

## **1. EXECUTIVE SUMMARY**

- 1.1. This technical note has been prepared to assess the traffic flow changes of replacing a showroom with a drive-through restaurant. The technical assessment concludes that:
- 1.2. The traffic report submitted in support of the current approval for the subject land identified a trip generation of 4,095 vehicle movements per day. It is noted that the traffic report dated December 2016 included two drive-through facilities and larger showroom areas.
- 1.3. The proposed change to provide a second drive-through facility is shown to generate 3,951 movements per day. As the forecast traffic generation is shown to reduce to that identified in the December 2017 traffic report, no material traffic impact will occur.
- 1.4. Assessment of the operation of the drive-through facility has been undertaken and is based on a survey of a similar facility in a similar locality. The assessment concludes that ample stacking is provided for the drive-through. No impact to the operation of the car park access is anticipated under normal operating conditions.

## **2. BACKGROUND**

- 2.1. Development of the subject site, located on the corner of Joondalup Drive and Joseph Banks Boulevard has recently been approved. Figure 1 shows the location of the subject site.
- 2.2. A development approval has recently been granted for the subject land. The traffic assessment submitted calculated that 4,095 trips would be generated by the approved development, of which 2,087 trips would be new to the surrounding road network.



**Figure 1 Site Location (Site area indicative)**

### 3. DEVELOPMENT PROPOSAL

3.1. The current proposal changes the area of showrooms and includes for a drive-through facility. Figure 2 shows the site layout plan.



**Figure 2 Site Layout (refer to Architects plans)**

#### 4. TRAFFIC GENERATION AND DISTRIBUTION

- 4.1. The traffic generation of the subject site is contained within the traffic impact assessment dated 1 December 2017. The submitted traffic report identified that the site was expected to generate 4,095 vehicle movements per day, of which 2,087 trips would be new to the surrounding road network.
- 4.2. The current proposal is forecast to generate the traffic demands shown in Table 1.

**Table 1 Forecast Traffic Generation**

Land Use	Area / No	Daily Trips	AM Peak	PM Peak
Service station	8 pumps	1,348	97	111
Vehicle service	330m <sup>2</sup>	99	11	13
Bulky goods	1,460m <sup>2</sup>	307	8	36
Take away food	204m <sup>2</sup>	122	0	8
Drive-through food	333m <sup>2</sup>	1,665	127	100
Child care	100	400	100	70
Office`	100m <sup>2</sup>	10	2	2
<b>Total</b>		<b>3,951</b>	<b>345</b>	<b>340</b>

- 4.3. The current proposal is calculated to generate 144 less vehicle movements per day with approximately 10 less trips in the morning peak and 18 less trips in the evening peak than stated in the traffic report submitted for the current approval.
- 4.4. The current proposal generates similar levels of traffic to the approved development. On this basis no material traffic impact will occur and current road network planning will not be affected.

#### 5. OPERATION OF THE DRIVE-THROUGH

- 5.1. The change to the approved land use is for a drive-through restaurant to be located to the south eastern corner of the site. The proposed drive-through will provide two ordering points.
- 5.2. The end user is expected to be a mid tier operator such as Chicken Treat or Red Rooster as other primary brands are already located within close proximity to the subject site.
- 5.3. Assessment of the drive-through operation is provided to determine what impacts may occur to the service roads of the subject site.
- 5.4. There are few recognised sources to determine the expected patronage of fast food drive-through facilities, however surveys undertaken by Riley Consulting

indicate that between 30 and 50 customers per hour can be expected at the proposed facility. Also the peak period of attraction can be expected between 6pm and 7pm (not in the road network peak).

- 5.5. A survey of the Red Rooster store at Henley Brook with a single ordering point recorded 27 customers between 5pm – 6pm and 48 customers between 6pm-7pm on a typical Friday evening. The average wait time between 5pm-6pm was 315 seconds and 371 seconds between 6pm-7pm. The facility allows capacity for 7 vehicles to wait before interruption to the car park occurs. The maximum queue was 9 vehicles for a short period at 6:30pm.
- 5.6. Using M/M/M queuing theory, the Henley Brook store is calculated to provide 58 services per hour during the peak period, based on the average time of 371 seconds in the system. The average number of customers (cars) in the system is 4.8. With the Henley Brook store having a peak queue of 9 vehicles a factor of 1.87 needs to be applied to the average number of customers (cars) in the system. The assessment is attached in Appendix A.
- 5.7. Based on the expected patronage to the Banksia Grove store, M/M/M queuing theory predicts that on average just over 1 customer can be expected in the system during the peak period of operation. On this basis stacking capacity for 2 vehicles would be required.
- 5.8. A sensitivity test is undertaken based on the minimum of 30 orders per point per hour to assess the potential stacking impact. The M/M/M queuing theory attached at Appendix B indicates that there would be 5.45 customers (cars) in the system. Applying the factor of the Henley Brook survey, up to 10.1 cars could be expected as the maximum queue.
- 5.9. The Banksia Grove drive-through facility has stacking to accommodate 6 cars beyond the order points and four cars prior to the order points. In total 10 cars can stack at the drive-through before any interruption to the car park access road would occur. Based on the survey of the Henley Brook store with a single order point and a peak queue of 9 cars, it is considered that appropriate stacking area is provided for the Banksia Grove drive-through facility.
- 5.10. Applying the findings of the sensitivity test also indicates that capacity for 10 stacking vehicles is sufficient.
- 5.11. As the peak period of drive-through operation occurs after 6pm, other adjacent land uses will be closed and minor interruption to the car park access lane would not be expected to present any serious concerns as traffic entering the site would not have a significant demand passing the proposed drive-through facility.

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- 5.12. It is considered therefore that the area of stacking for the drive through is acceptable.

## **6. CONCLUSIONS**

- 6.1. The level of traffic generated by the subject site is shown to be slightly lower than indicated in the traffic report for the current approval. On this basis the findings of no material traffic impact caused by the subject site are still valid.
- 6.2. Assessment of the operation of the drive-through based on a similar facility in a similar locality suggests that ample stacking capacity is provided. Under normal operations there should be no impact to the car park access roads.

## APPENDIX A HENLEY BROOK RED ROOSTER M/M/M QUEUING

### 2. Input all the values required.

**C**  
1  
Number of Servers  
Number of servers in parallel open to attend customers.

Arrival and Service rates  
 **$\lambda$**  Arrivals / Hour  
48 Cust/hr Convert

**$\mu$**  Services / Hour  
58 Cust/hr Convert

Calculate

### Results

### 3. See your results.

Display Results in Cust/hr and show results with 2 decimals

**4.8** Customers

**L** Average Customers in System  
Average number of customers in the system.

**3.97** Customers

**Lq** Average Customers in Queue  
Average number of customers (entities) in the queue. In other words the expected amount of customers waiting to be served.

**0.1** Hours

**W** Average Time Spent in System  
Average time spent by a customer from arrival until fully served.

**0.08** Hours

**Wq** Average Time Waiting in Line  
Average time it takes a customer to start being served.

**0.83**

**$\rho$**  Server Utilization  
Percentage of time a server is being utilized by a customer.

**$\lambda'$**  Lambda prim  
A value used in some calculations.

### Probabilities

Discrete  
P ('n' cust. in system) = 0 Cust.-> 0.17

Time Based  
P (time in system <= 0 Hours) = 0

P (time in queue <= 0 Hours) = 0.17

## APPENDIX B BANKSIA GROVE M/M/M QUEUING

2. Input all the values required.

C

2

Number of Servers

Number of servers in parallel open to attend customers.

Arrival and Service rates

$\lambda$  Arrivals / Hour

Cust/hr
Convert

$\mu$  Services / Hour

Cust/hr
Convert

Calculate

Results

3. See your results.

Display Results in Cust/hr and show results with 2 decimals

1.06

Customers

**L** Average Customers in System

Average number of customers in the system.

0.2

Customers

**Lq** Average Customers in Queue

Average number of customers (entities) in the queue, in other words the expected amount of customers waiting to be served.

0.02

Hours

**W** Average Time Spent in System

Average time spent by a customer from arrival until fully served.

0

Hours

**Wq** Average Time Waiting in Line

Average time it takes a customer to start being served.

0.43

Server Utilization

Percentage of time a server is being utilized by a customer.

$\lambda'$

Lambda prim

A value used in some calculations.

Probabilities

Discrete

P ('n' cust. in system <= 0 Cust.) = 0.4

Time Based

P (time in system <= 0 Hours) = 0

P (time in queue <= 0 Hours) = 0.74

2. Input all the values required.

C

2

Number of Servers

Number of servers in parallel open to attend customers.

Arrival and Service rates

$\lambda$  Arrivals / Hour

Cust/hr
Convert

$\mu$  Services / Hour

Cust/hr
Convert

Calculate

Results

3. See your results.

Display Results in Cust/hr and show results with 2 decimals

5.45

Customers

**L** Average Customers in System

Average number of customers in the system.

3.79

Customers

**Lq** Average Customers in Queue

Average number of customers (entities) in the queue, in other words the expected amount of customers waiting to be served.

0.11

Hours

**W** Average Time Spent in System

Average time spent by a customer from arrival until fully served.

0.08

Hours

**Wq** Average Time Waiting in Line

Average time it takes a customer to start being served.

0.83

Server Utilization

Percentage of time a server is being utilized by a customer.

$\lambda'$

Lambda prim

A value used in some calculations.

Probabilities

Discrete

P ('n' cust. in system <= 0 Cust.) = 0.09

Time Based

P (time in system <= 0 Hours) = 0

P (time in queue <= 0 Hours) = 0.24




1 VIEW FROM SOUTH



2 VIEW FROM NE JOONDALUP DRIVE

 Arise  
Developments

C	ISSUE FOR REVISED DA	HB	NP	11 SEP 2018
B	ISSUE FOR INFORMATION	RT	NP	10 JUL 2018
A	ISSUE FOR DA	RT	NP	27 JUN 2018
revision/ issue	description	drawn by	check by	date
project	BANKSIA GROVE COMMERCIAL DEVELOPMENT	drawn	description	
location	CNR JOONDALUP DR & JOSEPH BVD	RT	3D VIEWS SHEET 1 OF 3	
checked		NP		
scale			date	11 SEP 2018
			project no	131.16
			dwg no	SK125
			rev	C

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VIEW FROM SOUTH TO TAKE AWAY OUTLET & DRIVE THRU

3



VIEW FROM SOUTH WEST

4

**Arise**  
Developments

C	ISSUE FOR REVISED DA	HB	NP	11 SEP 2018
B	ISSUE FOR INFORMATION	RT	NP	10 JUL 2018
A	ISSUE FOR DA	RT	NP	27 JUN 2018
revision/ issue	description	drawn by	check by	date
project	BANKSIA GROVE COMMERCIAL DEVELOPMENT	drawn	description	
location	CNR JOONDALUP DR & JOSEPH BVD	RT	3D VIEWS SHEET 2 OF 3	
		checked	NP	
		scale	date	11 SEP 2018
			project no	131.16
			dwg no	SK126
			rev	C

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5 VIEW FROM SE JOONDALUP DRIVE



6 VIEW FROM NW JOSEPH BANKS BOULEVARD

**Arise**  
Developments

C	ISSUE FOR REVISED DA	HB	NP	11 SEP 2018
B	ISSUE FOR INFORMATION	RT	NP	10 JUL 2018
A	ISSUE FOR DA	RT	NP	27 JUN 2018
revision/ issue	description	drawn by	check by	date
project	BANKSIA GROVE COMMERCIAL DEVELOPMENT	drawn	description	
location	CNR JOONDALUP DR & JOSEPH BVD	RT	3D VIEWS SHEET 3 OF 3	
checked		NP		
scale			date	11 SEP 2018
			project no	131.16
			dwg no	SK127
			rev	C

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