Colston Budd Rogers & Kafes Pty Ltd
as Trustee for C & B Unit Trust
ABN 27 623 918 759

Our Ref: TR/10235/jj

30 June, 2017

Transport Planning
Traffic Studies
Parking Studies

Fabcot Pty Ltd
c/- Woolworths Limited
PO Box 8000
BAULKHAM HILLS NSW 2153

Attention: Tony Pratt
Email: tpratt@woolworths.com.au

Dear Sir,

RE: PLANNING PROPOSAL FOR
PROPOSED TAREN POINT SHOPPING CENTRE

1. As requested, we have reviewed the traffic matters raised by Council in its email dated 28 April 2017. These relate to the traffic generation rates used to assess the traffic effects of the planning proposal (which were lower than those used for the Kirrawee Brickpits development). These matters were discussed with Council's traffic section at a meeting on 13 June 2017 along with options for improvements to the intersection of Taren Point Road and Parraweena Road. Our response is set out below.

Traffic Generation Rates

2. We prepared a revised traffic report in support of the planning proposal (New Traffic Report for Proposed Supermarket, Liquor Store, Café and On Line Sales Fulfilment Facility, Taren Point – March 2017). In the report, traffic generation rates of 9.4 and 8.2 vehicles per hour per 100m^2 (two-way) in the Thursday afternoon and Saturday midday peak hours respectively were adopted for the proposed supermarket. Council has raised concern that these rates are lower than those used in the assessment of the Kirrawee Brickpits development (14.0 and 13.2 vehicles per hour per 100m^2, two-way).

3. As noted in our report, the traffic generation rates adopted for Taren Point are based on surveys of the IGA supermarket located some 200 metres east of the subject site. It has a similar size, products and turnover as the proposed Woolworths development. This is confirmed in the Addendum Economic Impact Assessment prepared by MacroPlanDimasi (dated 26 June 2017). Given the locality, size and turnover, traffic generation rates based on the existing IGA

Suite 1801/Tower A, Zenith Centre, 821 Pacific Highway, Chatswood NSW 2067
P.O. Box 5186 West Chatswood NSW 1515 Tel: (02) 9411 2411 Fax: (02) 9411 2422
Directors - Geoff Budd - Stan Kafes - Tim Rogers - Joshua Hollis ACN 002 334 296
EMAIL: cbrk@cbrk.com.au

supermarket give the best estimate of traffic generation of the proposed Woolworths at Taren Point. This approach is consistent with RMS Guidelines which note that:

Surveys of existing developments, similar to the proposal, can also be undertaken and comparisons may be drawn.

Intersection of Taren Point Road/Parraweena Road

4. To mitigate the traffic effects of the planning proposal, our revised traffic report suggested modifications to the intersection of Taren Point Road/Parraweena Road. The suggested modification was to provide a trailing right turn phase on the Parraweena Road (western) approach to the intersection. This would reduce queuing on Parraweena Road and improve safety at the intersection.

5. RMS were consulted regarding the proposed modification and advised that it did not support the trailing right turn phase as it would reduce green time on Taren Point Road. As an alternative, RMS suggested provision of a third lane on the western approach to the intersection (with separate left, through and right turn lanes).

6. We have investigated the provision of a third lane on the Parraweena Road western approach to the intersection (to provide separate left, through and right turn lanes). The investigation found that it appears feasible within the existing road reserve with respect to geometry (subject to the following modifications) and provides capacity and safety improvements. The required modifications are set below and shown on the attached concept plan prepared by Henty & Hymas:

- provide 3 lanes on Parraweena Road (west) approach comprising a left turn lane, through lane and 60 metre long right turn bay;
- reduce the number of westbound lanes from two lanes to one lane;
- some loss of parking on the southern side of Parraweena Road;
- to accommodate the wider carriageway, footpaths on either side of Parraweena Road would be reduced to some 3 metres;
- realign the Parraweena Road (east) approach to line up with the western side of the intersection. This would involve widening on the southern side of Parraweena Road and reconfiguring the lanes to provide separate through and left turn lanes;
- modifications to the pedestrian crossings on the western and southern approaches to the intersection to accommodate the lanes changes; and
- modifications to the kerb return on the south western corner of the intersection to maintain the same size truck to turn left from Taren Point Road into Parraweena Road.

7. The impact on the operation of the intersection of Taren Point Road/Parraweena Road with the above modifications has been assessed using SIDRA and VISSYM. The assessment includes traffic from the planning proposal and other approved developments in the area, with a sensitivity test using the higher traffic generation rates suggested by Council. The SIDRA results are summarised below in Table 1, with SIDRA movement summaries attached.

Table 1	**Summary of SIDRA Analysis**					
	Average Delay (secs)		Level of Service		95% Queue (m)*	
	Weekday PM	Saturday Midday	Weekday PM	Saturday Midday	Weekday PM	Saturday Midday
Base*	22	24	B	B	105	142
Base + Dev	20	20	B	B	61	71
Base + Dev (sensitivity test)	21	21	B	B	62	72

*Base represents existing + approved developments (Bunnings & Homemakers)
**95% back of queue on Parraweena Road (west) approach

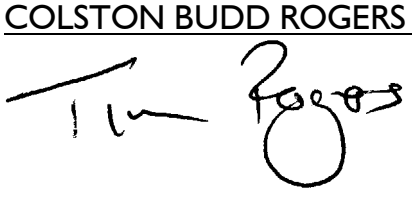
8. Examination of Table 1 reveals that the provision of three lanes on the Parraweena Road (west) approach to the intersection of Taren Point Road would result in a reduction in average delays for the intersection and reduction in queues on the Parraweena Road (west) approach.

9. The results of the VISSYM modelling are set out in the attached report prepared by GTA. In summary it also found improved operation and reduced queues.

10. In summary the provision of three lanes on the Parraweena Road (west) approach to the intersection of Taren Point Road will result improvements to the operation of the intersection and reduced queues on Parraweena Road (western approach) with traffic from the planning proposal.

11. We trust the above provides the information you require. Finally, if you should have any queries, please do not hesitate to contact us.

Yours faithfully,
COLSTON BUDD ROGERS & KAFES PTY LTD



T. Rogers
Director

MEMORANDUM

TO: Tony Pratt

CC: Tim Rogers, Tim De Young, Robert Dus

FROM: Nicholas Brown

DATE: 5 July 2017

OUR REF: N120862

PAGE 1 OF 15

RE: **Taren Point Traffic Network – VISSIM Modelling Modelling Outcome**

1. Background

Fabcot Pty Ltd and Colston, Budd, Hunt & Kafes (CBH&K) commissioned GTA Consultants to undertake microsimulation modelling to assess the cumulative traffic effects of the proposed supermarket development on industrial land located along Parraweena Road in Taren Point.

Following a submission of the planning proposal to the Sutherland Shire Council a number of traffic issues were raised as part of Council's review. Subsequently, a previous microsimulation model prepared by GTA was utilised to assess the impacts of the proposed development as per Council comments below:

- *'A recent microsimulation traffic model has been undertaken for Bunnings/ Homemaker Centre which includes Parraweena Road. To accurately understand the traffic implications of the planning proposal, it is recommended that you extend the microsimulation traffic model to include Parraweena Road / Kareena Rd and Parraweena Road / site access intersections.'*

Details of traffic and parking effects of this development are set out in a separate report prepared by CBH&K.

The modelling has assessed the operation of intersections in the vicinity of the developments for the reference case and post development traffic volumes for both Thursday PM and Saturday Midday (MID) peak hours.

The relevant study area includes three intersections of different traffic operation types, e.g. signal and priority intersections. Figure 1.1 illustrates the context of the study area, while Table 1.1 lists the studied intersections.

melbourne
sydney
brisbane
canberra
adelaide
gold coast
townsville
perth

Level 6, 15 Help Street
CHATSWOOD NSW 2067

PO Box 5254
WEST CHATSWOOD NSW 1515

t// +612 8448 1800

Figure 1.1: Study Area

Table 1.1: Key Intersections within the Study Area

#	Intersection	Type
1	Taren Point Rd / Parraweena Rd	Signalised intersection
2	Taren Point Rd / Koonya Circuit	Signalised T-intersection
3	Parraweena Rd / Willarong Rd	Priority controlled T Intersection

This memorandum sets out an overview of the works completed to date and includes the following:

- Traffic Data
- Network Development
- Post Development Model Testing
- Conclusion.

2. Traffic Data

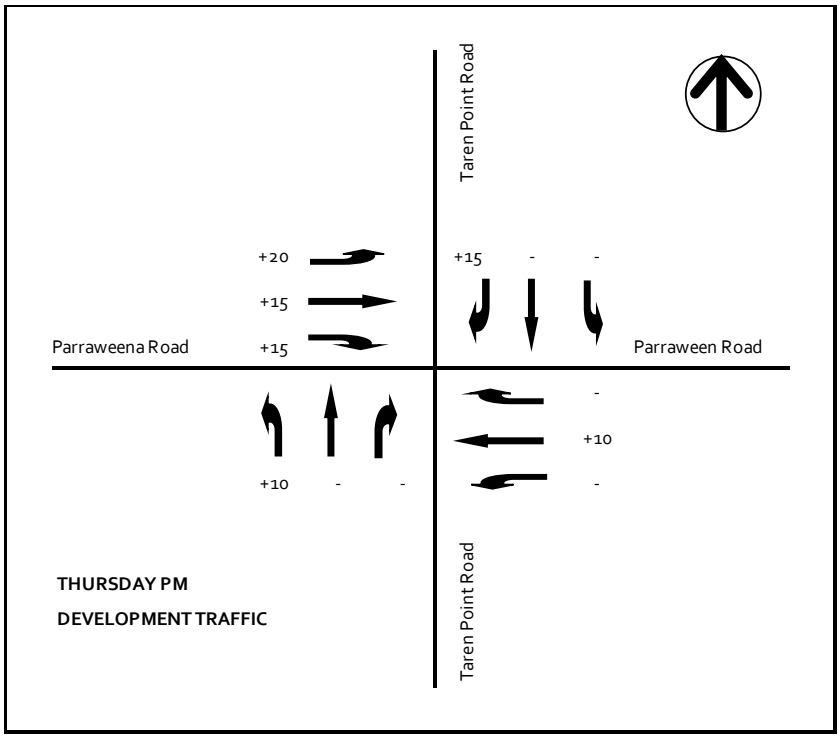
Reference Case Traffic Volumes

Traffic volumes for the reference case model where obtained using the post development volumes as presented in the GTA VISSIM Modelling memorandum for the Bunnings and Bulky Good Developments (dated 22/09/15). This included the existing volumes collected as part of the initial round of modelling and includes the development traffic for the previously assessed Bunnings and Bulky Goods development.

Post Development Traffic Volumes

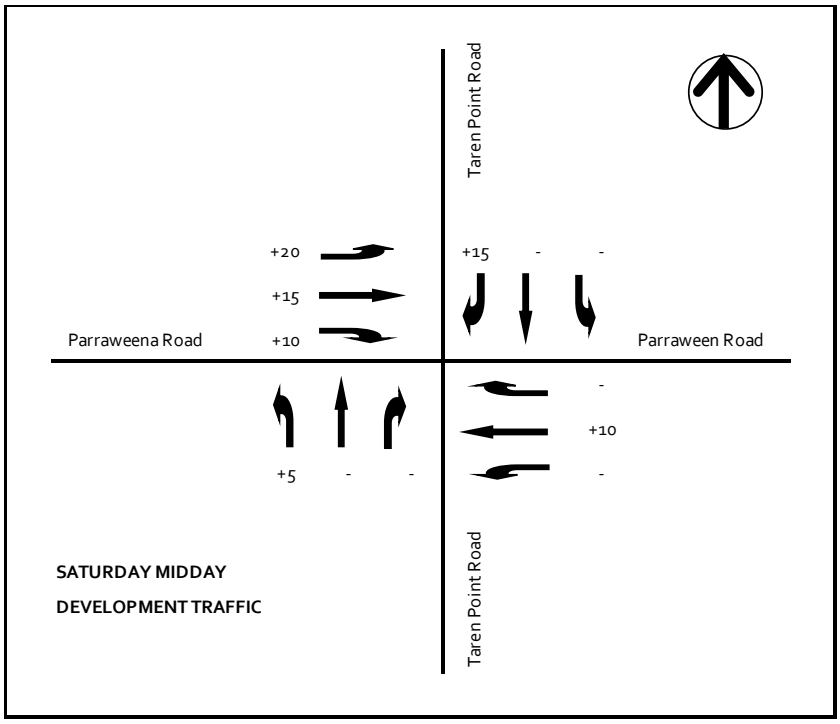
The development traffic volumes for the supermarket were provided by Colston Budd Rogers & Kafes Pty Ltd[1] and can be seen in Figure 2.1 and Figure 2.2. These figures indicate that between 5 and 20 vehicles movements will be added to the relevant movements at the Parraweena Road/Taren Point intersection. It was assumed that all development traffic would be contained to the main roads with the additional vehicle movements extrapolated to the other intersections within the model.

Figure 2.1: Thursday PM Development Traffic



[1] Traffic volumes provided by Colston Budd Rogers & Kafes Pty Ltd in an email dated 3/3/17.

Figure 2.2: Saturday Midday Development Traffic



3. Model Development

As the reference case model was previously development as part of a former works within the area, no reference case model development was required for this assessment.

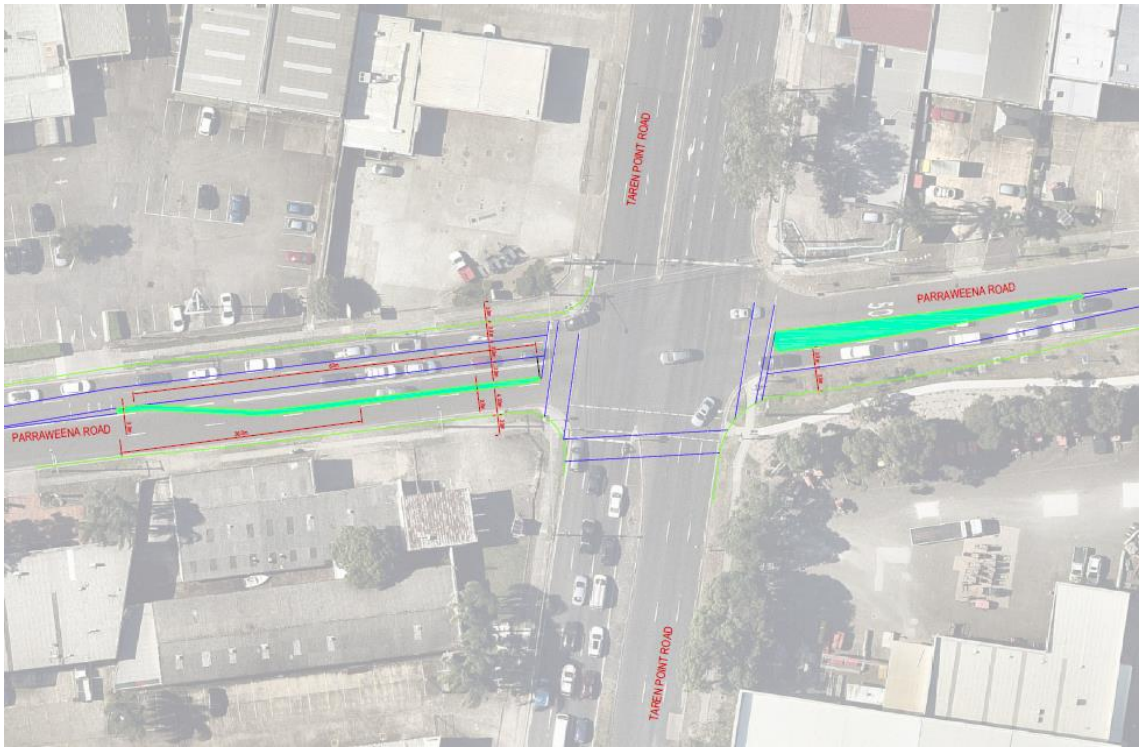
4. Calibration and Validation

As the reference case model was previously development as part of a former works within the area, the calibration and validation of the reference case model was not required for this assessment. Details of the calibration and validation results are presented in the GTA VISSIM Modelling memorandum for the Bunnings and Bulky Good Developments (dated 22/09/15).

5. Future Model Testing

The future development scenario was modelled based on the development traffic volumes provided in Section 2. Additionally, modifications to the Taren Point Road/Parraweena Road intersection were updated to reflect the proposed right turn bay on the west approach along Parraweena Road as shown in Figure 5.1.

Figure 5.1: Proposed Taren Point Road/Parraweena Road Intersection



As a result of introducing the right turn bay, the Parraweena Road west approach has now been modelled with a left, through and right configuration across the three lanes. To accommodate the additional right turn bay on the west approach, the east approach has been modified to reflect a single through lane and a dedicated left turn lane.

Following discussions with RMS, it was noted that their preference was not to change to signal arrangement at this intersection as part of any layout modifications at the intersection. Therefore, the right turn bay on the west approach will operate as a filtered right turn as is currently permitted at the intersection.

Both the reference case and post development scenarios were analysed from a network wide and localised intersection perspectives. The sections below discuss the model outputs.

5.1 Network Statistic

A summary of the overall performance of the road network within the study area is presented in Table 5.1 and Table 5.2 for Thursday PM and Saturday midday respectively. The most relevant network statistics were extracted from the models and include the following:

- Vehicle Hours Travelled – VHT (hr)
- Vehicle Kilometres Travelled – VKT (km)
- Average Speed for All Vehicles (km/hr)
- Average Delay for All Vehicles (sec)

Table 5.1: Thursday Reference Case and Post Development Network Performance Statistic (Thursday PM)

Statistic	Reference Case Model	Post Development	% Difference
VHT (peak hour)	161 hr	165 hr	+2%
VKT (peak hour)	4,530 km	4,591 km	+1%
Average Speed (peak hour)	28 km/h	28 km/h	0%
Average Delay (peak hour)	47 sec	47 sec	0%

Table 5.2: Saturday Reference Case and Post Development Network Performance Statistic (Saturday Midday)

Statistic	Reference Case Model	Post Development	% Difference
VHT (peak hour)	215 hr	168 hr	-22%
VKT (peak hour)	4,434 km	4,570 km	+3%
Average Speed (peak hour)	20 km/h	27 km/h	32%
Average Delay (peak hour)	77 sec	47 sec	-38%

The overall network statistics suggest that with traffic from the proposed development in place, the impact to the adjacent road network would be as follows:

- No change in average travel speed during the Thursday peak period, while the Saturday peak period average travel speed is 32% higher than the reference case scenario.
- No change in average delays during the Thursday peak period, while the Saturday peak period decreases by 38% on reference case scenario.

5.2 Intersection Analysis

5.2.1 Criteria

The operation of the key intersections within the study area was assessed using intersection delays and Level of Service (LOS).

Table 5.3 shows the criteria adopted in assessing the level of service.

Table 5.3: Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Source: Table 14.3 in the RMS Modelling Guidelines (version 1.0 – February 2013)

5.2.2 Results

Table 5.4 and Table 5.5 present the intersection performance for the reference case and post development scenarios for both the Thursday PM and Saturday Midday peaks respectively.

Table 5.4: Thursday Reference Case and Post Development Intersection Performance

#	Intersection	Reference Case Model		Post Development	
		Overall Intersection		Overall Intersection	
		Delay	LOS	Delay	LOS
1	Taren Point Rd / Parraweena Rd	30	C	28	B
2	Taren Point Rd / Koonya Circuit	17	B	18	B
3	Parraweena Rd / Willarong Rd	2	A	2	A

(1) Worst movement is based on the worst delay.

The intersection performance results show that during the Thursday afternoon peak period the impacts of the development traffic are negligible on the operation of intersections within the network with:

- all intersections continuing to operate at similar levels of services when compared to the reference case model operational performance;
- the intersection of Taren Point Road/Parraweena Road would operate at LOS B (satisfactory level of service) with a minor decrease in average delays (2 seconds per vehicle);
- the impact on the Parraweena Road/Koonya Circuit and Parraweena Road/Willarong Road intersections is negligible and both intersections would continue to operate at LOS B and LOS A respectively.

Table 5.5: Saturday Reference Case and Post Development Intersection Performance

#	Intersection	Reference Case Model		Post Development	
		Overall Intersection		Overall Intersection	
		Delay	LOS	Delay	LOS
1	Taren Point Rd / Parraweena Rd	36	C	24	B
2	Taren Point Rd / Koonya Circuit	21	B	19	B
3	Parraweena Rd / Willarong Rd	4	A	5	A

(1) Worst movement is based on the worst delay.

The intersection performance results show that during the Saturday midday peak hour, the Taren Point Rd / Parraweena Rd intersection delays decrease by 12 seconds per vehicle and would operate at an improved LOS B. The remaining assessed intersections will operate at similar Levels of Service as the reference case model.

5.3 Parraweena Road Queuing Analysis

Table 5.6 presents a comparison of modelled queues for the Taren Point Road/Parraweena Road intersection during the Thursday PM peak period.

Table 5.6: Thursday PM Peak – Reference Case and Post Development Traffic – Queue Results

#	Intersection	Reference Case Model		Post Development	
		Overall Intersection	Worst Movement	Overall Intersection	Worst Movement
		Average (m)	Maximum (m)	Average (m)	Maximum (m)
1	Taren Point Rd / Parraweena Rd	37	134	36	173

Although the Thursday PM peak results indicate that the maximum queue is expected to increase as part of the additional development traffic volumes, it is noted that the average queue across the entire peak hour is expected to improve. Figure 5.2 shows a snapshot from the model which illustrates the extent of queue on Parraweena Road.

Figure 5.2: Queue on Parraweena Road (West) – Thursday PM Post Development Model

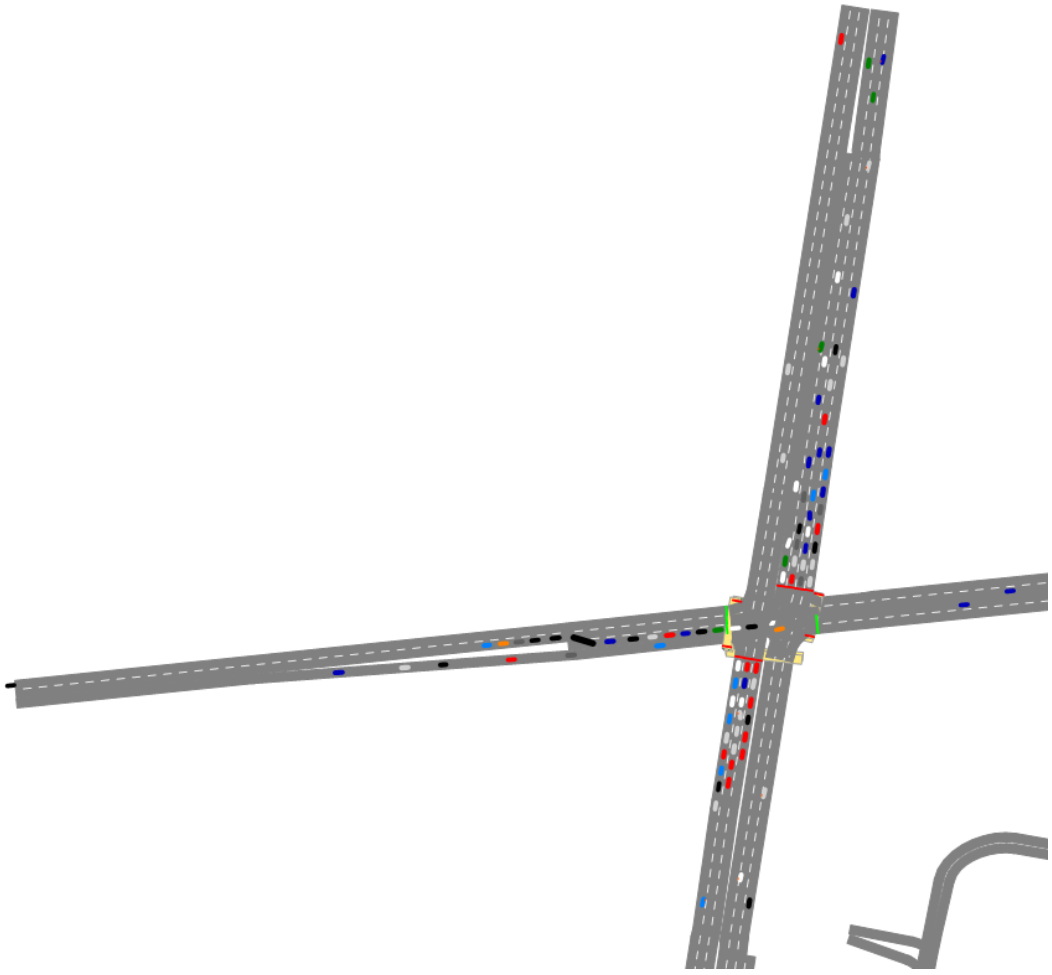


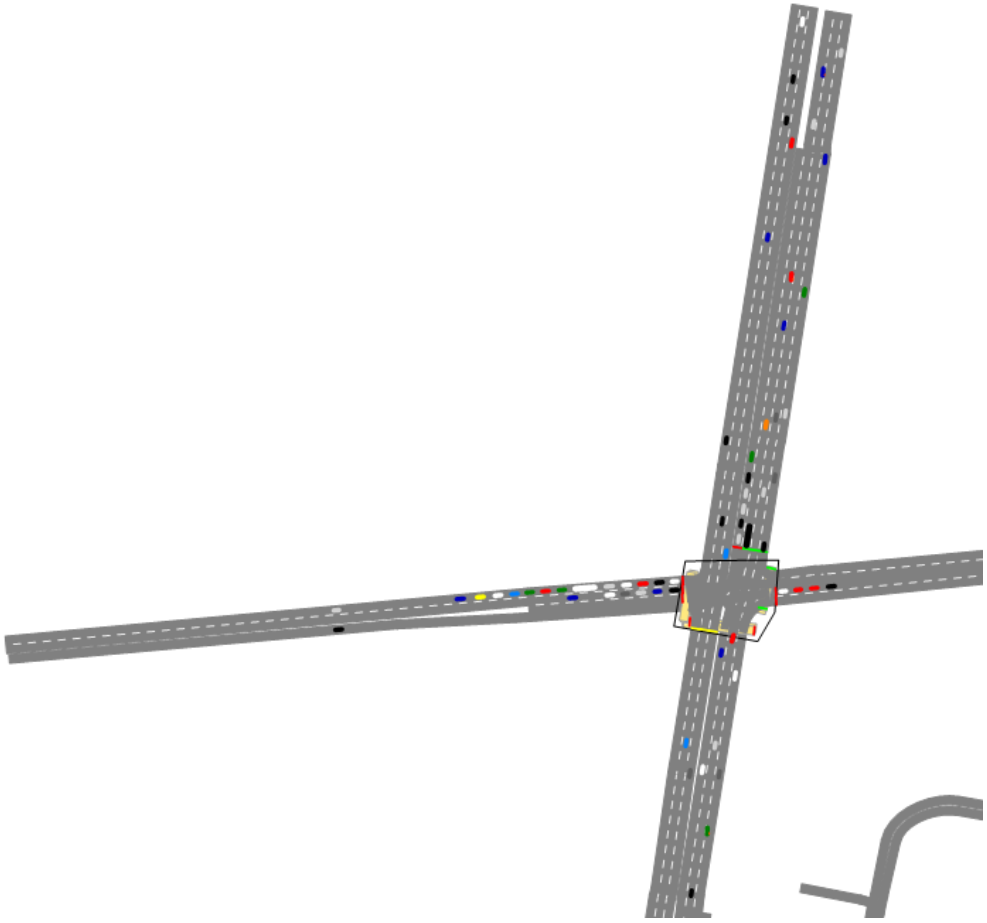
Table 5.7 presents a comparison of modelled queues for the Taren Point Road/Parraweena Road intersection during the Saturday Midday peak period.

Table 5.7: Saturday Midday Peak – Reference Case and Post Development Traffic – Queue Results

#	Intersection	Reference Case Model		Post Development	
		Overall Intersection	Worst Movement	Overall Intersection	Worst Movement
		Average (m)	Maximum (m)	Average (m)	Maximum (m)
1	Taren Point Rd / Parraweena Rd	81	285	23	104

Result from the Saturday peak indicates that the average intersection queue decreases significantly compared to the reference case model. Figure 5.3 graphically illustrates the extent of queueing along Parraweena Road during the Saturday midday peak model.

Figure 5.3: Queue on Parraweena Road (West) – Saturday Midday Post Development Model



5.4 Network Unreleased Vehicles

A comparison of vehicles unable to enter the network has been undertaken and is presented in Table 5.8 for the reference case and post development models.

Table 5.8: Saturday Midday Unreleased Vehicles

Peak Period	Approach	Reference Case Model	Post Development Model
PM	West Approach at Parraweena Road/Taren Point Intersection	0 vehicles	0 vehicles
SAT	West Approach at Parraweena Road/Taren Point Intersection	41 vehicles	0 vehicles

The results show that the post development model with the revised intersection layout removes the number of unreleased vehicles from the model. This indicates that the queueing impacts on the Parraweena Road west approach have significantly reduced as part of the future model testing.

6. Sensitivity Modelling

GTA understands that the post development traffic volumes outlined in Section 2 have been approved by Council as part of the traffic modelling process. However, Council have request that the traffic volumes previously assessed within GTA's original traffic modelling assessment (dated 23/02/17) should be tested as part of a sensitivity test to fully understand the impacts of the proposed development on the network. These post development volumes are higher than those presented in Section 2 and are shown in Figure 6.1 and Figure 6.2.

Figure 6.1: Thursday PM Development Traffic

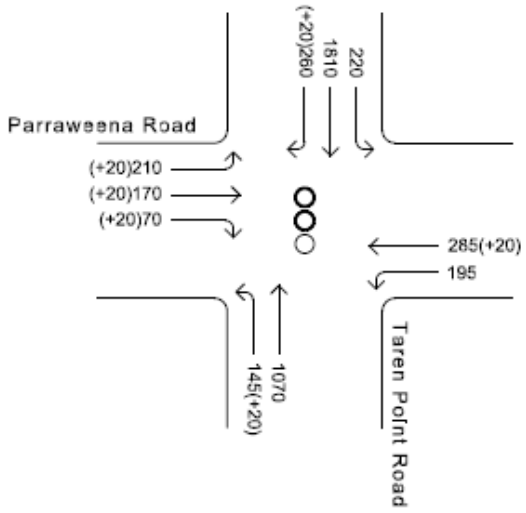
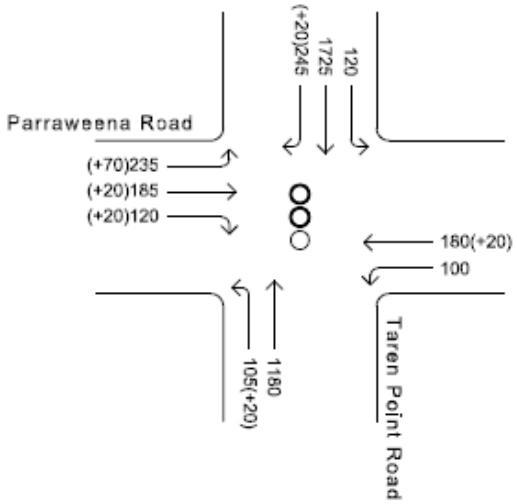


Figure 6.2: Saturday Midday Development Traffic



6.1 Network Statistic

A summary of the overall performance of the road network within the study area for the sensitivity modelling assessment is presented in Table 6.1 and Table 6.2 for Thursday PM and Saturday midday respectively. The most relevant network statistics were extracted from the models and include the following:

- Vehicle Hours Travelled – VHT (hr)
- Vehicle Kilometres Travelled – VKT (km)
- Average Speed for All Vehicles (km/hr)
- Average Delay for All Vehicles (sec)

Table 6.1: Thursday Reference Case and Sensitivity Modelling Network Performance Statistic (Thursday PM)

Statistic	Reference Case Model	Sensitivity Modelling	% Difference
VHT (peak hour)	161 hr	164 hr	+2%
VKT (peak hour)	4,530 km	4,612 km	+2%
Average Speed (peak hour)	28 km/h	28 km/h	0%
Average Delay (peak hour)	47 sec	47 sec	0%

Table 6.2: Saturday Reference Case and Sensitivity Modelling Network Performance Statistic (Saturday Midday)

Statistic	Reference Case Model	Sensitivity Modelling	% Difference
VHT (peak hour)	215 hr	179 hr	-17%
VKT (peak hour)	4,434 km	4,690 km	+6%
Average Speed (peak hour)	20 km/h	26 km/h	27%
Average Delay (peak hour)	77 sec	50 sec	-35%

The overall network statistics suggest that with traffic from the proposed development in place, the impact to the adjacent road network would be as follows:

- No significant change to average vehicle speeds or delays during the Thursday peak period, while the Saturday peak period average travel speeds increase by 27% and vehicle delay times decrease by 35%.

6.2 Intersection Analysis

6.2.1 Results

With reference to the Level of Service Criteria presented in Section 5.2.1, Table 6.3 and Table 6.4 present the intersection performance for the reference case and sensitivity modelling scenarios for both the Thursday PM and Saturday Midday peaks respectively.

Table 6.3: Thursday Reference Case and Sensitivity Modelling Intersection Performance

#	Intersection	Reference Case Model		Sensitivity Modelling	
		Overall Intersection		Overall Intersection	
		Delay	LOS	Delay	LOS
1	Taren Point Rd / Parraweena Rd	30	C	29	C
2	Taren Point Rd / Koonya Circuit	17	B	17	B
3	Parraweena Rd / Willarong Rd	2	A	2	A

(1) Worst movement is based on the worst delay.

The intersection performance results show that during the Thursday afternoon peak period, traffic volumes from the development have no significant impact on the operation of intersections within the modelled network with:

- all intersections continuing to operate at similar levels of services when compared to the reference case model operational performance;
- the intersection of Taren Point Road/Parraweena Road would continue to operate at LOS C (satisfactory level of service) with a minor decrease in average delays (1 second per vehicle);
- the impact on the Parraweena Road/Koonya Circuit and Parraweena Road/Willarong Road intersections is negligible and both intersections would continue to operate at LOS B and LOS A respectively.

Table 6.4: Saturday Reference Case and Sensitivity Modelling Intersection Performance

#	Intersection	Reference Case Model		Sensitivity Modelling	
		Overall Intersection		Overall Intersection	
		Delay	LOS	Delay	LOS
1	Taren Point Rd / Parraweena Rd	36	C	26	B
2	Taren Point Rd / Koonya Circuit	21	B	20	B
3	Parraweena Rd / Willarong Rd	4	A	4	A

(1) Worst movement is based on the worst delay.

The intersection performance results show that during the Saturday midday peak hour, Taren Point Rd / Parraweena Rd intersection delay times decrease by 10 seconds per vehicle, achieving an LOS of B. The remaining assessed intersections will operate at similar Levels of Service as the reference case model.

6.3 Parraweena Road Queuing Analysis

Table 6.5 present a comparison of modelled queues for the Taren Point Road/Parraweena Road intersection during the Thursday PM peak period.

Table 6.5: Thursday PM Peak – Reference Case and Sensitivity Modelling Traffic – Queue Results

#	Intersection	Reference Case Model		Sensitivity Modelling	
		Overall Intersection	Worst Movement	Overall Intersection	Worst Movement
		Average (m)	Maximum (m)	Average (m)	Maximum (m)
1	Taren Point Rd / Parraweena Rd	37	134	37	173

The Thursday PM peak results indicate that the maximum queue increases from 134m in the reference case to 173m in the post development model. However, it is noted that the average queue across the entire peak hour is expected to remain the same between the reference case and sensitivity modelling indicating a comparable outcome between both scenarios.

Figure 6.3 shows a snapshot from the model which illustrates the extent of queue on Parraweena Road.

Figure 6.3: Queue on Parraweena Road (West) – Thursday PM Post Development Model

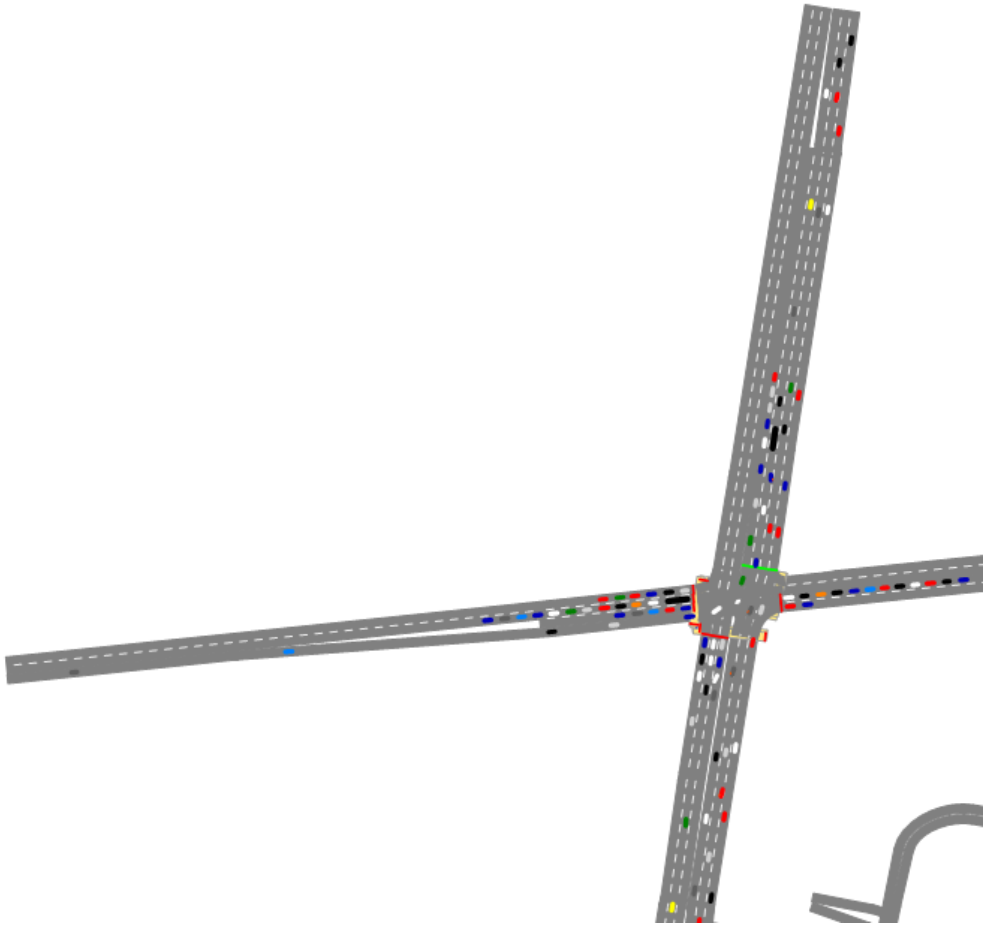


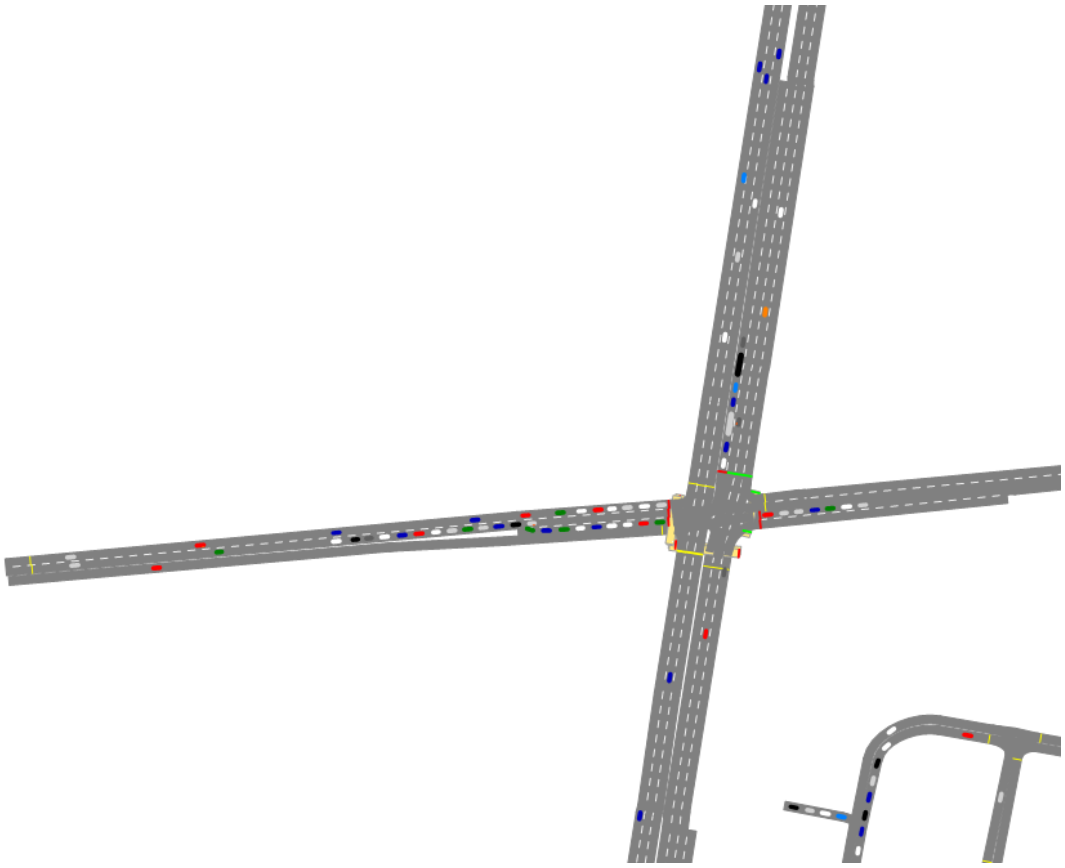
Table 6.6 presents a comparison of modelled queues for the Taren Point Road/Parraweena Road intersection during the Saturday Midday peak period.

Table 6.6: Saturday Midday Peak – Reference Case and Sensitivity Modelling Traffic – Queue Results

#	Intersection	Reference Case Model		Sensitivity Modelling	
		Overall Intersection	Worst Movement	Overall Intersection	Worst Movement
		Average (m)	Maximum (m)	Average (m)	Maximum (m)
1	Taren Point Rd / Parraweena Rd	81	285	26	179

Result from the Saturday peak indicates that the average intersection queue decreases significantly from the reference case model. Table 6.4 graphically illustrates the extent of queueing along Parraweena Road during the Saturday midday peak model.

Figure 6.4: Queue on Parraweena Road (West) – Saturday Midday Post Development Model



6.4 Network Unreleased Vehicles

A comparison of vehicles unable to enter the network has been undertaken and is presented in Table 6.7 for the reference case and sensitivity modelling.

Table 6.7: Saturday Midday Unreleased Vehicles

Peak Period	Approach	Reference Case Model	Sensitivity Modelling
PM	West Approach at Parraweena Road/Taren Point Intersection	0 vehicles	0 vehicles
SAT	West Approach at Parraweena Road/Taren Point Intersection	41 vehicles	0 vehicles

The results show that the sensitivity modelling with the revised intersection layout removes the number of unreleased vehicles from the model. This indicates that the queueing impacts on the Parraweena Road west approach have significantly reduced as part of the sensitivity modelling.

7. Conclusion

Based on the analysis and discussion presented within this memo, the following conclusions are made:

- The VISSIM model has been developed to assess the cumulative traffic impacts of the proposed supermarket development on industrial land located along Parraweena Road in Taren Point.
- The model has been adopted from the previously undertaken GTA VISSIM Modelling with the results presented in the GTA memorandum for the Bunnings and Bulky Good Developments (dated 22/09/15).
- The future model testing incorporates a revised intersection layout at the Taren Point Road / Parraweena Road intersection as follows:
  - Parraweena Road west approach – left only lane, through only lane and right only turn bay (60m).
  - Parraweena Road east approach – left only lane and through only lane.
- The model results showed that the revised intersection layout and additional traffic generation by the proposed development is likely to have the impact on the performance of the intersections identified in the network model:
  - Average speed variation will improve by up to 32% in the Saturday peak whilst the Thursday PM peak will maintain the same average speed.
  - The Taren Point Road / Parraweena Road Intersection Level of Service will improve to a LOS B during both peaks. All other intersections appear to operate at the level of service that is consistent with the reference case model.
  - The west approach of the Taren Point Road / Parraweena Road intersection appears to be the critical section within the analysed road network.
  - The introduction of the right turn bay on the Parraweena Road west approach significantly reduces the queues during the critical Saturday midday peak period.
  - No unreleased vehicles were recorded as part of the future year modelling scenarios.
- The higher traffic volumes of the sensitivity modelling scenario outlines a slightly worse set of results when compared to the future year modelling scenario. However, overall the results present an improvement to the network performance, intersection level of service and queueing impacts when compared to the reference case model.