

# AUSTRAL STRUCTURE PLAN SUBDIVISION

Traffic and Access Study

27 OCTOBER 2021







# **Quality Assurance**

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# Contents

Exec	utive s	ummary		i
	Purp	ose of this	report	i
	Strate	egic contex	xt	i
	Exist	ing condition	DNS	i
	The p	proposal		i
	Trans	sport impa	ct	ii
	Conc	lusion		III
1.0	Intro	duction		1
	1.1	Purpose	of the report	1
	1.2	Report s	tructure	1
2.0	Strat	egic conte	ext	2
	2.1	Connect	ed Liverpool 2050 – Local Strategic Planning Statement (LSPS)	2
		2.1.1	Transport connectivity	2
		2.1.2	Local planning priority	3
	2.2	Liverpoo	l Bike Plan 2018-2023	4
	2.3	Liverpoo	I Growth Centre Precinct Development Control Plan (DCP)	5
		2.3.1	Movement network	5
		2.3.2	Pedestrian and cycle network	6
		2.3.3	Temporary vehicular access	6
		2.3.4	General parking requirements in Liverpool Growth Centre Precinct Development Control Plan	7
	2.4	Liverpoo Precinct	I Growth Centre Precinct Development Control Plan, Schedule 1 Austral & Leppington Nor s	th 8
	2.5	Western	Sydney Street Design Guidelines	11
3.0	Exist	ting condi	tions	14
	3.1	The site		14
	32	Travel b	ehaviour	14
	0.2	321	Method of Travel to Work data	14
		3.2.2	Household Travel Survey	15
	3.3	Road ne	twork classification	17
	3.4	Road ne	twork performance	19
	3.5	Public tr	ansport	. 20
	0.0	351	Train	20
		3.5.2	Bus	20
	3.6	Active tr	ansport	22
4.0	Prop	osed deve	elopment	24
-	4.1	Planned	subdivision	24
	42	Propose	d road network	25
	1.2	1 2 1	Poad notwork and hiorarchy	20
		4.2.1	Proposed cross-section	25
	4.3	Car acce		26
	44	Active tr	ansnort access	27
	4.5	Trip gen	eration and distribution	27
	1.0	inp goi		21
5.0	Traff	ic impact	assessment	28
	5.1	Road ne	twork impact	28
		5.1.1	Road network impact	28
		5.1.2	Shared zone	28
		5.1.3	Cross section Impact	28 24
	52	0.1.4 Public tr	i iaii-wiuiii ioau queue aliaiysis ansnort imnact	31 22
	0.2			02



	5.3	Active transport impact	33
6.0	Concl	usion	34

# **Appendices**

APPENDIX A	Proposed cross sections	А
APPENDIX B	SIDRA output	В



# **Executive summary**

#### Purpose of this report

SCT Consulting was engaged by Landcom to undertake a traffic study to support a Development Application (DA) for a residential subdivision that could yield around 422 dwellings at Gurner Avenue, Austral. The site is under Lot 184 DP 1237400, located in the Liverpool City Council Local Government Area (LGA).

#### Strategic context

The Liverpool City Council encourages mode shift to sustainable transport modes such as public transport and cycling to mitigate road network congestion. The Fifteenth Avenue Smart Transit Corridor is around one kilometre to the south of the site where electric, autonomous transit could support public transport access to commercial and industrial employment opportunities.

The Schedule 1 Austral & Leppington North Precincts forms part of the Liverpool Growth Centre Precincts Development Control Plan. The vision for the Austral and Leppington North Precincts is that a range of housing types will develop to meet the needs of a diverse community, supported by local services, infrastructure, facilities and employment, in an environmentally sustainable manner. The Indicative Layout Plan (ILP) prepared in Schedule 1 forms the basis for urban development in the precinct.

The improvement of the cycle network provision and connectivity according to Liverpool Bike Plan and Schedule 1 Austral & Leppington North Precincts also facilitates the use of bicycles for residents to nearby activities and mode change with public transport.

Western Sydney Street Design Guidelines sets out new street types for Western Sydney. These street types build upon the street hierarchies currently presented in a variety of existing guidelines including Landcom's *Street Design Guidelines* and *Austroads Guide to Road Design* and provide a greater variety of street types required in Western Sydney. The relevant local street types associated with the proposal include Local Street, Residential Laneway and Local Collector.

#### **Existing conditions**

The study area showed a higher proportion of drivers in Austral, 61 per cent, in comparison to the 53 per cent of Greater Sydney, showing a higher dependency on private car use. Train and bus use was lower than Greater Sydney at six per cent and 0.3 per cent. This is attributed to the long commuting time to jobs by public transport. Greater Sydney had16 per cent and six per cent for train and bus use, respectively. Active transport use was also lower than Greater Sydney, which is a product of sparse local employment opportunities and walking infrastructure.

Based on desktop review and typical traffic conditions provided by Google Maps, the road network in the vicinity of the site generally operates without any major delays during peak hours due to the rural nature of the area with minimal urban development. Slow movement tends to occur at Fifteenth Avenue approaching Cowpasture Road and the Westlink M7 during a typical AM peak.

The site is around five kilometres to the north of Leppington Railway Station, which is a terminal station that provides T2 and T5 services. It has a frequency of about six services during AM and PM peak hours and covers the destinations of Blacktown (on the T5 line) and City Circle (on the T2 line). Bus services are available on Gurner Avenue and further south on Fifteenth Avenue, which is over one kilometre from the site. The bus frequency at the nearby bus stops is below four services per hour during a typical weekday peak hour.

This area is expected to change significantly as the remaining sites are developed. The delivery of the remaining street network will improve permeability and walking infrastructure, which is expected to increase the attractiveness of walking, cycling and public transport modes.

#### The proposal

The subdivision seeks to provide 422 residential dwellings (being 85 dwellings are R3 zoned apartments) and a childcare centre on a total of 318 lots. The site is divided into two sub-development precincts.

The proposed road network provides more permeability and more connecting points to the rest of the road network than ILP such as:

– Edmondson Avenue (Street Type A) extends through the western precinct as a collector road.



- East-West WSUD Spine (Street Type B) is an east-west spine that connects from Edmondson Avenue, which bisects the western precinct to enable efficient distribution.
- Edge Street (Street Type E) connects Seoul Avenue and extends on the western and northern boundary of the eastern precinct to provide accessibility.
- Multiple local streets and residential laneways provide permeability and accessibility across the two precincts.
   Four local streets including Edge Street (Street Type E), Shared Zones (Street Type C1) and Laneway connect the future planned road to the south of the western precinct while two Shared Zones (Street Type C1) and WSP Street (Street Type J) connect the existing Seoul Avenue with the eastern precinct.

The western precinct would gain access via the existing Edmondson Avenue and Crown Street (connecting back to Edmondson Avenue via Swamphen Street) to the south. Therefore, Edmondson Avenue provides temporary access for the western precinct before the completion of neighbouring developments. In the long term, another access point would be available to the west of Edmondson Avenue to connect Gurner Road with the site according to ILP. The eastern precinct can gain access via the existing Seoul Avenue, which further connects with Oslo Street, King Rock Road for a wider road network.

#### Transport impact

#### Road network impact

With the expected yield of 337 and 85 low-density and medium-density dwellings, the subdivision is expected to generate 375 and 389 vehicle trips during the AM and PM peak hours.

AECOM prepared an *Austral & Leppington North Precincts Traffic Assessment* in 2011 for [then] NSW Department of Planning and Infrastructure. Modelling of the precincts used the AECOM CUBE model, with trip generation and distribution based on an assessment of average trip rates for developed and residential areas, population and employment projections and dwelling and employment numbers proposed for the Growth Centres. The modelled development yield is consistent with that subsequently provided for the Liverpool Growth Centre Precincts DCP.

The proposed yield of the site is consistent with the Liverpool Growth Centre Precincts DCP. There is no uplift proposed on this site beyond what has been anticipated in previous planning. Hence, it is assumed that the trip generation of the development would be accommodated by the planned infrastructure and the road network impact would be acceptable.

Shared zones are distributed widely across the site. There would be traffic calming treatments along those shared zones such that vehicle speeds would be reduced, which provides a safer environment for cyclists and pedestrians across the site.

The proposed cross-sections generally maintain the features recommended by *Western Sydney Street Design Guidelines*. It is noted that there are variations such as wider on-street parking spaces, the addition of cycle paths, converting a footpath to the cycle path and one way shared zones etc. Those deviations have a limited impact on the road network and are considered beneficial for site access and sustainable transport use.

For Edmondson Avenue during the interim scenario, on-street parking is not restricted for the 5.5 m wide road, so drivers need to give way to pass each other if there is a parked car (the remaining width would be less than 3.5 m). SIDRA modelling was carried out to evaluate the queue length. It is confirmed that the maximum queue length would occur when northbound traffic gives way to the southbound traffic in the PM peak hour. However, the queue of two vehicles is acceptable, supporting this temporarily narrower street layout.

#### Public transport impact

With the proposed urban growth in Austral, the network will continue to evolve with increases in frequency and further route coverage as the road network is delivered. TfNSW regularly reviews bus service provision in line with population growth and network changes. It is recommended that the following changes be considered as part of the planning for the area:

- Addition of bus stops along Gurner Avenue and Seventeenth Avenue such that residents can catch buses closer to home (before bus routes extension to further north)
- Potential bus route extensions north of Gurner Avenue and Seventeenth Avenue. However, this will be subject to the timing of the development of the road network (full width of Edmondson Avenue).



#### Conclusion

The study concluded that the impacts of the proposed development are at a level able to be accommodated by the existing and planned infrastructure.



# 1.0 Introduction

## 1.1 Purpose of the report

SCT Consulting was engaged by Landcom to undertake a traffic study to support a Development Application (DA) for a residential subdivision that could yield around 422 dwellings at Gurner Avenue, Austral. The site is under Lot 184 DP 1237400 located in the Liverpool City Council Local Government Area (LGA).

The site is currently rural, bounded by vegetation to the west and existing trails to the north and the east. The southern boundary of the site has an interface with development along Edmondson Avenue and Seoul Avenue. Edmondson Avenue and Seoul Avenue are the nearest connection points to the site (**Figure 1-1**).

#### Figure 1-1 Proposed subdivision



Source: Nearmap, 2021

# 1.2 Report structure

This report has been structured into the following sections:

- Section 2 considers the future transport planning context.
- Section 3 describes the existing transport conditions for all modes of transport.
- Section 4 provides an overview of the proposed development and access requirements.
- Section 5 outlines the indicative traffic and transport impact as a result of the proposed development.
- Section 6 summarises the study findings and presents conclusions.



# 2.0 Strategic context

# 2.1 Connected Liverpool 2050 – Local Strategic Planning Statement (LSPS)

A Local Strategic Planning Statement (LSPS) has been developed to set Liverpool City Council's strategic planning vision for the next 30 years. It lists Council's planning priorities across four areas including connectivity, productivity, liveability, and sustainability and sets out the actions to deliver on the planning priorities to meet the community's future vision for Liverpool.

Roads are being enhanced through key projects including The Northern Road Upgrade, the Bringelly Road Upgrade, the M12 motorway and the Outer Sydney Orbital. Council is working with external stakeholders to improve access in and around the CBD and investigate options for public parking to support growth.

Council's flagship proposal – the Fifteenth Avenue Smart Transit (FAST) Corridor – is proposed to provide the residents with a rapid public transit connection from Liverpool city centre to the many opportunities provided by the Western Sydney Airport, including new high-value jobs. It will also link existing suburbs such as Miller and Middleton Grange, redressing past public transport disadvantages.

#### 2.1.1 Transport connectivity

Transport connectivity is a critical element of the Council's vision for a connected Liverpool. Faster public transport services to Liverpool and other major centres are top transport priorities. Council continues to advocate for better public transport connectivity. This will be particularly important for the success of Liverpool's Innovation Precinct, Western Sydney International Airport and Western Sydney Aerotropolis, and to help in the management of road congestion.



#### Figure 2–1 Transport improvement initiatives

Source: Connected Liverpool 2050 - Local Strategic Planning Statement (LSPS), 2021

Liverpool City Council will seek to ensure that infrastructure projects being planned for and delivered – including the South - West rail line extension, the Moorebank Intermodal Terminal, the M12 motorway, the Outer Sydney Orbital and freight line, the Sydney Metro City and Southwest extension from Bankstown to Liverpool and the North-South rail line – benefit Liverpool's residents and will advocate for their timely delivery.



The city-shaping network includes higher capacity, high-frequency services providing access to metropolitan centres as well as connecting the three cities of Sydney Greater Metropolitan Area (GMA). City-shaping infrastructure such as the FAST Corridor project would be progressed and advocated for Liverpool to be connected to future fast rail projects.

**Relevance for the Gurner Avenue site**: regional roads and rail infrastructures are planned to cater for the expected growth of Liverpool City including the Western Sydney International Airport and Western Sydney Aerotropolis. The most relevant infrastructure includes the Fifteenth Avenue Smart Transit (FAST) Corridor<sup>1</sup>, the M12 Motorway (completion by 2025)<sup>2</sup> and the Edmondson Avenue upgrade (completion by 2023)<sup>3</sup>.

#### 2.1.2 Local planning priority

Council will prioritise the below local planning schemes and actions based on the timeframes of short term (now – 2020 / 2021), medium-term (2021 / 2022 - 2028 / 2029) and long term (2029 / 2030+).

2.1.2.1 Active and public transport reflecting Liverpool's strategic significance

- Work with Transport for NSW (TfNSW) to bring forward extension of Sydney Metro City and Southwest and investigate a preferred alignment (short term planning, with delivery in the long term)
- Upgrade Edmondson Avenue from Fifteenth Avenue to Bringelly Road (medium-term)
- Work with TfNSW on an extension of the T-way from Hoxton Park Road south to Edmondson Park Station (medium-term)
- Investigate extension of the FAST Corridor to Holsworthy Station (short term planning, with delivery in the long term).

**Relevance for the Gurner Avenue site:** Edmondson Avenue upgrade (between Fifteenth Avenue and Bringelly Road) is projected to be completed by 2023 (funded by Department of Planning, Industry and Environment (DPIE)), which could facilitate access from the site to the Leppington major centre and Bringelly Road by car and public transport.

#### 2.1.2.2 Accessible and connected suburbs

- Work with TfNSW to optimise public transport infrastructure and accessibility as well as connectivity to pathways and cycleways as part of place-making for neighbourhood centres (short to medium term)
- Liaise with Fairfield and Canterbury Bankstown councils to implement active transport routes around Chipping Norton Lakes, including bridge and road connections (medium-term).

**Relevance for the Gurner Avenue site:** Liverpool City Council encourages mode shift to sustainable transport modes such as public transport and cycling to mitigate the road network congestion. Council is working with TfNSW and DPIE to pursue the Fifteenth Avenue Smart Transit Corridor project where electric, autonomous transit could support public transport access to commercial and industrial employment opportunities. The improvement of the cycle network provision and connectivity also facilitates the use of bicycles for residents to nearby activities and mode change with public transport.

#### 2.1.2.3 Liverpool is a leader in innovation and collaboration

- Work with Greater Sydney Commission and relevant stakeholders to address the Liverpool Collaboration Area Place Strategy through amendments to the LEP (short to medium term)
- Investigate planning control changes to support connected and autonomous vehicles and adaptive reuse of parking infrastructure (medium-term).

<sup>&</sup>lt;sup>1</sup> <u>https://www.liverpool.nsw.gov.au/development/major-projects/fifteenth-avenue-smart-transit-fast-corridor</u>

<sup>&</sup>lt;sup>2</sup> <u>https://investment.infrastructure.gov.au/projects/ProjectDetails.aspx?Project\_id=051560-13NSW-NP</u>

<sup>&</sup>lt;sup>3</sup> https://www.liverpool.nsw.gov.au/development/major-projects/current-major-works



# 2.2 Liverpool Bike Plan 2018-2023

Liverpool City Council is committed to improving cycling and associated bike facilities. *The Liverpool Bike Plan 2018-2023* (the Bike Plan) is a high-level planning document that outlines the provision of bicycle-related infrastructure and is also a communication strategy designed to promote and increase the rates of cycling in Liverpool.

As shown in **Figure 2–2**, Austral is identified as one of the eight distinct precincts for a detailed bicycle network plan including Austral, Middleton Grange and West Hoxton.

The Austral precinct has a large road network with low traffic volumes but there are also barriers such as hilly topography, isolation from the rest of the city and minimal off-road cycling facilities. It is identified that future development should incorporate cycling facilities into the plan and there is an opportunity for the low density, semirural area to provide recreational cycle paths, and cycling links to Leppington Station.

**Relevance for the Gurner Avenue site:** The Bike Plan identifies an off-road cycleway network close to the site, which provides an opportunity for a better cycling environment around new developments. They connect to a wider cycle network such as those along the Westlink M7 and Fifteenth Avenue, making cycling a pleasant experience for the residents.



#### Figure 2–2 Austral Precinct bike plan

Source: Liverpool Bike Plan 2018 - 2023



# 2.3 Liverpool Growth Centre Precinct Development Control Plan (DCP)

The purpose of this DCP is to communicate the planning, design and environmental objectives and controls against which the Consent Authority will assess Development Applications. It consolidates and simplifies the planning controls for the Precincts in the South West Growth Centre.

### 2.3.1 Movement network

The movement network chapter identifies the objectives for street network and design that relates to the site such as:

- Establish a hierarchy of interconnected streets that give safe, convenient, and clear access within and beyond the Precinct
- Contribute to the creation of an interesting and attractive streetscape
- Provide a safe and convenient public transport, pedestrian, and cycleway network.

A few planning controls of the street network layout and design include:

- The design and construction of streets are to be consistent with the relevant typical designs in Figure 2–3 and Figure 2–4
- Alternative street designs for local streets and access ways may be permitted on a case by case basis if they
  preserve the functional objectives and requirements of the design standards
- Where roads are adjacent to public open space or drainage land, or adjacent to arterial, sub-arterial or transit boulevards, the verge width on the side adjacent to the open space, drainage land or major road may, in certain circumstances, be reduced to a minimum of 1 m
- Where local roads are located as per control above or are within or on the boundary of land zoned Environmental Living, the carriageway width may be reduced to 6.5 m providing the applicant can demonstrate to Council's satisfaction that the road will operate safely and effectively
- Residential roads, i.e. collector roads, local streets, access road/places, and shared ways shall be designed for and signposted at a maximum of 50 km/h (i.e. traffic management must be considered at the subdivision application, with either road layout or speed reducing devices used to produce a traffic environment which reduces traffic speed).

#### Figure 2–3 Typical collector road



Source: Liverpool Growth Centre Precinct Development Control Plan (DCP), 2021

![](_page_13_Picture_1.jpeg)

![](_page_13_Figure_2.jpeg)

Source: Liverpool Growth Centre Precinct Development Control Plan (DCP), 2021

#### 2.3.2 Pedestrian and cycle network

A few planning controls of the pedestrian and cycle network include:

- The design of footpaths and cycleways located within the road reserve is to be per Figure 2-3 and Figure 2-4
- The minimum width of an off-street shared cycle and pedestrian pathways is to be 2.5 m.

#### 2.3.3 Temporary vehicular access

A few planning controls of the temporary vehicular access include:

- Where necessary to ensure that access to residential properties is provided in the early stages of development, Council may consent to the construction and operation of temporary access roads.
- Temporary access roads are to remain in operation only until the road network has been developed to provide permanent access to all properties. A section 88B instrument<sup>4</sup> is required as part of the subdivision requiring that the temporary access road remains open for as long as necessary to ensure access to all properties.
- A minimum carriageway width of 5.5 m is required for all half-width roads.

<sup>&</sup>lt;sup>4</sup> A section 88B instrument is the part of a deposited plan which upon registration: creates easements, profit à prendre, restrictions on use of land, and positive covenants; releases easements and profits à prendre.

![](_page_14_Picture_1.jpeg)

#### Figure 2–5 Temporary half road width construction

![](_page_14_Figure_3.jpeg)

Source: Liverpool Growth Centre Precinct Development Control Plan (DCP), 2021

#### 2.3.4 General parking requirements in Liverpool Growth Centre Precinct Development Control Plan

General parking requirements are identified as follows:

For R2, R3 zones (shop top housing only):

- One and two-bedroom dwellings will provide at least one car space
- Three or more bedroom dwellings will provide at least two car spaces
- At least one car parking space must be located behind the building façade line where the car parking space is accessed from the street on the front property boundary.

For R3, R4 zones (residential flat buildings):

- One space per dwelling, plus 0.5 spaces per three or more bedroom dwelling
- One visitor car parking space per five apartments
- Bicycle parking spaces: one per three dwellings.

For R2, R3, R4 zones Manor homes:

- One and two bedrooms: one space (minimum)
- Three bedrooms or more: two spaces (minimum).

![](_page_15_Picture_1.jpeg)

# 2.4 Liverpool Growth Centre Precinct Development Control Plan, Schedule 1 Austral & Leppington North Precincts

This Schedule forms part of the *Liverpool Growth Centre Precincts DCP*. The vision for the Austral and Leppington North Precincts is that a range of housing types will develop to meet the needs of a diverse community, supported by local services, infrastructure, facilities and employment, in an environmentally sustainable manner. All infrastructure in this schedule will be delivered by Council.

The Indicative Layout Plan (ILP) prepared in Schedule 1 forms the basis for urban development in the precinct by setting out:

- The transport network
- The open space and drainage networks
- The locations of land uses including residential development, schools, community facilities, utilities, centres and employment lands
- Areas requiring protection because of environmental or heritage values
- The density and types of housing are preferred in various parts of the Precinct.

The precinct road hierarchy plan and the pedestrian and cycle network plan are illustrated in **Figure 2–6** and **Figure 2–7**.

Within the site boundary, the ILP shows a local street looping through the west precinct. It intersects with Edmondson Avenue and has two connecting points with the east-west local street to the south of the site. Two local street loops form the road network in the eastern precinct that connects Seoul Avenue and the northern extension of Edmondson Avenue.

Relevance for the Gurner Avenue site:

- The eastern site can be accessed via the extension of Seoul Avenue and Eighteenth Avenue (Figure 2–6)
- The western site can be accessed via the extension of Edmondson Avenue (Figure 2–6)
- Fifteenth Avenue and Edmondson Avenue (south of Fifteenth Avenue) are planned as Transit Boulevard, which will expect high-quality public transport and Fifteenth Avenue Smart Transit (Figure 2–6)
- There are many signalised intersections along Fifteenth Avenue and Edmondson Avenue to provide safe pedestrian crossing opportunities for future residents
- A mid-block pedestrian crossing with refuge is planned on Gurner Avenue to connect the proposed retail/school to the south of Gurner Avenue (Figure 2–7)
- Gurner Avenue, Fourth Avenue and Edmondson Avenue are planned as major pedestrian/cycle routes (offroad) that further link to Liverpool City Council Bike Route and Open Space Link (shared path) (Figure 2–7).

![](_page_16_Picture_1.jpeg)

#### Figure 2–6 Precinct road hierarchy

![](_page_16_Figure_3.jpeg)

Source: Liverpool Growth Centre Precinct DCP Schedule 1 Austral & Leppington North Precincts, 2021

![](_page_17_Picture_1.jpeg)

#### Figure 2–7 Pedestrian and cycle network

![](_page_17_Figure_3.jpeg)

Source: Liverpool Growth Centre Precinct DCP Schedule 1 Austral & Leppington North Precincts, 2021

![](_page_18_Picture_1.jpeg)

# 2.5 Western Sydney Street Design Guidelines

The Western Sydney Street Design Guidelines (The Guidelines) seeks to create streets with improved environmental, social and health outcomes for all street users. The Guidelines are focused on service provision to new greenfield development areas in Western Sydney. They have the potential to be applied to existing areas that are undergoing significant change and are in an appropriate urban setting.

The Guideline sets out new street types for Western Sydney. These street types build upon the street hierarchies currently presented in a variety of existing guidelines including Landcom's *Street Design Guidelines* and *Austroads Guide to Road Design* and provide a greater variety of street types required in Western Sydney.

The relevant local street types associated with the proposal include Local Street, Residential Laneway and Local Collector (**Figure 2–8** to **Figure 2–9**).

**Relevance for the Gurner Avenue site:** The cross sections specified in the Guidelines differ from the *Liverpool Growth Centre Precinct Development Control Plan* including the width of the carriageway and road reserve, as well as the arrangement of the facilities. This study needs to justify the proposed cross-sections based selected.

![](_page_19_Picture_1.jpeg)

OPERTY IDUNIARY

PEDESTRIAN ZONE

PLANTING

#### Figure 2–8 Proposed cross-sections for local streets (3.1 and 3.3)

![](_page_19_Figure_3.jpeg)

B3.3 Local Street Type 3 - Dual carriage and footpaths - Low density (case study B)

2.4m

FLEX ZONE

Source: West Sydney Street Design Guideline, 2021

![](_page_20_Picture_1.jpeg)

#### Figure 2–9 Proposed cross-sections for laneway and local collector (3.5 and 3.6)

Source: West Sydney Street Design Guideline, 2021

13

![](_page_20_Picture_6.jpeg)

![](_page_21_Picture_1.jpeg)

# 3.0 Existing conditions

## 3.1 The site

The site is (Lot 184 DP 1237400) is located at Gurner Avenue in Austral within the Liverpool City LGA (Figure 3-1).

![](_page_21_Figure_5.jpeg)

Figure 3–1 Gurner Avenue site in a regional context

The majority of the site is zoned as R2-Low Density Residential with remaining land use SP2 Infrastructure, RU6 Transition, E2 and E4 environmental zoning. The site comprises rural land uses including small scale rural related buildings with vegetation cover.

Leppington Station is 4.8 kilometres to the south of the site, providing connectivity to the rest of Sydney through mass transit services.

# 3.2 Travel behaviour

#### 3.2.1 Method of Travel to Work data

2016 Method of travel to work data from Austral, Liverpool was analysed to determine travel behaviour of the existing residents in the vicinity of the site using the study area shown in **Figure 3–2**.

![](_page_22_Picture_1.jpeg)

![](_page_22_Figure_2.jpeg)

#### Figure 3–2 Study area for the travel behaviour reference for method of travel to work analysis

At the time of the Journey to Work (JTW) data being collected in 2016, approximately 1,174 trip samples were included in the survey for the area. According to the Australian Bureau of Statistics, a person in employment is those of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit.

The study area showed a higher proportion of drivers in Austral, 61 per cent, in comparison to the 53 per cent of Greater Sydney, showing a higher dependency on private car use. Train and bus use was six per cent and 0.3 per cent, compared with Greater Sydney showed 16 per cent and six per cent, respectively. This is consistent with the longer journey times between residential land uses in the vicinity and employment locations.

Active transport use was low as a result of low-end destinations and lack of cycling infrastructure provision in Austral to connect to the regional network such as the M7 dedicated cycleway. Lastly, the use of trucks was high at seven per cent compared to only one per cent for Greater Sydney, reflecting unique job types in the study area such as logistics and trade.

Of the 67,787 people who worked in Liverpool City, the largest share of workers (38 per cent) lived in Liverpool LGA, followed by Campbelltown (11 per cent) and Fairfield (10 per cent). Smaller origins included Camden (six per cent), Canterbury - Bankstown (six per cent), and other origins across the Greater Sydney region each generating less than five per cent of work-related trips to Liverpool.

Around 31 per cent of residents worked within Liverpool LGA. The City of Sydney, Fairfield, and Canterbury -Bankstown generated 10 per cent, nine per cent and eight per cent of total work-related trips, respectively. Other destinations were all below six per cent. Hence, the medium-long commuting distance to major employment is consistent with the higher car use, which is relatively convenient and cost-effective.

#### 3.2.2 Household Travel Survey

The proposed site sits within the statistical area "Bringelly – Green Valley" as defined by the Australian Bureau of Statistics, 2017 / 2018 Household Travel Survey (HTS) as shown in **Figure 3–3**. For analysis, it has been assumed

![](_page_23_Picture_1.jpeg)

that JTW data provides a suitable reflection of the travel characteristics during AM and PM peak hour periods on an average weekday, due to the high proportion of trips during this timeframe associated with journey to work trips.

![](_page_23_Figure_3.jpeg)

Figure 3–3 Study area for the travel behaviour reference for household travel survey analysis

 Table 3-1 and Table 3-2 provide a summary of the overall mode choice and purpose of travel by residents of

 Bringelly – Green Valley against the Sydney average. The average travel distance for each category is also listed.

	Bringelly – Green Valley		Greater Sydney	
Mode of travel	Proportion	Average distance	Proportion	Average distance
Vehicle Driver	51%	13 km	40%	10 km
Vehicle Passenger	29%	9 km	17%	8 km
Train	3%	27 km	6%	18 km
Bus	3%	9 km	5%	8 km
Walk Only	6%	1 km	15%	1 km
Walk Linked	7%	1 km	16%	1 km
Other	1%	5 km	1%	6 km
Total	100%	-	100%	-

 Table 3-1
 Household travel survey – residents within Bringelly – Green Valley, travel by mode

Source: https://www.transport.nsw.gov.au/data-and-research/passenger-travel/surveys/household-travel-survey-hts, 2021

The study area had more vehicle drivers and vehicle passengers at 51 per cent and 29 per cent compared to Greater Sydney's 40 per cent and 17 per cent. Higher vehicle occupancy was observed in the study area, i.e. 1.56 people per

![](_page_24_Picture_1.jpeg)

vehicle for the study area and 1.43 people per vehicle for Sydney. Comparatively, other modes of transport such as train and walking trips had about half the rate compared with Greater Sydney level due to long distance to activities and relatively low-density development and jobs. Due to the comparatively long distance to the nearest rail station (4.8 km), rail use tends to be only efficient for longer journeys.

	Bringelly – (	Green Valley	Greater Sydney		
Trip purpose	Proportion	Average distance	Proportion	Average distance	
Commute	15%	22 km	17%	16 km	
Work related business	10%	23 km 6%		16 km	
Education/childcare	15%	8 km	10%	6 km	
Shopping	10%	7 km	16%	6 km	
Personal business	5%	8 km	6%	7 km	
Social/recreation	20%	10 km	25%	8 km	
Serve passenger	24%	8 km	18%	6 km	
Other	1%	11 km	2%	5 km	
Total	100%	-	100%	-	

Table 3-2 Household travel survey - residents within Bringelly - Green Valley, travel by purpose

Source: https://www.transport.nsw.gov.au/data-and-research/passenger-travel/surveys/household-travel-survey-hts, 2021

The main trip purpose in Bringelly – Green Valley was 'serve passenger' at 24 per cent, followed by social/recreation at 20 per cent. In addition, the percentage of total trips for residents in Bringelly – Green Valley is similar to the percentage of total trips in the Greater Sydney region for all other trip purposes.

For Bringelly – Green Valley, the average distance travelled by all modes of transport and by trip purposes were both around 12 km which were approximately 30 per cent longer than Greater Sydney (nine km). This can be attributed to the area's long distance to employment destinations, requiring residents to travel further. Trip purposes showed a further average distance travelled in comparison to Greater Sydney such as work-related business and change mode of travel, which is likely related to jobs in Sydney CBD or other strategic centres. The low use of active transport also tallies with this increased distance.

## 3.3 Road network classification

The major roads in the vicinity of the site include Gurner Road, Fourth Avenue, Devonshire Road, Fifteenth Avenue, Edmondson Avenue, Bringelly Road and Elizabeth Drive as shown in **Figure 3–4**. The majority of the planned road network within the site have not been constructed. Seoul Avenue to the southeast is being delivered as part of the neighbouring development.

![](_page_25_Picture_1.jpeg)

![](_page_25_Figure_2.jpeg)

#### Figure 3–4 Road network around the site

The characteristics of the key road network, surrounding the subject site are:

- Gurner Avenue / Seventeenth Avenue is the main east-west local route closest to the south of the site. It connects Devonshire Road to the west and Twenty Eighth Avenue to the east with a total length of about four kilometres. It generally has one lane in each direction. Footpaths are available on the sections near the intersection with Edmondson Avenue as part of new urban development. There is a school zone near the Fourth Avenue intersection with a pedestrian refuge provided in the east and south legs of the intersection, which mainly services students to/from the school.
- Fifteenth Avenue is an east-west sub-arterial road to the south of Gurner Avenue / Seventeenth Avenue. It has
  one lane in each direction that connects Devonshire Road in the west and Cowpasture Road in the east. There
  are limited footpaths on either side of the road.
- Bringelly Road is an east-west sub-arterial road with mixed cross-sections of dual two and dual three lanes between King Street and Edmondson Avenue. It is a part of the key state road network that connects with Cowpasture Road, The Northern Road and the Westlink M7 that provide access to the rest of Sydney GMA. Shared paths are provided on both sides of the road.
- Elizabeth Drive is an east-west arterial road to the north of the site. It also forms part of the key state road
  network that connects with Cowpasture Road, The Northern Road and the Westlink M7 that provide access to
  the rest of Sydney GMA. The road is generally two lanes eastbound and one lane westbound without a footpath.
- Fourth Avenue is a north-south local road that connects Gurner Avenue with Bringelly Road, with one lane in each direction. A 150-metre footpath is provided on both sides of the road, south of the Gurner Avenue intersection. There is a school zone close to the Gurner Avenue intersection whilst the north leg is gated and could be privately owned.
- Devonshire Road is a north-south sub-arterial road to the west of the site. It has one lane in each direction that connects Elizabeth Drive in the north and King Street and Bringelly Road in the south. There is no footpath on either side of the road.

![](_page_26_Picture_1.jpeg)

Edmondson Avenue currently splits into two disconnected segments to the south of the site. The part between Fifteenth Avenue and Bringelly Road is classified as a sub-arterial road. It has one lane in each direction with a footpath on the western side of the road. The section closer to the site (between Sixteen Avenue and site boundary) is a half-width road for two directions (The eastern half of the road would be constructed together with the development). On-street parking is not restricted for the 5.5 m wide road, so drivers need to give way to pass each other if there is a parked car. A footpath is provided together with the completion of new building blocks on the west side.

## 3.4 Road network performance

Based on desktop review and typical traffic conditions provided by Google Maps (refer to **Figure 3–5** for typical traffic conditions in the AM peak hour), the road network in the vicinity of the site generally operates without any major delays during peak hours due to the rural nature of the area with minimal urban development.

Slow movement tends to occur at Fifteenth Avenue approaching Cowpasture Road and the Westlink M7 during a typical AM peak.

![](_page_26_Figure_6.jpeg)

![](_page_26_Figure_7.jpeg)

Source: Google Maps, 2021

![](_page_27_Picture_1.jpeg)

# 3.5 Public transport

#### 3.5.1 Train

The site is around five kilometres, to the north of Leppington Railway Station which is a terminal station that provides T2 and T5 services as shown in **Figure 3–6**. It has a frequency of about six services during AM and PM peak hours and covers the destinations of Blacktown (on the T5 line) and City Circle (on the T2 line).

![](_page_27_Figure_5.jpeg)

![](_page_27_Figure_6.jpeg)

#### 3.5.2 Bus

Route 855 and route 861 are available on Fifteenth Avenue while Route 853 is available on Edmondson Avenue (south of Fifteenth Avenue), which are all over one kilometre from the site. The bus frequency at the nearby bus stops is below four services per hour during a typical weekday peak hour as shown in **Figure 3–7**.

![](_page_28_Picture_1.jpeg)

![](_page_28_Figure_2.jpeg)

#### Figure 3–7 Service frequency at bus stops during a typical weekday AM peak

Based on travel behaviour analysis of the study area identified in **Section 3.2**, due to relatively long distance to major employment destinations and activities, public transport was not an attractive transport mode at Austral. The modal shift could take place when new development and public transport infrastructure are delivered in the vicinity.

![](_page_29_Picture_1.jpeg)

# 3.6 Active transport

Given the rural nature of the site, there is limited current pedestrian and cycling facilities.

Cycle infrastructure in the vicinity of the site is available along the recently upgraded section of Bringelly Road, the open space in the West Hoxton area that connects to the regional connection along Cowpasture Road as well as the open space north of the Middleton Grange area that connects to the Westlink M7 off-road shared path, as shown in **Figure 3–8**.

![](_page_29_Figure_5.jpeg)

![](_page_29_Figure_6.jpeg)

A walking catchment for the site is shown in **Figure 3–9**, which shows the locations accessible within walking distance (0 - 400m, 400 - 800m and 800m - 1,200m) including the Kingfisher Estate Austral on the northern extension of Edmondson Avenue and Al Faisal College at the intersection of Gurner Avenue/ Fourth Avenue.

The active transport mode share is expected to increase after the delivery of the structure plan in the future and the connection to a wider cycle path network.

![](_page_30_Picture_1.jpeg)

#### Figure 3–9 Walking catchment map

![](_page_30_Figure_3.jpeg)

![](_page_31_Picture_1.jpeg)

# 4.0 Proposed development

## 4.1 Planned subdivision

The subdivision seeks to provide 422 residential dwellings (being 85 dwellings are R3 zoned apartments) and a childcare centre on a total of 318 lots. The site is divided into two sub-development precincts (**Figure 4-1** and **Figure 4-2**).

![](_page_31_Figure_5.jpeg)

![](_page_31_Figure_6.jpeg)

Source: Project Surveyors, 2021

![](_page_32_Picture_1.jpeg)

![](_page_32_Figure_2.jpeg)

![](_page_32_Figure_3.jpeg)

Source: Project Surveyors, 2021

# 4.2 Proposed road network

The proposed transport network needs to cater for the travel characteristics of the proposed land uses as well as integrate appropriately with the surrounding network. The most important interface for the precinct is with the existing and the planned road network to the south.

#### 4.2.1 Road network and hierarchy

The proposed street and the hierarchy are shown in **Figure 4–3**, which have changed from the street network specified in the ILP.

![](_page_33_Picture_1.jpeg)

![](_page_33_Figure_2.jpeg)

Source: e8urban, 2021

The proposed road network indicates improved permeability and more connecting points to the rest of the road network than ILP recommends, including:

- Edmondson Avenue (Street Type A) extends through the western precinct as a collector road.
- East-West WSUD Spine (Street Type B) is an east-west spine that connects from Edmondson Avenue, which bisects the western precinct to enable efficient distribution.
- Edge Street (Street Type E) connects Seoul Avenue and extends on the western and northern boundary of the eastern precinct to provide accessibility.
- Multiple local streets and residential laneways provide permeability and accessibility across the two precincts.
   Four local streets including Edge Street (Street Type E), Shared Zones (Street Type C1) and Laneway connect the future planned road to the south of the western precinct while two Shared Zones (Street Type C1) and WSP Street (Street Type J) connect the existing Seoul Avenue with the eastern precinct.

#### 4.2.2 Proposed cross-section

The proposed cross-section for local sub-arterial is generally consistent with what has been suggested in the *West Sydney Street Design Guideline*. The detailed cross-section designs for different street types are shown in **Appendix A**.

## 4.3 Car access

The western precinct would gain access via the existing Edmondson Avenue and Crown Street (connecting back to Edmondson Avenue via Swamphen Street) to the south. Edmondson Avenue intersects with Gurner Avenue which further connects a wider road network. Therefore, Edmondson Avenue provides temporary access for the western precinct before the completion of neighbour developments and surrounding infrastructures.

![](_page_34_Picture_1.jpeg)

In the long term, another access point would be available to the west of Edmondson Avenue to connect Gurner Road with the site according to ILP. The eastern half of Edmondson Avenue would be expected to be delivered associated with the neighbour development such that a full width of Edmondson Avenue could be completed.

The eastern precinct can gain access via the existing Seoul Avenue, which further connects with Oslo Street, King Rock Road for a wider road network.

It is noted that there are no connections for cars between the two precincts due to the riparian zone.

## 4.4 Active transport access

An off-road cycle lane would be accommodated on one side of the proposed Edmondson Avenue, Edge Street (Street Type E) and Shared Zone 2 (Street Type D). A shared path would be available on East-West WSUD Spine. Other street types are all classified as shared zones that create an active transport friendly environment.

A minimum 1.5 m wide footpath will be provided on at least one side of all roads (except shared zone and laneways) within the precinct to improve walkability.

# 4.5 Trip generation and distribution

According to Roads and Maritime Services' *Guide to Traffic Generating Developments Technical Direction 2013/04a*, low-density residential development is forecast to generate 0.95 and 0.99 vehicle trips per dwelling, during the AM and PM peak hour, respectively. Meanwhile, RTA's *Guide to Traffic Generating Developments* recommends up to 0.65 vehicle trips per dwelling for peak hours for medium-density residential dwellings.

The childcare centre is expected to service the residents of the site itself. Therefore, there would be limited trip generation onto the external road network and the trip generation for childcare centre is excluded.

With the expected yield of 337 and 85 low-density and medium-density dwellings, the subdivision is expected to generate 375 and 389 vehicle trips during the AM and PM peak hours as shown in **Table 4-1**.

Landuco	Viold	Trip	rates	Trip generation		
Lanu use	neiu	AM peak	PM peak	AM peak	PM peak	
Low-density residential	+337 dwellings	0.95 veh per dwelling dwelling		+320 vehicle trips	+334 vehicle trips	
Medium- density residential	+85 dwellings	0.65 veh per dwelling	0.65 veh per dwelling	+55 vehicle trips	+55 vehicle trips	
Total	+422 dwellings	22 dwellings -		+375 vehicle trips	+389 vehicle trips	

#### Table 4-1 Trip generation per hour

Source: SCT Consulting, 2021

In terms of trip distribution, it is expected all traffic would be heading to/from the south given there would be no strategic road network available to the north of the site.

![](_page_35_Picture_1.jpeg)

# 5.0 Traffic impact assessment

## 5.1 Road network impact

#### 5.1.1 Road network impact

Based on **Section 4.5**, the resulting additional traffic associated with the development would be 375 and 389 vehicles in both directions during AM peak and PM peak hours.

AECOM prepared an *Austral & Leppington North Precincts Traffic Assessment* in 2011 for [then] NSW Department of Planning and Infrastructure. Modelling of the precincts utilised the AECOM CUBE model, with trip generation and distribution based on an assessment of average trip rates for developed and residential areas, population and employment projections and dwelling and employment numbers proposed for the Growth Centres. The modelled development yield is consistent with that subsequently provided for the Liverpool Growth Centre Precincts DCP.

The proposed yield of the site is consistent with the Liverpool Growth Centre Precincts DCP. Hence, it is assumed that the trip generation of the development would be accommodated by the planned infrastructure and the road network impact would be acceptable.

#### 5.1.2 Shared zone

Apart from Edmondson Avenue, East-West Spine and Edge Street, all the remaining streets are categorised as shared zones. Those shared zones and laneways provide permeability and connectivity across the internal street network. There would be traffic calming treatments along those shared zones such that vehicle speeds would be reduced, which provides a safer environment for cyclists and pedestrians across the site.

#### 5.1.3 Cross section impact

The previous DCP is inconsistent with the new Western Sydney Street Design Guidelines. A process of reconciliation has been undertaken that generally implements the newer Western Sydney Street Design Guidelines, which provide a higher quality space.

The proposed cross-sections generally maintain the features recommended by *Western Sydney Street Design Guidelines* with deviations as justified in **Table 5-1**. Those deviations have a limited impact on the road network and are considered beneficial for site access and sustainable transport use.

![](_page_36_Picture_1.jpeg)

#### Table 5-1 Cross section justifications

Road name	Western Sydney Street Design Guidelines	Proposed design	Justification
Entry Street (A)	<ul> <li>B3.6 Local Collector</li> <li>Pedestrian zone/ planting zone/ flex zone/ carriageway/ flex zone/ planting zone/ cycle zone/ planting zone/ pedestrian zone</li> <li>Variable/ 2m/ 6.4m/ 2m/ variable (total=22.7m)</li> </ul>	<ul> <li>Entry Street (Street Type A)</li> <li>Buffer/ pedestrian zone/ planting zone/ flex zone/ carriageway/ flex zone/ planting zone/ cycle zone/ separator/ pedestrian zone/ buffer</li> <li>0.6m/ 1.5m/ variable/ 2.4m/ 6.4m/ 2.4m / variable/ 2.5m/ 0.6m/ 1.5m/ 0.6m (total=26.9-29.4m)</li> </ul>	AS2890.1 specifies a minimum of 2.1m for parallel parking with additional 300mm clearance of obstructions. Adopting a 2.4m wide parking space is acceptable provides more generous space for the passengers and for doors swinging out. It has no impact on pedestrian crossings and reduces the impact on the road users on the carriageway.
East-West Spine (B)	<ul> <li>B3.3 Local Street Type 3 – Dual carriage and footpaths – Low Density (case study B)</li> <li>Pedestrian zone/ planting zone/ flex zone/ carriageway/ flex zone/ planting</li> </ul>	<ul> <li>East-West Spine (Street Type B)</li> <li>Buffer/ shared path/ planting zone/ flex zone/ carriageway/ planting zone/ pedestrian zone/ buffer</li> <li>0.6m/ 2.5m/ 2.4m/ 2.4m/ 5.6m/ 2.4m / 1.5m/ 0.6m (total=18m)</li> </ul>	Converting a footpath to a shared path facilitates the cyclists and enhance the cycle network for the western precinct.
and Edge Street (E)	zone/ planting zone/ pedestrian zone – Variable/ 2.4m/ 5.6m/ 2.4m/ variable (total=19.8m)	<ul> <li>Edge Street (Street Type E)</li> <li>Buffer/ cycleway/ carriageway/ planting zone (parking)/ pedestrian zone/ buffer</li> <li>0.4m/ 2.5m/ 0.6m/ 5.5m/ 2.4m/ 1.5m/ 0.6m (total=12-13.5m)</li> </ul>	The cycleway would facilitate the cycle network and its connectivity. It is mountable to allow for a fire engine during an emergency. Given there is no residential dwellings on one side of the edge road, the parking has been removed.
Shared zones (varies)	<ul> <li>B3.1 Local Street Type 1 – Shared Zone, Residential Neighbourhood</li> <li>Planting zone/ flex zone/ shared zone/ flex zone (parking)/ planting zone</li> <li>Variable/ 2m/ 5.5m/ 2m/ variable (total=13.6m)</li> </ul>	<ul> <li>Shared Zones (Street Type C1 &amp; C2)</li> <li>Buffer/ Planting zone/ flex zone/ shared zone/ flex zone/ planting zone</li> <li>0.6m/ variable/ 2.4m/ 5.5m/ variable/ 0.6m (total=12-13.6m)</li> </ul>	AS2890.1 specifies a minimum of 2.1m for parallel parking with additional 300mm clearance of obstructions. Adopting a 2.4m wide parking space is acceptable provides more generous space for the passengers and for doors swinging out. It has no impact on pedestrian crossings and reduces the impact on the road users on the carriageway.

![](_page_37_Picture_1.jpeg)

Road name	Western Sydney Street Design Guidelines	Proposed design	Justification
		<ul> <li>C3 and Swale Street 2 (Street Type I)</li> <li>Buffer/ planting zone/ shared zone/ planting zone/ shared zone/ flex zone/ buffer</li> <li>0.6m/ variable/ 3.5-4m/ variable/ 3.4-4m/ 2.4m/ 0.6m (total=23.1-25m)</li> </ul>	Same justification for wider parking spaces as above. The road cross section includes two one-way driveway width a landscaped median. This is considered acceptable due to the provision of open space and there is limited impact on traffic circulation. It is expected that no-stopping signage would be installed to avoid blockage by parked cars. The narrowed street benefits a pedestrian and cyclist friendly environment.
	<ul> <li>Shared Zone (Street Type D)</li> <li>Buffer/ Planting zone/ flex zone/ shared zone/ cycleway/ open space</li> <li>0.6m/ variable/ 2.4m/ 5.5m/ 2.6m (total=8.9-14.2m)</li> </ul>	Same justification for wider parking spaces as above. The cycleway would facilitate the cycle network and its connectivity to eastern precinct. It is mountable to allow for a fire engine during an emergency. Given there are no dwellings on one side of the edge road, the parking has been removed.	
		<ul> <li>Swale Street 1 (Street Type H) and WSP Street (Street Type J) (Shared Zone)</li> <li>Buffer/ planting zone/ footpath/ planting zone/ shared zone/ planting zone/ buffer</li> <li>0.6m/ variable/ 1.5m/ 13.4m/ 4-4.1m/ 2.4m/ 0.6m (total=25m)</li> </ul>	Those roads will operate as one way to serve a limited number of dwellings It is expected that no-stopping signages would be installed to avoid blockage by parked cars. The narrowed street benefits a pedestrian and cyclist friendly environment and allows vehicle to travel.
Laneway (varies)	<ul> <li>B3.5 Residential laneway</li> <li>Planting zone/ shared zone/ planting zone</li> <li>1.5m/ 5.5m/ 1.5m (total=8.5m)</li> </ul>	<ul> <li>Laneways (Street Type F &amp; G)</li> <li>Planting zone/ shared zone/ planting zone</li> <li>0.75m/ 5.5m/ 0.75m (total=7m)</li> </ul>	The narrower landscape has no impact on traffic circulation.

Source: SCT Consulting, 2021

![](_page_38_Picture_1.jpeg)

#### 5.1.4 Half-width road queue analysis

As discussed in **Section 3.3**, Edmondson Avenue is currently a half-width road, and another half would not be available until the neighbouring development opens. On-street parking is not restricted for the 5.5 m wide road, so drivers need to give way to pass each other if there is a parked car (The remaining width would be less than 3.5 m). Hence, SIDRA modelling was carried out to evaluate the queue length for this interim scenario.

The worst case would take place at the mid-block of Edmondson Avenue (between Gurner Avenue and Swamphen Street) during the two peak hours, where car trips would be generated for both the western precinct of the subject site (226 out of the total 422 dwellings) and 35 Gurner Avenue (84 dwellings to the south of western precinct) (**Figure 5-1**).

Figure 5-1 Location for SIDRA modelling (red star shows the location)

![](_page_38_Picture_6.jpeg)

Source: Nearmap, 2021

## 5.1.4.1 Key assumptions for the model

In developing the SIDRA models to estimate the future traffic conditions, the following scenarios were tested at the mid-block of Edmondson Avenue:

- Northbound traffic gives way to southbound traffic (AM)
- Southbound traffic gives way to northbound traffic (AM)
- Northbound traffic gives way to southbound traffic (PM)
- Southbound traffic gives way to northbound traffic (PM).

It is assumed that a total of 295 and 307 car trips would be generated for AM and PM peak hours and a directional ratio of 90 per cent and 10 per cent have been applied.

![](_page_39_Picture_1.jpeg)

The available on-street parking on Edmondson Avenue is about 50 m long. Assuming the travel speed is 40 km/h, it takes about 4.5 seconds for a car to give way to the other. From conservative perspective, a gap acceptance of 6 seconds and follow-up headway of 3.5 seconds were adopted in the SIDRA modelling, which are the maximum values in the RMS recommended modelling guidelines.

#### 5.1.4.2 Intersection level of service

Intersection Level of Service (LoS) is a typical design tool used by traffic engineers to identify when roads are congested. The Level of Service as defined in TfNSW Traffic Modelling Guidelines is provided in **Table 5-2**.

#### Table 5-2 Level of Service definitions

Level of Service	Average delay per vehicle (seconds)	Performance explanation
А	Less than 14.5	Good operation
В	14.5 to 28.4	Good with acceptable delays and spare capacity
С	28.5 to 42.4	Satisfactory
D	42.5 to 56.4	Operating near capacity
E	56.5 to 70.4	At capacity, at signals incidents will cause excessive delays. Roundabouts require other control method.
F	70.5 or greater	At capacity, at signals incidents will cause excessive delays. Roundabouts require other control method.

Source: Roads and Maritime Services (2002), Traffic Modelling Guidelines

In addition, Degree of Saturation (DoS) is included to complement Level of Service, i.e. a measure of the volume/capacity for the worst turning movement at the intersection. DoS is 1 implies the turning movement is at capacity.

#### 5.1.4.3 Queue analysis

The AM and PM peak hour mid-block performance are summarised in **Table 5-3**. As shown, all scenarios would operate well with good LoS and spare capacity.

The maximum queue length would occur when northbound traffic gives way to the southbound traffic in the PM peak hour. However, the queue of two vehicles is acceptable. A detailed SIDRA output is shown in **Appendix B**.

			AM Peal	<	PM Peak			
Scenarios	Delay	LoS	DoS	95 <sup>th</sup> percentile queue	Delay	LoS	DoS	95 <sup>th</sup> percentile queue
Northbound traffic gives way to southbound traffic	1.8s	А	0.15	1.0m	0.2s	А	0.25	9.1m
Southbound traffic gives way to northbound traffic	0.2s	А	0.24	8.7m	1.9s	А	0.15	1.1m

#### Table 5-3 Queue length

Source: SCT Consulting, 2021

It would be less of an issue if a full-width road is completed. No give way manoeuvring is needed on Edmondson Avenue.

# 5.2 Public transport impact

As analysed in **Section 3.5**, the area around the site experienced low public transport mode share given the site's distance from train stations and relatively low bus service frequency. With the proposed urban growth in Austral, the network will continue to evolve with increases in frequency and further route coverage as the road network is

![](_page_40_Picture_1.jpeg)

delivered. TfNSW regularly reviews bus service provision in line with population growth and network changes. It is recommended that the following changes be considered as part of the planning for the area:

- Addition of bus stops along Gurner Avenue and Seventeenth Avenue such that residents can catch buses closer to home (before bus routes extension to further north)
- Potential bus route extensions north of Gurner Avenue and Seventeenth Avenue. However, this will be subject to the timing of the development of the road network (full width of Edmondson Avenue).

Given the scale of the development, it is expected that the public transport demand would be limited, hence no significant impact on the public transport network.

# 5.3 Active transport impact

It is important to ensure a safe and well-connected, high-quality footpath and cycle path system around the site, to promote sustainable transport use, especially for short-distance trips. It is proposed to provide footpaths on all local streets (except share zones and laneways) such that the walking facility could be connected to Edmondson Avenue. This would facilitate walking and connections to nearby destinations.

The bicycle facility has been proposed according to the ILP on Edmondson Avenue. Cycle paths and shared paths would be available on East-West Spine and Edge Streets, making the residential precinct cyclist-friendly. The connections between the two precincts facilitate active transport use by future residents.

The number of person/bicycle trips generated by the development during the peak periods would be limited, hence no significant impact on the active transport network.

![](_page_41_Picture_1.jpeg)

# 6.0 Conclusion

The subdivision seeks a yield of 422 residential dwellings and a child care centre with a proposed internal road network. In summary:

- The proposed development responds to the housing target for Austral and Leppington North and will be developed to meet the needs of a diverse community, supported by local services, infrastructure, facilities, and employment, in an environmentally sustainable manner.
- The proposed road network is generally consistent with the Indicative Layout Plan but provides improved permeability and more connecting points to the rest of the road network.
- Edmondson Avenue provides temporary access for the western precinct before the completion of neighbouring developments. In the long term, another access point would be available to the west of Edmondson Avenue to connect Gurner Road with the site. The eastern half of Edmondson Avenue would be expected to be delivered associated with the neighbouring development such that a full width of Edmondson Avenue could be completed.
- The eastern precinct can gain access via the existing Seoul Avenue, which further connects with Oslo Street, King Rock Road to the wider road network.
- The subdivision is expected to generate 375 and 389 vehicle trips during the AM and PM peak hours. Given the compliance of the proposed development yield with the DCP, it is assumed that the trip generation of the development would be accommodated by the planned infrastructure and the road network impact would be acceptable.
- Shared zones are distributed widely across the site. There would be traffic calming treatments along those shared zones such that vehicle speeds would be reduced, which provides a safer environment for cyclists and pedestrians across the residential precincts.
- The proposed cross-sections generally maintain the features recommended by Western Sydney Street Design Guidelines. It is noted that there are variations such as wider on-street parking spaces, the addition of cycle paths, converting a footpath to the cycle path and one way shared zones etc. Those deviations have a limited impact on the road network and are considered beneficial for site access and sustainable transport use.
- During the interim scenario, the two opposing traffic would need to give way to each other if there is a parked car on Edmondson Avenue (5.5 m wide road). It is confirmed that the maximum queue length would occur when northbound traffic gives way to the southbound traffic in the PM peak hour. However, the queue of two vehicles is acceptable.
- TfNSW regularly reviews bus service provision in line with population growth and network changes. It is
  recommended that the following changes be considered as part of the planning for the area including the
  addition of bus stops along Gurner Avenue and Seventeenth Avenue and potential bus route extensions north
  of Gurner Avenue and Seventeenth Avenue.
- An off-road cycle lane would be accommodated on one side of the proposed Edmondson Avenue, Edge Street (Street Type E) and Shared Zone 2 (Street Type D) whereas a shared path would be available on East-West WSUD Spine. Other street types are all classified as shared zones that create an active transport friendly environment.
- A minimum of 1.5 m wide footpath will be provided on at least one side of all roads (except shared zone and laneways) within the precinct to improve walkability.

The Traffic and Access Study concluded that the development is at a level able to be accommodated by the existing and planned infrastructure.

![](_page_42_Picture_1.jpeg)

# APPENDIX A **Proposed cross sections**

## STREET A Entry Street

![](_page_43_Figure_1.jpeg)

	PROJECT: GURNER AVENUE AUSTRAL	DRAWING: STREET A	<b>SKETCH NO:</b> SK_0090	SCALE:	<b>e8urban</b>
<b>IF</b> LANDCOM	CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	Burban pty. Itd. ABN: 97 668 290 842

![](_page_44_Figure_1.jpeg)

![](_page_44_Figure_2.jpeg)

	PROJECT: GURNER AVENUE AUSTRAL	DRAWING: STREET B	<b>SKETCH NO:</b> SK_0091	SCALE:	e8urban	
<b>E LANDCOM</b>	CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	BURGENTION BURGENTION JOE ROWLING Burban pty. Itd. ABN: 97 668 290 842	

![](_page_45_Figure_1.jpeg)

![](_page_45_Figure_2.jpeg)

Buffer

I ANDCOM				
CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	BIRECTOR: 4-0 address Joe Rowling e&urban pty. ltd. ABN: 97 668 290 842

![](_page_46_Figure_1.jpeg)

![](_page_46_Figure_2.jpeg)

	PROJECT: GURNER AVENUE AUSTRAL	DRAWING: STREET C2	<b>SKETCH NO:</b> SK_0093	SCALE:	<b>e8urban</b>
<b>I LANDCOM</b>	CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	e8urban pty. ltd. ABN: 97 668 290 842

![](_page_47_Figure_1.jpeg)

![](_page_47_Picture_2.jpeg)

![](_page_48_Figure_1.jpeg)

#### LEGEND - STREET DESIGN

![](_page_48_Figure_3.jpeg)

PROJECT: GURNER AVENUE AUSTRAL	DRAWING: STREET D	<b>SKETCH NO:</b> SK_0095	SCALE:	e8urban
CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	Bank and the second sec

## STREET E Edge Street

![](_page_49_Figure_1.jpeg)

![](_page_49_Figure_3.jpeg)

![](_page_49_Picture_4.jpeg)

### STREET F Laneway 1 (Tree on two sides)

![](_page_50_Figure_1.jpeg)

![](_page_50_Figure_2.jpeg)

**III LANDCOM** 

PROJECT: GURNER AVENUE AUSTRAL	DRAWING: STREET F	<b>SKETCH NO:</b> SK_0097	SCALE:	e8urban
CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	DIRECTOR: Construction Joe Rowling e8urban pty. Itd. ABN: 97 668 290 842

![](_page_51_Figure_1.jpeg)

![](_page_51_Figure_2.jpeg)

#### LEGEND - STREET DESIGN

![](_page_51_Figure_4.jpeg)

	PROJECT: GURNER AVENUE AUSTRAL	DRAWING: STREET G	<b>SKETCH NO:</b> SK_0098	SCALE:	e8urban
<b>LANDCOM</b>	CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	Bin

## STREET H Swale Street 1

![](_page_52_Figure_1.jpeg)

	PROJECT: GURNER AVENUE AUSTRAL	DRAWING: STREET H	<b>SKETCH NO:</b> SK_0099	SCALE:	e8urban
<b>E LANDCOM</b>	CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	eBurban pty. Itd. ABN: 97 668 290 842

## STREET I Swale Street 2

![](_page_53_Figure_1.jpeg)

PROJECT: GURNER AVENUE AUSTRAL	DRAWING: STREET I	SKETCH NO: SK_0100	SCALE:	e8urban	
CLIENT: LANDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	e8urban pty. ltd. ABN: 97 668 290 842	

## STREET J WSP Street

![](_page_54_Figure_1.jpeg)

![](_page_54_Figure_2.jpeg)

![](_page_54_Figure_3.jpeg)

PRO GURI	OJECT: RNER AVENUE AUSTRAL	DRAWING: STREET J	SKETCH NO: SK_0101	SCALE:	e8urban
	ENT: NDCOM / OSL	<b>DATE:</b> 18/10/21	<b>REVISION:</b> A 18/10/21 B 20/10/21 C 21/10/21	PURPOSE: FOR INFORMATION	BIRECTOR:       4:000000000000000000000000000000000000

![](_page_55_Picture_1.jpeg)

# APPENDIX B SIDRA output

# $\nabla$ Site: 101v [a. AM SB Priority]

New Site Site Category: (None) Giveway / Yield (Two-Way)

Move	Movement Performance - Vehicles												
Mov ID	Turn	Demand F Total veh/h	lows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h	
South: Edmonson Ave (s)													
2	T1	32	1.0	0.038	1.8	LOS A	0.1	1.0	0.41	0.27	0.41	48.8	
Appro	ach	32	1.0	0.038	1.8	NA	0.1	1.0	0.41	0.27	0.41	48.8	
North:	Edmons	son Ave (n)											
8	T1	280	1.0	0.145	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0	
Appro	ach	280	1.0	0.145	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0	
All Vel	hicles	312	1.0	0.145	0.2	NA	0.1	1.0	0.04	0.03	0.04	49.9	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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# $\nabla$ Site: 101v [b. AM NB Priority]

New Site Site Category: (None) Giveway / Yield (Two-Way)

Move	Movement Performance - Vehicles												
Mov ID	Turn	Demand F Total veh/h	lows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h	
South: Edmonson Ave (s)													
2	T1	32	1.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0	
Appro	ach	32	1.0	0.016	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0	
North:	Edmons	son Ave (n)											
8	T1	280	1.0	0.243	0.2	LOS A	1.2	8.7	0.14	0.05	0.14	49.6	
Approa	ach	280	1.0	0.243	0.2	NA	1.2	8.7	0.14	0.05	0.14	49.6	
All Vel	nicles	312	1.0	0.243	0.2	NA	1.2	8.7	0.13	0.04	0.13	49.6	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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# $\nabla$ Site: 101v [c. PM SB Priority]

New Site Site Category: (None) Giveway / Yield (Two-Way)

Move	Movement Performance - Vehicles												
Mov ID	Turn	Demand F Total veh/h	lows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h	
South: Edmonson Ave (s)													
2	T1	291	1.0	0.253	0.2	LOS A	1.3	9.1	0.15	0.05	0.15	49.6	
Appro	ach	291	1.0	0.253	0.2	NA	1.3	9.1	0.15	0.05	0.15	49.6	
North:	Edmons	son Ave (n)											
8	T1	33	1.0	0.017	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0	
Appro	ach	33	1.0	0.017	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0	
All Vel	nicles	323	1.0	0.253	0.2	NA	1.3	9.1	0.13	0.05	0.13	49.6	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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# $\nabla$ Site: 101v [d. PM NB Priority]

New Site Site Category: (None) Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand F Total veh/h	lows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Edmonson Ave (s)												
2	T1	291	1.0	0.150	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Appro	ach	291	1.0	0.150	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
North: Edmonson Ave (n)												
8	T1	33	1.0	0.040	1.9	LOS A	0.2	1.1	0.42	0.28	0.42	48.7
Appro	ach	33	1.0	0.040	1.9	NA	0.2	1.1	0.42	0.28	0.42	48.7
All Vel	nicles	323	1.0	0.150	0.2	NA	0.2	1.1	0.04	0.03	0.04	49.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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

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

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