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# Best Street & Oxley Street, Griffith Proposed Industrial Subdivision

## Transport Impact Assessment

Prepared for: Planningmatters Development Service

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# Revision

Revision	Date	Comment	Prepared By	Approved By
A	12 March 2024	Final	David Graham	David Graham



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For and on behalf of

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# 1. Introduction

## 1.1 Background and Proposal

A Development Application (DA) is being submitted for a proposed industrial subdivision of Lot 1943 DP 44495 & Lot 724 DP 751709, off Best Street and Oxley Street, Griffith. The proposal involves subdividing the land into 35 lots of varying sizes. Of these, 33 lots will be for industrial uses, with the remaining 2 lots to be vested to Council for drainage purposes.

Access will be provided via the extension of both Best Street and Oxley Street, and the construction of a new local road connecting the ends of Best Street and Oxley Street, and extending to the north and east with court bowls at each end. All of the lots will gain access from these new roads.

Stantec was commissioned to undertake a transport impact assessment of the proposed subdivision.

## 1.2 Purpose of this Report

The report sets out an assessment of the anticipated traffic and transport implications of the proposed subdivision, including consideration of:

- the acceptability of the traffic impacts of the proposed subdivision, including the need for mitigating road works.
- the adequacy of the proposed internal road layout

## 1.3 References

In preparing this report, reference has been made to the following:

- plans of the proposed subdivision prepared by Planningmatters Development Service, project no.2021.25, sheet 1, issue D, dated 5 March 2024
- Griffith Local Environmental Plan (LEP) 2014
- Griffith Development Control Plan No.3 – Industrial Development, March 1995
- Griffith City Council Engineering Guidelines for Subdivisions and Development Standards. Part 2 - Road Designs, amended 26 April 2016
- Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management, edition 4.0, 2020
- other documents as nominated.



## 2. Existing Conditions

### 2.1 Subject Site

The subject site consists of two land parcels (Lot 1943 DP 44495 & Lot 724 DP 751709) which are located at the ends of Best Street and Oxley Street, Griffith. The site also has a frontage of approximately 100m to Bridge Road.

The site is located within a General Industrial Zone (IN1) and is currently mostly undeveloped, other than a dwelling with outbuildings, which is located in the southwest corner of the site. The surrounding properties include a mix of industrial and agricultural land uses.

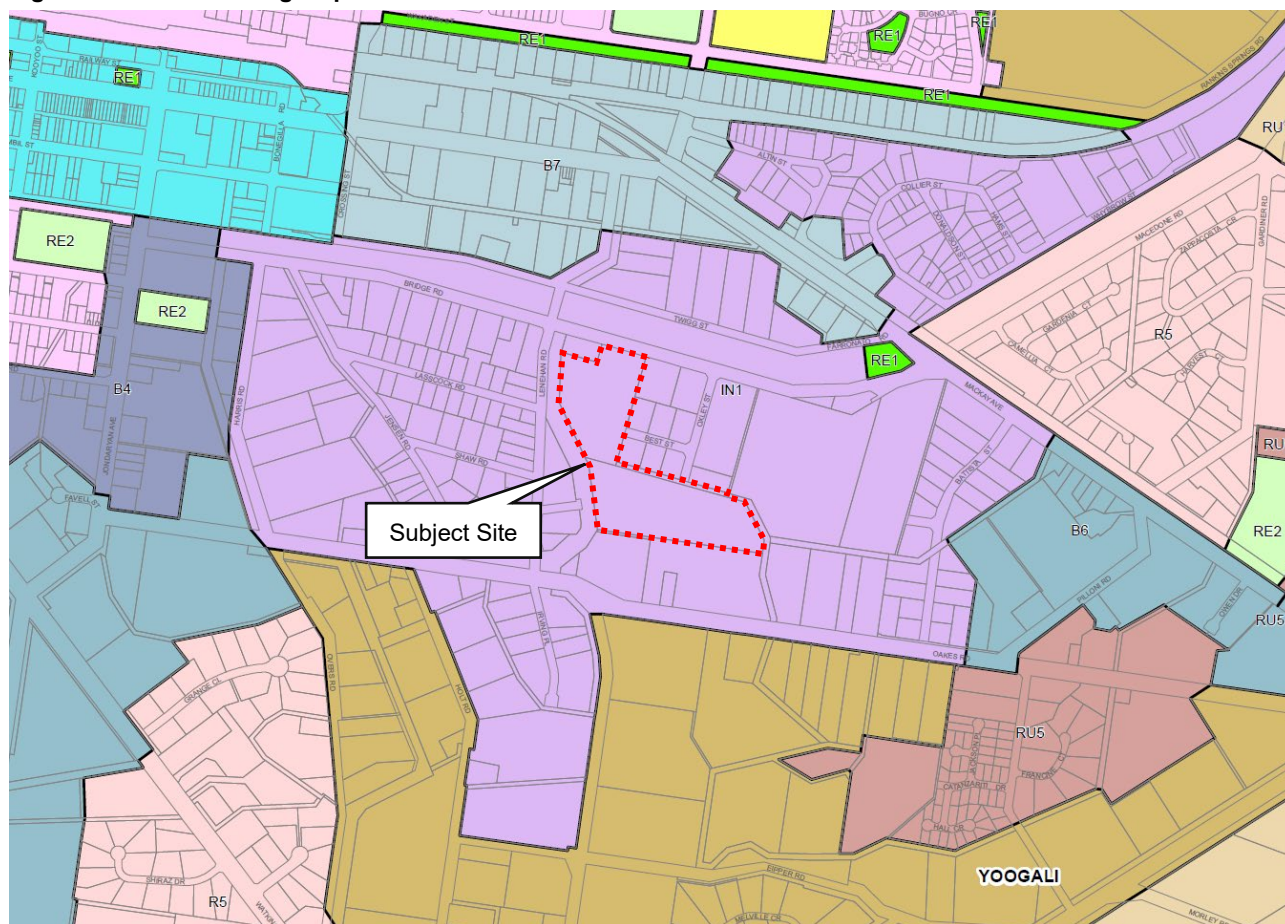
The location of the subject site and the surrounding environs is shown in Figure 2.1, and the land zoning is shown in Figure 2.2.

**Figure 2.1 – Subject Site and its Environs**





**Figure 2.2 – Land Zoning Map**



## 2.2 Road Network

### 2.2.1 Adjoining Roads

#### Best Street

Best Street functions as a local industrial road. It is a two-way road aligned in an east-west direction and is configured with an undivided, 13 metre wide carriageway, which is constructed with kerb and channel, and underground drainage. Kerbside parking is permitted. The western end of Best Street currently terminates at a cul-de-sac. There is no court bowl provided.

#### Oxley Street

Best Street functions as a local industrial road. It is a two-way road aligned in a north-south direction and is configured with an undivided, 13 metre wide carriageway, which is constructed with kerb and channel, and underground drainage. Kerbside parking is permitted. The southern end of Oxley Street currently terminates at a cul-de-sac. There is no court bowl provided.

#### Bridge Road

Bridge Road functions as a local road. It is a two-way road aligned in an east-west direction and configured with an undivided two-lane, 7 metre wide carriageway. Bridge Road does not have kerb and channel or underground drainage.

### 2.2.2 Other Roads

Other roads within the vicinity of the site include Lenehan Road and Mackay Avenue (B94).

### 2.2.3 Surrounding Intersections

Key intersections in the vicinity of the site include:

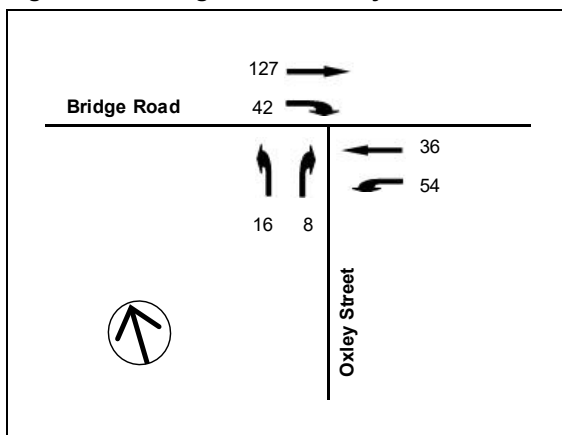
- Best Street / Oxley Street (unsignalised T-intersection)
- Oxley Street / Bridge Road (unsignalised T-intersection with auxiliary channelised left and right turn lanes in Bridge Road)
- Bridge Road / Lenehan Road (roundabout)

### 2.2.4 Traffic Volumes

Traffic tube counts were undertaken of Bridge Road between Oxley Street and Mackay Street in November and December 2019. These found that this section of Bridge Road carried an average of approximately 2,350 vehicle movements per day (two-way).

These surveys were undertaken prior to the development of the service station on the southwest corner of Bridge Road and Oxley Street. The traffic impact assessment that was completed for the development of the service station anticipated the post-development traffic turning movements at the intersection of Bridge Road and Oxley Street during a weekday PM peak hour shown in Figure 2.3. Given that this service station is now operational, they are assumed to approximately represent the existing conditions at the intersection.

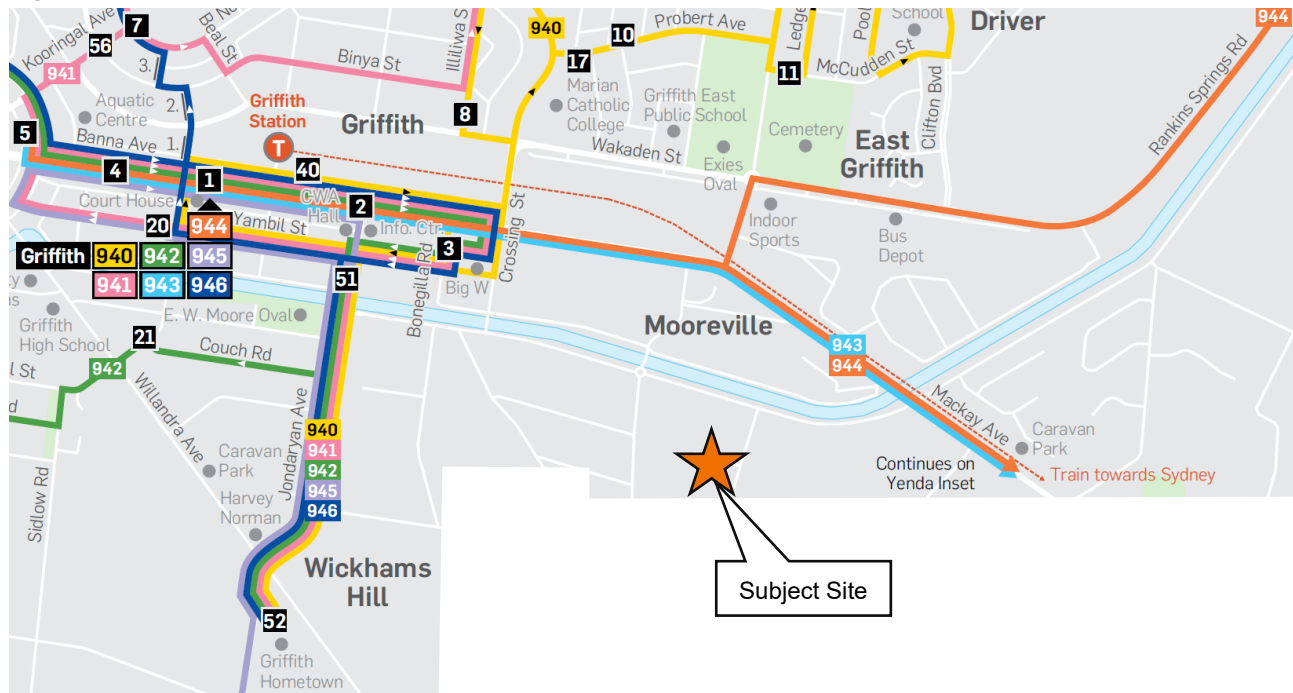
**Figure 2.3 – Bridge Road & Oxley Street Intersection – Estimated Current PM Peak Hour Turning Movements**



## 2.3 Public Transport

The nearest bus services to the site are Routes 943 and 944, which operate along Mackay Avenue, approximately 750m from the site. However, these routes only operate a limited service, during school peak periods only. Other routes operate through the Griffith CBD, approximately 1km to the northwest of the site. The bus services in the vicinity of the site are shown in Figure 2.4.

**Figure 2.4 – Public Transport Map**



## 2.4 Pedestrians & Cyclists

There are no formal footpaths or bicycle facilities in the vicinity of the site.



## 3. Traffic Impact Analysis

### 3.1 Traffic Generation

Traffic surveys were undertaken in 2012 on behalf of RMS of 7 industrial estates in regional NSW. The estates ranged between 6ha and 52ha in size, but with 5 of the 7 estates being less than 20ha in size.

The surveys found that 6 of the 7 estates generated between 100 and 200 total daily vehicle movements per hectare of land area, of which between 10 and 24 vehicle movements per hectare were within a peak hour.

The proposed subdivision has a total area of just less than 10ha. Consequently, if the higher rates from the RMS surveys are conservatively adopted, the proposed subdivision could generate up to 2,000 daily vehicle movements, including up to 240 vehicle movements in a peak hour.

### 3.2 Traffic Distribution

All traffic generated by the proposed subdivision will need to access the site via the intersection of Oxley Street and Bridge Road. Given the location of the site to the east of the Griffith CBD, it is expected that the majority of traffic accessing the subdivision will be travelling to/from the west. Notwithstanding, the proximity of the site to Mackay Avenue is likely to attract a reasonable volume of traffic to/from the east. Therefore, for the purposes of this assessment, the following traffic distributions have been assumed:

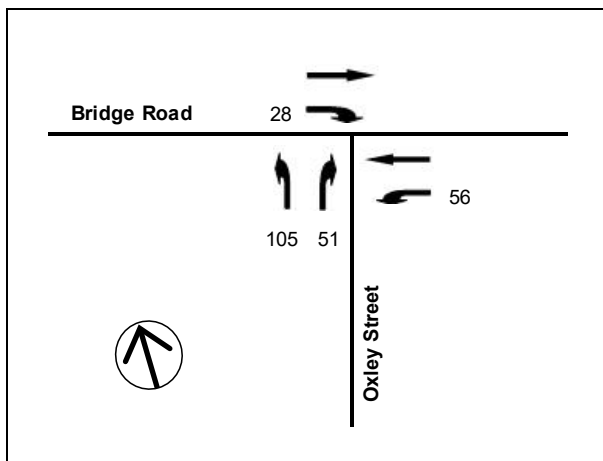
- To/from west on Bridge Road – 67%
- To/from east on Bridge Road – 33%

The RMS surveys referenced above found the following average peak hour directional splits for industrial estates in regional NSW:

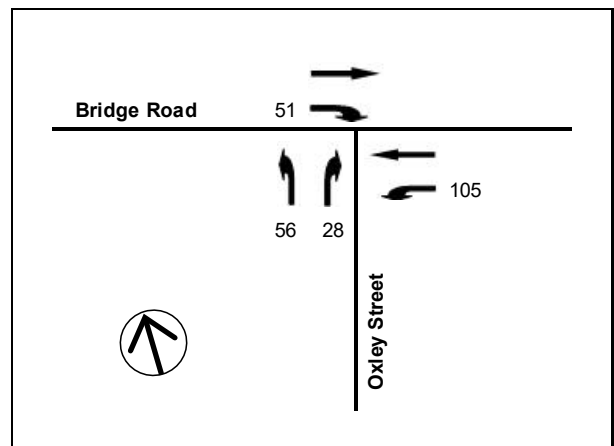
- AM – 65% in / 35% out
- PM – 35% in / 65% out

Based on the above, Figure 3.1 and Figure 3.2 show the estimated site-generated traffic volumes at the intersection of Bridge Road and Oxley Street during the AM and PM peak hours respectively.

**Figure 3.1 – Bridge Road & Oxley Street – AM Peak Hour Site-Generated Traffic Volumes**



**Figure 3.2 – Bridge Road & Oxley Street – PM Peak Hour Site-Generated Traffic Volumes**

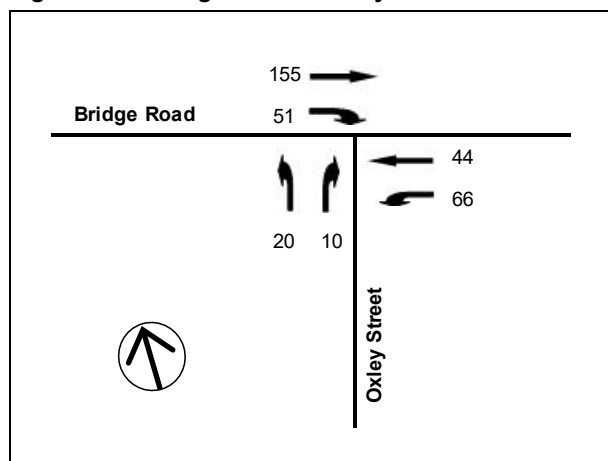


### 3.3 Traffic Impact

#### 3.3.1 Background Traffic Volumes

In order to consider the future impact of the additional traffic 10-years post-development, consideration needs to be given to the expected background traffic at that time. Therefore, the existing traffic volumes at the intersection of Bridge Road and Oxley Street shown in Figure 2.3 have been growthed by 2% per annum (compounding) for a period of 10 years. These volumes are shown in Figure 3.3.

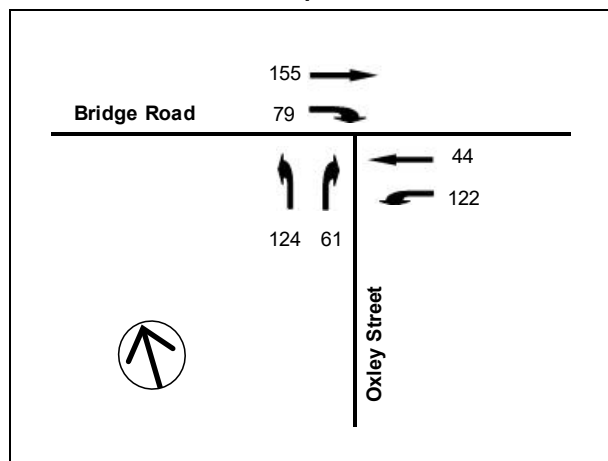
**Figure 3.3 – Bridge Road & Oxley Street – 10-Year Future Background Traffic Volumes**



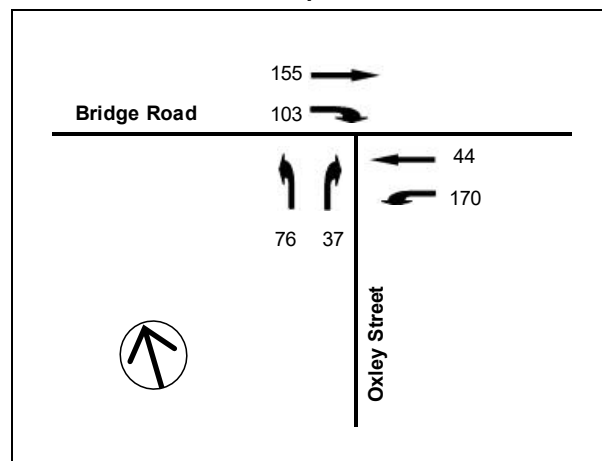
### 3.3.2 Post-Development Traffic Volumes

By adding the 10-year future traffic volumes at the intersection of Bridge Road and Oxley Street shown in Figure 3.3 to the expected future site-generated traffic volumes shown in Figure 3.1 and Figure 3.2, we can obtain the expected 10-year post-development traffic volumes at the intersection. These are shown in Figure 3.4 and Figure 3.5. Note that, in the absence of existing data for the AM peak hour, it has been assumed that the existing AM peak hour volumes are the same as the PM peak hour volumes.

**Figure 3.4 – Bridge Road & Oxley Street – AM Peak Hour 10-Year Post-Development Traffic Volumes**



**Figure 3.5 – Bridge Road & Oxley Street – PM Peak Hour 10-Year Post-Development Traffic Volumes**



### 3.3.3 Intersection Operation

The impact of the subdivision traffic upon the intersection of Bridge Road and Oxley Street has been assessed using SIDRA INTERSECTION modelling software. On the basis of the turning movement estimates in Figure 3.4 and Figure 3.5, Table 3.1 shows a summary of the anticipated 10-year post-development operation of the intersection. Detailed results of this analysis are provided in Appendix A of this report.

**Table 3.1 – Bridge Road & Oxley Street Intersection – Estimated 10-Year Post-Development Peak Hour Intersection Operation**

Peak Hour	Approach	Degree of Saturation (DOS)	Average Delay	95th Percentile Queue
AM	Oxley Street (South)	0.21	7 sec	7m
	Bridge Road (East)	0.07	4 sec	0m
	Bridge Road (West)	0.09	2 sec	2m
PM	Oxley Street (South)	0.13	7 sec	4m
	Bridge Road (East)	0.10	5 sec	0m
	Bridge Road (West)	0.10	3 sec	3m

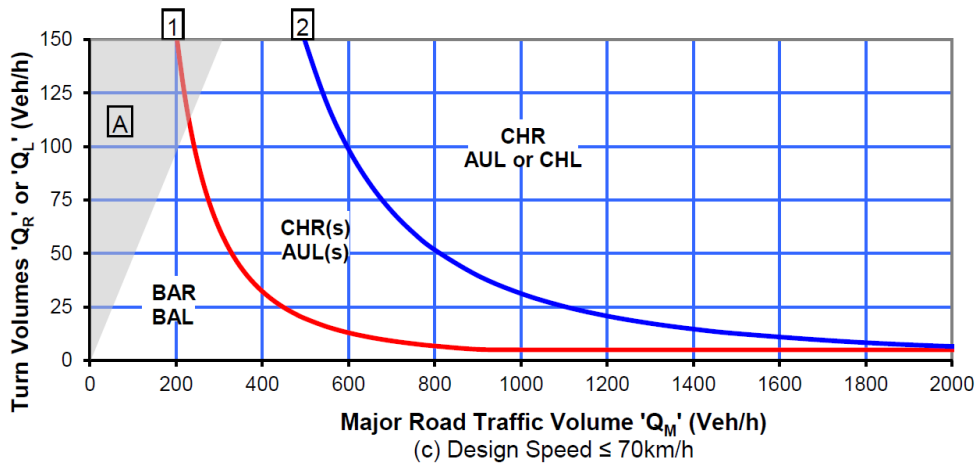
As can be seen from Table 3.1, the intersection is expected to continue to operate well for at least 10 years following the completion of the proposed subdivision, with minimal delays and queues.

### 3.3.4 Intersection Geometry

The intersection of Bridge Road and Oxley Street currently has an AUL type left turn lane from Bridge Road into Oxley Street and a CHR(s) type protected right turn lane from Bridge Road into Oxley Street.

The warrants for turn lanes at unsignalised intersections are outlined in Figure 3.25 of the Austroads Guide to Traffic Management Part 6. As Bridge Road has a 60km/h speed limit in the vicinity of Oxley Street, the relevant diagram is reproduced below in Figure 3.6.

**Figure 3.6 – Turn Lane Warrants**



For right turn movements at an intersection with no left turn slip lane,  $Q_R$  equals the volume of right turn movements into the side road whilst  $Q_M$  equals the sum of the two-way volume of through traffic and left turn traffic into the side road. The relevant volumes for the 10-year post-development scenario at the intersection of Bridge Road and Oxley Street are provided in Table 3.2 below.

**Table 3.2 – Bridge Road & Oxley Street – 10-Year Post-Development Peak Hour Right Turning Volumes**

Peak Period	$Q_R$	$Q_M$
AM	79	320
PM	103	369

When the 10-year post-development volumes from Table 3.2 are plotted on Figure 3.6, we can see that the intersection of Bridge Road and Oxley Street will continue to meet the warrants for a CHR(s) right turn lane for at least 10-year post-development.

For left turn movements at an intersection,  $Q_L$  equals the volume of left turn movements into the side road whilst  $Q_M$  equals the volume of adjacent through traffic in the same direction of travel. The relevant volumes for the 10-year post-development scenario at the intersection of Bridge Road and Oxley Street are provided in Table 3.3 below.

**Table 3.3 – Bridge Road & Oxley Street – 10-Year Post-Development Peak Hour Left Turning Volumes**

Peak Period	$Q_L$	$Q_M$
AM	122	44
PM	170	44

When the 10-year post-development volumes from Table 3.3 are plotted on Figure 3.6, we can see that the intersection of Bridge Road and Oxley Street will only meet the warrants for a BAL left turn lane for at least 10-year post-development. Nevertheless, an AUL treatment has been installed.

Consequently, the existing geometry of the intersection of Bridge Road and Oxley Street will continue to be adequate for at least 10-years post-development. Therefore, no works are required at this intersection to accommodate additional traffic generated by the proposed subdivision.

## 4. Internal Road Layout

### 4.1 Design Requirements

Design requirements for roads within Griffith are outlined in *Griffith City Council Engineering Guidelines for Subdivisions and Development Standards. Part 2 - Road Designs* ('Council Guidelines'). However, this document does not specify required carriageway and road reserve widths for roads in industrial subdivisions.

### 4.2 Proposed Road Designs

#### 4.2.1 Road Width

The proposed roads within the subdivision have been designed to be consistent with the design of the existing sections of Oxley Street and Best Street. Specifically, these streets will be extended with 13m wide carriageways within a 22m road reserve, consistent with the existing cross-sections. Similarly, the new road connecting the ends of Oxley Street and Best Street (marked as 'Road 2', 'Road 3', 'Road 4' and 'Road 5' on the proposed subdivision plan) will also generally have a 13m wide carriageway within a minimum 22m wide road reserve width.

A 13m wide carriageway provides sufficient width for simultaneous two-way movements by heavy vehicles whilst other vehicles are parked kerbside on both sides of the road. It also provides adequate space for heavy vehicles to turn in and out of the adjacent lots. Therefore, it is considered appropriate.

#### 4.2.2 Splays & Kerb Radii

The Council Guidelines indicate that splays of the property boundaries should be provided at intersections. However, the document doesn't specify the actual splay dimensions required. The plans propose 8m x 8m splays adjacent to all the intersections within the subdivision. This is consistent with the current property boundary splays at the intersection of Oxley Street and Best Street and is considered appropriate to ensure that adequate sight lines are provided at intersections.

As requested by Council, the plans show 18m kerb radii at the internal intersections, which is adequate to allow simultaneous turns by B-Doubles at the intersections. This is considered excessive, and a reduced radius of 15.5m, consistent with the existing radii at the intersection of Best Street and Oxley Street, is considered to be more appropriate, noting that intersections are typically not designed to accommodate simultaneous movements by B-Doubles as such movements are infrequent, and it is typical practice to allow a B-Double to cross a centre line if necessary when making a turn.

#### 4.2.3 Court Bowls

The new road connecting Oxley Street and Best Street is proposed to extend to the northwest and southeast, with court bowls at both ends. One court bowl is proposed to have a diameter of 35m, whilst the other court bowl is proposed to have a diameter of 36m.

AS2890.2:2018 indicates that heavy rigid trucks and articulated semi-trailers both have a minimum turn diameter of less than 28m. Therefore, a court bowl diameter of 35m or 36m will be adequate to accommodate U-turns by heavy rigid trucks and articulated semi-trailers. Consequently, the court bowl dimensions are considered appropriate.

#### 4.2.4 Footpaths

It is not proposed to provide footpaths within the new subdivision. It is noted that there are no footpaths along Oxley Street or Best Street within the existing industrial subdivision. There are also no footpaths along Bridge Road. Therefore, it is considered reasonable to not provide footpaths within the proposed subdivision.

## 5. Conclusions

The following conclusions are made based on the analysis and discussions presented within this report:

- A DA is being sought for a proposed industrial subdivision. The proposed development involves subdividing the land into 35 lots of varying sizes. Of these, 33 lots will be for industrial uses, with the remaining 2 lots to be vested to Council for drainage purposes.
- The proposed subdivision could generate up to 2,000 daily vehicle movements, including up to 240 vehicle movements in a peak hour.
- Access from the surrounding road network to all of the lots will be via the intersection of Bridge Road and Oxley Street.
- Modelling of the future performance of the intersection of Bridge Road and Oxley Street using SIDRA indicates that it is expected to continue to operate well for at least 10 years following the completion of the proposed subdivision, with minimal delays and queues.
- The existing geometry of the intersection of Bridge Road and Oxley Street will also continue to be adequate for at least 10-years post-development. Therefore, no works are required at this intersection to accommodate additional traffic generated by the proposed subdivision.
- The roads within the subdivision are proposed to have 13m wide carriageways within 22m wide road reserves. This is consistent with the existing geometry of Oxley Street and Best Street, and is considered appropriate.
- The plans propose 8m x 8m splays adjacent to all the intersections within the subdivision. This is consistent with the current property boundary splays at the intersection of Oxley Street and Best Street and is considered appropriate to ensure that adequate sight lines are provided at intersections.
- As requested by Council, the plans show 18m kerb radii at the internal intersections, which is adequate to allow simultaneous turns by B-Doubles at the intersections. This is considered excessive, and a reduced radius of 15.5m, consistent with the existing radii at the intersection of Best Street and Oxley Street, is considered to be more appropriate.
- The new court bowls will have a diameter of 35m or 36m. This will be adequate to accommodate U-turns by heavy rigid trucks and articulated semi-trailers. Therefore, the court bowl dimensions are considered appropriate.
- It is not proposed to provide footpaths within the new subdivision. This is considered reasonable given that there are no footpaths along Oxley Street or Best Street within the existing industrial subdivision, and no footpaths along Bridge Road in the vicinity of the site.

# Appendix A. SIDRA Intersection Outputs





## SITE LAYOUT

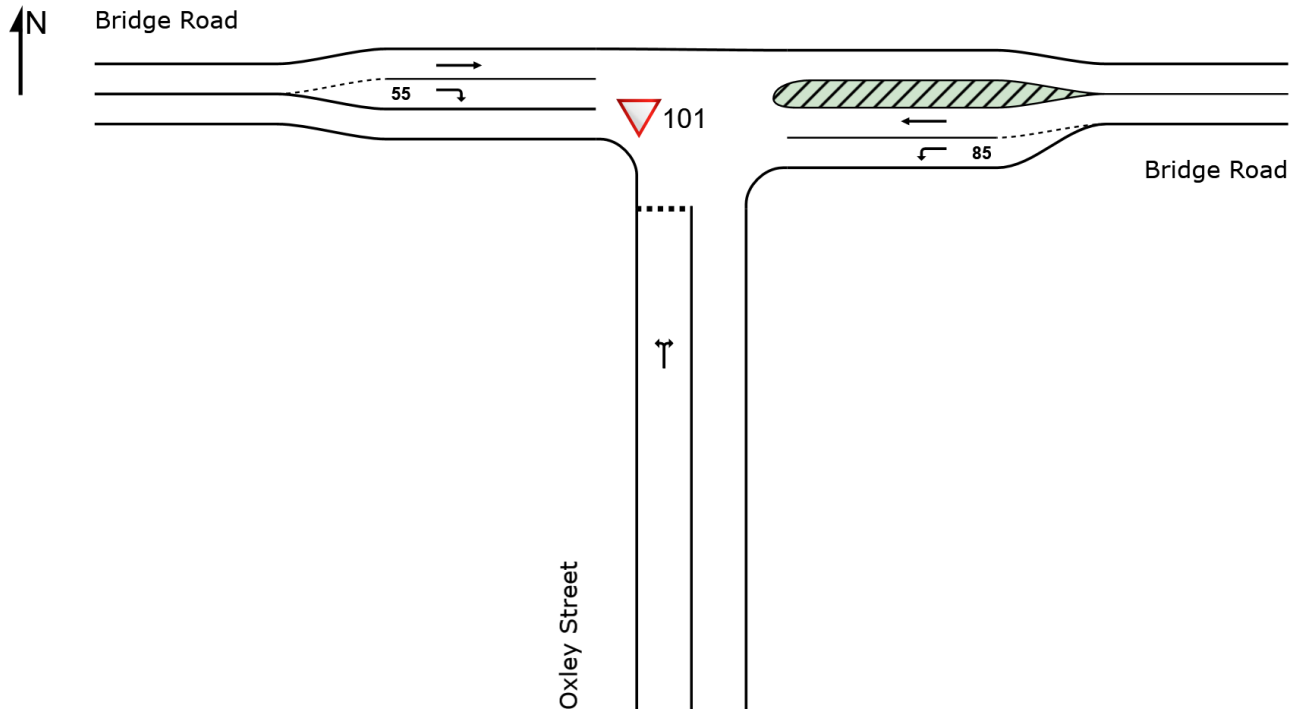
▽ Site: 101 [AM 10-Year Post-Development (Site Folder: General)]

Bridge Road & Oxley Street, Griffith

Site Category: (None)

Give-Way (Two-Way)

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



# MOVEMENT SUMMARY

▼ Site: 101 [AM 10-Year Post-Development (Site Folder: General)]

Bridge Road & Oxley Street, Griffith  
Site Category: (None)  
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] m				
South: Oxley Street														
1	L2	124	10.0	131	10.0	0.209	5.9	LOS A	0.9	6.6	0.16	0.57	0.16	52.1
3	R2	61	10.0	64	10.0	0.209	9.4	LOS A	0.9	6.6	0.16	0.57	0.16	52.3
Approach		185	10.0	195	10.0	0.209	7.1	LOS A	0.9	6.6	0.16	0.57	0.16	52.2
East: Bridge Road														
4	L2	122	10.0	128	10.0	0.074	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
5	T1	44	10.0	46	10.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		166	10.0	175	10.0	0.074	4.2	NA	0.0	0.0	0.00	0.42	0.00	54.8
West: Bridge Road														
11	T1	155	10.0	163	10.0	0.090	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	79	10.0	83	10.0	0.073	6.5	LOS A	0.3	2.2	0.30	0.57	0.30	52.2
Approach		234	10.0	246	10.0	0.090	2.2	NA	0.3	2.2	0.10	0.19	0.10	57.1
All Vehicles		585	10.0	616	10.0	0.209	4.3	NA	0.9	6.6	0.09	0.38	0.09	54.8

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

# MOVEMENT SUMMARY

▼ Site: 101 [PM 10-Year Post-Development (Site Folder: General)]

Bridge Road & Oxley Street, Griffith  
Site Category: (None)  
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV ] %	[ Total veh/h	HV ] %				[ Veh. veh	Dist ] m				
South: Oxley Street														
1	L2	76	10.0	80	10.0	0.132	5.9	LOS A	0.5	3.9	0.15	0.57	0.15	52.1
3	R2	37	10.0	39	10.0	0.132	9.7	LOS A	0.5	3.9	0.15	0.57	0.15	52.2
Approach		113	10.0	119	10.0	0.132	7.1	LOS A	0.5	3.9	0.15	0.57	0.15	52.1
East: Bridge Road														
4	L2	170	10.0	179	10.0	0.103	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
5	T1	44	10.0	46	10.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		214	10.0	225	10.0	0.103	4.5	NA	0.0	0.0	0.00	0.46	0.00	54.4
West: Bridge Road														
11	T1	155	10.0	163	10.0	0.090	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	103	10.0	108	10.0	0.101	6.8	LOS A	0.4	3.1	0.35	0.60	0.35	52.1
Approach		258	10.0	272	10.0	0.101	2.7	NA	0.4	3.1	0.14	0.24	0.14	56.5
All Vehicles		585	10.0	616	10.0	0.132	4.2	NA	0.5	3.9	0.09	0.38	0.09	54.9

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

