APPENDIX D

Transport Impact Assessment

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Bright Tank Brewing Pty Ltd
1248 Karnup Road, Serpentine
Transport Assessment

version 1.01

Bright Tank Brewing Pty Ltd

Transport Assessment

Karnup Road

Serpentine

QTM Works # 30252

Client: Bright Tank Brewing

Date: March 2022

Document Control						
Version	**Date**	**Author**		**Reviewer**		**Notes**
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1	28/02/2022	Yap	P			Draft issued for comment
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TABLE OF CONTENTS

List of Figures

1. Introduction

This Transport Impact Assessment (TIA) is a document setting out the transport impacts on the proposed development proposal to 1248 Karnup Road, Serpentine (Site). Its intention is to ensure safe operation from a traffic movement perspective of the site with the focus on the entry and egress arrangements for light and heavy vehicles (semi trailers). Bright Tank Brewing (BTB) has commissioned Quality Traffic Management Pty Ltd ('QTM') to prepare a Transport Impact Assessment for their proposed development at the Site.

1.1 Purpose and scope of this TIA

The purpose of this TIA is to set out the requirements for management measures identified for circulating traffic within and adjacent to the site. This is to ensure a safe road environment for all road users on-site and in the adjacent road network.

The TIS has been prepared in accordance with the Western Australian Planning Commission (WAPC) guideline document "Transport Assessment Guidelines for Development: Volume 4 – Individual Developments. The assessment in this TIS considers the following issues:

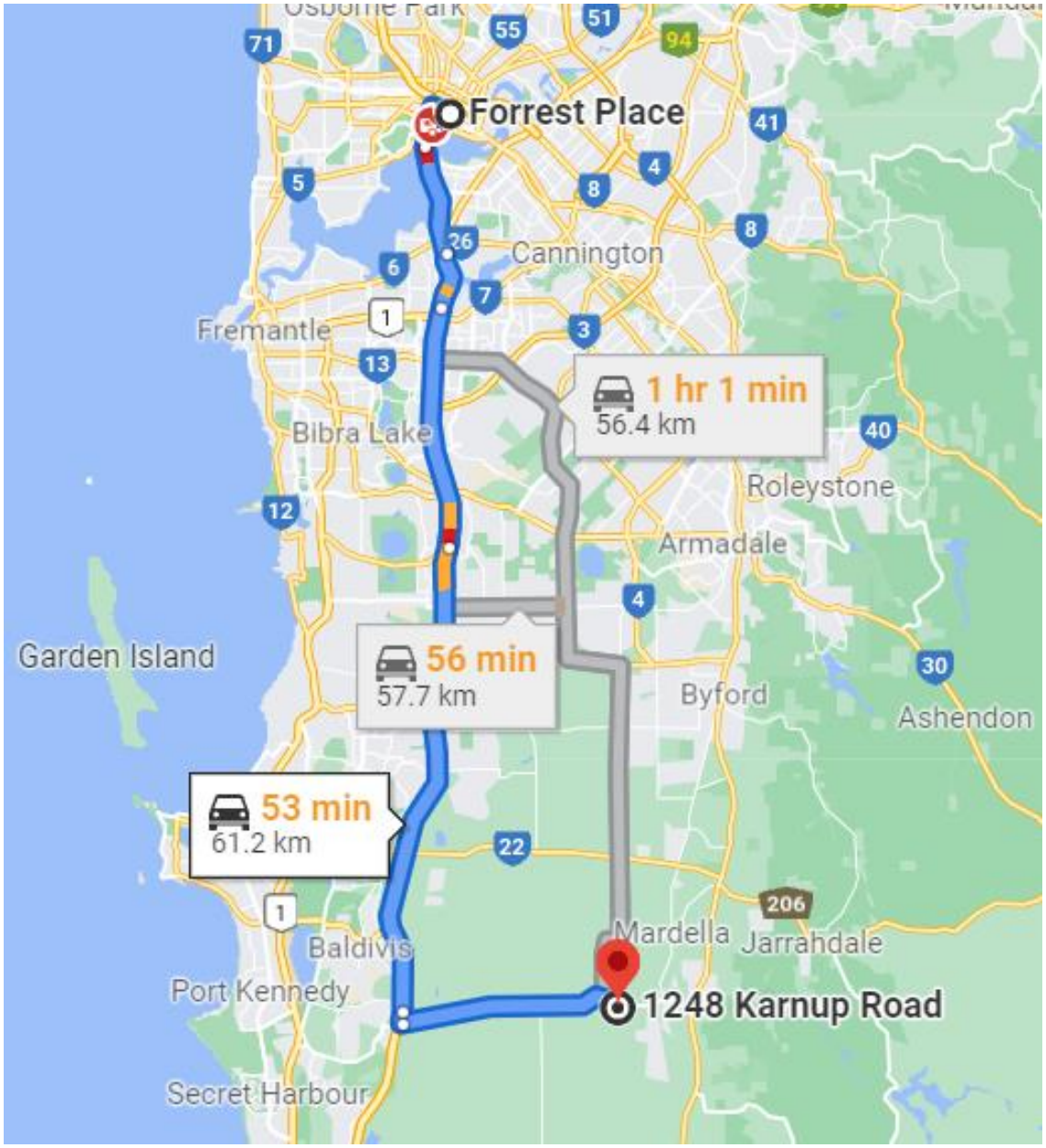
- The site and its surrounding road network
- Traffic generation characteristics of its development
- Traffic volume distribution and assignment on to the adjacent network.
- Parking assessment
- Road safety related assessment
- Non-motorised travel modes: demand and facilities
- Public transportation provision and facilities nearby

.

1.2 Location of the Site

The Site is located approximately 62 km by road south of Perth's Central Business District (CBD). It is set in a rural setting with three adjoining neighbouring lots (south, east and west) are rural in nature. The frontage road and sole access is via Karnup Road.

The location of the Site in relation to Perth CBD is shown in Figure 1.



Source: Google Maps

Figure 1: General Location of Bright Tank Brewing Karnup Road site with reference to Perth CBD.

2. Site Description

The site is bounded by on the western side, eastern side, and southern side by other rural properties. The north side of the Site abuts Karnup Road. (**Figure 2**)

2.1. Existing conditions

The Site has an existing dwelling on site. This dwelling will be retained in the development proposal.

2.2. Proposed conditions

The Site is to be accessed by a single (1) two-way crossovers on Karnup Road. The configuration of the crossover will be outlined with details provided in Section 6.

The operations of the site from a transportation point of view are divided into main two parts:

1. Brewery operating during weekday business hours.
2. An on-site 1,000 seat restaurant will operate during the Thursday and Friday (lunch and dinner), on weekends (lunch and dinner services) and public holidays (lunch and dinner services where trading is permitted by government).

The layout of the existing site is shown in **Figure 2**.

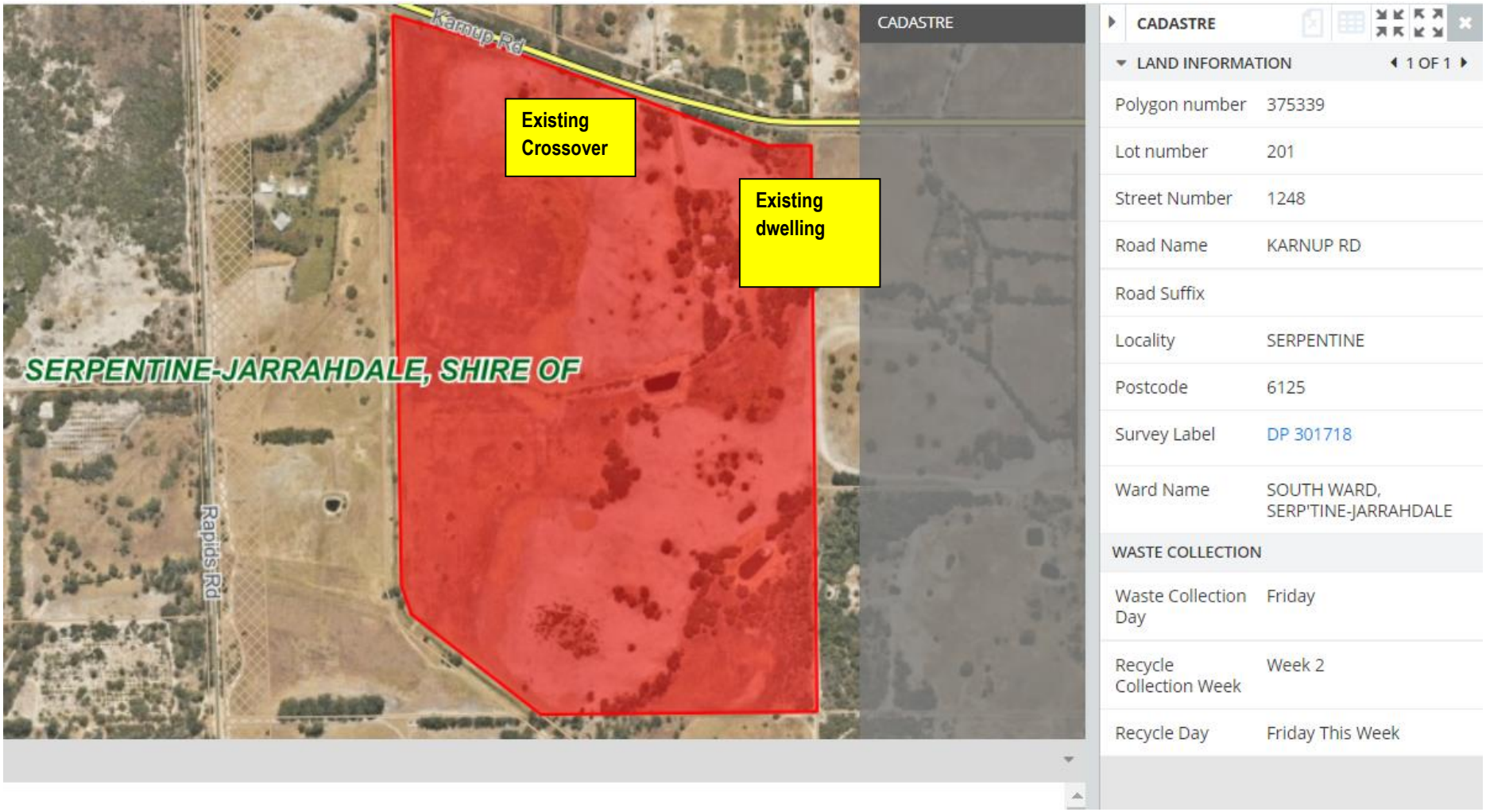


Figure 2: Site of 1248 Karnup Road from Shire of Serpentine Jarrahdale web based GIS

3. Proposed Development

The proposed development is to develop a brewery on the Site and a restaurant.

As advised by the Project Architect, the proposed brewery will have a gross floor area of 1398 square meters. The proposed restaurant area will have a gross floor area of approximately 890 square meters. This is shown as **Figure 3**in detail and for the whole site layout in **Figure 4**.

250 car park bays are to be provide this includes 5 parking bays for person with a disability.

Space for end of trip facilities for bicycle parking in front is to be set aside, pending future operation of weekend breakfast service.

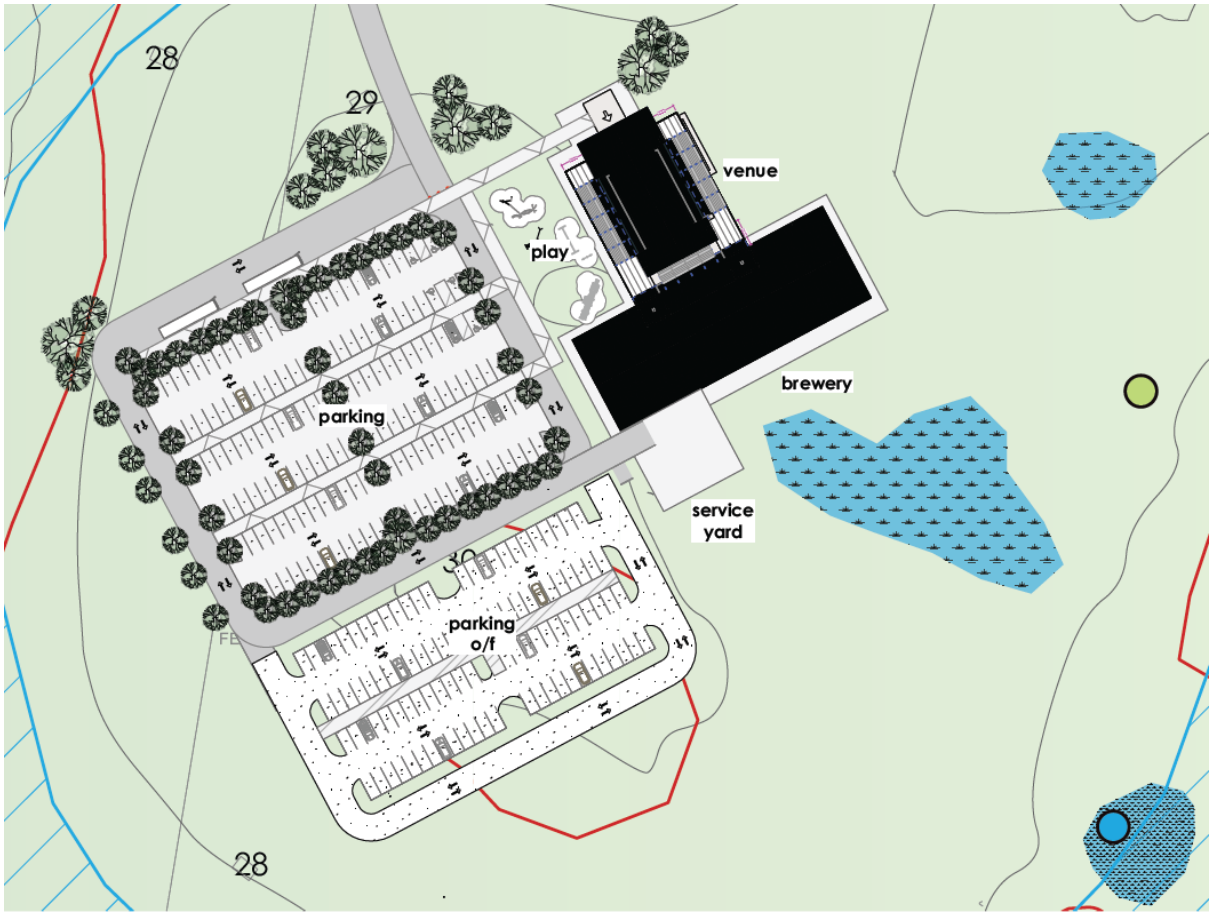


Figure 3 Layout plan of the venue.

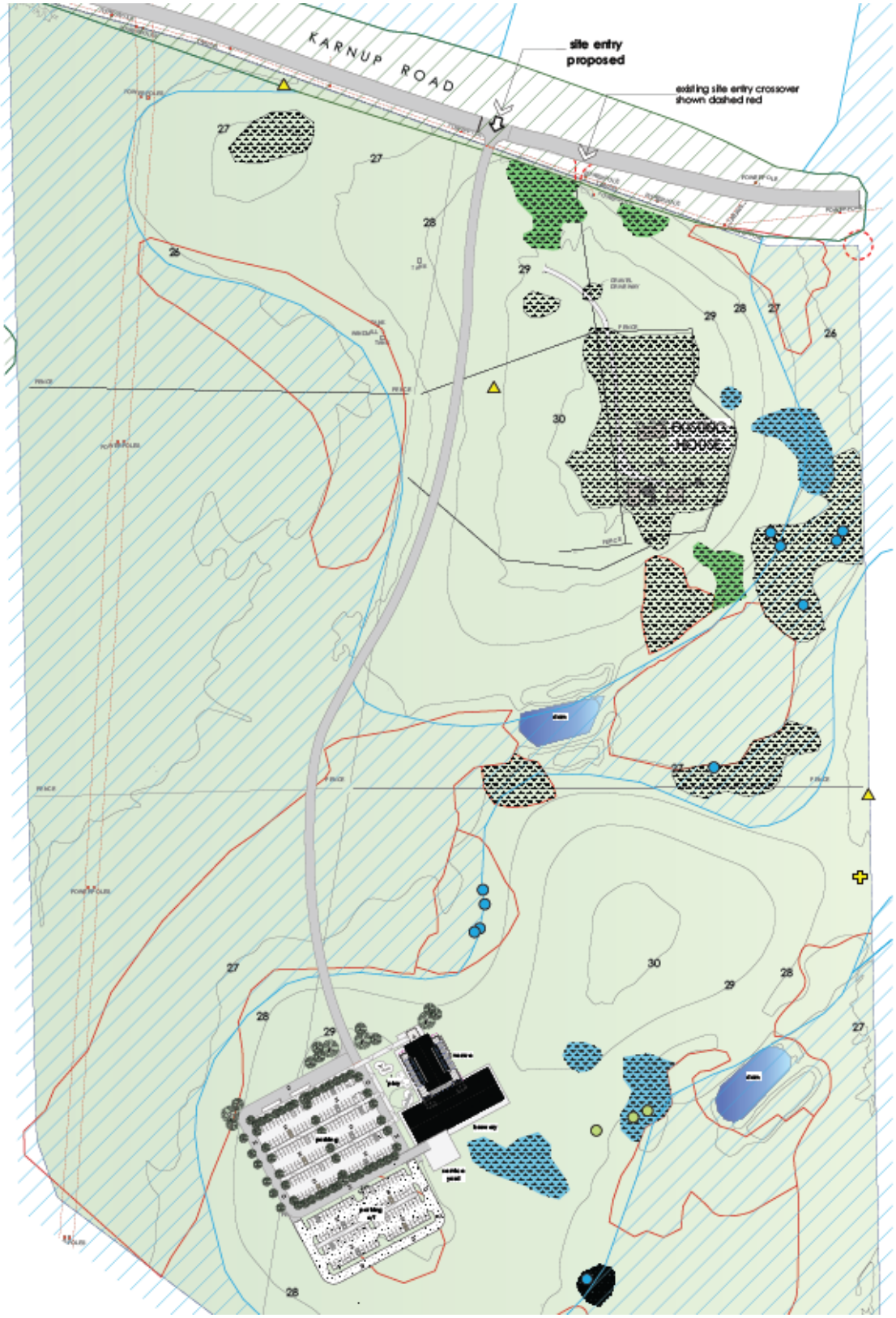


Figure 4 Site layout plan including the internal road network to Karnup Road

4. Existing adjacent land use

The land use zoning of the lots adjacent to the Site is zoned as rural.

5. Existing transport network.

The Site is access via Karnup Road. The summary of the adjacent roads' characteristics is shown in

Table 1. It summarises the road network characteristics around the Site. The road hierarchy extract from MRWA Road information System (RIS) is shown in **Figure 5** and speed zoning of the adjacent road is shown in **Figure 6**.

5.1. Intersection layouts and controls

The site is to be access via a new crossover location approximately 20 to 30 m west of the existing crossover. The proposed crossover design details to be provided later in this report.

5.2. Pedestrian and cycle networks

There is no existing pedestrian and cycle networks facilities on this section of Karnup Road. Pedestrians and bicycles will need to use Karnup Road verge / shoulder.

5.3. Public transport services.

There is no existing public transport servicing this site within 2.75 km. The nearest limited public transport service is a twice daily Australind service between Perth and Bunbury. The Serpentine station stop is only available with prior arrangement with the service provider: TransWA. The station is located approximately 2.75 km away. The proponent is considering a shuttle bus service to either Byford town centre (and later Byford Railway Station) and / or Armidale Railway Station, and Rockingham Railway Station.

Table 1: Summary of the major road characteristics adjacent to Site

Road Name	Segment	Hierarchy	Cross-section	Speed Zone
Karnup Road	Rapids Road to ~ 480 m east of Walker Road	Regional Distributor	Single carriageway, 2 lanes	70 km/h
Karnup Road	~480 m east of Walker Road to Southwestern Highway	Regional Distributor	Single carriageway, 2 lanes	60 km/h
Richardson Street	Karnup Road to 90 Richardson Street	Regional Distributor	Single carriageway, 2 lanes	60 km/h
Richardson Street	90 Richardson Street to Feast Road	Regional Distributor	Single carriageway, 2 lanes	80 km/h
Rapids Road	Karnup Road to Lowlands Road	Local Distributor	Single carriageway, 2 lanes	Default speed limit
Southwestern Highway	~180 m north-east of Lewis Road to ~130 m north of Arnold Road	Primary Distributor	Single carriageway, 2 lanes	80 km/h

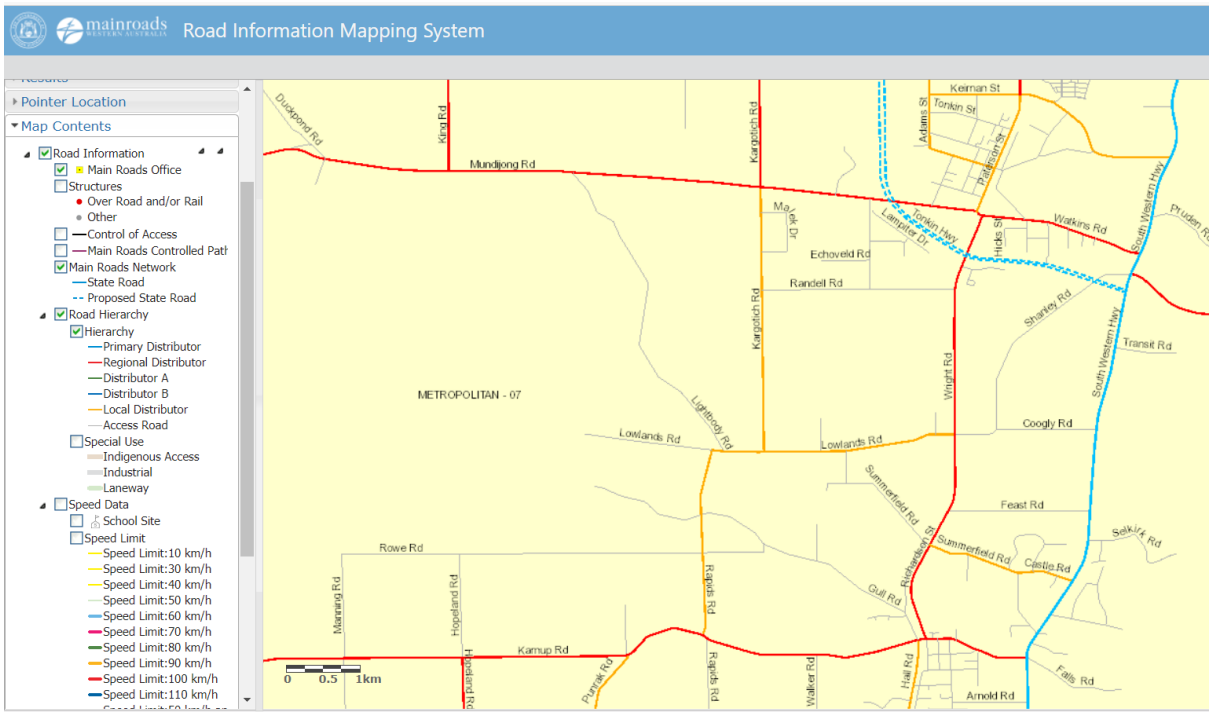


Figure 5 Screen shot of the Hierarchy of Road network based on MRWA classification.

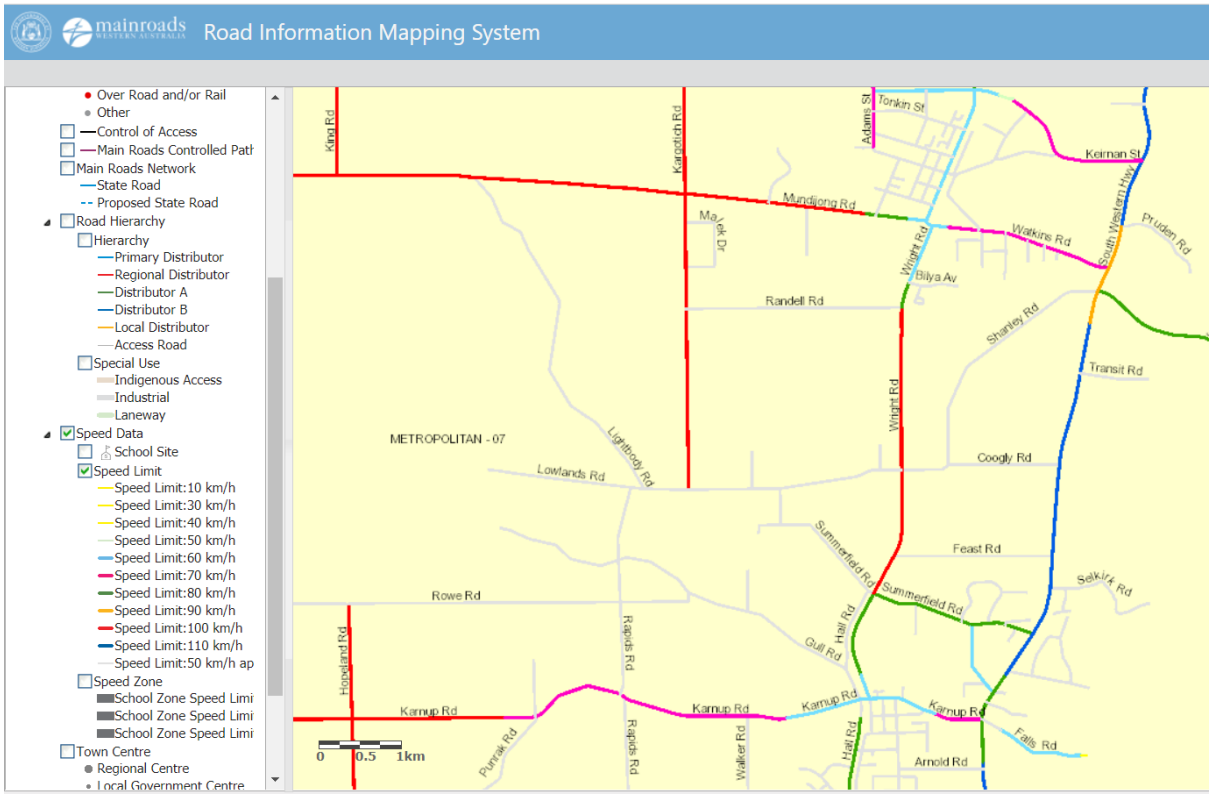


Figure 6 Speed zoning of the adjacent road network from MRWA RIS Website.

Table 2: Summary of the major road characteristics adjacent to Site

Road Name	Location	Year	Source	Traffic				
				Vehicles Per Hour				Total two-way Daily
				Direction (E or N bound)		Direction (W or S bound)		
				AM	PM	AM	PM	
Karnup Road	300m W of Rapids Rd	2019	SJ Shire	101	112	107	128	2586
Karnup Road	Between Rapids and Walker Rd	2019	MRWA TrafficMap	68	103	96	84	1996
		2017						1878
Karnup road	W of Southwestern Highway	2016	MRWA TrafficMap	85	72	69	100	1973

6. Analysis of the Transport Network

The transport network is to be analysed in the year 2021 and the year 2031, ten year post opening of the Site.

6.1. Assessment years

The assessment will be based on 2021 and 2031. The baseline assessment will be based on observed traffic counts. However, the 2031 volumes will be based on the Main Roads Western Australia (MRWA) Regional Operations Model (ROM) model outputs. The publicly available ROM outputs is based on the 2013 model outlined in the Serpentine Structure Plan consultation document released in January 2021. Based on advice from the Local Authority, the Transport Assessment Report is to be updated with more up to date ROM modelling outputs. This is in the pipeline to be done.

A review of the Table 2 of the Draft Serpentine Town Site Structure Plan, Transport Assessment report showed that it observed volumes are very lower than the modelled volumes. Without the benefit of access to the original modelling assumptions and detailed outputs, the author is not able assess the reliability or otherwise of the model.

For the purpose of the assessment the adopted baseline volume is Karnup Road west of Walker Road, this is data collected by MRWA in 2019 / 20 (conservatively assumed to be 2019). The site number is 50590. The volume recorded at a weekend 12 noon is as follows:

Table 3: Volume in of traffic in 1200 on a weekend in 2019 / 20

	East Bound	West Bound
Weekend 1200 (noon midday)	52	57

Based on the growth rate of the traffic on Karnup Road between Rapids Road and Walker Road recorded in 2017 and 2019 respectively the growth rate 3.5 percent.

Table 4: Projected volume on Karnup Road adjacent to Site in 2019, 2021 and 2031 respectively

	Rate 1.035 pa	East Bound	West Bound
2019	-	52	57
2021	1.07	56	61
2031	1.41	73	80

6.2. Traffic generation

The volume of traffic generated by the restaurant has been estimated using the peak trip generation rates from the Western Australian Planning Commission - Transport Impact Assessment Guidelines as detailed in Table 3.

Table 5: Restaurant Trip Generation (Site Peak Hour)

Land Use	Unit	Quantum	Rate	Traffic Generated
Restaurant	Seats	1,000	10 trips per 100 seats	100 trips

This is a conservative prediction as there will be bus parking for charters, plus shuttle bus services proposed to hubs such as Rockingham, Byford and Armadale to minimise the need for patrons and workers to drive to the Site.

During the weekday when the microbrewery is in operation it is anticipated it will have 5 staff members on site

6.3. Traffic distribution

The trips distribution is based on an analysis of potential catchment areas' population and proximity to the Site. This is shown in **Figure 8**.

Analysis of populations distribution and hence the catchment formed the trip distribution assumptions.

The distribution is as follows:

- West: South west 20%, North west 20%
- East: North 30% via Robinson Street, 25% via South Western Highway South 5% via South Western Highway
- Serpentine (east) 5%, this is considered an area east of the Site.

6.4. Car Park Design

6.4.1. . Parking supply

The proposed development contains 250 parking bays at the side of the restaurant building. The are other overflow parking area for large events.

The day to day operation of the brewery is anticipated to generate about demand for about 5 parking bays for staff and visitors. This will be catered by the proposed car park for the restaurant.

6.4.2. Provisions for buses

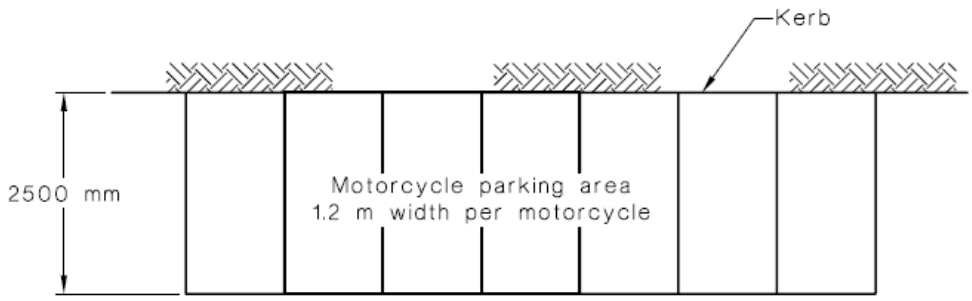
There is a provision for bus parking in the proposed development. The bus area is linked by a footpath leading to the venue.

6.4.3. Provisions for service vehicles

The Site also have provision for a 19m semi-trailer sized vehicles to access the service area behind the brewery. All services vehicles servicing the brewery and restaurant will deliver or pick up from this loading area. Localised widening at intersections traversed by the service vehicles and buses will be provided. This will be shown in the detailed design stage.

6.4.4. Provisions for motorcycles

There is an area set aside to be earmarked for motorcycle parking. However, this is to be determined in the operational phase to gauge the demand from patrons who travel to the Site by motor cycle. Typical motor cycle parking bay is shown in **Figure 7**.



NOTE: Transverse bay markings will usually be needed to control space usage and parking angle.

FIGURE 2.7 MOTORCYCLE PARKING PROVISION

Figure 7 Motor cycle parking bay design.

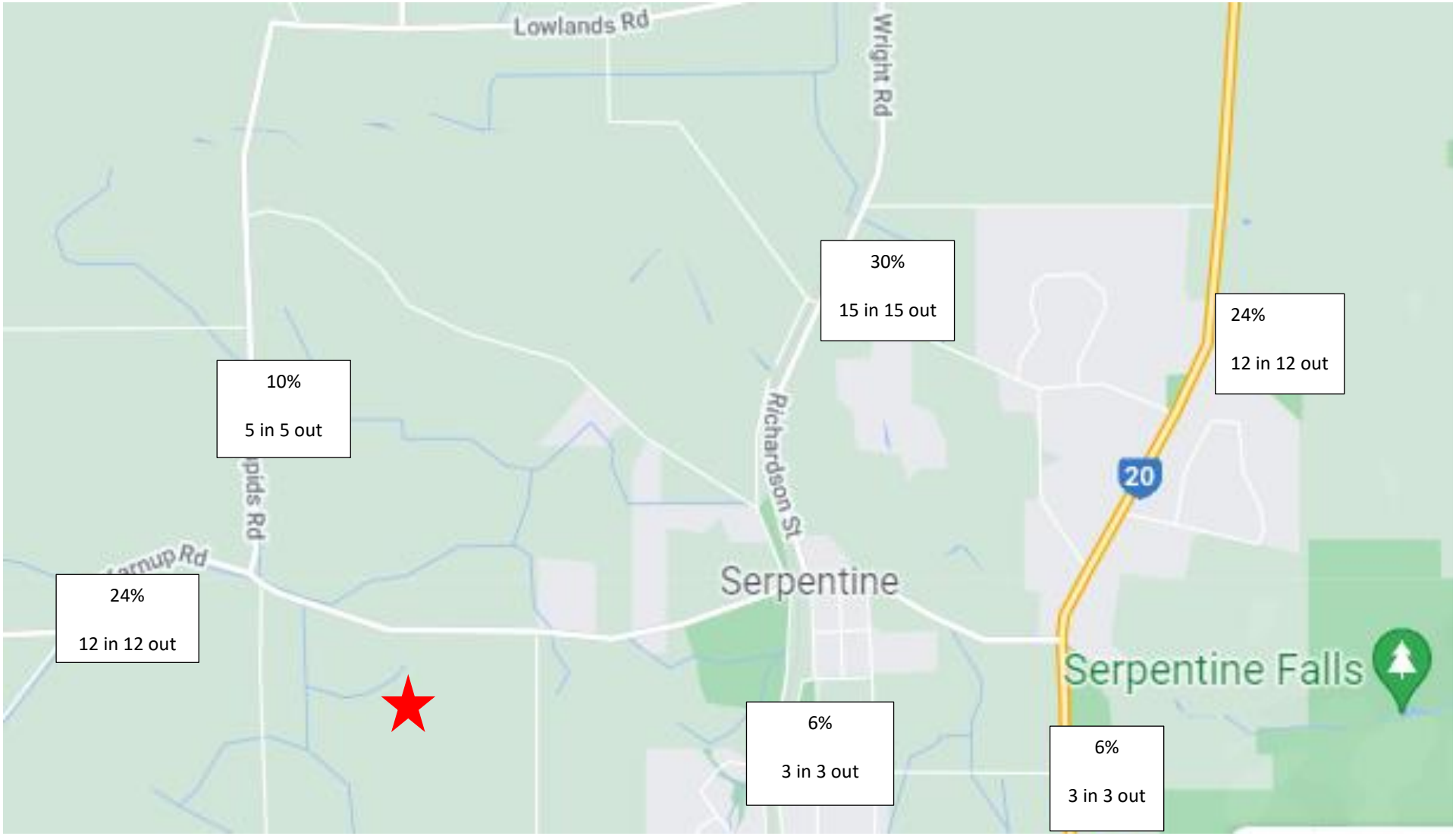


Figure 8 Assumed distribution and assignment of peak hour of Site generated traffic

6.5. Design of the crossover cross-section

Vehicle access to the brewery and restaurant is on one proposed crossover on Karnup Road. A summary of the proposed layout is shown in the sections below.

6.5.1. Requirements of Australian Standard 2890.1

The cross section of the crossover is determined by the selection of cross over category. In the Standards, the facility is classed as a Class 3 which accesses an Arterial Road with a parking bays less than 600, but more than 301 bays. The crossover will be class as Category 4 which entails an entry width of 6 m and separated by an island of 1 to 3 meters wide and a 6m to 8m exit width.

Translating this into a cross-section, the crossover will have an entry width of 6m and an exit width of 6m minimum dividing into a left turn pocket of 30m in length and a right turn lane. The island width will be 2m wide and approximately 10m+ long with an approximately 20 square metre in area so it is conspicuous to egressing traffic.

29 AS/NZS 2890.1

TABLE 3.1
SELECTION OF ACCESS FACILITY CATEGORY

Class of parking facility (see Table 1.1)	Frontage road type	Access facility category				
		Number of parking spaces (Note 1)				
		<25	25 to 100	101 to 300	301 to 600	>600
1,1A	Arterial	1	2	3	4	5
	Local	1	1	2	3	4
2	Arterial	2	2	3	4	5
	Local	1	2	3	4	4
3,3A	Arterial	2	3	4	4	5
	Local	1	2	3	4	4

NOTES:

1 When a car park has multiple access points, each access should be designed for the number of parking spaces effectively served by that access.

2 This Table does not imply that certain types of development are necessarily suitable for location on any particular frontage road type. In particular, access to arterial roads should be limited as far as practicable, and in some circumstances it may be preferable to allow left-turn-only movements into and out of the access driveway.

Figure 9 Selection of crossover category.

TABLE 3.2

ACCESS DRIVEWAY WIDTHS

metres

Category	Entry width	Exit width	Separation of driveways
1	3.0 to 5.5	(Combined) (see Note)	N/A
2	6.0 to 9.0	(Combined) (see Note)	N/A
3	6.0	4.0 to 6.0	1 to 3
4	6.0 to 8.0	6.0 to 8.0	1 to 3
5	To be provided as an intersection, not an access driveway, see Clause 3.1.1.		

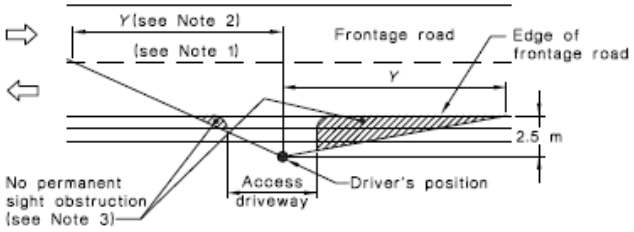
NOTE: Driveways are normally combined, but if separate, both entry and exit widths should be 3.0 m min.

Figure 10 Crossover width which is category 4.

6.6. Crossover Sight distance

Based on AS2890.1 Figure 3.2 (shown as **Figure 11**), the minimum required stopping sight distance (SSD) based on the approach road of Karnup Road.

Based on the 70 km/h speed limit along this section of Karnup Road, the minimum sight distance 85 m and the desirable 5s gap sight distance is 97m. An analysis of the sight lines based on the feature survey shows that some lower limbs of the trees in the verge area will need to be trimmed and uplifted to improve the sight lines. They will be required to be maintained with traffic management.



Frontage road speed (Note 4) km/h	Distance (Y) along frontage road m		
	Access driveways other than domestic (Note 5)		Domestic property access (Note 6)
	Desirable 5 s gap	Minimum SSD	
40	55	35	30
50	69	45	40
60	83	65	55
70	97	85	70

Figure 11 Sight Line requirements for the proposed crossover based on AS 2890.1.

The proposed crossover location is located approximately 20 to 30 m west of the existing crossover. The view to the east is shown in **Figure 12** and the view to the west is shown in **Figure 13**.

Figure 12 Sight line view from the existing crossover to the east

Figure 13 Sight line view from the existing crossover to the west

6.7. Geometrical requirements of the crossover

The geometrical requirement of the crossover is analysed against the Austroads requirements for intersection geometrical requirements.

The turn traffic volumes for a 3-way intersection is assessed against the project traffic in 2031.

The traffic volume used in the assessment is based on the calculations shown in **Figure 19**.

Based on the traffic volume generated in year 2031, the Q (opposed) volume for a right turn treatment is 77 + 80 +33 =183 vph and QR is 17 vehicle per hour. Hence a BAR type treatment is supported (**Figure 14**).

Based on the traffic volume generated in year 2031, the Q (opposed) is 80 vph for the left turn and the QL is 33 vph. A BAL configuration is suggested by the chart (**Figure 14**)

The BAR treatment entails the provision of a widened sealed shoulder to facilitate the through vehicle passing the queued vehicles (**Figure 15**).

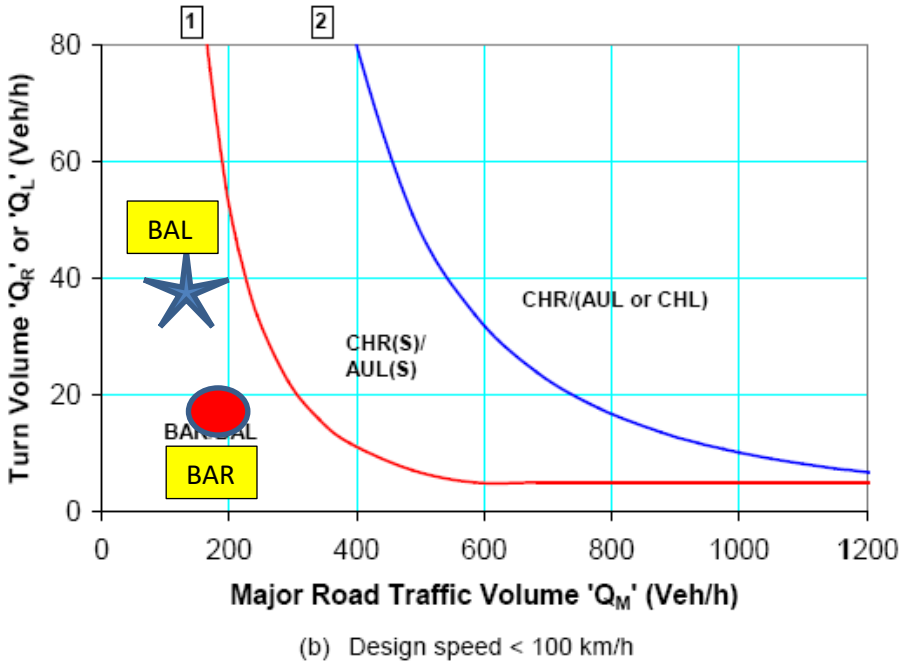
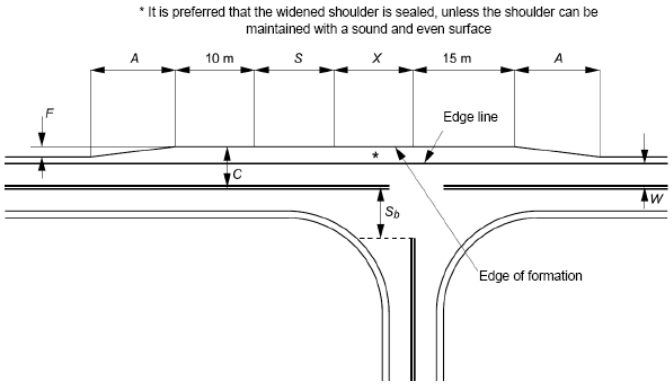


Figure 14 Intersection design configuration chart from Aust Roads

Figure A 28: Basic right (BAR) turn treatment on a two-lane rural road



Notes:
This treatment applies to the right turn from a major road to a minor road.
The dimensions of the treatment are:

- *W* = Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection.
- *C* = On straights –6.5 m minimum
  7.0 m minimum for Type 1 & Type 2 road trains
  On curves – widths as above + curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle)
- *A* = $\frac{0.5VF}{3.6}$
  Increase length *A* on tighter curves (e.g. those with a side friction demand greater than the maximum desirable). Where the design through vehicle is larger than or equal to a 19 m semi-trailer the minimum speed used to calculate A is 80 km/h
- *V* = Design speed of major road approach (km/h)
- *F* = Formation/carriageway widening (m)
- *S* = Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m)
- *X* = Distance based on design vehicle turning path, typically 10–15 m

Source: Department of Main Roads (2006)[25].

Figure 15 Indicative treatment type for the proposed crossover on Karnup Road.

7. Provisions for service vehicles

The proposed crossover is to be designed to Shire of Serpentine Jarrahdale specifications to accommodate site access to a 19 m semi-trailer. The internal road network will be designed at the detailed design stage to provide localised widening at the crossover identified to facilitate the movements of heavy vehicles which includes semitrailer, buses and rigid trucks. Semitrailers, rigid trucks are anticipated to deliver to the site during weekdays before the start of service at the restaurant. The buses will be anticipated to operate when the restaurant is operating. The route is design to minimise the interactions with other light vehicles and pedestrians.

8. Impact on surrounding roads

The proposed development will a moderate impact on the surrounding roads The roadway capacity is capable of accommodate the quantum of increased traffic. Austroads “Guide to Traffic Management Part 3: Traffic Studies and Analysis” noted that the peak hour mid-block capacity of a single traffic on an urban road with interrupted flow is estimated to be between 1,200 and 1,400 passenger car units per hour. Based on

the predicted flow of Karnup Road adjacent to the proposed crossover, the network is considered to have sufficient lane capacity at mid-block capacity to cater for the anticipated increase in vehicle traffic associated with the proposed development.

9. Impact on intersections

Traffic impact of the intersection on Karnup Road is modelled using SIDRA software. The layout modelled is shown in **Figure 16**.

The inputs to the SIDRA model for 2021 are shown in **Figure 17**. The SIDRA modelling results The level of service is at level A (**Figure 18**).

The design volume as input into the SIDRA model for 2031 is shown in **Figure 19** The SIDRA modelling results for 2031 model is shown in **Figure 20**. The level of service 10 year post development is l

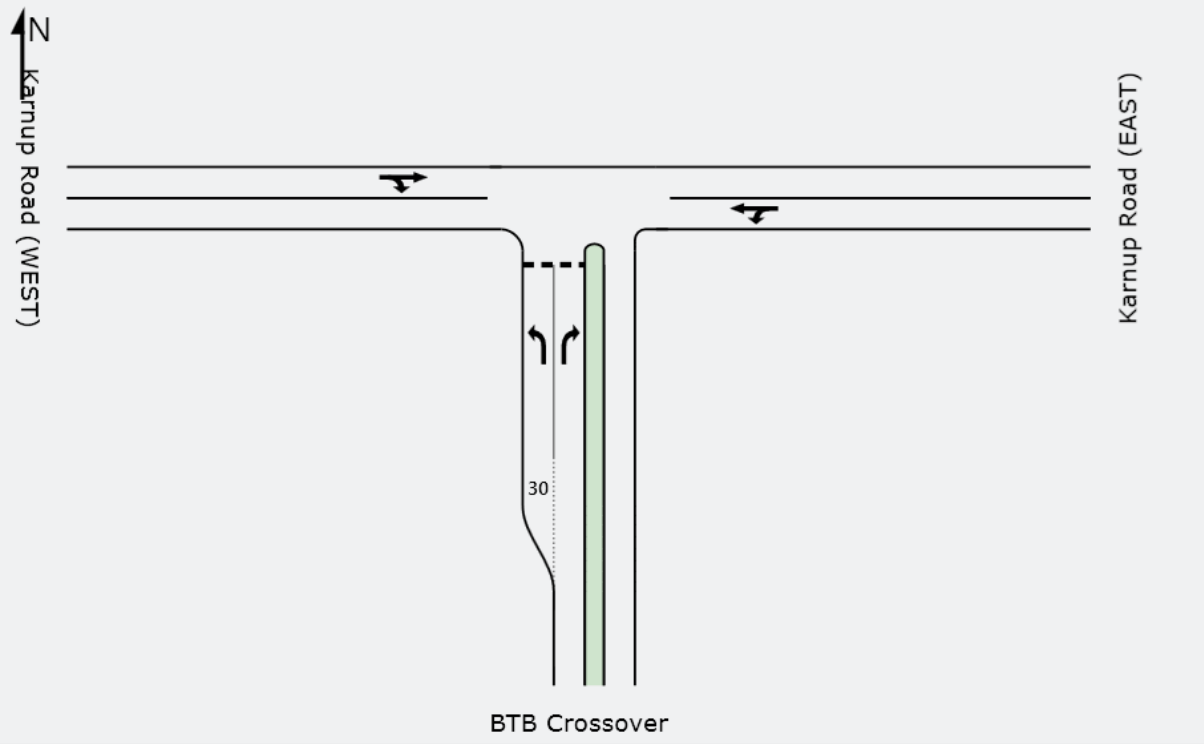


Figure 16 Layout of proposed crossover in SIDRA

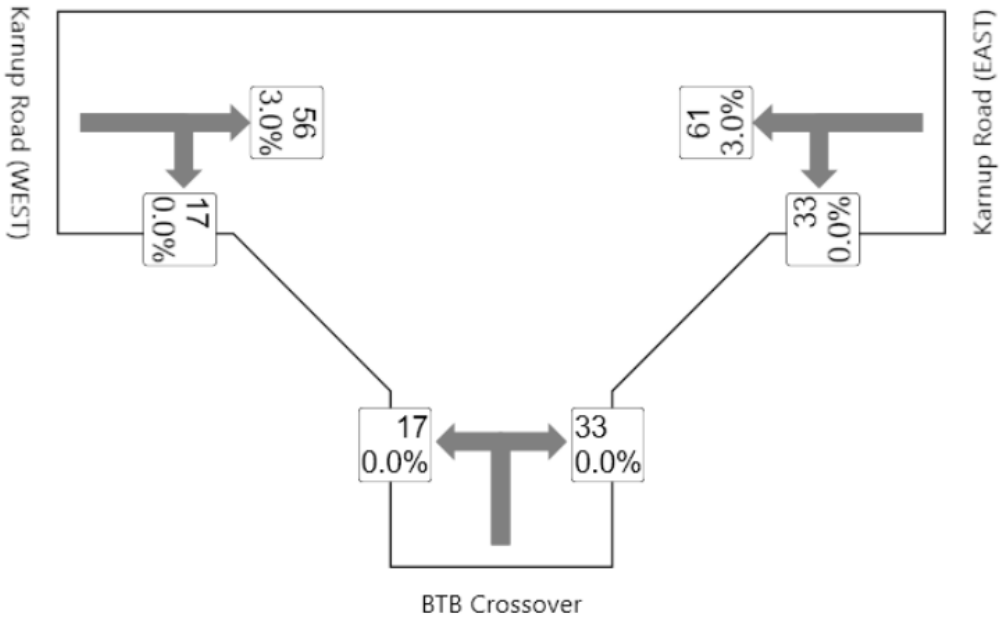


Figure 17 Design traffic volume for 2021

MOVEMENT SUMMARY

Site: BTB Xing 2021 Sunday Noon - 1K Pax

1248 Karnup Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: BTB Crossover											
1	L	18	0.0	0.026	8.7	LOS A	0.1	0.5	0.18	0.62	48.2
3	R	35	0.0	0.049	9.8	LOS A	0.2	1.3	0.33	0.65	47.2
Approach		53	0.0	0.049	9.4	LOS A	0.2	1.3	0.28	0.64	47.5
East: Karnup Road (EAST)											
4	L	35	0.0	0.052	8.2	LOS A	0.0	0.0	0.00	0.88	49.0
5	T	64	3.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		99	1.9	0.052	2.9	NA	0.0	0.0	0.00	0.31	55.6
West: Karnup Road (WEST)											
11	T	59	3.0	0.047	0.5	LOS A	0.3	1.8	0.22	0.00	55.5
12	R	18	0.0	0.047	8.7	LOS A	0.3	1.8	0.22	0.84	48.8
Approach		77	2.3	0.047	2.4	NA	0.3	1.8	0.22	0.19	53.8
All Vehicles		228	1.6	0.052	4.2	NA	0.3	1.8	0.14	0.35	52.9

Level of Service (LOS) Method: Delay (HCM 2000).
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 used.

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SIDRA INTERSECTION 5.1.13.2093
Project: Q:\CLIENTS\B\Bright Tank Brewing\30252 - Karnup Road Serpentine Brewery and Restaurant\03 Work docs - TMP\Karnup Road 1248 Crossing.sip
8001163, QTM PTY LTD, SINGLE

SIDRA INTERSECTION

Figure 18 SIDRA modelling results for post opening. The level of service is adequate.

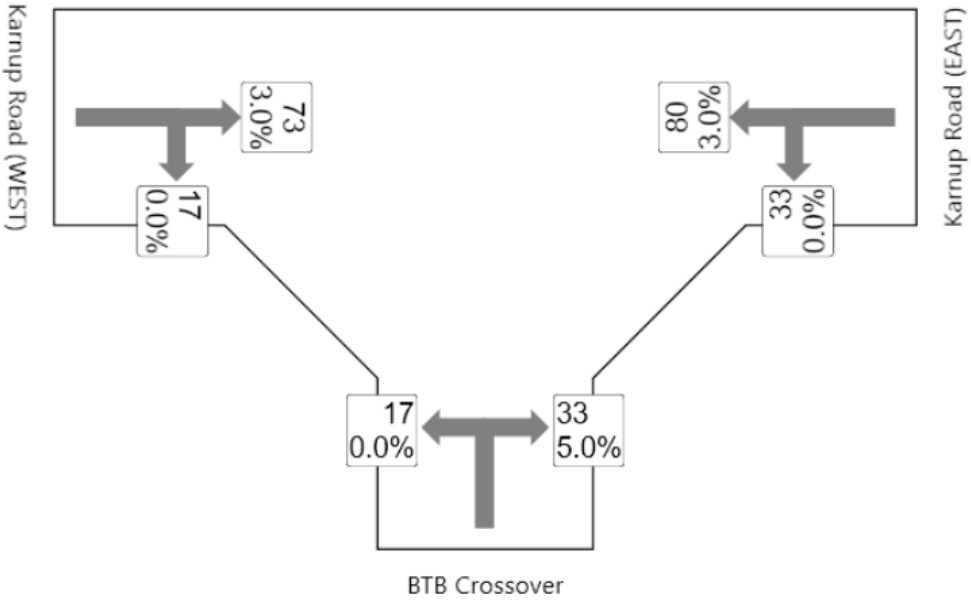


Figure 19 Design traffic volume for 2031

MOVEMENT SUMMARY

Site: BTB Xing 2031 Sunday Noon - 1K Pax

1248 Karnup Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: BTB Crossover											
1	L	18	0.0	0.026	8.8	LOS A	0.1	0.5	0.21	0.63	48.0
3	R	35	5.0	0.052	10.5	LOS B	0.2	1.4	0.37	0.68	46.7
Approach		53	3.3	0.052	9.9	LOS A	0.2	1.4	0.31	0.66	47.1
East: Karnup Road (EAST)											
4	L	35	0.0	0.063	8.2	LOS A	0.0	0.0	0.00	0.91	49.0
5	T	84	3.0	0.063	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		119	2.1	0.063	2.4	NA	0.0	0.0	0.00	0.27	56.3
West: Karnup Road (WEST)											
11	T	77	3.0	0.057	0.6	LOS A	0.3	2.3	0.25	0.00	55.0
12	R	18	0.0	0.057	8.8	LOS A	0.3	2.3	0.25	0.85	48.9
Approach		95	2.4	0.057	2.1	NA	0.3	2.3	0.25	0.16	53.7
All Vehicles		266	2.5	0.063	3.8	NA	0.3	2.3	0.15	0.31	53.4

Level of Service (LOS) Method: Delay (HCM 2000).
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 used.

Processed: Monday, 14 February 2022 2:31:10 PM
SIDRA INTERSECTION 5.1.13.2093
Project: Q:\CLIENTS\B\Bright Tank Brewing\30252 - Karnup Road Serpentine Brewery and Restaurant\03 Work docs - TMP\Karnup Road 1248 Crossing.sip
8001163, QTM PTY LTD, SINGLE

SIDRA INTERSECTION

Figure 20 SIDRA modelling results for 10 from post opening. The level of services is no worse than level B.

10. Impact on the area

Due to the road closure caused by the collapse of a culvert, Karnup Road is closed near Wellard Street for an extended period of time until early 2022. The traffic flow in the area was disrupted and any data collected will not be indicative of the usual traffic pattern of the area.

11. Road Safety

The road safety performance of this section of Karnup Road between Walker Road and Rapids Road has recorded two property damage crashes between January 2016 and December 2020. Although the Shire had anecdotally mentioned to the Project Planners of more incidents but these incidents were not officially recorded in the MRWA Crash Statistics database.

Using MRWA application GPSSLK app online, the location can be identified.

One of the crashes was a run off the road type crash in which a station wagon travelling from west to east went out of control ended up colliding with a tree. It was recoded as a property damage only crash with no casualties. It happened in daylight (1615) on a Sunday afternoon in July 2019.

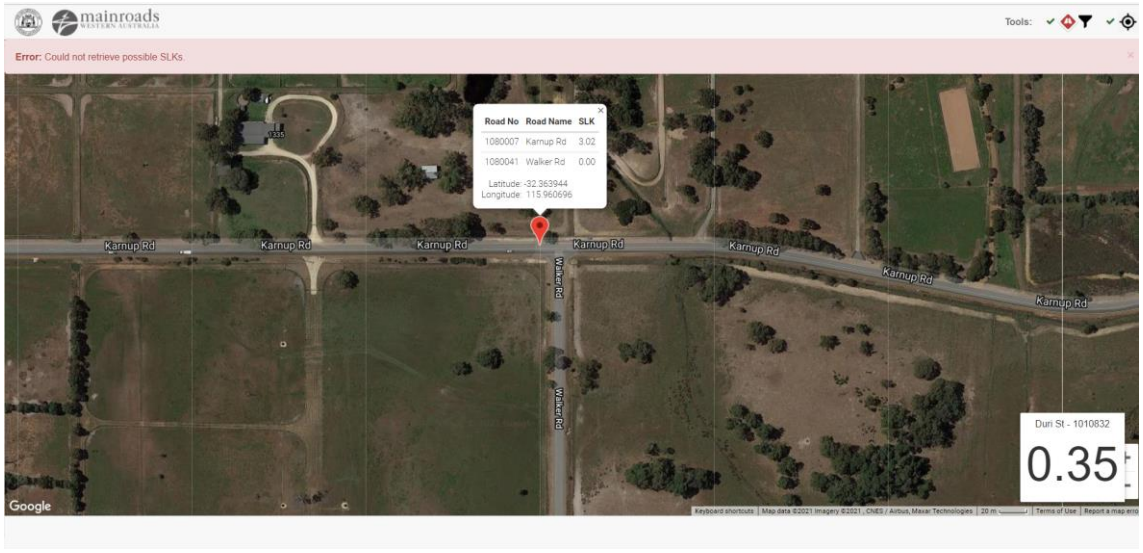


Figure 21 Location for the first crash.

The second crash was vehicle leaving a driveway at straight line kilometre 4.28 Karnup Road which is approximately 280 west of Rapids Road (south) intersection with Karnup Road. The vehicle on Karnup Road travelling from the west to the east collided with the vehicle leaving the driveway intending to turn left. This crash happened on a Tuesday afternoon in 3:25; it occurred on a Tuesday in March 2020.

Figure 22 Location for the second crash.

The two crashes occurred away from the proposed crossover location and caused no casualties.

There is sufficient roadway capacity in Karnup Road to cater for the proposed development; it is not considered to increase the risk of a road crash above acceptable levels.

11.1. Traffic management plan

This transport assessment is for day-to-day operations of the Site post development only. A site-specific event Traffic Management Plan is to be prepared for the Shire's consideration should an event is to be held on Site.

12. Pedestrian and Public Transport Network

The restaurant patrons are unlikely to walk or cycle to and from the proposed development. The current limited provision of public transport service in Serpentine (a twice daily limited stop railway services to Perth) making it a not practical mode of transport for workers and patrons. The only provision is to provide area for bicycle parking when they decide to provide a morning service for breakfast which has the potential attract weekend, long distance bicycle riders.

The car park design has a network of pedestrian "spines" footpath for guiding pedestrians to and from their vehicles. The lighting provision will be provided to recognise the operating hours of the Site.

13. Site specific issues

The items that require attention of the project architect are:

1. Design of the internal roadway in the car park and circulating roadway for semitrailers. Localised widening to be provided to cater for the movement of semitrailer.
2. The crossover will require a basic left turn (BAL)and widen seal shoulder (BAR layout **Figure 15**)

14. Conclusions and Recommendations

A Transport Impact Assessment of the proposed development at 1248 Karnup Road has the following conclusions:

- There is adequate roadway capacity in the existing road network to accommodate the anticipated additional traffic generated by the proposed development
- The proposed car parking provisions satisfies the minimum requirements outlined by Shire of Serpentine Jarrahdale town planning scheme's requirements.
- The is adequate sight distance on the proposed crossover in all directions.
- The demand for bicycle parking for staff and patrons is expected to be minimal for the proposed development. It is recommended that area to be set aside for future bicycle parking should a weekend breakfast service is to be operated.

Appendix A: Traffic counts

mainroads WESTERN AUSTRALIA

SITE 6841

Hourly Volume

Karnup Rd (1080007)

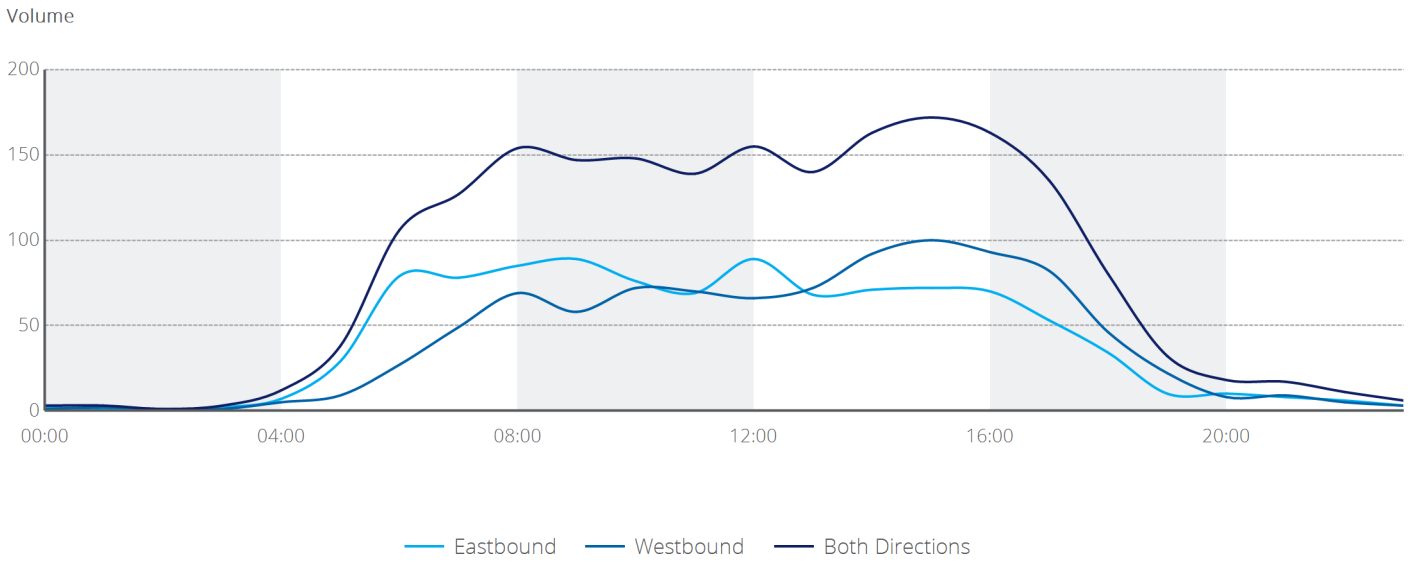
West of South Western Hwy (SLK 0.50)

2016/17
Monday to Friday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	2	1	3	0	0	0	0.0
01:00	1	2	3	0	0	0	0.0
02:00	0	1	1	0	1	1	100.0
03:00	2	1	3	0	1	1	33.3
04:00	7	5	12	0	1	1	8.3
05:00	29	9	38	10	1	11	28.9
06:00	79	27	106	15	3	18	17.0
07:00	78	49	127	13	6	19	15.0
08:00	85	69	154	15	8	23	14.9
09:00	89	58	147	12	10	22	15.0
10:00	76	72	148	14	9	23	15.5
11:00	69	70	139	12	11	23	16.5
12:00	89	66	155	16	9	25	16.1
13:00	68	72	140	14	10	24	17.1
14:00	71	92	163	12	9	21	12.9
15:00	72	100	172	11	7	18	10.5
16:00	70	93	163	8	3	11	6.7
17:00	53	82	135	4	4	8	5.9
18:00	34	46	80	2	2	4	5.0
19:00	10	22	32	0	0	0	0.0
20:00	10	8	18	0	0	0	0.0
21:00	8	9	17	0	0	0	0.0
22:00	6	5	11	1	0	1	9.1
23:00	3	3	6	0	1	1	16.7
TOTAL	1011	962	1973	159	96	255	12.9

Peak Statistics

AM	TIME	08:15	11:15	08:15	06:15	08:45	10:15
	VOL	89	73	161	17	12	25
PM	TIME	12:00	14:45	14:30	13:15	13:45	13:45
	VOL	89	104	181	16	11	26



mainroads WESTERN AUSTRALIA

SITE 6841

Hourly Volume

Karnup Rd (1080007)

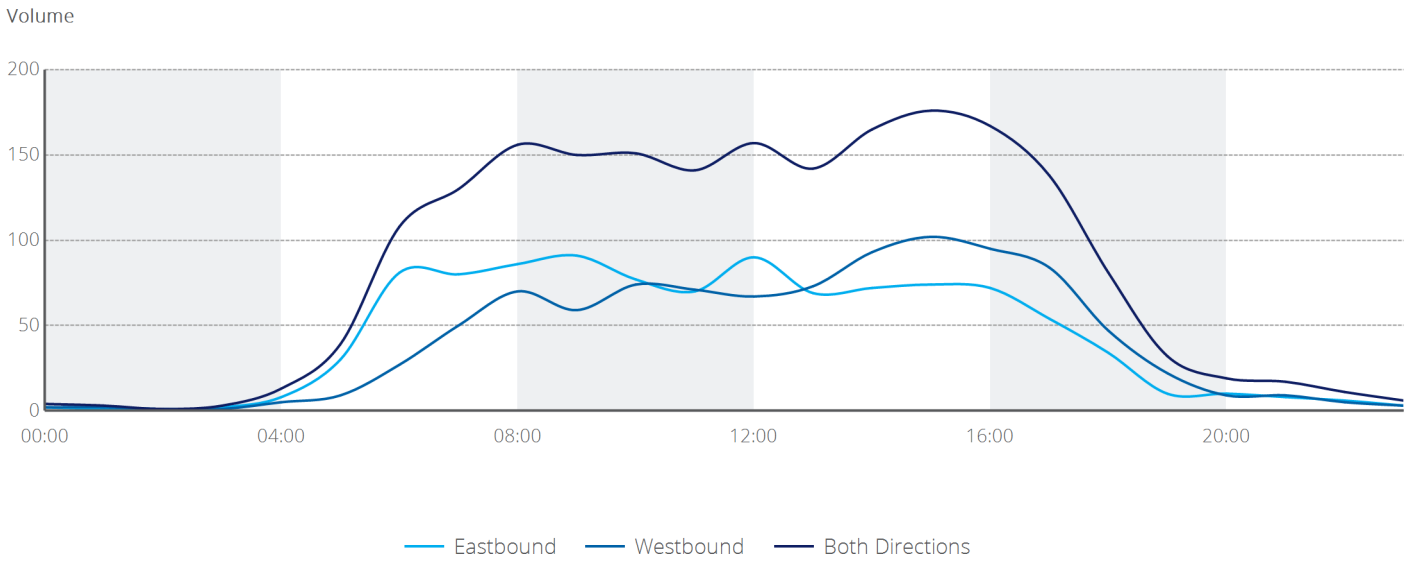
West of South Western Hwy (SLK 0.50)

2016/17
Monday to Sunday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	2	2	4	0	1	1	25.0
01:00	1	2	3	0	0	0	0.0
02:00	0	1	1	0	1	1	100.0
03:00	2	1	3	0	1	1	33.3
04:00	8	5	13	1	1	2	15.4
05:00	30	9	39	10	1	11	28.2
06:00	81	27	108	16	3	19	17.6
07:00	80	50	130	14	6	20	15.4
08:00	86	70	156	15	8	23	14.7
09:00	91	59	150	12	10	22	14.7
10:00	77	74	151	14	10	24	15.9
11:00	70	71	141	12	11	23	16.3
12:00	90	67	157	16	9	25	15.9
13:00	69	73	142	14	10	24	16.9
14:00	72	93	165	12	9	21	12.7
15:00	74	102	176	11	7	18	10.2
16:00	72	95	167	8	3	11	6.6
17:00	54	84	138	4	4	8	5.8
18:00	34	47	81	2	2	4	4.9
19:00	10	22	32	0	0	0	0.0
20:00	10	9	19	0	0	0	0.0
21:00	8	9	17	0	0	0	0.0
22:00	6	5	11	1	0	1	9.1
23:00	3	3	6	0	1	1	16.7
TOTAL	1030	980	2010	162	98	260	12.9

Peak Statistics

AM	TIME	08:30	10:00	08:15	06:15	10:30	10:15
	VOL	91	74	163	18	13	26
PM	TIME	12:00	14:45	14:30	13:15	13:45	13:45
	VOL	90	106	185	16	11	26



mainroads WESTERN AUSTRALIA

SITE 8272

Hourly Volume

South Western Hwy (H009)

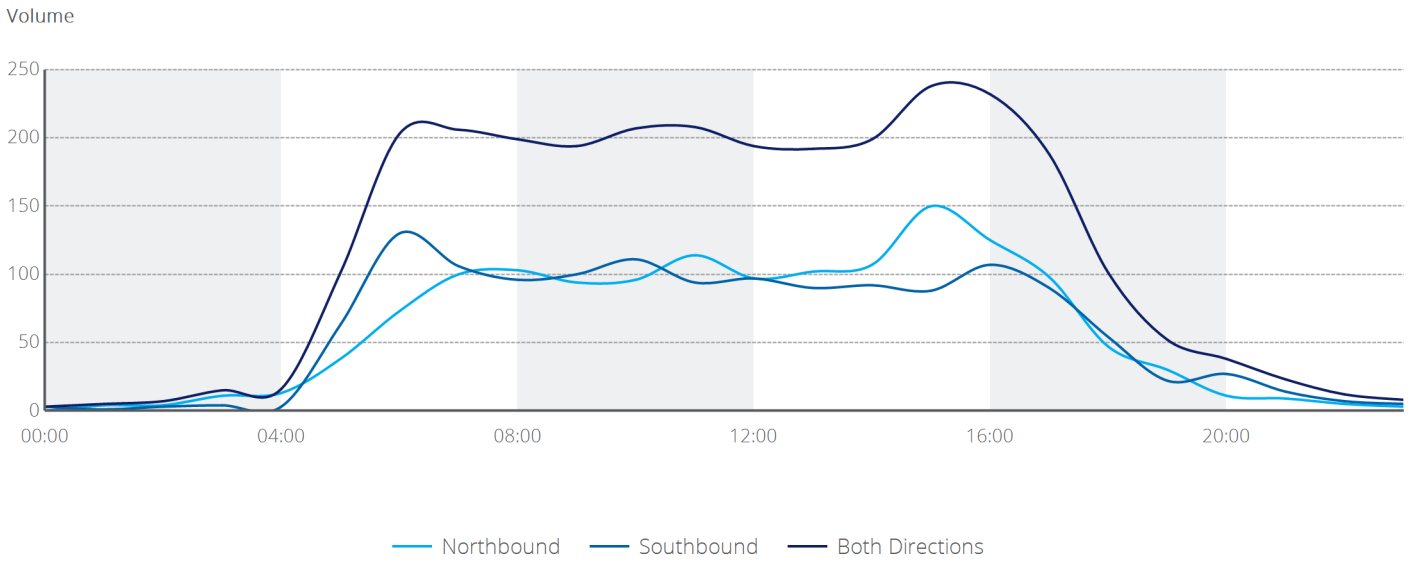
South of Karnup Rd (SLK 24.62)

2016/17
Monday to Friday

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	0	3	3	0	0	0	0.0
01:00	4	1	5	1	0	1	20.0
02:00	4	3	7	2	2	4	57.1
03:00	11	4	15	3	1	4	26.7
04:00	13	3	16	4	1	5	31.3
05:00	38	63	101	11	16	27	26.7
06:00	73	130	203	15	24	39	19.2
07:00	100	106	206	26	18	44	21.4
08:00	103	96	199	22	21	43	21.6
09:00	94	100	194	26	20	46	23.7
10:00	96	111	207	28	23	51	24.6
11:00	114	94	208	28	26	54	26.0
12:00	97	97	194	23	20	43	22.2
13:00	102	90	192	24	20	44	22.9
14:00	107	92	199	24	16	40	20.1
15:00	150	88	238	24	14	38	16.0
16:00	125	107	232	20	15	35	15.1
17:00	98	90	188	20	13	33	17.6
18:00	47	54	101	8	7	15	14.9
19:00	30	22	52	1	3	4	7.7
20:00	11	27	38	3	3	6	15.8
21:00	9	14	23	2	3	5	21.7
22:00	5	7	12	1	1	2	16.7
23:00	3	5	8	0	0	0	0.0
TOTAL	1434	1407	2841	316	267	583	20.5

Peak Statistics

AM	TIME	11:00	06:15	06:30	10:30	10:45	10:45
	VOL	114	135	219	30	28	58
PM	TIME	15:00	16:00	15:15	12:15	12:30	12:30
	VOL	150	107	240	27	26	51



mainroads WESTERN AUSTRALIA

SITE 8272

Hourly Volume

South Western Hwy (H009)

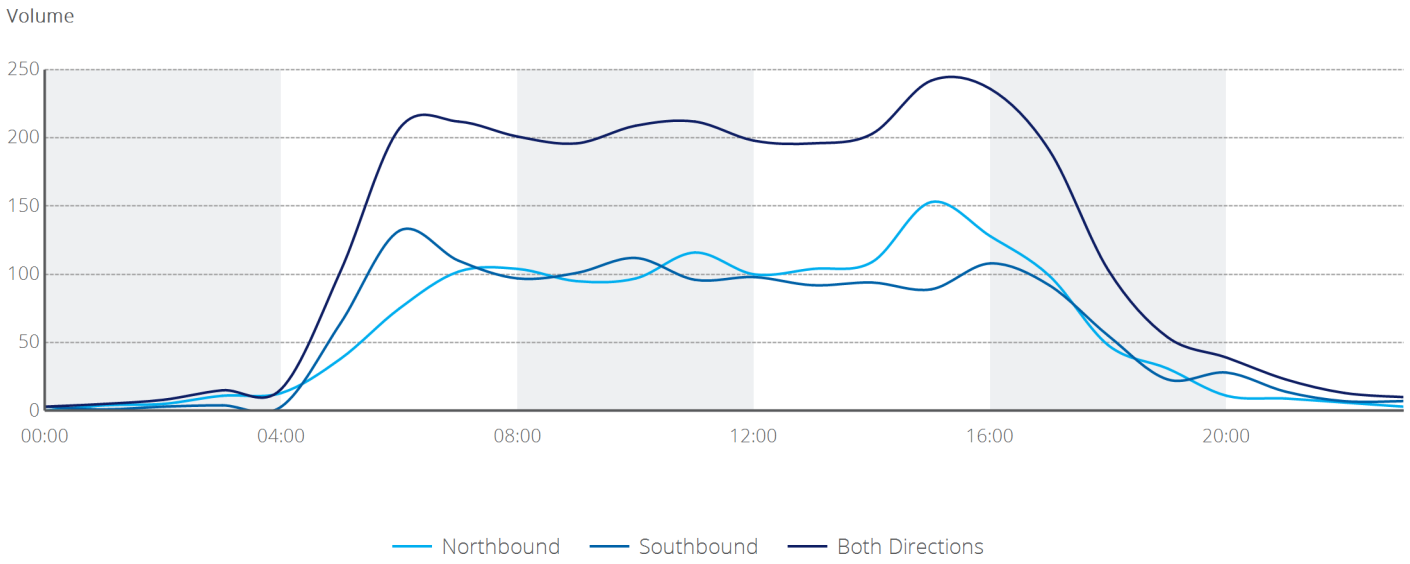
South of Karnup Rd (SLK 24.62)

2016/17
Monday to Sunday

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	0	3	3	0	0	0	0.0
01:00	4	1	5	1	0	1	20.0
02:00	5	3	8	3	2	5	62.5
03:00	11	4	15	3	1	4	26.7
04:00	13	3	16	4	1	5	31.3
05:00	38	64	102	11	16	27	26.5
06:00	75	132	207	16	24	40	19.3
07:00	102	110	212	27	20	47	22.2
08:00	104	97	201	22	21	43	21.4
09:00	95	101	196	26	20	46	23.5
10:00	97	112	209	28	23	51	24.4
11:00	116	96	212	28	27	55	25.9
12:00	100	98	198	24	20	44	22.2
13:00	104	92	196	25	20	45	23.0
14:00	109	94	203	24	17	41	20.2
15:00	153	89	242	24	14	38	15.7
16:00	128	108	236	21	15	36	15.3
17:00	99	92	191	20	14	34	17.8
18:00	48	55	103	8	7	15	14.6
19:00	31	23	54	1	3	4	7.4
20:00	11	28	39	3	3	6	15.4
21:00	9	14	23	2	3	5	21.7
22:00	6	7	13	1	1	2	15.4
23:00	3	7	10	0	1	1	10.0
TOTAL	1461	1433	2894	322	273	595	20.6

Peak Statistics

AM	TIME	11:00	06:15	06:30	10:30	10:45	10:45
	VOL	116	138	224	30	29	59
PM	TIME	15:15	16:00	15:15	12:15	12:30	12:30
	VOL	153	108	246	28	26	51



mainroads WESTERN AUSTRALIA

SITE 50590

Hourly Volume

Karnup Rd (1080007)

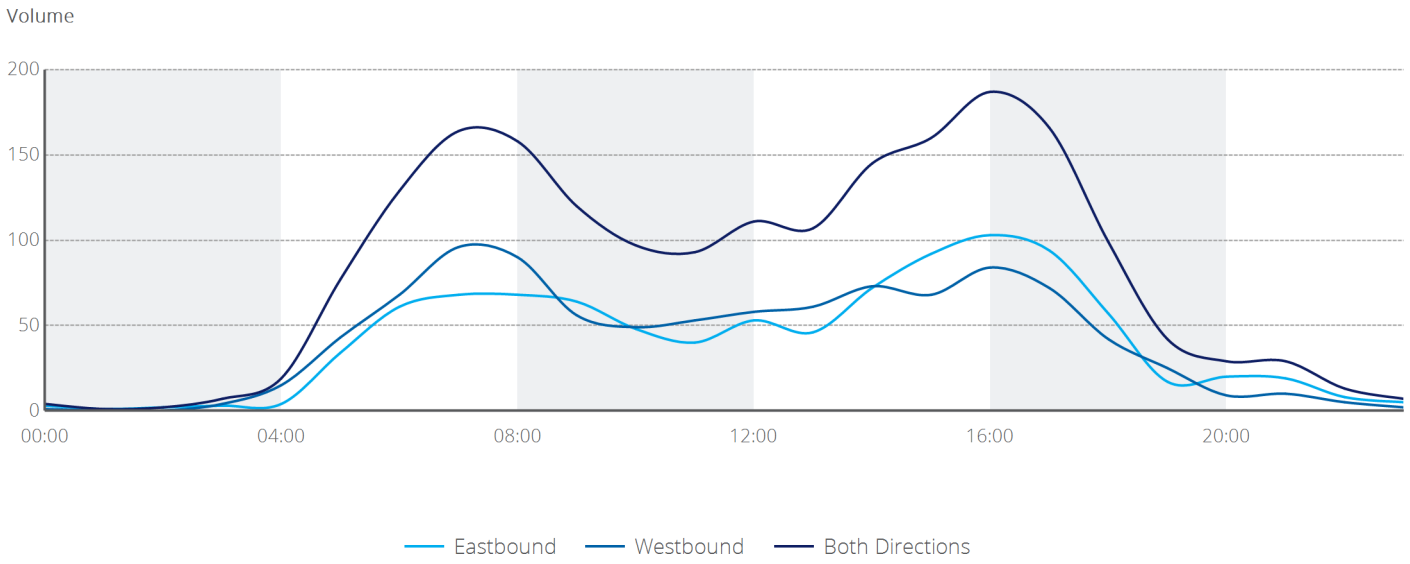
West of Walker Rd (SLK 3.75)

2019/20
Monday to Friday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	3	1	4	1	0	1	25.0
01:00	1	0	1	0	0	0	0.0
02:00	2	0	2	1	0	1	50.0
03:00	3	4	7	0	1	1	14.3
04:00	4	15	19	1	0	1	5.3
05:00	34	43	77	11	6	17	22.1
06:00	61	68	129	11	6	17	13.2
07:00	68	96	164	16	9	25	15.2
08:00	68	90	158	9	10	19	12.0
09:00	64	56	120	6	9	15	12.5
10:00	48	49	97	9	8	17	17.5
11:00	40	53	93	5	10	15	16.1
12:00	53	58	111	8	6	14	12.6
13:00	46	61	107	8	8	16	15.0
14:00	72	73	145	5	8	13	9.0
15:00	92	68	160	12	7	19	11.9
16:00	103	84	187	14	6	20	10.7
17:00	94	72	166	7	7	14	8.4
18:00	57	42	99	4	2	6	6.1
19:00	17	25	42	1	3	4	9.5
20:00	20	9	29	2	0	2	6.9
21:00	19	10	29	0	1	1	3.4
22:00	8	5	13	1	1	2	15.4
23:00	5	2	7	1	1	2	28.6
TOTAL	982	984	1966	133	109	242	12.3

Peak Statistics

AM	TIME	07:30	07:15	07:15	07:00	08:15	07:00
	VOL	75	103	177	16	13	25
PM	TIME	15:30	16:00	16:00	16:00	15:45	15:45
	VOL	106	84	187	14	9	22



mainroads WESTERN AUSTRALIA

SITE 50590

Hourly Volume

Karnup Rd (1080007)

West of Walker Rd (SLK 3.75)

2019/20
Monday to Sunday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	3	1	4	1	0	1	25.0
01:00	1	0	1	0	0	0	0.0
02:00	2	0	2	1	0	1	50.0
03:00	3	4	7	0	1	1	14.3
04:00	4	15	19	1	0	1	5.3
05:00	34	43	77	11	6	17	22.1
06:00	61	67	128	11	6	17	13.3
07:00	68	94	162	16	8	24	14.8
08:00	68	89	157	9	10	19	12.1
09:00	64	56	120	6	9	15	12.5
10:00	48	49	97	9	8	17	17.5
11:00	39	53	92	5	10	15	16.3
12:00	52	57	109	8	6	14	12.8
13:00	46	60	106	8	8	16	15.1
14:00	71	72	143	5	8	13	9.1
15:00	91	68	159	12	7	19	11.9
16:00	102	83	185	14	6	20	10.8
17:00	93	71	164	7	7	14	8.5
18:00	56	42	98	4	2	6	6.1
19:00	17	25	42	1	3	4	9.5
20:00	18	9	27	1	0	1	3.7
21:00	19	10	29	0	1	1	3.4
22:00	8	5	13	1	1	2	15.4
23:00	5	2	7	1	1	2	28.6
TOTAL	973	975	1948	132	108	240	12.3

Peak Statistics

AM	TIME	07:30	07:15	07:15	07:00	08:15	07:00
	VOL	75	102	176	16	13	24
PM	TIME	15:30	16:00	16:00	16:00	15:45	15:45
	VOL	104	83	185	14	9	22