FABCOT PTY LTD

NEW TRAFFIC REPORT FOR PROPOSED SUPERMARKET, LIQUOR STORE, CAFÉ AND ON LINE SALES FULFILMENT FACILITY, TAREN POINT

MARCH 2017

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REF: 10235/2

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ATTACHMENTS

1. INTRODUCTION

1.1 Colston Budd Rogers and Kafes Pty Ltd has been commissioned by Fabcot Pty Ltd to prepare a new report examining the transport implications of a planning proposal for a development in Taren Point. The new report includes the following:

- additional traffic modelling as requested by Council;
- inclusion of an online sales fulfillment facility (for on line deliveries); and
- traffic assessment taking into account additional traffic modelling.

1.2 The site is on the south-eastern corner of Parraweena Road and Kareena Road, as is shown in Figure 1. The site is currently occupied by commercial and industrial development. The planning proposal is being lodged for a retail development with an on line sales fulfilment facility. A concept plan of a possible site layout has been prepared by BN Architects. It shows a potential site layout with the following elements, supermarket of 3,800m^2, liquor store of 200m^2, café of 70m^2, 200m^2 on line sales fulfilment facility and on-site car parking, with vehicular access from Parraweena Road and Kareena Road.

1.3 In an email dated 18 November 2016, Sutherland Council requested the following traffic information:

- *Concept plan with site access entry /exit location for vehicles, trucks and pedestrians.*

- *Crash data analysis along Parraweena Road and review of existing traffic calming measures and environmental performance standards based on increased AADT.*
- *Review of parking provision based on RMS guidelines.*
- *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*

1.4 Following discussions with Council's traffic manager the requirements for additional traffic modelling was modified (as set out in an email dated 31 January 2017) by adding development traffic to the existing (+ approved developments) with a VISSYM model to determine the impact of the proposed development on the intersection of Taren Point Road and Parraweena Road. Separate SIDRA analysis is to be undertaken at the following intersections:

- Site entry/exits, Kareena/Parraweena and Shirley/Parraweena (network);
- Parraweena/Port Hacking (isolation); and
- Kareena/The Boulevarde (isolation).

1.5 GTA Consultants (who prepared the previous microsimulation (VISSYM) model referenced in Councils email of 18 November 2016) were engaged to update the model as agreed with Council in the email dated 31 January 2017. A copy of their report is provided in Attachment A.

1.6 This report assesses the transport implications of the planning proposal through the following chapters:

- Chapter 2 - describing the existing conditions; and
- Chapter 3 - assessing the traffic implications of the planning proposal.

2. EXISTING CONDITIONS

Site Location and Road Network

2.1 The site is at 130 – 142 Parraweena Road, on the south-eastern corner of the Parraweena Road/Kareena Road intersection, at Taren Point. It is occupied by commercial/industrial development which has vehicular access from Parraweena Road and Kareena Road. The site location is shown in Figure 1.

2.2 There are commercial, industrial and retail uses on Parraweena Road east of Kareena Road and residential uses to the west. Further east, there are retail, industrial and bulky goods uses in Taren Point. South of the site there are commercial and industrial uses.

2.3 Parraweena Road connects Taren Point Road and employment areas in the east with Port Hacking Road in the west. It generally provides for one traffic lane and one parking lane in each direction, clear of intersections. There are traffic calming measures in place in the residential section, west of the site. It has a 50 kilometre per hour speed limit, and a 4.5 tonne load limit west of the site.

2.4 Kareena Road provides access to employment areas and residential properties. It provides for one traffic lane and one parking lane in each direction, clear of intersections. The intersection of Kareena Road with Parraweena Road is an unsignalised t-intersection, with Parraweena Road having priority.

2.5 South of the site, Kareena Road has an unsignalised intersection with The Boulevard. The Boulevard provides a significant east-west connection, with two traffic lanes and a bicycle lane in each direction, with parking permitted clear of

intersections. There are right turn bays on The Boulevard for turns into both sides of Kareena Road. Right turns from Kareena Road onto The Boulevard are not permitted.

2.6 Taren Point Road provides a major north-south road connection, connecting the Captain Cook Bridge with Taren Point and Caringbah. It generally provides a six lane divided carriageway, with three traffic lanes in each direction and parking permitted clear of intersections, outside peak periods. The intersection of Taren Point Road with Parraweena Road is controlled by traffic signals. Right turns from Parraweena Road (westbound) and Taren Point Road (northbound) are not permitted.

2.7 West of the site, Port Hacking Road provides another major north-south link between the Princes Highway at Sylvania in the north and Miranda in the south. It generally provides a four to six lane divided carriageway, with two to three traffic lanes in each direction, and additional turn lanes at intersections. The intersection of Port Hacking Road with Parraweena Road is an unsignalised t-intersection controlled by stop signs. There is a right turn bay in Port Hacking Road for turns into Parraweena Road. Right turns from Parraweena Road are not permitted.

Traffic Flows

2.8 Traffic generated by the proposed development will have its greatest effects during weekday afternoon and Saturday lunchtime peak periods when it combines with other traffic on the surrounding road network. In order to gauge traffic conditions, counts were undertaken during weekday afternoon and Saturday lunchtime periods at the following intersections:

- Taren Point Road/Parraweena Road;
- Parraweena Road/Port Hacking Road;
- Parraweena Road/Kareena Road;
- Parraweena Road/IGA Access;
- Parraweena Road/Shirley Road; and
- Kareena Road/The Boulevard.

2.9 The results of the surveys are shown in Figures 2 and 3 and summarised in Table 2.1.

Table 2.1: Existing two-way (sum of both directions) peak hour traffic flows

Road	Location	Weekday PM	Saturday Midday
Taren Point Road	North of Parraweena Road	3,570	3,505
	South of Parraweena Road	3,290	3,230
Port Hacking Road	North of Parraweena Road	2,140	2,565
	South of Parraweena Road	2,640	3,090
The Boulevard	East of Kareena Road	2,455	2,375
	West of Kareena Road	2,485	2,385
Parraweena Road	West of Taren Point Road	1,140	1,070
	West of Shirley Road	1,070	1,010
	West of Kareena Road	1,055	1,000
	East of Port Hacking Road	840	995
Kareena Road	South of Parraweena Road	180	180
	North of The Boulevard	170	140
Shirley Road	North of Parraweena Road	85	90
IGA Access	North of Parraweena Road	345	300

2.10 Examination of Table 2.1 reveals that:

- Taren Point Road, Port Hacking Road and The Boulevard carried some 2,150 to 3,600 vehicles per hour two-way during the weekday afternoon and Saturday lunchtime peak periods;
- Parraweena Road carried lower flows of some 840 to 1,140 vehicles per hour two-way;
- Kareena Road carried some 150 to 400 vehicles per hour two-way during the surveyed peak hours;
- Shirley Road carried some 80 to 90 vehicles per hour two-way during the surveyed peak hours; and
- The IGA shopping centre located some 200 metres to the east of the subject site generated some 300 to 345 vehicles per hour two-way during the surveyed peak hours.

Intersection Operations

2.11 The capacity of the road network is largely determined by the capacity of its intersections to cater for peak period traffic flows. The surveyed intersections shown in Figures 2 and 3 have been analysed as agreed with Council (the intersection of Taren Point Road/Parraweena Road as part of the VISSYM model prepared by GTA and all other intersections using SIDRA – network and isolated).

2.12 SIDRA simulates the operations of intersections to provide a number of performance measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle. Based on average delay per vehicle, SIDRA estimates the following levels of service (LOS):

- For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Satisfactory but operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode.
>70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required
57 to 70	=	"E"	At capacity and requires other control mode
>70	=	"F"	Unsatisfactory and requires other control mode

2.13 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle

should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

2.14 The intersections of Parraweena Road with Kareena Road, Shirley Road and the IGA access have been assessed as part of a network. The intersections of Parraweena Road/Point Hacking Road and Kareena Road/The Boulevarde have been assessed as isolated intersections. The traffic from the approved Bunnings and Carringbah homemaker centre developments have been included in this SIDRA analysis.

2.15 The SIDRA network intersection analysis found that:

- the unsignalised intersections of Parraweena Road with Shirley Road and Kareena Road would operate with average delays of less than 20 seconds per vehicle in the weekday afternoon and Saturday midday peak hours respectively for the movement with the highest delay (right turn onto Parraweena Road). This represents level of service B, a satisfactory level of intersection operation; and

- the unsignalised intersection of the IGA Access/Parraweena Road would operate with average delays of 25 seconds per vehicle in the weekday afternoon and Saturday midday peak hours respectively for the movement with the highest delay (right turn onto Parraweena Road). This represents level of service B, a satisfactory level of intersection operation.

2.16 The SIDRA isolated intersection analysis found that:

- the unsignalised intersection of Port Hacking Road with Parraweena Road would operate with average delays for the highest delayed movement of less than 30 seconds per vehicle during peak periods. This represents level of service B/C, a satisfactory level of service; and

- the unsignalised intersection of Kareena Road with The Boulevard would operate with average delays for the highest delayed movement of less than 30 seconds per vehicle during peak periods. This represents level of service B/C, a satisfactory level of service.

2.17 The VISSYM model included traffic from recently approved Bunnings and Carringbah Homemaker developments. The results of the VISSYM modelling are provided in Attachment A. In summary the VISSYM modelling of the Taren Point Road/Parraweena Road intersection (existing plus approved developments) found that:

- The intersection would operate with average delays of 30 and 36 seconds per vehicle in the weekday afternoon and Saturday midday peak hours respectively. This represents level of service C, a satisfactory level of intersection operation; and

- The modelling assessed queuing on the Parraweena Road western approach to the intersection. The modelling found that in the weekday afternoon peak hour the average queue would be 6 vehicles (37 metres) with a maximum queue of 22 vehicles (134 metres). In Saturday midday peak hour the average

queue would be 13 vehicles (81 metres) with a maximum queue of 47 vehicles (285 metres).

Public Transport

2.18 Local bus services are provided by Transdev ad Sydney Buses. Services operate along Parraweena Road, adjacent to the site and Taren Point Road and Port Hacking Road, east and west of the site.

2.19 Route 477 operates along Taren Point Road and connects Miranda with Taren Point, Sans Souci, Ramsgate, Kogarah and Rockdale. Services are every 30 minutes in each direction, Monday to Saturday and every 60 minutes in each direction on Sundays.

2.20 Route 971 operates along Port Hacking Road and connects Cronulla with Miranda, Port Hacking Road and Hurstville. Services are every 30 minutes in each direction, Monday to Saturday, and every 60 minutes in each direction on Sundays. During weekday peak periods, services are more frequent.

2.21 Route 986 operates along Parraweena Road and connects Miranda with North Miranda via Sutherland Hospital. Two services are provided in each direction on weekdays.

2.22 The site is therefore accessible by public transport.

3. IMPLICATIONS OF PROPOSED DEVELOPMENT

3.1 The planning proposal is being lodged for a retail development with an on line sales fulfilment facility. A concept plan of a possible site layout has been prepared by BN Architects. It shows a potential site layout with the following elements, supermarket of 3,800m^2, liquor store of 200m^2, café of 70m^2, 200m^2 on line sales fulfilment facility and on-site car parking, with vehicular access from Parraweena Road and Kareena Road. The online sales fulfilment facility is where a customer places an order online for home delivery.

3.2 This chapter assesses the implications of the proposed development through the following sections:

- public transport;
- parking provision;
- access, servicing and internal layout;
- traffic generation and effects;
- response to traffic matters raised by Council; and
- summary.

Public Transport

3.3 As previously discussed, the site is close to bus services which operate along Taren Point Road, Parraweena Road and Port Hacking Road. These services offer alternatives to travel by modes other than car, particularly for employees.

3.4 The proposed development would provide employment opportunities and retail facilities close to public transport services. The proposal would therefore

strengthen demand for these services. The proposed development is therefore consistent with government policy and the planning principles of:

(a) improving accessibility to employment and services by walking, cycling, and public transport;

(b) improving the choice of transport and reducing dependence solely on cars for travel purposes;

(c) supporting the efficient and viable operation of public transport services; and

(d) moderating growth in the demand for travel and the distances travelled, especially by car.

Parking Provision

3.5 Chapter 35 of the draft Sutherland Shire Council Development Control Plan 2015 (Roads, Vehicular Access, Traffic, Parking and Bicycles) indicates that retail development should provide parking at a minimum rate of one space per 30m^2 GFA. On this basis, the development would require a minimum of 136 spaces.

3.6 By way of comparison RMS Guidelines suggest provision of 4.2 spaces per 100m^2 for supermarkets and 4.5 spaces per 100m^2 for specialty shops. Applying these rates the proposed development would require 179 spaces.

3.7 The proposed development will provide some 200 spaces which satisfies the DCP and RMS parking requirements. Appropriate disabled parking will be included in this provision.

3.8 The DCP includes a motor cycle parking requirement of one space per 25 car spaces. On this basis, six motor cycle spaces would be required. At least six motor cycle spaces will be provided in accordance with the DCP.

3.9 The DCP incudes a bicycle parking requirement of one space per 10 car spaces. On this basis, a minimum of 20 bicycle parking spaces would be required. 20 bicycle spaces will be provided in accordance with the DCP.

Access, Servicing and Internal Layout

3.10 Vehicular access is proposed to be provided from Parraweena Road and Kareena Road for customers and service vehicles respectively. Driveway widths will be provided in accordance with the Australian Standard for Parking Facilities (Part 1: Off-street car parking and Part 2: Off-street commercial vehicle facilities), AS 2890.1:2004 and AS 2890.2 – 2002, to accommodate cars and service vehicles.

3.11 The on site parking will be provided at grade. Parking space dimensions, aisle widths and internal circulation will be provided in accordance with AS 2890.1:2004.

3.12 The deliveries to the development will be trucks ranging in size up to 19 metre semi-trailers and 12.5 metre rigid trucks. Home deliveries by the on line sales facility will be by small rigid trucks (up to 6.4 metres long). The design will provide for service vehicles to enter the site from Kareena Road, manoeuvre into the loading docks and exit in a forward direction. Deliveries to the site and the on line sales facility will operate from separate docks that can function independently of each other. Indicative truck turning paths are attached.

Traffic Generation and Effects

3.13 Traffic generated by the proposed development will have its greatest effects during weekday afternoon and Saturday lunchtime peak periods when it combines with other traffic on the surrounding road network. Estimates of traffic generation for the retail component have been based on surveys of the existing IGA shopping centre located some 200 metres to the east of the site as:

- The IGA shopping centre (some 3,650m^2) is of a similar size to the proposed development (4,020m^2); and

- the annual sales at the IGA shopping centre ($35 million/year) is similar to estimated annual sales of the proposed development ($33 million/year).

3.14 The existing IGA shopping centre was found to generate 345 and 300 vehicles per hour (two way) in the weekday afternoon and Saturday midday peak hours respectively. Traffic was split some 50% in/50% out in both peak hours. This equates to generation rates of 9.4 vehicles per hour (two way) in the weekday afternoon peak hour and 8.2 vehicles per hour (two way) in the Saturday peak hour. Applying these rates, the proposed development would generate some 380 and 330 vehicles per hour (two way) in the weekday afternoon and Saturday midday peak hours respectively.

3.15 The RMS guidelines suggest that 25 per cent of visits are likely to be passing trade, i.e. customers who would have driven past the site regardless of their visit to the site.

3.16 In addition the retail/economic studies have estimated that the proposed development would have an impact of some 13% on the sales at the existing IGA shopping centre. Thus some existing traffic (based on the impact on sales some 13% or 35 to 45 vehicles per hour, two way) that currently accesses the IGA shopping centre would be diverted to the proposed development

3.17 The on line sales fulfillment facility will result in an increase in truck movements to/from the site compared to a typical supermarket, with additional trucks bringing goods to the site and small trucks operating from the site (making home deliveries). The on line sales fulfillment facility would generate some 20 to 30 truck movements per day (two way), the majority of which (16 to 24) would be small trucks associated with home deliveries. This is equivalent of 2 to 4 truck movements per hour (two way).

3.18 The additional traffic has been assigned to the road network taking into account passing trade and diverted trips from the IGA shopping centre. Existing two-way peak hour traffic flows plus the additional traffic from the proposed development are shown in Figures 2 and 3, and summarised in Table 3.1.

3.19 Examination of Table 3.1 reveals that:

- traffic flows on Taren Point Road, Port Hacking Road and The Boulevard would increase by some 15 to 45 vehicles per hour two-way during the weekday afternoon and Saturday lunchtime peak periods;

- traffic flows on Parraweena Road would increase by some 55 to 110 vehicles per hour two-way during the weekday afternoon and Saturday lunchtime peak periods;

Table 3.1: Existing two-way peak hour traffic flows plus development traffic					
Road	**Location**	**Weekday PM**		**Saturday Midday**	
		Existing	+ Dev	Existing	+ Dev
Taren Point Road	North of Parraweena Road	3,570	+35	3,505	+35
	South of Parraweena Road	3,290	+25	3,230	+15
Port Hacking Road	North of Parraweena Road	2,140	+25	2,565	+15
	South of Parraweena Road	2,640	+45	3,090	+40
The Boulevard	East of Kareena Road	2,455	+45	2,375	+45
	West of Kareena Road	2,485	+25	2,385	+20
Parraweena Road	West of Taren Point Road	870	+85	585	+75
	West of Shirley Road	1,070	+90	1,010	+80
	West of Kareena Road	1,055	+110	1,000	+85
	East of Port Hacking Road	840	+70	995	+55
Kareena Road	South of Parraweena Road	180	+70	180	+65
	North of The Boulevard	170	+70	140	+65
Shirley Road	North of Parraweena Road	85	+0	90	+0
IGA Access	North of Parraweena Road	345	-45	300	-35

- traffic flows on Kareena Road would increase by some 65 to 70 vehicles per hour two-way during the during the weekday afternoon and Saturday lunchtime peak periods; and

- traffic flows at the IGA shopping centre access would decrease by some 35 to 45 vehicles per hour two-way during the during the weekday afternoon and Saturday lunchtime peak periods.

3.20 In addition, the proposed development would result in people within the primary catchment being located closer to a supermarket and hence having to travel less

distance in order to undertake their weekly shopping (at centres such Sylvania, Miranda and Caringbah). This would result in reduced traffic at these centres. Furthermore less travel will result in a reduction in vehicle kilometres with complementary environmental benefits of less fuel consumption, less vehicle emissions and savings in time.

3.21 The intersections previously analysed in Chapter 2 have been re-analysed with VISSYM (intersection of Taren Point Road/Parraweena Road) and SIDRA (other intersections) with the additional development traffic flows shown in Figures 2 and 3. The SIDRA analysis found that:

- the unsignalised intersections of Parraweena Road with the Woolworths access and Kareena Road would operate with average delays of less than 25 seconds per vehicle in the weekday afternoon and Saturday midday peak hours respectively for the movement with the highest delay (right turn onto Parraweena Road). This represents level of service B, a satisfactory level of intersection operation;

- the unsignalised intersection of the Shirley Road/Parraweena Road would continue to operate with average delays of 20 seconds per vehicle in the weekday afternoon and Saturday midday peak hours respectively for the movement with the highest delay (right turn onto Parraweena Road). This represents level of service B, a satisfactory level of intersection operation;

- the unsignalised intersection of the IGA Access/Parraweena Road would continue to operate with average delays of 25 seconds per vehicle in the weekday afternoon and Saturday midday peak hours respectively for the

movement with the highest delay (right turn onto Parraweena Road). This represents level of service B, a satisfactory level of intersection operation;

- the unsignalised intersection of Port Hacking Road with Parraweena Road would operate with average delays for the highest delayed movement of less than 35 seconds per vehicle during peak periods. This represents level of service C, a satisfactory level of service; and

- the unsignalised intersection of Kareena Road with The Boulevard would continue to operate with average delays for the highest delayed movement of less than 30 seconds per vehicle during peak periods. This represents level of service B/C, a satisfactory level of service.

3.22 The VISSYM model found that with development traffic in place, the intersection of Taren Point Road and Parraweena Road:

- would operate with average delays of 36 seconds per vehicle in the weekday afternoon and Saturday midday peak hours respectively. This represents level of service C, a satisfactory level of intersection operation; and

- the modelling found that in the weekday afternoon peak hour the average queue on the western approach of the intersection (Parraweena Road eastbound) would increase by 2 vehicles (to 52 metres) and the maximum queue would increase by 17 vehicles (to 233 metres). In the Saturday midday peak hour the average and a maximum queue would be unchanged.

3.23 Overall the traffic analysis found that the proposed development would have minimal impact on the operation of the surrounding road network with

intersections continuing to operate at their existing levels of service in peak periods with only minor increases in average delays per vehicle. Traffic flow increases on Parraweena Road would be generally less than 10% in the peak periods.

3.24 The analysis found that there are existing long queues on the Parraweena Road western approach to the intersection with Taren Point Road. These are a result of traffic turning right into Taren Point Road (southbound) from Parraweena Road (eastbound) being delayed by through traffic in the opposite direction. This diverts through traffic into the left turn lane which in turn increases delays and queues for traffic turning left into Taren Point (northbound) during the green left turn arrow phase in the signal cycle.

3.25 To address the existing queuing issue on the Parraweena Road western approach to the intersection with Taren Point Road, a number of options were investigated to reduce queuing without significant impact on overall intersection performance. GTA identified that by introducing a trailing right turn phase on the Parraweena Road western approach, queues on this approach would be reduced, particularly in the Saturday midday peak period. The VISSYM model was rerun (with the trailing right turn phase and development traffic in place). The analysis found that:

- The intersection of Taren Point Road/Parraweena Road would operate with average delays of 34 to 36 seconds per vehicle in the weekday afternoon and Saturday midday peak hours respectively. This represents level of service C, a satisfactory level of intersection operation; and

- the modelling found that in the weekday afternoon peak hour the average queue on the western approach of the intersection (Parraweena Road

eastbound) would increase by 1 vehicle (to 44 metres) and the maximum queue would increase by 2 vehicles (to 150 metres). In the Saturday midday peak hour the average and maximum queue would decrease by 6 vehicles (to 47 metres) and 10 vehicles (220 metres) respectively.

3.26 The VISSYM modelling found that the trailing right turn would reduce queues and provide additional capacity for vehicles through the intersection without significant impacts on the overall intersection performance and minimize the impact of traffic from the proposed development. In addition, provision of a separate right turn phase would improve safety at the intersection by allowing traffic to turn right into Taren Point without having to wait for a gap in the opposing traffic flow.

3.27 In summary the traffic analysis has found that:

- the proposed development would have minimal impact on the operation of the surrounding road network with intersections continuing to operate at their existing levels of service in peak periods with only minor increases in average delays per vehicle. Traffic flow increases on Parraweena Road would be generally less than 10% in the peak periods;

- provision of a trailing right turn on the Parraweena Road western approach to the intersection with Taren Point Road would reduce queues and provide additional capacity for vehicles through the intersection and minimize the impact of traffic from the proposed development; and

- provision of a separate right turn phase would improve safety at the intersection by allowing traffic to turn right into Taren Point without having to

wait for a gap in the opposing traffic flowto reduce queuing on Parraweena Road.

Response to Matters Raised by Council

3.28 The traffic matters raised by Council are summarized below.

- concept plan with site access entry /exit location for vehicles, trucks and pedestrians.
- crash data analysis along Parraweena Road and review of existing traffic calming measures and environmental performance standards based on increased AADT.
- review of parking provision based on RMS guidelines.
- updated traffic modelling.

3.29 Our response to each of these matters is set out below:

- a concept plan showing the site access locations has been prepared by BN Group. Indicative truck turning paths showing access to/from loading docks are attached to this report;
- a review of crash data is set out below;
- a review of parking provision (including assessment against RMS rates) is set out in this report; and

- updated traffic modelling as agreed with Council is set out in this report.

3.30 A review of the most five years of crash data from 2011 to 2015 (most recent data available) for the section of Parraweena Road between Port Hacking Road and Taren Point Road (a distance of some 1.3 kilometres) has been undertaken. The review found that there was a low crash occurrence with a minor number of severity crashes as follows:

- there were 11 crashes from 1 January 2011 to 31 December 2015;
- four of these crashes occurred in 2011, two each in 2012 to 2014 and one in 2015; and
- there were no fatalities and only two casualty crashes (a moderate crash in 2012 and a minor casualty crash in 2014).

3.31 Parraweena Road has an AADT of some 10,000 vehicles per day. With this volume of traffic, a low crash occurrence and the severity of the crashes accidents being minor, there would appear to be no unusual safety issues along Parrawneena Road in the vicinity of the site.

Summary

3.32 In summary, the main points relating to the traffic implications of the planning proposal are as follows:

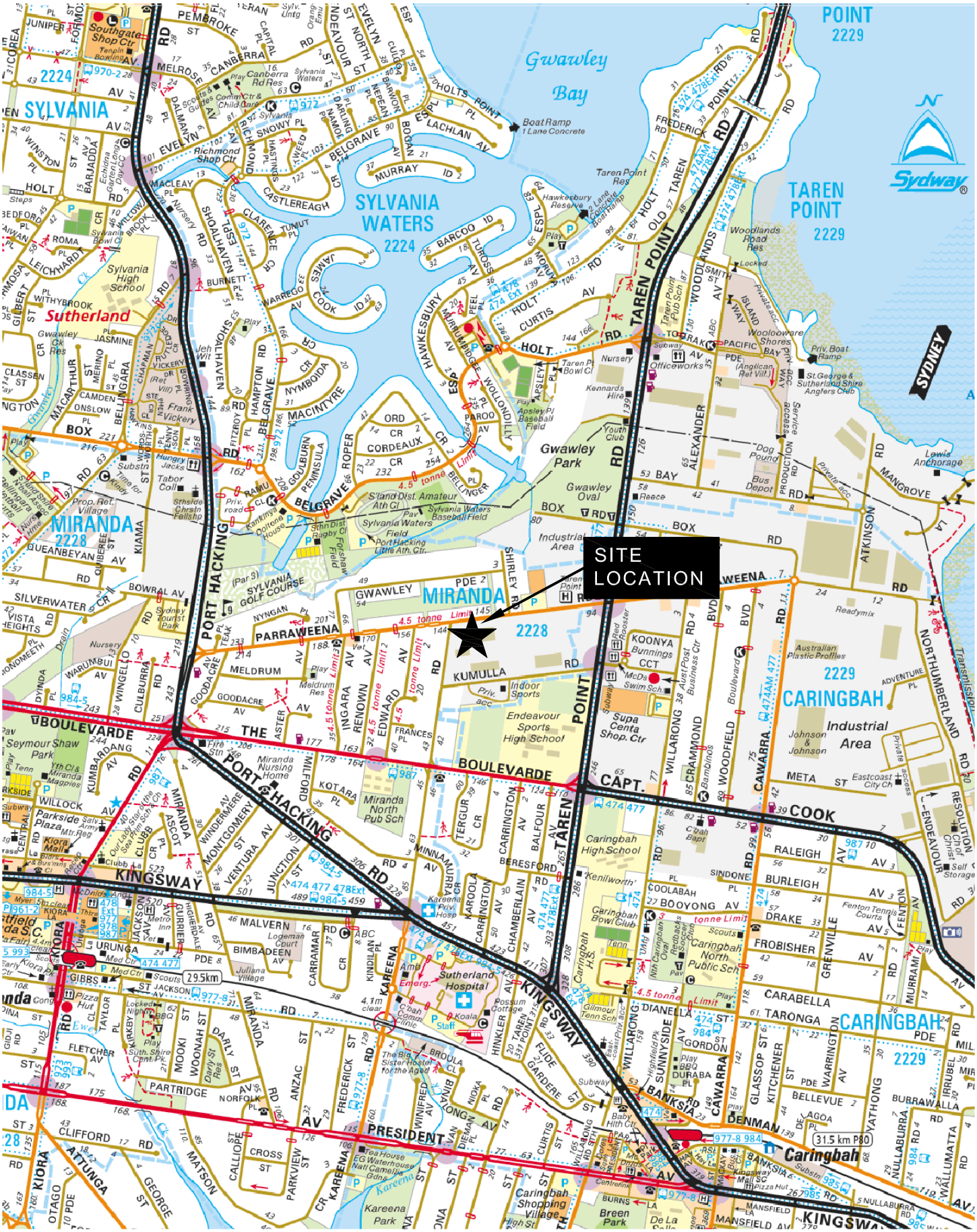
i) the proposed development would be accessible by public transport services;

ii) appropriate parking will be provided;

iii) access, servicing and internal layout will be provided in accordance with AS 2890.1:2004 and AS 2890.2 – 2002;

iv) the road network will be able to accommodate the additional traffic from the proposed development;

v) to reduce queues and improve the operational performance of the intersection of Parraweena Road/Taren Point Road, provision of a trailing right turn phase on the Parraweena Road western approach is recommended.



Location Plan

Colston Budd Rogers & Kafes Pty Ltd

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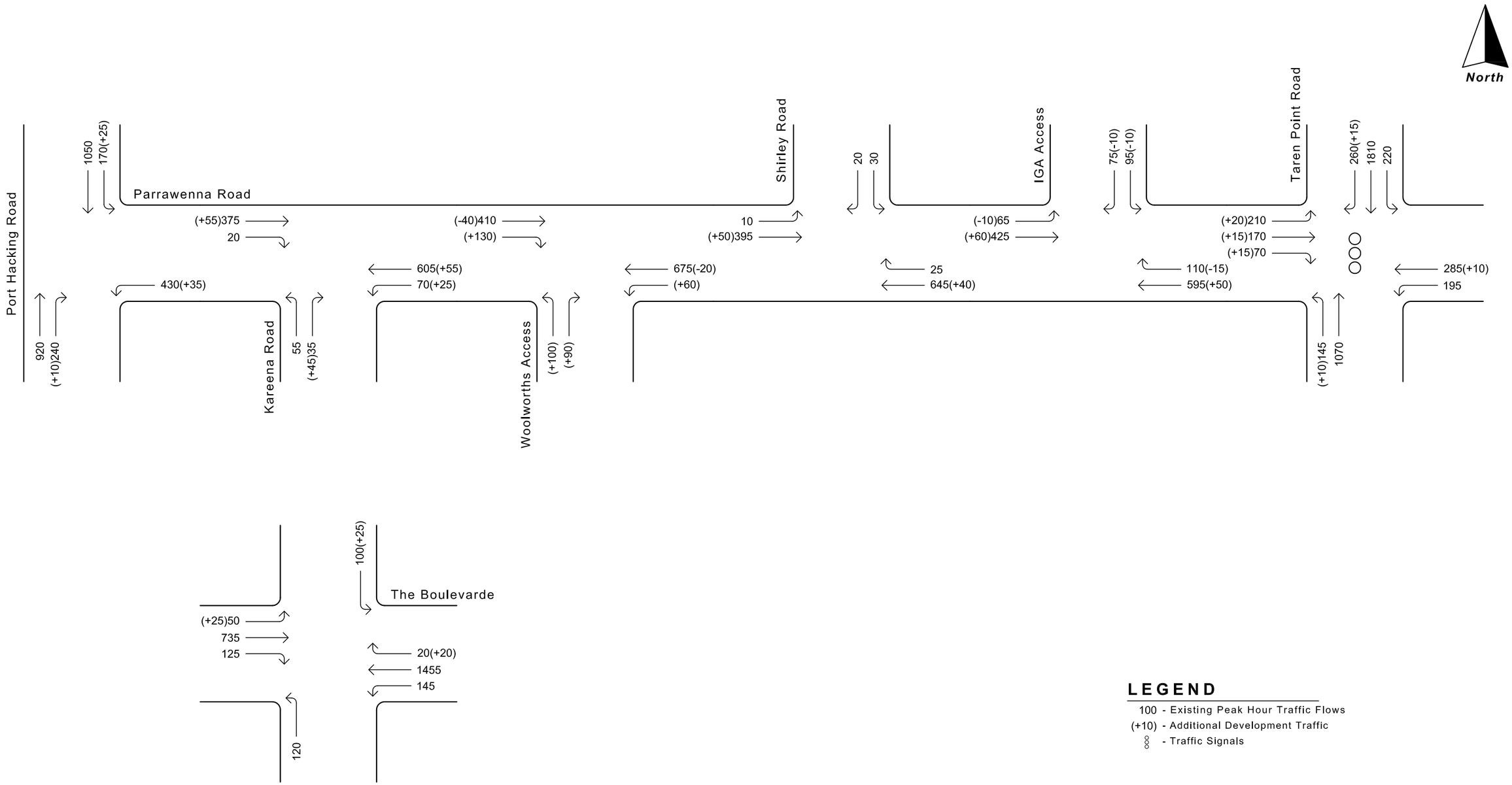
Figure 1



LEGEND

100 - Existing Peak Hour Traffic Flows
(+10) - Additional Development Traffic
- Traffic Signals

Existing weekday afternoon peak hour traffic flows plus development traffic

Colston Budd Rogers & Kafes Pty Ltd

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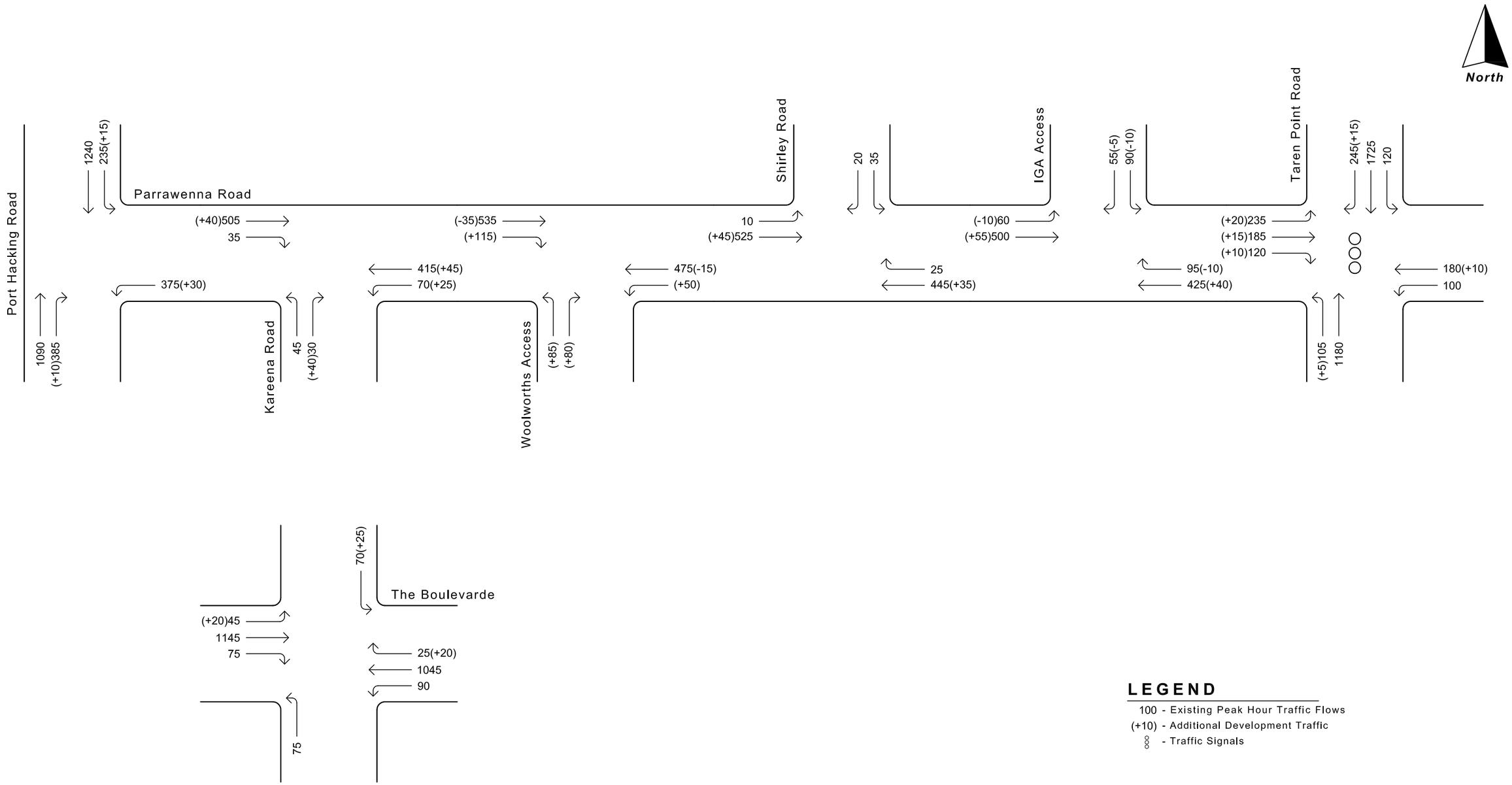
Figure 2



LEGEND

100 - Existing Peak Hour Traffic Flows
(+10) - Additional Development Traffic
- Traffic Signals

Existing Saturday midday peak hour traffic flows plus development traffic

Colston Budd Rogers & Kafes Pty Ltd

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Figure 3

ATTACHMENT A

GTA MODELLING REPORT

MEMORANDUM

TO: Tony Pratt

CC: Tim Rogers, Tim De Young, Robert Dus

FROM: Nicholas Brown

DATE: 10 March 2017

OUR REF: N120860

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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.

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sydney
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adelaide
gold coast
townsville
perth

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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

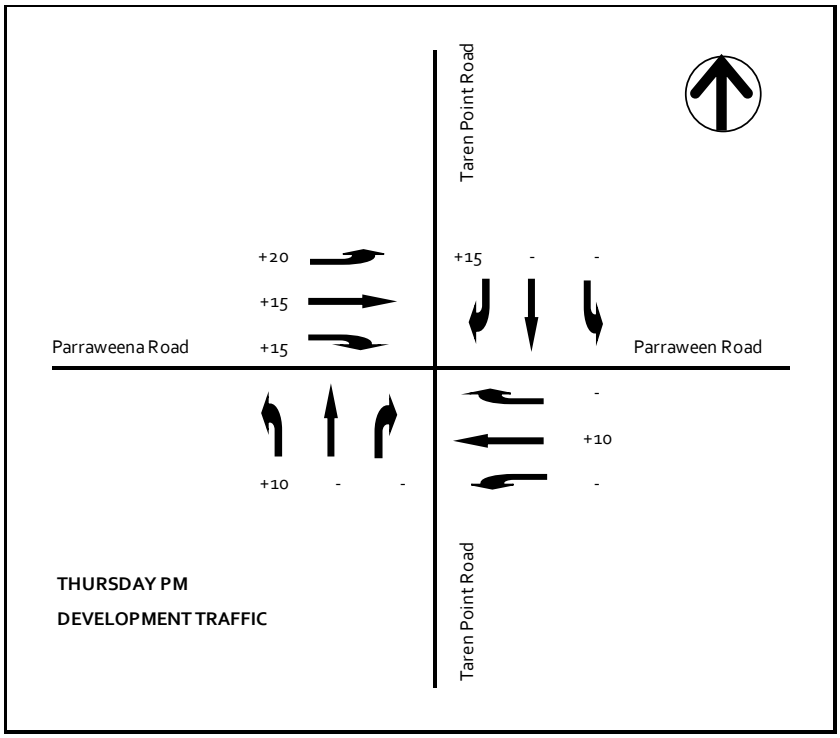
Reference Case Traffic Volumes

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

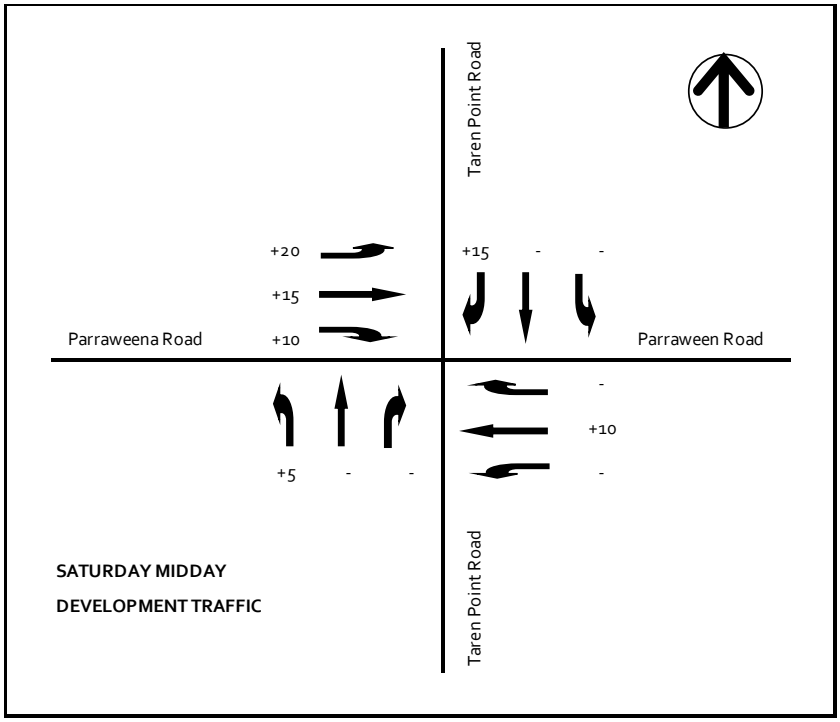
The development traffic volumes for the supermarket were provided by Colston Budd Rogers & Kafes Pty Ltd[1] and can be seen in Figure 2.1 and Figure 2.2. These figures indicate that between 5 and 20 vehicles movements will be added to the relevant movements at the Parraweena Road/Taren Point intersection. 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 with no modifications to the road network required.

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	184 hr	+14%
VKT (peak hour)	4,530 km	4,548 km	+0.4%
Average Speed (peak hour)	28 km/h	25 km/h	-11%
Average Delay (peak hour)	47 sec	58 sec	+23%

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	219 hr	+2%
VKT (peak hour)	4,434 km	4,468 km	+0.8%
Average Speed (peak hour)	20 km/h	20 km/h	0%
Average Delay (peak hour)	77 sec	77 sec	0%

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:

- A decrease in the average travel speed of up to 11% during the Thursday peak period, while the Saturday peak period remains consistent with the reference case scenario.
- An increase in the average delays of 23% percent during the Thursday peak period, while the Saturday peak period remains consistent with the 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	36	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 a minor impact 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 continue to operate at LOS C (satisfactory level of service) with a minor increase in average delays (6 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	36	C
2	Taren Point Rd / Koonya Circuit	21	B	21	B
3	Parraweena Rd / Willarong Rd	4	A	3	A

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

The intersection performance results show that during the Saturday midday peak hour, all of the assessed intersections will operate at similar Levels of Service as the reference case model.

5.3 Parraweena Road Queuing Analysis

Table 5.6 present 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	52	233

The Thursday PM peak results indicate that the additional traffic generated by the proposed development (50veh) is likely to result in increased queue lengths along the west approach of the Parraweena Road/Taren Point Road intersection. The maximum queue increases from 134m in the reference case to 233m in the post development model. Figure 5.1 shows a snapshot from the model which illustrates the extent of queue on Parraweena Road.

Figure 5.1: Queue on Parraweena Road (West) – Thursday PM Post Development Model

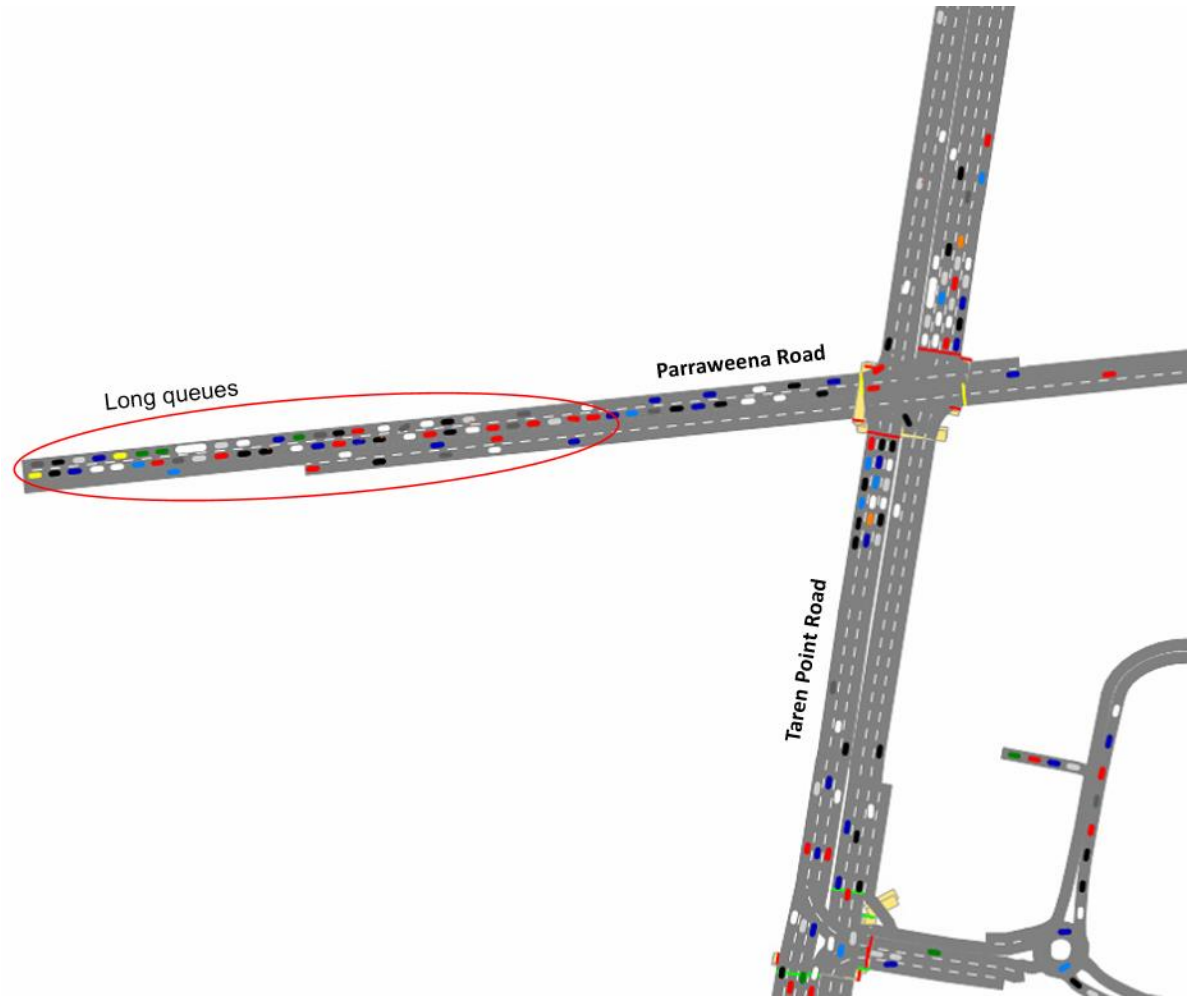
Table 5.7 presents a comparison of modelled queues for the Taren Point Road/Parraweena Road intersection during the Saturday Midday peak period.

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	82	285

Result from the Saturday peak indicates that the average intersection queue is the same as in the reference case model. However, the west approach experiences long queues that extend to the model boundary and result in a number of vehicles that are unable to enter the study area. This issue occurs in both models as highlighted by the consistent maximum queue length of 285m in each model. Figure 5.3 graphically illustrates the extent of queueing along Parraweena Road during the Saturday midday peak model.

Figure 5.2: Queue on Parraweena Road (West) – Saturday Midday Post Development Model



Given this issue occurs in both models, a comparison of vehicles unable to enter the network at this location has been undertaken. Table 5.8 presents the results for the reference case and post development models.

Table 5.8: Saturday Midday Unreleased Vehicles

Approach	Reference Case Model	Post Development Model
West Approach at Parraweena Road/Taren Point Intersection	41 vehicles	70 vehicles

The results show that an additional 29 vehicles could be expected to join the queue on the west approach on the Parraweena Road/Taren Point intersection in the post development model. The difference in unreleased vehicles gives an indication of the likely queuing impacts along this approach as a result of the proposed development.

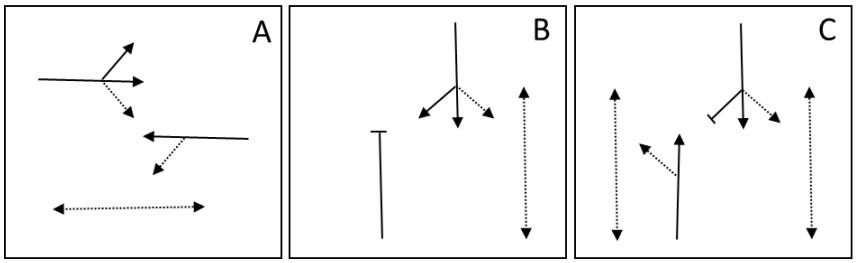
5.4 Signal Operational Improvements

Further investigation was undertaken to address high levels of demand on the western approach of the Taren Point Road / Parraweena Road intersection during both the Thursday and Saturday peak periods. It was identified that right turners on the west approach to the Taren Point Road / Parraweena Road intersection were being held by westbound through movements which is resulting in the long queues on this approach.

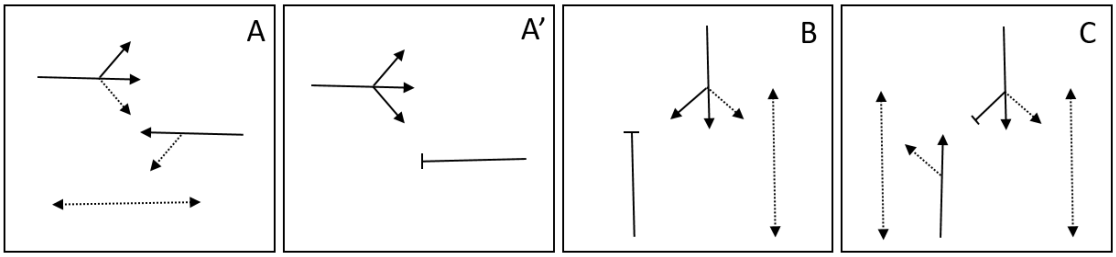
It was identified that improvements to the signal timings could be introduced to optimise the signal phases so that spare green time can be utilised to cater for the additional demand on the critical west approach. Figure 5.3 presents the signal phases modelled in the reference case and post development models.

Figure 5.3: Modelled Signal Phases

Reference Case Model – Signal Phases



Post Development Model – Signal Phases (Amended)



As shown in Figure 5.3, an additional signal phase (lagging right turn) was introduced to the signal sequence of the post development model to help provide additional green time to the west approach to cater for the high levels of demand. In addition, the available green time on the north and south approaches was slightly reduced (approx.1-2 seconds), which was then added to the phase controlling the west approach. Overall, it was determined that the lagging right turn on the west approach would help reduce the queues and provide additional capacity for vehicles through the intersection without significant impacts on the overall intersection performance.

Table 5.9 presents a results comparison between the reference case and post development signal optimisation models for the Thursday peak period.

Table 5.9: Network Operational Summary – Thursday Peak

Approach	Reference Case Model		Post Development Model (Signal Optimisation)		% Difference
Intersection Performance	**Delay**	**LOS**	**Delay**	**LOS**	
Taren Point Rd / Parraweena Rd	30	C	34	C	+13%
Taren Point Rd / Koonya Circuit	17	B	17	B	0%
Parraweena Rd / Willarong Rd	2	A	2	A	0%
Queue Results	**Overall Intersection**	**Worst Movement**	**Overall Intersection**	**Worst Movement**	**% Difference**
	Average (m)	**Maximum (m)**	**Average (m)**	**Maximum (m)**	
Taren Point Rd / Parraweena Rd	37	134 [1]	44	150 [1]	+12%
Unreleased Vehicles					
West Approach at Parraweena Road/Taren Point Intersection	0 vehicles		0 vehicles		0%
Network Statistics					
VHT (peak hour)	161 hr		174 hr		+8%
VKT (peak hour)	4,530 km		4,562 km		+1%
Average Speed (peak hour)	28 km/h		26 km/h		-7%
Average Delay (peak hour)	47 sec		52 sec		+11%

[1] The maximum queue was observed on the west approach of the Taren Point Road / Parraweena Road intersection.

The Thursday peak results show a consistent comparison between the reference case and post development signal optimisation models. The average delay through the Parraweena Road/Taren Point Intersection will increase by four seconds whilst the all other network statistics remain consistent with the reference case model. The maximum queues at the Parraweena Road/Taren Point intersection will increase marginally from 134m to 150m. It is noted that without signal optimisation the maximum queue length reaches 233m.

Table 5.10 presents a results comparison between the reference case and post development signal optimisation models for the Saturday peak period.

Table 5.10: Network Operational Summary – Saturday Peak

Approach	Reference Case Model		Post Development Model (Signal Optimisation)		% Difference
Intersection Performance	**Delay**	**LOS**	**Delay**	**LOS**	
Taren Point Rd / Parraweena Rd	36	C	36	C	0%
Taren Point Rd / Koonya Circuit	21	B	20	B	-5%
Parraweena Rd / Willarong Rd	4	A	4	A	0%
Queue Results	**Overall Intersection**	**Worst Movement**	**Overall Intersection**	**Worst Movement**	**% Difference**
	Average (m)	**Maximum (m)**	**Average (m)**	**Maximum (m)**	
Taren Point Rd / Parraweena Rd	81	285 [1]	47	220 [1]	-23%
Unreleased Vehicles					
West Approach at Parraweena Road/Taren Point Intersection	41 vehicles		0 vehicles		-100%
Network Statistics					
VHT (peak hour)	219 hr		192 hr		-12%
VKT (peak hour)	4,468 km		4,550 km		+2%
Average Speed (peak hour)	20 km/h		23 km/h		+15%
Average Delay (peak hour)	77 sec		60 sec		-22%

[1] The maximum queue was observed on the west approach of the Taren Point Road / Parraweena Road intersection.

The Saturday peak results show that the post development unreleased traffic demand can be reduced to zero as part of the signal optimisation scenario. This indicates that the west approach along Parraweena Road will provide adequate capacity to cater for the expected post development traffic demands. The maximum queue lengths of 220m presents a 23% improvement in maximum queue length when compared to the reference case model.

The results from both peak periods indicate that signal optimisation at the Parraweena Road/Taren Point Intersection can provide operational benefits that minimise the impact of the additional traffic demands. Notwithstanding, it would be recommended that any changes to signal timings/arrangements be discussed and agreed with RMS.

6. Conclusion

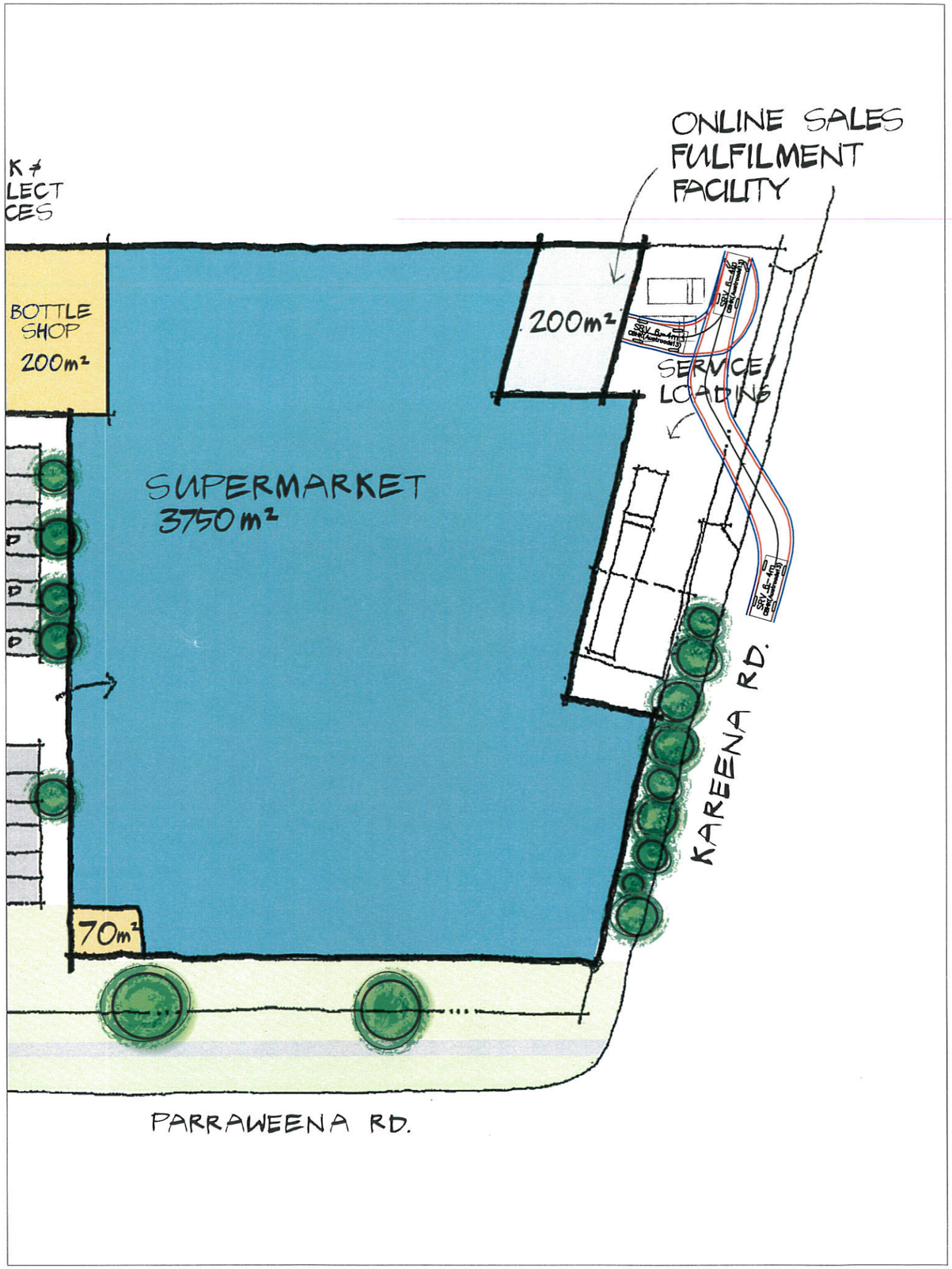
Based on the analysis and discussion presented within this memo, the following conclusions are made:

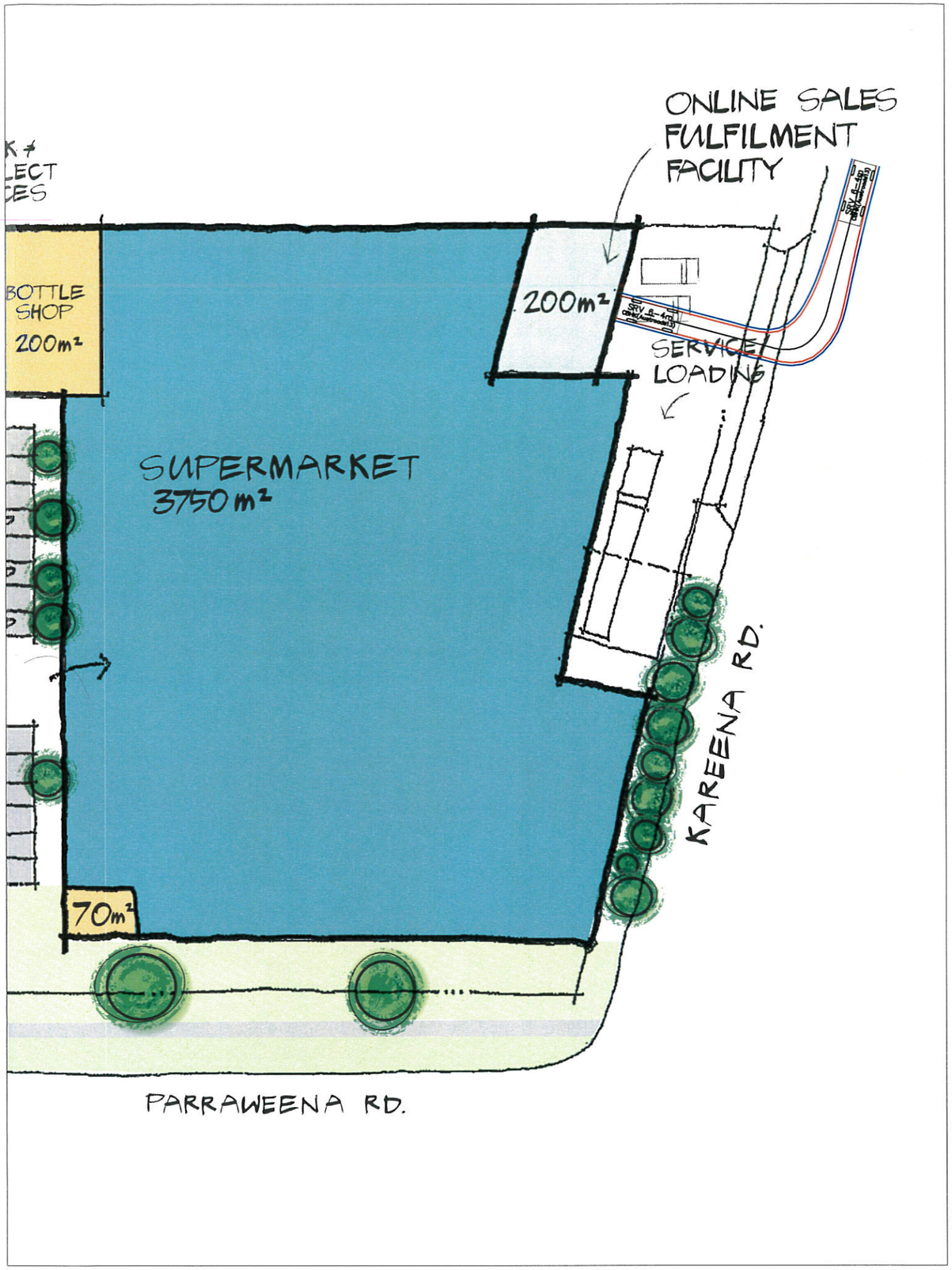
- The VISSIM model has been developed to assess the cumulative traffic impacts of the proposed supermarket development on industrial land located along Parraweena Road in Taren Point.
- The model has been adopted from the previously undertaken GTA VISSIM Modelling with the results presented in the GTA memorandum for the Bunnings and Bulky Good Developments (dated 22/09/15).
- The model results showed that the additional traffic generation by the proposed development is likely to have the impact on the performance of the intersections identified in the network model. However, optimising the signal timings at the Taren Point Road / Parraweena Road intersection can provide operational benefits that minimise the impact of the additional traffic demands:

- Average speed variation will be in the range of -7% and +15% in Thursday afternoon and Saturday peak periods respectively.
- All 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.
- Signal optimisations included the introduction of a lagging right turn phase to allow right turn vehicles to clear from the west approach at the Taren Point Road / Parraweena Road intersection.
- Modifications to the signal phasing at the Taren Point Road / Parraweena Road intersection will provide benefits to the queues and average delays on the west approach to the intersection during the post development scenario.

ATTACHMENT B

TRUCK TURNING PATHS





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Swept Path of Vehicle Body
Swept Path of Clearance to Vehicle Body

6.4m SMALL RIGID VEHICLE SWEPT PATHS

DRAWN BY CBRK Pty Ltd_hs Ref: 10235 DD MMMM 2011

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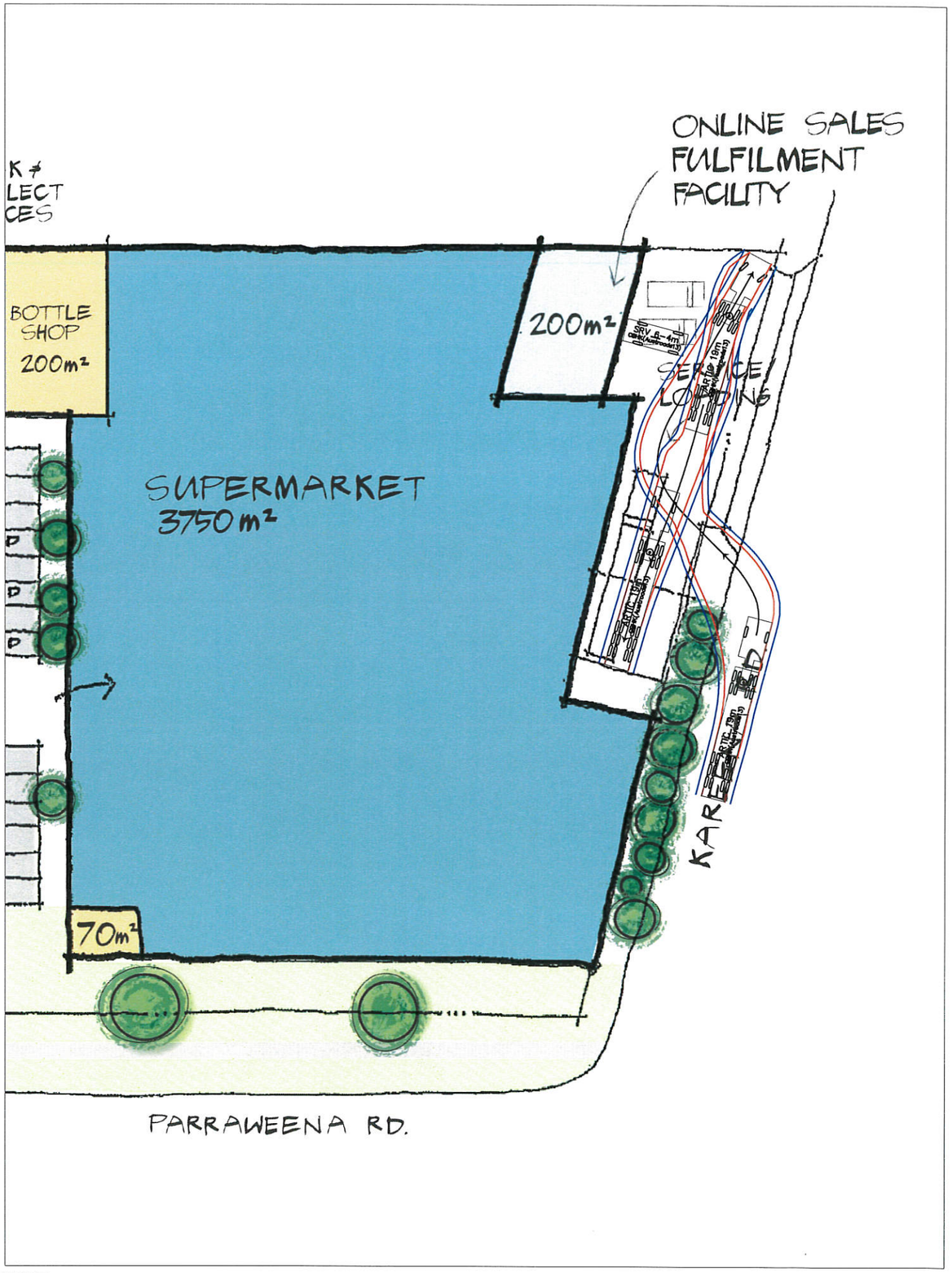

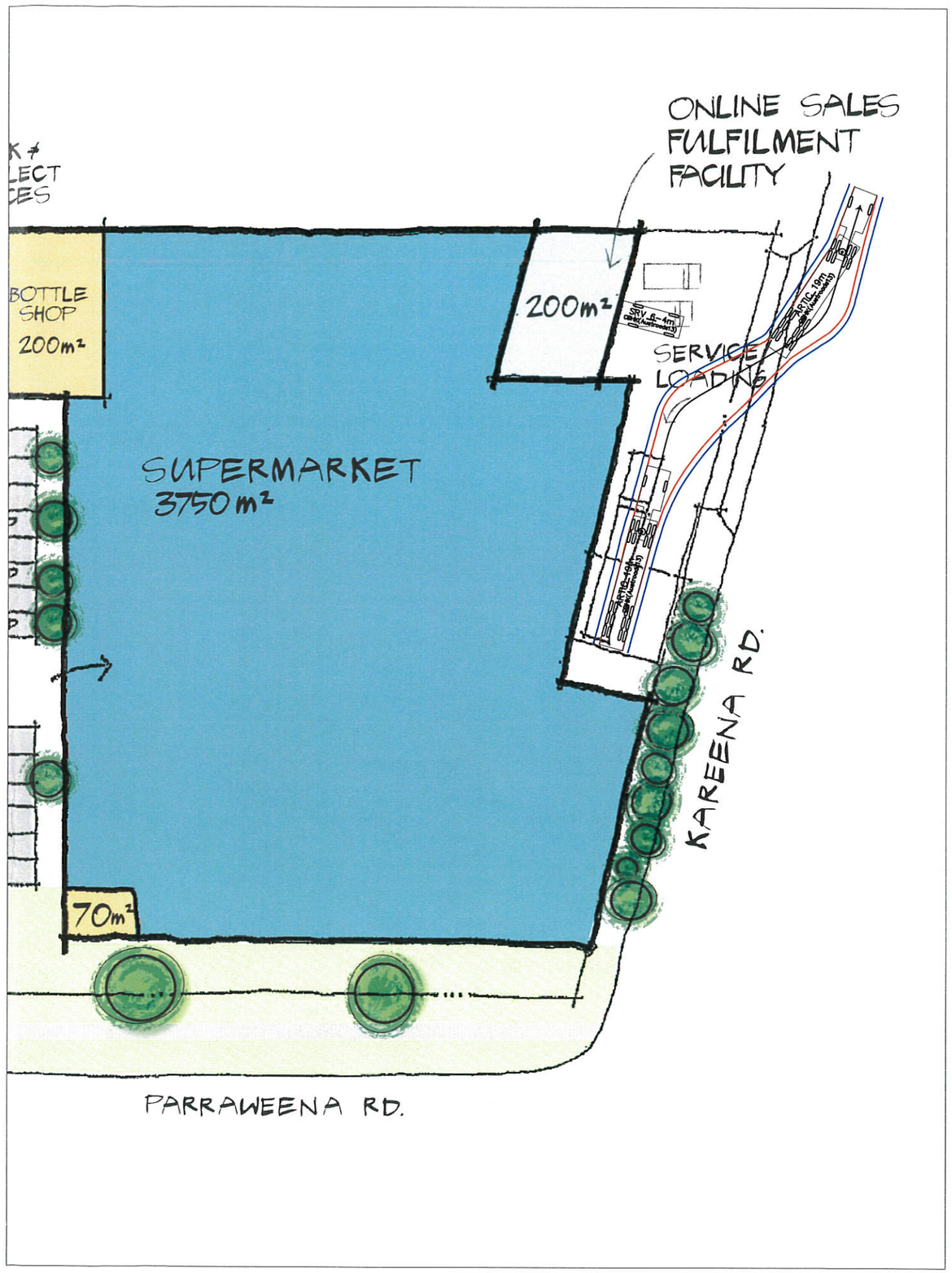

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Swept Path of Vehicle Body
Swept Path of Clearance to Vehicle Body

19m ARTICULATED VEHICLE SWEPT PATHS

DRAWN BY CBRK Pty Ltd_hs Ref: 10235 07.02.2017

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