FRASERS PROPERTY AUSTRALIA

SHELL COVE BOAT HARBOUR STAGE 1
TRAFFIC AND PARKING ASSESSMENT

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1.0 INTRODUCTION

Shell Cove Boat Harbour Precinct has been planned by Australand to provide a town centre for the developing Shell Cove residential area. The *Shell Cove Boat Harbour Precinct Concept Plan Application and Environmental Assessment* was prepared by LFA in February 2010, to provide an overall concept plan for the area. This was supported by a report by Maunsell titled *Shell Cove Boatharbour Precinct Traffic Study,* dated 24 March 2009. This Maunsell report set out an analysis of the traffic generation and road and intersection design for the area. From area network traffic modelling, Maunsell assessed individual intersections and developed the proposed intersection layouts.

Since the date of the 2009 Maunsell report, on-going refinements in the design of the Boat Harbour Precinct have been undertaken. Subsequently, Australand commissioned Christopher Hallam & Associates Pty Ltd to undertake a review of the road network, taking into account the precinct layout and land use details proposed. This report also considered car parking demands. This report, titled *Shell Cove Boat Harbour Precinct Masterplan Traffic and Parking Assessment,* was prepared in May 2015.

Australand – now Frasers Property Australia - commissioned Christopher Hallam & Associates Pty Ltd to provide traffic design advice and to prepare a traffic and parking impact assessment for Stage 1 of the Shell Cove Boat Harbour Precinct. The Masterplan report provides important background to this current Stage 1 assessment, and should be read in conjunction with this new report, which is set out as follows:

- Section 2 briefly reviews the Shell Cove Boat Harbour Precinct
- Section 3 describes the proposed Stage 1, reviews access and loading, car parking, and estimates traffic generation and traffic impacts, and
- Section 4 sets out the conclusions.

2.0 SHELL COVE BOAT HARBOUR PRECINCT

2.1 Overview

The current concept plan for the ultimate development of Shell Cove Boat Harbour Precinct is shown on Figure 1. The details are as follows:

- Supermarket 3600 sq m
- Specialty shops 1424 sq m
- Restaurant 592 sq m (inside) plus 225 sq m (outside)
- Tavern 955 sq m (inside) plus 280 sq m (outside)
- Community 910 sq m; library 685 sq m
- Marina 300 berths
- Residential apartments
- Apartment hotel

There have been, and probably will continue to be on-going refinements in the post-Stage 1 details and designs, so that some changes to this plan in Figure 1 will occur. It should be seen as a Master Plan, illustrating the ultimate development, with details to be confirmed at each development application stage.

To properly assess the roads and intersections, even for Stage 1, we consider it desirable to assess the traffic implications of the full development. For this purpose, we have set out below our assessment of the traffic generation of the full development. The information in this Section is taken from our May 2015 report *Shell Cove Boat Harbour Precinct Masterplan Traffic and Parking Assessment.*

2.2 Traffic Generation Rates

In this Section we have set out our assessment of land use traffic generation rates and have made comparisons with the earlier traffic assessment by Maunsell, as a check that earlier roads planning is still applicable.

Standard Residential

Maunsell assumed standard rates from the 2002 RTA *Guide to Traffic Generating Developments,* this being 9.0 veh/day/dwelling, or 0.85 veh/hr/dwelling. The RMS has recently published a *Technical Direction TDT 2013/04a,* in August 2013. This provides the results of new traffic surveys and recommends some variations in traffic generation rates compared with those in the 2002 Guide. It distinguishes between sites in the Sydney Region and Regional sites. For Sydney sites the rate is 10.7 veh/day/dwelling while for Regional sites the rate is 7.4 veh/day/dwelling. The 2002 RTA Guide thus gives conservatively higher rates for dwellings in Regional areas. Relying on the 2002 Guide rates is thus conservative.

Medium Density Residential

Maunsell quote the RTA rate of 6 veh/day/dwelling. This is the rate from the 2002 Guide for large (three-bedroom) dwellings. There were no new surveys. The assumption of this rate is thus conservative.

Apartment Unit

Maunsell quote 4 veh/day/dwelling. From the 2002 Guide this is equivalent to a small (one-bedroom) medium density unit. The RMS 2013 surveys suggest for "High density residential flat building" in a Regional location a rate of 4.6 veh/day/unit. This is substantially higher than the recommended Sydney rate of 1.5 veh/day/unit. We are not confident that the Regional rate of 4.6 truly reflects the likely outcomes, particularly with the Regional low density rates being substantially lower. There could be an issue with survey sample size in these rates. We prefer to stick with the original Maunsell rate of 4 veh/day/unit.

Shops and Supermarket

Maunsell suggest rates that do not appear to come from the 2002 Guide. They suggest for supermarkets, 77.5 veh/day/100 sq m , and for shops, 30 veh/day/100 sq m. The 2002 Guide has various ways of estimating trip generation at shopping centres. We recommend using the disaggregated model, with differing rates for each retail type. For the Friday afternoon peak hour, the supermarket rate is 13.8 veh/hr/100 sq m, while for specialty shops it is 5.6 veh/hr/100 sq m. RTA surveys found that the daily traffic generation of shopping centres is about 10 times the afternoon peak hour generation. The resulting daily rates are thus supermarkets, 138 veh/day/100 sq m, and shops, 56 veh/day/100 sq m, with these rates derived from Friday surveys, which is appropriate given that Friday is likely to be the peak weekday at Boat Harbour. For the AM peak hour, from the RMS 2010/2011 shopping centre surveys, the ratio of AM Peak Trips/PM Peak Trips had a mean of 0.55. This can be used to estimate the AM peak hour trips from the PM peak hour trips.

Office and Commercial

Maunsell use the 2002 Guide rate of 10.0 veh/day/100 sq m (and a peak hour rate of 2.0 veh/hr/100 sq m). The RMS 2013 recommended rate is 11.0 veh/day/100 sq m, and peak hour figures of 1.6 veh/hr/100 sq m (AM) and 1.2 veh/hr/100 sq m (PM). This suggests a spreading of the peak movements.

Technology Park

Maunsell suggest a rate of 5.5 veh/day/100 sq m. The RTA 2002 Guide recommends for Factories 5 veh/day/100 sq m and 1 veh/hr/100 sq m, while for Business Parks there is no daily figure but there is a peak hour figure of 1.1 veh/hr/100 sq m. The Maunsell rate is this Business Park rate multiplied by the Factories peak to day expansion factor.

The RMS 2013 document presents different rates for Sydney and for Regional, with the Sydney rate being 4.60 veh/day/100 sq m and the Regional rate being 7.83 veh/day/100 sq m. It would be

prudent to use the new Regional rates. The peak hour rates are 0.70 veh/hr/100 sq m (AM) and 0.78 veh/hr/100 sq m (PM).

Retirement Village

The Maunsell rate of 6 veh/day/dwelling is high, and higher than the standard RTA Guide rate of 2 veh/day/dwelling. RMS 2013 recommend a rate of 2.1 veh/day/dwelling, which is close to the 2002 Guide rate, and with a peak hour rate of 0.4 veh/hr/dwelling, but with this peak rate not occurring during the commuter peak hours. We recommend using the new 2.1 veh/day/dwelling rate.

Hotel

Maunsell suggest a rate of 32 veh/day/100 sq m. However the 2002 RTA Guide provides no rates, so the origin of this rate is not known.

For hotels, we consider that the generation needs to be broken down into accommodation and tavern (bar and bistro). For Accommodation we suggest the use of the 2002 Guide rate for Motels, of 3.0 veh/day/unit and 0.4 veh/hr/unit, assuming one-bedroom units. For two-bedroom units within an apartment hotel, we recommend using the apartment unit regional rates of 4.58 veh/day/unit, 0.53 veh/hr/unit (AM) and 0.32 veh/hr/unit (PM).

For the Tavern component, the RTA have always recommended that comparisons be drawn with similar developments. With the lack of details on the type of hotel and tavern proposed for the precinct, this is difficult. As a guide, we recommend using the RTA Guide rate for Restaurants, of 60 veh/day/100 sq m and 5.0 veh/hr/100 sq m for the evening peak hour.

Restaurant

As above, we recommend using the RTA 2002 Guide rates of 60 veh/day/100 sq m and 5.0 veh/hr/100 sq m.

Library/Community

Maunsell recommend a rate of 5 veh/day/100 sq m. The RTA 2002 Guide rates for Office/commercial are 10 veh/day/100 sq m and 2.0 veh/hr/100 sq m. The RMS 2013 rates are 11 veh/day/100 sq m, 1.6 veh/hr/100 sq m (AM) and 1.2 veh/hr/100 sq m (PM).

With car parking for the Community Centre being at the same rate of one space/40 sq m as the RTA Guide, we recommend using the 2013 rates for this use. For the Library floor area, with lower rates of parking provision, we recommend using the Maunsell rate of 5 veh/day/100 sq m.

Marina

This is a difficult land use to assess. It is a very seasonal use. From our surveys at Rose Bay and Point Piper Marinas on Sydney Harbour, compared with an assumed peak usage in December, the monthly variations between July and January were found to be:

July 53%; August 49%; September 59%; October 59%; November 50%; December 100%; January 79%

Marina usage tends to be busy on Summer weekends and not very busy on weekdays, or out of the warmer months. While some marinas on Sydney Harbour and Pittwater can have weekday evening peak usage through yacht races, this is not expected to be a feature of boat usage at Shell Cove. An important traffic generation will be from the commercial vessels, and even these will have seasonal variations in use, with whale watching only on some months of the year, and with weekends being busier than weekdays. Other commercial uses such as off-shore game fishing and diving will also likely to be busier on the weekend. Transient boat users who call in at the marina when sailing past will have minimal traffic generation, unless they hire a car for a few days.

We have based our traffic generation assessment on observed person movements per hour at Rose Bay & Point Piper Marinas on Summer weekends, with the factoring taking into account the parking supply for Boat Harbour Marina. As separately reviewed, we recommend the provision of 40 car parking spaces for Stage 1 of the marina, including provision for the five commercial vessel berths, with the intent being to undertaken monitoring of parking demand for the marina prior to further marina stages. For this assessment of the ultimate traffic generation of a 300 berth marina, for the balance of the 250 berths, we have assumed the rate of 0.223 spaces per berth, which is the rate for berths longer than 20m that we found in our extensive marina parking research. This requires an additional 55 spaces, taking the total to 95 spaces. Table 2.1 sets out our analysis of the hourly traffic movements on a Summer weekend, for Stage 1 and for Ultimate development of the 300 berth marina, based on surveys at Rose Bay and Point Piper Marinas. Note that the absolute figures for person movements at Rose Bay/Point Piper do not transpose into the car movements shown. The distribution of the person movements has been used to determine the traffic movements, assuming 100% use of the parking provided at some time during the day.

Table 2.1 Summer Weekend Person Movement and Traffic Generation

Time	Rose Bay Persons IN	Rose Bay Persons OUT	Shell Cove S1 Cars IN	Shell Cove S1 Cars OUT	Shell Cove Parking	Shell Cove Cars IN	Shell Cove Cars OUT	Shell Cove Parking
8-9am	7	0	6	0	6	15	0	15
9-10am	14	0	13	0	19	31	0	46
10-11am	15	2	14	2	31	33	4	75
11-12pm	7	3	7	2	36	15	5	85
12-1pm	7	3	6	2	40	15	5	95
1-2pm	2	7	2	6	36	5	15	85
2-3pm	4	8	4	8	32	10	18	77
3-4pm	1	12	1	12	21	3	29	51
4-5pm	0	20	0	19	2	0	46	5
Total	57	55	53	51	-	127	122	-

From Table 2.1 it can be seen that for Stage 1 of the marina, assuming all allocated parking is used, on a Summer weekend day the daily two-way traffic movements will be about 106 veh/day, while for the ultimate development of the marina, with 300 berths, the daily two-way traffic movements will be about 254 veh/day.

For weekdays, the use of the marina will be substantially lower. Again, based on usage rates observed at other marinas over the week, we have conservatively assumed that the weekday generation will be 50% of the weekend generation, or 53 veh/day for the Stage 1 and 127 veh/day for the 300 berth marina. For reviewing weekday peak periods, the same 50% reduction can be assumed, so that for the morning and afternoon peak hours, the traffic movements will be:

Period	Weekday 50 berths	Weekday 300 berths
8-9am	3 veh/hr	8 veh/hr
4-5pm	10 veh/hr	23 veh/hr

As stated, the Stage 1 will include the five commercial vessel berths, which will have substantially higher rates of usage, while the additional 250 berths are assumed to be more typical private berths, with lower rates of use and parking demand.

2.3 Precinct Traffic Generation

As discussed in the Masterplan report, the TRACKS model assumed the total Shell Cove area to have a generation of 50,551 veh/day, with about 35% of this, or 18,000 veh/day from the Boat Harbour Precinct. The Maunsell assessment found a lower generation from the Boat Harbour Precinct, of about 14,000 veh/day, but to be conservative, Maunsell used the TRACKS outputs in their review of road hierarchy and intersections.

To check that this Maunsell assessment is still valid for the current mix of uses at the Boat Harbour Precinct, we have applied our generation rates set out in Section 2.2 to this current mix. This review includes residential flat buildings along the northern edge of the Precinct, where final apartment yields are not confirmed, but the numbers set out below are the current estimates.

Similarly for the apartment hotel, the assessment is based on the current projection of 110 two-bedroom apartments where 48 of these are dual-key, allowing separate use as 96 one-bedroom rooms. Some apartments within this hotel will be full-time residential. The traffic generation has been based on 96 motel units plus 62 two-bedroom apartments. This apartment hotel will include lobby, reception and various services that will not generate traffic in their own right. Some conference area is likely, but this has been assumed to be used by hotel residents only and not operate as an independent function centre. Current planning does not include public bar and restaurant facilities in this hotel, although there could be a low key lobby bar catering for in-house guests and residents.

Marine Offices

- 301 sq m @ 11/100 sq m/day = 33 veh/day
- AM peak @ 1.6/100 = 5 veh/hr; PM peak @1.2/100 = 4 veh/hr

Restaurants

- 592 sq m internal plus 225 sq m external = 817 sq m GFA assumed
- 817 sq m @ 60/100sq m/day = 490 veh/day
- AM peak 0; PM peak @ 5/100/hr = 41 veh/hr

Supermarket

- 3600 sq m GFA @ 13.8 veh/100 sq m/hr (Friday) = 497 veh/hr PM

- AM figure is 0.55 x 497 = 273 veh/hr
- Daily x10 = 4970 veh/day

Shops

- 1424 sq m GFA @ 5.6 /100 sq m/hr (Friday) = 80 veh/hr PM
- AM figure is 0.55 x 80 = 44 veh/hr
- Daily x 10 = 800 veh/day

Community/Library

- Community 910 sq m @ 10/100 sq m/day = 91 veh/day
- Peak @ 2.0 veh/100 sq m/hr = 18 veh/hr
- Library 685 sq m @ 5/100 sq m /day = 34 veh/day
- Peak @ 1.0 veh/100 sq m/hr = 7 veh/hr

Tavern

- 955 sq m indoors plus 280 sq m outdoors = 1235 sq m total GFA
- Daily 1235 sq m @ 60/100 sq m/day = 741 veh/day
- PM Peak 1235 sq m @ 5/100 sq m/hr = 62 veh/hr
- AM Peak: assume 0.1 x 62 = 6 veh/hr

Residential Apartments - East

- 25 apartments @ 4.58/day = 114 veh/day
- AM peak @ 0.53/hr = 13 veh/hr; PM peak @ 0.32/hr = 8 veh/hr

Residential Apartments – North

- 152 apartments @ 4.58/day = 696 veh/day
- AM peak @ 0.53/hr = 81 veh/hr; PM @ 0.32 = 49 veh/hr

Apartment Hotel

- 96 one-bedroom rooms @ 3.0/room/day =288 veh/day
- 62 two-bedroom units @ 4.58/unit/day = 284
- Peak 96 one-bedroom rooms @ 0.4 veh/room/hr =38 veh/hr AM & PM
- Peak 62 two-bedroom units @ 0.53/unit/hr = 33 veh/hr (AM); 62 @ 0.32/unit/hr = 20 veh/hr (PM)

Marina

- Stage 1 106 veh/day Weekend, 53 veh/day Weekday
- Stage 1: AM weekday 3 veh/hr; PM weekday 10 veh/hr
- Ultimate: 254 veh/day Weekend, 127 veh/day Weekday
- Ultimate: AM weekday 8 veh/hr; PM weekday 23 veh/hr

Total Precinct

Table 2.2 gives the projected daily and peak hour flows for the Precinct.

Table 2.2 Projected Weekday Traffic Generation of Boat Harbour Precinct

Land Use	Vehicles/Day	AM Peak Veh/Hr	PM Peak Veh/Hr
Marine offices	33	5	4
Restaurants	490	0	41
Supermarket	4970	273	497
Shops	800	44	80
Community/library	125	25	25
Tavern	741	6	62
Residential apartments - East	114	13	8
Residential apartments – North	696	81	49
Apartment hotel	572	71	58
Marina	S1:53; Ult 127	S1 3; Ult 8	S1 10; Ult 23
Total	Ult: 8,668	526	847

Note that some of these trips would be multi-purpose, for example, people shopping and then going to a restaurant or tavern, local residents walking to the restaurants or tavern and marina users using the restaurants or tavern after boating.

With the total weekday trip generation of about 18,000 veh/day that was estimated in the TRACKS modelling, the total in Table 2.2 of 8,668 veh/day is substantially less, and hence the analysis by Maunsell in their 2009 report of road hierarchy and intersections remains valid, with a conservative over-allowance for the total trips. This will allow for higher yields than currently proposed.

As a cross-check, we reviewed the land use information in Table 2.1 of the Maunsell report. For the Boat Harbour Precinct, and using our preferred generation rates, we estimated a total daily flow of 13,300 veh/day, plus marina traffic, for a total of under 13,500 veh/day. This compares with our estimate of 8,668 veh/day. For the remaining precinct land uses in the Maunsell Table 2.1, and using our generation rates, we estimate a total daily flow of just under 18,000 veh/day. Added to Boat Harbour Precinct this yields about 31,500 veh/day, a figure less than the 50,500 veh/day projected by the TRACKS model. The traffic flow outputs from the TRACKS model remain conservative.

The original assessment by Maunsell of the major road intersections along Harbour Boulevarde were reviewed in our report *Shell Cove Boat Harbour Precinct Masterplan Traffic and Parking Assessment.* For the proposed Stage 1, further review of these Harbour Boulevarde intersections is not required, only an assessment of the roads and intersections to the east of Harbour Boulevarde. Based on the traffic projections set out in Table 2.2 and on our assumptions on traffic distribution, we have prepared Figure 2 to set out *Projected Peak Hour Traffic Flows.* This Figure is used in Section 3.5, in our assessment of roads and intersection capacity.

3.0 STAGE 1 DEVELOPMENT APPLICATION

3.1 Description

Section 2.1 set out details of the proposed total development of the Shell Cove Boat Harbour Precinct. The proposed Stage 1 will consist of the following components:

- Supermarket 3600 sq m
- Liquor (specialty) shop 200 sq m
- Specialty shops 753 sq m

Figure 3 shows the Staging Plan for Shell Cove, with the Stage 1 areas delineated. Figure 4 shows the Ground Floor Plan and Figure 5 shows the Basement Plan. Car parking is proposed at-grade west of the supermarket, in a basement under the supermarket plus on-street spaces on Road 10. Other parking areas shown on Figure 3 are not included in this Stage 1 DA.

3.2 Access and Loading

Figure 4 shows Cove Boulevarde (Road 10) providing access to the car parking from the North and West, travelling down the private road to the parking, either in the ground level area or via the ramp down to the basement area. From the South, Road MC01 will provide access off Harbour Boulevarde and off the minor residential streets to the immediate south of the Precinct. The road in front of the supermarket is envisaged as a private road, in effect being an accessway into the car parking. Figure 5 shows the Basement parking, with ingress via a ramp from this private road and egress via a ramp to Road MC01.

The car parking has been designed to comply with AS/NZS2890.1-2004. There are some differences between the details in this Standard compared with *Shellharbour Development Control Plan.* As discussed with Council, it has been decided to comply with AS/NZS2890.1, and where possible also comply with the DCP. The standard parking space dimensions adopted are 5.5m x 2.6m, with an aisle width of 6.6m. This follows the requirement for a User Type 3A use, for shopping centres.

Looking at Figure 4, there will be three on-street parallel spaces at the northern end of the private road, just south of its junction with Road 10. One of these spaces will be allocated to taxis. In Road 10 (Cove Boulevarde) there will be parallel on-street parking spaces on both sides.

The main parking area will have four aisles off the private road and will allow free circulation. Trolley bays are included in the layout. A total of 4 parking spaces for disabled persons are proposed. At a rate of approximately 3% of total, this is a satisfactory level of provision.

With the locations marked for pedestrians to cross the parking aisles and across the private road, these should be outlined in differential paving and/or painting, but not marked as formal marked footcrossings, which have a legal significance. They are within a private road and parking area. The crossing over the road just south of Road 10 will provide a link between the pedestrian mall area and

the parking area west of this road. The approaches to this crossing will have a minimum of 9m of "No Stopping" and 3m of "No Stopping" on the departure side, to ensure there is adequate visibility. At the southern end there is no on-street parking near the crossing point.

The bus bay proposed is satisfactory, with an adequate length for a bus to pull in and out.

Immediately south of the bus bay there is the one-way entry ramp down to the Basement parking area. This will have transition sections of 1:12 and centre ramp gradient of 1:8. These gradients are very satisfactory.

In Road MC01, some parallel parking spaces are proposed along the southern side, but these do not form part of the Stage 1 parking supply relied upon.

Road MC01 also provides access to the loading dock at the southern side of the supermarket building. This loading dock area will provide two docks for the supermarket, with one of these docks suitable for 19m articulated trucks. There will also be a smaller dock for the specialty shops. With the large 19m articulated trucks, they will approach along Road MC01 from Harbour Boulevarde, turn left into the first dock driveway, drive towards the specialty shops loading area, and then reverse back into the supermarket dock. On leaving, this 19m truck will make a short-radius right-turn through the second dock driveway and back onto Road MC01, towards Harbour Boulevarde.

Figure 5 shows the proposed Basement parking area. This has been designed to meet the required Standards. It is accessed via a one-way entry ramp down from the private road, with the egress proposed via a one-way ramp at the eastern side to Road MC01. As shown on Figure 4, this ramp will be adjacent to the egress from the loading dock. This position is satisfactory, and takes into account future development to the East. With this egress on a bend, there will be easy vision by drivers both to the West and to the South. The position of this egress has been considered in the context of future development to the East. With regard to sight lines to pedestrians, AS/NZS requires sight line splays of 2.5m inside the property boundary, splaying out to 2.0m on each side of the driveway. The front fence near the loading dock will be set back more than 2.5m from the site boundary, and certainly more than 2.5m from the footpath alignment. Hence this requirement of the Standard will be met. Consideration might be given to cutting a splay in the corner of the side walls, between the driveway and the loading dock. This is not essential, but could be useful to improve general sight lines.

The Basement parking layout will have two primary north-south aisles and four secondary east-west aisles. This is a neat and efficient layout. There will be four parking spaces for disabled persons adjacent to the travelator and lift. There will be 17 spaces for small cars along the western side of the basement.

3.3 Car Parking

The car parking for Stage 1 has been assessed using the parking rates set out in the DCP:

- Supermarket 3600 sq m @ one space per 20 sq m = 180 spaces
- Specialty shops 753 sq m @ one space per 35 sq m = 21.51 spaces
- Liquor (specialty) shop 200 sq m @ one space per 35 sq m = 5.71 spaces
- Total for Stage 1 = 207.22 spaces, so 207

The proposed parking supply shown on Figures 4 and 5 is 270 spaces, exceeding the requirements of the DCP, and hence will be satisfactory. This number is comprised of 14 kerbside spaces in Road 10, 124 spaces at ground level west of the supermarket, including two on-street spaces in the private rroad (not including the taxi space) and 132 spaces in the basement under the supermarket. With a DCP requirement for 207 spaces and a Stage 1 supply of 270 spaces, the surplus of 63 spaces will be allocated to the future Stage 2 development.

3.4 Traffic Generation

Based on the traffic generation rates set out in Section 2.3, the projected weekday peak hour traffic generation of Stage 1 will be:

- Supermarket (3600 sq m) 273 veh/hr AM and 497 veh/hr PM
- Specialty shops (953 sq m) 29 veh/hr AM and 53 veh/hr PM
- Total 302 veh/hr AM and 550 veh/hr PM

However for the assessment of intersections, we have used the projected peak hour flows for the total ultimate development, as set out in Table 2.2, of 526 veh/hr in the morning peak hour and 847 veh/hr in the evening peak hour. The traffic distribution shown on Figure 2 has been assumed. As indicated, the traffic flows on Figure 2 include ALL future traffic to and from the town centre.

3.5 Traffic Impact

As seen on Figure 2, the majority of traffic to the supermarket is likely to come from Cove Boulevarde, from origins to the North and West. In the private road, into the supermarket parking area, the multiple aisles will distribute traffic turning movements over four locations, plus the basement access. The “through” traffic along this road will simply be trips between residential areas to the immediate south of the town centre into the community centre, plus some trips between the North-East and the tavern area. Occasional bus movements would be additional. With this relatively low traffic flow level, there will be no problems with buses pulling in and out of the bus bay.

In Cove Boulevarde (Road 10), the two-way peak hour flow between Harbour Boulevarde and the private road is projected to be 235 veh/hr in the morning peak hour and 326 veh/hr in the evening peak hour. In Cove Boulevarde east of the above junction, the projected traffic flow through the

Shared Zone is 40 veh/hr two-way total in the morning peak hour and about the same in the evening peak hour. These are comfortably low levels of flow through this pedestrian oriented Shared Zone.

At the junction of Cove Boulevarde and the private road, a simple priority junction is proposed, with priority given to Cove Boulevarde traffic, with Give Way signs on the side approaches. The operation of this priority junction has been assessed using the SIDRA6 traffic model. A guide to the significance of the outputs from this model is found in the RMS's *Guide to Traffic Generating Developments,* and is reproduced in Table 3.1 below.

Table 3.1 Level of Service Criteria For Intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabouts	Give Way & Stop signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident Study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode

The full results of the SIDRA analysis are set out in the Appendix. Table 3.2 summarises the key results.

Table 3.2 SIDRA Analysis of Cove Boulevarde (Road 10) & Private Road – Ultimate Traffic Flows

Approach	Move	AM Delay (secs/veh)	AM Level Of Service	AM 95% Queue (m)	PM Delay (secs/veh)	PM Level Of Service	PM 95% Queue (m)
Pvt Road	Left	6	A	1	6	A	4
South	Thru	5	A	1	5	A	4
	Right	6	A	1	6	A	4
Cove Bld	Left	6	A	1	6	A	1
East	Thru	0	A	1	0	A	1
	Right	6	A	1	6	A	1
Pvt Road	Left	7	A	2	7	A	1
North	Thru	5	A	2	5	A	1
	Right	6	A	2	7	A	1
Cove Bld	Left	6	A	3	6	A	4
West	Thru	0	A	3	0	A	4
	Right	6	A	3	6	A	4
ALL	All	5.0	(A)	(3)	5.2	(A)	(4)

Table 3.2 indicates that this intersection, operating under priority control, with priority to Cove Boulevarde traffic, would have low delay levels and a good level of service of A on all movements, in both future peak periods. Thus priority control for this intersection will be satisfactory.

Road MC01 is projected to carry a morning peak hour two-way flow of about 110 veh/hr, and an afternoon peak hour flow of about 360 veh/hr, east of Harbour Boulevarde. East of the private road the flows will be lower, with a morning two-way peak hour flow of about 60 veh/hr and an afternoon peak hour flow of about 260 veh/hr. The location of the egress from the supermarket basement parking area is the main generator of traffic in this part of the network. The intersection of Road MC01 and the private road will be a simple priority control junction, with priority to Road MC01 traffic, and Give Way signs on the minor road approaches. This has been modelled in SIDRA as having one lane approaches, as a worst case analysis. The currently proposed design will have the approach on Road MC01 from Harbour Boulevarde having a left turn lane as well as a central through plus right lane. The full results of the SIDRA analysis are set out in the Appendix, with Table 3.3 summarising the results.

Table 3.3 SIDRA Analysis of Road MC01 and Private Road – Ultimate Traffic Flows

Approach	Move	AM Delay (secs/veh)	AM Level Of Service	AM 95% Queue (m)	PM Delay (secs/veh)	PM Level Of Service	PM 95% Queue (m)
Pvt Road	Left	5	A	1	5	A	1
South	Thru	3	A	1	4	A	1
	Right	5	A	1	5	A	1
Road MC01	Left	5	A	1	5	A	5
East	Thru	<1	A	1	<1	A	5
	Right	5	A	1	5	A	5
Pvt Road	Left	5	A	1	6	A	1
North	Thru	4	A	1	5	A	1
	Right	5	A	1	6	A	1
Road MC01	Left	5	A	2	5	A	3
West	Thru	0	A	2	<1	A	3
	Right	5	A	2	5	A	3
ALL	All	3.6	(A)	(2)	2.7	(A)	(5)

Table 3.3 indicates that this intersection will function in a very satisfactory manner under priority control. While this analysis has assumed one lane approaches, the proposed design shown on Figure 3 has an additional left turn lane for the Road MC01 approach from the Harbour Boulevarde roundabout, to ensure free flowing traffic into the supermarket parking area.

With pedestrian movements, there will be footpaths beside the roads in this Stage 1 development. We recommend that the splitter islands on the roundabouts on Harbour Boulevarde incorporate pedestrian refuges, or at least island breaks to enable pedestrians to shelter, allowing them to cross each direction of traffic flow at one movement at a time. On Road MC01 the directional flows east of the roundabout are projected to be about 110 veh/hr in the morning peak hour and 360 veh/hr in the afternoon peak hour. The morning peak hour is reasonable for a pedestrian to cross. In the afternoon the total two-way flows are getting higher, but a pedestrian splitter island or median break will assist through allowing crossings to be undertaken in two movements. East of the private

road junction the flows in Road MC01 will be lower, with about 50 veh/hr two-way in the morning and about 260 veh/hr two-way in the afternoon.

In Cove Boulevarde (Road 10), the peak directional flows east of the Harbour Boulevarde will be 160-170 veh/hr. These flow levels are not too high for a pedestrian to cross. East of the private road junction the flows will be lower and will be suitable for a Shared Zone. Traffic flows along Harbour Boulevarde will however be higher, which is why our report *Shell Cove Boat Harbour Precinct Masterplan Traffic and Parking Assessment* suggests that an option in the longer term would be to install traffic signals at the Harbour Boulevarde/Cove Boulevarde junction, for pedestrian safety reasons.

4.0 CONCLUSIONS

1. Our report *Shell Cove Boat Harbour Precinct Masterplan Traffic and Parking Assessment* sets out the wider planning of the road network at the Shell Cove Boat Harbour Precinct and the major intersections. This report also covers the cumulative parking demand issue for the ultimate development of the Precinct.
2. The first stage of the development will be the construction of the 3600 sq m supermarket, plus 953 sq m of specialty shops. The parking for this first stage will be to the immediate west of the supermarket and shops, in a basement under the supermarket and in front of a row of shops north of Road 10.
3. The car parking areas have been designed to comply with AS/NZS2890.1-2004, as a minimum, with spaces 5.5m x 2.6m, and 6.6m wide aisles. The proposed parking layouts are satisfactory.
4. The loading docks will be at the southern end of the supermarket building and will provide two docks for the supermarket, plus a dock for smaller vehicles servicing the specialty shops. Adequate space has been provided for the manoeuvring of service vehicles.
5. The DCP requires a total of 207 parking spaces. A total of 270 spaces will be provided as part of the Stage 1 development. The excess of 63 spaces will be applied to the next stage of development.
6. To assess the capacity of the intersections within Stage 1, the ultimate projected peak hour flows have been used. The intersections of Cove Boulevarde (Road 10) with Private Road, and Road MC01 with Private Road will be simple priority controlled junctions. The intersection analysis has shown that they will have ample capacity for the peak hour flows.
7. Footpaths will be provided on roads within this Stage 1 development. The splitter islands on the Harbour Boulevarde roundabouts will assist pedestrians to cross Cove Boulevarde and Road MC01. East of Private Road, the projected peak hour flows are lower and hence it will be easier for pedestrians to cross the roads.
8. In conclusion, the traffic and parking implications of the Stage 1 development of Shell Cove Boat Harbour Precinct will be satisfactory.

FIGURE 1 SHELL COVE BOAT HARBOUR PRECINCT

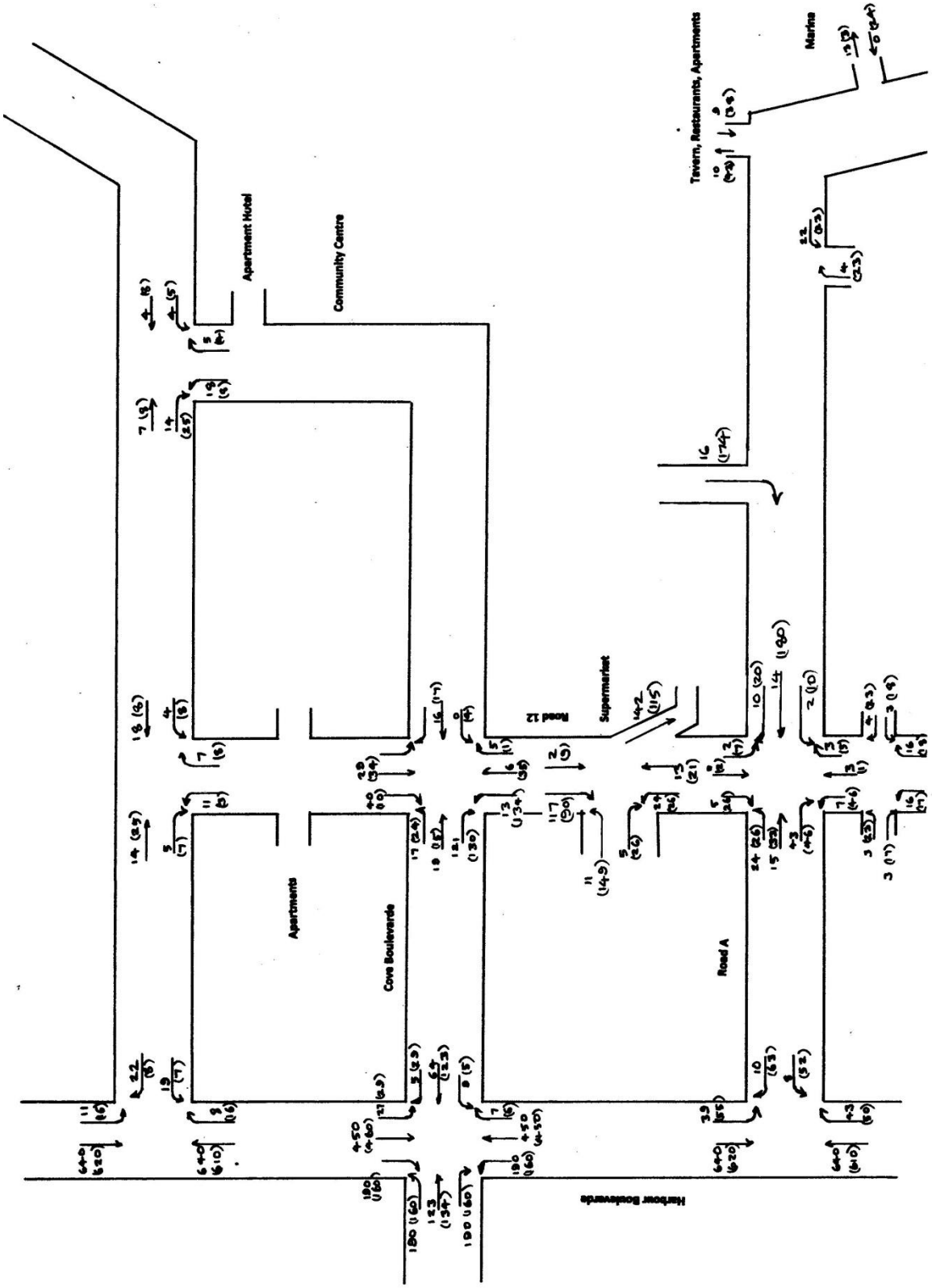

FIGURE 2 PROJECTED PEAK HOUR TRAFFIC FLOWS

KEY: 10 AM peak; (10) PM peak

FIGURE 3 STAGING PLAN

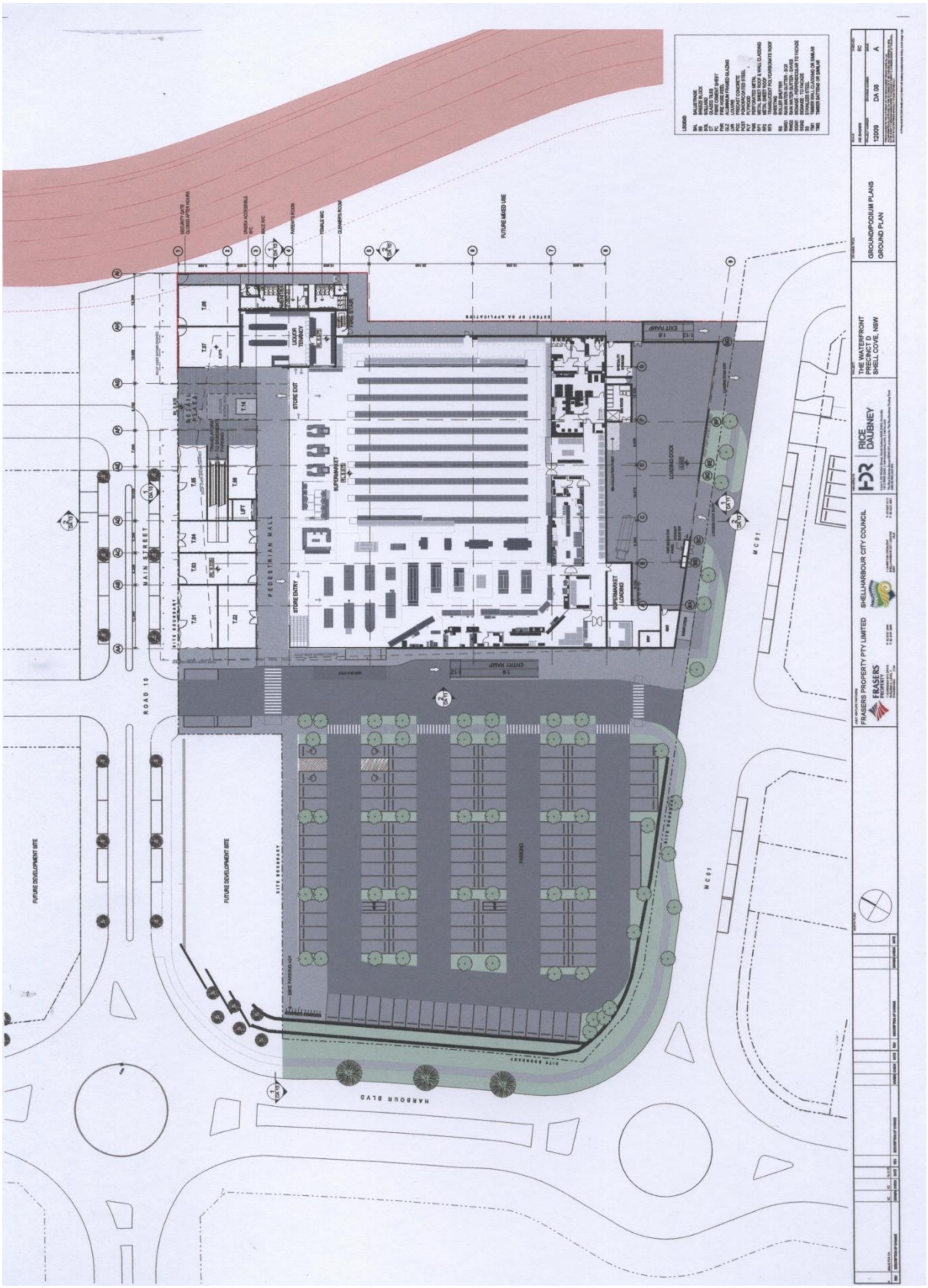

FIGURE 4 GROUND PLAN

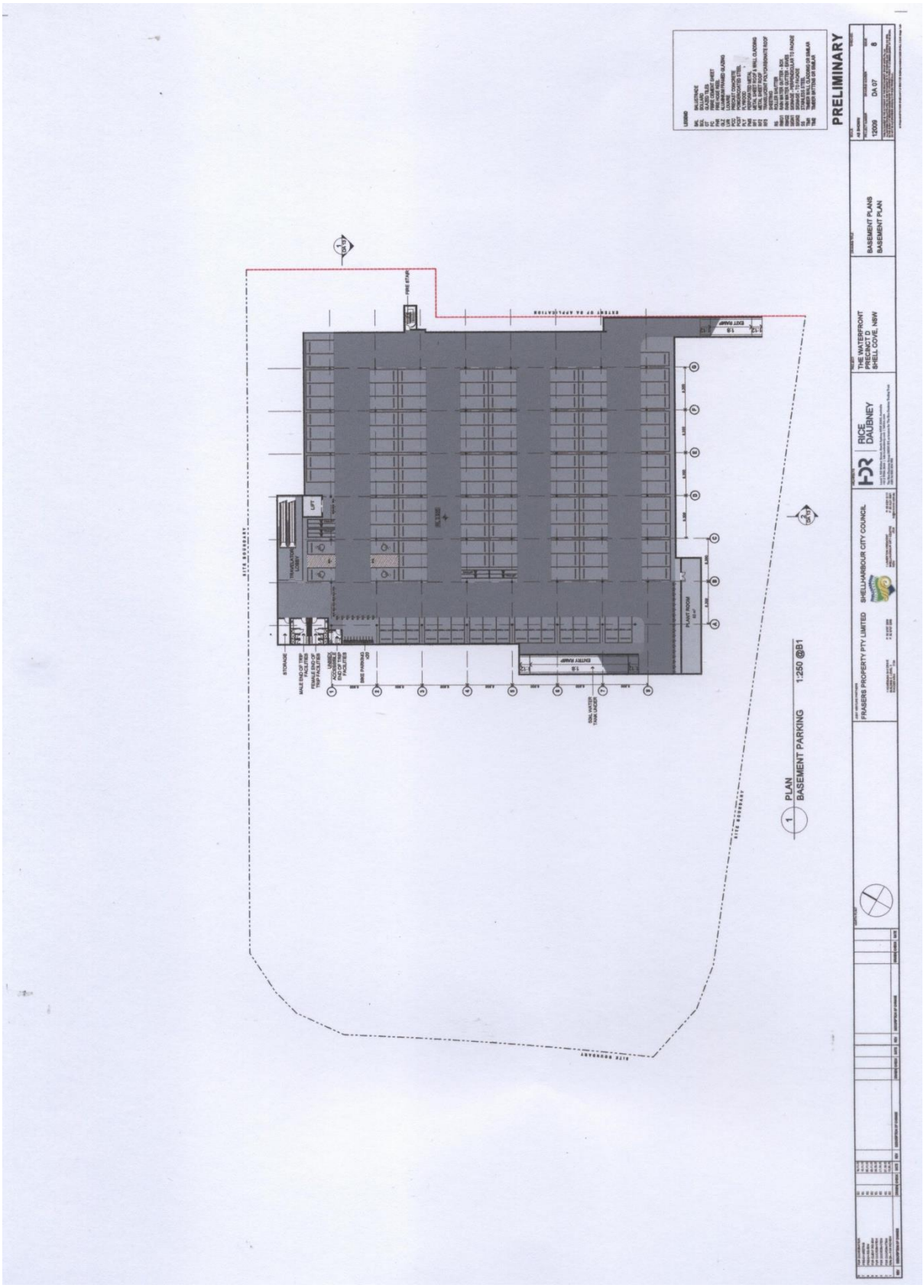

FIGURE 5 BASEMENT PLAN

APPENDIX SIDRA INTERSECTION ANALYSIS RESULTS

MOVEMENT SUMMARY

Site: Cove Boulevarde/Road 12

Future AM Peak
One lane approaches
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road 12 South											
1	L2	23	5.0	0.027	5.9	LOS A	0.1	0.7	0.05	0.56	53.4
2	T1	6	5.0	0.027	4.5	LOS A	0.1	0.7	0.05	0.56	53.5
3	R2	5	5.0	0.027	5.8	LOS A	0.1	0.7	0.05	0.56	52.8
Approach		35	5.0	0.027	5.7	LOS A	0.1	0.7	0.05	0.56	53.3
East: Cove Bld East											
4	L2	5	5.0	0.015	5.7	LOS A	0.1	0.5	0.12	0.21	55.8
5	T1	17	5.0	0.015	0.1	LOS A	0.1	0.5	0.12	0.21	57.5
6	R2	5	5.0	0.015	5.6	LOS A	0.1	0.5	0.12	0.21	55.2
Approach		27	5.0	0.015	2.2	NA	0.1	0.5	0.12	0.21	56.7
North: Road 12 North											
7	L2	5	5.0	0.079	6.5	LOS A	0.3	2.0	0.21	0.58	53.1
8	T1	31	5.0	0.079	5.1	LOS A	0.3	2.0	0.21	0.58	53.3
9	R2	42	5.0	0.079	6.4	LOS A	0.3	2.0	0.21	0.58	52.6
Approach		78	5.0	0.079	5.9	LOS A	0.3	2.0	0.21	0.58	52.9
West: Cove Bld west											
10	L2	18	5.0	0.095	5.7	LOS A	0.5	3.4	0.09	0.50	53.7
11	T1	20	5.0	0.095	0.1	LOS A	0.5	3.4	0.09	0.50	55.3
12	R2	127	5.0	0.095	5.6	LOS A	0.5	3.4	0.09	0.50	53.2
Approach		165	5.0	0.095	4.9	NA	0.5	3.4	0.09	0.50	53.5
All Vehicles		305	5.0	0.095	5.0	NA	0.5	3.4	0.12	0.50	53.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA INTERSECTION 6

MOVEMENT SUMMARY

▽ Site: Cove Boulevarde/Road 12

Future PM Peak
One lane approaches
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road 12 South											
1	L2	137	5.0	0.128	5.9	LOS A	0.5	3.9	0.06	0.55	53.4
2	T1	37	5.0	0.128	4.5	LOS A	0.5	3.9	0.06	0.55	53.6
3	R2	5	5.0	0.128	5.8	LOS A	0.5	3.9	0.06	0.55	52.9
Approach		179	5.0	0.128	5.6	LOS A	0.5	3.9	0.06	0.55	53.4
East: Cove Bld East											
4	L2	5	5.0	0.016	5.7	LOS A	0.1	0.6	0.12	0.20	55.8
5	T1	18	5.0	0.016	0.1	LOS A	0.1	0.6	0.12	0.20	57.6
6	R2	5	5.0	0.016	5.6	LOS A	0.1	0.6	0.12	0.20	55.3
Approach		28	5.0	0.016	2.2	NA	0.1	0.6	0.12	0.20	56.8
North: Road 12 North											
7	L2	5	5.0	0.051	6.6	LOS A	0.2	1.3	0.15	0.55	53.4
8	T1	36	5.0	0.051	5.2	LOS A	0.2	1.3	0.15	0.55	53.6
9	R2	11	5.0	0.051	6.5	LOS A	0.2	1.3	0.15	0.55	52.8
Approach		52	5.0	0.051	5.6	LOS A	0.2	1.3	0.15	0.55	53.4
West: Cove Bld west											
10	L2	25	5.0	0.102	5.7	LOS A	0.5	3.7	0.09	0.51	53.6
11	T1	16	5.0	0.102	0.1	LOS A	0.5	3.7	0.09	0.51	55.2
12	R2	137	5.0	0.102	5.6	LOS A	0.5	3.7	0.09	0.51	53.0
Approach		178	5.0	0.102	5.1	NA	0.5	3.7	0.09	0.51	53.3
All Vehicles		437	5.0	0.128	5.2	NA	0.5	3.9	0.09	0.51	53.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Shell Cove Centre

Roads MC01 and 12
Future AM Peak
One lane approaches
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road 12 South											
1	L2	7	5.0	0.011	4.8	LOS A	0.0	0.3	0.06	0.51	46.6
2	T1	3	5.0	0.011	3.4	LOS A	0.0	0.3	0.06	0.51	46.7
3	R2	3	5.0	0.011	4.8	LOS A	0.0	0.3	0.06	0.51	46.2
Approach		14	5.0	0.011	4.5	LOS A	0.0	0.3	0.06	0.51	46.5
East: Road A East											
4	L2	2	5.0	0.015	4.7	LOS A	0.1	0.5	0.12	0.24	47.8
5	T1	15	5.0	0.015	0.1	LOS A	0.1	0.5	0.12	0.24	48.3
6	R2	11	5.0	0.015	4.7	LOS A	0.1	0.5	0.12	0.24	47.3
Approach		27	5.0	0.015	2.2	NA	0.1	0.5	0.12	0.24	47.9
North: Road 12 North											
7	L2	2	5.0	0.008	5.0	LOS A	0.0	0.2	0.09	0.52	46.4
8	T1	1	5.0	0.008	3.6	LOS A	0.0	0.2	0.09	0.52	46.5
9	R2	5	5.0	0.008	5.0	LOS A	0.0	0.2	0.09	0.52	46.0
Approach		8	5.0	0.008	4.8	LOS A	0.0	0.2	0.09	0.52	46.2
West: Road A West											
10	L2	26	5.0	0.049	4.7	LOS A	0.2	1.7	0.07	0.43	46.9
11	T1	16	5.0	0.049	0.0	LOS A	0.2	1.7	0.07	0.43	47.4
12	R2	45	5.0	0.049	4.7	LOS A	0.2	1.7	0.07	0.43	46.4
Approach		87	5.0	0.049	3.8	NA	0.2	1.7	0.07	0.43	46.7
All Vehicles		137	5.0	0.049	3.6	NA	0.2	1.7	0.08	0.40	46.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

▽ Site: Shell Cove Centre

Roads MC01 and 12
Future PM Peak
One lane approaches
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Road 12 South											
1	L2	48	5.0	0.044	5.4	LOS A	0.2	1.2	0.29	0.53	45.9
2	T1	1	5.0	0.044	4.0	LOS A	0.2	1.2	0.29	0.53	46.0
3	R2	5	5.0	0.044	5.4	LOS A	0.2	1.2	0.29	0.53	45.5
Approach		55	5.0	0.044	5.3	LOS A	0.2	1.2	0.29	0.53	45.9
East: Road A East											
4	L2	11	5.0	0.119	4.8	LOS A	0.7	4.8	0.17	0.07	48.5
5	T1	189	5.0	0.119	0.2	LOS A	0.7	4.8	0.17	0.07	49.1
6	R2	21	5.0	0.119	4.8	LOS A	0.7	4.8	0.17	0.07	48.1
Approach		221	5.0	0.119	0.9	NA	0.7	4.8	0.17	0.07	49.0
North: Road 12 North											
7	L2	7	5.0	0.042	6.2	LOS A	0.1	1.0	0.19	0.56	45.7
8	T1	2	5.0	0.042	4.8	LOS A	0.1	1.0	0.19	0.56	45.7
9	R2	26	5.0	0.042	6.2	LOS A	0.1	1.0	0.19	0.56	45.2
Approach		36	5.0	0.042	6.1	LOS A	0.1	1.0	0.19	0.56	45.3
West: Road A West											
10	L2	26	5.0	0.067	5.3	LOS A	0.3	2.5	0.32	0.33	46.7
11	T1	35	5.0	0.067	0.7	LOS A	0.3	2.5	0.32	0.33	47.2
12	R2	48	5.0	0.067	5.3	LOS A	0.3	2.5	0.32	0.33	46.2
Approach		109	5.0	0.067	3.8	NA	0.3	2.5	0.32	0.33	46.6
All Vehicles		421	5.0	0.119	2.7	NA	0.7	4.8	0.22	0.24	47.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.