



Transport Impact Statement

Project:	Lot 3 (415) Mundaring Weir Road, Piesse Brook Proposed Restaurant
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1 Summary

Shawmac was commissioned to assess the impacts associated with the proposed restaurant at Lot 3 (415) Mundaring Weir Road, Piesse Brook, in the City of Kalamunda.

This Transport Impact Statement has been prepared in accordance with the WAPC Transport Impact Assessment Guidelines for Developments: Volume 4 – Individual Developments (2016), for lodgement with the Development Application.

Based on the assessment of traffic generation for the proposed restaurant it is predicted that the proposed development will not have an unacceptable impact on the adjacent intersections and road segments. The proposed car park is sufficient to ensure all parking occurs on site.

2 Introduction

2.1 Background

Shawmac has been commissioned to prepare a Transport Impact Statement to assess the potential traffic impacts associated with the proposed restaurant located at Lot 3 (415) Mundaring Weir Road, Piesse Brook, in the City of Kalamunda. The site plan of the restaurant and car parking layout are shown in **Appendix A**.

2.2 Site Location

The subject site is located as shown in **Figure 1**. An aerial view (January 2019) of the subject site is shown in **Figure 2**.

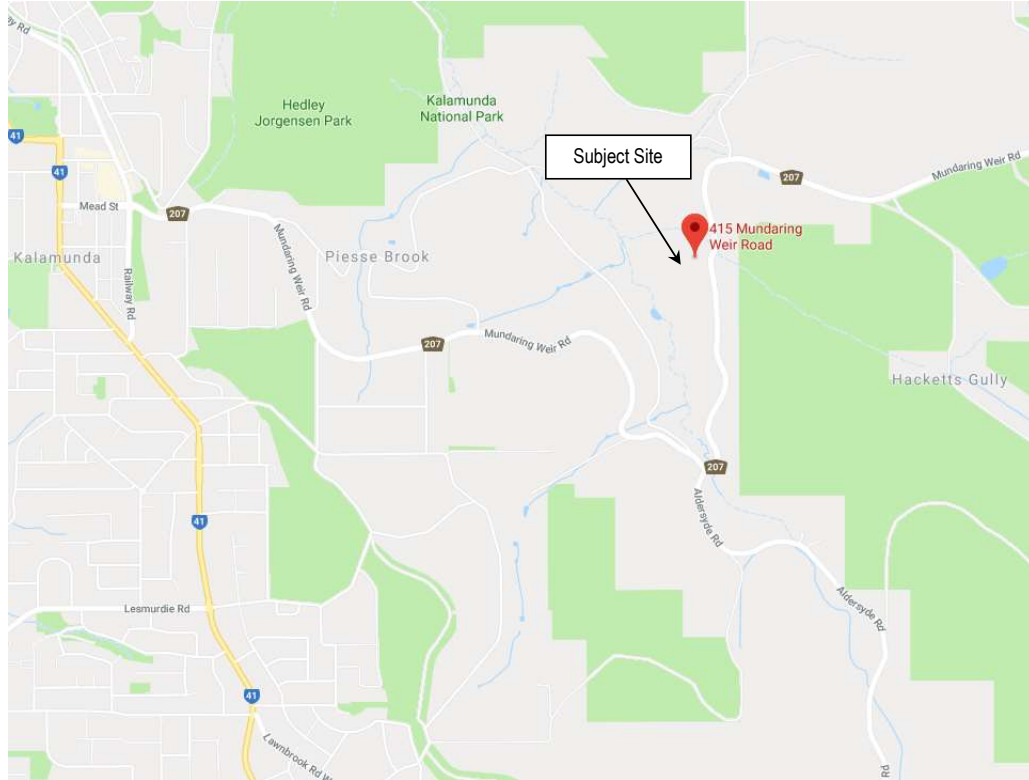


Figure 1: Site Location



Figure 2: Aerial View



3 Site Proposal

3.1 Existing Development

The site was previously a small restaurant however it is no longer operational and is not currently generating traffic.

3.2 Proposed Development

The proposed development consists of a 480 seat restaurant. The development will be limited to 480 people, including staff and contractors, as per the July 2019 Department of Health approvals.

This assessment was undertaken based on a proposed maximum daily capacity of 780 patrons per day and a maximum of 350 people at any one time. This ensures that the Traffic Impact Statement is a highly conservative assessment of potential traffic impacts associated with the restaurant, including consideration of "worst-case" peak hours.

The restaurant will open for breakfast, lunch and dinner throughout the week. Advice from the site's owner indicates that the peak service period will be between 11 am and 2 pm.

4 Existing Situation

4.1 Existing Roads

Figure 3 shows the road hierarchy surrounding the site as extracted from the Main Roads *Road Information Mapping* web tool.

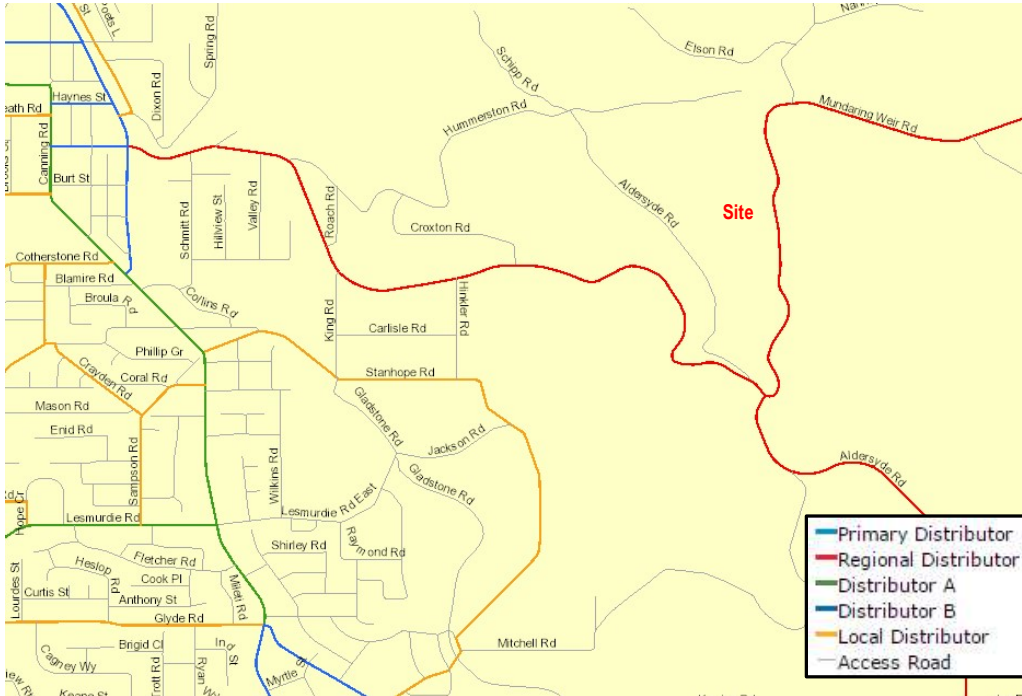


Figure 3: Road Hierarchy

Mundaring Weir Road

Mundaring Weir Road forms the eastern boundary of the site. It is a two-lane, single carriageway road with a typical 6.0m seal width. The Shire of Kalamunda have recently widened a portion of Mundaring Weir Road and the Hackett Valley Bridge in anticipation of future traffic demand. Mundaring Weir Road provides frontage access to the subject site and under the MRWA Functional Road Hierarchy, is classified as a Regional Distributor. Mundaring Weir Road operates with a 60 km/h speed limit and connects the town centre of Kalamunda to Mundaring.

Aldersyde Road

Aldersyde Road is located south and west of the site and runs from Hummerston Road in the north to Lawnbrook Road East, Bickley in the south. Aldersyde Road is classified as a Regional Distributor under the MRWA Functional Road Hierarchy and operates with a 60km/h speed limit.

4.2 Road Hierarchy vs Actual Flows

The latest traffic volumes for Mundaring Weir Road were derived from the City of Kalamunda Metrocount tube count survey undertaken in March 2017 and the data is attached in **Appendix B. Table 1** summarises the peak hour and daily traffic volumes for Mundaring Weir Road.



Table 1: Traffic Volumes

Period	Time	Total Traffic
Weekday AM Peak Hour Traffic	7 – 8 am	116 vph
Weekday PM Peak Hour Traffic	4 – 5 pm	128 vph
Weekend AM Peak Hour Traffic	11 – 12 pm	251 vph
Weekend PM Peak Hour Traffic	2 – 3 pm	211 vph
Daily Weekday Traffic		1255 vpd
Daily Weekend Traffic		1488 vpd

As shown in **Table 1**, the peak hours of the road network are 7 – 8 am and 4 – 5 pm during the week and 11 – 12 pm and 2 – 3 pm on the weekends.

MRWA Modelling indicates that predicted volumes for Mundaring Weir Road in the vicinity of the site are expected to be about 4,600 vpd in 2051.

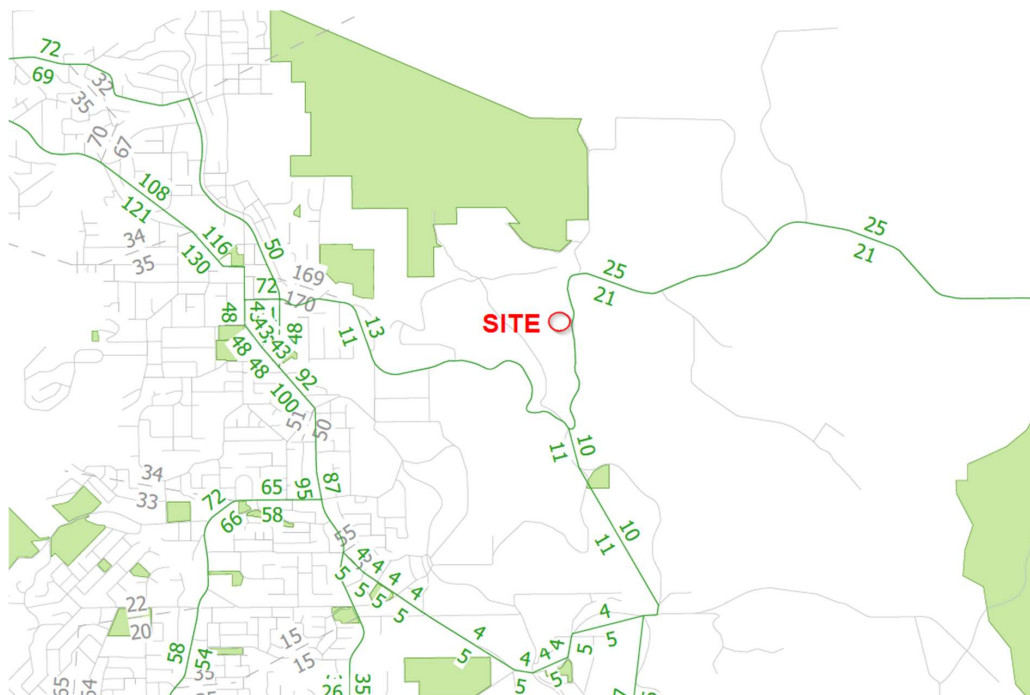


Figure 4: Predicted 2051 Volumes (Source - MRWA ROM)

4.3 Changes to the Surrounding Network

No changes to the surrounding road network are proposed that will affect the development.



5 Vehicle Access and Parking

5.1 Proposed Access and Parking

Vehicle access will be via the existing sealed crossover from Mundaring Weir Road and a sealed driveway with a width of 6 m.

The City of Kalamunda's Local Planning Scheme (No. 3) requires 1 car parking bay for every 4 people on site (i.e. 120 bays required for 480 on-site persons).

The restaurant will house two main car parking areas containing 151 car parking bays for visitors and staff, including:

- An unsealed carpark containing 100 car bays (2.5 m x 5.5 m dimension) in the south of the site.
- A partially sealed car park containing 47 car bays in the north of the site, including two sealed ACROD bays and a shared access space to the immediate north of the restaurant.
- A small sealed parking area containing 4 car bays, designated for emergency/special use only, located immediately to the west of the restaurant.

In addition, there are 4 bus parking bays (12.5 m x 3.5 m) located just off the main driveway, with additional capacity for 4 x 47 people (188 people total).

Additional access and manoeuvring space has been provided for service vehicles accessing the ATU in the north of the site and the restaurant to the south.

The site owner has specifically designed the carpark to include additional car parking bay capacity (+25%) to that required by the City of Kalamunda, in order to alleviate concerns regarding off-parking.

All dimensions conform to the requirements indicated in Australian Standard AS 2890, including car bays of 2.5 m x 5.5 m and driveway/carpark aisles of 6 m or greater throughout for 2 way traffic. A fully dimensioned plan showing proposed access and parking layout presented below.

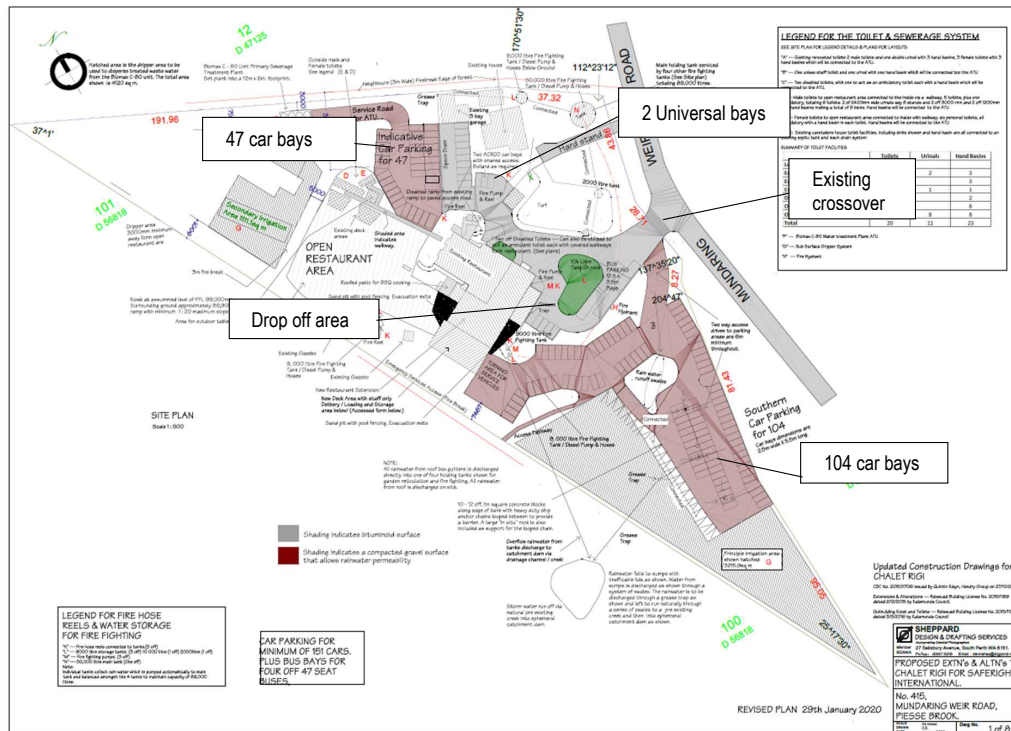


Figure 5: Vehicle Access and Parking Layout

5.2 Parking Supply

According to City of Kalamunda's Local Planning Scheme No. 3, the on-site parking requirement is 1 bay per 4 people accommodated. The car park requirement and provision are outlined in **Table 2**.

Table 2: Parking Requirement

Land Use	Measurement	Quantum	Parking Generation Rate	Parking Required	Parking Provided
Restaurant	Person	480	1 per 4 seats	120	151

The proposed development includes 151 appropriately sized bays which meets the City's requirement and is therefore considered to be adequate to meet the likely parking demand. The car park layout includes two ACROD bays with a shared access space which satisfies the requirement for 2% of parking to be set aside for people with disabilities.

The ACROD bays and the shared access space are fully compliant with AS2890.1 requirements (2.5 m x 5.5 m for the bays and the shared access space).



In addition, there are 4 bus parking bays (12.5 m x 3.5 m) located just off the main driveway, with additional capacity for 4 x 47 people (188 people total).

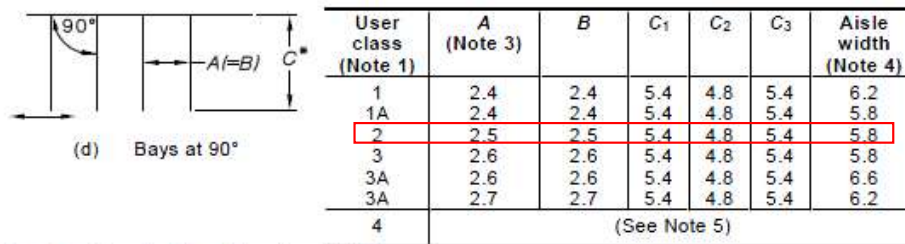
With 151 car bays the car park could theoretically cater for 604 persons simultaneously (not including the bus parking). However as the facility is limited to 480 seats it is highly unlikely that demand would ever exceed capacity.

5.3 Access and Parking Layout

5.3.1 Parking

The layout and dimensions of the car park have also been assessed for compliance with Australian Standard AS/NZS 2890.1-2004 – *Parking facilities – Off-street car parking* (AS/NZS 2890.1). The facility has been assessed as a Class 2 facility as restaurant parking is typically medium to long-term.

The required dimensions for 90 degree angled parking are shown in **Figure 6**.



*Dimension C is selected as follows (see Note 6):
 C1—where parking is to a wall or high kerb not allowing any overhang.
 C2—where parking is to a low kerb which allows 600 mm overhang in accordance with Clause 2.4.1(a)(i).
 C3—where parking is controlled by wheelstops installed at right angles to the direction of parking, or where the ends of parking spaces form a sawtooth pattern, e.g. as shown in the upper half of Figure 2.4(b).

Figure 6: AS/NZS 2890.1 – 90 Degree Angled Parking

The proposed parking bay dimensions as noted on the site plan are 2.5 m by 5.5 m which is compliant with the AS2890.1 requirements. The aisle widths are at least 6 m which is compliant with the AS2890.1 requirements.

AS2890.1 also requires that blind (dead end) aisles longer than six 90 degree bays required provision to turnaround at the end of the aisle.

Sufficient turnaround provision has been provided in both southern and northern car parks, although 2 of the bays may need to be reserved for reversing / turning around in the northern car park on the easternmost aisle (immediately adjacent the existing 3 bay garage). Should these 2 bays be removed, the car park would still far exceed the minimum requirements for parking

5.4 Access Sight Distance

Figure 3.2 of AS2890.1, shown as **Figure 7**, prescribes the minimum required stopping sight distance (SSD) for



access driveways based on the approach speed of vehicles on the frontage road.

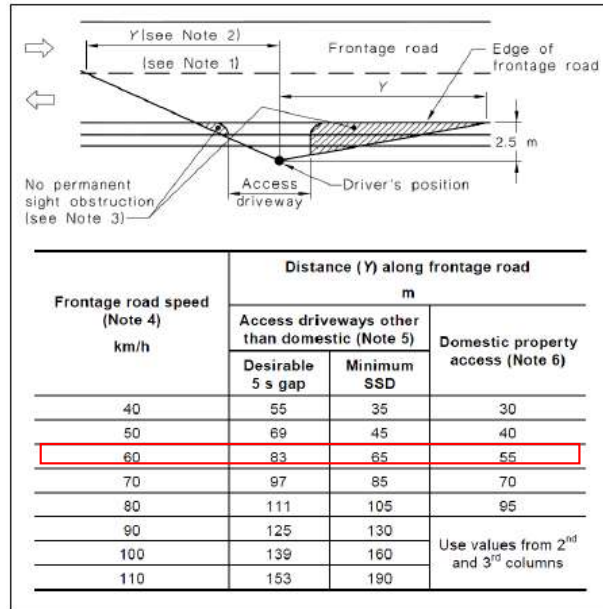


Figure 7: AS2890.1 – Access Sight Distance Requirements

Based on the 60 km/h frontage speed along Mundaring Weir Road, the desirable sight distance from the proposed crossover is 83 m. A site visit was undertaken to determine that the sight distance to the south was 160m and to the north was 135 m as shown in Figure 8 and Figure 9. It is concluded that the minimum sight distance is achieved in both directions.



Figure 8: Access Sight Distance to the North



Figure 9: Access Sight Distance to the South

5.5 Provision for Service Vehicles

Waste will be collected internally in the main restaurant building and will be stored in waste bins located in the dedicated staff-only Delivery / Loading and Storage Area beneath the deck (accessed from ground level).

An extended turning and parking area has been allocated to allow access and manoeuvrability for service and delivery vehicles immediately adjacent the Delivery / Loading and Storage Area.

Extended access and parking area has also been allocated for vehicles servicing and maintaining the wastewater ATU treatment system in the north of the site.

A detailed Loading, Servicing and Delivery Management Plan will be prepared as part of any future approval conditions.

6 Transport Assessment

6.1 Assessment Years

The development is assessed based on the current network condition. No short term traffic growth is expected to on Mundaring Weir Road as no intensification of the surrounding land use is likely to occur. Notwithstanding this, assessment has also been made using predicted 2051 flows for Mundaring Weir Road as a horizon year.

6.2 Time Periods for Assessment

The weekend (Sunday) lunch service has been chosen for assessment as this service would coincide with the weekend peak hour on the road network from 11 am – 12 pm. The weekday peak hours have also been



assessed although the weekday peak hour traffic on the road network is measurably lower than the weekend peak.

6.3 Peak Hour Traffic Generation

6.3.1 RTA

The New South Wales Roads and Traffic Authority (RTA, now RMS) *Guide to Traffic Generating Developments* indicates that rates can vary significantly for this land use type and gives an average evening peak hour rate of 5 trips per 100 m² Gross Floor Area (GFA), or 10 trips per 100 seats (based on 2 m² GFA per person). Applying the RTA rates gives the traffic generation as outlined in **Table 3**.

Table 3: Traffic Generation

Land Use	Measurement	Quantum	Traffic Generation Rate	Traffic Generated	Source
Restaurant	Seat	350	10 per 100 seats	35 vph	RTA <i>Guide to Traffic Generating Developments</i>

It is noted that this assessment was based on a conservative assumption of 350 people present on-site at any one time.

6.3.2 ITE

Comparison with rates indicated by the Institute of Transportation Engineers (ITE) *Trip Generation Rates - 9th Edition (Code 931)* indicate that traffic generation is expected to be in the order of 2.86 daily trips per seat, 0.03 trips per seat in the morning peak and 0.26 trips per seat in the evening peak. Application of these rates gives a daily generation of 1001 vehicles with an hourly peak generation of 91 vehicles.

Assuming that traffic generation over a typical day will follow a similar pattern to parking demand, and adopting the demand pattern reported by ITE, the traffic generation over a typical weekday was predicted as shown in **Table 4**.

Table 4: Predicted Traffic over a Day

Time Periods vs Traffic Distribution						
<8AM	8AM-10AM	10AM-12PM	12PM-2PM	2PM-4PM	4PM-6PM	>6PM
44%	76%	92%	100%	53%	76%	100%
31 vph	53 veh	64 veh	70 veh	37 veh	53 veh	35 vph

6.3.3 Alternative

Due to the varying trip generation rates from different sources, a more conservative approach has been taken. The traffic generated by the site has been estimated from based on a 100% restaurant occupancy with an



average vehicle occupancy of 2 people per vehicle (occupancy of 4 people per vehicle suggested by the council parking ratio). The peak hour traffic generation is therefore calculated to be 50 vph during breakfast and 175 vph during lunch and dinner. It is assumed that peak hour traffic generated by the restaurant will be evenly split between arriving and departing flows. The conservative approach above is considered to account for any overlap of traffic movements in between the three services during the day.

6.4 Distribution

As outlined in **Figure 1**, Mundaring Weir Road connects to Kalamunda Town Centre to the west and Mundaring to the east. Based on the surrounding land use and likely patronage from metropolitan Perth, the traffic distribution is assumed to be 65% west and 35% to the east.

On weekdays, it is assumed conservatively that the breakfast and dinner peak traffic generation coincides with the morning and afternoon peaks hour on the road network. On weekends, it is assumed that the lunch peak traffic generation coincides with the Sunday peak hour on the road network. As such, the resulting peak hour traffic volumes on the road network during the assessed peak periods are as follows:

- Weekday AM Peak $116\text{vph} + (50\text{vph}) = 166\text{vph}$
- Weekday PM Peak $128\text{vph} + (175\text{vph}) = 303\text{vph}$
- Weekend AM Peak $251\text{vph} + (175\text{vph}) = 426\text{vph}$

For the 2051 scenario, the peak hours traffic flows are assumed to be equivalent to 10% of the daily traffic volumes. It was also assumed that the weekend peak hour traffic flows is approximately double the weekday PM peak as indicated by the existing traffic data.

- Weekday AM Peak 2051 $460\text{vph} + (50\text{vph}) = 510\text{vph}$
- Weekday PM Peak 2051 $460\text{vph} + (175\text{vph}) = 635\text{vph}$
- Weekend AM Peak 2051 $920\text{vph} + (175\text{vph}) = 1,095\text{vph}$

6.5 Impact on Roads

6.5.1 Austroads Guidelines

Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (AGTM03) notes that the typical mid-block capacity of a two-lane rural road is 1,700 passenger cars per hour.

The resulting peak hour traffic volumes on the road network during all assessed peak hours and scenarios will remain well within the practical capacity of the existing road and the change of site operation will have minimal impact on the capacity of the road network at mid-block locations.



6.6 Impact on Intersections

6.6.1 Intersections Capacity

SIDRA Intersection 8 has been used to assess the peak hour capacity and performance of the property access on Mundaring Weir Road.

SIDRA is a commonly used intersection modelling tool used by traffic engineers for all types of intersections. Outputs for four standard measures of operational performance can be obtained, being Degree of Saturation (DoS), Average Delay, Queue Length, and Level of Service (LoS).

- Degree of Saturation is a measure of how much physical capacity is being used with reference to the full capability of the particular movement, approach, or overall intersection. A DoS of 1.0 equates to full theoretical capacity although in some instances this level is exceeded in practice. Design engineers typically set a maximum DoS threshold of 0.95 for new intersection layouts or modifications.
- Average Delay reports the average delay per vehicle in seconds experienced by all vehicles in a particular lane, approach, or for the intersection as a whole. For severely congested intersections the average delay begins to climb exponentially.
- Queue Length measures the length of approach queues. In this document we have reported queue length in terms of the length of queue at the 95th percentile (the maximum queue length that will not be exceeded for 95 percent of the time). Queue lengths provide a useful indication of the impact of signals on network performance. It also enables the traffic engineer to consider the likely impact of queues blocking back and impacting on upstream intersections and accesses.
- Level of Service is a combined appreciation of queuing incidence and delay time incurred, producing an alphanumeric ranking of A through F. A LoS of A indicates an excellent level of service whereby drivers delay is at a minimum and they clear the intersection at each change of signals or soon after arrival with little if any queuing. Values of B through D are acceptable in normal traffic conditions. Whilst values of E and F are typically considered undesirable, within central business district areas with significant vehicular and pedestrian numbers, delays/queues are unavoidable and hence, are generally accepted by road users.

The peak hour volumes through the access intersection are assumed to be as shown in **Figure 10** to **Figure 12**. The directional split of through traffic along Mundaring Weir Road adjacent to the site (east of Fern Road) has been based on the nearest MRWA traffic count with directional splits (Mundaring Weir Road west of Hinkler Road, 2016).

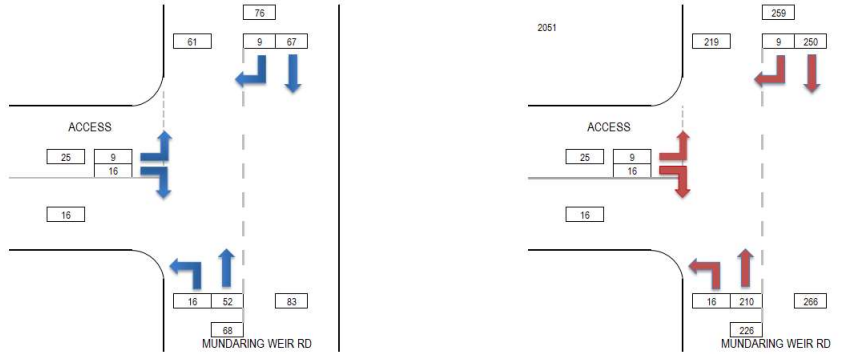


Figure 10: Predicted Weekday AM Peak Hour Traffic

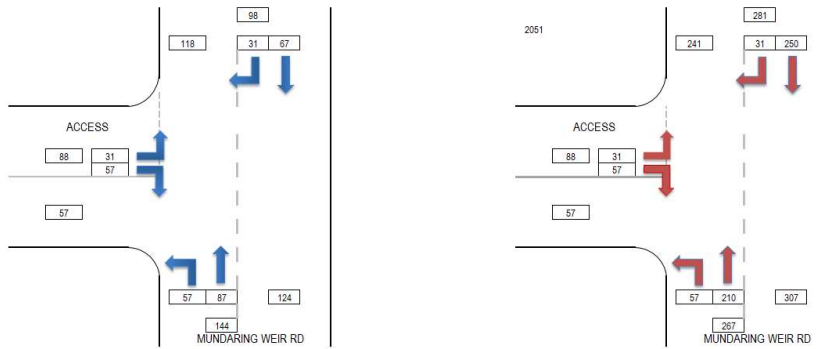


Figure 11: Predicted Weekday PM Peak Hour Traffic

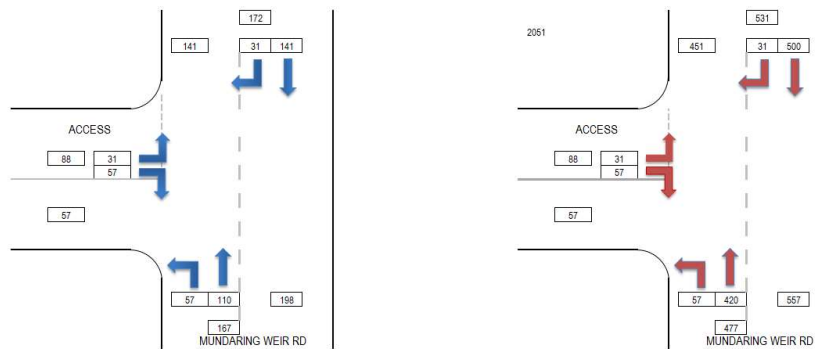


Figure 12: Predicted Weekend AM Peak Hour Traffic

The results of the assessment are summarised in Table 5.



Table 5: SIDRA Outputs

Peak Period	Worst DoS	95%ile Queue (m)	Average Delay (s)	Worst Delay (s)	Average LoS	Worst LoS
Weekday AM Peak Current Traffic	0.042	0.5	1.3	8.9	A	A
Weekday AM Peak 2051 Traffic	0.144	0.6	0.5	8.9	A	A
Weekday PM Peak Current Traffic	0.079	1.8	2.5	8.9	A	A
Weekday PM Peak 2051 Traffic	0.160	2.4	1.5	8.9	A	A
Sunday Peak Current Traffic	0.098	2.0	2.0	8.9	A	A
Sunday Peak 2051 Traffic	0.305	3.8	1.3	10.2	A	B

The results indicate that under all scenarios the intersection would perform with excellent degree of saturation, queue distance and delay.

6.6.2 Intersection Treatments

The existing intersection is a rural basic T-junction. The need for intersection turning treatments has been reviewed using the Main Roads WA Intersection Warrants calculator and applying the current Sunday peak hour intersection volumes. The assessment as shown in Figure 13 indicates that a Basic Right (BAR) turn treatment and a Basic Left (BAL) turn treatment is warranted.

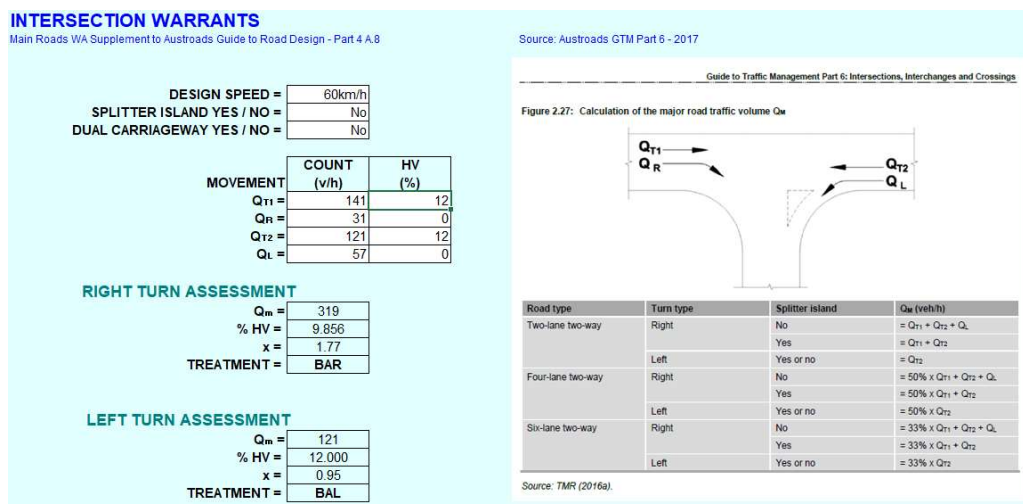


Figure 13: MRWA Intersection Warrants

Rural BAR and BAL treatments involve widening of the road shoulder (preferably sealed) to allow through vehicles to pass a turning vehicle.

The existing access currently has an unsealed shoulder on the western side of Mundaring Weir Road that is



similar to a rural BAL treatment. The shoulder is approximately 1.5 to 2.0m wide and could feasibly be used for vehicles to pull off the carriageway. However, the City of Kalamunda has indicated that they would still require a BAL to be undertaken in accordance with AGRD – Part 4A at the site crossover with the proposed development. A BAR treatment at the access location is not feasible due to the existing barrier along the eastern side of Mundaring Weir Road that ends to the north of the main access. In this instance, a BAR treatment is not considered to be essential for the following reasons:

- The SIDRA assessment based on the existing geometry with no added turn lanes indicates that the access will operate well within capacity at all times;
- The lesser proportion of site traffic is generated to and from the north/east and therefore the likelihood of a through vehicle being stuck behind a vehicle turning right from this direction is low; and
- The site has operated as a restaurant previously and the crash history does not suggest any safety issues with this section of road.

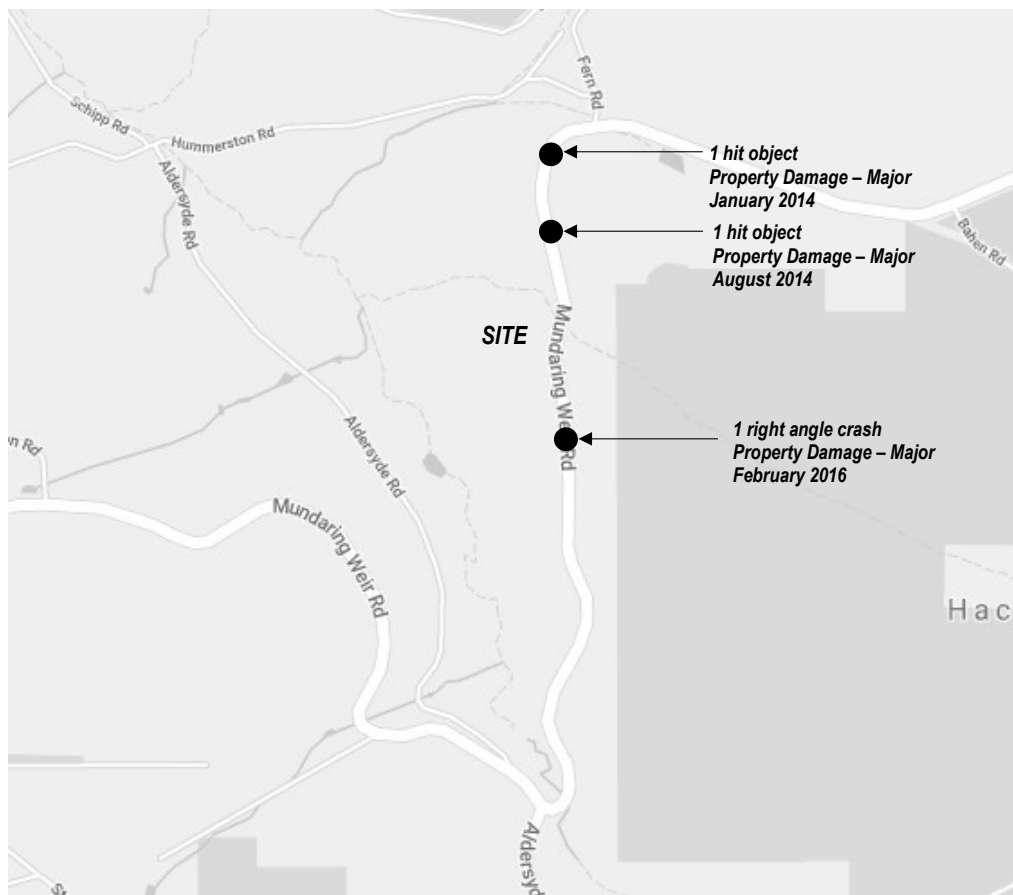
The City of Kalamunda confirmed in September 2019 that they do not require a BAR due to the primary attraction and destination for site-generated being from and to the south and the location of the safety barrier as part of City roadworks to the north of the property.



7 Site Specific or Safety Issues

7.1 Crash History

The crash history of Mundaring Weir Road for the five year period ending December 2018 was sourced from MRWA Reporting Centre as summarised in **Figure 14**. The crash history includes all recorded incidents between Aldersyde Road and Fern Road.



No atypical crash patterns were identified and given the low traffic volume on Mundaring Weir Road, the development would be unlikely to change the risk profile to an unacceptable level.

The access is located on the outside of a horizontal curve whilst the dividing line provides guidance to drivers continuing on Mundaring Weir Road it should be supported with a continuity line on the outside of the curve across the driveway access.



8 Public Transport Access

There are no public transport services currently available within reasonable walking distance from the site. Given the nature of the development this is not considered an issue.

The site owner is considering options to charter a private bus offering a pick up and drop off service between the Kalamunda Town Centre.

The site allows for parking of 4 private buses in specially designated bus parking bays.

9 Pedestrian and Cyclist Access

There is currently no pedestrian infrastructure within 1 km of the site with the exception of the walking trails in the nearby Kalamunda National Park, and it is considered unlikely that patrons or staff will walk to the restaurant.

Road cyclists often use Mundaring Weir Road and the adjacent road network, whilst the surrounding National Park and state forest contain over 40 km of mountain bike trails.

The site owners plans to specifically encourage cyclists to utilise the venue particularly for breakfast and lunch time service.

10 Conclusion

A transport assessment of the proposed restaurant to be located on the on Lot 3 (415) Mundaring Weir Road, Piesse Brook in the City of Kalamunda has concluded the following:

- There is adequate capacity in the existing road network to accommodate the expected development traffic. The MRWA intersection warrants calculator indicates that a BAR and BAL turn treatment is warranted at the access. A BAR treatment is not feasible due to the existing roadside barrier. However, the City of Kalamunda require a BAL treatment to be undertaken in accordance with AGRD – Part 4A at the site crossover with the proposed development.
- The proposed car parking supply satisfies the minimum requirements as outlined by the City of Kalamunda Local Planning Scheme.
- The layout of the car park is primarily compliant with Australian Standards except for the minor adjustment of blind aisles in the northern carpark in the easternmost aisle.
- Access is shown from one crossover onto Mundaring Weir Road which is desirable.
- There is adequate sight distance from the proposed site crossover in both directions.
- The site owner is considering the provision of a bus pick up / drop off service to the Kalamunda Town

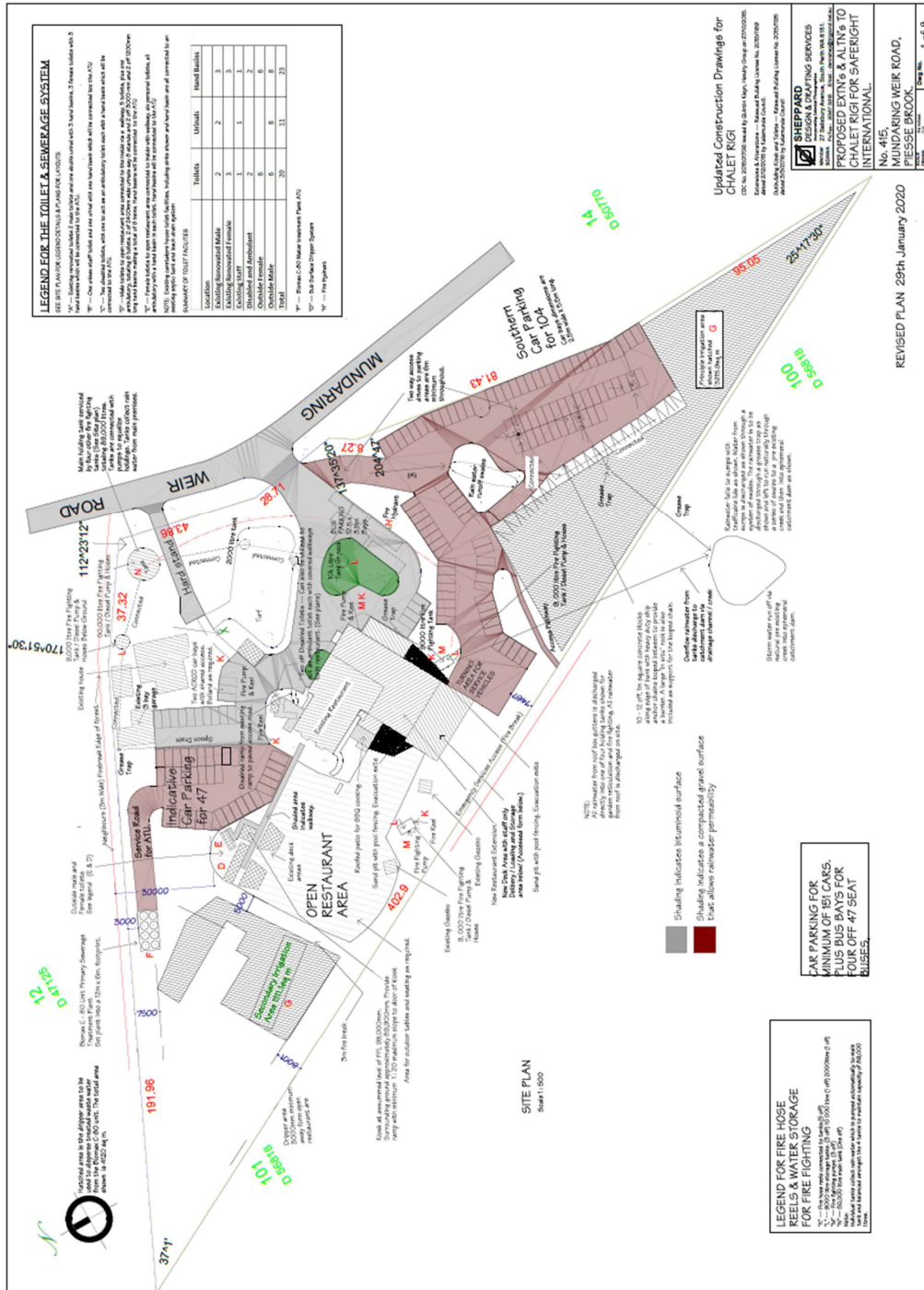


Centre.

- The development provides a drop off / pick up area for cars and buses.
- The waste truck will collect internally and entry and exit the site in a forward direction.
- A review of the crash history adjacent to the site did not indicate any safety issues with the road network and the additional traffic generated by the proposed development is not likely to increase the risk of crashes.



11 Appendix A - Site Layout





12 Appendix B - Traffic Count

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-831

Site: MUNDARING RD (0620).0.1EW
Description: 70m East of FERN RD 1 <70>
Filter time: 9:54 Thursday, 23 March 2017 => 9:46 Thursday, 30 March 2017
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	1 - 7
Hour									
0000-0100	1.0	0.0	3.0	0.0	2.0	4.0	10.0	1.2	2.9
0100-0200	1.0	2.0	2.0	1.0	2.0	3.0	5.0	1.6	2.3
0200-0300	1.0	1.0	0.0	2.0	3.0	1.0	1.0	1.4	1.3
0300-0400	0.0	0.0	0.0	0.0	2.0	1.0	0.0	0.4	0.4
0400-0500	1.0	2.0	2.0	2.0	0.0	0.0	2.0	1.4	1.3
0500-0600	11.0	13.0	13.0	16.0	13.0	9.0	8.0	13.2	11.9
0600-0700	39.0	48.0	36.0	43.0	41.0	59.0	45.0	41.4	44.4
0700-0800	117.0	107.0	107.0	112.0	134.0	102.0	96.0	115.4	110.7
0800-0900	88.0	86.0	96.0	21.0	107.0	187.0	140.0	79.6	103.6
0900-1000	62.0	67.0	67.0	2.5	91.0	185.0	181.0	48.7	82.3
1000-1100	90.0	97.0	80.0	88.0	93.0	185.0	202.0	89.6	119.3
1100-1200	77.0	100.0	87.0	95.0	112.0	192.0	251.0	94.2	130.6
1200-1300	105.0	107.0	81.0	85.0	114.0	165.0	196.0	98.4	121.9
1300-1400	65.0	68.0	91.0	77.0	100.0	234.0	177.0	80.2	116.0
1400-1500	76.0	83.0	108.0	78.0	125.0	170.0	211.0	94.0	121.6
1500-1600	113.0	115.0	102.0	108.0	147.0	143.0	169.0	117.0	128.1
1600-1700	117.0	118.0	139.0	118.0	145.0	155.0	114.0	127.4	129.4
1700-1800	95.0	109.0	108.0	106.0	132.0	112.0	80.0	110.0	106.0
1800-1900	60.0	69.0	58.0	52.0	89.0	104.0	78.0	65.6	72.9
1900-2000	25.0	37.0	22.0	46.0	35.0	28.0	29.0	33.0	31.7
2000-2100	15.0	13.0	18.0	16.0	19.0	7.0	14.0	16.2	14.6
2100-2200	8.0	4.0	14.0	11.0	15.0	13.0	11.0	10.4	10.9
2200-2300	7.0	6.0	8.0	6.0	28.0	61.0	12.0	11.0	18.3
2300-2400	2.0	2.0	2.0	4.0	9.0	14.0	3.0	3.8	5.1
Totals									
0700-1900	1065.0	1126.0	1124.0	942.5	1389.0	1934.0	1895.0	1120.1	1342.3
0600-2200	1152.0	1228.0	1214.0	1058.5	1499.0	2041.0	1994.0	1221.1	1443.8
0600-0000	1161.0	1236.0	1224.0	1068.5	1536.0	2116.0	2009.0	1235.9	1467.3
0000-0000	1176.0	1254.0	1244.0	1089.5	1558.0	2134.0	2035.0	1255.1	1487.3
AM Peak	0700 117.0	0700 107.0	0700 107.0	0700 112.0	0700 134.0	1100 192.0	1100 251.0		
PM Peak	1600 117.0	1600 118.0	1600 139.0	1600 118.0	1500 147.0	1300 234.0	1400 211.0		



13 Appendix C - SIDRA Outputs

MOVEMENT SUMMARY

▽ Site: 101 [Access / Mundaring Weir Rd AM Peak]

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mundaring Weir Rd S												
1	L2	16	0.0	0.037	8.9	LOS A	0.0	0.0	0.00	0.27	0.00	55.4
2	T1	52	12.0	0.037	0.0	LOS A	0.0	0.0	0.00	0.27	0.00	57.8
Approach		68	9.2	0.037	2.1	NA	0.0	0.0	0.00	0.27	0.00	57.2
North: Mundaring Weir Rd N												
8	T1	67	12.0	0.042	0.0	LOS A	0.1	0.4	0.04	0.11	0.04	58.9
9	R2	9	0.0	0.042	7.5	LOS A	0.1	0.4	0.04	0.11	0.04	17.2
Approach		76	10.6	0.042	0.9	NA	0.1	0.4	0.04	0.11	0.04	45.7
West: Access												
10	L2	9	0.0	0.020	0.1	LOS A	0.1	0.5	0.15	0.06	0.15	16.8
12	R2	16	0.0	0.020	0.5	LOS A	0.1	0.5	0.15	0.06	0.15	16.7
Approach		25	0.0	0.020	0.3	LOS A	0.1	0.5	0.15	0.06	0.15	16.7
All Vehicles		169	8.4	0.042	1.3	NA	0.1	0.5	0.04	0.17	0.04	38.9

MOVEMENT SUMMARY

▽ Site: 101 [Access / Mundaring Weir Rd AM Peak - 2051]

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mundaring Weir Rd S												
1	L2	16	0.0	0.125	8.9	LOS A	0.0	0.0	0.00	0.08	0.00	56.7
2	T1	210	12.0	0.125	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	59.3
Approach		226	11.2	0.125	0.6	NA	0.0	0.0	0.00	0.08	0.00	59.1
North: Mundaring Weir Rd N												
8	T1	250	12.0	0.144	0.0	LOS A	0.1	0.6	0.03	0.03	0.03	59.6
9	R2	9	0.0	0.144	8.2	LOS A	0.1	0.6	0.03	0.03	0.03	17.2
Approach		259	11.6	0.144	0.3	NA	0.1	0.6	0.03	0.03	0.03	54.9
West: Access												
10	L2	9	0.0	0.027	0.7	LOS A	0.1	0.6	0.36	0.24	0.36	16.7
12	R2	16	0.0	0.027	2.1	LOS A	0.1	0.6	0.36	0.24	0.36	16.6
Approach		25	0.0	0.027	1.6	LOS A	0.1	0.6	0.36	0.24	0.36	16.6
All Vehicles		510	10.8	0.144	0.5	NA	0.1	0.6	0.03	0.07	0.03	50.8



MOVEMENT SUMMARY

▽ Site: 101 [Access / Mundaring Weir Rd PM Peak]

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Mundaring Weir Rd S												
1	L2	57	0.0	0.079	8.9	LOS A	0.0	0.0	0.00	0.44	0.00	54.2
2	T1	87	12.0	0.079	0.0	LOS A	0.0	0.0	0.00	0.44	0.00	56.5
Approach		144	7.3	0.079	3.5	NA	0.0	0.0	0.00	0.44	0.00	55.5
North: Mundaring Weir Rd N												
8	T1	67	12.0	0.056	0.2	LOS A	0.2	1.3	0.16	0.28	0.16	57.1
9	R2	31	0.0	0.056	7.7	LOS A	0.2	1.3	0.16	0.28	0.16	17.0
Approach		98	8.2	0.056	2.6	NA	0.2	1.3	0.16	0.28	0.16	32.7
West: Access												
10	L2	31	0.0	0.074	0.3	LOS A	0.3	1.8	0.22	0.12	0.22	16.7
12	R2	57	0.0	0.074	0.8	LOS A	0.3	1.8	0.22	0.12	0.22	16.7
Approach		88	0.0	0.074	0.6	LOS A	0.3	1.8	0.22	0.12	0.22	16.7
All Vehicles		330	5.6	0.079	2.5	NA	0.3	1.8	0.11	0.30	0.11	30.4

MOVEMENT SUMMARY

▽ Site: 101 [Access / Mundaring Weir Rd PM Peak - 2051]

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Mundaring Weir Rd S												
1	L2	57	0.0	0.147	8.9	LOS A	0.0	0.0	0.00	0.24	0.00	55.5
2	T1	210	12.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	58.0
Approach		267	9.4	0.147	1.9	NA	0.0	0.0	0.00	0.24	0.00	57.4
North: Mundaring Weir Rd N												
8	T1	250	12.0	0.160	0.2	LOS A	0.3	1.9	0.10	0.10	0.10	58.7
9	R2	31	0.0	0.160	8.4	LOS A	0.3	1.9	0.10	0.10	0.10	17.2
Approach		281	10.7	0.160	1.1	NA	0.3	1.9	0.10	0.10	0.10	46.3
West: Access												
10	L2	31	0.0	0.097	0.7	LOS A	0.3	2.4	0.38	0.30	0.38	16.6
12	R2	57	0.0	0.097	2.5	LOS A	0.3	2.4	0.38	0.30	0.38	16.6
Approach		88	0.0	0.097	1.9	LOS A	0.3	2.4	0.38	0.30	0.38	16.6
All Vehicles		636	8.7	0.160	1.5	NA	0.3	2.4	0.10	0.19	0.10	39.7



MOVEMENT SUMMARY

▽ Site: 101 [Access / Mundaring Weir Rd Sunday Peak]

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mundaring Weir Rd S												
1	L2	57	0.0	0.092	8.9	LOS A	0.0	0.0	0.00	0.38	0.00	54.6
2	T1	110	12.0	0.092	0.0	LOS A	0.0	0.0	0.00	0.38	0.00	56.9
Approach		167	7.9	0.092	3.0	NA	0.0	0.0	0.00	0.38	0.00	56.1
North: Mundaring Weir Rd N												
8	T1	141	12.0	0.098	0.1	LOS A	0.2	1.6	0.12	0.16	0.12	58.2
9	R2	31	0.0	0.098	7.8	LOS A	0.2	1.6	0.12	0.16	0.12	17.1
Approach		172	9.8	0.098	1.5	NA	0.2	1.6	0.12	0.16	0.12	40.6
West: Access												
10	L2	31	0.0	0.080	0.3	LOS A	0.3	2.0	0.26	0.16	0.26	16.3
12	R2	57	0.0	0.080	1.3	LOS A	0.3	2.0	0.26	0.16	0.26	16.3
Approach		88	0.0	0.080	1.0	LOS A	0.3	2.0	0.26	0.16	0.26	16.3
All Vehicles		427	7.1	0.098	2.0	NA	0.3	2.0	0.10	0.25	0.10	33.8

MOVEMENT SUMMARY

▽ Site: 101 [Access / Mundaring Weir Rd Sunday Peak - 2051]

Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Mundaring Weir Rd S												
1	L2	57	0.0	0.263	8.9	LOS A	0.0	0.0	0.00	0.14	0.00	56.3
2	T1	420	12.0	0.263	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	58.8
Approach		477	10.6	0.263	1.1	NA	0.0	0.0	0.00	0.14	0.00	58.5
North: Mundaring Weir Rd N												
8	T1	500	12.0	0.305	0.3	LOS A	0.4	3.2	0.10	0.06	0.10	59.1
9	R2	31	0.0	0.305	10.2	LOS B	0.4	3.2	0.10	0.06	0.10	17.2
Approach		531	11.3	0.305	0.9	NA	0.4	3.2	0.10	0.06	0.10	51.7
West: Access												
10	L2	31	0.0	0.167	1.7	LOS A	0.5	3.8	0.61	0.57	0.61	16.4
12	R2	57	0.0	0.167	7.4	LOS A	0.5	3.8	0.61	0.57	0.61	16.4
Approach		88	0.0	0.167	5.4	LOS A	0.5	3.8	0.61	0.57	0.61	16.4
All Vehicles		1096	10.1	0.305	1.3	NA	0.5	3.8	0.10	0.13	0.10	46.0