CRONULLA SHARKS REDEVELOPMENT
MIXED USE MASTERPLAN

MARCH 2012

TRAFFIC MANAGEMENT AND ACCESSIBILITY PLAN
(INCORPORATING TRAFFIC AND PARKING STUDY)

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EXECUTIVE SUMMARY

This report has been amended since the September 2011 issue to accommodate the following alterations to the scheme and includes a commitment by the Sharks to provide a regular bus shuttle service as an interim (or supplementary) measure until a dedicated public bus service is realised:

- *A reduction in the number of residential apartments from 700 to 597 units, without reducing the on-site car parking for the residential component. Therefore resulting in an increased proportion of parking for visitors, which lies in between the rates specified in the RTA's "Guide to Traffic Generating Developments" (Oct 2002) for high density residential flat buildings in regional and sub-regional centres.*

- *A 15.7% reduction in the supermarket component from 7,600m^2 to 6,404m^2 (some 1,196m^2 less). Supermarkets generate 3 times the amount of traffic per m^2 compared to other retail types so this will result in less traffic generation.*

- *A 6% reduction in the overall retail component.*

- *An increase in the medical centre floor space and an 11.4% reduction in the leisure facility floor area to that previously proposed.*

- *Compliant car parking supply for the retail / club / medical / leisure component will be provided within its car parking area.*

Notwithstanding the above changes that achieve a reduced development outcome that reduced scheme is indicative only. In terms of the retail/club component, approval is sought for the Concept Plan for the overall GFA proposed in the original submission (i.e. @26,500m^2), which is an upper limit. Accordingly, it should be noted that:

- *The traffic generation and management proposed in the exhibited scheme is acceptable.*
- *The revisions to the indicative layout (retail component in particular) address issues associated with urban design and improved public access and movement. While these revisions have the effect of changing the retail mix and will produce traffic generation rates that are lower than those overall rates proposed in the exhibited Concept Plan, they are indicative plans only.*
- *Therefore approval is sought for the overall Concept Plan GFA (as exhibited) to maintain flexibility for the detailed design as part of the future detailed Project Application.*

This report also responds to Issue 7 "Transport and Accessibility (Construction and Operational)" of the Director General's Requirements dated 25 March 2011.

These investigations have considered vehicular / pedestrian / cyclist access & integration, internal / external traffic impacts, on-site parking provision, management of external parking needs & impacts as well as servicing provision / impacts associated with the proposed development scheme. The key findings include:

Public Transport Improvement

- *The development will function as a new retail centre and will be supported by a new bus service that will link the site to Miranda, Caringbah & Cronulla Train Stations with community benefits to local residents, schools and users of nearby sporting / training fields.*

- *Bus bays will be provided in front of both the residential and retail components on the northern side of Captain Cook Drive and maximised to a reasonable extent to allow potential use by shuttle buses on game days. An additional bus bay will also be provided on the southern side of Captain Cook Drive immediately west of the retail / club component, linked to the site via pedestrian phases at the proposed western traffic signal serving the retail / club car park. This bay being on the downstream side of the retail signals.*

Traffic Management / Vehicular Access / Bicycle & Pedestrian Integration

- *The impact of traffic generated by the development can be accommodated by the surrounding road, subject to the provision of the following traffic management measures:*

  - *Retain the Captain Cook Drive / Gannons Road roundabout.*

  - *Relocation of the existing pedestrian / cyclist traffic signals within Captain Cook Drive from the eastern boundary of the retained Council controlled Solander Fields to a midpoint along the road frontage to the residential component of the development to incorporate a two phase "T" junction with the new roadway serving the proposed residential apartments. These signals will retain a pedestrian / cyclist phase across Captain Cook Drive as well as allowing entry and exit traffic from the residential development, except that right turn entry traffic from Captain Cook Drive will be prohibited. These signals will operate on demand and will be isolated.*

  - *Two new traffic signals within Captain Cook Drive serving the retail component separated by a distance of approximately 170m. The western traffic signals are similarly located to the previous DA approval being generally in line with the eastern facade of the existing club premises. The eastern traffic signals are proposed to replace the previously approved relocated Captain Cook Drive / Woolooware Road roundabout. The existing Captain Cook Drive / Woolooware Road roundabout will be removed, as previously agreed with Council to create a new junction further to the east and in line with the prolongation of Woolooware Road, adjacent to the retained service station and Fitness First premises. Access arrangements to the service station will generally be retained from Captain Cook Drive and modified to reflect the imminent four lane upgrade of Captain Cook Drive east of Woolooware Road up to Elouera Road that is currently in the preliminary planning stage with Council, funded by the State Government. These two retail signals will be co-ordinated. The RTA's (RMS) Network Operations department has recently (March 2012) raised no issue with the proposed two sets of signalised intersections serving the retail component of the master plan.*

- *Internal pedestrian & cyclist paths are proposed linking a new foreshore pedestrian / bicycle path to the three proposed traffic signals serving the residential and retail components of the development.*

- *The increases of traffic flows are manageable in terms of traffic flow efficiency, road safety and residential amenity considerations.*

- *The on-site parking / servicing layout and design complies with AS2890.1-2004, AS2890.6-2009 & AS2890.2-2002 requirements.*

- *Construction Traffic Management Principles to protect the amenity of local residents.*

Car Parking & Servicing

The on-site car parking complies with Council's / RTA requirements for all uses, except that reduced parking rates are adopted for the visitor parking provision for the residential apartments and the resident parking rate for the two (2) bed apartments plus a 10% dual use reduction is applied to the retail / club parking area. The departure from the Council's parking rate is justified on the basis of improved public transport provision with a new service provided along Captain Cook Drive where no service currently occurs. Preliminary discussions with the NSW Department of Transport have resulted in an in-principle support for a bus service linking the frontage of the proposed residential and retail components of the site with Miranda, Caringbah and Cronulla Train Stations. The scale of development is of a level that will support the introduction of this new bus service which will also provide benefits to local residents, schools and users of the nearby sporting / training fields.

To further assist the Department's determination, it is relevant to note that the RTA "Guide to Traffic Generating Developments" applies a visitor parking rate of 1 space per 5 dwelling units for medium density development and further reduces this to 1 space per 7 dwelling units in town centres.

Work Travel Plans will be introduced to encourage use of introduced public transport services, car pooling and other initiatives to reduce private car use by retail / club / medical / leisure employees.

GAME DAY Parking

For game day parking, a separate parking strategy report has been developed, incorporating parking within identified satellite parking locations with bus shuttle services to and from the football ground. Several shuttle bus service routes have been developed to encourage visitors to use public transport. Proposed shuttle bus routes will transport spectators from/to various public transport hubs throughout the Sutherland Shire to reduce parking demand and traffic impact during game days.

The further qualification to the Game Day Traffic & Parking Management strategy is that the western playing fields will be available for game day parking in the short term (3 to 5 years) as the proposed residential development will be staged and follow the retail construction.

The Game Day Satellite Parking Plan makes clear that both the existing game day parking and traffic issues and the loss of on-site parking as a result of the Concept Plan scheme are capable of being appropriately managed in order to achieve a superior outcome for local residents and patrons of Toyota Stadium. This Concept

Plan does not permit the carrying out of any works, and there will be no changes to existing on-site parking arrangements until the relevant development consent and construction certificate are issued. In light of this, the proponent will continue to refine and formalise game day arrangements within the framework of the Game Day Satellite Parking Plan in consultation with the Department, Council and the local community, with a final plan and the appropriate agreements to be in place prior to the issuing of any future construction certificate.

It should be noted that the overall redevelopment of the site is expected to occur in a number of stages over a period of several years as detailed in the Environmental Assessment Report, and that there will be opportunities to provide interim on-site arrangements which allow for an orderly transition from the present situation to the measures proposed under the Game Day Satellite Parking Plan. The staging of the project's construction will provide a substantial transitional period in which defined areas of the site will be gradually closed for game day parking over several years. This transitional period will ensure that visitors to Toyota Stadium have sufficient time to change their transport behaviours and adapt to the new transport arrangements for the site.

1. INTRODUCTION

M^CLaren Traffic Engineering was commissioned in November 2010 to undertake a revised traffic and parking study in support of a development application for the Cronulla Sharks landholding.

This report responds to Issue 7 *"Transport and Accessibility (Construction and Operational)"* of the Director General's Requirements dated 25 March 2011.

The proposed mixed use redevelopment of the Cronulla Sutherland Leagues Club site including a new neighbourhood retail centre, residential development and upgrades to the sports facilities, including Toyota Stadium, will create a long term sustainable and viable solution for the Club as well as create a **new centre** and destination location that meets the needs of the surrounding community. The Concept Plan prepared for the site is seeking to develop the site in three stages, being:

- Stage 1 – New Neighbourhood Retail Centre, Medical and Leisure facilities on the eastern car park site and redevelopment of the Leagues Club facilities;
- Stage 2 - Residential Masterplanned Estate on the western car park and field area; and
- Stage 3 - Extension and improvement of the Sharks playing field facilities including grandstand extensions.

Raised concerns over parking supply in regard to the previous submission have been addressed in this updated report. The development has now decreased in the number of residential units while providing in the same parking supply as proposed in the previous submission. A 6% reduction in the overall retail component, an increase in the medical centre floor space and an 11.4% reduction in the leisure facility floor area to that previously proposed.

The proposal involves:

- Reduction in existing Club GFA from 8,500m^2 to 3,900m^2
- 597 Residential Units in total (comprising an assumed mix of 144 x 1 bed, 385 x 2 bed, 68 x 3 bed) plus small commercial area of 740m^2 GFA.
- 6,404m^2 GFA Supermarkets
- 1,096m^2 GFA Mini / Majors
- 5,572m^2 GFA Retail specialty stores
- 2,817m^2 GFA Medical
- 2,968m^2 GFA Leisure facilities
- 1,568 on-site parking spaces, comprising 851 spaces for the residential, 24 for the commercial office area on the residential land parcel and 693 car

parking spaces for the club / retail / supermarket / leisure / medical component.

- Removal of existing roundabout at the intersection of Woolooware Road North / Captain Cook Drive and creation of new eastern set of traffic signals along the prolongation of Woolooware Road North. Retail existing service station / Fitness First access arrangements and provide additional access to the service station from the northern end of Woolooware Road.

- New traffic signal controlled access from Captain Cook Drive approximately 170m offset to the west of Woolooware Road roundabout intersection to serve the new club / retail development.

- Separate resident only signalised access onto Captain Cook Drive offset approximately 300m to the west of proposed new retail signalised intersection.

Notwithstanding the above changes that achieve a reduced development outcome that reduced scheme is indicative only. In terms of the retail/club component, approval is sought for the Concept Plan for the overall GFA proposed in the original submission (i.e. @26,500m^2), which is an upper limit. Accordingly, it should be noted that:

- The traffic generation and management proposed in the exhibited scheme is acceptable.
- The revisions to the indicative layout (retail component in particular) address issues associated with urban design and improved public access and movement. While these revisions have the effect of changing the retail mix and will produce traffic generation rates that are lower than those overall rates proposed in the exhibited Concept Plan, they are indicative plans only.
- Therefore approval is sought for the overall Concept Plan GFA (as exhibited) to maintain flexibility for the detailed design as part of the future detailed Project Application.

2. THE SITE & SURROUNDING ENVIRONS

The site is located on Captain Cook Drive, Woolooware and includes the Solander playing fields, Cronulla Sharks Leagues Club, existing car park areas associated with the club, Toyota Stadium and associated grandstands. The location of the site is shown in **Figure 1** and in the image below.

Opposite the site is Woolooware Golf Course and Captain Cook Oval, which is primarily used for softball and baseball. To the east of the site, on the south eastern corner of the new roundabout at Woolooware Road North is Woolooware High School. To the east of the sharks car park is Fitness First and a petrol station. West of the site is Toyota Motor Corporation.

2.1 Surrounding Roads

Nearby roads are described in this section.
Captain Cook Drive:

- Regional road east of Gannons Road, operating as a 4 lane divided carriageway immediately adjacent to the site.
- State Road west of Gannons Road, operating as a 6 lane divided carriageway.
- Operates as a 2 lane undivided carriageway east of the site.
- Kerbside parking is generally not permitted along either side of the road adjacent to the site.
- Bicycle lanes are located on both sides of the road adjacent to the site.
- 70km/h speed limit outside of school zone times, 40km/h School Zones apply around Woolooware High School during school zone times.

Woolooware Road North:

- Local Road classification
- 2 lane undivided carriageway
- Unrestricted kerbside parking generally permitted along both sides of the road

- 50km/h speed limit, except during school zone times leading up to Captain Cook Drive intersection 40km/h

Gannons Road

- Regional Road classification
- 2 lane undivided carriageway
- Unrestricted kerbside parking generally permitted along both sides
- 60km/h speed limit

2.2 Traffic Management

The following prevailing traffic management facilities exist within the immediate vicinity of the site:

- Roundabout at the intersection of Captain Cook Drive / Woolooware Road North / Car Park Access for Cronulla Sharks Club Building. This roundabout operates as a two lane circulating roundabout.
- Wombat crossing in Woolooware Road North immediately south of the new roundabout at the junction of Captain Cook Drive / Woolooware Road North.
- Bicycle lanes on both sides of Captain Cook Drive along the front of the property.
- 40km/h School Zones operate near Woolooware High School.
- Pedestrian actuated traffic signals across Captain Cook Drive, at the driveways serving Solander Field and Captain Cook Oval.
- Roundabout control at the junction of Captain Cook Drive with Gannons Rd.
- Modified vehicle entry and exit arrangements for the car park serving Captain Cook Oval.
- Indented bus bay on Captain Cook Drive out the front of Toyota Stadium.
- During peak events at Toyota Stadium, such as 1st Grade Rugby League matches, a special event traffic management plan is used to manage the peak traffic & pedestrian activity. This plan was development in 1998 by *M^CLaren Traffic Engineering* in consultation with Council's traffic committee and the Sharks.

2.3 Traffic Flows

M^CLaren Traffic Engineering has undertaken traffic counts at the following intersections on Saturday 2nd April 2011 and Friday 1st April 2011, with results included as **Annexure A**:

- Captain Cook Drive / Elouera Road
- Captain Cook Drive / Woolooware Road North / club access
- Captain Cook Drive / Gannons Road / Toyota access
- Captain Cook Drive / Taren Point Road / The Boulevard
- Gannons Road / Kingsway
- Gannons Road / Denman Avenue

2.4 Intersection Performances

During peak crowd conditions at Toyota Stadium difficulties were often experienced by vehicles leaving the driveways serving overflow parking areas as well from the accessway to the Club car park immediately east of Toyota Stadium. However, these difficulties have been addressed by the Peak Event Traffic Management Plan developed in 1998 by *M^CLaren Traffic Engineering* in consultation with Sutherland Shire Council, the Cronulla Sharks, and local traffic committee (Refer to Figures 1 & 2 of that 1998 document). Council have also installed supplementary measures to assist pedestrian safety since that time.

In addition, the roundabout constructed at the junction of Captain Cook Drive / Woolooware Road North / Club car park around 2002 has dramatically improved traffic conditions during typical demand periods and during peak game periods. The existing performance of the key intersections were analysed with the aid of SIDRA intersection Version 5.1 for the Friday evening and Saturday peak periods. The result of the analysis is shown in **Table 1**.

TABLE 1: EXISTING INTERSECTION PERFORMANCES

Intersection	Peak Hour	Degree of Saturation(1)	Average Delay(2) (sec/vehicle)	Level of Service(3)	Control Type
Captain Cook Drive / Gannons Road	**FRIDAY PM**	1.49	**>70** (>70)	**F** Worst: F	Roundabout
	SATURDAY NOON	0.75	**12.0** (17.7)	**A** Worst: B	
Captain Cook Drive / Woolooware Road North	**FRIDAY PM**	0.77	**8.3** (22.2)	**A** Worst: B	Roundabout
	SATURDAY NOON	0.53	**8.2** (15.2)	**A** Worst: B	
Captain Cook Drive / Elouera Road	**FRIDAY PM**	0.71	**10.9** (13.6)	**A** Worst: A	Roundabout
	SATURDAY NOON	0.29	**7.5** (11.1)	**A** Worst: A	
Gannons Road / Kingsway	**FRIDAY PM**	1.00	**54.4**	**D**	Signals
	SATURDAY NOON	1.19	**64.8**	**E**	
Gannons Road / Denman Avenue	**FRIDAY PM**	0.86	**19.9**	**B**	Signals
	SATURDAY NOON	1.05	**32.9**	**C**	
Captain Cook Dr / Boulevard / Taren Pt Rd	**FRIDAY PM**	1.08	**>70**	**F**	Signals
	SATURDAY NOON	1.00	**>70**	**F**	

NOTES :

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) Average delay is the average delay experience by all movements. The average delay for the worst movement is shown in brackets for Stop, Giveway and roundabout intersections.

(3) Level of Service is a qualitative measure of performance describing operational conditions. The overall Level of Service is shown in bold, with the Level of Service for the most disadvantaged movement shown in brackets.

It is evident from **Table 1** that the intersections that currently operate poorly are the Gannons Road / Kingsway signalised intersection and the Captain Cook Drive / Gannons Road roundabout on the Friday evening peak.

2.5 Local Issues

A number of traffic, parking and access issues were noted during the preliminary planning phase for incorporation in any future development schemes for the site. These are as follows:

- Management of peak parking during peak events at the football field.
- Amenity impacts on nearby residents, particularly Woolooware Road North.
- Modifications to Peak Event Traffic Management Plan.
- Impacts of other unrelated future significant development further east (toward Kurnell).

2.6 Existing Parking Supply

The following total parking numbers are currently available for game days within the Sharks landholdings:

Eastern car park	532
Western car park	511
Field 3	67
Total	**1,134**

Past conditions (as documented in *the "Statement of Environmental Effects: Traffic and Parking Management & Landscaping Proposal"* dated February 1999, prepared by *Planning Collaborative* in association with *M^CLaren Traffic Engineering, Trott Tench Architects & Landscan*) identified that a minimum of 1,134 spaces be provided on-site. The current 2011 provision is 24 short of this figure.

It is relevant to note that previous reports[1] prepared for the Cronulla Sharks have identified that the *average maximum* parking demand for the Club, including extensions and alterations proposed in 1995, equates to 478 spaces at 10:30pm for the busiest day of the week (i.e. Saturday), this reduces to 172 (say 180) spaces at 6:30pm on an average Saturday. This includes the effects of functions within the function rooms, but excludes the effects of 1st Grade football matches on Toyota Stadium. Recent trends may have resulted in a reduced average maximum parking demand due to poker machine taxes and smoking restrictions.

The Club has a policy that no functions are held in the Club on the day of a 1st Grade football home game. For game day parking, a separate parking strategy

[1] "Proposed Conversion of Gymnasium to Bar Area for Cronulla Sutherland Leagues Club" Planning Workshop Australia, October 1995.

will be developed, incorporating parking within the Western Carpark as well as supplementary satellite parking locations with bus shuttle services to and from the football ground.

2.7 Access Constraints & Opportunities for Future Development

Works have been completed to achieve a widening of Captain Cook Drive to a four lane divided carriageway standard between Gannons Road to Woolooware Road North.

Council traffic engineers previously advised in the year 2000 that between Gannons Road and Woolooware Road North all traffic entering and leaving driveways and access ways (i.e. Solander, Sharks training fields and baseball fields on southern side) will be restricted to left turn traffic movements only due to the central median. The plans prepared by Sutherland Shire Council for the upgrade of Captain Cook Drive show the following works, much of which has been completed:

- Central median between Gannons Road to Woolooware Road North.
- Pedestrian traffic lights immediately west of vehicle access to Solander Fields parking area.
- Break in median (with locked sliding gate) to assist peak departure of traffic from the western sealed parking area of the Sharks practice fields. Police control of exit will be required.
- Concrete footpath (2m wide) along northern side between Solander Field and the Woolooware Road North roundabout.
- Formalise bus bay along the Sharks main football field (76m long bay, 4m wide).
- Provide a 21m wide break in median opposite main pedestrian access to the western end of the Sharks main football field to facilitate peak exit of pedestrian from the field at the end of peak events.
- “No Stopping” restrictions along both sides of Captain Cook Drive.
- Provide new driveways at either end of the baseball car park on the southern side of Captain Cook Drive to facilitate a one way system through the existing car park.

2.8 Public Transport Services

The site is located within a one (1) kilometre walking distance from the football field to Woolooware Railway Station.

The following two bus route services previously operated at or near the site, and will be discussed with Veolia Transport in order to seek re-instatement of the service either in part or a supplementary service:

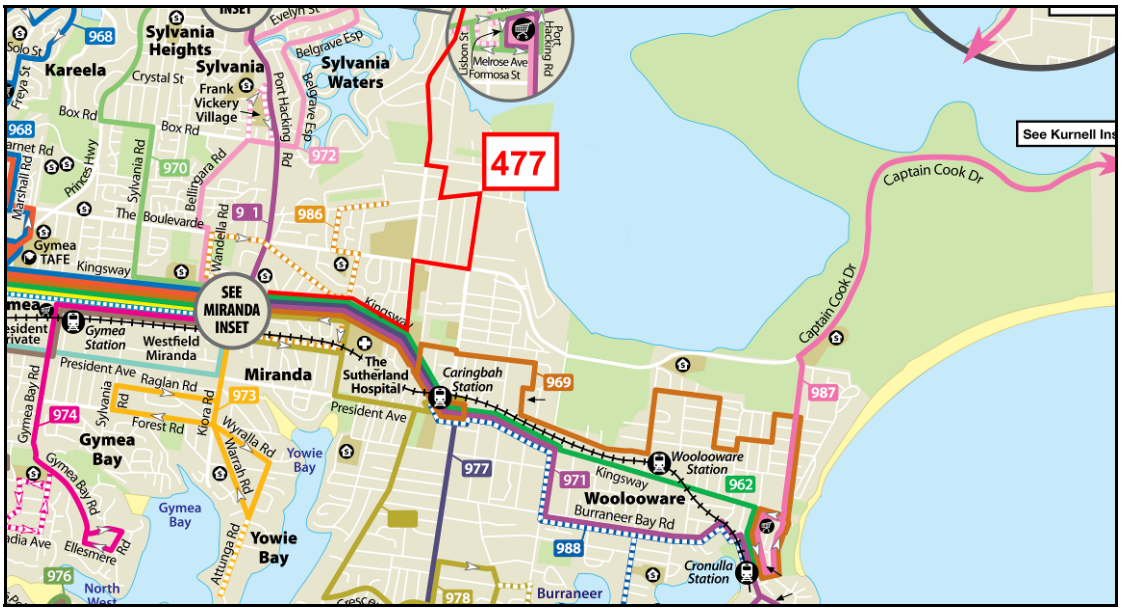
- Route 987, which operated along Captain Cook Drive between Miranda Railway Station, Cronulla Rail Station and the Kurnell Peninsula via a bus stop at the Cronulla Sharks Leagues Club.

- Route 984, which operates along Woolooware Road North and Sturt Road (at stops within 400 metres of the Cronulla Sharks Leagues Club) linking to Woolooware Rail Station, Caringbah & Cronulla centres.

Previously, preliminary discussions with bus operators (i.e. Buslink / Crowthers) indicated that they would be prepared to consider an expanded service dependent upon new developments and patronage. Discussions have yet to be undertaken with Veolia Transport management who now control the bus routes in the area.

The Sharks Leagues Club operates a Courtesy Bus on a phone call basis for the community, including non-members. A door-to-door pick up and drop off service extends to all areas east of Kareena Rd down to Parraweena Rd as well as providing a pick up and drop off service from Miranda Train Station.

The NSW Government Transport website indicates that there are no existing bus services which run along Captain Cook Drive in front of the site. See the image below for a diagram of bus routes in the area.



3 STRATEGIC CONTEXT

3.1 Strategic Planning Policy and Plans

This section outlines government plans and strategies which provide a transport context within which this proposed development should be considered.

3.1.1 NSW State Plan

The NSW State Plan 2006 and its update in 2010 define the NSW Government's overarching goals and priorities for action. It is intended to set a framework for linking the various other NSW Government plans and policies, including the Metropolitan Strategy.

Transport-relevant goals include:

- A high quality transport system;

- Practical environmental solutions; and
- Improved urban environments.

Beneath these goals are a number of transport-relevant priorities with associated targets.

The 2010 priorities are:

- Improve the public transport system;
  - Increase the share of commute trips made by public transport;
  - Increase the proportion of total journeys to work by public transport in the Sydney Metropolitan Region to 28% by 2016;
- Provide reliable public transport;
- Improve the road network;
- Maintain road infrastructure;
- Improve road safety;
- Increase walking and cycling;
- Increase the number of jobs closer to home; and
- Grow cities and centres as functional and attractive places to live, work and visit.

3.1.2 Metropolitan Strategy and Metropolitan Transport Plan

The Metropolitan Strategy (December 2005) outlines a broad framework vision for the future growth of the Sydney metropolitan area to 2031. The strategy proposes the concentration of growth in centres by identifying housing and employment capacity targets for Sydney's sub regions and strategic centres.

The Metropolitan Strategy

The Metropolitan Strategy's transport vision for Sydney is "... *neighbourhoods with improved local transport, with walking and cycling facilities and bus services to major centres. People will be able to carry out more of their trips closer to home, reducing the time taken and cost of longer trips."*

Transport actions proposed by the Metropolitan Strategy are:

- Improve transport between Sydney's centres;
- Improve the existing transport system;
- Influence travel choices to encourage more sustainable travel;
- Improve transport decision-making, planning, evaluation and funding;
- Ensure sufficient port capacity is available to serve Sydney;
- Connect the regions and economic gateways within the GMR; and
- Minimise the adverse impacts from freight movements.

3.1.3 Metropolitan Transport Plan

This was released in February 2010 and provides a 25 year vision for the linking of Sydney's land use planning with its transport network. It is intended that this plan be merged with the Metropolitan Strategy. The plan includes a 10 year funding guarantee for essential transport infrastructure and services.

The plan includes:

- The $4.5 billion Western Express City Rail Service- a separate dedicated rail track to slash travelling times from western Sydney to the city;
- Start of work on the $6.75 billion North West rail link from Epping to Rouse Hill;
- A $500 million expansion of the current light rail system with an extension from Lilyfield to Dulwich Hill;
- Improvement to bus services- including 1000 new buses in strategic bus corridors.
- New trains- addition of 626 rail carriages;
- $158 million for cycleways;
- $400 million for commuter car park;
- $225 million on ferries;
- $536 million for motorway planning, transit corridor reservations and land acquisition;
- $483 million to deliver important freight works in Sydney; and
- $21.9 million of State and Federal Funded road projects.

3.1.4 State Environmental Planning Policy No. 66

The SEPP 66: Integrating Land Use and Transport policy has since been withdrawn. However it included a set of guidelines incorporating Accessible Development Principles which still remain applicable.

The Accessible Development Principles are:

1. Develop concentrated centres of housing, employment, services and public facilities with an acceptable walking distance (400 to 1,000m) of major public transport nodes, such as railway stations and high frequency bus routes with at least a 15 minute frequency at peak times;
2. Encourage a mix of housing, employment, services, public facilities and other compatible land uses, in accessible centres;
3. Concentrate high density, mixed use, accessible centres along major public transport corridors with urban areas;

4. Plan and implement public transport infrastructure and services in conjunction with land use strategies to maximise access along corridors, and to and from centres;
5. Provide street networks with multiple and direct connections to public transport services and efficient access for buses;
6. Provide walkable environments and give priority to access for pedestrians, including access for people with disabilities;
7. Maximise cyclists' accessibility to centres, services, facilities and employment locations;
8. Use the location, supply and availability of parking to discourage car use;
9. Improve transport choice and propose an integrated transport approach by management road traffic flow and priority of transport modes; and
10. Design with an emphasis on the needs of pedestrians, cyclists and public transport users.

3.1.5 Draft Centres Policy

This draft policy seeks to replace Draft SEPP 66 (Integrating Land Use and Transport.) It sets out the following principles in relation to the development of centres:

1. The need to reinforce the importance of centres and clustering business activities;
2. The need to ensure the planning is flexible, allows centres to grow and new centres to form;
3. The market is best places to determine need. The planning system should accommodate this need whilst regulating its location and scale;
4. Councils should zone sufficient land to accommodate demand including larger retail formats;
5. Centres should have a mix of retail types that encourage competition; and
6. Centres should be well designed to encourage people to visit and stay longer.

3.2 Local Planning and Policy

3.2.1 Sutherland Council Strategic Plan

This is set out in the document "Our Shire, Our Future- Our Guide to Shaping the Shire to 2030." This was published in 2007.

The plan sets out a vision for the Shire which includes directions for "People", "Place" and "Nature". This was published in 2007.

"*A community working together to attain safe, healthy and active lifestyles through accountable decision making that achieves sustainable development and economic opportunities which respect people and nature."*

The subject proposal seeks to contribute to this vision through the provision of sustainable development and economic opportunities. Of further relevance to the project are specified key directions under the heading "place". These are:

- Greater housing choice to suit a changing population, increased access to housing and design that is sustainable within the environment;
- Improved transport options, including well integrated cycling paths and footpaths and high quality public transport infrastructure; and
- Leisure and recreation opportunities to suit the needs of the changing population that are designed to have minimal impact on the environment.

The plan specifies the following desired outcomes that are of relevance to transport aspects of the proposal:

- An integrated shire-wide bicycle and pedestrian network, with a particular emphasis on connecting communities;
- Reduced car dependence and increased alternative transport options within an improved urban design;
- Well planned neighbourhoods and activity centres that encourage physical activity;
- Suburban activity centres at key location offering a range of services and contributing to a sense of place;
- Employment opportunities that integrate into local communities; and
- Reduced greenhouse emissions.

The plan summarises transport directions and potential responses as shown in **Table 2** below:

TABLE 2: SUTHERLAND SHIRE STRATEGIC PLAN

Key Directions	Outcomes	Responsibility	Potential Response
Improved transport options including well integrated cycle paths, and a high quality public transport infrastructure	An integrated Shire-wide pedestrian network, with a particular emphasis on connecting communities. Reduced car dependence and increased alternative transport options within an improved urban design. Well planned neighbourhoods and activity centres to encourage physical activity	Council Cycle Groups Rail Corporation of NSW Sydney Ferries Corporation State Transit Authority of NSW Private Transport Providers State Planning Private Recreation and Leisure Providers Major Employers	Continue to enhance the Shire's bicycle networks and bike plan, in collaboration with all user groups. Improve integration of various transport types at interchange points, particularly through timetabling. State Government to finalise decision about the use of the F6 corridor land. Improve the ferry service between Bundeena and Cronulla, and construct a wharf at Kurnell to enable a ferry link between various points of Botany Bay. Engage community groups and private sector providers in planning, development and delivery of neighbourhood facilities. Major employers encouraged to provide workplace resources that support employees use of alternative transport e.g. change rooms, showers, bicycle lockers etc.

3.2.2 Sutherland Development Control Plan

The Sutherland Development Control Plan: Vehicular Access, Traffic, Parking and Bicycles document specifies the provision and design requirements for access via these modes. It sets out the following objectives:

a. To ensure all land uses and/ or combination of activities provide sufficient parking on site to satisfy the demand for parking by different vehicle types generated by the development, including Traffic Generating Development;

b. To ensure all land use have a described parking provision;

c. To minimise reliance on street parking;

d. To minimise amenity impacts on neighbouring properties, including streetscape, noise and light spill;

e. To ensure appropriate on-site provision and design of parking for older people and people with limited mobility or disability, in accordance with Australian Standards;

f. To recognise the need for innovative site specific parking solutions for development; and

g. To encourage greater use of more sustainable transport modes such as public transport, motor bikes, walking and cycling.

The application seeks to meet these objectives by providing an appropriate level of car, bicycle and motorcycle parking and through its location adjacent to a local centre with a railway system.

3.3 Comment on Strategic Context

Many of the underlying themes of the strategies have relevance to the proposal. Current State Policies provide a good framework to support local strategies to improve the level of accessibility and sustainable transport for the area.

A list of objectives has been developed for this TMAP in the following section which aims to support the State and Local Strategies.

4 OBJECTIVES OF THE TMAP

4.1 Objectives

This TMAP will guide further sustainable development of the Cronulla Sharks Mixed use Masterplan.

The TMAP is intended to provide a plan which would:

- Minimise car based trips;
- Support and promote sustainable travel to and from the site;
- Maintain satisfactory operation on the local road network; and
- Manage freight movements generated by the centre.

4.2 Environmental Transport Measures

The primary targets for site access will be:

- Car parking to be appropriate for needs but limited to the minimum necessary;
- Suitable bicycle and motorcycle parking and facilities to be provided;
- Good paths to transport modes to be provided;
- Cycle connections to be provided to existing and future cycle routes;
- Safety- access by road and by public transport, walking and cycling will be as safe and efficient as possible;
- Transport Access Guide- preparation and maintenance guides for staff and for patrons will be a priority; and
- Freight- deliveries will be well managed, entirely within the site.

5 TRAVEL CHARACTERISTICS

5.1 Sutherland Travel Characteristics

Table 3 and **Table 4 p**rovide Census Journey to Work statistics for the Sutherland Shire as a whole. **Table 3** covers the home end (i.e. residents who live in the Sutherland Shire) and **Table 4** covers the work end (i.e. persons who work in the Sutherland Shire). **Table 3** indicates that 60% of persons drive to work from the whole of the Sutherland Shire.

Table 4 indicates that 62% of persons drove to work in the Sutherland Shire as a whole while 75% drove to work in the vicinity of the station. This difference is largely explained by a greater number of persons working at home throughout the Shire.

The census statistics emphasise the importance of locating homes near the railway stations and public transport nodes. They also emphasise the relatively high use of private vehicles and the desirability of implementing Transit Orientated Development as a means of reducing the dependency within the Sutherland Shire.

Table 3: 2006 Census Journey to Work (from Shire)

Main Mode	Sutherland Shire Total	To Work Sutherland Council Depot TZ-766
Bicycle	0%	1%
Bus	0%	1%
Car as Driver	60%	60%
Car as Passenger	4%	5%
Did not go to work	12%	12%
Ferry	0%	0%
Motorbike/ scooter	0%	0%
Not stated	2%	1%
Taxi	0%	0%
Train	13%	12%
Tram	0%	0%
Truck	1%	2%
Walked only	2%	2%
Worked at home	4%	4%
Other	0%	0%
Total	**100%**	**100%**

Table 4: 2006 CENSUS JOURNEY TO WORK (to SHIRE)

Main Mode	Sutherland Shire Total	To Work Sutherland Council Depot TZ_766
Bicycle	1%	1%
Bus	1%	1%
Car as Driver	62%	75%
Car as Passenger	6%	6%
Did not go to work	14%	5%
Ferry	0%	0%
Motorbike/ scooter	0%	0%
Not stated	1%	1%
Taxi	0%	0%
Train	4%	2%
Tram	0%	0%
Truck	1%	3%
Walked only	4%	2%
Worked at home	7%	4%
Other	0%	0%
Total	**100%**	**100%**

5.1.1 Mode Share

To estimate indicative shopper travel modes for the centre, previous RTA surveys of shopper travel behaviours at Miranda and Kareela Shopping centres were compared and from this an estimate was made for the Woolooware proposal. This is provided in **Table 5.**

TABLE 5: COMPARATIVE SHOPPING CENTRE TRAVEL MODES

Mode	Miranda	Kareela	Woolooware Target
Car Drivers	69%	84%	75%
Car Passengers	5%	7%	10%
Walk	10%	9%	5%
Bus	6%	0%	5%
Dropped Off	N/A	N/A	1%
Bicycle	0%	0%	3%
Taxi	1%	0%	1%
Train	9%	0%	0%
Total	**100%**	**100%**	**100%**

As would be expected in Sutherland, most shopper visits would be made by car. However a significant number would be made by walking and public transport. It is therefore important to foster these modes.

6 PROPOSED PUBLIC TRANSPORT IMPROVEMENTS

As a result of a residential / retail DA prepared by the Sharks, public transport improvements have been considered. The DA proposal includes upgrading public transport services to the site, including adding several new indented bus bays along Captain Cook Drive. Ultimately indented bus bays will be located along the front of Toyota Stadium (5 x 12.5m buses), just west of Toyota Stadium (6 x 12.5m buses), east of Toyota Stadium (6 x 12.5m buses), and an indented bus bay on the southern side of Captain Cook Drive for at least 6 x 12.5m buses opposite Toyota Stadium.

Whilst a number of bus route options have been discussed with the Department of Transport and a private operator the applicant is steadfast in achieving the best possible outcome in terms of securing significantly improved public transport services for the site. The applicant has given a commitment to provide shuttle bus services as an interim (or supplementary) measure until a dedicated regular public bus service is realised.

Further, it should be noted that a dedicated regular public bus service would not be necessarily needed in the short term (3 to 5 years) as it will take time for the development to be constructed, during which time the Department of Transport and private operator (with assistance from the applicant) can undertake the necessary more detailed operational assessment.

6.1 Consultation with NSW Department of Transport

Meetings in May 2011 discussed various options of bus transport initiatives, and the options discussed are as follows.

Divert Route 477 past Sharks Development

Under this option the existing Route 477 will divert from Taren Point down to the Sharks development site, turn around within the Sharks site and then return to Miranda Station. See the image below for the possible new route (dotted path (**RED**) indicates proposed route 477 modification).

This option is not deemed desirable due to the inconvenience caused to existing patrons of the 477 route. Instead of the route travelling directly to Miranda Train Station and shopping district, it will instead be diverted **4.9km** to the Shark's site.

Divert Route 969 past Sharks Development

Under this option the existing Route 969 will divert from the Kingsway up Gannons Road, past the Sharks site and then rejoin the existing route on Sturt Road off Woolooware Road North before continuing on to Cronulla Station. See the image below for the possible new route (dotted path (**BROWN**) indicates proposed route 969 modification).

Create New Bus Route

The best option would be for a new route to be implemented. This is because diverting existing routes past the Sharks development would inconvenience existing customers.

Discussions have been held with the Dept. of Transport who have agreed "in-principle" with the provision of a new bus service that will operate between Miranda to Cronulla rail stations via The Kingsway, Caringbah Train Station, Gannons Road, Captain Cook Road and Elouera Road.

Indented bus bays will be provided along the northern side of Captain Cook Drive in front of the proposed retail and residential land parcels as well as an indented bay on the southern side opposite the retail parcel linked via the proposed traffic signals close to Toyota Stadium that serves the retail development.

Further, there has been a recent large residential subdivision approved at Kurnell, just east of Elouera Road, which is only serviced by 1 bus route which runs only once every hour. A new bus route could provide an additional service to this new subdivision at Kurnell as well as servicing the proposed Sharks development.

A possible route for this new service is shown in the diagram below (Blue Route).

Table 8 of this report shows that the total Friday PM peak hour traffic generation to the shopping centre component of the development is about 1,260 two way vehicles per hour.

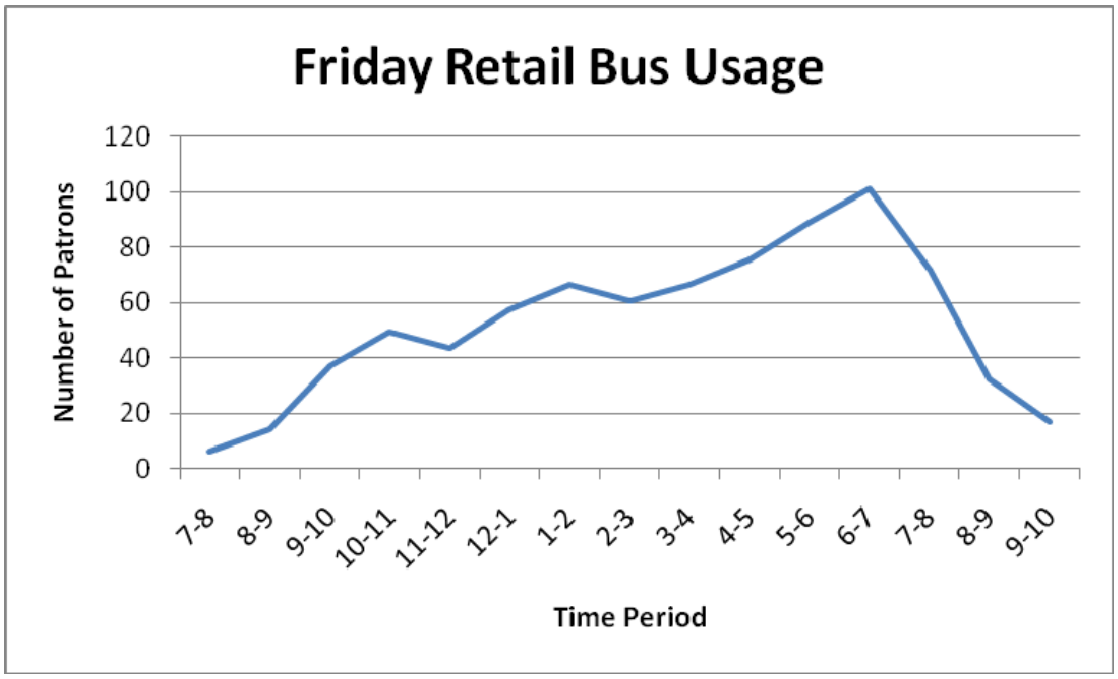
If it is assumed that 10% of visitors to the shopping centre will travel by bus, this results in 126 (say 150) bus passengers in the Friday PM peak hour.

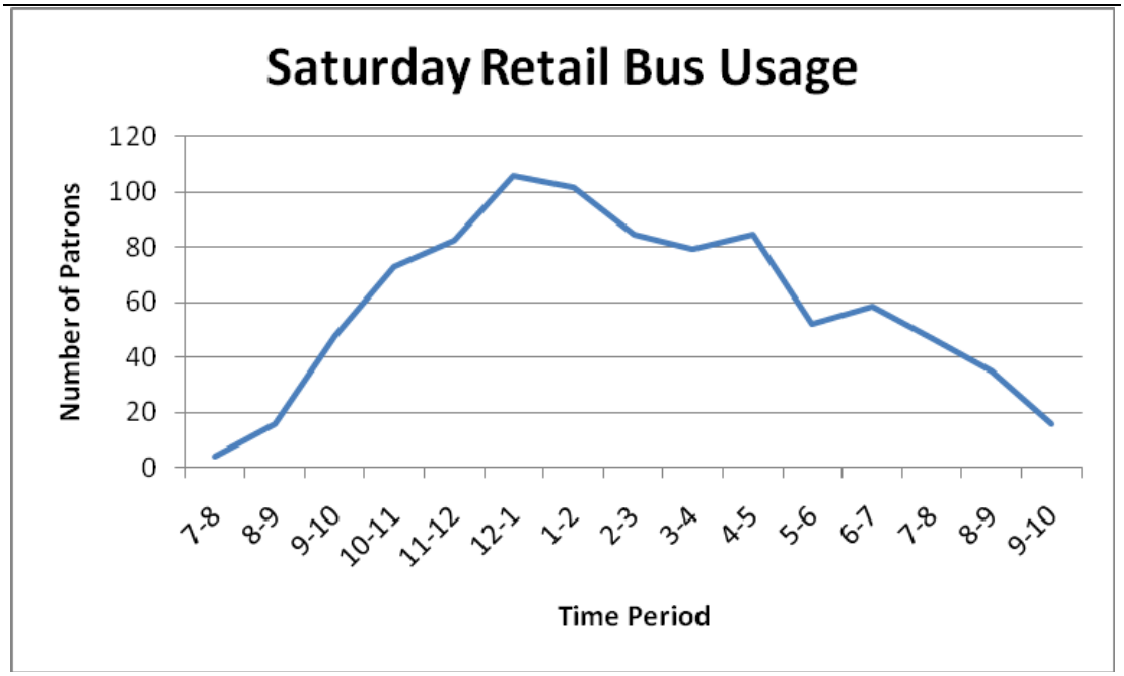
Table 9 of this report shows that the total Saturday Noon peak hour traffic generation to the shopping centre component of the development is about 1,323 two way vehicles per hour.

If it is again assumed that 10% of visitors to the shopping centre will travel by bus, this results in say 150 bus passengers in the Saturday Noon peak hour.

From this it can be seen that at least two (2) buses are needed per hour during peak times (i.e. 75 boarding; 75 departing with a bus capacity of 60 persons).

The number of people travelling to and from the retail component over a Friday and Saturday has been estimated based on daily traffic information surveyed at Kareela shopping centre based on peak hourly maximum patronage of 100 persons for ease of adjustment if demand increases to the levels expected above (i.e. 150 patrons at peak times). This information is provided in the following graphs.





7 PARKING & SERVICING REQUIREMENTS

7.1 Development Proposal

The proposal involves:

- Reduction in existing Club GFA from 8,500m^2 to 3,035m^2
- 597 Residential Units in total (comprising an assumed mix of 144 x 1 bed, 385 x 2 bed, 68 x 3 bed) plus small commercial area of 740m^2 GFA.
- 6,404m^2 GFA Supermarkets
- 1,096m^2 GFA Mini / Majors
- 5,572m^2 GFA Retail specialty stores
- 2,817m^2 GFA Medical
- 2,968m^2 GFA Leisure facilities
- 1,568 on-site parking spaces, comprising 851 spaces for the residential, 24 for the commercial office area on the residential land parcel and 693 car parking spaces for the club / retail / supermarket / leisure / medical component.
- Removal of existing roundabout at the intersection of Woolooware Road North / Captain Cook Drive and creation of new eastern set of traffic signals along the prolongation of Woolooware Road North. Retail existing service station / Fitness First access arrangements and provide additional access to the service station from the northern end of Woolooware Road.
- New traffic signal controlled access from Captain Cook Drive approximately 170m offset to the west of Woolooware Road roundabout intersection to serve the new club / retail development.

- Separate resident only signalised access onto Captain Cook Drive offset approximately 300m to the west of proposed new retail signalised intersection.

Notwithstanding the above changes that achieve a reduced development outcome that reduced scheme is indicative only. In terms of the retail/club component, approval is sought for the Concept Plan for the overall GFA proposed in the original submission (i.e. @26,500m^2), which is an upper limit. Accordingly, it should be noted that:

- The traffic generation and management proposed in the exhibited scheme is acceptable.
- The revisions to the indicative layout (retail component in particular) address issues associated with urban design and improved public access and movement. While these revisions have the effect of changing the retail mix and will produce traffic generation rates that are lower than those overall rates proposed in the exhibited Concept Plan, they are indicative plans only.
- Therefore approval is sought for the overall Concept Plan GFA (as exhibited) to maintain flexibility for the detailed design as part of the future detailed Project Application.

7.2 Car Parking Requirements

Parking requirements for the proposed development is shown in **Table 6**. The parking rates are based on the RTA's *"Guide to Traffic Generating Developments"*, as well as rates developed by *M^CLaren Traffic Engineering* based on surveys of existing sites.
It is noted that effects of peak spectator demands at the adjacent Toyota Stadium will be the subject of separate parking strategy that will incorporate parking within the Western Carpark as well as supplementary satellite parking locations with bus shuttle services to and from the football ground.

The following parking table includes the club's average maximum parking demand that was the subject of detailed patronage and parking surveys in 1995, which was accepted by Council in the previous Masterplan approval.

TABLE 6: PEAK PARKING DEMAND

COMPONENT	SCALE	PARKING RATE	PEAK PARKING DEMAND
Existing Club	8,500m^2	-	Average Max Demand 180
REDUCED Club	5,465m^2 SMALLER	pro rata (i.e. 180/8,500)	LESS 116
Residential	597 units total 144 x 1 bed 385 x 2 bed 68 x 3 bed	1 space / 1 bed 1.5 spaces / 2 bed 2 spaces / 3 bed 1 visitor / 4 units 1 car wash bay for first 30 then 1/20 bays	***1,007*** (includes 149 visitor spaces and assumes that 29 car wash bays will be shared with visitor spaces)
Commercial office on Residential land parcel	740m^2 GFA	1 space / 30 m^2	25
Supermarket	6,404m^2 GFA	1 space / 23.8 m^2	269
Mini / Major Retail	1,096m^2 GFA =	1 space / 25 m^2	44
Specialty Retail	5,572m^2 GFA =	1 space / 22.2 m^2	251
Medical	2.817m^2 GFA =	1 space / 111.1 m^2	25
Leisure*	2,968m^2 GFA	Ancillary*	Nil*
Allowance for dual use of supermarket / retail area by club patrons and residents (say about 10%)	-	-	LESS 56
TOTAL	**-**	**-**	**1,629**

Note: * Leisure uses within large shopping centres do not generate separate parking demand as they tend to trade off shoppers already within the centre. They typically exhibit low staff levels and attract children of adult shoppers.

The parking rates used for the retail and medical centre uses that appear in **Table 6** above are based upon the following extract from the RTA's Guide.

The parking provisions outlined above are based on aggregated retail categories. The relative parking demand characteristics of different floor area types can be seen in the following indicative model:

Peak Parking Demand = 24 A(S) + 40 A(F) + 42 A(SM) + 45 A(SS) + 9 A(OM) (per 1,000m^2).

where:

A(S):	Slow Trade GLFA, includes major Department stores such as David Jones and Grace Brothers, furniture, electrical and utility goods stores.
A(F):	Faster Trade GLFA, includes discount department stores such as K-Mart and Target, together with larger specialist stores such as Fosseys.
A(SM):	Supermarket GLFA, includes stores such as Franklins and large fruit markets.
A(SS):	Speciality Shops and Secondary retail GLFA, includes speciality shops and take-away stores such as McDonalds. These stores are grouped since they tend not be primary attractors to the centre.
A(OM):	Offices, medical GLFA.

The average maximum parking assessment is the appropriate method recommended by the RTA in the *"Guide to Traffic Generating Developments"*, which determines the demands associated with each facility within the club at the superimposed average maximum attendance period. The calculated average maximum demand of 180 spaces at 6:30pm has been extracted from detailed excel spreadsheets that were prepared on the basis of patronage and parking surveys previously conducted for the Club by *Planning Workshop Australia*.

It is evident from **Table 6** above that the peak parking demand prior to 7pm of the planned reduction in the size of the existing club and proposed development equates to 1,629 car parking spaces. In addition, 29 car wash bays are required within the residential component of the proposed development and these are assumed to be shared with the visitor spaces.

The parking rates for the residential component are quite high, and parking provided at this rate is unlikely to be used in practice. A lower rate is proposed in accordance with good Transit Oriented Development principles. A rate of 1 space per 1 bed and 2 bed dwellings, and 2 spaces per 3 bedroom dwelling is more appropriate for this development. Census data for the Sutherland Shire area shows that for residential apartments higher than 4 storeys confirms these proposed rates. Residential visitor parking spaces will be provided at a rate of 1 space / 8 units. An application of these rates is shown in **Table 7**.

TABLE 7: RESIDENTIAL SITE PARKING DEMAND

COMPONENT	SCALE	PARKING RATE	PEAK PARKING DEMAND
Residential	597 units total 144 x 1 bed 385 x 2 bed 68 x 3 bed	1 space / 1 bed 1 spaces / 2 bed 2 spaces / 3 bed 1 visitor space / 8 units	665 Plus 75 visitor spaces
TOTAL	**-**	**-**	**740**

Councils' rates require the residential development have 29 car wash bays. It is proposed that 29 residential visitor parking spaces be designed to have dual use as a car wash bay.

The development provides **883** (858 for residents and 25 are allocated to the small commercial office) car parking spaces for the residential component, which exceeds the proposed parking demand level of 740 spaces. The 75 visitor spaces will increase to 100 spaces with the inclusion of the 25 commercial spaces that will be available for use after office hours for visitors to residential units. Peak visitation to residential dwellings occurs after 6pm on Fridays & Saturdays when the office component will be closed. Thus the actual visitor parking provision of 100 spaces equates to 1 per 6 units which is higher that the 1 per 8 rate shown in **Table 7** above and this rate lies in between the rates specified in the RTA's *"Guide to Traffic Generating Developments"* (Oct 2002) for high density residential flat buildings in regional and sub-regional centres, as shown in the extract below.

5.4.3 High density residential flat buildings.

Definition.

A *high density residential flat building* refers to a building containing 20 or more dwellings. This does not include aged or disabled persons' housing. *High density residential flat buildings* are usually more than five levels, have basement level car parking and are located in close proximity to public transport services. The building may contain a component of commercial use.

Parking.

The recommended minimum number of off-street resident parking spaces is as follows:

Metropolitan Regional (CBD) Centres:

- 0.4 spaces per 1 bedroom unit.
- 0.7 spaces per 2 bedroom unit.
- 1.20 spaces per 3 bedroom unit.
- 1 space per 7 units (visitor parking).

Metropolitan Sub-Regional Centres:

- 0.6 spaces per 1 bedroom unit.
- 0.9 spaces per 2 bedroom unit.
- 1.40 spaces per 3 bedroom unit.
- 1 space per 5 units (visitor parking).

Metropolitan Regional Centres (Central Business District) provide high levels of local employment as well as access to rail and bus services and therefore may have less parking requirements.

The recommended minimum number of off-street visitor parking spaces is one space for every 5 to 7 dwellings. Councils may wish to reduce this requirement for buildings located in close proximity to public transport, or where short term unit leasing is expected.

The Council rates require 1,007 parking spaces, thus the proposed reduced rates that have been applied result in a difference of 267 spaces. The proposal provides a further 693 car parking spaces for the club / retail / supermarket component, which meets Council's requirement. Council requires 653 parking spaces (if the 10% dual use discount is not applied) for the non-residential site components of the development.

The majority of parking for the residential component is provided within a ground level car parking area under the proposed buildings, as well as 43 spaces on the ground level internal roads.

The proposed **693** non-residential site spaces will be allocated as follows:

- 129 spaces for shared club / medical / leisure
- 564 spaces for shared supermarkets / specialty / mini / major retail.

In regard to discouraging future residents from parking within the adjacent Solander Fields and Captain Cook Oval for their second vehicle if they only have one on-site carspace, the options to could include the installation of

parking restrictions, say a 4 hour limit after 6pm at night or the installation of gates to both of these sporting filed car parks with the building manager of the future residential coordinating the opening and closing of the gates.

7.3 Motorcycle Parking

Council's DCP suggests that one motorcycle space be provided per 25 non-residential car spaces. Council requires 653 non-residential car parking spaces, and hence 26 motorcycle parking spaces are required within the retail precinct. A further 1 motorbike space is needed for the office component within the residential precinct.

7.4 Bicycle Parking

Council's DCP gives the following bicycle parking rates in relation to this proposed development:

- 1 per 5 dwelling units plus 1 visitor space per 10 units (residential)
- 1 per 10 car parking spaces for first 200 car spaces, then 1 space per 20 parking spaces thereafter and 1 unisex shower per 10 employees. (commercial)

The proposal includes 597 units, and requires 653 non-residential car parking spaces within the retail precinct and a further 25 spaces for the office component within the residential precinct. As such bicycle storage facilities are required as follows:

- 119 for residents
- 60 for residential visitors
- 40 for the commercial component within the retail precinct
- 3 for the commercial component within the residential precinct

7.5 Servicing Provision

Under each residential tower there will be a dual loading dock for waste removal and furniture delivery / removal. Loading docks will be 7m wide x 9m long, for access by two MRV.

For the proposed retail component an adequate supply of loading docks are proposed for the scale of retail / retained club areas.

7.6 Car Park Guidance System

It is recommended that an electronic dynamic parking guidance system be installed to direct entering traffic within the retail / club car park to available parking spaces, which could be utilised on game days to assist directing cars to specially assigned internal game day parking spaces.

8 TRAFFIC IMPACT

8.1 Traffic Planning Principles

The traffic planning principles that underpin the design are as follows:

1. Relocation of the roundabout at the junction of Captain Cook Drive with Woolooware Road North to a position further east enables a more efficient site layout with respect to separating vehicular and pedestrian access for residential uses on the site from the higher traffic generating licensed club / retail uses on the site. This intersection will be upgraded to signals to allow greater capacity for vehicles and greater safety for pedestrians.

2. Establish main vehicular and pedestrian access to the club / retail components via a new traffic controlled intersection on Captain Cook Drive at a location approximately 170m west of the Captain Cook Drive / Woolooware Road North roundabout. This facilitates the best and safest means of pedestrian crossing of Captain Cook Drive during typical demands, and reduces the demand at the nearby roundabout intersection. This new signal intersection will be co-ordinated with the proposed Woolooware Road North signal intersection for improved performance.

3. Maintain service vehicle access south of the club for the club and to the NE (via Woolooware Road) for the retail component under a management plan.

4. Provide accessible path from Captain Cook Drive to the main Club entry.

5. Provide new signalised intersection access near existing pedestrian crossing signals across Captain Cook Drive, to allow access to / from proposed residential apartments. A separate entry / exit for the apartments will reduce the demand at other intersections, and provide safe and efficient pedestrian access across Captain Cook Drive. No right turn restriction will be in place for westbound vehicles wishing to turn into the site.

6. Relocate shared pedestrian / cycle path from western side of Solander Playing Fields car park to eastern side of the car park, to reduce conflict with pedestrians walking between parking spaces and Solander Playing Fields.

7. Provide additional bus bays for peak events at the Sharks site along northern side of Captain Cook Drive at available locations along the site's frontage as well as on the southern side opposite the football ground.

8. Provide on-site car parking areas in accordance with AS2890.1-2004 & AS2890.6-2009.

9. Provide on-site servicing areas in accordance with AS2890.2-2002.

See **Annexure B** for a concept plan of the proposed access arrangements and new intersection designs.

8.2 Traffic Generation

Notwithstanding the proposed changes that achieve a reduced development outcome that reduced scheme is indicative only. In terms of the retail/club component, approval is sought for the Concept Plan for the overall GFA proposed in the original submission (i.e. @26,500m^2), which is an upper limit. Accordingly, it should be noted that:

- The traffic generation and management proposed in the exhibited scheme is acceptable.
- The revisions to the indicative layout (retail component in particular) address issues associated with urban design and improved public access and movement. While these revisions have the effect of changing the retail mix and will produce traffic generation rates that are lower than those overall rates proposed in the exhibited Concept Plan, they are indicative plans only.
- Therefore approval is sought for the overall Concept Plan GFA (as exhibited) to maintain flexibility for the detailed design as part of the future detailed Project Application.

Traffic generation to and from the site during the Friday PM peak period has been calculated in **Table 8**, based on rates from the RTA *"Guide to Traffic Generating Developments"* and other rates developed by *M^CLaren Traffic Engineering* based on surveys at other sites.

TABLE 8: TRAFFIC GENERATION (FRIDAY PM)

COMPONENT	SCALE	PEAK HOUR TRAFFIC GENERATION RATE	PEAK HOUR TRAFFIC GENERATION
Existing Club	8,500m^2	(survey)	**168**
REDUCED Club	5,465m^2 SMALLER	pro rata (i.e. 168/8,500)	**LESS 108, but say 60**
Residential	597 units	0.29 / unit	**173**
Commercial office on Residential land parcel	740m^2 GFA	2 / 100 m^2	**15**
Supermarket	6,404m^2	14.1 / 100m^2 GLFA *	**903**
Mini / Major Retail	1,096m^2	2.4 / 100m^2 GLFA *	**26**
Specialty Retail	5,572m^2	5.7 / 100m^2 GLFA *	**318**
Medical	2,817m^2	0.5 / 100m^2 GLFA *	**14**
Leisure	2,968m^2 GFA	Ancillary	**-**
SUBTOTAL	-	-	**1,557**
Allowance for dual use of supermarket / retail area by club patrons and residents (say 10%)	-	**-**	**LESS 125**
TOTAL	**-**	**-**	**1,432**

** Generation rates are based upon RTA's "Guide to Traffic Generating Developments" (Oct 2002) and increased by 2.5% to take into account the higher car ownership levels in Sutherland LGA compared to the Sydney average..*

It can be seen from **Table 8** that the TOTAL two way Friday PM peak hour traffic generation will be 1,432 vehicles per hour, which is **12% LOWER** than the level of traffic generation previously assessed in the September 2011 TMAP. It is noted that this volume of vehicles will be separated into three main access intersections to reduce the impact on the existing road network.

Beyond the immediate driveways a discount of 20% applies to the retail traffic generation for *"linked & multi-purpose trips"*, based upon Section 3.6.1 of the RTA's *"Guide to Traffic Generating Developments"*.

Thus the external additional traffic generation reduces to some **1,015** additional vehicle trips (559 in; 456 out) beyond the immediate influence of the driveways serving the on-site parking provision for the Friday evening period (i.e. (0.8x1,247)+14-125-60[retail centre])= 827 plus 188 residential precinct = 1,015).

Traffic generation to and from the site during the Saturday noon peak period has been calculated in **Table 9** (on the following page), based on rates from the RTA *"Guide to Traffic Generating Developments"* and other rates developed by *McLaren Traffic Engineering* based on surveys at other sites.

A reduction for some of the developments and increase for others has been adopted for the Saturday peak based on the Friday peak traffic generation. See the notes under the table for details.

TABLE 9: TRAFFIC GENERATION (SATURDAY NOON)

COMPONENT	SCALE	PEAK HOUR TRAFFIC GENERATION RATE	PEAK HOUR TRAFFIC GENERATION
Existing Club	8,500m^2	(survey)[1]	**100**
REDUCED Club	5,465m^2 SMALLER	pro rata (i.e. 100/8,500)	**LESS 64, but say 30**
Residential	597 units	25% x 0.29 / unit [2]	**43**
Commercial office on Residential land parcel	740m^2 GFA	Negligible	**0**
Supermarket	6,404m^2	14.8 / 100m^2 GLFA [3]	**948**
Mini / Major Retail	1,096m^2	2.5 / 100m^2 GLFA [3]	**27**
Specialty Retail	5,572m^2	6 / 100m^2 GLFA [3]	**334**
Medical	2,817m^2	0.5 / 100m^2 GLFA [3]	**14**
Leisure	2,968m^2 GFA	Ancillary	**-**
SUBTOTAL	-	-	**1,436**
Allowance for dual use of supermarket / retail area by club patrons and residents (say 10%)	-	**-**	**LESS 131**
TOTAL	**-**	**-**	**1,305**

Notes:

1. *Total Saturday noon two-way peak hour traffic based on count conducted on Saturday 1st April 2011.*
2. *Assumes Saturday noon peak traffic generation for the residential component is 25% of the Friday PM peak traffic. Residents are more likely to leave the site earlier in the day and return later in the day.*
3. *Surveys conducted by the RTA indicate that the Saturday peak at shopping centres is 105% of the Friday PM peak traffic generation. Includes 2.5% factor to take into account the higher car ownership levels in Sutherland LGA compared to the Sydney average*

It can be seen from **Table 9** that the TOTAL two way Saturday noon peak hour traffic generation will be 1,305 vehicles per hour, which is **13% LOWER** than the level of traffic generation previously assessed in the September 2011

TMAP. It is noted that this volume of vehicles will be separated into three main access intersections to reduce the impact on the existing road network.

Beyond the immediate driveways a discount of 20% applies to the retail traffic generation for *"linked & multi-purpose trips"*, based upon Section 3.6.1 of the RTA's *"Guide to Traffic Generating Developments"*.

Thus the external additional traffic generation reduces to some **943** additional vehicle trips (472 in; 471 out) beyond the immediate influence of the driveways serving the on-site parking provision for the Saturday noon period (i.e. (0.8x1,309)+14-131-30[retail centre])= 900 plus 43 residential precinct = 943).

8.3 Traffic Assignment

The following traffic assignment has been applied on the basis of the economic impact assessment and journey to work data:

- West of Boulevard / Taren Pt Rd: 40% of residential, 6% of retail
- North of Boulevard / Taren Pt Rd: 40% of residential, 6% of retail
- West of Gannons Rd Roundabout: 80% of residential, 12% of retail
- South of Gannons Rd Roundabout (along Gannons Rd): 10% of residential, 16% of retail
- Between Gannons Rd Roundabout & New Res. Signals: 95% of residential, 28% of retail
- Between New Res. Signals 7 New Retail Signals: 10% of residential, 28% of retail
- Between New Retail Signals & Woolooware Rd / Capt Cook Drive: 10% of residential, 0% of retail
- East of Woolooware Rd / Capt Cook Drive: 44% of retail
- East of Elouera Roundabout (Kurnell): 18% of retail
- South of Elouera Roundabout: 26% of retail
- South along Woolooware Road: 10% of residential, 30% of retail

8.4 Intersection Performances

The performances of nearby key intersections have been analysed using SIDRA intersection Version 5.1. The result of the analysis is shown in **Table 10**, which compares the existing performance to the future performance. The future traffic volumes includes existing traffic volumes, additional volumes due to the full extent of the proposed Sharks development, as well as estimated traffic due to the large new subdivision at Kurnell which has been recently approved. The September 2011 SIDRA assessment is retained as the reduced 12% to 13% of traffic arising from **Tables 8 & 9** above will result in an improvement to nearby key intersections to that reported in September 2011.

It is noted that the Department of Planning & Infrastructure sought to obtain traffic generation estimates and associated impacts during the weekday AM peak. Our response to this request is that the weekday AM commuter peak hour period from 8am to 9am is not the peak traffic generation period for the proposed development and it is not usual practice to undertake assessment at non-peak times of development proposal.

Further, the combined traffic generation levels of the proposed retail / recreational / medical / modified club / residential project is on Friday evenings & Saturdays lunchtimes. While the proposed residential component would

generate a peak load during the weekday 8-9am period the retail / club / medical centre / recreational uses generate very low levels during that period.

The retail traffic generation during the 8-9AM peak is much lower than the PM peak assessed being at least 50% to 60% lower. Clubs and recreational uses generate little or no traffic during the 8-9am peak hour period and medical centres tend to generate only staff activity at that time.

The future analysis assumes that Captain Cook Drive will be upgraded to a four lane road east of the Captain Cook Drive / Woolooware Road North intersection. This upgrade will be necessary due to the significant increase in traffic to / from the east due to the significant new residential subdivision development and industrial developments at Kurnell. The future assessment is done based on the proposed signalised intersection at Captain Cook Drive and Woolooware Road North.

The future analysis includes three proposed new signalised accesses to the site, one for the residential component and the other two for the commercial / club component, the eastern most new traffic signals being the relocated & upgraded Captain Cook Drive / Woolooware Road North intersection. The two retail signal access points will have their cycle times co-ordinated for greater efficiency.

TABLE 10: COMPARISON OF INTERSECTION PERFORMANCES

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (s/veh)	Level of Service[3]	Control Type
EXISTING PERFORMANCE					
Captain Cook Drive / Gannons Road	**FRI PM**	1.49	**>70** (>70)	**F** Worst: F	Roundabout
	SAT NOON	0.75	**12.0** (17.7)	**A** Worst: B	
Captain Cook Drive / Woolooware Road North	**FRI PM**	0.77	**8.3** (22.2)	**A** Worst: B	Roundabout
	SAT NOON	0.53	**8.2** (15.2)	**A** Worst: B	
Captain Cook Drive / Elouera Road	**FRI PM**	0.71	**10.9** (13.6)	**A** Worst: A	Roundabout
	SAT NOON	0.29	**7.5** (11.1)	**A** Worst: A	
Gannons Road / Kingsway	**FRI PM**	1.00	**54.4**	**D**	Signals
	SAT NOON	1.19	**64.8**	**E**	
Gannons Road / Denman Avenue	**FRI PM**	0.86	**19.9**	**B**	Signals
	SAT NOON	1.05	**32.9**	**C**	
Captain Cook Dr / Boulevard / Taren Pt Rd	**FRI PM**	1.08	**>70**	**F**	Signals
	SAT NOON	1.00	**>70**	**F**	
FUTURE PERFORMANCE					
Captain Cook Drive / Gannons Road	**FRI PM**	1.88	**>70** (>70)	**F** Worst: F	Roundabout
	SAT NOON	0.94	**21.5** (38.8)	**B** Worst: C	
Captain Cook Drive / Woolooware Road North	**FRI PM**	0.78	**16.1**	**B**	Proposed Upgrade to Signals
	SAT NOON	0.51	**16.2**	**B**	
Captain Cook Drive / Elouera Road	**FRI PM**	0.81	**11.7** (17.3)	**A** Worst: B	Roundabout
	SAT NOON	0.42	**7.7** (11.5)	**A** Worst: A	
Gannons Road / Kingsway	**FRI PM**	1.00	**57.8**	**E**	Signals
	SAT NOON	1.23	**>70**	**F**	
Gannons Road / Denman Avenue	**FRI PM**	0.87	**20.5**	**B**	Signals
	SAT NOON	1.11	**55.8**	**D**	
Captain Cook Dr / Boulevard / Taren Pt Rd	**FRI PM**	1.23	**>70**	**F**	Signals
	SAT NOON	1.02	**>70**	**F**	
Captain Cook Drive / New Residential Access	**FRI PM**	0.75	**2.5**	**A**	Proposed New Signals
	SAT NOON	0.74	**1.8**	**A**	
Captain Cook Dr / New Retail Access	**FRI PM**	0.84	**9.4**	**A**	Proposed New Signals
	SAT NOON	0.84	**11.2**	**A**	

Notes :

1. Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

2. Average delay is the average delay experience by all movements. The average delay for the worst movement is shown in brackets for stop, give way and roundabout intersections.
3. Level of Service is a qualitative measure of performance describing operational conditions. The overall Level of Service is shown in bold, with the Level of Service for the most disadvantaged movement shown in brackets.

It can be seen that the two proposed "T" junction signalised access points to the site will both operate at a level of service A during both peak periods.

The proposed upgrade from roundabout to signals at the intersection of Captain Cook Drive and Woolooware Road North will operate at a level of service A and B during the Friday PM and Saturday Noon peak periods respectively. This is an acceptable level of service.

All other intersections will retain satisfactory LoS with the proposed development impacts, or are already currently operating at a poor LoS with existing traffic volumes. In particular:

- Captain Cook Drive / Gannons Road roundabout will drop from a LoS A to B during the Saturday peak, however a LoS B is acceptable operation during a peak traffic hour. LoS F will be maintained during the Friday PM peak hour.

- Gannons Road / Kingsway signals will drop from a LoS E to F during the Saturday peak. This intersection's current performance is already at an unacceptable level, and the proposed development will only add a very small additional number of vehicles to it as it is 1.5km away from the proposed development site and the traffic assignment along Gannons Road attributed to this development (based upon the retail assessment) is 10% of the residential and 16% of the retail. During the Friday PM peak period this intersection operates at a LoS D and will marginally drop to LoS E.

- Captain Cook Drive / Taren Point Road signals currently performs at a poor LoS F condition during both the Friday PM commuter peak hour and during the Saturday noon peak and will continue to operate poorly with the effects of the proposed development.

It is noted that this assessment recommends the upgrade of the Woolooware Road North roundabout to signals. This will result in a significant improvement in performance. SIDRA shows that, even with the new development plus the new Kurnell subdivision, this intersection will actually IMPROVE in performance if it is upgraded to a signalised intersection. In addition, further improvement in performance may be seen along this part of Captain Cook Drive, as the proposed closely spaced signalised intersections will have their phasings linked, resulting in a performance benefit. To this end, a separate co-ordinated or linked SCATES analysis was conducted for the two proposed traffic lights serving the retail side of the club with the resulting analysis identifying Level of Service "A" condition for a 105 second cycle time. Refer to **Annexure C** for output results.

Signals at this location will also increase the safety for pedestrians, as currently pedestrians are required to dangerously dart between vehicles approaching the roundabout. With a signalised intersection all movements will

have signalised pedestrian crossings across them. This will improve the safety of nearby residents, school students at Woolooware High School, and users of the proposed shopping centre.

8.5 Improved Pedestrian Safety

Currently pedestrian safety across Captain Cook Drive is a significant concern. There is no facility to assist pedestrians crossing this road east of the site, and pedestrians wishing cross near Woolooware Road North roundabout have to dash between cars across four lanes of traffic, which is quite dangerous. During game day events there is a significant volume of pedestrians wishing to cross Captain Cook Drive on their way to the stadium. The new signalised access points will provide signalised pedestrian crossings, greatly improving pedestrian access and safety.

The additional indented bus bays will minimise conflicts between vehicles and pedestrians needing to cross Captain Cook Drive, as spectators will be able to be dropped off by buses in front of or near the stadium.

To improve pedestrian safety across Gannons Road near the roundabout, the RTA has suggested that a signalised pedestrian crossing be constructed across Gannons Road south of the roundabout. The pedestrian paths will need to be diverted to this crossing and a fence installed to encourage pedestrians to safely cross Gannons Road at the pedestrian lights.

8.6 Residential Amenity

In terms of residential amenity consideration, it is evident that Woolooware Road North currently accommodates peak hour volumes in excess of the maximum level set by the RTA. However, it must be stressed that these limiting values (developed by the RTA) are for roads purely within residential precincts, typical of the new estates being planned in new urban release areas.

Woolooware Road North provides access to a nearby rail station and abuts a recreational area. Thus RTA limiting values should not be strictly applied in this instance, but gives a guide as to when existing roads may require some form of treatment (either directly or indirectly).

9 RESPONSE TO MATTERS RAISED BY RTA ON 29 JUNE 2011

9.1 Kurnell Development Potential

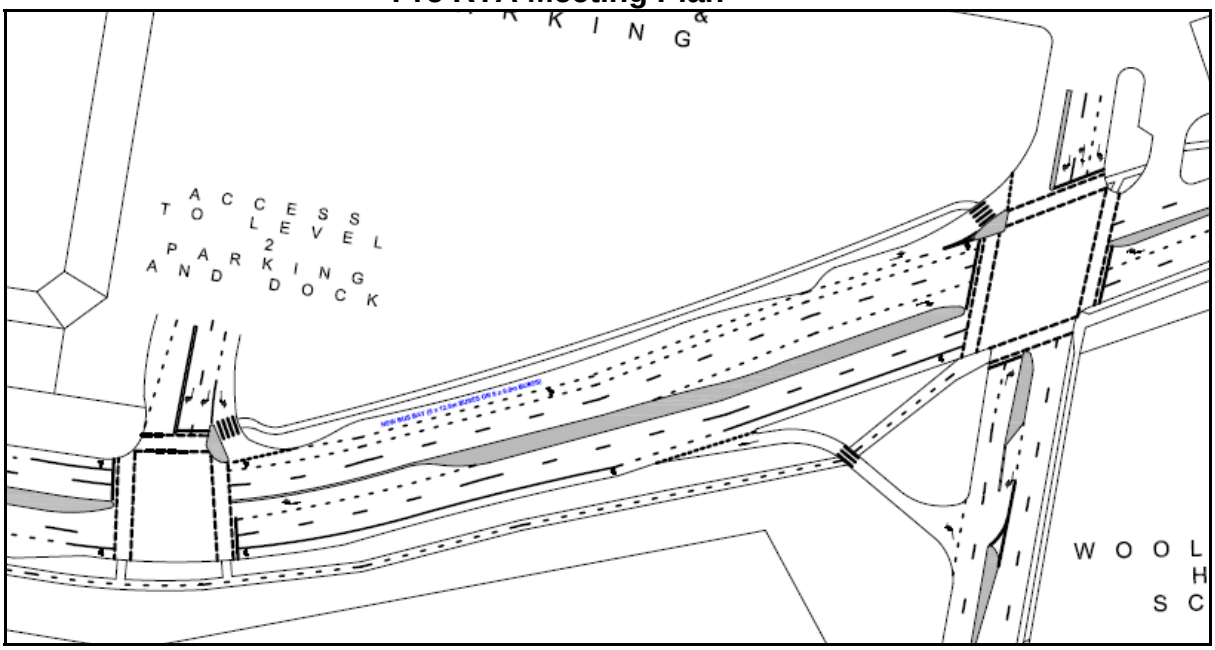
In order to assess the future performance of the key intersections surrounding the development site, additional volumes have been added in to account for growth. A total of 383 additional vehicles per peak hour have been added along Captain Cook Drive to account for future growth in the Kurnell / Cronulla area, which includes the newly approved residential subdivision at Kurnell. A conservative assumption has been adopted that 100% of this future traffic volume will travel along Captain Cook Drive and continue west past the development site.

MTE has been in contact with relevant authorities in regards to supplying a new bus service to allow retail and residential visitors easier access to other metropolitan and public transport hubs. However no discount in traffic generation has been adopted for this new bus service, beyond an hourly service. The Kareela Shopping Centre comparison used as a basis for traffic generation for the subject retail centre had an hourly bus service at the time when the RTA research identified its traffic generation rate. Thus any increase in peak hourly bus frequency for the proposed service that will operate along Captain Cook Drive serving the site is likely to further reduce car dependence and peak hourly private vehicle trip rates. Investigations on the trip rate reduction for 2 or 3 bus services per hour at peak times can be undertaken if requested.

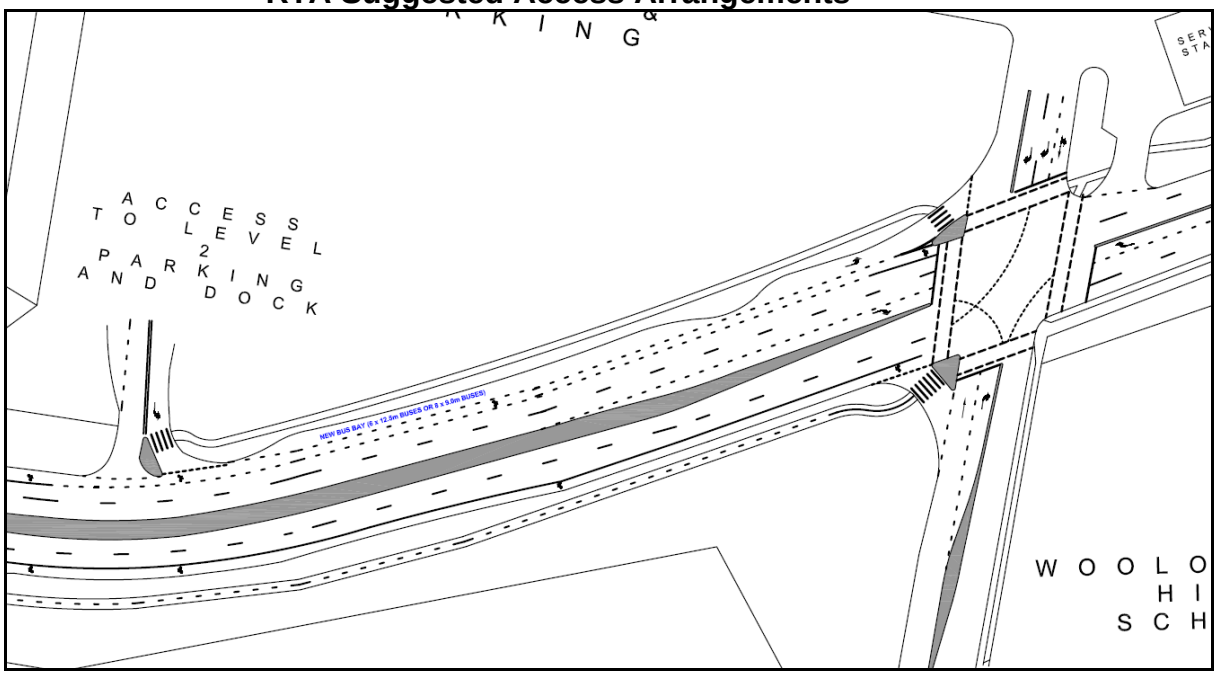
9.2 Single Retail Signals

The RTA suggested that the proposed two retail signal access points be combined into one signal access point at the junction of Captain Cook Drive and Woolooware Road North, with a supplementary left in / left out only access point west of this intersection. The single signal control mode was requested by the RTA to be investigated under a double diamond phase.

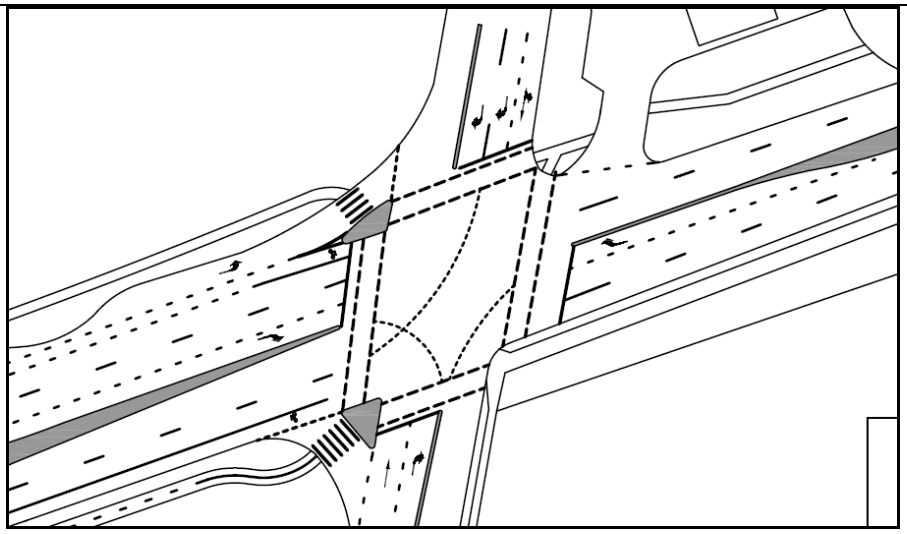
Pre RTA Meeting Plan



RTA Suggested Access Arrangements



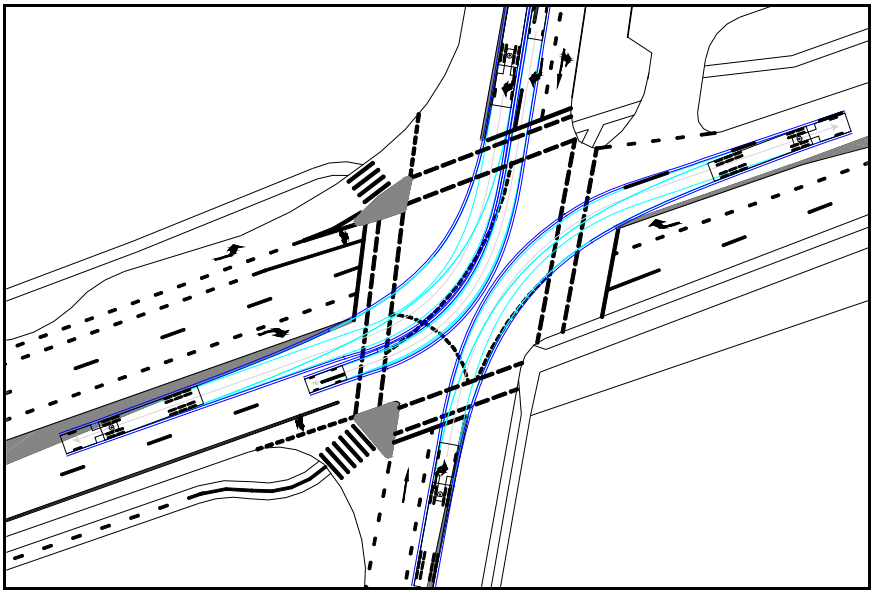
The results of the SIDRA assessment for the single retail traffic signals, assessed using dual right turn bays out of site was found to generate significant queuing within the retail car park for the EXIT load of traffic. This option was extensively assessed and is deemed INAPPROPRIATE for implementation by *M^CLaren Traffic Engineering*.



The detailed assessment found as follows:

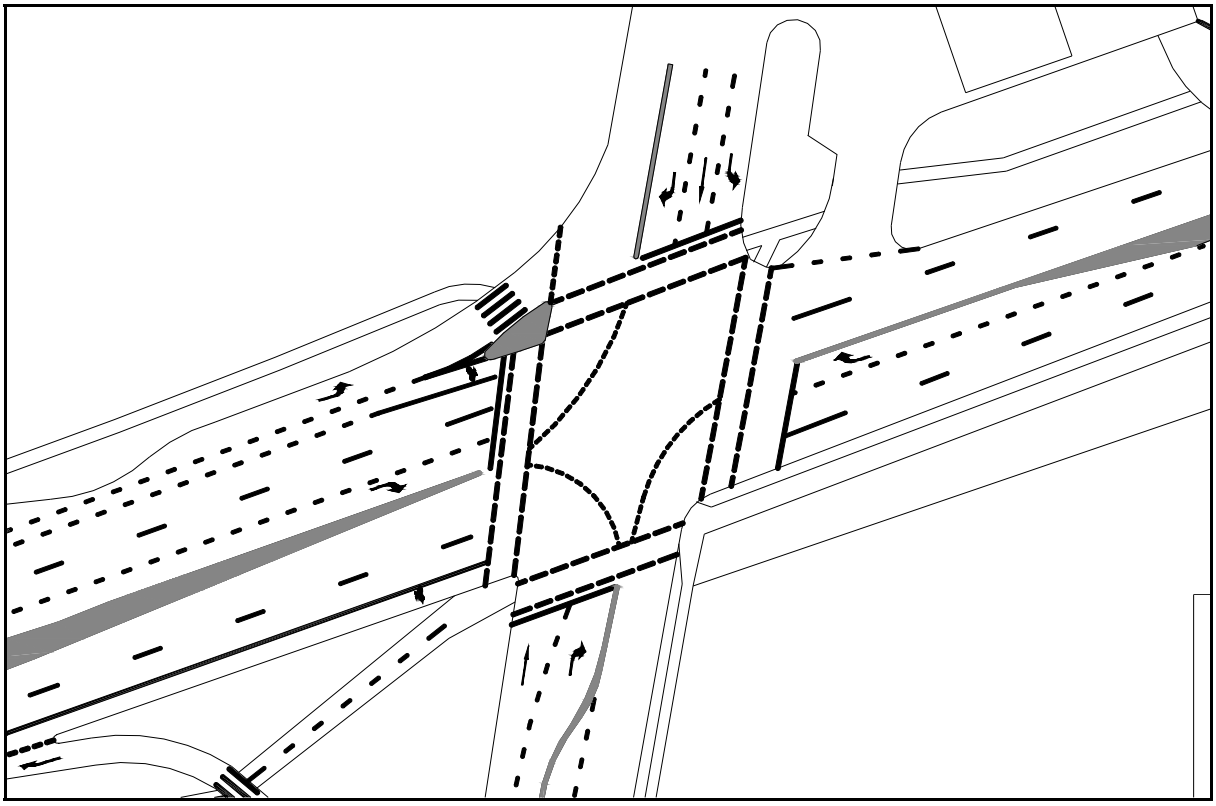
1. Firstly the volumes of traffic turning right out of the retail development do not warrant dual right turn bays, even though the right turn out of the second access point is banned. Traffic split assumptions have been made by MTE based on economic catchment data. The peak hour right turn volumes are 232 and 180 veh/h during the Friday PM and Saturday noon peaks respectively, with only one signal intersection at the retail development.

2. Secondly a dual right turn intersection under D0D0 phasing requires a larger intersection to accommodate the dual right turn swept paths opposed by a the right turn swept path from Woolooware Road North with 2.0m distance in between the opposing turns. Captain Cook Drive and Woolooware Road North are not perpendicular to each other, and require significantly more significant treatment than usual in order to accommodate these movements safely.



3. Finally, there is only enough room for three exit lanes out of the site at Woolooware Road North. If two of these were to be for the dual right turn bays, this would leave only 1 lane for combined through/left movements. This would then effectively *double* queue lengths back into the site. With the right, through and left movements all in separate lanes the maximum queue length back into the site during the critical Friday PM peak period is approximately 50m (under D0C0 operation), which is manageable. However if a dual right turn arrangement were to be adopted with D0D0 operation the maximum queue length, caused by the combined left/through lane, will be over **150m**, which is unmanageable and will cause significant chaos and congestion in the parking areas of the proposed development.

It can be seen that having dual right turn bays out of the development is not appropriate and will result in unnecessary additional treatment at the proposed signalised intersection. A more appropriate design is shown in the following image, with separate turn bays for the right, through and left movements. This results in shorter queues back into the site.



Assessment using D0D0 phasing

The RTA suggests that D0D0 phase convention be investigated at the Woolooware Road North intersection. A comparison of delay using D0D0 and other phase conventions is shown in the following table. The assessment using D0C0 assumes only 1 right turn lane out of the site. The comparison is done for the critical Friday PM peak period.

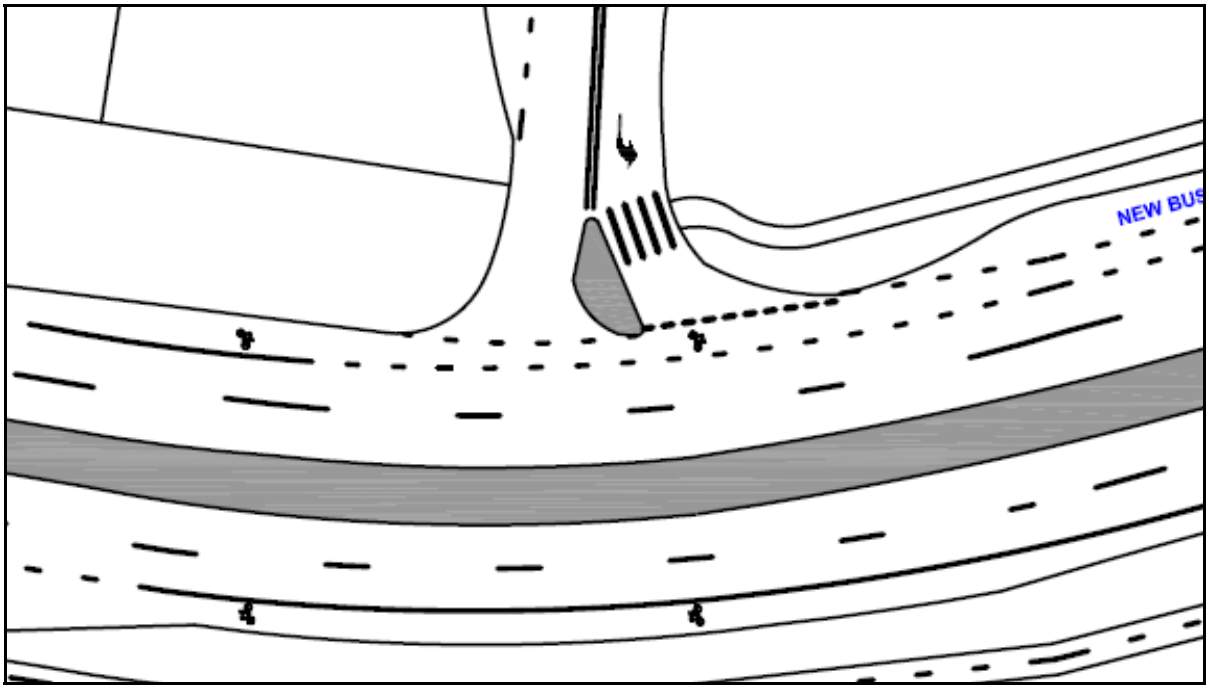
Phase	Average Delay (sec/veh)	Level of Service
D0D0	23.5	B
D0C0	16.1	B
D0S0	39.2	C

It can be seen that the best phase convention to use is D0C0. D0D0 is not necessary as the right turn volumes in and out of the site are not significantly higher than other turn movements, even if all right turn volumes were combined into this one intersection at Woolooware Road North.

In summary it can be seen that the best treatment option for the signalised intersection at Woolooware Road North is to have a single right turn bay out of the site, using a D0C0 phase system. The second retail signals is also necessary to assist in managing traffic conditions and variations in traffic demand particularly for Christmas trade period and if further growth occurs within the Kurnell peninsula beyond the growth adopted in this report.

9.3 Western Retail Access to be Left In / Left Out

The RTA suggestion of having only 1 retail signalised intersection would result in the second intersection being retained as a left in / left out intersection on Captain Cook Drive, with the concrete median preventing right turn movements.



Overall this intersection will perform at a LoS A, due to the large volume of through movement vehicles that experience no delay, and as such the overall delay / LoS at this intersection is not a good indicator of its performance. The average delay of the left turn vehicles turning onto Captain Cook Drive will be 18.0 and 13.5 sec/h during the Friday PM and Saturday noon peak periods

respectively. Hence, this intersection option will operate at an acceptable level of delay.

There is a concern for pedestrian safety crossing this intersection without signals, particularly during game times. During game events at Toyota Park there will be a very large number of pedestrians walking across this intersection on the way to the stadium, as it is the main access route for spectators parked east of the stadium or at Woolooware High School. During games the retail / supermarket developments will continue to operate and continue to draw traffic. A significant portion of this traffic will turn left into this give way intersection, conflicting with the large volume of pedestrians crossing. As the pedestrians will not have a zebra or signalised crossing to protect them this could be a safety issue, especially as vehicles are arriving at an approach speed of up to 70km/h off Captain Cook Drive.

9.4 Gannons Rd Roundabout versus Signals

The RTA suggests that Gannons Road roundabout requires an upgrade to signals. It is noted that this upgrade to signals is needed regardless of this development, as it currently operates at a LoS F during the PM peak period which represents an unsatisfactory performance. As such it is not deemed to be the responsibility of this development to fund the upgrade of this intersection, if it is needed in any event and in view of recent approvals for residential commercial activity within the Kurnell peninsula. However an investigation into the advantage of upgrading the roundabout to signals has been undertaken. The following table compares the future performance of roundabouts and signals at this intersection, with the development traffic and traffic from the new Kurnell subdivision added in.

Intersection	Peak	Average Delay (sec/veh)	Level of Service
Existing roundabout design	Friday PM	304.1	F
	Saturday Noon	21.5	B
Possible signals	Friday PM	43.5	D
	Saturday Noon	30.2	C

It can be seen that if the intersection were upgraded to signals the Friday PM peak period would be improved from LoS F to LoS D. However it is noted that the significant delay currently experienced on a Friday PM **IS NOT** due to traffic to/from this future development. The reason this intersection performs poorly during the weekday PM is because there is a significant volume of vehicles turning right at the roundabout from the west along Captain Cook Drive. Any vehicles travelling from the east then have to give way to all of these vehicles turning right, resulting in a delay of over **804.6** seconds by these westbound vehicles alone.

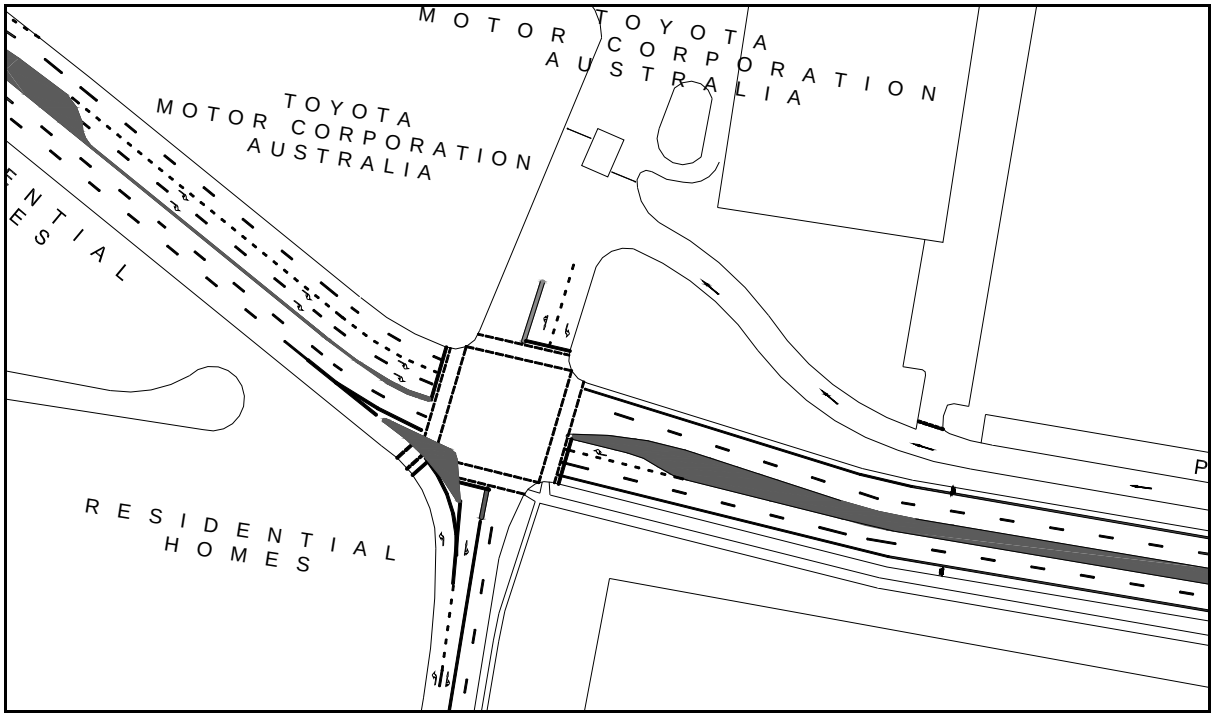
The problem extends further when one considers the STATE road network in the area and the fact that Gannons Road is effectively accommodating large

traffic volumes that bypass the Kingsway through the Caringbah shopping centre in both directions of travel during the commuter peak hour period.

Without this large right turn volume of traffic at the roundabout, the roundabout would operate at a more acceptable level of service, as is seen by its LoS C operation during the Saturday PM peak period. Indeed the LoS will **drop** for periods other than the PM commuter peak period if signals are installed, as outside of the PM peak period the roundabout design operates better than signals. This is shown by the Saturday noon SIDRA test; using a roundabout the operation will be LoS B, using signals the operation will be LoS C with almost double the amount of average delay.

As such it is not the responsibility of this development to fund an upgrade of this intersection, as the traffic from this development is not what is causing the significant delay at the roundabout. The poor operation of this roundabout is due to a larger network problem where vehicles are diverting through Woolooware to avoid significant delays at other intersections through Caringbah.

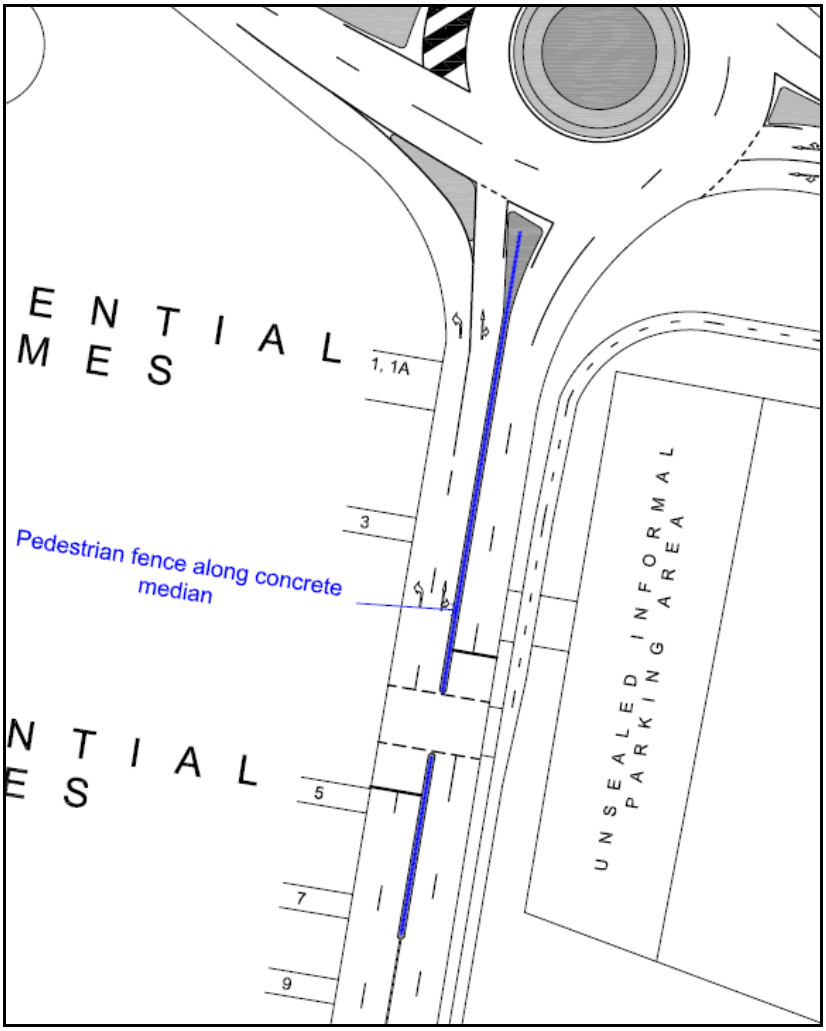
Signals at this intersection will need to include dual right turn bays from Captain Cook Drive west, at least 100m long each (determined from SIDRA assessments). The roadway would need to be widened to accommodate these dual right turn bays.



Overall it can be seen that it is not desirable to upgrade Gannons Road roundabout to signals, which should certainly not be funded by this development. The most desirable option is to keep the roundabout design, which operates better than signals outside of the PM commuter peak period, and for Council/RTA to implement other works to encourage commuters to use alternative routes along the main roads through the Sutherland Shire rather than bypassing through Woolooware.

The issue of pedestrian safety across Gannons Road was also raised by the RTA. A shared path is provided along the southern side of Captain Cook drive, with no pedestrian or bicycle path along the northern side. As such the issue of pedestrian safety can be addressed by providing a signalised pedestrian crossing across Gannons Road south of the roundabout.

Under this option, a pedestrian fence should be provided along a concrete median connecting the roundabout to the pedestrian signals to prevent pedestrians from dashing across Gannons Road in between traffic. A SIDRA assessment of the proposed pedestrian crossing has been undertaken and shows that the worst case condition, with all future traffic from the DA as well as the future Kurnell subdivision included, will result in a 57m queue length back from the pedestrian signals during the critical peak PM peak period. As such the stop line at the crossing should be at least 60m offset from the roundabout to avoid queuing back into the roundabout. The shared cycle path will be diverted down Gannons Road to meet the crossing, as shown in the following image.



This option is much more economical, and will result in the intersection performing better than signals outside of the commuter PM peak period, while addressing pedestrian safety issues.

9.5 Solander Service Road

The RTA requested that Sutherland Shire Council advise whether the Solander service road is a public or private road. At this point in time no response has been received from Sutherland Shire Council.

9.6 SCATES Assessment

Further improvement in performance may be seen along the Captain Cook Drive retail frontage as the proposed closely spaced signalised intersections will have their phasings linked, resulting in a performance benefit. To this end, a separate co-ordinated or linked SCATES analysis was conducted for the two proposed traffic lights serving the retail side of the club with the resulting analysis identifying Level of Service "A" condition for a 105 second cycle time. Refer to **Annexure C** for output results.
The SCATES assessment undertaken for the coordinated performance of the proposed two signalised intersections that serves the retail part of the development is summarised in the table below.

These two intersections will be 170m apart. The T junction to the west will operate under T4 phase arrangement with a left turn slip lane out of the site.

The proposed signals at Woolooware Road North / Captain Cook Drive have been assessed using D0C0 convention, as SIDRA showed that this phase operation is the best option. The proposed signals at Woolooware Road North have a left turn slip lane into the site from Captain Cook Drive west and a left turn slip lane from Woolooware Road North. The coordinated performance of the signals from SCATES is provided in the following table for a cycle time of 105 seconds.

Peak Period	Degree of Saturation	Average Delay (sec/veh)	Level of Service
Friday PM	0.71	7	A
Saturday Noon	50	7	A

It can be seen that under coordinated operation, the two signals operate at a very good Level of Service, and there is no issue in terms of delay or congestion with having the two signalised intersections for the retail component of the development 170m apart.

The RTA (now RMS) Network Operations department has raised no issue with the proposed two sets of signalised intersections serving the retail component of the master plan within recent March 2012 advice.

10 GAME DAY TRAFFIC MANAGEMENT

Refer to separate report dated September 2011.

The further qualification to the Game Day Traffic & Parking Management strategy is that the western playing fields will be available for game day parking in the short term (3 to 5 years) as the proposed residential development will be staged and follow the retail construction.

The *Game Day Satellite Parking Plan* makes clear that both the existing game day parking and traffic issues and the loss of on-site parking as a result of the Concept Plan scheme are capable of being appropriately managed in order to achieve a superior outcome for local residents and patrons of Toyota Stadium. This Concept Plan does not permit the carrying out of any works, and there will be no changes to existing on-site parking arrangements until the relevant development consent and construction certificate are issued. In light of this, the proponent will continue to refine and formalise game day arrangements within the framework of the *Game Day Satellite Parking Plan* in consultation with the Department, Council and the local community, with a final plan and the appropriate agreements to be in place prior to the issuing of any future construction certificate.

It should be noted that the overall redevelopment of the site is expected to occur in a number of stages over a period of several years as detailed in the Environmental Assessment Report, and that there will be opportunities to provide interim on-site arrangements which allow for an orderly transition from the present situation to the measures proposed under the *Game Day Satellite Parking Plan*. The staging of the project's construction will provide a substantial transitional period in which defined areas of the site will be gradually closed for game day parking over several years. This transitional period will ensure that visitors to Toyota Stadium have sufficient time to change their transport behaviours and adapt to the new transport arrangements for the site.

11 INTERNAL ACCESS, CIRCULATION & PARKING / SERVICING DESIGN

The on-site access and circulation for vehicles associated with the development will comply with the following principles:

- The loading dock adjacent to the southern edge of the Club, with separate access from Captain Cook Drive via the new traffic signals. Service vehicle loading dock access to the retail component via the northern extension of Woolooware Road North, whilst retaining access to the existing service station and Fitness First premises.
- Modified service station access arrangements that retains vehicle entry and exit from / to Captain Cook Drive whilst providing an additional vehicle entry / exit to the service station along the prolongation of Woolooware Road.

- Ramp details and car parking layouts in accordance with AS2890.1-2004. Compliant grades for the on-site car parking that serves the club / retail and the residential components. Minimum desirable headroom of 2.3 metres in all car parks.
- All disabled parking will require headroom of 2.5 metres above each dedicated space in accordance with AS2890.6-2009.
- Separate areas for garbage storage and collection with adequate headroom for the design service vehicle types that will use the docks. The club dock will be restricted to rigid trucks, whilst the retail docks to the NE of the site off Woolooware Road North will facilitate semi-trailers and some smaller rigid trucks.
- Taxi provision will be included for the retail / club component.
- Separate bus bays near the retail / club and residential components will be provided.
- Pedestrian / cyclist access will be fully integrated in the scheme both along the foreshore and with north-south links to the proposed three traffic signals. The existing bicycle lane along the southern side of Captain Cook Drive will be retained with appropriate connections.

12 SEPP 66 CONSIDERATIONS

The *'Integrating Land Use and Transport'* policy package, including SEPP66, reinforces the principles outlined in *'Shaping our Cities'* relating to directing and encouraging increased development to suitable locations.

The *'Integrating Land Use and Transport'* overview document outlines the objectives of the policy as follows:

> *"The aim of integrating land use and transport is to ensure that urban structures, building forms, land use locations, development designs, subdivisions and street layouts achieve the following objectives:*
>
> - *Improving access to housing, jobs and services by walking, cycling and public transport.*
> - *Increasing the choice of available transport and reducing dependency on cars.*
> - *Reducing travel demand including the number of trips generated by development and the distances travelled, especially by car.*
> - *Supporting the efficient and viable operation of public transport services.*
> - *Providing for the efficient movement of freight."*

The policy package identifies a range of strategies and actions recommended to achieve these objectives. The document *'Improving Transport Choice'* which forms part of the policy package identifies 10 'accessible development principles', which are identified to assist Councils in converting metropolitan planning and transport policy into appropriate local level outcomes.

The 10 principles are summarised as follows:

1. 'Concentrate in centres' – Develop concentrated centres containing the highest appropriate densities of housing, employment, services and public facilities within an acceptable walking distance – 400 to 1,000 metres – of major public transport nodes, such as railway stations and high frequency bus route with at least a 15 minute frequency at peak times'.
2. Mix use in centres – Encourage a mix of housing, employment, services, public facilities and other compatible land uses, in accessible centres'.
3. Align centres within corridors – Concentrate high density, mixed use, accessible centres along major public transport corridors, within urban areas.
4. Link public transport with land use strategies – Plan and implement public transport infrastructure and services in conjunction with land use strategies to maximise access along corridors and to and from centres.

5. Connect streets – Provide street networks with multiple and direct connections to public transport services and efficient access for buses.
6. Improve pedestrian access – Provide walkable environments and give priority to access for pedestrians including access for people with disabilities.
7. Improve cycle access – Maximise cyclist accessibility to centres, services, facilities and employment locations.
8. Manage parking demand – Use the location, supply and availability of parking to discourage car use.
9. Improve road management – Improve transport choice and promote an integrated transport approach by managing road traffic flow and priority of transport modes.
10. Implement good urban design – Design with an emphasis on the needs of pedestrian, cyclists and public transport users.

12.1 Application of SEPP66 to the Proposed Development

The proposed development will be a new centre with the introduction of significantly improved public transport accessibility. The general principles outlined in SEPP66 have been applied to the proposed development in the following ways:

- The proposed development incorporates additional kerbside bus bays along the Captain Cook Drive frontage for the club / retail and residential components and is designed to maximise accessibility by bus services, taxi, hire cars and shuttle buses.
- Provision of pedestrian actuated traffic signals across Captain Cook Drive at the entry to the club / medical centre / retail area at the western side of the retail component as well as pedestrian actuated traffic signals at the eastern side of the retail component. Footpaths exist on both sides of Captain Cook Drive which will directly link the proposed traffic signals.

  These signals will also directly benefit local users of the existing Woolooware High School, Fitness First, Service Station as well as serving patrons attending sporting events at Toyota Stadium. The traffic signals will assist the safe arrival & departure of spectators as part of the overall traffic management strategy for game days that has been enhanced in previous years by the Traffic Management Plan developed by *M^CLaren Traffic Engineering* in consultation with Council's traffic committee and the Sharks.
- Incorporate the Council's Bicycle Network plan as far as practicable by the provision of a recreational foreshore link to the north of the subject site. Its eastern extension along Captain Cook Drive (east of Woolooware Road North) will require more detailed input from Council, as part of the detailed (and imminent) works for the upgrade of Captain

Cook Drive to four (4) lanes between Woolooware Road and Elouera Road.

- Provision of shuttle bus services for Club patrons to supplement existing local bus services.
- Provision of shuttle bus services linking satellite parking areas and improved bus services to local train stations such as Woolooware Train Station, and possibly Miranda, Caringbah, Cronulla and Sutherland Train Stations on GAME DAYS / NIGHTS.
- The facilities provided with the proposed development, including introduced regular bus services, home delivery service from supermarkets, ATM's, enhanced taxi rank provision and the Club's community activities / courtesy bus will assist in discouraging car use.

In view of the above, the proposed development is almost self sufficient in that a variety of recreational and entertainment options / uses will exist within easy walking distance. Retail and ATM support services will be provided together with a new bus service under a Deed of Management with the bus operator. All of these will act to reduce car dependency as will the proposed and existing walking and cycling paths.

13 CONSTRUCTION TRAFFIC MANAGEMENT

A construction traffic management plan will be prepared for the proposed development identifying:

- Construction period, including stages of construction.
- The daily volume of construction traffic generated (trucks, plant & equipment vehicles, materials delivery and construction staff vehicles) for demolition and construction phases.
- Truck routes, with truck prohibited from using Woolooware Road in order to protect amenity of nearby residents.
- Site Access for trucks & construction staff. Control of soil / mud from being dropped from the wheels of construction vehicles onto adjacent public streets when those vehicles leave the construction site.
- Construction staff parking zones.

The site has access opportunities from Captain Cook Drive and a staged construction sequence can be implemented for the residential component that maximises the use of as much of the existing game day sealed and grassed overflow parking areas on the land in order to reduce the need for satellite parking areas in the short to medium term of the residential construction sequence.

14 WORK TRAVEL PLAN

In order to facilitate reduced dependence upon private car travel and to encourage other transport / travel modes, the following measures / initiatives will be introduced as part of the development proposal:

- Travel Access Guide.

  The new retail / commercial centre will be proactive in providing up to date public transport information for tenants / staff and patrons / customers. A Travel Access Guide (TAG) will be prepared in accordance with RTA Guidelines for both employees and customers. In particular the following measures will be introduced:

  - The Centre will provide public transport access information in the form of tenant information kits in order to encourage staff to use public transport / cycling / walking transport options.
  - Tenants will be encouraged to display travel information in staff lunch / rest / amenity areas.
  - Centre management will provide transport options and public transport timetable information on its website.
  - An information desk will be provided within the Centre that will provide directions to bus stops, bus routes, nearest train stations, taxi ranks, bicycle paths / links and pedestrian paths / crossing points.
  - Notice boards will be displayed within the centre to provide information on transport options (bus stops / bus routes & timetables / taxi rank / bicycle paths / pedestrian paths).

- Home Delivery

  Supermarkets will be encouraged to provide a home delivery service.

- Restricted Car Parking Supply

  Parking provision will be kept to a restricted level to encourage other travel modes. Nearby existing public parking areas may include appropriate restrictions.

- Bicycle Parking & Shower Provision.

  On-site bicycle parking will be provided with shower / amenities for employees to utilise.

15 OBJECTION TO CRONULLA SUPERMARKET

In relation to Sutherland Shire Council's statement that Cronulla Bowling Club is an adequate site for a new Supermarket for the town centre of Cronulla, the Council's report (dated 08/07/11) has been reviewed in the context of town centre accessibility, peak hour / weekend traffic activity, service vehicle access and proximity to public transport services in order assess the suitability of the Cronulla Bowling Club site for supermarket use.

As a consequence of this review the following statements are relevant:

1. Town centre location – The Cronulla Bowling Club is located on the fringe of the Cronulla town centre (refer to **Annexure D**) thereby resulting in higher car based trips that would otherwise not occur if the supermarket were in the core of the town centre.

2. Peak hour and weekend traffic – The introduction of a supermarket on the fringe of the town centre would adversely affect the peak hour and weekend traffic conditions by increasing the amount of traffic congestion in the town centre and surrounding area. Cronulla already has an existing congestion problem due to its high residential density meaning the proposed site for the supermarket would add to these problems. Peak hourly traffic generation rates for a supermarket are 3 times as great as a generic specialty retail shop per square metre.

3. Swept path tests conducted by *M^CLaren Traffic Engineering* (shown in **Annexure E**) show the difficulties of articulated truck traffic access to and from the Cronulla Bowling Club site. These include (but are not limited to):

    - The Kingsway / Wilbar Avenue junction.
    - Potential loss of kerbside parking / geometric problems associated with right turn exit trucks from Wilbar Avenue frontage.
    - Peak hour volumes and the associated large gap acceptance requirements for site emerging trucks may result in potential accident risk / traffic congestion.
    - The small roundabout at Wilbar Avenue / Purley Place / Searl Rd junction is insufficient to accommodate displaced "U" turning semi-trailers if right turn exit prohibited from the site.

4. Closest Bus Stop is located at Cronulla Train Station which is approximately 400m from the site (refer to **Annexure F**)

16 CONCLUSIONS

In view of the foregoing, it is evident that the development proposal is supportable in terms of road safety, traffic flow efficiency and residential amenity grounds subject to the following measures:

- Adequate on-site parking and servicing will be provided, plus improved public transport services following discussions with the Department of Transport.

- Significant improvements to traffic access to the site plus pedestrian / cyclist integration is proposed incorporating three traffic signals, as diagrammatically shown in **Annexure B**.

- The possible implementation of advanced parking directional signage on Captain Cook Drive on the approaches to the club that are linked to capacity indicators of the combined club / retail car park.

- For game day parking, a separate parking strategy has been developed, incorporating parking within identified satellite parking locations with bus shuttle services to and from the football ground. Additional Game Day bus services to various train station will be provided to augment those services that currently operate.

- Maintain Gannons Road / Captain Cook Drive roundabout.

Final car parking numbers and layouts will be provided at the detailed staged DA applications for the proposed development.

In addition, the following measures are incorporated in the design to give rise to the general principles outlined in SEPP66:

- The proposed development incorporates additional kerbside bus bays along the Captain Cook Drive frontage for the club / retail and residential components and is designed to maximise accessibility by bus services, taxi, hire cars and shuttle buses.
- Provision of pedestrian actuated traffic signals across Captain Cook Drive at the entry to the club / medical centre / retail area at the western side of the retail component as well as pedestrian actuated traffic signals at the eastern side of the retail component. Footpaths exist on both sides of Captain Cook Drive which will directly link the proposed traffic signals.

  These signals will also directly benefit local users of the existing Woolooware High School, Fitness First, Service Station as well as serving patrons attending sporting events at Toyota Stadium. The traffic signals will assist the safe arrival & departure of spectators as part of the overall traffic management strategy for game days that has been enhanced in previous years by the Traffic Management Plan

developed by *M^CLaren Traffic Engineering* in consultation with Council's traffic committee and the Sharks.

- Incorporate the Council's Bicycle Network plan as far as practicable by the provision of a recreational foreshore link to the north of the subject site. Its eastern extension along Captain Cook Drive (east of Woolooware Road North) will require more detailed input from Council, as part of the detailed (and imminent) works for the upgrade of Captain Cook Drive to four (4) lanes between Woolooware Road and Elouera Road.
- Provision of shuttle bus services for Club patrons to supplement existing local bus services.
- Provision of shuttle bus services linking satellite parking areas and improved bus services to various train stations on GAME DAYS / NIGHTS.
- The facilities provided with the proposed development, including introduced regular bus services, home delivery service from supermarkets, ATM's, enhanced taxi rank provision and the Club's community activities / courtesy bus will assist in discouraging car use.

In view of the above, the proposed development is almost self sufficient in that a variety of recreational and entertainment options / uses will exist within easy walking distance. Retail and ATM support services will be provided together with a new bus service under a Deed of Management with the bus operator. All of these will act to reduce car dependency as will the proposed and existing walking and cycling paths.

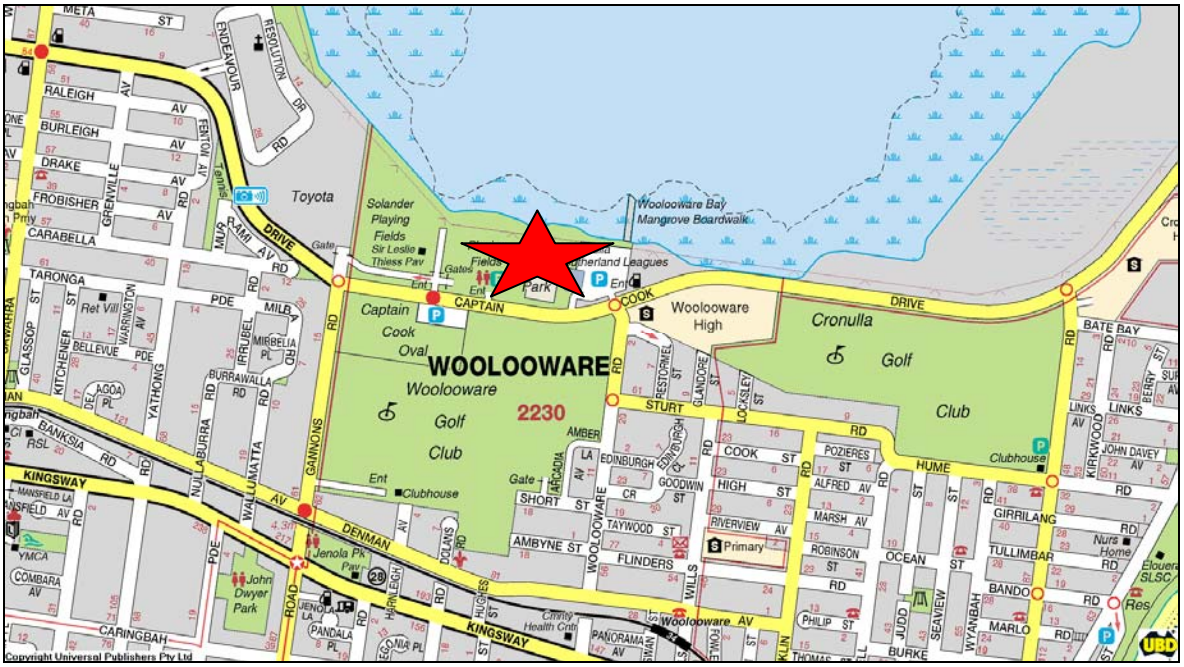
Notwithstanding the proposed changes that achieve a reduced development outcome that reduced scheme is indicative only. In terms of the retail/club component, approval is sought for the Concept Plan for the overall GFA proposed in the original submission (i.e. @26,500m^2), which is an upper limit. Accordingly, it should be noted that:

- The traffic generation and management proposed in the exhibited scheme is acceptable.
- The revisions to the indicative layout (retail component in particular) address issues associated with urban design and improved public access and movement. While these revisions have the effect of changing the retail mix and will produce traffic generation rates that are lower than those overall rates proposed in the exhibited Concept Plan, they are indicative plans only.
- Therefore approval is sought for the overall Concept Plan GFA (as exhibited) to maintain flexibility for the detailed design as part of the future detailed Project Application.

The *Game Day Satellite Parking Plan* makes clear that both the existing game day parking and traffic issues and the loss of on-site parking as a result of the Concept Plan scheme are capable of being appropriately managed in order to achieve a superior outcome for local residents and patrons of Toyota Stadium. This Concept Plan does not permit the carrying out of any works, and there

will be no changes to existing on-site parking arrangements until the relevant development consent and construction certificate are issued. In light of this, the proponent will continue to refine and formalise game day arrangements within the framework of the *Game Day Satellite Parking Plan* in consultation with the Department, Council and the local community, with a final plan and the appropriate agreements to be in place prior to the issuing of any future construction certificate.

It should be noted that the overall redevelopment of the site is expected to occur in a number of stages over a period of several years as detailed in the Environmental Assessment Report, and that there will be opportunities to provide interim on-site arrangements which allow for an orderly transition from the present situation to the measures proposed under the *Game Day Satellite Parking Plan*. The staging of the project's construction will provide a substantial transitional period in which defined areas of the site will be gradually closed for game day parking over several years. This transitional period will ensure that visitors to Toyota Stadium have sufficient time to change their transport behaviours and adapt to the new transport arrangements for the site.



SITE LOCATION

CRONULLA SHARKS REDEVELOPMENT

FIGURE 1:
SITE LOCATION

PREPARED FOR: BLUESTONE CAPITAL VENTURES No. 1 PTY LTD

BY: M^CLAREN TRAFFIC ENGINEERING

ANNEXURE A: TRAFFIC COUNTS

(Sheet 1 of 12)

Curtis Traffic Surveys	Turning movement count				Peak Hour Volumes	253			271
Job:	110401mcl					415			65
Day, date	02/04/11						347	58	
Location:	Elloura Rd & Capt Cook Dr				N				
Weather:	Fine								
Client:	McLaren Traffic Engineering								
	From Capt Cook Dr west		From Elloura Rd		From Capt Cook Dr east				
Time Period	1	2	3	4	5	6	Total		
10:30 to 10:45	47	74	77	11	21	67	297		
10:45 to 11:00	59	81	62	13	14	71	300		
11:00 to 11:15	53	82	81	15	24	74	329		
11:15 to 11:30	73	89	85	16	16	80	359	peak	
11:30 to 11:45	66	92	82	12	17	75	344		
11:45 to 12:00	61	107	87	14	18	65	352		
12:00 to 12:15	53	127	93	16	14	51	354		
12:15 to 12:30	42	115	92	18	11	35	313		
12:30 to 12:45	54	120	79	16	12	45	326		
12:45 to 13:00	47	113	69	19	16	51	315		
13:00 to 13:15	59	95	70	25	11	45	305		
13:15 to 13:30	62	107	65	21	14	34	303		
Total	676	1202	942	196	188	693			
Hourly summary									
10:30 to 11:30	232	326	305	55	75	292	1285		
10:45 to 11:45	251	344	310	56	71	300	1332		
11:00 to 12:00	253	370	335	57	75	294	1384		
11:15 to 12:15	**253**	**415**	**347**	**58**	**65**	**271**	**1409**	peak hour	
11:30 to 12:30	222	441	354	60	60	226	1363		
11:45 to 12:45	210	469	351	64	55	196	1345		
12:00 to 13:00	196	475	333	69	53	182	1308		
12:15 to 13:15	202	443	310	78	50	176	1259		
12:30 to 13:30	222	435	283	81	53	175	1249		

ANNEXURE A: TRAFFIC COUNTS

(Sheet 2 of 12)

Curtis Traffic Surveys

	Turning movement count
Job:	110401mcl
Day, date	02/04/11
Location:	Gannons Rd & Kingsway
Weather:	Fine
Client:	McLaren Traffic Engineering
	All motor vehicles

Peak Hour (N)

Approach	left	through	right
From Gannons Rd north	388	340	263
From Kingsway west	219	1114	52
From Gannons Rd south	67	295	63
From Kingsway east	56	1335	409

Time Period	From Gannons Rd north left	through	right	From Kingsway west left	through	right	From Gannons Rd south left	through	right	From Kingsway east left	through	right	Total vehicle movements	
10:30 to 10:45	72	60	62	39	205	14	15	72	16	14	282	93	944	
10:45 to 11:00	74	81	61	59	242	9	17	64	13	17	313	102	1052	
11:00 to 11:15	84	83	60	47	291	13	13	65	17	16	311	105	1105	
11:15 to 11:30	95	75	57	55	272	8	16	78	15	13	305	99	1088	
11:30 to 11:45	122	86	75	60	285	15	12	74	16	16	309	128	1198	Peak
11:45 to 12:00	84	87	67	56	263	18	17	65	18	14	356	94	1139	
12:00 to 12:15	87	92	64	48	294	11	22	78	14	13	365	88	1176	
12:15 to 12:30	79	61	63	59	255	9	18	58	17	15	313	91	1038	
12:30 to 12:45	94	65	61	58	279	14	16	68	12	12	318	81	1078	
12:45 to 13:00	77	57	58	55	265	12	13	53	18	16	303	77	1004	
13:00 to 13:15	79	73	62	53	258	7	18	65	22	7	245	103	992	
13:15 to 13:30	85	71	64	54	255	6	15	51	20	9	248	99	977	
Totals	1032	891	754	643	3164	136	192	791	198	162	3668	1160		
10:30 to 11:30	325	299	240	200	1010	44	61	279	61	60	1211	399	4189	
10:45 to 11:45	375	325	253	221	1090	45	58	281	61	62	1238	434	4443	
11:00 to 12:00	385	331	259	218	1111	54	58	282	66	59	1281	426	4530	
11:15 to 12:15	**388**	**340**	**263**	**219**	**1114**	**52**	**67**	**295**	**63**	**56**	**1335**	**409**	**4601**	**Peak Hour**
11:30 to 12:30	372	326	269	223	1097	53	69	275	65	58	1343	401	4551	
11:45 to 12:45	344	305	255	221	1091	52	73	269	61	54	1352	354	4431	
12:00 to 13:00	337	275	246	220	1093	46	69	257	61	56	1299	337	4296	
12:15 to 13:15	329	256	244	225	1057	42	65	244	69	50	1179	352	4112	
12:30 to 13:30	335	266	245	220	1057	39	62	237	72	44	1114	360	4051	

ANNEXURE A: TRAFFIC COUNTS

(Sheet 3 of 12)

Curtis Traffic Surveys

Turning movement count

Job: 11040 mcl

Day, date: 02/04/11

Location: Gannons Rd & Denman Av

Weather: Fine

Client: McLaren Traffic Engineering

All motor vehicles

Peak Hour

Time Period	From Gannons Rd north			From Denman Av west			From Gannons Rd south			From Denman Av east			Total vehicle movements
	left	through	right	left	through	right	left	through	right	left	through	right	
10:30 to 10:45	25	145	33	18	28	22	26	154	20	28	43	31	573
10:45 to 11:00	28	165	23	21	38	15	28	165	14	26	50	66	639
11:00 to 11:15	22	175	14	23	48	43	40	171	44	22	28	10	640
11:15 to 11:30	28	149	31	16	26	38	34	159	26	38	36	14	595
11:30 to 11:45	32	159	34	19	36	48	20	184	42	41	44	12	671
11:45 to 12:00	36	167	21	24	41	52	43	172	36	32	29	19	672
12:00 to 12:15	20	177	38	20	38	44	28	188	38	38	33	21	683 Peak
12:15 to 12:30	24	185	12	28	32	40	24	165	33	36	31	24	634
12:30 to 12:45	22	105	14	24	48	54	39	121	46	56	41	36	606
12:45 to 13:00	28	94	9	26	51	42	31	106	51	62	33	19	552
13:00 to 13:15	20	142	15	24	56	28	38	128	64	71	48	23	657
13:15 to 13:30	27	142	24	33	29	38	44	121	55	54	31	12	610
Totals	312	1805	268	276	471	464	395	1834	469	504	447	287	
10:30 to 11:30	103	634	101	78	140	118	128	649	104	114	157	121	2447
10:45 to 11:45	110	648	102	79	148	144	122	679	126	127	158	102	2545
11:00 to 12:00	118	650	100	82	151	181	137	686	148	133	137	55	2578
11:15 to 12:15	116	652	124	79	141	182	125	703	142	149	142	66	2621
11:30 to 12:30	**112**	**688**	**105**	**91**	**147**	**184**	**115**	**709**	**149**	**147**	**137**	**76**	**2660 Peak Hour**
11:45 to 12:45	102	634	85	96	159	190	134	646	153	162	134	100	2595
12:00 to 13:00	94	561	73	98	169	180	122	580	168	192	138	100	2475
12:15 to 13:15	94	526	50	102	187	164	132	520	194	225	153	102	2449
12:30 to 13:30	97	483	62	107	184	162	152	476	216	243	153	90	2425

ANNEXURE A: TRAFFIC COUNTS

(Sheet 4 of 12)

Curtis Traffic Surveys

Turning movement count

Job: 11040 mcl

Day, date: 01/04/11

Location: Capt Cook Dr, Sharks & Woolooware Rd Nth

Weather: Fine

Client: McLaren Traffic Engineering

All motor vehicles

N

Peak Hour

	30	33	12	8
	787			404
	297			14
		154	5	14

Time Period	From Sharks left	From Sharks through	From Sharks right	From Capt Cook Dr west left	From Capt Cook Dr west through	From Capt Cook Dr west right	From Wooloware Rd Nth left	From Wooloware Rd Nth through	From Wooloware Rd Nth right	From Capt Cook Dr east left	From Capt Cook Dr east through	From Capt Cook Dr east right	Total vehicle movements	
10:30 to 10:45	1	2	2	8	178	65	27	1	4	4	87	1	380	
10:45 to 11:00	2	3	7	10	185	75	35	2	7	4	90	2	422	
11:00 to 11:15	2	2	4	5	210	72	30	0	6	5	104	0	440	
11:15 to 11:30	1	2	5	6	175	65	29	1	5	3	119	1	412	
11:30 to 11:45	3	3	7	6	209	75	33	2	6	5	131	3	483	Peak
11:45 to 12:00	1	3	13	7	179	83	55	1	1	1	85	4	433	
12:00 to 12:15	2	4	8	8	195	65	37	2	3	3	95	3	425	
12:15 to 12:30	2	2	5	9	204	74	29	0	4	5	93	2	429	
12:30 to 12:45	0	3	4	4	187	82	18	1	3	2	106	2	412	
12:45 to 13:00	1	2	3	8	168	74	35	1	4	2	90	3	391	
13:00 to 13:15	0	10	5	5	165	65	31	2	3	4	89	1	380	
13:15 to 13:30	1	17	17	9	173	54	27	4	1	5	96	2	406	
Totals	16	53	80	85	2228	849	386	17	47	43	1185	24		
10:30 to 11:30	6	9	18	29	748	277	121	4	22	16	400	4	1654	
10:45 to 11:45	8	10	23	27	779	287	127	5	24	17	444	6	1757	
11:00 to 12:00	7	10	29	24	773	295	147	4	18	14	439	8	1768	
11:15 to 12:15	7	12	33	27	758	288	154	6	15	12	430	11	1753	
11:30 to 12:30	**8**	**12**	**33**	**30**	**787**	**297**	**154**	**5**	**14**	**14**	**404**	**12**	**1770**	**Peak Hour**
11:45 to 12:45	5	12	30	28	765	304	139	4	11	11	379	11	1699	
12:00 to 13:00	5	11	20	29	754	295	119	4	14	12	384	10	1657	
12:15 to 13:15	3	17	17	26	724	295	113	4	14	13	378	8	1612	
12:30 to 13:30	2	32	29	26	693	275	111	8	11	13	381	8	1589	

ANNEXURE A: TRAFFIC COUNTS

(Sheet 5 of 12)

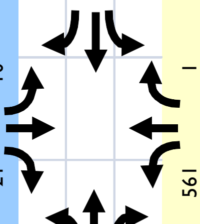
Curtis Traffic Surveys

Turning movement count

Job:	110401mcl
Day, date	02/04/11
Location:	Capt Cook Dr, Toyota & Gannons Rd
Weather:	Fine
Client:	McLaren Traffic Engineering
	All motor vehicles

Peak Hour

N



	left	through	right
From Toyota	21	10	5
From Capt Cook Dr west	1	1082	633
From Gannons Rd	561	1	203
From Capt Cook Dr east	134	950	0

Time Period	From Toyota left	From Toyota through	From Toyota right	From Capt Cook Dr west left	From Capt Cook Dr west through	From Capt Cook Dr west right	From Gannons Rd left	From Gannons Rd through	From Gannons Rd right	From Capt Cook Dr east left	From Capt Cook Dr east through	From Capt Cook Dr east right	Total vehicle movements	
10:30 to 10:45	1	3	4	0	134	104	134	0	61	40	182	0	663	
10:45 to 11:00	0	1	1	0	219	120	151	0	60	32	187	0	771	
11:00 to 11:15	2	3	7	0	224	132	162	1	51	36	224	0	842	
11:15 to 11:30	5	2	6	0	171	120	143	0	43	34	200	0	724	
11:30 to 11:45	2	1	4	1	230	136	136	0	65	36	272	0	883	
11:45 to 12:00	0	4	2	0	259	170	142	0	42	36	228	0	883	
12:00 to 12:15	2	3	9	0	239	165	136	0	46	28	214	0	842	
12:15 to 12:30	1	2	6	0	354	162	147	1	50	34	236	0	993	Peak
12:30 to 12:45	0	3	7	0	219	120	122	1	42	37	203	0	754	
12:45 to 13:00	1	4	6	0	172	120	118	0	42	36	172	1	672	
13:00 to 13:15	0	0	6	0	226	150	126	0	46	25	157	0	736	
13:15 to 13:30	2	1	10	0	233	134	132	0	54	31	158	0	755	
Totals	16	27	68	1	2680	1633	1649	3	602	405	2433	1		
10:30 to 11:30	8	9	18	0	748	476	590	1	215	142	793	0	3000	
10:45 to 11:45	9	7	18	1	844	508	592	1	219	138	883	0	3220	
11:00 to 12:00	9	10	19	1	884	558	583	1	201	142	924	0	3332	
11:15 to 12:15	9	10	21	1	899	591	557	0	196	134	914	0	3332	
11:30 to 12:30	**5**	**10**	**21**	**1**	**1082**	**633**	**561**	**1**	**203**	**134**	**950**	**0**	**3601**	**Peak Hour**
11:45 to 12:45	3	12	24	0	1071	617	547	2	180	135	881	0	3472	
12:00 to 13:00	4	12	28	0	984	567	523	2	180	135	825	1	3261	
12:15 to 13:15	2	9	25	0	971	552	513	2	180	132	768	1	3155	
12:30 to 13:30	3	8	29	0	850	524	498	1	184	129	690	1	2917	

ANNEXURE A: TRAFFIC COUNTS
(Sheet 6 of 12)

Curtis Traffic Surveys

Turning movement count

Job: 110401mcl

Day, date: 02/04/11

Location: Taren Pt Rd, Blvd & Capt Cook Dr

Weather: Fine

Client: McLaren Traffic Engineering

All motor vehicles

Peak Hour

N

Approach	left	through	right
From Taren Point Rd north	458	990	341
From The Boulevarde	0	901	230
From Taren Point Rd south	29	904	105
From Capt Cook Dr	36	678	553

Time Period	From Taren Point Rd north left	through	right	From The Boulevarde left	through	right	From Taren Point Rd south left	through	right	From Capt Cook Dr left	through	right	Total vehicle movements	
10:30 to 10:45	115	207	84	56	179	0	5	194	24	8	158	149	1179	
10:45 to 11:00	126	219	77	49	217	0	6	189	31	9	170	147	1240	
11:00 to 11:15	130	228	95	42	197	0	9	205	39	14	169	154	1282	
11:15 to 11:30	131	238	114	33	141	0	4	209	24	7	174	120	1195	
11:30 to 11:45	118	243	85	62	231	0	5	207	29	8	188	101	1277	
11:45 to 12:00	105	254	97	75	279	0	7	224	26	6	168	134	1375	Peak
12:00 to 12:15	116	248	72	42	219	0	8	242	26	12	156	163	1304	
12:15 to 12:30	119	245	87	51	172	0	9	231	24	10	166	155	1269	
12:30 to 12:45	117	239	79	56	167	0	11	229	23	9	169	141	1240	
12:45 to 13:00	101	233	82	62	164	0	8	209	19	8	170	132	1188	
13:00 to 13:15	94	237	76	57	159	0	9	217	27	9	160	137	1182	
13:15 to 13:30	106	246	86	71	170	0	7	214	31	6	157	129	1223	
Totals	1378	2837	1034	656	2295	0	88	2570	323	106	2005	1662		
10:30 to 11:30	502	892	370	180	734	0	24	797	118	38	671	570	4896	
10:45 to 11:45	505	928	371	186	786	0	24	810	123	38	701	522	4994	
11:00 to 12:00	484	963	391	212	848	0	25	845	118	35	699	509	5129	
11:15 to 12:15	470	983	368	212	870	0	24	882	105	33	686	518	5151	
11:30 to 12:30	458	990	341	230	901	0	29	904	105	36	678	553	5225	Peak Hour
11:45 to 12:45	457	986	335	224	837	0	35	926	99	37	659	593	5188	
12:00 to 13:00	453	965	320	211	722	0	36	911	92	39	661	591	5001	
12:15 to 13:15	431	954	324	226	662	0	37	886	93	36	665	565	4879	
12:30 to 13:30	418	955	323	246	660	0	35	869	100	32	656	539	4833	

ANNEXURE A: TRAFFIC COUNTS

(Sheet 7 of 12)

Curtis Traffic Surveys	Turning movement count				Peak Hour Volumes	341			19
Job:	110401mcl					939			58
Day, date	01/04/11						17	235	
Location:	Elloura Rd & Capt Cook Dr				N				
Weather:	Fine								
Client:	McLaren Traffic Engineering								
	From Capt Cook Dr west		From Elloura Rd		From Capt Cook Dr east				
Time Period	1	2	3	4	5	6	Total		
16:00 to 16:15	70	185	3	39	4	12	313		
16:15 to 16:30	78	187	2	42	8	9	326		
16:30 to 16:45	65	179	6	53	12	5	320		
16:45 to 17:00	89	241	11	63	11	9	424	peak	
17:00 to 17:15	87	197	4	71	18	5	382		
17:15 to 17:30	76	247	2	54	13	2	394		
17:30 to 17:45	89	254	0	47	16	3	409		
17:45 to 18:00	67	214	4	39	11	5	340		
18:00 to 18:15	79	247	2	41	15	0	384		
18:15 to 18:30	68	167	0	27	9	0	271		
18:30 to 18:45	59	145	4	32	10	3	253		
18:45 to 19:00	64	135	5	23	6	0	233		
Total	891	2398	43	531	133	53			
Hourly summary									
16:00 to 17:00	302	792	22	197	35	35	1383		
16:15 to 17:15	319	804	23	229	49	28	1452		
16:30 to 17:30	317	864	23	241	54	21	1520		
16:45 to 17:45	**341**	**939**	**17**	**235**	**58**	**19**	**1609**	peak hour	
17:00 to 18:00	319	912	10	211	58	15	1525		
17:15 to 18:15	311	962	8	181	55	10	1527		
17:30 to 18:30	303	882	6	154	51	8	1404		
17:45 to 18:45	273	773	10	139	45	8	1248		
18:00 to 19:00	270	694	11	123	40	3	1141		

ANNEXURE A: TRAFFIC COUNTS
(Sheet 8 of 12)

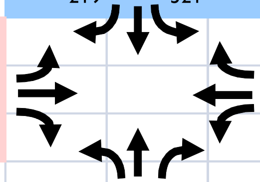
Curtis Traffic Surveys

Peak Hour

	Turning movement count	
Job:	110401mcl	
Day, date	01/04/11	
Location:	Gannons Rd & Kingsway	
Weather:	Fine	
Client:	McLaren Traffic Engineering	
	All motor vehicles	

Peak hour volumes – From Gannons Rd north: 219, 521, 499; From Kingsway west: 252, 1448, 36; From Gannons Rd south: 57, 436, 110; From Kingsway east: 0, 1404, 71

N



Time Period	From Gannons Rd north left	through	right	From Kingsway west left	through	right	From Gannons Rd south left	through	right	From Kingsway east left	through	right	Total vehicle movements	
16:00 to 16:15	47	94	54	41	197	16	8	97	25	11	202	0	792	
16:15 to 16:30	51	87	65	46	215	24	11	89	34	12	206	0	840	
16:30 to 16:45	67	87	46	56	208	14	15	92	21	14	210	0	830	
16:45 to 17:00	89	128	51	60	239	7	25	93	26	16	225	0	959	
17:00 to 17:15	142	134	56	62	374	4	17	158	31	14	315	0	1307	
17:15 to 17:30	127	124	56	67	362	12	6	105	25	22	358	0	1264	
17:30 to 17:45	114	146	59	62	393	13	20	111	28	16	356	0	1318	Peak
17:45 to 18:00	116	117	48	61	319	7	14	62	26	19	375	0	1164	
18:00 to 18:15	125	146	58	60	351	8	9	118	21	32	365	0	1293	
18:15 to 18:30	109	129	64	53	321	11	15	92	34	37	32	0	897	
18:30 to 18:45	107	97	45	39	310	7	14	46	21	18	245	0	949	
18:45 to 19:00	97	87	38	24	270	9	12	87	37	32	202	0	895	
Totals	1191	1376	640	631	3559	132	166	1150	329	243	3091	0		
16:00 to 17:00	254	396	216	203	859	61	59	371	106	53	843	0	3421	
16:15 to 17:15	349	436	218	224	1036	49	68	432	112	56	956	0	3936	
16:30 to 17:30	425	473	209	245	1183	37	63	448	103	66	1108	0	4360	
16:45 to 17:45	472	532	222	251	1368	36	68	467	110	68	1254	0	4848	
17:00 to 18:00	**499**	**521**	**219**	**252**	**1448**	**36**	**57**	**436**	**110**	**71**	**1404**	**0**	**5053**	**Peak Hour**
17:15 to 18:15	482	533	221	250	1425	40	49	396	100	89	1454	0	5039	
17:30 to 18:30	464	538	229	236	1384	39	58	383	109	104	1128	0	4672	
17:45 to 18:45	457	489	215	213	1301	33	52	318	102	106	1017	0	4303	
18:00 to 19:00	438	459	205	176	1252	35	50	343	113	119	844	0	4034	

ANNEXURE A: TRAFFIC COUNTS

(Sheet 9 of 12)

Curtis Traffic Surveys

Turning movement count

Job: 11040 mcl

Day, date: 01/04/11

Location: Gannons Rd & Denman Av

Weather: Fine

Client: McLaren Traffic Engineering

All motor vehicles

Peak Hour

N

	From Gannons Rd north			From Denman Av west			From Gannons Rd south			From Denman Av east			Total vehicle movements	
Time Period	left	through	right	left	through	right	left	through	right	left	through	right		
16:00 to 16:15	3	145	5	4	64	36	26	95	19	51	6	2	456	
16:15 to 16:30	4	137	4	3	69	33	31	104	27	47	5	3	467	
16:30 to 16:45	6	144	4	6	82	31	34	98	32	44	9	2	492	
16:45 to 17:00	6	197	1	5	79	29	37	126	30	49	6	1	566	Peak
17:00 to 17:15	5	197	9	7	61	34	29	102	24	41	7	4	520	
17:15 to 17:30	5	197	5	8	63	36	32	96	29	51	5	2	529	
17:30 to 17:45	3	173	6	5	70	28	35	124	31	45	11	3	534	
17:45 to 18:00	3	161	3	7	77	64	31	85	34	39	15	5	524	
18:00 to 18:15	1	197	6	11	54	58	28	97	26	49	22	3	552	
18:15 to 18:30	3	204	5	4	65	27	31	63	27	36	14	3	482	
18:30 to 18:45	4	162	5	5	58	33	37	79	22	39	13	2	459	
18:45 to 19:00	3	134	4	6	21	42	34	72	20	36	9	3	384	
Totals	46	2048	57	71	763	451	385	1141	321	527	122	33		
16:00 to 17:00	19	623	14	18	294	129	128	423	108	191	26	8	1981	
16:15 to 17:15	21	675	18	21	291	127	131	430	113	181	27	10	2045	
16:30 to 17:30	22	735	19	26	285	130	132	422	115	185	27	9	2107	
16:45 to 17:45	**19**	**764**	**21**	**25**	**273**	**127**	**133**	**448**	**114**	**186**	**29**	**10**	**2149**	**Peak Hour**
17:00 to 18:00	16	728	23	27	271	162	127	407	118	176	38	14	2107	
17:15 to 18:15	12	728	20	31	264	186	126	402	120	184	53	13	2139	
17:30 to 18:30	10	735	20	27	266	177	125	369	118	169	62	14	2092	
17:45 to 18:45	11	724	19	27	254	182	127	324	109	163	64	13	2017	
18:00 to 19:00	11	697	20	26	198	160	130	311	95	160	58	11	1877	

ANNEXURE A: TRAFFIC COUNTS

(Sheet 10 of 12)

Curtis Traffic Surveys

Turning movement count

Job: 11040mcl

Day, date: 01/04/11

Location: Capt Cook Dr, Sharks & Woolooware Rd Nth

Weather: fine

Client: McLaren Traffic Engineering

All motor vehicles

Peak Hour

N

Time Period	From Sharks left	From Sharks through	From Sharks right	From Capt Cook Dr west left	From Capt Cook Dr west through	From Capt Cook Dr west right	From Woolooware Rd Nth left	From Woolooware Rd Nth through	From Woolooware Rd Nth right	From Capt Cook Dr east left	From Capt Cook Dr east through	From Capt Cook Dr east right	Total vehicle movements	
16:00 to 16:15	1	0	2	2	241	31	19	2	3	2	141	0	444	
16:15 to 16:30	0	0	3	2	279	24	26	1	3	4	124	0	466	
16:30 to 16:45	2	2	5	4	247	18	23	3	2	5	146	0	457	
16:45 to 17:00	4	5	7	12	342	59	50	3	4	1	187	1	675	Peak
17:00 to 17:15	6	6	9	16	297	57	26	3	5	3	162	6	596	
17:15 to 17:30	2	10	9	24	311	61	43	4	8	3	164	5	644	
17:30 to 17:45	1	4	7	19	345	65	49	3	5	2	146	2	648	
17:45 to 18:00	1	5	8	16	297	60	35	0	8	0	105	4	539	
18:00 to 18:15	2	1	14	18	324	67	49	3	5	1	126	0	610	
18:15 to 18:30	3	5	8	11	212	51	28	8	3	5	89	4	427	
18:30 to 18:45	2	5	17	21	241	57	28	5	14	1	84	6	481	
18:45 to 19:00	3	3	2	10	197	31	29	6	5	1	80	5	372	
Totals	27	46	91	155	3333	581	405	41	65	28	1554	33		
16:00 to 17:00	7	7	17	20	1109	132	118	9	12	12	598	1	2042	
16:15 to 17:15	12	13	24	34	1165	158	125	10	14	13	619	7	2194	
16:30 to 17:30	14	23	30	56	1197	195	142	13	19	12	659	12	2372	
16:45 to 17:45	**13**	**25**	**32**	**71**	**1295**	**242**	**168**	**13**	**22**	**9**	**659**	**14**	**2563**	**Peak Hour**
17:00 to 18:00	10	25	33	75	1250	243	153	10	26	8	577	17	2427	
17:15 to 18:15	6	20	38	77	1277	253	176	10	26	6	541	11	2441	
17:30 to 18:30	7	15	37	64	1178	243	161	14	21	8	466	10	2224	
17:45 to 18:45	8	16	47	66	1074	235	140	16	30	7	404	14	2057	
18:00 to 19:00	10	14	41	60	974	206	134	22	27	8	379	15	1890	

ANNEXURE A: TRAFFIC COUNTS

(Sheet 11 of 12)

Curtis Traffic Surveys

Turning movement count

Job: 110401mcl

Day, date: 01/04/11

Location: Capt Cook Dr, Toyota & Gannons Rd

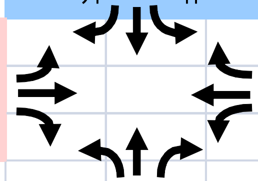
Weather: Fine

Client: McLaren Traffic Engineering

All motor vehicles

Peak Hour

N



Peak hour movements: From Toyota (left, through, right): 12, 41, 94; From Capt Cook Dr west (left, through, right): 5, 1285, 567; From Gannons Rd (left, through, right): 275, 3, 192; From Capt Cook Dr east (left, through, right): 207, 578, 1

Time Period	From Toyota left	From Toyota through	From Toyota right	From Capt Cook Dr west left	From Capt Cook Dr west through	From Capt Cook Dr west right	From Gannons Rd left	From Gannons Rd through	From Gannons Rd right	From Capt Cook Dr east left	From Capt Cook Dr east through	From Capt Cook Dr east right	Total vehicle movements	
16:00 to 16:15	1	2	1	1	238	124	39	1	46	25	124	1	603	
16:15 to 16:30	0	0	1	0	254	116	45	1	50	23	129	0	619	
16:30 to 16:45	3	6	7	1	280	157	85	2	27	21	142	0	731	
16:45 to 17:00	1	5	7	4	273	146	86	1	68	134	129	0	854	
17:00 to 17:15	3	12	27	0	263	137	62	1	40	19	143	0	707	
17:15 to 17:30	5	12	29	1	362	156	78	0	45	29	159	1	877	Peak
17:30 to 17:45	3	12	31	0	387	128	49	1	39	25	147	0	822	
17:45 to 18:00	2	12	17	0	292	130	53	1	37	33	134	0	711	
18:00 to 18:15	3	8	19	4	292	125	75	1	44	34	159	0	764	
18:15 to 18:30	1	9	17	2	188	108	52	1	28	24	139	0	569	
18:30 to 18:45	2	8	17	2	296	138	60	1	21	40	129	0	714	
18:45 to 19:00	1	8	18	1	181	99	61	0	20	28	138	0	555	
Totals	25	94	191	16	3306	1564	745	11	465	435	1672	2		
16:00 to 17:00	5	13	16	6	1045	543	255	5	191	203	524	1	2807	
16:15 to 17:15	7	23	42	5	1070	556	278	5	185	197	543	0	2911	
16:30 to 17:30	12	35	70	6	1178	596	311	4	180	203	573	1	3169	
16:45 to 17:45	**12**	**41**	**94**	**5**	**1285**	**567**	**275**	**3**	**192**	**207**	**578**	**1**	**3260**	**Peak Hour**
17:00 to 18:00	13	48	104	1	1304	551	242	3	161	106	583	1	3117	
17:15 to 18:15	13	44	96	5	1333	539	255	3	165	121	599	1	3174	
17:30 to 18:30	9	41	84	6	1159	491	229	4	148	116	579	0	2866	
17:45 to 18:45	8	37	70	8	1068	501	240	4	130	131	561	0	2758	
18:00 to 19:00	7	33	71	9	957	470	248	3	113	126	565	0	2602	

ANNEXURE A: TRAFFIC COUNTS

(Sheet 12 of 12)

Curtis Traffic Surveys

Turning movement count

Job: 11040 mcl

Day, date: 01/04/11

Location: Taren Pt Rd, Blvd & Capt Cook Dr

Weather: Fine

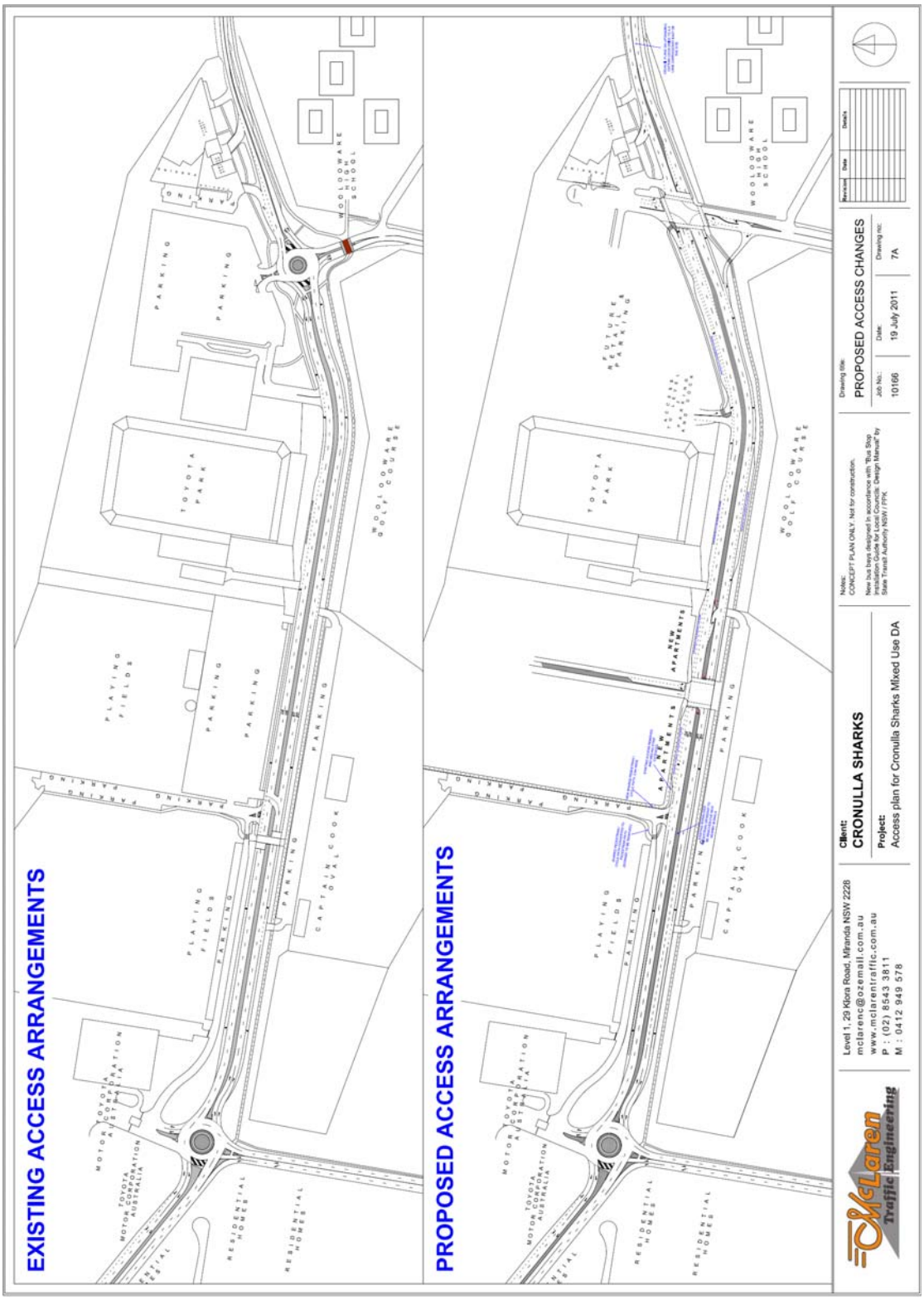
Client: McLaren Traffic Engineering

All motor vehicles

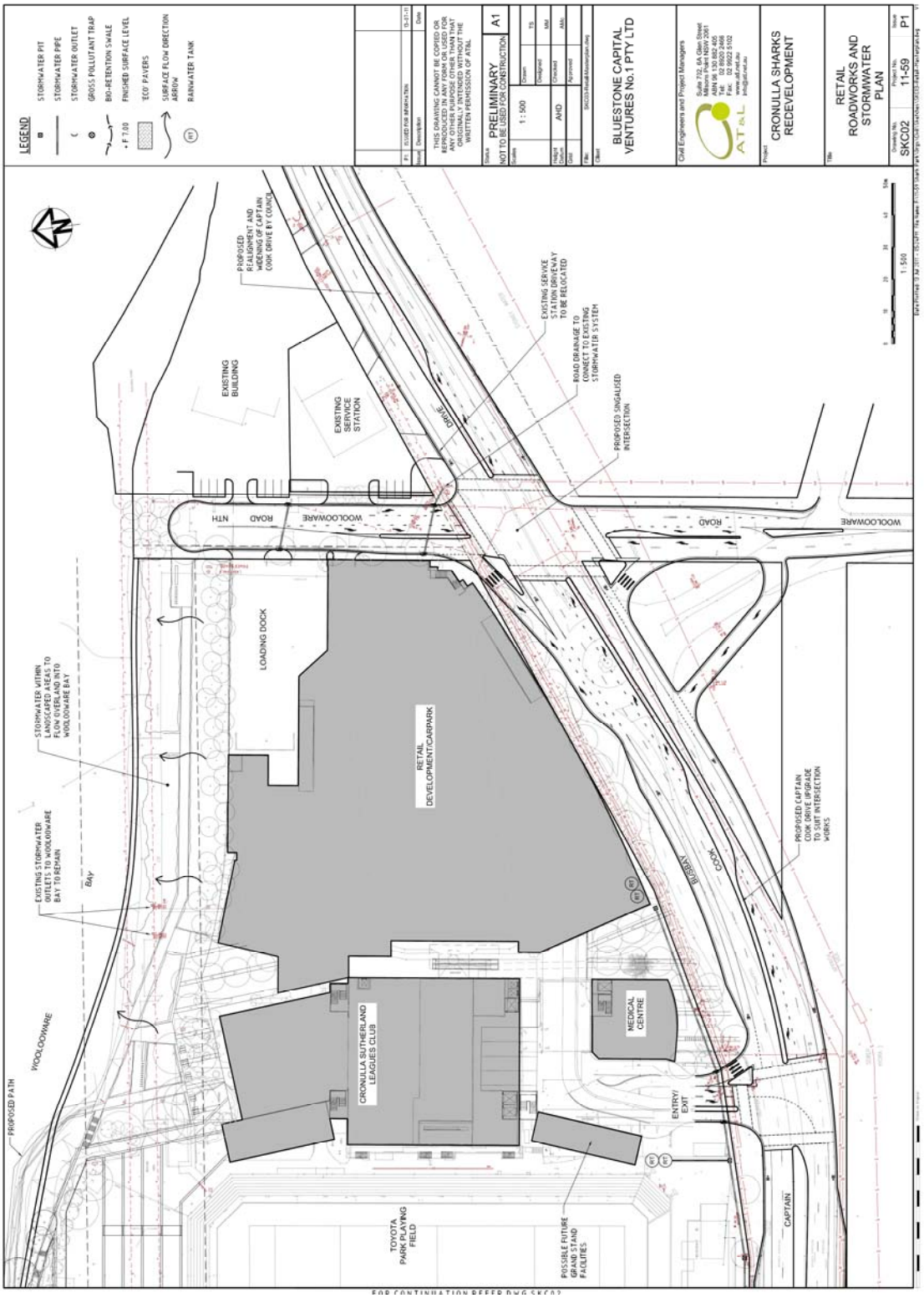
Peak Hour

Time Period	From Taren Point Rd north			From The Boulevarde			From Taren Point Rd south			From Capt Cook Dr			Total vehicle movements	
	left	through	right	left	through	right	left	through	right	left	through	right		
16:00 to 16:15	158	338	75	51	177	0	6	159	31	18	301	81	1395	
16:15 to 16:30	167	357	89	49	189	0	6	167	24	17	278	79	1422	
16:30 to 16:45	162	425	94	55	162	0	8	150	29	24	281	75	1465	
16:45 to 17:00	151	455	110	64	155	0	7	162	27	24	310	56	1521	
17:00 to 17:15	154	421	95	62	141	0	5	175	25	28	333	69	1508	
17:15 to 17:30	161	395	108	65	126	0	4	184	21	25	314	71	1474	
17:30 to 17:45	186	428	109	42	139	0	2	205	24	29	295	108	1567	
17:45 to 18:00	204	436	112	37	178	0	3	199	20	22	279	129	1619	Peak
18:00 to 18:15	191	397	95	41	152	0	7	205	23	20	284	151	1566	
18:15 to 18:30	135	320	94	32	124	0	5	168	19	19	221	109	1246	
18:30 to 18:45	141	314	87	27	119	0	5	142	12	16	169	116	1148	
18:45 to 19:00	113	329	89	29	137	0	4	154	14	14	174	97	1154	
Totals	1923	4615	1157	554	1799	0	62	2070	269	256	3239	1141		
16:00 to 17:00	638	1575	368	219	683	0	27	638	111	83	1170	291	5803	
16:15 to 17:15	634	1658	388	230	647	0	26	654	105	93	1202	279	5916	
16:30 to 17:30	628	1696	407	246	584	0	24	671	102	101	1238	271	5968	
16:45 to 17:45	652	1699	422	233	561	0	18	726	97	106	1252	304	6070	
17:00 to 18:00	705	1680	424	206	584	0	14	763	90	104	1221	377	6168	
17:15 to 18:15	742	1656	424	185	595	0	16	793	88	96	1172	459	6226	Peak Hour
17:30 to 18:30	716	1581	410	152	593	0	17	777	86	90	1079	497	5998	
17:45 to 18:45	671	1467	388	137	573	0	20	714	74	77	953	505	5579	
18:00 to 19:00	580	1360	365	129	532	0	21	669	68	69	848	473	5114	

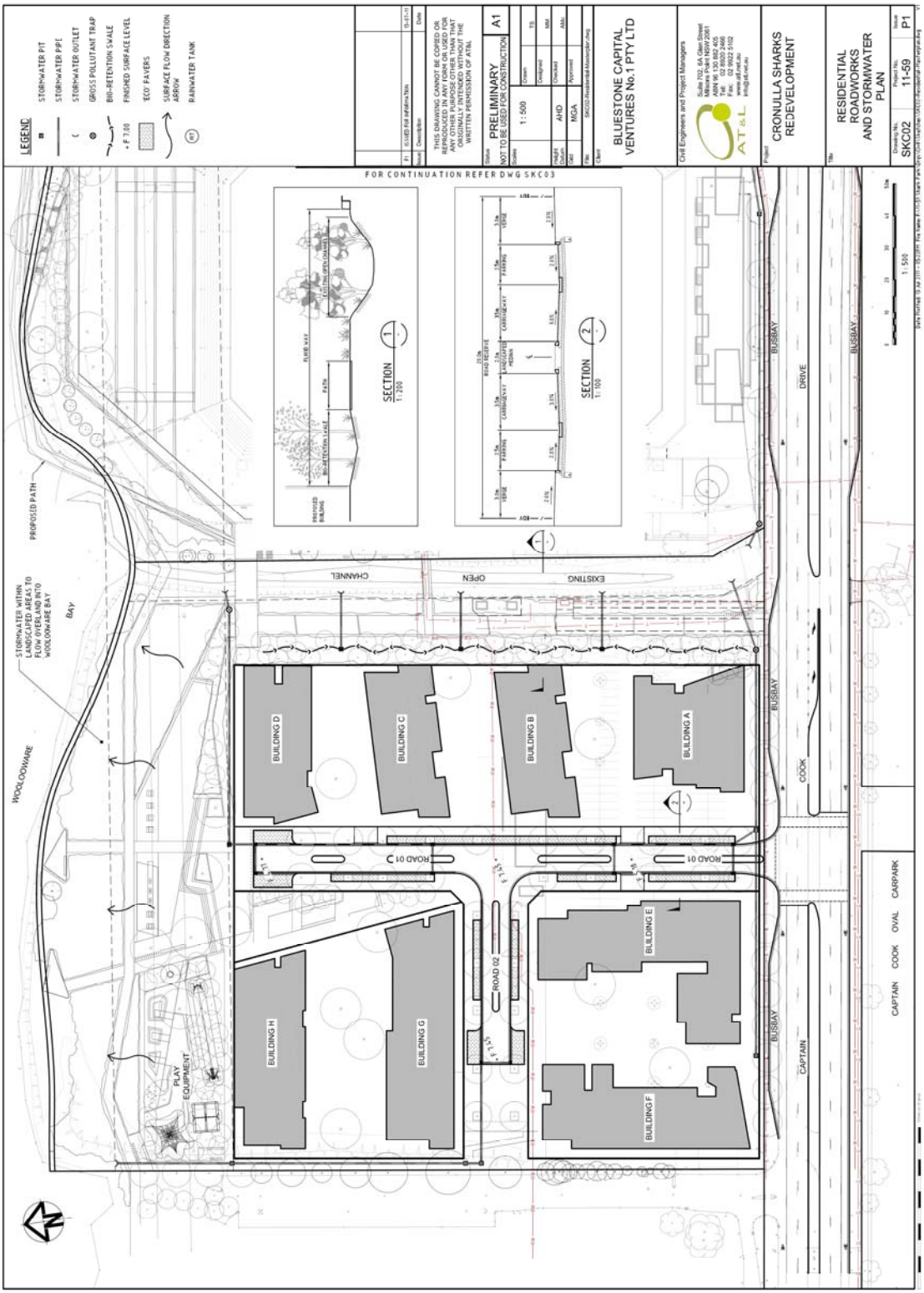
ANNEXURE B: PROPOSED ACCESS ARRANGEMENTS (Sheet 1 of 3)



ANNEXURE B: PROPOSED ACCESS ARRANGEMENTS (Sheet 2 of 3)



ANNEXURE B: PROPOSED ACCESS ARRANGEMENTS (Sheet 3 of 3)



ANNEXURE C: SCATES OUPUT RESULTS

```
SCATES Program Version: 2008  Date: 04-AUG-11  Time:
Registered User Name. - Freeware
Registered User No.    -      0
Data File: C:\NETANAL\10166
CAPTAIN COOK DRIVE
PROPOSED TWO RETAIL SIGNALS

The coordinated delays shown here are the calculated delays to be expected
under SCATS control. The coordinated delays in the Splits Screen will
normally be higher as they are calculated there for isolated operation
and do not reflect the benefits of coordination.

The isolated delay rate shown here for the main road is calculated to
reflect the interaction of adjacent intersections.
The isolated main road and total delay rates will therefore differ to those
shown in the Splits and Movement DS Screens which are calculated with no
interaction. The Level of Service (L/S) is for co-ordinated operation for
all movements.

       INTERSECTION DELAY PERFORMANCE for BUSINESS PEAK for FILE 10166
      _______Main Road________ _______Side Road________ __________Total_________
 TCS Isol Cord Cord Pcu  Cord Isol Cord Cord Pcu  Cord Isol Cord Cord Pcu  Cord
 No. dlay dlay Sec  per   DS  dlay dlay Sec  per   DS  dlay dlay Sec  per   DS
  &  Rate Rate per  Hour      Rate Rate per  Hour      Rate Rate per  Hour
 L/S Pc/h Pc/h Pcu            Pc/h Pc/h Pcu            Pc/h Pc/h Pcu

3333A   0    0    0  116 0.11    1    2   20  280 0.11    1    2   14  396 0.11
4444A   6    0    1  434 0.28    2    2   11  742 0.28    8    2    7 1176 0.28

--------------------------------------------------------------------------------
TOT     6    0    1              3    4   13              9    4    9   L/S = A
--------------------------------------------------------------------------------
HIGHEST DS               0.28                    0.28                    0.28
--------------------------------------------------------------------------------

          INTERSECTION DELAY PERFORMANCE for PM PEAK for FILE 10166
      _______Main Road________ _______Side Road________ __________Total_________
 TCS Isol Cord Cord Pcu  Cord Isol Cord Cord Pcu  Cord Isol Cord Cord Pcu  Cord
 No. dlay dlay Sec  per   DS  dlay dlay Sec  per   DS  dlay dlay Sec  per   DS
  &  Rate Rate per  Hour      Rate Rate per  Hour      Rate Rate per  Hour
 L/S Pc/h Pc/h Pcu            Pc/h Pc/h Pcu            Pc/h Pc/h Pcu

3333A   2    0    0 2556 0.55    3    3   45  211 0.55    5    3    3 2767 0.55
4444A  26    3    3 2724 0.71    7    7   27  955 0.64   33   10   10 3679 0.71

--------------------------------------------------------------------------------
TOT    29    3    2             10   10   30             38   12    7   L/S = A
--------------------------------------------------------------------------------
HIGHEST DS               0.71                    0.64                    0.71
--------------------------------------------------------------------------------

          INTERSECTION DELAY PERFORMANCE for AM PEAK for FILE 10166
      _______Main Road________ _______Side Road________ __________Total_________
 TCS Isol Cord Cord Pcu  Cord Isol Cord Cord Pcu  Cord Isol Cord Cord Pcu  Cord
 No. dlay dlay Sec  per   DS  dlay dlay Sec  per   DS  dlay dlay Sec  per   DS
  &  Rate Rate per  Hour      Rate Rate per  Hour      Rate Rate per  Hour
 L/S Pc/h Pc/h Pcu            Pc/h Pc/h Pcu            Pc/h Pc/h Pcu

3333A   1    0    0 2016 0.46    2    2   46  153 0.46    3    2    3 2169 0.46
4444A  19    2    4 1928 0.50    5    5   23  775 0.45   24    7   10 2703 0.50

--------------------------------------------------------------------------------
TOT    21    2    2              7    7   27             27    9    7   L/S = A
--------------------------------------------------------------------------------
HIGHEST DS               0.50                    0.46                    0.50
--------------------------------------------------------------------------------
END OF FILE
```

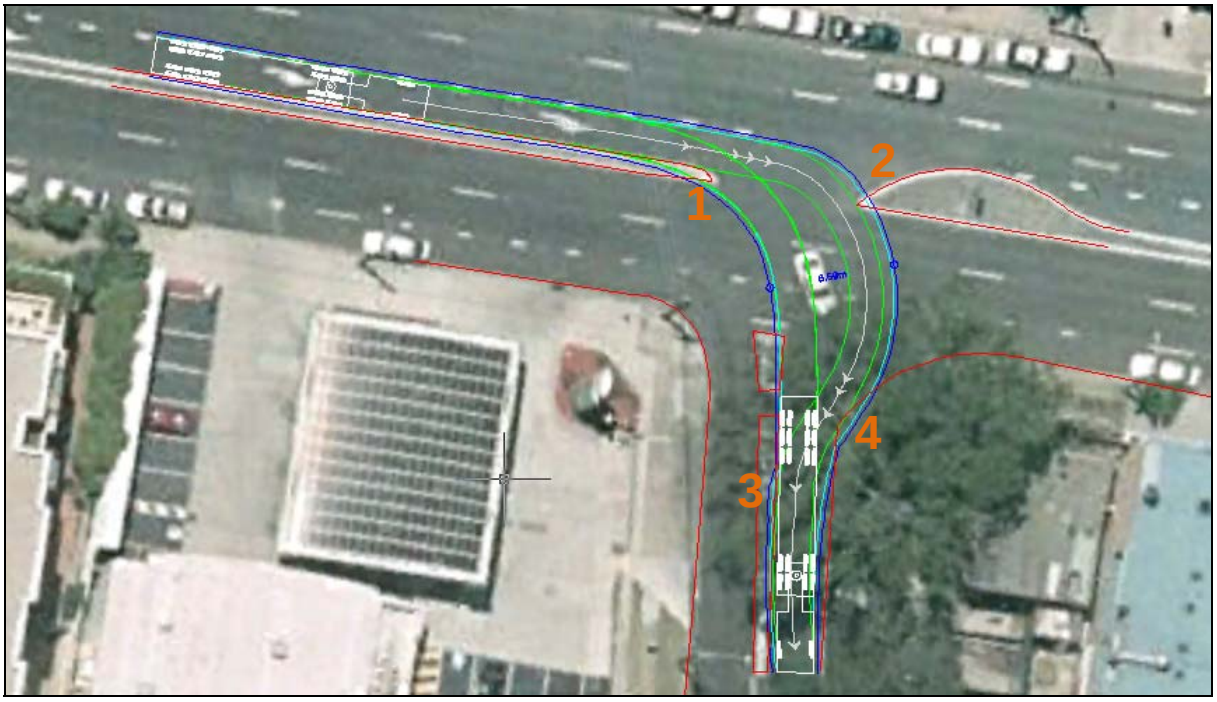
ANNEXURE D: PROPOSED SUPERMARKET SITE

Map of Cronulla Town Centre

Aerial Photograph of Site

Proposed Supermarket Site ★

ANNEXURE E: SWEPT PATH TESTS (SHEET 1 OF 4)



19m Truck, on to Wilbar Ave
5km/h
1 Manoeuvre
Unsuccessful – Truck hits median strip at point '1', '2' and '3'. Truck also hits guide post at point '4'.

Green = Front and Rear Tyre
Light Blue = Body of Vehicle
Dark Blue = 300mm Body Clearance

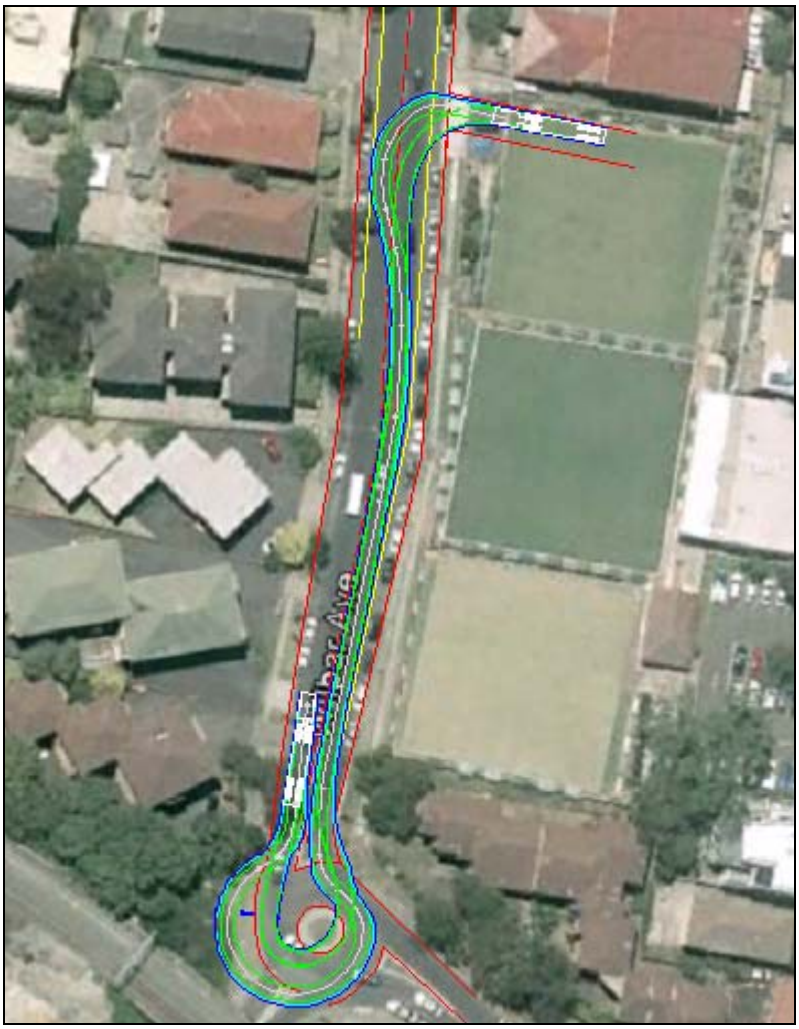
ANNEXURE E: SWEPT PATH TESTS (SHEET 2 OF 4)

19m Truck, on to Kingsway
5km/h
1 Manoeuvre
Unsuccessful – Truck hits median strip at point '1'.

ANNEXURE E: SWEPT PATH TESTS (SHEET 3 OF 4)

19m Truck, Right turn on to Wilbar Ave
5km/h
1 Manoeuvre

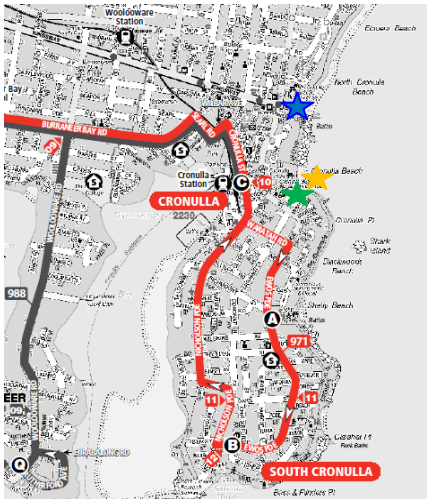
ANNEXURE E: SWEPT PATH TESTS (SHEET 4 OF 4)



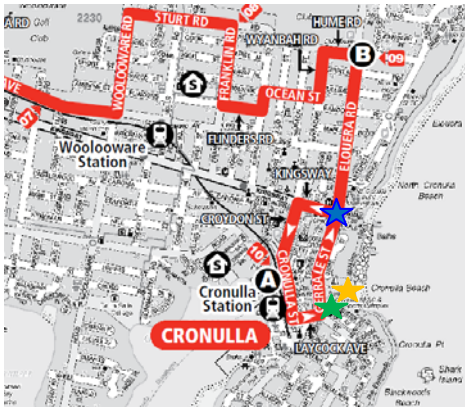
19m Truck, Left turn on to Wilbar Ave and 'U' Turn
5km/h
1 Manoeuvre
Unsuccessful – Truck requires both lanes when turning left out of site. Truck cannot use the small roundabout due to the trucks size.

ANNEXURE F: CRONULLA PUBLIC TRANSPORT SERVICES

Bus Route – South Cronulla



Bus Route – North Cronulla



Proposed Supermarket Site

Closest Train Station

Closest Bus Station

*Approximately a 400m walk from proposed site to closest bus stop and train station