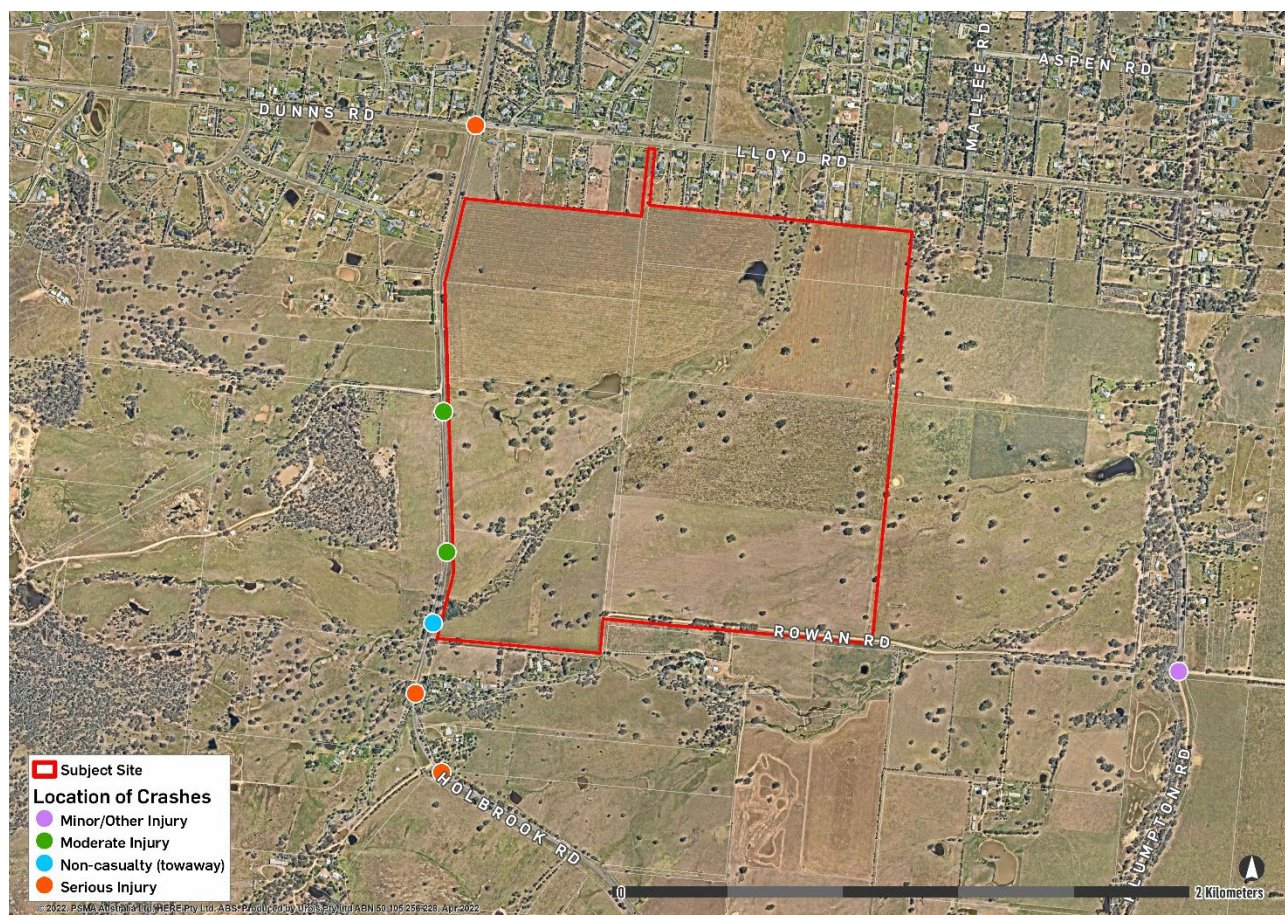
Year	Degree of crash	RUM description	Natural lighting
2017	Serious injury	Right off-road on the left bend into Parked Vehicle	Darkness
	Serious Injury	Right off-road on the right bend into Parked Vehicle	Daylight
	Non-casualty	Left off-the road into an object	Darkness
	Moderate injury	Left off-road	Daylight
2018	Serious Injury	Cross-traffic	Daylight
	Moderate injury	Left off-road	Darkness
	Moderate injury	Cross-traffic	Daylight
2019	Minor / other injury	Out of control on a bend	Daylight

Source: TfNSW Centre for Road Safety Website -

https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/lga_stats.html?r=eyJrIjojMDA3OGRhN2UtZjRkNy00N2JmLWE0MjMtZmlyNzFiOTdmMjI3IiwidCI6ImNiMzU2NzgyLWFKOWEtNDdmYi04NzhiLTdlYmNIYig1Yig2YyJ9&pageName=ReportSectiona5a83b637554074c1384

Six of the seven crashes occurred on Holbrook Road, two of these crashes occurred at a bend in the road approaching the Rowan Road intersection. The nature of these crashes could indicate site / perception issues for the driver as vehicles may underestimate the level of the curve in the road. Two crashes occurred at intersections, however, the nature of these crashes indicates driver error and is not indicative of any underlying road safety issues. The remaining three crashes occurred on a relatively straight road away from intersections. The nature of these crashes indicates driver error and is not indicative of any underlying Road safety issues. **Figure 6** highlights the location of these crashes.

Figure 6 Location of crashes



Source: TfNSW Centre for Road Safety Website -

https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/lga_stats.html?r=eyJrJoiMDA3OGRhN2UtZjRkNy00N2JmLWE0MjMtZmlyNzFiOTdmMjI3liwidCI6ImNiMzU2NzgyLWFkOWEtNDdmYi04NzhiLTdlYmNIYig1Yig2YyJ9&pageName=ReportSectiona5a83b637554074c1384

2.3.9. Walking and Cycling Network

There are currently no footpaths surrounding the site. There are also no cycling routes within the vicinity of the site. The closest walking route is a dirt path located at the northern end of Ironbark Place connecting to the northern edge of Springvale.

The limited active transport infrastructure is reflective of the rural nature surrounding the site.

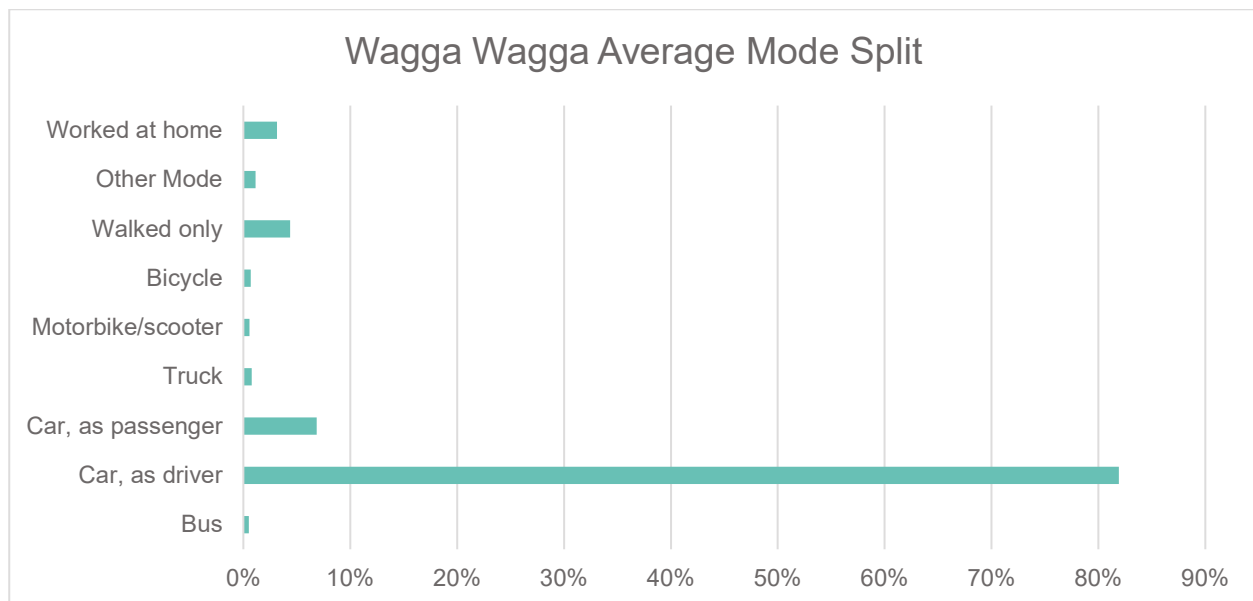
2.3.10. Public transport network

There are no bus stops within the direct vicinity of the site reflective of the rural nature of the site. The closest bus stop is located at the intersection of Grenadoo Road and Angela Road, approximately two kilometres from the northeast corner of the site. This stop is serviced by the 969 which only services that stop 5 times a week in each direction in the before and after school period.

2.3.11. Mode Splits

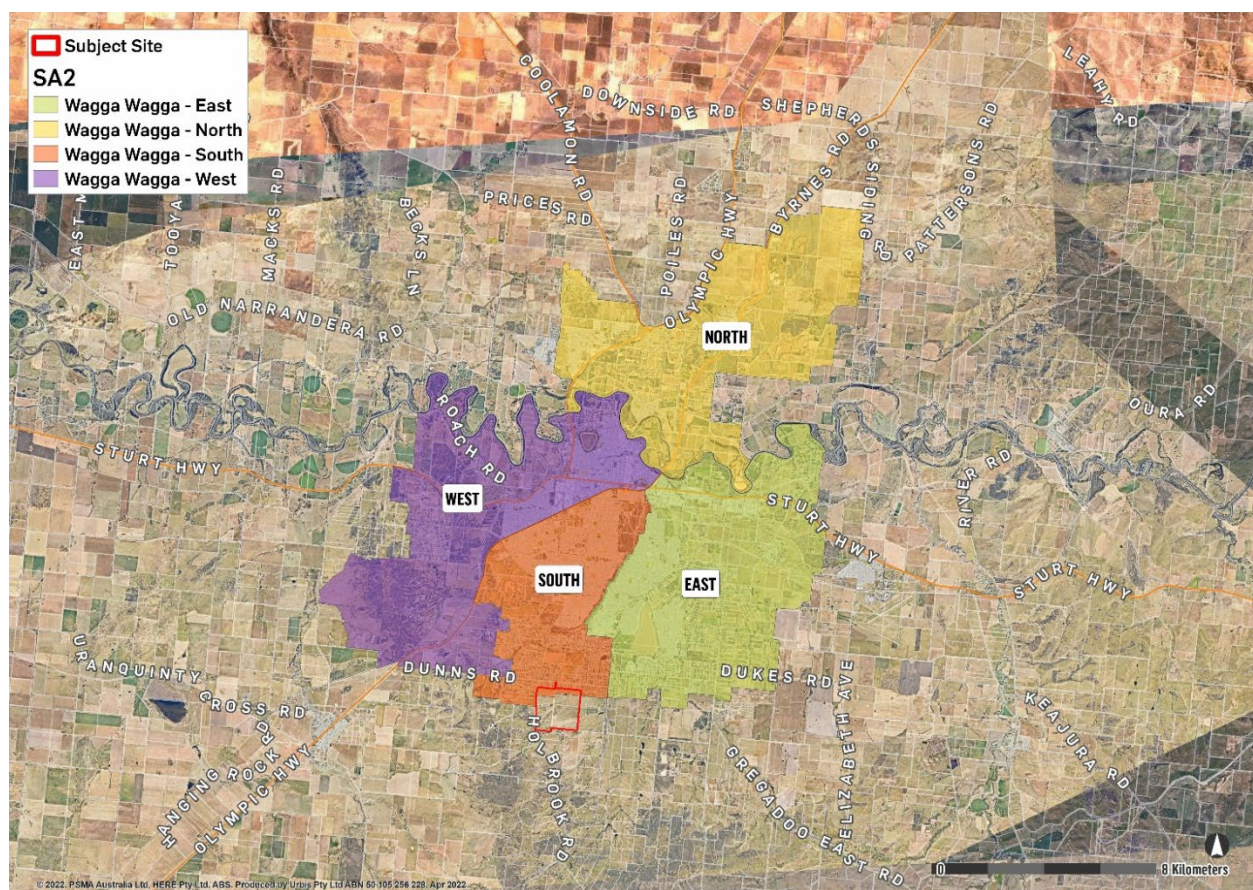
Mode splits from North Wagga Wagga, South Wagga Wagga, East Wagga Wagga and West Wagga Wagga Australian Bureau of Statistics (ABS) Statistical Area Level 2 (SA2) Journey to Work (JTW) dataset were averaged to determine mode splits to work in Wagga Wagga. **Figure 7** highlights the average mode splits for Wagga Wagga. **Figure 8** highlights SA2 Locations used for this assessment.

Figure 7 Mode Splits



Source: ABS Tablebuilder

Figure 8 SA2 locations used to determine mode splits



Source: Urbis

Most people living in Wagga Wagga use a car to access work, accounting for nearly 81 per cent of all trips to work. This is unsurprising given the limited public transport network in Wagga Wagga. Walking is the second most popular choice accounting for four per cent of the mode split. Given the limited active transport network in Wagga Wagga, this could present an opportunity to increase this mode with investment in active transport infrastructure.

DEVELOPMENT PROPOSAL

3.1. OVERVIEW

The subject site is located along Holbrook Road, south of the existing Wagga Wagga urban area.

The Planning Proposal seeks to rezone the site from RU1 Primary Production and R5 Large Lot Residential to the following mix of land use zones

- R1 General Residential.
- R5 Large Lot Residential.
- B2 Local Centre.
- RE1 Public Recreation.

Based on a dwelling yield of 10 dwellings per hectare, the Planning Proposal master plan will enable the delivery of circa 2,100 dwellings across a 225-hectare site area, which importantly will encompass the delivery of a diverse mix of low-density residential housing typologies described as follows:

- **Rural transition residential lots** – These residential lots will be located along the southern boundary of the site and will be the largest residential lot typology. This lot typology will importantly provide an appropriate transition between the site and the adjacent rural context to the south of Rowan Road.
- **Neighbourhood residential lots** – A range of suitable low-density residential lots will be accommodated within proximity to open space provision and the riparian corridor network. This lot typology will provide the appropriate transition between the village residential lots and the rural transition lots. A diversity of lot sizes will be delivered through the neighbourhood residential lot typology.
- **Village residential lots** – These residential lots will leverage the proximity to the local centre and its associated amenities and offerings. Fundamentally, these residential lots will still uphold the low-density residential housing charter that the site will deliver, whilst ensuring that an appropriate diversity of housing choices are delivered.

The Planning Proposal will enable the creation of a new amenity-led neighbourhood providing an opportunity for a variety of housing options through a range of residential lot sizes, supported by the timely delivery of resilient utilities and infrastructure that supports and promotes the future growth of Wagga Wagga in an orderly and sustainable way. The delivery of a mix of low-density housing choices will be crucial to attracting a wide range of demographics to the area.

As presented in the Urban Design Study that supports the Planning Proposal, a dense, active and vibrant local village centre will be located at the heart of the neighbourhood, with a mix of land uses and services for convenience. The local centre will create a focal point for the community and encourages social gathering and interaction.

Future development on the site would be facilitated by a highly connected and permeable network with convenient access to public transport, public spaces, facilities and amenities. Cycleways and footpaths will connect across the site to promote a walkable community.

The Planning Proposal will also ensure that the environmental values of the site are preserved through the dedicated retention and where required rehabilitation, of significant trees and riparian corridors.

Figure 9 highlights the indicative structure plan of Rowan village.

There is a similar proposal for a site adjacent to the subject site. This site, located to the east is included in the structure plan as the road network between the two sites will be integrated.

Figure 9 Indicative structure plan of the site



Source: Urbis

3.2. LAND USES

The proposal seeks to deliver a greenfield development incorporating a range of land uses that will cater to the various needs of future residents and the local community. As this TIA relates to a Planning Proposal, an indicative mix and scale of land use have been adopted for this assessment as summarised in **Table 10**.

Table 10 Indicative land use breakdown

Use	Volume / Detail (m ²)
Residential / accommodation uses	
Lots	Circa 2100 inclusive of which Circa 90 are seniors living.
Village Centre	
Supermarket	1,040 m ² floorspace
Liquor	190 m ² floorspace
Food (café)	220 m ² floorspace
Household goods (such as a Telstra store)	130 m ² floorspace
Retail services (Hairdressers)	140 m ²
Childcare Centre	90 children

Use	Volume / Detail (m ²)
Medical Centre	5 Doctors

Source: Urbis

3.3. VEHICLE ACCESS

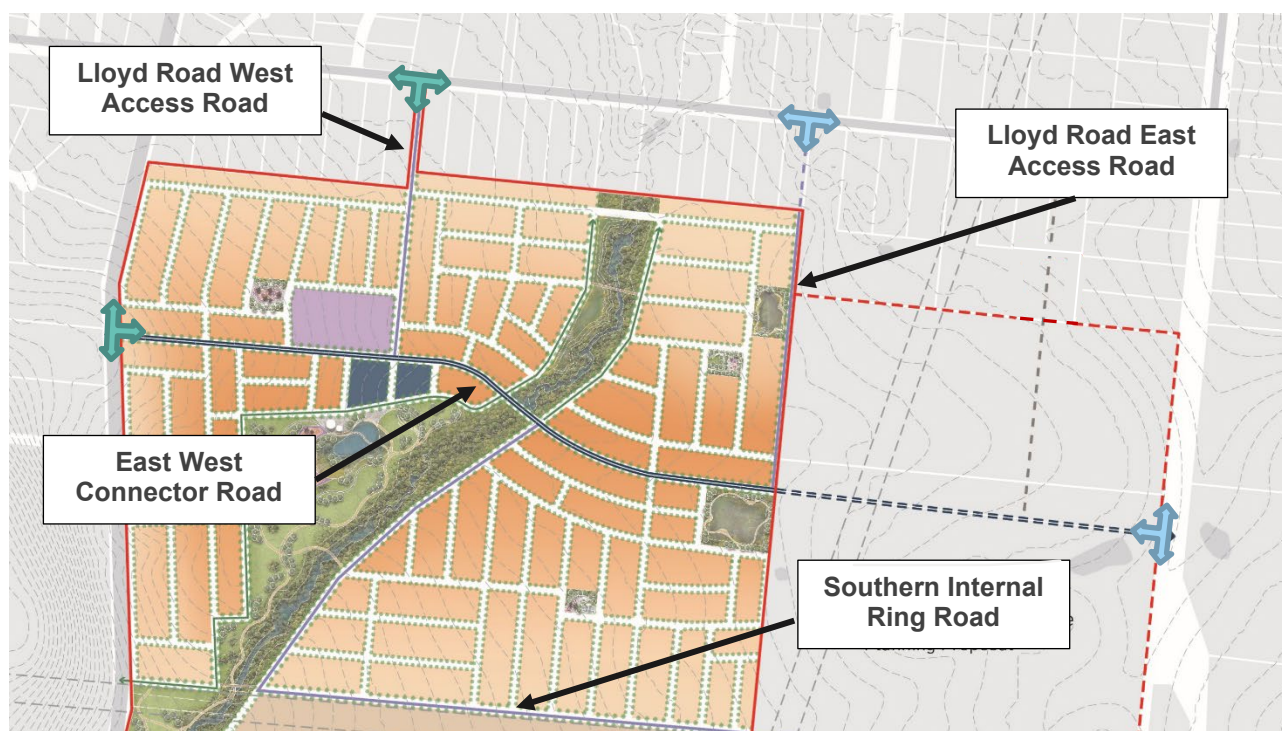
The planning proposal indicates four indicative access points from the site to the wider road network. All of these access points will be from new access points that are proposed to the wider road network. There will be two access points to Lloyd Road, one access point to Plumpton Road and one access point to Holbrook Road. There will be no access from existing site crossover points. Of the four access points, two are within the control of the site being Lloyd Road West and Holbrook Road. Further investigations and consultation are continuing regarding access options for the Lloyd Road East Access Road with any changes to be noted in the final report. The final access point is to Plumpton Road through the proposed East West Collector connecting to the adjacent Sunnyside development. This connection is to be collaboratively developed in conjunction with Council and controlled through the DCP

There will be a collector road running through the site which will act as the primary east-west connector road for the site. This road also provides a connection between Plumpton Road and Holbrook Road. This road will connect through an adjacent site to access Holbrook Road.

These access points will provide a connection between the site and the Wagga Wagga CBD in the first instance, with future access points to the north and east subject to other development sites

Access points for the site are shown as crosses in **Figure 10**. Access points that require further consultation and acquisition are shown in blue.

Figure 10 Vehicle access points



Source: Urbis

3.4. INTERNAL ROAD NETWORK

The internal road network of the planning proposal is shown in **Figure 10**. The major roads within the site are indicatively named below

- East-West Connector Road.
 - Provides connection between the east and west of the site and connects all areas of the site to the town centre. Connection through to Plumpton Road requires further consultation with the owners of the adjacent site.
- Lloyd Road West Access Road.
 - Provides access between the town centre and the western portion of the site to Lloyd Road.
- Lloyd Road East Access Road.
 - Provides access from the eastern portion of the site to Lloyd Road. Connection through to Lloyd Road requires further land acquisition.
- Southern Internal Ring Road.
 - Provides access from the southern residential area of the site to the East-West Connector Road via the Sunnyside development. Further consultation with the landowners of the adjacent site is required.

In addition to these major roads, there will also be a network of local roads providing access between residential dwellings and the major roads within the site. All roads will be designed in accordance with Council, TfNSW and Austroads guidelines.

Table 11 highlights the characteristics of the internal road network.

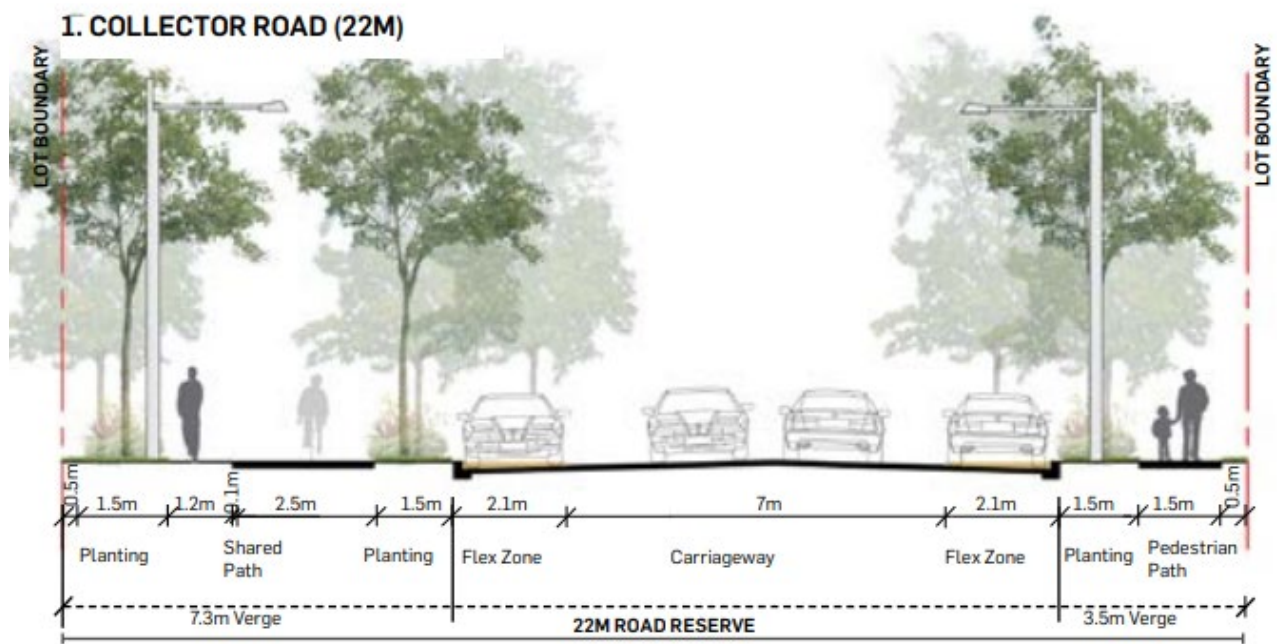
Table 11 Road typologies

Road Type	Road widths	Number of lanes	Bicycle facility	Other features
Collector Road	11.2 m	Two (one lane in each direction)	Separated path	1.5 m separation between kerb and shared path. 2.1 m 'flex zone' on either side of the roadway.
Primary Local Road	10 m	Two (one lane in each direction)	Shared path	1.5 m separation between kerb and shared path. 2.1 m 'flex zone' on either side of the roadway.
Local Road	9.7 m	Two (one lane in each direction)	no	1.5 m separation between kerb and footpath. 2.1 m 'flex zone' on either side of the roadway.
Park Street	7.6 m	Two (one lane in each direction)	Shared path	1.5 m separation between kerb and shared path. 2.1-metre 'flex zone' on the footpath side of the roadway.
Emergency Road	6 m	Two	No	N/A

Source: Urbis

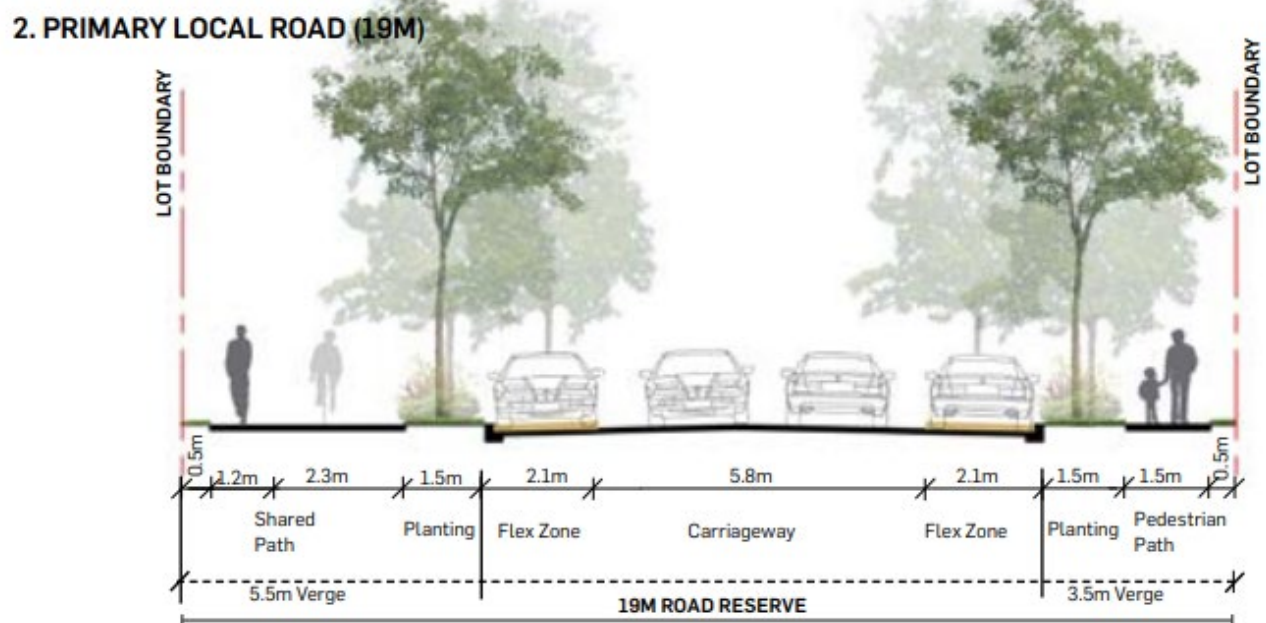
Street cross sections for the road typologies indicated in **Table 11** are shown in **Figure 11** to **Figure 15**.

Figure 11 Collector Road



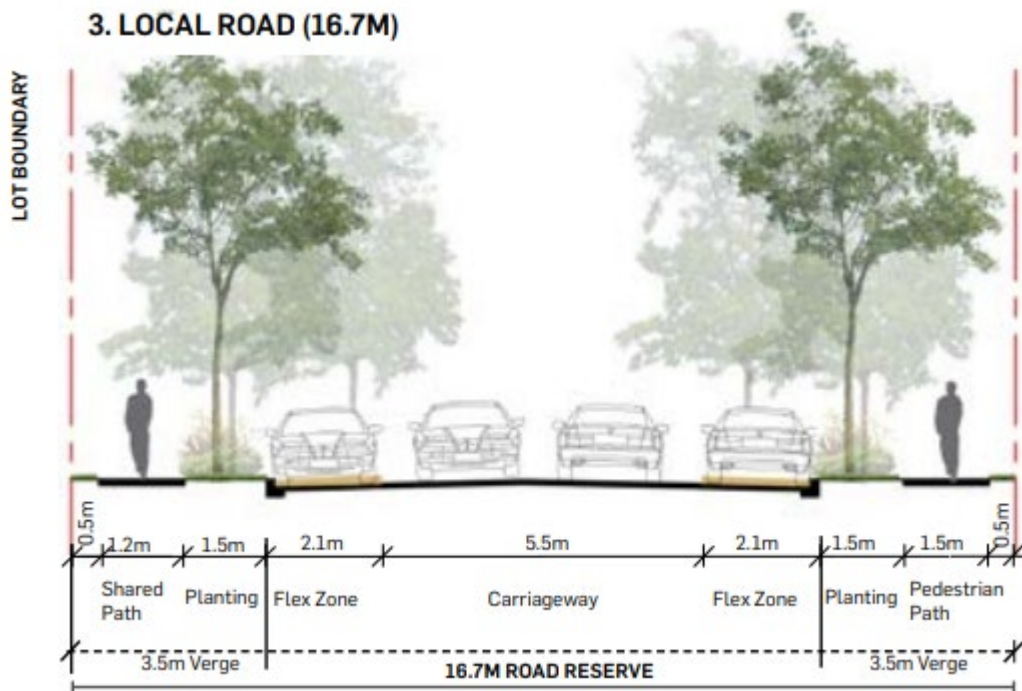
Source: Urbis

Figure 12 Primary Local Road



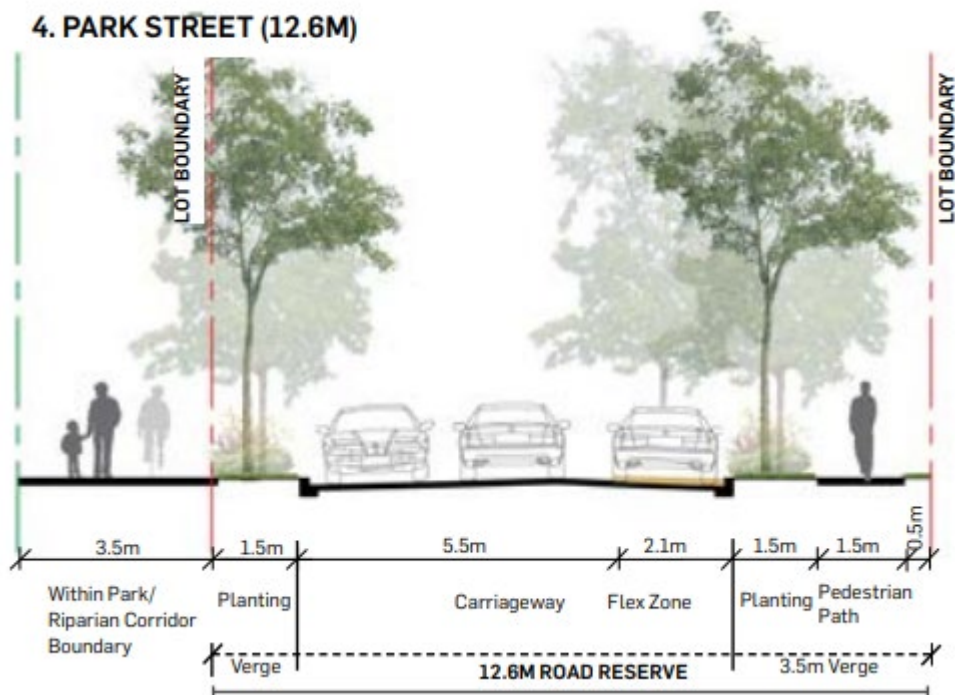
Source: Urbis

Figure 13 Local Road



Source: Urbis

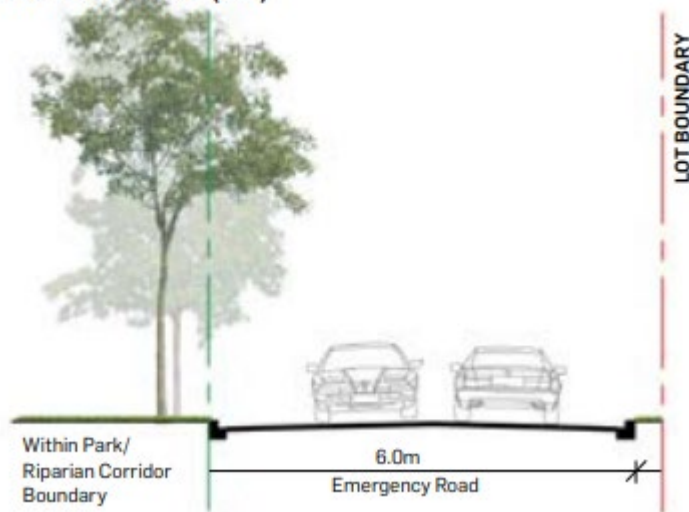
Figure 14 Park Street



Source: Urbis

Figure 15 Emergency Road

5. EMERGENCY ROAD (6M)



Source: Urbis

3.5. ACTIVE TRANSPORT NETWORK

There is an active transport network proposed within the site. The East-West Connector Road will act as an active spine for the site and will feature a shared path. This shared path will also connect Lloyd Road and the East-West Connector via the northern access roads to Lloyd Road. The shared path will also travel the length of the Southern Internal Ring Road and along the green spine.

Figure 16 details the active transport network. Active transport connections are shown in green.

Figure 16 Active Transport Network



Source: Urbis

3.6. PUBLIC TRANSPORT NETWORK

Given that there will be a significant increase in trips generated by the site. The proposed development will incorporate a bus service between the site and funded by the developer. This bus service will connect the site to Wagga Wagga CBD via Plumpton and Holbrook Roads. This service will serve the East-West Connector Roads in both directions. The frequency of services and location of stops is to be determined.

TRAFFIC GENERATION AND TRIP DISTRIBUTION

4.1. DEVELOPMENT SCENARIOS

There are two potential scenarios for vehicle access points to the site from the surrounding road network. These scenarios are

- Only roads which are within the control of the developer.
- All access points that may be completed.

The location of these access points is described in **Section 3.3** of this report.

As a result, some of the following sections have been completed twice to demonstrate both scenarios.

4.2. TRAFFIC GENERATION

Traffic generation estimates for the proposal have generally been calculated based on the TfNSW *Guide to Traffic Generating Developments 2002* and *Technical Direction TDT 2013/ 04 Guide to Traffic Generating Developments Updated traffic surveys* (TDT 2013/ 04).

It should be noted that due to the indicative nature of the structure plan, land uses were determined based on the GFA demand for key land uses within the village centre in 2030. These demands were derived from the report titled *Wagga Wagga South Demand Assessment*. These uses include

- Supermarket -1,040 m² of GFA.
- Liquor (non-drive-in) – 190 m² of GFA.
- Café – 220 m² of GFA.
- Specialty retail (e.g Telstra store) – 130 m² of GFA.
- Retail services (e,g Hairdresser) – 140 m² of GFA.

Given the nature of the village centre being the cluster for these activities, the supermarket, liquor, speciality retail and retail services will be considered as a shopping centre and the traffic generation rate for a regional shopping centre under 15,000 m² in size has been used to determine the traffic generation for these uses.

Estimates of weekday peak hour traffic volumes to and from the site resulting from the proposed development are set out in **Table 12**.

Table 12 Trip generation

Weekday				
Use	Quantum/Detail	Traffic Generation Rate	Peak Hour	Peak Hour Traffic Generation Estimate
Residential/Accommodation Uses				
Residential (all except seniors living)	Circa 2,000	0.85 per dwelling (AM) 0.87 per dwelling (PM)	17:15 – 18:15	1,768 trips
Seniors Living	Circa 100	0.89 per dwelling	09:00 – 19:00	89 trips
Total	Circa 2100 dwellings	–	–	1,765 trips
Retail				

Weekday				
Use	Quantum/Detail	Traffic Generation Rate	Peak Hour	Peak Hour Traffic Generation Estimate
Village Centre	1,550 m ²	12.5 per 100 m ²	16:30 – 17:30	194 trips
Cafe	220 m ²	5 per 100 m ²	Undetermined	3 trips
Total	1,720 m² GFA	–	–	197 trips
Services				
Childcare Centre	90 Children + 12 Staff ¹	-	08:00 – 09:00	90 Trips
Medical Centre	25 Appointments max in one hour ²	-	Undetermined	20 Trips
Total	-	-	-	111 Trips
Total peak hour generation (16:15 – 17:15)				1,768 trips

Source: Urbis

¹ Staffing for the childcare centre was determined using the Australian Children's Education & Care Quality Authority Educator to Child Ratio Calculator. The exact number of staff required is determined by the number of children and age. For this assessment 10 Children are under 24 months old, 10 children are between 24 and 36 months and 70 children are at preschool age. This volume requires 12 educators.

² It is anticipated that there would be a demand for 5 doctors within the medical centre, along with two supporting receptionists. It was assumed that each doctor could see a maximum of four patients in one hour.

4.3. BACKGROUND TRAFFIC GROWTH RATE

There was no background traffic growth rate available for Holbrook Road, Lloyd Road or Plumpton Road. Background traffic growth was derived from TfNSW traffic volume viewer data from a counter located on Holbrook Road 120 m north of Waverly Road Mangoplah. Daily weekday volumes between 2006 and 2011 were used to determine the background growth rate. The background growth rate is as follows

Northbound – 3.4 per cent.

Southbound – 3.6 per cent.

4.4. TRIP DISTRIBUTION

The directional distribution and assignment of the development traffic are based on a range of factors that differ for each land use activity. These include

- Configuration of the road network in the immediate vicinity of the site.
- Location of employment and other trip attractors.
- Configuration and location of access points.
- Analysis of TfNSW Travel Zone forecasts for 2041 to determine where residents of Rowan Village will access employment and which roads, they will use to access employment.
- Mode splits derived from ABS Journey to Work Data to determine the number of residents driving to work.

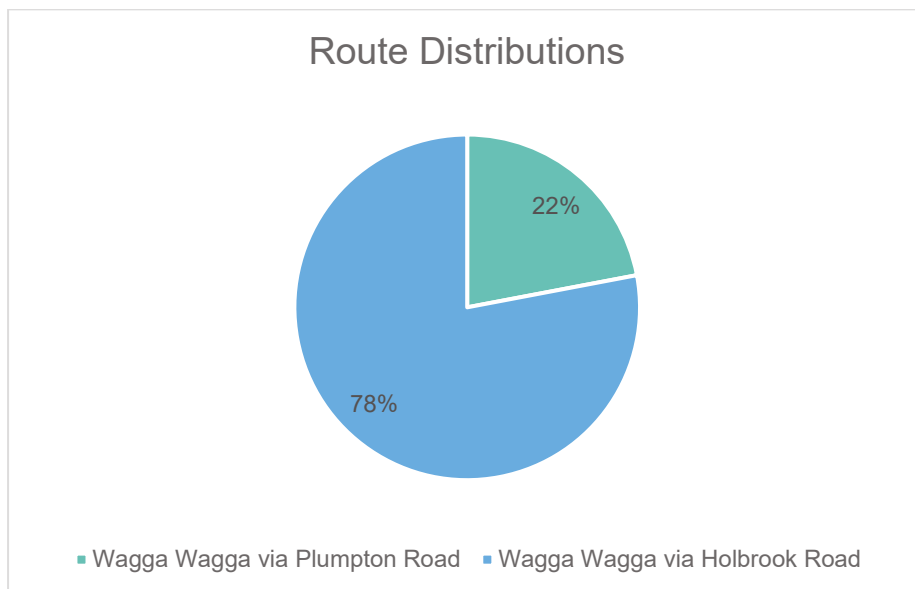
Trip distribution was determined using the trip generation rate from the number of residential dwellings (excluding seniors living). Trip distribution was applied during the AM and PM peaks. Employment distributions provide a gauge for other trips such as trips to school / other services. Given the high-level nature of the planning proposal, only trip distribution based on TfNSW Travel Zones was applied.

Based on where employment will be, route paths towards employment were determined to be along either Holbrook Road or Plumpton Road. **Figure 17** outlines the percentages of which these trips were distributed.

A further figure will be provided outlining the detailed distribution of trips from the site up to Urana Street. Timing of this is detailed in **Table 1**.

It should be noted that the trip generation estimate for the adjacent development to the east of the site has also been distributed. A total of 338 trips are generated by this site.

Figure 16 Route distributions



Source: Urbis

Trips generated by the site were distributed in accordance with the distributions found in the TfNSW *Trip Generation Surveys Low density residential dwelling houses analysis report* for Wagga Wagga. These distributions were

AM

- Inbound – 23 per cent.
- Outbound – 77 per cent.

PM

- Inbound – 67.5 per cent.
- Outbound – 32.5 per cent.

It was assumed that 69 jobs would be available within the village centre. It was assumed all of these jobs would be provided by future residents of Rowan Village. The breakdown of these jobs are as below

- Childcare – 12 staff.
- Medical Centre – 7 staff.
- Seniors Living – 20 staff.
- Café – 12 staff.
- Supermarket 12 staff.
- Salon – 6 staff.

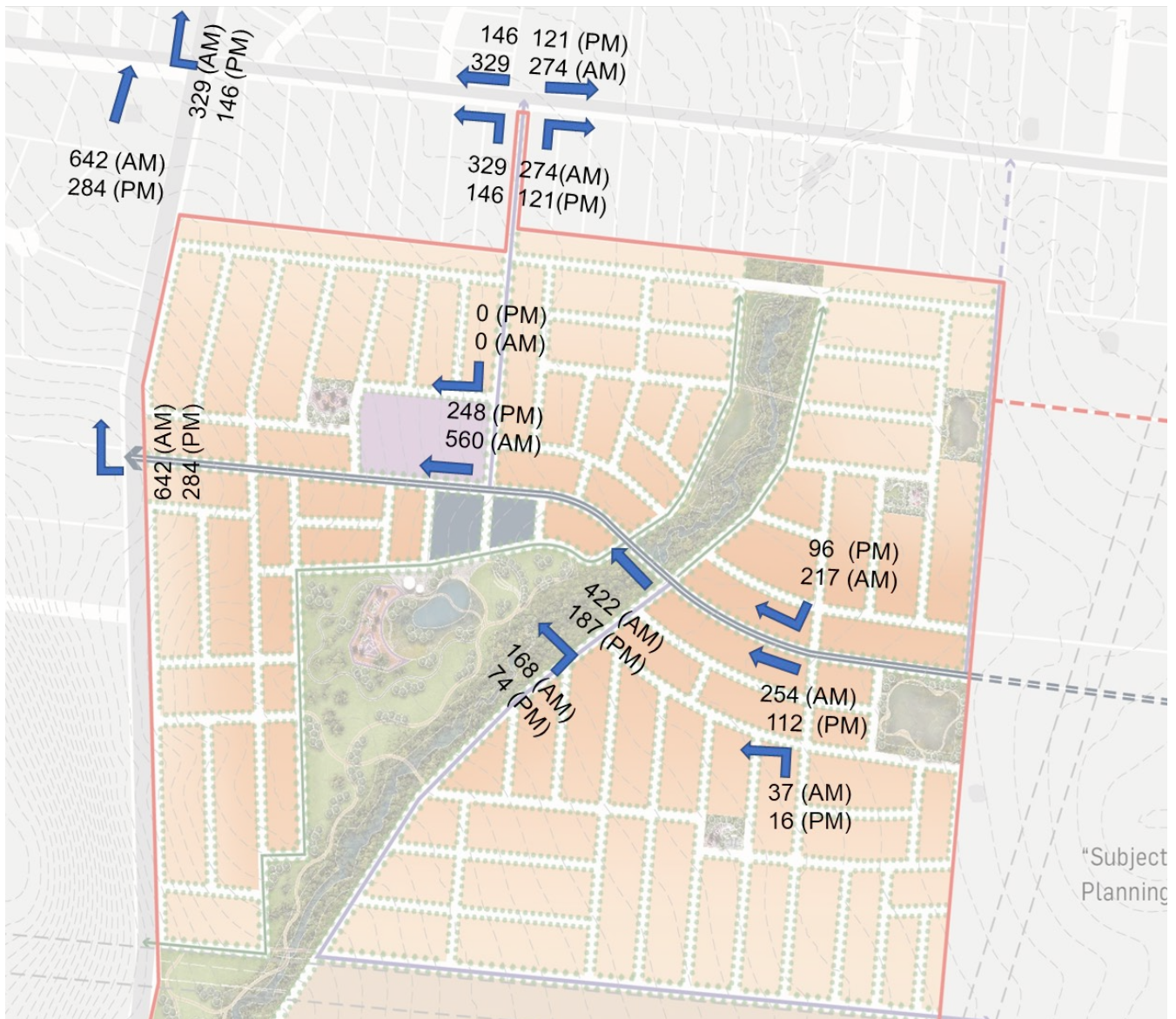
The 69 trips generated by staff have been discounted from external traffic distribution as these staff would not be leaving the site.

Two trip distribution scenarios were developed showing distribution both with and without additional access points mentioned in **Section 3.3**. These access points include the east-west connector road extending to Plumpton Road and the additional northern access points from Lloyd Road. It should be noted that traffic distribution showing all indicative access points includes traffic generation from the Sunnyside development, while the minimum access points do not.

Development controlled access points

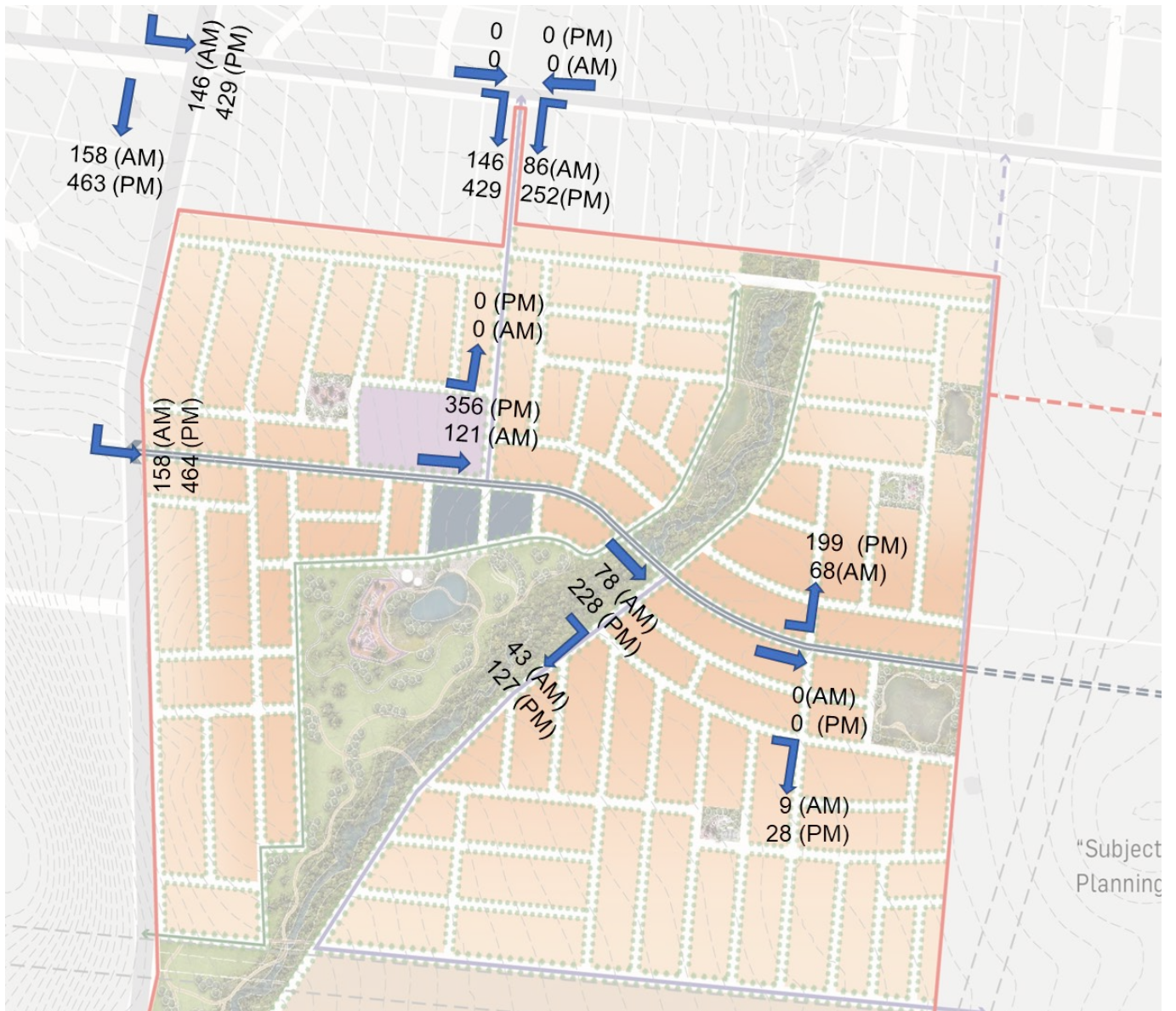
Figure 18 and **Figure 19** demonstrate the AM and PM peak traffic distributions to and from the site considering only the minimum access points

Figure 18 Outbound traffic distribution



Source: Urbis

Figure 19 Inbound Traffic Distribution

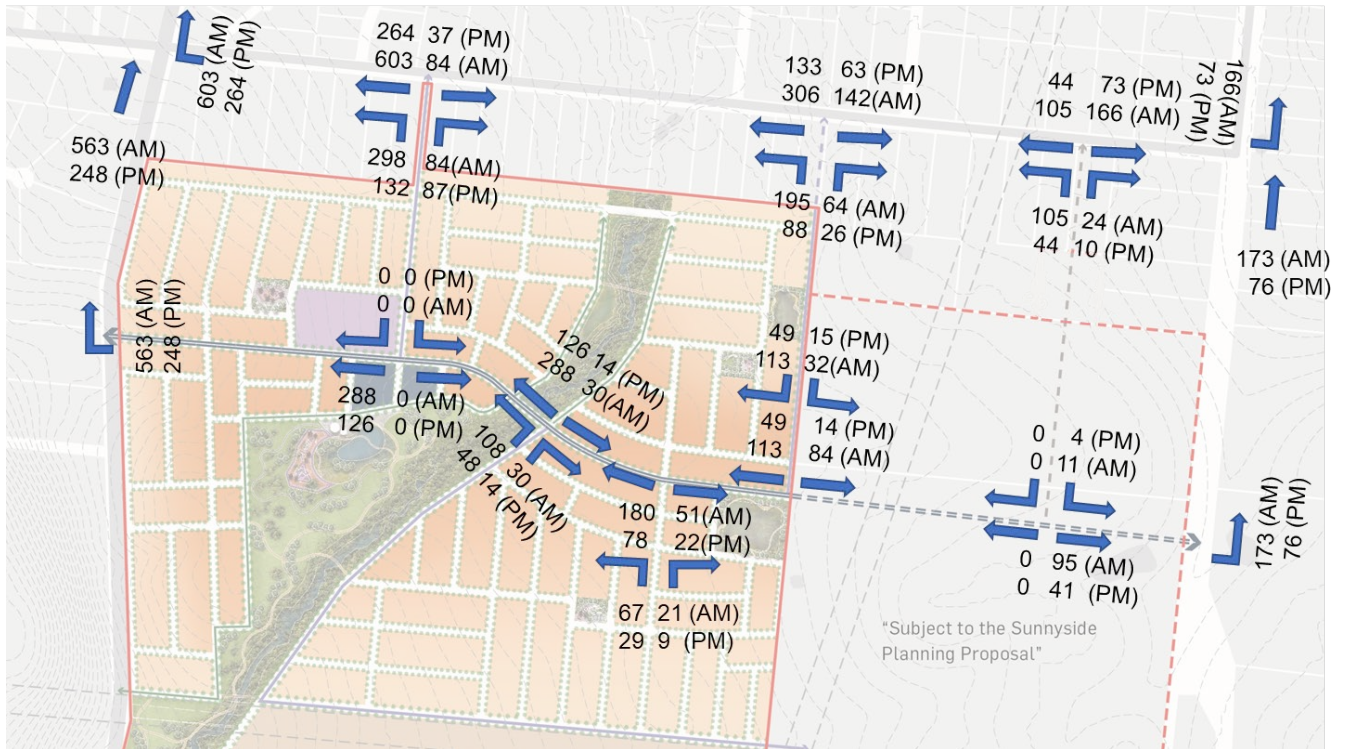


Source: Urbis

All indicative access points

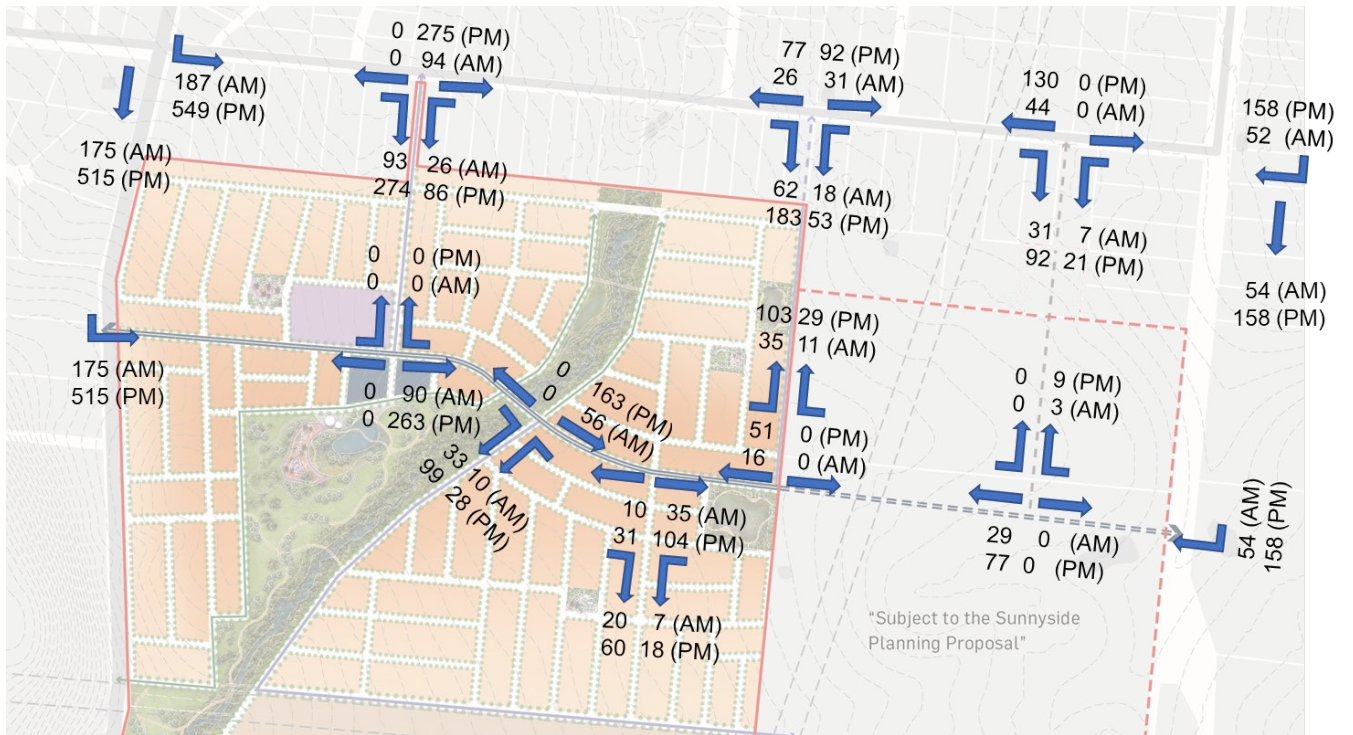
Figure 20 and **Figure 21** demonstrates the AM and PM peak traffic distributions to and from the site inclusive of all indicative access road.

Figure 20 Outbound traffic distribution



Source: Urbis

Figure 21 Inbound Traffic Distribution



Source: Urbis

TRANSPORT IMPACT ASSESSMENT

5.1. PUBLIC AND ACTIVE TRANSPORT

Only roads which are within the control of the developer

As discussed in **Sections 2.3.8** and **2.3.9** there are limited public and active transport connections to the site. The closest bus stop is approximately 2 km away from the northeast corner of the site and is only serviced by one route, the 969, which is an infrequent service.

Similarly, there are no active transport connections between the site and the broader active transport network. Central Wagga Wagga has an existing cycling network, however, the closest access point to this from the site is approximately 1.5 km away from the northeast corner of the site. The Draft Wagga Wagga Transport Plan highlights an extensive shared path network for Wagga Wagga. However, this network does not extend down to the site on either Holbrook or Lloyd Roads. Investigations should be undertaken to extend these shared paths to the site to connect via Lloyd and Holbrook Roads.

Within the site, all footpaths and shared paths / cycleways will be designed in accordance with Council / Austroads guidelines and Australian Standards. It will ensure that there is sufficient connection between the residential component of the site and the village centre, as well as provide a connection to the broader active transport network. The developer has committed to providing a bus service along the East-West Connector Road to connect the site to central Wagga Wagga. This bus service will connect the site to Wagga CBD via Plumptre and Holbrook Roads. This service will service the East-West Connector Roads in both directions. The frequency of services and location of stops is to be determined. A turning bay will be required at the end of the East-West Connector Road to allow for a bus to turn around once it reaches the end of the road to complete the route. This bus service must integrate into the prioritised bus network proposed by Draft Wagga Wagga Transport Plan. The prioritised bus network proposed will include an additional 240 services a week, greatly increasing public transport as a viable option to commute around Wagga Wagga.

All access points that may be completed

As discussed in **Sections 2.3.8** and **2.3.9** there are limited public and active transport connections to the site. The closest bus stop is approximately 2 km away from the northeast corner of the site and is only serviced by one route, the 969, which is an infrequent service.

Similarly, there are no active transport connections between the site and the broader active transport network. Central Wagga Wagga has an existing cycling network, however, the closest access point to this from the site is approximately 1.5 km away from the northeast corner of the site. The Draft Wagga Wagga Transport Plan highlights an extensive shared path network for Wagga Wagga. However, This network does not extend down to the site on either Holbrook or Plumptre Roads. Investigations should be undertaken to extend these shared paths to the site.

Within the site, all footpaths and shared paths / cycleways will be designed in accordance with Council / Austroads guidelines and Australian Standards. It will ensure that there is sufficient connection between the residential component of the site and the village centre, as well as provide a connection to the broader active transport network. The developer has committed to providing a bus service along the East-West Connector Road to connect the site to central Wagga Wagga. This bus service will connect the site to Wagga CBD via Plumptre and Holbrook Roads. This service will service the East-West Connector Roads in both directions. The frequency of services and location of stops is to be determined. This bus service must integrate into the prioritised bus network proposed by Draft Wagga Wagga Transport Plan. The prioritised bus network proposed will include an additional 240 services a week, greatly increasing public transport as a viable option to commute around Wagga Wagga.

Two trip distribution scenarios were developed showing distribution both with and without additional access points mentioned in **Section 3.3**. These access points include the east-west connector road extending to Plumptre Road and the additional northern access points from Lloyd Road.

5.2. TRAFFIC IMPACT ASSESSMENT

5.2.1. Intersection Performance

SIDRA INTERSECTION will be used to assess the impacts of the planning proposal on the surrounding road network. SIDRA INTERSECTION will be used to assess AM and PM network peak impacts in the opening year with and without the development and 10 years after the opening year with and without the development. SIDRA INTERSECTION analysis will be completed upon the completion of the traffic counts. An outline of activities and timing is shown in **Table 1**. Two modelling scenarios will be developed. One in which all indicative access points from the site are operational and another where only the minimum access points are used.

5.2.2. Only roads which are in control of the developer

Development impacts in year of completion

SIDRA INTERSECTION results for the AM and PM peak periods with the development are shown in **Table 13**.

Table 13 SIDRA INTERSECTION analysis AM and PM peak with development completion year

A table will be inserted at this point showing the results from the analysis of SIDRA modelling for the year of completion when the results of the modelling are available.

Source: SIDRA INTERSECTION

Development impacts 10 years after completion

SIDRA INTERSECTION results for the AM and PM peak periods without the development are shown in **Table 14**.

Table 14 SIDRA INTERSECTION analysis AM and PM peak without development 10 years after opening year.

A table will be inserted at this point showing the results from the analysis of SIDRA modelling for the year of completion plus 10 years when the results of the modelling are available.

Source: SIDRA INTERSECTION

5.2.3. All access points that may be built

Development impacts opening year

SIDRA INTERSECTION results for the AM and PM peak periods without the development are shown in **Table 15**.

Table 15 SIDRA INTERSECTION analysis AM and PM peak without development completion year.

A table will be inserted at this point showing the results from the analysis of SIDRA modelling for the opening year when the results of the modelling are available.

Source: SIDRA INTERSECTION

SIDRA INTERSECTION results for the AM and PM peak periods with the development are shown in **Table 16**.

Table 16 SIDRA INTERSECTION analysis AM and PM peak with development completion year.

A table will be inserted at this point showing the results from the analysis of SIDRA modelling for the opening year when the results of the modelling are available.

Source: SIDRA INTERSECTION

Development impacts 10 years after completion

SIDRA INTERSECTION results for the AM and PM peak periods without the development are shown in **Table 17**.

Table 17 SIDRA INTERSECTION analysis AM and PM peak without development 10 years after completion year

A table will be inserted at this point showing the results from the analysis of SIDRA modelling for the year of completion plus 10 years when the results of the modelling are available.

Source: SIDRA INTERSECTION

SIDRA INTERSECTION results for the AM and PM peak periods with the development are shown in **Table 18**.

Table 18 SIDRA INTERSECTION analysis AM and PM peak with development 10 years after completion.

A table will be inserted at this point showing the results from the analysis of SIDRA modelling for the year of completion plus 10 years when the results of the modelling are available.

Source: SIDRA INTERSECTION

5.3. MIDBLOCK CAPACITY ASSESSMENT

The capacity assessment of each of the key access roads to the site will be applied to Holbrook Road, Plumpton Road, Lloyd Road, Bourke Street and Koorlingal Road upon the receipt of traffic counts. The results from Equation 23 will determine the traffic mitigation measures required to support the planning proposal. The key activities and timing of this are outlined in **Table 1**.

5.3.1. Midblock Capacity Assessment

Midblock capacity assessment was completed for Holbrook Road, Plumpton Road, Lloyd Road, Bourke Street and Koorlingal Road.

Table 19 shows the midblock volumes and capacity for these roads under the completion year plus 10 years for the development with only roads roads which are in control of the developer, while **Table 19** shows the midblock capacity if all access roads are constructed.

Table 19 Midblock capacity assessment, 10 years after completion, developer controlled roads constructed.

A table will be inserted at this point showing the results from the analysis of midblock capacity assessment for the year of completion when the results of the modelling are available.

Source: Urbis

Table 20 Midblock capacity assessment, 10 years after completion if all access roads are constructed.

A table will be inserted at this point showing the results from the analysis of midblock capacity assessment for the year of completion when the results of the modelling are available.

Source: Urbis

MITIGATION MEASURES

6.1. TRAFFIC MITIGATION MEASURES

Only roads which are within the control of the developer

The results of **Section 5.1.1 and Section 5.3** will determine which traffic mitigation measures may be required. Traffic mitigation measures will likely be required. Mitigation measures include road widening and intersection upgrades.

All access points which may be completed

The results of **Section 5.1.2 and Section 5.3** will determine which traffic mitigation measures may be required. Traffic mitigation measures will likely be required. Mitigation measures include road widening and intersection upgrades.

6.2. PUBLIC AND ACTIVE TRANSPORT MEASURES

Only roads which are within the control of the developer

A bus service is proposed to service the site via the East-West Connector Road. This bus will operate in both directions along with the road and will serve to connect the site to the Wagga Wagga CBD via Holbrook and Plumpton Roads. Providing a direct bus service connecting homes to employment will reduce the car dependency of the development.

An active transport network is proposed within the site and is described in **Section 4.2**. It is recommended that this active transport network connects to the existing shared path along Plumpton Road, Approximately 1.5 km north of the northeast corner of the site. This will provide an active transport connection between the site and Wagga Wagga CBD.

All access points which may be completed

A bus service is proposed to service the site via the East-West Connector Road. In the scenario in which the East-West Connector Road does not extend to Plumpton Road, a bus turning bay will be required for the bus to turn around to exit the site via the Holbrook Road access. The bus will service the extent of the East-West Connector Road before turning around. This bus will operate in both directions along with the road and will serve to connect the site to the Wagga Wagga CBD via Holbrook and Plumpton Roads. Providing a direct bus service connecting homes to employment will reduce the car dependency of the development.

An active transport network is proposed within the site and is described in **Section 4.2**. It is recommended that this active transport network connects to the existing shared path along Plumpton Road, Approximately 1.5 km north of the northeast corner of the site. This will provide an active transport connection between the site and Wagga Wagga CBD.

CONCLUSION

This report provides a transport and traffic assessment of the proposed planning proposal of Rowan Village. The structure plan is anticipated to have the following transport and traffic-related impacts.

Trips generated by the site will likely result in the need to upgrade the method of control beyond that of the priority controlled method of control at Holbrook and Plumpton Road. It is also possible that the intersection method of control at Holbrook / Plumpton and Lloyd Roads will need to be upgraded to accommodate the additional traffic flow generated by the site. Further studies will be required to determine the exact implications of the development on the surrounding road network **Table 1** highlights the additional analysis to be undertaken post the lodgement of this report.

Access to the site will be via access points. Two from Lloyd Road, one from Holbrook Road and one from Plumpton Road. These access points will carry vehicles from the site to the surrounding road network.

The majority of trips away from the site will be towards Wagga Wagga. The majority of these trips will use Holbrook Road to access employment and services.

The peak traffic generating period for the site will be between 17:15 and 18:15. The peak hour will generate 1768 vehicle trips.

As a result of the traffic generated by the proposed development. Likely, the intersection control method between the East-West Connector and Holbrook / Plumpton Road will need to be beyond that of priority control. Further studies are required to determine the method of control required. Active transport connections within the site and a bus route connecting the site to the Wagga Wagga CBD will serve to reduce car dependency at the proposed development.

There will be a small village centre located at the centre of the development. Likely, this village centre will only attract visitors from within the development area. It is unlikely this development will attract trips to the site as surrounding residential areas have closer centres.

An internal road network is proposed. All internal roads will be designed in accordance with TfNSW, Austroads and Council Guideline.

Subject to the mitigation measures being identified in **Section 6** being adopted, this development will not have any traffic and transport impacts that cannot be managed.

DISCLAIMER

This report is dated 20 April 2022 and incorporates information and events up to that date only and excludes any information arising, or event occurring, after that date which may affect the validity of Urbis Pty Ltd (**Urbis**) opinion in this report. Urbis prepared this report on the instructions and for the benefit only, of DevCore (**Instructing Party**) for the purpose of Transport Impact Assessment (**Purpose**) and not for any other purpose or use. To the extent permitted by applicable law, Urbis expressly disclaims all liability, whether direct or indirect, to the Instructing Party which relies or purports to rely on this report for any purpose other than the Purpose and to any other person which relies or purports to rely on this report for any purpose whatsoever (including the Purpose).

In preparing this report, Urbis was required to make judgements which may be affected by unforeseen future events, the likelihood and effects of which are not capable of precise assessment.

All surveys, forecasts, projections and recommendations contained in or associated with this report are made in good faith and on the basis of information supplied to Urbis at the date of this report and upon which Urbis relied. Achievement of the projections and budgets set out in this report will depend, among other things, on the actions of others over which Urbis has no control.

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Whilst Urbis has made all reasonable inquiries it believes necessary in preparing this report, it is not responsible for determining the completeness or accuracy of information provided to it. Urbis (including its officers and personnel) is not liable for any errors or omissions, including in information provided by the Instructing Party or another person or upon which Urbis relies, provided that such errors or omissions are not made by Urbis recklessly or in bad faith.

This report has been prepared with due care and diligence by Urbis and the statements and opinions given by Urbis in this report are given in good faith and in the reasonable belief that they are correct and not misleading, subject to the limitations above.

APPENDIX A

SIDRA INTERSECTION RESULTS