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Shute Harbour Marina EIS– Traffic Impact Assessment

Prepared for Shute Harbour Marina Development Pty Ltd

July 2008

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1.0 EXECUTIVE SUMMARY

The Shute Harbour Marina Resort is a proposal consisting of an integrated marina, resort hotel, managed resort accommodation and commercial precinct. The proposal includes 669 marina berths, 109 hotel units and 117 lots for managed resort accommodation.

Development will only occur south and seaward of Shute Harbour Road greatly simplifying the road traffic and safety issues compared with other proposals for the site which included development on both sides of the road.

The Shute Harbour Marina Resort proposal more than meets the relevant requirements and standards in terms of traffic, parking and transport.

Key points of the proposed development in terms of traffic and transport are as follows:

- during construction from 2010 to 2012 it will have a maximum total traffic generation of some 171vph;
- site access will be able to be maintained via a single unsignalised T-intersection. A construction traffic management plan will be required prior to the commencement of construction;
- during operations after reaching full capacity it will have a traffic generation of 332vph;
- the single unsignalised T-intersection site accesses will provide good levels of service to both the proposed development and through traffic on Shute Harbour Road;
- sufficient sight distances are provided to and from the unsignalised T-intersection;
- 291-341 parking spaces required for the commercial precinct including provision for the marina berths and approximately 425 are provided
- pedestrian paths will be provided along the waterfront and the two collector roads;
- a bus lay-by is provided which can serve as a stop for the Whitsunday Transit as well as the courtesy bus provided by the developer.
- The contribution of $2.5 M by the developer to a new public boat ramp outside the development with up to 95 trailer boat parks will substantially relieve parking issues in the Shute Harbour precinct

2.0 INTRODUCTION

2.1 Background

Cardno Eppell Olsen has been commissioned by Shute Harbour Marina Development Pty Ltd to conduct a Traffic Impact Assessment (TIA) report for a proposed marina development which also needs to address the conditions specific to traffic and transport in the Terms of Reference (TOR).

The subject site is located at Shute Harbour; Airlie in North Queensland, on leasehold land described as lot 2 on SP117389 and adjacent seabed where a permit to occupy has been granted.

This report has been prepared for submission as part of an Environment Impact Statement.

The proposed development has two distinct precincts, one being the commercial precinct at the eastern end and the other a managed resort accommodation precinct at the western end. Sufficient car parking spaces are provided as part of each residential lot/unit and a three storey multi-level car parking structure for the commercial uses and berths. Parking for the hotel is provided by an underground facility. Separate to this development, the developer and council are in discussions to construct a new boat ramp separate to the ferry terminal which also provides for car with boat trailer parking.

The section of Shute Harbour Road along the site frontage is currently a standard two lane undivided road layout with a total sealed pavement width of approximately 6.0-6.5m with unsealed shoulders. No existing facilities or transport related infrastructure such as pedestrian paths, bicycle lanes, bicycle awareness zones or bus stops are provided. The verge does provide for limited overflow parking for cars with boat trailers and heavy vehicles waiting to unload/load barges but this is due to a high demand for recreational fishing and a lack of parking amenities in the area.

The proposed development has a single unsignalised T-intersection which will provide sufficient capacity for development traffic, construction and operation, and the through traffic on Shute Harbour Road. Sufficient sight distances are provided to and from the unsignalised T-intersection in both directions. A 12.5m road width (excluding verge) on Shute Harbour Road has been designed to provide for the cross section required by the Department of Main Roads to allow for an overtaking lane in the future.

In regards to the construction phase, the majority of trips will be to/from Airlie Beach along Shute Harbour Road. A construction programme and methodology has been produced and used to estimate the expected number of vehicle trips for workers and materials.

The longest loads were expected to be steel piles in excess of 20m long, but these will be formed by welding standard 12m piles together. A construction traffic management plan and pavement impact assessment would therefore form part of the conditions to Development Application. They will address the following:

- the volume, composition (types and quantities), origin of goods to be moved including construction and raw materials;
- anticipated times at which oversize movements may occur;
- details of oversize indivisible loads (including types and composition);
- the proposed transport routes; and
- increased road maintenance.

From the construction programme and methodology, a maximum total traffic generation of some 168vph is expected and a single unsignalised T-intersection will provide sufficient capacity for both construction traffic and the through traffic on Shute Harbour Road. The access allows for a swept path for a 19m articulated vehicle (AV). Should a larger vehicle be required on site, than this will need to be addressed in the construction traffic management plan.

During operation, the proposed development will have a total traffic generation of 332vph. The single unsignalised T-intersection site accesses will provide good levels of service to both the proposed development and through traffic on Shute Harbour Road. Pedestrian paths will be provided along the waterfront and the two collector roads. A bus lay-by is provided which can serve as a stop for the Whitsunday Transit as well as the courtesy bus provide by the developer.

2.2 Scope of Work

The scope of works required for this report has been identified in a Terms of Reference issued by the Queensland Government in June 2007 and in preparing this report, the following have been considered:

- detailed site traffic generation potential during operation & construction;
- the development impact on the surrounding road network, in particular on Shute Harbour Road;
- any new, modified or upgraded road infrastructure required as a result of the proposal;
- short and long term car parking provision and layout;
- the implications for existing and future public transport (scheduled public transport and courtesy services), pedestrian and bicycle facilities.

2.3 References

In preparing this report, reference to the following background materials have been made:

- AUSTROADS '*Guide to Traffic Engineering Part 5: Intersections at Grade'*;
- Queensland Transport "*draft Transport Assessment Guidelines";*
- Queensland Transport Crash Analysis Statistics;
- Roads & Traffic Authority, "*Guide to Traffic Generating Developments"*
- Department of Main Roads, '*Road Planning and Design Manual'*;
- Whitsunday Shire Council, *'Transitional Planning Scheme'* (16th June 2000);
- Whitsunday Shire Council, *'Draft IPA Planning Scheme'* (24th August 2006);
- peak hour traffic counts undertaken by Australasian Traffic Surveys.

3.0 EXISTING SITUATION

3.1 Subject Site

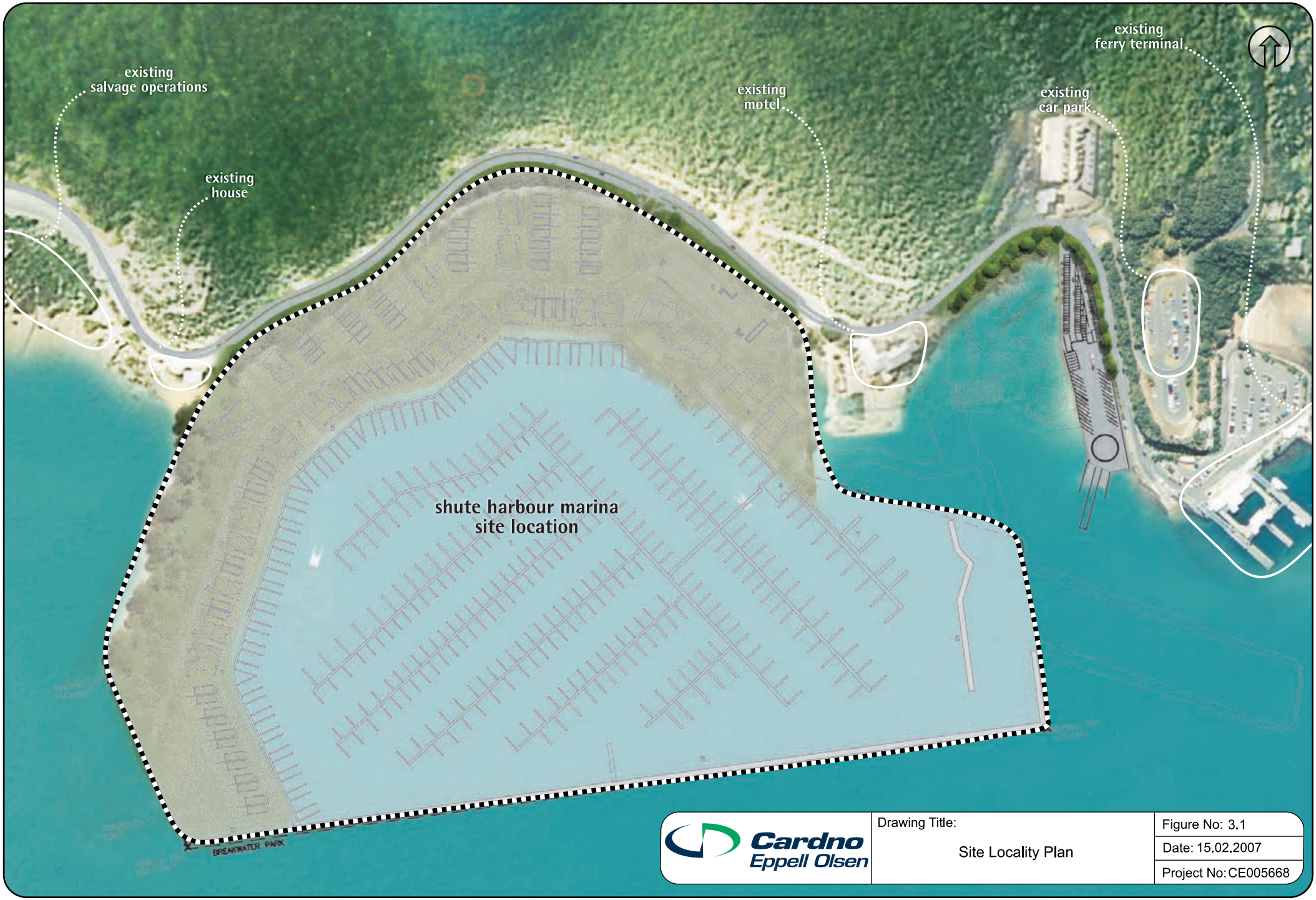
The subject is located at Shute Harbour, approximately 10 km east of Airlie Beach in North Queensland. The project area is bordered by Shute Harbour Road to the north and extends seaward to the south. Conway National Park to the north east and north west. Access to the site is proposed as a single unsignalised T-junction intersection along Shute Harbour Road.

The site is located west of the existing Shute Harbour Motel and east of a small house and existing marine salvage operation. Further to the east is a barge wharf used to supply the nearby islands of the Whitsundays and the Shute Harbour Transit Terminal which is the second busiest single ferry terminal in Australia., Small scale supporting commercial and retail development is also located at the Transit Terminal.

The location of the subject site and surrounding road networks and landmarks are shown in Figure 3.1.

3.2 Key Roads

Shute Harbour Road provides the only main connection along Airlie Beach. The Department of Main Roads (DMR) has gradually been upgrading the road from Proserpine/ Cannonvale/Airlie Beach towards Shute Harbour to a wider formation with sealed shoulders. The cross section of Shute Harbour Road east of the site is typically has a total sealed pavement width of approximately 9.0m with 3.0m lanes and 1.5m sealed shoulders. The section of road along the site frontage is yet to be upgraded and has a two lane undivided road layout with a total sealed pavement width of approximately 6.0-6.5m with unsealed shoulders. No pedestrian paths, bicycle lanes or bicycle awareness zones are provided. Figure 3.2 illustrates the typical cross section along the site frontage.



Cardno Eppell Olsen

Drawing Title: Site Locality Plan

Figure No: 3.1

Date: 15.02.2007

Project No: CE005668

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Figure 3.2 ***Shute Harbour Road East of Site***

The link is characterised by a curvilinear layout and has a posted speed limit of 60km/hr with 50km/hr advisory speeds for substandard bends as posted. A double centre line is provided along the length of the road, with breaks to provide for full movements access to/from adjacent properties. Direct access is allowed even on sub standard curves with poor site visibility.

On road parking is allowed along the eastern end of Shute Harbour Road. This is mainly used as overflow parking by cars with boat trailers. The extent of parking varies depending on season and weather conditions, but on worst case occasion extends past the proposed site access.

Following discussion between Whitsunday Regional Council and the developer a preliminary design of a proposed new four lane public boat ramp and trailer parking in the unnamed bay between the Shute Harbour Motel and the Barge Wharf has been produced. This facility will provide car and boat trailer parking to alleviate parking on Shute Harbour Road. The developer will contribute $2.5M towards these works and further assist in the detailed planning and design.

Gravelled areas along Shute Harbour Road provide informal waiting areas for service and delivery vehicles between ferry and barge services, as shown on Figure 3.3.

Figure 3.3 ***Informal Waiting Areas***

3.3 Existing Traffic Volumes

To determine existing traffic volumes along the site frontage, Australasian Traffic Surveys (ATS) was commissioned to conduct a seven day classified traffic count for the period 29 August 2007 to 4 September 2007. A maximum peak hour volume of 331vph was identified in the Thursday PM peak hour (17:00 – 18:00pm). The two way daily demand was recorded as an average of 2,321vpd for the five day weekday period, marginally higher than the seven day average daily volume. The daily demand incorporates a high proportion, approximately 12%, heavy vehicle traffic.

The traffic count information provided by the Department of Main Roads (DMR) and results of the ATS survey are included at Appendix A.

3.4 Historic Traffic Growth

DMR has provided historic traffic count data along Shute Harbour Road, west of the Shute Harbour Airport. The traffic count information is summarised in Table 3.1 below.

Table 3.1 ***Traffic Growth***

Year	AADT	Annual Growth (Linear)	
1998	2,161	Base Year	-
1999	2,445	13.1%	-
2000	2,166	0.1%	-
2001	2,431	4.2%	Base Year
2002	2,502	3.9%	2.9%
2003	2,685	4.8%	5.2%
2004	2,787	4.8%	4.9%
2005	2,613	3.0%	1.9%
2006	2,671	3.0%	2.0%
Average		**4.6%**	**3.4%**

Historic traffic count information suggests a long term linear growth at 5% per annum based on 1998 traffic data. A lower rate at around 3.5% linear growth is identified in the last five years (2001 – 2006). The latter is more consistent with the DMR projected exponential growth rate of 2.79% per annum to 2009. A 3.5% linear growth rate has been adopted for the purpose of this report.

3.5 Crash Analysis

Queensland Transport (QT) has provided the crash records for the five year period Jan 2001 to December 2005. The records reveal 10 vehicle crashes in the assessment period, of which four were serious enough to cause hospitalisation, two required medical treatment, one resulted in minor injuries and two involved property damage only. A summary of the crash records and a figure mapping the location of crashes are included at Appendix B.

The majority of incidents occurred at curves along the road and although the majority of incidents were related to driver violations, including undue car and attention (2) failure to keep left (2), cross double lines (1) or excessive speed (1), it is expected that the road environment may have contributed to the incidents. Two incidents involved vehicles of path on curves in wet conditions and the remaining two crashes were related to unusual circumstances such as animal on the road and bicycle defects.

3.6 Future Road Network Planning

Proserpine Shute Harbour Road is a state controlled road under DMR in the Mackay District. According to the Roads Implementation Program 2007-2008 to 2011-2012 no works are proposed in the vicinity of the site.

As part of the development, an existing agreement (Appendix C) to provide provision for a three lane cross section has been identified. This requirement has been considered and met

by dedicating land to accommodate the road reserve for DMR to construct the additional lane in the future as and when required as follows:

- 3 x 3.5m lanes for two through lanes plus one overtaking lane;
- 2 x 2.0m shoulders;
- 2.0m central median.

4.0 PROPOSED DEVELOPMENT

4.1 Site Use

The proposed development primarily consists of 117 lots of managed resort accommodation in the western sections of the site. Being conservative, it is assumed that this will result in a mix of built form as follows:

- single lot 61 dwellings;
- 1 bedroom 42 units;
- 2 bedroom 88 units;
- 3 bedroom 19 units.

A percentage of units may be owner occupied but these are expected to be used predominantly as holiday apartment, not as a permanent place of residence. It is therefore not expected that the traffic associated with these units will be related to work/commuter trips towards the west in the peak periods.

A mixed use area, comprising 446sq.m GFA marina office and 1,982sq.m GFA commerce (commercial, restaurant and retail uses) as well as 109 three bedroom units is proposed in the eastern area. The breakdown of uses has yet to be finalised and is likely to undergo further refinement, however for the purpose of the traffic report the following land use mixture has been adopted:

- single lot dwellings 61 dwellings;
- 1 bedroom 42 units;
- 2 bedroom 88 units;
- 3 bedroom 128 units;
- office (Marina Office + 50% of commerce) 991sq.m GFA;
- retail (30% of commerce) 595sq.m GFA;
- restaurant (20% of commerce) 396sq.m GFA;
- marina 669 berths.

A master plan drawing of the site is available at Appendix D.

4.2 Access Arrangement

The property fronts on to Shute Harbour Road and access to the site is proposed via a single, unsignalised T-intersection along this link. Inspection of the site suggests that adequate sight distance can be achieved at the proposed location. This is conceptually illustrated on Drawing 5668-108 at Appendix E. The operation of the access intersection is further considered in Section 5.0.

The proposed access arrangement is in the form of an unsignalised T intersection, which has been designed to allow access by an Articulated Vehicle (AV). Arrangements for access of any indivisible loads or oversized vehicles, should these be required, would be detailed in due course by the appointed contractor as part of a construction traffic management plan.

4.3 Construction Activities

A construction methodology has been developed and provided shown in Section 3.4.1 of the main report. A breakdown of indicative construction activities is summarised in Table 4.1 below.

Table 4.1 ***Construction Activities***

Stage	Month	Construction Works
1	1 – 3	Preliminary site works and earthworks.
2	3 - 8	Construction of walls to enclose Area 1 including: - temporary sheet pile wall (wall 6); and - temporary bund wall.
	9 - 14	Construction of Area 1 including: - earthworks to excavate marina basin; - fill development area; and - construct revetment wall (wall 1).
3	9 - 14	Construction of walls to enclose Area 2 including: - temporary sheet pile wall (wall 6); and - rock faced bund (wall 3).
	15 - 20	Construction of Area 2 including: - earthworks to excavate marina basin; - fill development area.
	19 - 23	Construction of revetment wall (wall 1).
	12 - 23	Construction of breakwater (walls 4 and 5).
4	24 - 30	Dredging of marina basin beyond temporary sheet pile wall (wall 6).
5	Internal	Road works, services, infrastructure and fit out.
5	External	Upgrading of Shute Harbour Road.

The construction works associated with land reclamation and excavations are expected to be ongoing for around two years with on site activities 10 hours per day, six days per week. A summary of the heavy vehicle deliveries and frequencies is reproduced in Table 4.2 below.

Table 4.1 ***Heavy Vehicle Total Deliveries and Frequency***

Type	Quantity	Number of truck loads	Timeframe	Daily Vehicle Numbers
Sheet piles				
- Wall 6 – Ch 0 to Ch 700		85	6 months (Month 3 – 8)	1 truck
- Wall 6 – Ch 700 to end		100	6 months (Month 9 – 14)	1 truck
Blockwork Revetment Wall				
- Wall 1 – Ch 0 to Ch 600		65	6 months (Month 3 – 8)	1 truck
- Wall 1 – Ch 600 to end		70	6 months (Month 9 – 14)	1 truck
Imported Fill Material				
- Temporary Bund	100,000 m^3	6,800	6 months (Month 3 – 8)	44 trucks
- Temporary Bund – Rock Facing	9,500 m^3	790	6 months (Month 3 – 8)	5 trucks
- Wall 6 – Ch 0 to 700	50,000 m^3	3,400	6 months (Month 3 – 8)	22 trucks
- Wall 6 – Ch 700 to end	50,000 m^3	3,400	6 months (Month 9 – 14)	22 trucks
- Wall 3 – Rock Faced Bund - Fill	100,000 m^3	6,800	6 months (Month 9 – 14)	44 trucks
- Wall 3 – Rock Faced Bund - Rock	5,500 m^3	450	6 months (Month 9 – 14)	3 trucks
Breakwater			12 months (Month 12 – 23)	
Concrete Panel Structure				
- Steel piles		175	7 months	1 truck
- Concrete units		590	6 months	4 trucks
Concrete Box Option				
- Steel piles		145	6 months	1 truck
- Materials for Concrete boxes	12,000 m^3	810	12 months	3 trucks
- Reinforcement for Concrete boxes	1,320 t	45	12 months	1 truck/week
- Gravel fill for Concrete boxes	17,500 m^3	1,200	12 months	4 trucks

Significant traffic movements include transport of staff and delivery of sheet piles, steel piles and sand imports, with maximum delivery numbers detailed below:

- sheet piles 185 trucks;
- concrete blocks 135 trucks;
- sand/gravel/rock/ fill 22,840 trucks.

The breakwater has two alternative structure types and numbers of deliveries required for the construction are described below:

Alternative 1 - Steel Pile & Precast Facing Panels:

- steel piles 175 trucks;
- concrete units 590 trucks.

Alternative 2 - Steel Pile & Gravel Filled Concrete Boxes:

- steel piles 145 trucks;
- material for the boxes 810 trucks;
- reinforcement 45 trucks;
- gravel fill 1,200 trucks.

Due to the limited site area available for material storage, the delivery of materials will most likely be daily or every second day. Movement of materials will therefore be spread across the construction period with limited numbers in peak hours and is not expected that deliveries will impact the external network in terms of link capacity or intersection performance. Daily vehicle numbers are outlined in Table 4.3. The peak construction vehicle numbers will occur either between month 3 and 8 with a combined total of 78 trucks per day or if the breakwater alternative 2 construction is used month 12 and 14 with a combined total of 85 trucks per day.

An average of 78 full time equivalent workers will be employed during the construction period, with a peak of 192 positions at the end of the construction period.

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Table 4.3 - Construction Timeline & Deliveries

Stage	Construction Works	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PROCESS																								
1	Preliminary site works and earthworks																							
2	Construction of walls to enclose Area 1 including: - temporary sheet pile wall (wall 6); and - temporary bund wall.																							
	Construction of Area 1 including: - earthworks to excavate marina basin; - fill development area; and - construct revetment wall (wall 1).																							
3	Construction of walls to enclose Area 2 including: - temporary sheet pile wall (wall 6); and - rock faced bund (wall 3).																							
	Construction of Area 2 including: - earthworks to excavate marina basin; - fill development area.																							
	Construction of revetment wall (wall 1)																							
	Construction of breakwater (walls 4 and 5).																							

Item	Quantity	Number of Trucks	Delivery Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DELIVERIES																										
Sheet piles																										
- Wall 6 – Ch 0 to Ch 700		85	24 Weeks			1 Trucks per Day																				
- Wall 6 – Ch 700 to end		100	24 Weeks									1 Trucks per Day														
Blockwork Revetment Wall																										
- Wall 1 – Ch 0 to Ch 600		65	24 Weeks			1 Trucks per Day																				
- Wall 1 – Ch 600 to end		70	24 Weeks									1 Trucks per Day														
Imported Fill Material																										
- Temporary Bund	100,000	6,800	24 Weeks			47 Trucks per Day																				
- Temporary Bund – Rock Facing	9,500	790	24 Weeks			5 Trucks per Day																				
- Wall 6 – Ch 0 to 700	50,000	3,400	24 Weeks			24 Trucks per Day																				
- Wall 6 – Ch 700 to end	50,000	3,400	24 Weeks									24 Trucks per Day														
- Wall 3 – Rock Faced Bund - Fill	100,000	6,800	24 Weeks									47 Trucks per Day														
- Wall 3 – Rock Faced Bund - Rock	5,500	450	24 Weeks									3 Trucks per Day														
Breakwater			48 Weeks																							
Concrete Panel Structure																										
- Steel piles		175	28 Weeks												1 Trucks per Day											
- Concrete units		590	24 Weeks																						4 Trucks per Day	
Concrete Box Option																										
- Steel piles		145	24 Weeks												1 Trucks per Day											
- Materials for Concrete boxes	12,000	810	48 Weeks												3 Trucks per Day											
- Reinforcement for Concrete boxes	1,320	45	48 Weeks												1 Trucks per week											
- Gravel fill for Concrete boxes	17,500	1,200	48 Weeks												4 Trucks per Day											
Total - Breakwater as Concrete Panel Structure						**78 Trucks per Day**						**76 Trucks per Day**			**77 Trucks per Day**			**1 Trucks per Day**		**5**			**4 Trucks per Day**		
Total - Breakwater as Concrete Box Option															**85 Trucks per Day**			**9 Trucks per Day**					**8 Trucks per Day**		

working days per week 6

5.0 DEVELOPMENT TRAFFIC IMPACTS

5.1 Assessment Scenarios

Construction activities associated with the reclamation and excavation operations are expected to produce the greater levels of heavy vehicle traffic. These works are anticipated to commence in 2010 and be completed by 2012. Traffic conditions have been assessed for expected peak of construction around 2012, at the expected year of opening 2013 and for the future year 2023, which represents the 10 year design horizon.

The intersection analysis has been limited to the Shute Harbour Road/Site Access intersection.

5.2 Traffic Generation & Distribution – Construction

At the peak of construction, the development is expected to have 192 staff on site, the majority of which would be travelling to/from the western areas (95%). It is expected that some worker would be car pooling to work and occupancy of 1.25 has been adopted for construction staff.

The majority of staff would be arriving in the morning and departing in the afternoon, however some movements, 5%, have been allowed in the reverse direction.

At the time of peak staff numbers the majority of import has been completed. Nonetheless, for the purpose of the traffic assessment, it has been assumed that major import would still be ongoing at the time of peak staff. This import adds around 85 deliveries per day, with around 10% of these assumed to occur in the peak hours.

The total traffic at the construction peak would therefore result in some 171 vehicles access in the site in the peak hour.

5.3 Traffic Generation & Distribution – Operation

The generation potential of the marina has been assessed based on review of a number of reference documents, including the draft Transport Assessment Guidelines (Queensland Transport), Guide to Traffic Generating Developments (Roads & Traffic Authority) and previous work undertaken by Cardno Eppell Olsen. The following rates have been adopted:

- single lot dwellings 6vpd or 0.6vph/dwelling;
- 1 – 3 bedroom units 4vpd or 0.4vph/unit;
- commercial 10vpd or 3.4vph/100sq.m GFA;
- retail 120vpd or 12vph/100sq.m GFA;
- restaurant 60vpd or 5vph/100sq.m GFA;
- marina berths 1vpd or 0.1vph/berth.

Using the traffic generation rates mentioned above, the proposed development is anticipated to generate approximately 3,118 vehicles per day or 332vph in the peak hour. This estimate of traffic generation is considered a worst case scenario as given the nature of the development; travel is likely to include a significant proportion of walk up trips and trips undertaken by bus or boat.

A percentage of visitors to the development will also arrive to the area by air. Two domestic airports are situated in the area, namely Hamilton and Proserpine. In 2006, the following people thorough the airports were as follows:

- Hamilton Island – 450,000;
- Proserpine – 250,000.

Hamilton has more interstate flights directly to it than the other two and has a very popular ferry service from Hamilton Island to Shute Harbour which is co-ordinated with the flights. Therefore visitors from Hamilton Airport would arrive via the harbour and not private car.

The development proposes to provide a minibus service to supplement any gaps in scheduled public transport services. This courtesy service would likely operate between the site and Airlie Beach, Shute Harbour ferry terminal, Whitsunday Airport and rail services.

Additionally, a percentage of trips will occur via the water with the residents and tourists travelling in their privately owned, rented boat or charter boat.

Residential units are expected to be occupied largely by tourists and with destinations in Shute Harbour and Whitsunday Islands. The majority of traffic would be travelling outbound in the AM peak and inbound in the PM peak. The following distribution of traffic has been adopted for the dwelling units:

- Shute Harbour (east) 80%;
- Airlie Beach (west) 20%.
- AM Peak 70%out/30%in;
- PM Peak 30%out/70%in.

The opposite is expected for commercial, retail, restaurant and marina uses, with a distribution as follows:

- Shute Harbour (east) 20%;
- Airlie Beach (west) 80%.

Commercial and marina land uses would have an inwards attraction in the AM Peak with the majority of movements in an outwards direction in the PM peak, comprising:

- AM Peak 30%out/70%in;
- PM Peak 70%out/30%in.

Restaurant and retail trips are likely to have a relatively similar distribution of inbound and outbound trips in either peak, and a 50%/50% in/out distribution has been adopted for these land uses.

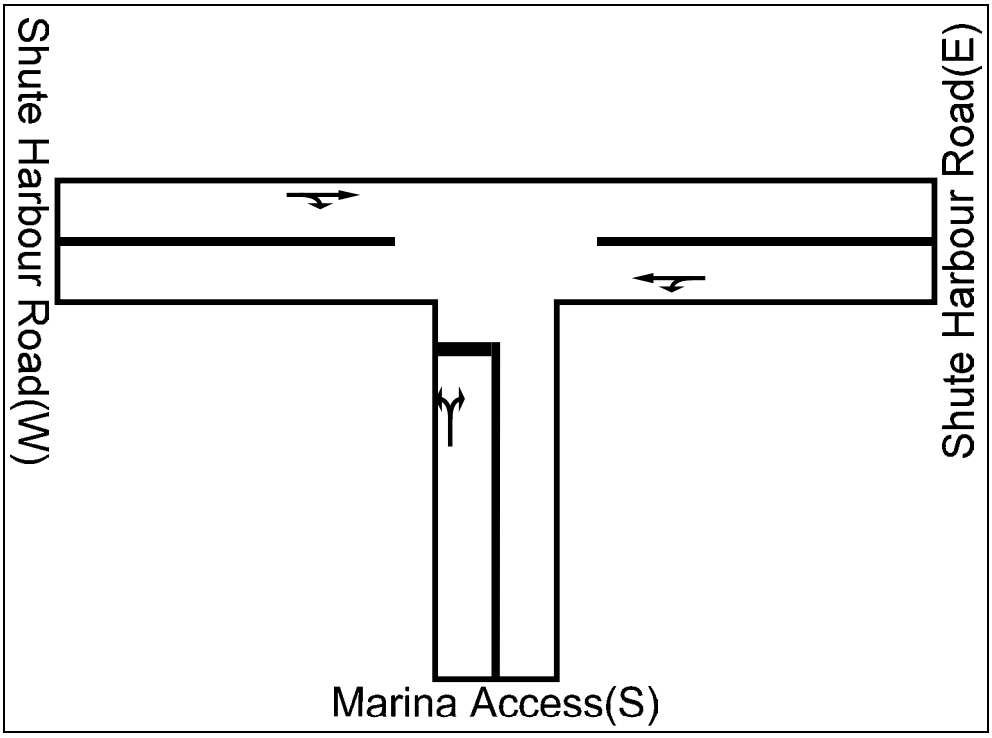
Further detailed calculations are available at Appendix F.

5.4 Traffic Impacts

The operation of the site access intersection has assessed been using the SIDRA3.2 Intersection software. As an output SIDRA3.2 provides values for the degree of saturation (DOS), queues and delays. The DOS is essentially a volume to capacity ratio and an upper value of 0.80 (or 80%) is typically adopted for an unsignalised intersection.

The access intersection has been assessed in a basic unsignalised intersection form, as illustrated on Figure 5.1.

Figure 5.1 ***Simplified Access Intersection Layout***



The results of this analysis are provided at Appendix G and are summarised in Table 5.1 below.

Table 5.1 Shute Harbour Road/ Site Access – aaSIDRA Analysis Results

Scenarios	AM Peak			PM Peak		
	DOS	Delay	95th %le Queue	DOS	Delay	95th %le Queue
2011 With Construction	0.24	3.5secs	12m	0.21	4.0secs	7m
2012 With Development	0.22	5.7secs	10m	0.26	5.3secs	7m
2022 With Development	0.30	5.0secs	16m	0.37	5.1secs	11m

The analysis shows that an unsignalised intersection with Shute Harbour Road would have sufficient capacity to accommodating the traffic volumes generated by the construction and operation of the proposed development. No specific turn lanes are required to achieve operational capacity.

Traffic volumes on Shute Harbour Road have significant peaks at the arrival/departure of ferry traffic. A sensitivity test was therefore also undertaken for a 15 minute peak demand, with the resulting intersection performance summarised in Table 5.2.

Table 5.2 Shute Harbour Road/ Site Access – aaSIDRA Analysis Results (15 min)

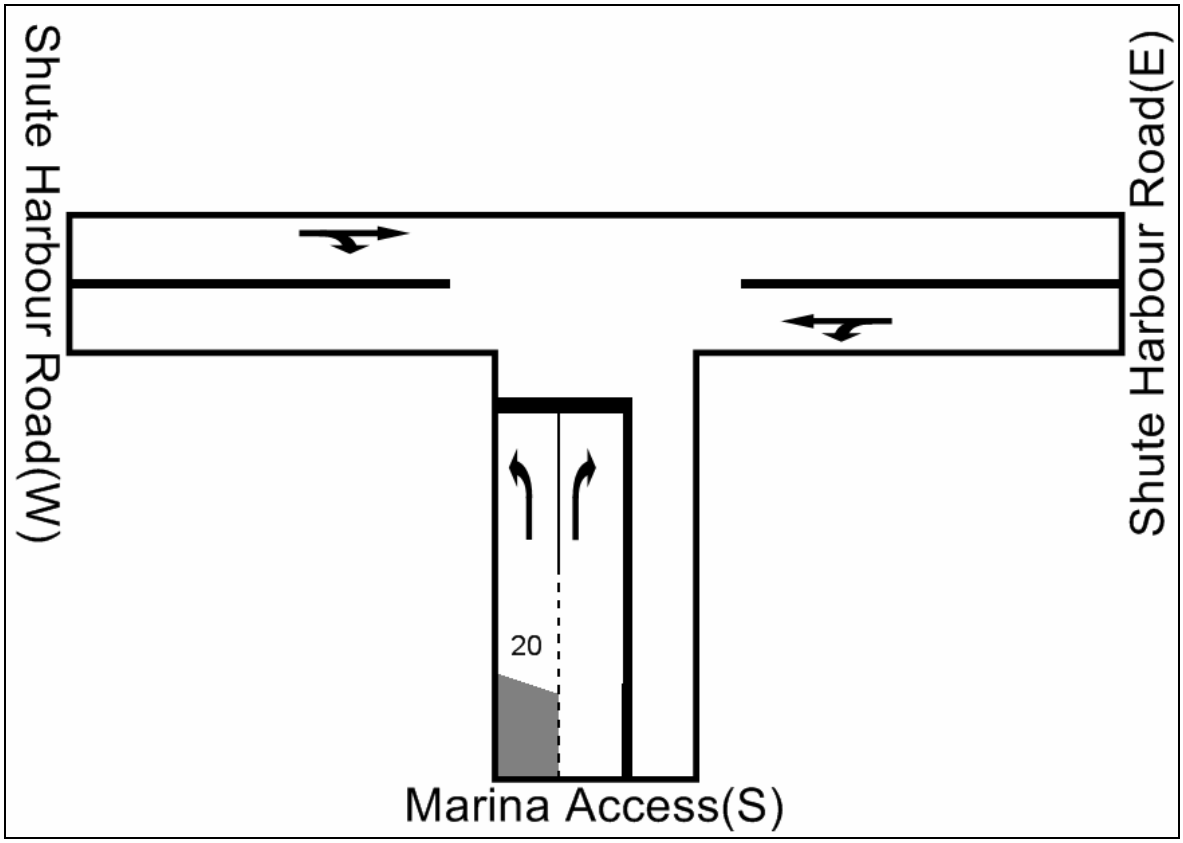
Scenarios	AM Peak			PM Peak		
	DOS	Delay	95th %le Queue	DOS	Delay	95th %le Queue
2011 With Construction	0.35	2.6secs	19m	0.42	4.3secs	14m
2012 With Development	0.33	4.7secs	17m	0.47	5.4secs	15m
2022 With Development	0.47	4.3secs	30m	>1	20.6secs	97m

Analysis of the 15 minute period indicates that at times of peak demand, vehicles would have difficulty exiting the site. With a left turn stand up lane from the proposed development, as illustrated in Figure 5.2, the intersection would provide adequate operation for the 15 minute peak at the 2022 design horizon with the resulting intersection performance summarised in Table 5.3.

Table 5.3 ***Shute Harbour Road/Site Access – aaSIDRA Analysis Results (15 min) – Left Stand Up Lane Layout***

Scenarios	AM Peak			PM Peak		
	DOS	Delay	95th %le Queue	DOS	Delay	95th %le Queue
2011 With Construction	0.35	2.6secs	19m	0.42	4.2secs	13m
2012 With Development	0.33	4.7secs	17m	0.47	5.0secs	11m
2022 With Development	0.47	4.1secs	30m	0.77	10.3secs	32m

Figure 5.2 ***Access Intersection – Left Stand Up Lane Layout***

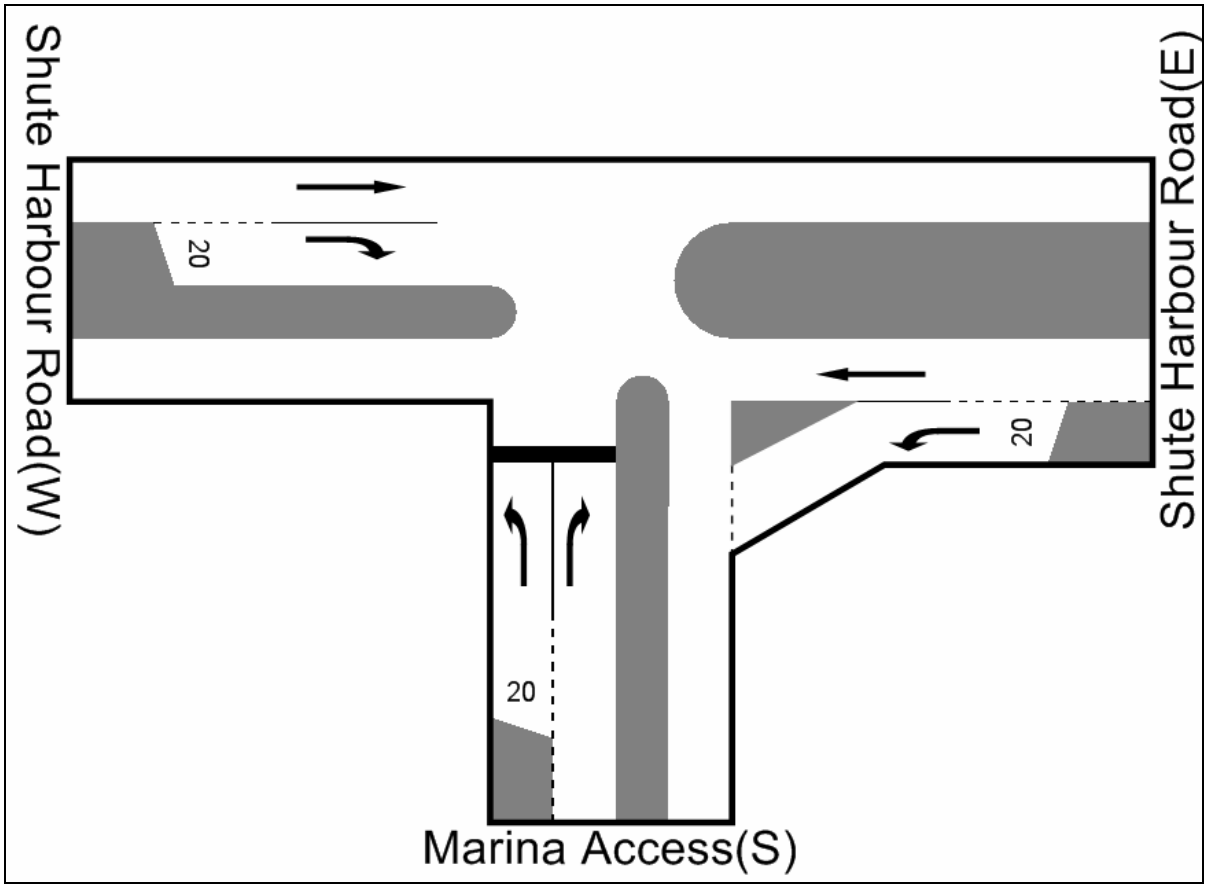


It is also proposed to provide slip turn lanes into the site to improve safety and capacity as shown the site plan at Appendix D. This layout provides a higher capacity design that any of the simplified layouts used as part of the analysis and is expected to provide sufficient capacity for the development, up to and including the 2022 future year design scenario. With slip turn lanes and the left stand up lane, as illustrated in Figure 5.3, the intersection would provide adequate operation for the 15 minute peak at the 2022 design horizon, with the resulting intersection performance summarised in Table 5.4.

Table 5.4 ***Shute Harbour Road/Site Access – aaSIDRA Analysis Results (15 min) – Slip Lane Layout***

Scenarios	AM Peak			PM Peak		
	DOS	Delay	95th %le Queue	DOS	Delay	95th %le Queue
2011 With Construction	0.27	2.5secs	4m	0.40	3.2secs	12m
2012 With Development	0.27	4.4secs	5m	0.41	4.0secs	6m
2022 With Development	0.42	3.7secs	7m	0.62	4.3secs	14m

Figure 5.3 ***Access Intersection - Slip Lane Layout***



6.0 SITE LAYOUT

The proposed development has a single unsignalised T-intersection access from Shute Harbour Road. It should be noted that this proposal does not have any development on northern side of Shute Harbour Road, whereas previous proposals for the site did.

It has two main collector roads, one which serves the commercial and unit precinct and the other the residential precinct. Both have a cross section of 16m with a 7.5m road for 2 lanes and 1.5m footpath. Several access streets are provided in the residential precincts which have a cross section of 16m but a 6.5m road for 2 lanes. Figure 790/48/01-308 rev A provides full details of the cross sections.

Turning bays are provided are the end of the residential collector and access streets for provision of a mini-bus and refuse collection vehicle (RCV). At the end commercial and unit collector a roundabout is provided to allow manoeuvrability of an AV for the re-fuelling of a tank providing petrol to the boats in the marina.

A multi-level car parking structure is also provided in the commercial precinct with approximately 425 car parking spaces to provide for the commercial, restaurants, offices and the marina berths.

A bus lay-by is also provided within the commercial precinct near the roundabout to cater for Whitsunday Transit (if required) and a courtesy bus which the proposed development will provide.

Swept Paths are included at Appendix H for the roundabout in the commercial precinct and main site access for a 19m articulated vehicle, and turn around facilities in the residential precinct for a refuse collection vehicle.

7.0 PARKING

7.1 Car Parking during Construction

Car parking during construction will fluctuate depending on the construction activities at the time. It is expected that during the first several stages that limited car parking will be required as it will primarily be the clearing and reclamation of the land to form the final natural surface level. The majority of construction workers will be operators of heavy equipment and can be shuttle bussed to/from the site as and if required. Only during the fit out of the marina is it expected that a higher demand for car parking will be required. At this stage ample land will be available on site to provide for more than sufficient space for the workers car parking area.

7.2 Car Parking during Operation

According to table 6.3.2 of the Whitsunday Shire Council Planning Scheme, the development would require car parking as detailed in Table 7.1.

Table 7.1 ***Car Parking Requirements***

Land Use	Minimum Spaces Rate
Accommodation Unit 1 bedroom	1.0 space per unit + 1 per 7 units visitor parking
Accommodation Unit 2 Bedroom	1.5 space per unit + 1 per 7 units visitor parking
Accommodation Unit 3 Bedroom	2.0 space per unit + 1 per 7 units visitor parking
Shop (<700sq.m)	1 space per 25sq.m GFA
Refreshment Premises	1 space per 15sq.m GFA
Commercial	1 space per 25sq.m GFA
Marina	0.6 spaces per berth

Draft IPA Planning Scheme has included provision for developments where centralised shared car parking facilities are provided in Integrated Resort Zone or Commercial Zone. The proposed development does not have any land use designated within the Draft IPA Planning Scheme but from the definitions it could be assumed to be an Integrated Resort Zone. This assumption is also supported by the inclusion of Shute Harbour in the list of mainland tourist facilities in point 6 of Section 1.4, and tourist facilities are one of the overall outcomes for Integrated Resort Zones stated in Section 4.53.

The above rates are generally considered appropriate, however a lower rate may be considered for the marina, given a large number are expected to be associated to the units/lots as either residential owners or holiday makers. The Australian Standards for Marinas recommend a rate of 0.3 to 0.6 spaces per berth. Given the proportion of bays located in close proximity to residencies with private parking, it is expected that the lower bound of this range, 0.3 spaces per berth, would be appropriate.

All dwellings in the managed resort accommodation area are expected to provide parking within the lots or in amalgamated parking areas. The parking for the hotel will be provided in an underground facility at the rate of 2.0 spaces per unit + 1 per 7 units visitor parking resulting in 234 parking spaces for the 109 unit (3 bedroom) hotel. Parking for the marina village uses (retail, commercial, restaurant and marina) are expected to share the multi-level car parking structure. A minimum of 291 car parking spaces are required to be provided as shown in Table 7.2

Table 7.2 Commercial Precinct Car Parking Spaces Required

Land Use	Area / Berths	Minimum Spaces Rate	Minimum Spaces
Commercial	991sq.m	1 space per 25sq.m GFA	40
Retail	595sq.m	1 space per 25sq.m GFA	24
Restaurant	396sq.m	1 space per 15sq.m GFA	26
Marina	669 berths	0.3 spaces per berth	201
Total			291

The multi-level car parking structure will provide for approximately 425 car parking spaces and therefore is expected to meet the demands of the proposed development. With the non berth land uses fixed, the 425 spaces represents at car parking rate of 0.50 spaces per berth.

According to Table 1 of the Whitsunday Shire Council Draft IPA Planning Scheme, the development would require car parking as detailed in Table 7.3.

Table 7.3 Draft IPA Car Parking Requirements

Land Use	Integrated Resort Zone Minimum Spaces Rate	Other Zones/Precincts Minimum Spaces Rate
Accommodation Unit 1 bedroom	0.7 space per unit + 1 per 7 units visitor parking	1.0 space per unit + 1 per 7 units visitor parking
Accommodation Unit 2 Bedroom	1.05 space per unit + 1 per 7 units visitor parking	1.5 space per unit + 1 per 7 units visitor parking
Accommodation Unit 3 Bedroom	1.4 space per unit + 1 per 7 units visitor parking	2.0 space per unit + 1 per 7 units visitor parking
Shop	1 space per 25sq.m GFA[#]	1 space per 25sq.m GFA
Restaurant	1 space per 25sq.m GFA	1 space per 15sq.m GFA
Offices	1 space per 30sq.m GFA[#]	1 space per 30sq.m GFA
Marina	0.4 spaces per berth	0.6 spaces per berth

Note: [#] A reduction has not been applied as development is not on an island.

Applying the Draft IPA Planing Scheme, with the Integrated Resort Zone rates for the commercial area, a minimum of 341 car parking spaces are required to be provided as shown in Table 7.4

Table 7.4 Draft IPA Commercial Precinct Car Parking Spaces Required

Land Use	Area / Berths	Minimum Spaces Rate	Minimum Spaces
Offices	991sq.m	1 space per 30q.m GFA	33
Shop	595sq.m	1 space per 25sq.m GFA	24
Restaurant	396sq.m	1 space per 25sq.m GFA	16
Marina	669 berths	0.4 spaces per berth	268
Total			341

With either analysis it can be seen that the provision of 425 car parking spaces in the multi story car park will provide ample parking to service the commercial precinct and marina operations.

8.0 PUBLIC TRANPORT

8.1 Existing Services

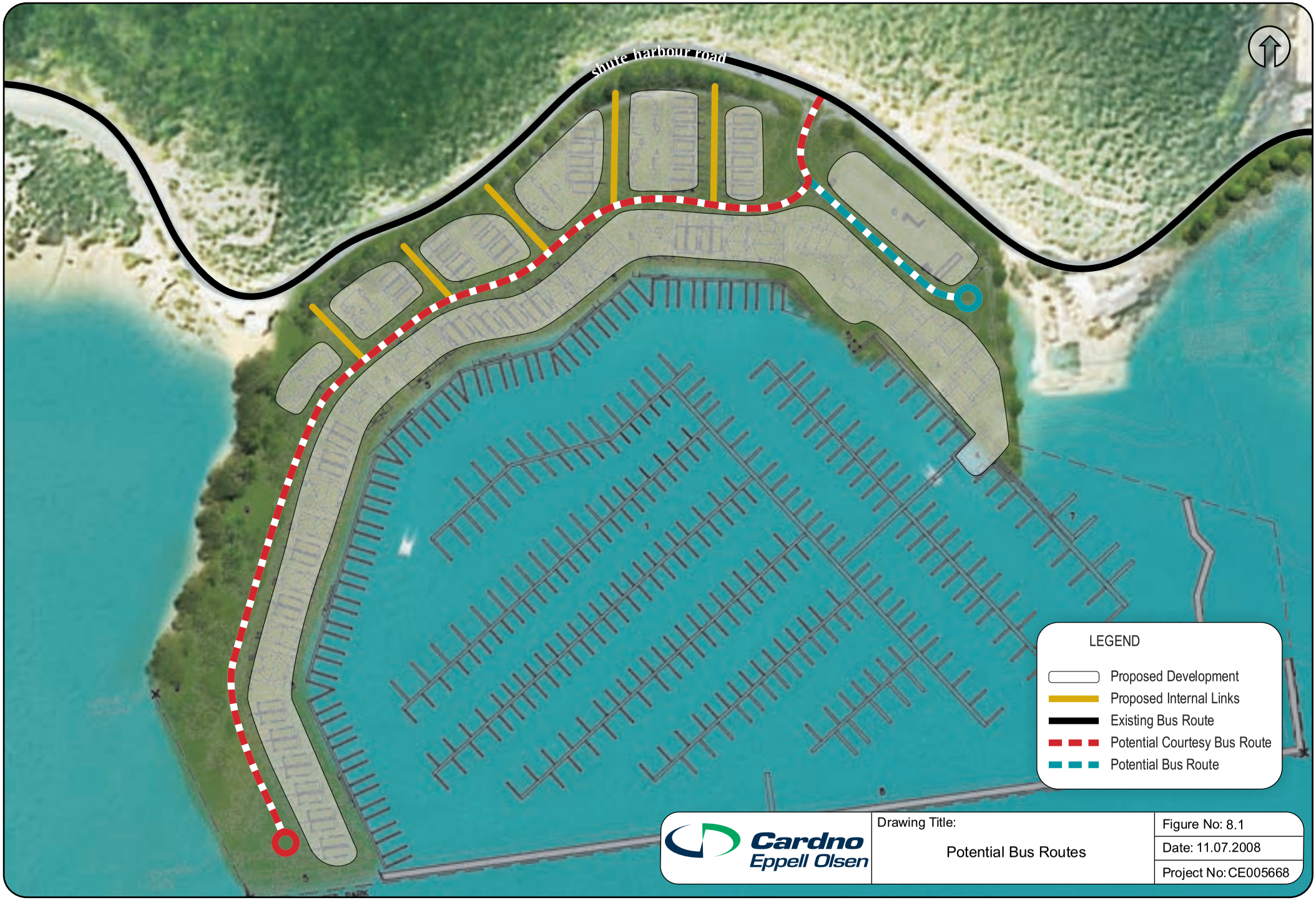
Scheduled public transport operates between Airlie Beach, Shute Harbour and Proserpine around 12 hrs a day, broadly 6am to 6pm. This service travels along the site frontage along Shute Harbour Road with services running every 15 -30 minutes, terminating at Shute Harbour. No stop is currently provided in the vicinity of the site.

Whitsunday Transit is contracted by Queensland Transport to provide school services throughout the area. This company also operates transfers to the Proserpine airport and rail station and provides chartered services.

8.2 Potential Future Services

The network will be designed to accommodate access by standard services at the marina village. This would allow a relatively efficient diversion of scheduled services. Complementary courtesy service can be accommodated throughout the site. The potential routes are illustrated on Figure 8.1.

A potential bus lay by area has also been provided in this area.



G:\5668\CorelDraw\5668_PotBusRoutes.cdr

9.0 BICYCLES & PEDESTRIAN

9.1 Existing Facilities

No pedestrian paths, bicycle lanes or bicycle awareness zones are provided on Shute Harbour Road.

9.2 Proposed Facilities

Within the proposed development, a pedestrian boardwalk will be provided along the water edge between the berths and the commercial or residential uses. Pedestrian paths will also be provided along the collector roads.

No bicycle provisions except for sealed shoulders have been provided on Shute Harbour Road as it is expected that no recreational riders to/from Airlie Beach occurs due to the steep hill east of Whitsunday Airport.

As part of the proposed new boat ramp facility which is separate to this development, a pedestrian path should be provided for connectivity between this proposed development and the ferry terminal.

10.0 CONCLUSIONS

The Shute Harbour Marina Resort is a proposal consisting of an integrated marina, resort hotel, managed resort accommodation and commercial precinct. The proposal includes 669 marina berths, 109 hotel units and 117 lots for managed resort accommodation. The proposed design will more than meet the relevant requirements and standards in terms of traffic, parking and transport.

Key points of the proposed development in terms of traffic and transport are as follows:

- during construction from 2010 to 2012 it will have a maximum total traffic generation of some 168vph;
- site access will be able to be maintained via a single unsignalised T-intersection. A construction traffic management plan will be required prior to the commencement of construction;
- during operations after reaching full capacity it will have a traffic generation of 332vph;
- the single unsignalised T-intersection site accesses will provide good levels of service to both the proposed development and through traffic on Shute Harbour Road;
- sufficient sight distances are provided to and from the unsignalised T-intersection;
- 291-341 parking spaces required for the commercial precinct including provision for the marina berths and approximately 425 are provided
- pedestrian paths will be provided along the waterfront and the two collector roads;
- a bus lay-by is provided which can serve as a stop for the Whitsunday Transit as well as the courtesy bus provide by the developer.
- The contribution of $2.5 M by the developer to a new public boat ramp outside the development with up to 95 trailer boat parks will substantially relieve parking issues in the Shute Harbour precinct

Appendix A

Traffic Count Information

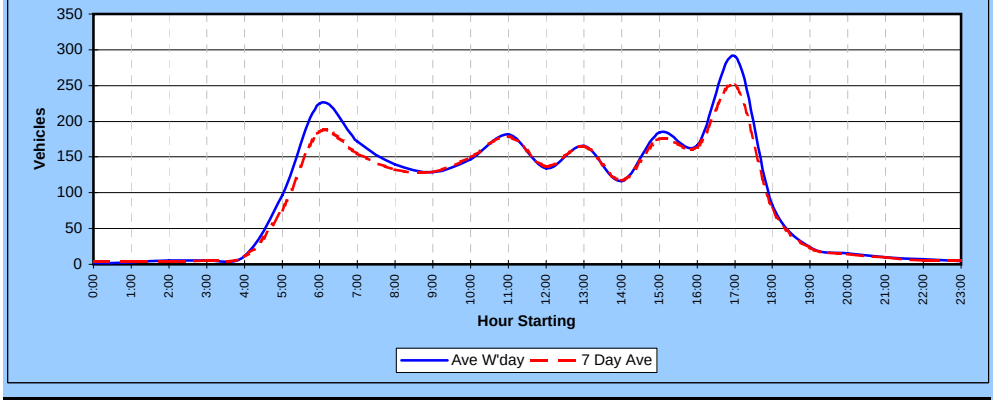
AUSTRALASIAN TRAFFIC SURVEYS

Road	Shute Harbour Road
Location	Western End of Development Site
Site No.	1
Start Date	Wednesday 29-Aug-07
Direction	Combined

Average Weekday	2321
7 Day Average	2178
Weekday Heavy's	12.4%
7 Day Heavy's	11.9%

Choose Direction: Combined

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	3-Sep	4-Sep	29-Aug	30-Aug	31-Aug	1-Sep	2-Sep		
AM Peak	207	230	223	239	226	163	180		
PM Peak	306	258	305	331	256	178	162		
0:00	1	3	3	1	1	9	5	2	3
1:00	0	1	7	1	6	7	2	3	3
2:00	4	5	14	0	3	2	6	5	5
3:00	6	4	5	6	5	5	5	5	5
4:00	12	9	15	14	10	7	6	12	10
5:00	103	97	96	96	91	28	21	97	76
6:00	207	230	223	239	226	110	64	225	186
7:00	166	184	156	172	182	127	100	172	155
8:00	125	140	124	146	163	131	100	140	133
9:00	121	119	133	120	151	144	113	129	129
10:00	130	141	120	159	185	148	166	147	150
11:00	203	166	183	158	199	163	180	182	179
12:00	122	138	104	148	159	126	162	134	137
13:00	173	148	150	169	190	167	154	166	164
14:00	123	121	86	139	112	110	130	116	117
15:00	189	158	166	194	213	178	130	184	175
16:00	158	153	158	174	190	172	142	167	164
17:00	306	258	305	331	256	161	134	291	250
18:00	91	60	93	92	81	62	63	83	77
19:00	16	14	35	27	31	24	18	25	24
20:00	11	13	17	18	15	19	6	15	14
21:00	13	7	7	15	9	10	11	10	10
22:00	5	6	10	11	3	2	3	7	6
23:00	10	0	8	3	2	8	4	5	5
Total	2295	2175	2218	2433	2483	1920	1725	2321	2178
% Heavies	13.2%	12.6%	12.1%	12.7%	11.6%	11.1%	9.2%	12.4%	11.9%



Queensland Government
Department of Main Roads

Traffic Analysis and Reporting System
AADT SEGMENTS REPORT

District	8 MACKAY DISTRICT
Road Section	851 PROSERPINE - SHUTE HARBOUR ROAD
Year	2006
TDist	26.67 — 33.64 Status C
Direction	All Directions

Through Distance: 26.670 - 33.640

Site: 82848 West of Shute Harbour Airport

Gaz Dir	AADT	% per Vehicle Class: Light Vehicle	Heavy Vehicle	Short Vehicle	Truck or Bus	Articulated Vehicle	Road Train	% Growth: 1 Yr	5 Yr	10 Yr
G	1,286	89.89	10.11	89.89	8.49	1.53	.09	-3.16	.54	1.91
A	1,385	89.89	10.11	89.89	8.45	1.59	.07	7.78	2.53	2.49
B	2,671	89.88	10.12	89.88	8.48	1.57	.07	2.22	1.55	2.20

* These values were updated manually or derived from previous years growth figures.

TARS Growth Rate Calculation Sheet

Road No.	851
Chainages	26.670 - 33.640
Description	West of Shute Harbour Airport
Site No.	82848
Assoc. Permanent Site No.	80021

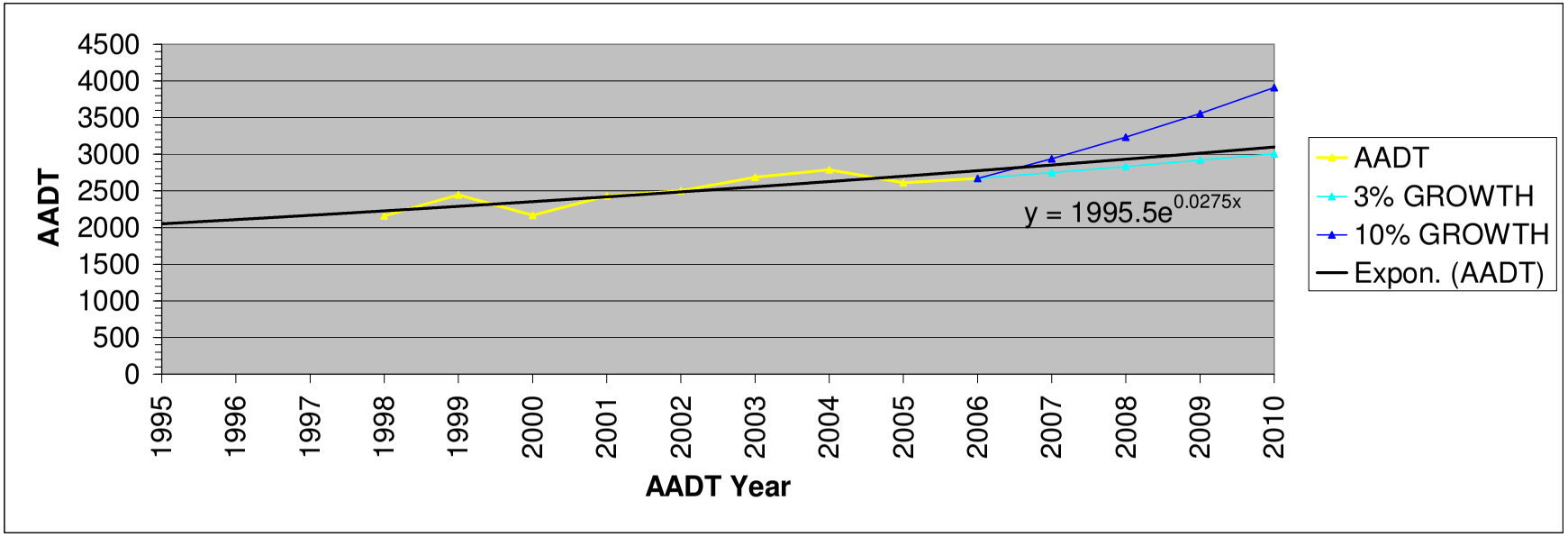
EXPONENTIAL GROWTH RATE

AADT Year	Growth Year	AADT	Growth Rate
1999	5	2290	
2004	10	2627	
2009	15	3014	2.79

EXPONENTIAL GROWTH RATE (Commercial Vehicles)

Year	Growth Year	Comm Veh	Growth Rate
1999	5	204	
2004	10	249	
2009	15	303	4.04

YEAR	AADT	AADT (not incl)	% COMM.	COMMERCIAL VEHICLES	3% GROWTH	10% GROWTH
1995		2334				
1996		2730				
1997		2620	7.98	209		
1998	2161		7.85	170		
1999	2445		8.85	216		
2000	2166		9.27	201		
2001	2431		9.00	219		
2002	2502					
2003	2685		9.60	258		
2004	2787					
2005	2613		9.59	251		
2006	2671		10.12	270	2671	2671
2007					2751	2938
2008					2834	3232
2009					2919	3555
2010					3006	3911



Appendix B

QT Crash Database Records

Crashes along Proserpine-Shute Harbour Rd (2001 to 2005)

(DMR road section 851, Tdistance 31.40 - 33.64 km)

0 0.15 0.3

kilometres

1 : 4380

N W E S

Queensland Government
Queensland Transport

standard A2 landscape

Information is for display purposes only and no responsibility is taken for data accuracy.

11/09/2007

Road Traffic Crashes along Proserpine-Shute Harbour Road
(DMR Road Section 851, Tdist 31.4 to 33.64km
from 01-jan-2001 to 31-dec-2005.

Year	Month	Day	Time	Severity	Crash Nature	Speed Limit	Lighting condition	Atmospheric Condition	Traffic Control	Roadway Feature	Num Units	Unit Number	Unit Description	Unit Intended Action	Unit Overall Damage	Unit Dir	Unit on Street	Unit Circumstance Description	Crash DCA Code	Description	Crash Street	Crash Intersecting street	Dist	Unit	Dir	Landmark	Crash Area
2001	February	Monday	3am	Hospitalisation	Hit object	60	Darkness - Not Lighted	Clear	No traffic control	Not applicable	1	1	Car/Station wagon	Go straight ahead	Extensive, unrepairable	South	PROSERPINE - SHUTE HARBOUR RD	ANIMAL UNCONTROLLED - ON ROAD	804	OFF PATH-CURVE: OFF CWAY LT BEND HIT OBJ	PROSERPINE - SHUTE HARBOUR RD		1	KM	West of SHUTE HARBOUR STORAGE (WHITSUNDAY DR)	VEHICLE	SHUTE HARBOUR
																		CONDITION - UNDER INFLUENCE OF LIQOUR/DRUG (NOT NECESSARY BAC)					1	KM	West of SHUTE HARBOUR STORAGE (WHITSUNDAY DR)	VEHICLE	
2001	July	Saturday	8am	Medical treatment	Head-on	60	Daylight	Clear	No traffic control	Not applicable	2	1	Car/Station wagon	Go straight ahead	Major - towed away	East	PROSERPINE - SHUTE HARBOUR RD	VIOLATION - FAIL TO KEEP LEFT	201	VEH'S OPPOSITE APPROACH: HEAD ON	PROSERPINE - SHUTE HARBOUR RD		600	M	West of WHITSUNDAY DR	VEHICLE	SHUTE HARBOUR
												2	Car/Station wagon	Go straight ahead	Major - towed away	West	PROSERPINE - SHUTE HARBOUR RD	NOT APPLICABLE	201	VEH'S OPPOSITE APPROACH: HEAD ON	PROSERPINE - SHUTE HARBOUR RD		600	M	West of WHITSUNDAY DR	VEHICLE	SHUTE HARBOUR
2002	March	Sunday	8am	Property damage	Hit object	80	Daylight	Raining	No traffic control	Not applicable	1	1	Car/Station wagon	Go straight ahead	Major - towed away	East	PROSERPINE - SHUTE HARBOUR RD	ROAD - WET/SLIPPERY	804	OFF PATH-CURVE: OFF CWAY LT BEND HIT OBJ	PROSERPINE - SHUTE HARBOUR RD		150	M	West of SWAMP BAY (1KM WEST OF SHUTE HARBOUR)	VEHICLE	SHUTE HARBOUR
2002	March	Wednesday	Noon	Hospitalisation	Fall from vehicle	60	Daylight	Clear	No traffic control	Not applicable	1	1	Motorcycle	Go straight ahead	Minor	East	PROSERPINE - SHUTE HARBOUR RD	EXCESSIVE SPEED FOR CIRCUMSTANCES	901	PASS & MISC: FELL IN/FROM VEHICLE	PROSERPINE - SHUTE HARBOUR RD		2	KM	West of SHUTE HARBOUR MARINA	VEHICLE	SHUTE HARBOUR
2002	May	Monday	10am	Property damage	Head-on	60	Daylight	Clear	No traffic control	Not applicable	2	1	Car/Station wagon	Go straight ahead	Moderate - towed away	West	PROSERPINE - SHUTE HARBOUR RD	VIOLATION - CROSS DOUBLE LINES	201	VEH'S OPPOSITE APPROACH: HEAD ON	PROSERPINE - SHUTE HARBOUR RD		2	KM	West of WHITSUNDAY DRIVE	VEHICLE	SHUTE HARBOUR
												2	Car/Station wagon	Go straight ahead	Moderate - towed away	East	PROSERPINE - SHUTE HARBOUR RD	NOT APPLICABLE	201	VEH'S OPPOSITE APPROACH: HEAD ON	PROSERPINE - SHUTE HARBOUR RD		2	KM	West of WHITSUNDAY DRIVE	VEHICLE	SHUTE HARBOUR
2002	November	Friday	6pm	Hospitalisation	Fall from vehicle	60	Daylight	Clear	No traffic control	Not applicable	1	1	Bicycle	Go straight ahead	Not applicable	West	PROSERPINE - SHUTE HARBOUR RD	VEHICLE DEFECTS - MISCELLANEOUS	901	PASS & MISC: FELL IN/FROM VEHICLE	PROSERPINE - SHUTE HARBOUR RD		100	M	West of 2049951 (800 M W WHITSUNDAY DR)	VEHICLE	SHUTE HARBOUR
2003	January	Tuesday	7am	Hospitalisation	Overturned	80	Daylight	Raining	No traffic control	Not applicable	1	1	4-wheel drive	Go straight ahead	Extensive, unrepairable	West	PROSERPINE - SHUTE HARBOUR RD	ROAD - WET/SLIPPERY	802	OFF PATH-CURVE: OFF CWAY LEFT BEND	PROSERPINE - SHUTE HARBOUR RD		600	M	West of SWAMP BAY TURN-OFF(FROM 1/2 WHITSUNDAY DRIVE)	VEHICLE	SHUTE HARBOUR
2003	December	Wednesday	Noon	Property damage	Hit object	60	Daylight	Raining	No traffic control	Not applicable	1	1	Car/Station wagon	Go straight ahead	Moderate - towed away	West	PROSERPINE - SHUTE HARBOUR RD	VIOLATION - UNDUE CARE AND ATTENTION	803	OFF PATH-CURVE: OFF CWAY RT BEND HIT OBJ	PROSERPINE - SHUTE HARBOUR RD		2	KM	West of SHUTE HARBOUR	AIRLIE BEACH	SHUTE HARBOUR
2004	January	Tuesday	3pm	Minor injury	Fall from vehicle	60	Daylight	Clear	No traffic control	Not applicable	1	1	Motorcycle	Go straight ahead	Minor	West	PROSERPINE - SHUTE HARBOUR RD	VIOLATION - UNDUE CARE AND ATTENTION	805	OFF PATH-CURVE: OUT OF CONTROL ON CWAY	PROSERPINE - SHUTE HARBOUR RD		1	KM	West of SHUTE HARBOUR QUAY	VEHICLE	SHUTE HARBOUR
2005	January	Wednesday	2pm	Medical treatment	Head-on	60	Daylight	Clear	No traffic control	Not applicable	2	1	Motorcycle	Go straight ahead	Extensive, unrepairable	East	PROSERPINE - SHUTE HARBOUR RD	VIOLATION - FAIL TO KEEP LEFT	201	VEH'S OPPOSITE APPROACH: HEAD ON	PROSERPINE - SHUTE HARBOUR RD		500	M	West of WHITSUNDAY DRIVE	VEHICLE	SHUTE HARBOUR
												2	Utility/Panel van	Go straight ahead	Minor	West	PROSERPINE - SHUTE HARBOUR RD	NOT APPLICABLE	201	VEH'S OPPOSITE APPROACH: HEAD ON	PROSERPINE - SHUTE HARBOUR RD		500	M	West of WHITSUNDAY DRIVE	VEHICLE	SHUTE HARBOUR

Appendix C

Extract of Developer Agreement

AGREEMENT

Between

STATE OF QUEENSLAND

and

SHUTE HARBOUR MARINA DEVELOPMENT PTY LTD
ACN 081 285 832

CROWN
LAW

Crown Solicitor
State Law Building
50 Ann Street
BRISBANE

Facsimile: (07) 3239 6386
Telephone: (07) 3239 6915
Reference: CP2/ROA077/2020/DER

Document No.: 539695

1.5 In this Agreement the headings to the clauses have been inserted for convenience of reference only and are not intended to be part of or to affect the meaning or interpretation of any of the terms and conditions of this Agreement.

1.6 In the case of any inconsistency between the Schedules to this Agreement and a clause contained in this Agreement, the provisions of the clause shall prevail to the extent of any inconsistency.

1.7 The singular includes the plural and vice versa.

1.8 Words importing one gender shall include a reference to all other genders.

1.9 A reference to a clause, schedule or attachment is a reference to a clause, schedule or attachment to this Agreement and includes any amendment to same made in accordance with this Agreement.

1.10 A covenant or agreement on the part of two or more persons shall be deemed to bind them jointly and severally.

2. Provision of a Road Reserve

2.1 The Developer shall make provision for a Road Reserve to pass through the Leased Area generally in the location shown on the Plan to satisfy the anticipated future traffic requirements of DMR.

2.2 The Developer shall use its best endeavours to comply in all respects with the anticipated traffic requirements of DMR, which are set out in Schedule 2, to the satisfaction of DMR and any other potential requirements that may be imposed by DMR at a later stage.

2.3 In the event that the boundaries of the Road Reserve are to be changed in some way as a result of the determination of the Access Point to the Development then any such changes must be approved by DMR.

2.4 Any costs associated with the possible realignment of the boundaries of the Road Reserve shall be paid by the Developer.

2.5 In addition to the costs referred to in clause 2.4 any costs associated with alterations to the present road system that are required as a direct result of the construction of the Development shall be paid by the Developer.

2.6 The Developer shall comply with the access requirements of DMR during Phase 1 of the works and will pay the reasonable costs associated with the impact on the Proserpine - Shute Harbour Road caused during the reclamation stage of the Development.

2.7 The Developer acknowledges that further conditions may be imposed by the Chief Executive of DMR pursuant to s.40 of the *Transport Infrastructure Act 1994* at the time that the application for the Development is considered, if it has a significant impact on the Proserpine – Shute Harbour Road, which is a State-controlled road as defined in that Act.

Schedule 2

DMR's proposed requirements for the Construction of the Development

1. Access to the Development is to be confined to one point of access. Approval may be given to a possible temporary Access Point for Stage 1 of the Development, provided that internal connection roads are provided to Stage 2 of the Development, and the temporary Access Point removed when the final Access Point is constructed.

2. Access is to be located to meet the Austroads standards for intersection visibility and layout. The Developer is to be responsible for any changes to the Road Reserve to accommodate any intersection requirements.

3. It will be the Developer's responsibility to ensure that the initial stages of the Development do not compromise any future access requirements.

4. If the Development is to occur on both sides of the Road Reserve measures will need to be implemented by the Developer to minimise any potential crossing conflicts by the provision of a Pedestrian/Vehicle underpass.

5. The Conditions of the lease (if any) need to specify that the boundaries of the Road Reserve may change dependent on the access intersection requirements, and the provision of filling of the Licensed Area.

6. The Developer is to address any necessary noise attenuation issues.

7. The Road Reserve must provide an area for the installation of services. As the Development is to be constructed in 2 Stages it may be necessary for the Developer to provide for interim and final location of services with associated costs of relocation to be paid by the Developer.

8. DMR has the following road template requirements:-

   - 3/3.5m Lanes (2 Through lanes + an overtaking lane)
   - 2/2.0m Shoulders
   - 2.0m central median
   - Width for tables drains, cut slopes, fill slopes, and 3.0m clearance for maintenance, These widths must relate to current natural surface levels.

9. The width for provision of access intersection works will be in addition to the above and will be the responsibility of the Developer.

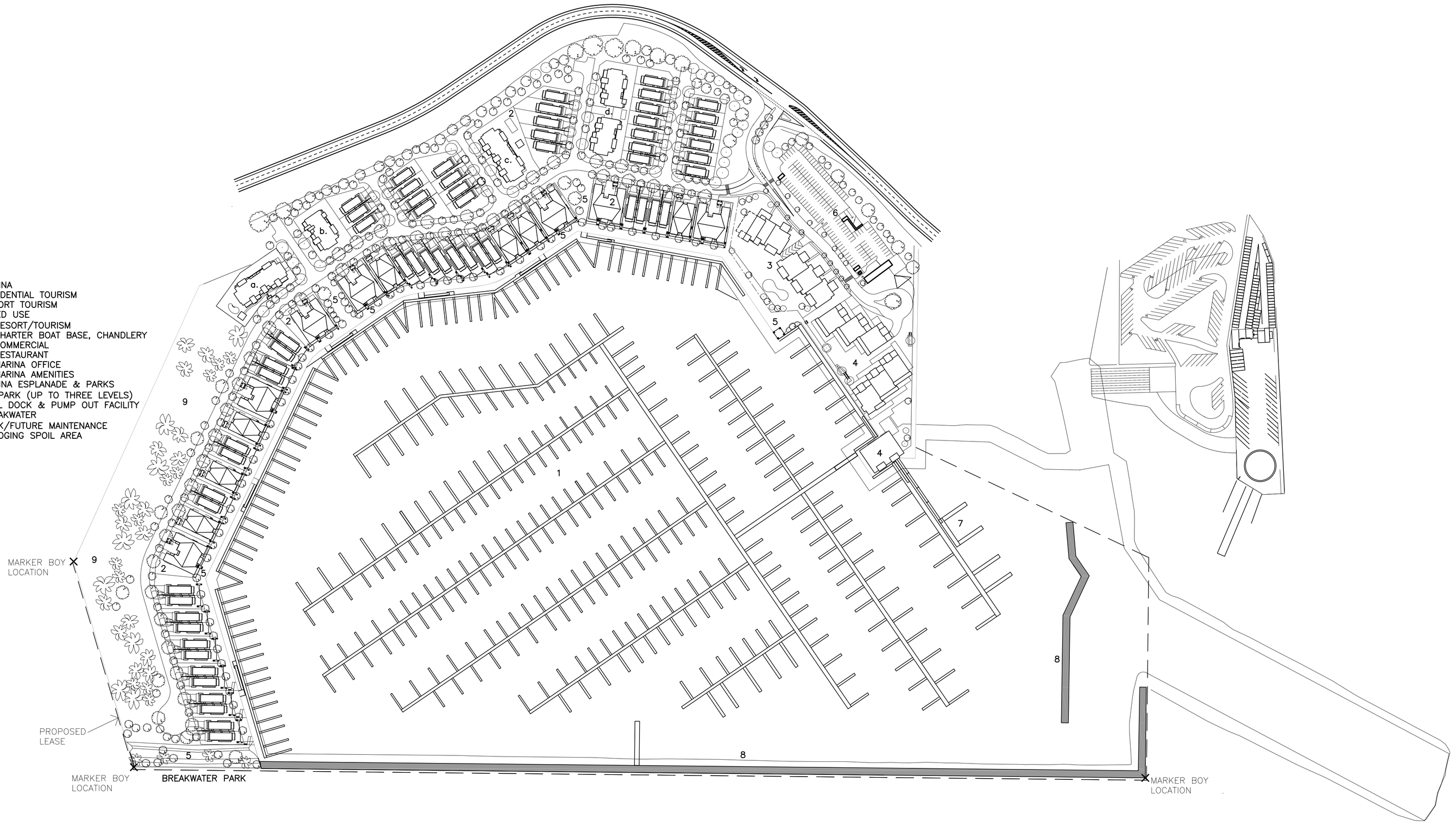
Appendix D

Master Plan Drawing

KEY:

1 MARINA
2 RESIDENTIAL TOURISM
3 RESORT TOURISM
4 MIXED USE
- RESORT/TOURISM
- CHARTER BOAT BASE, CHANDLERY
- COMMERCIAL
- RESTAURANT
- MARINA OFFICE
- MARINA AMENITIES

5 MARINA ESPLANADE & PARKS
6 CARPARK (UP TO THREE LEVELS)
7 FUEL DOCK & PUMP OUT FACILITY
8 BREAKWATER
9 PARK/FUTURE MAINTENANCE DREDGING SPOIL AREA



SD16	GENERAL AMENDMENTS	01-02-08
SD15	GENERAL AMENDMENTS	22-01-08
SD14	GENERAL AMENDMENTS	10-12-07
SD13	GENERAL AMENDMENTS	29-11-07
SD12	ADDED CO-ORDINATES	23-11-07
SD11	GENERAL REVISONS	19-11-07
ISSUE	COMMENTS	DATE

0 50m 100m

N

SHUTE HARBOUR MARINA

MASTER PLAN

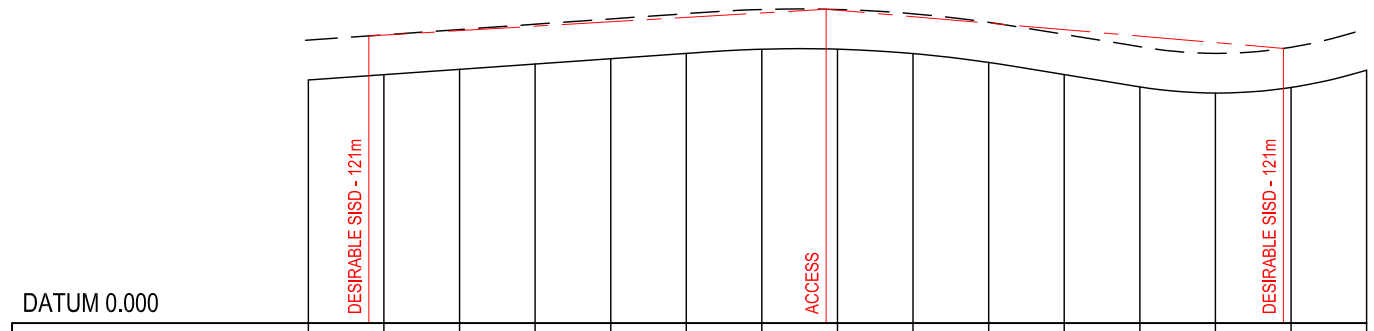
SCALE 1:2000 @ A1
CHECKED
DATE 01-02-08
DRAWING NO. 0605 SK01
ISSUE SD16

STUDIO TEKTON
thoughtful place making
ARCHITECTURE URBAN DESIGN
PO BOX 199
SPRING HILL QLD 4004
PH: (07) 3257 4995
FAX: (07) 3257 4993

Appendix E

Site Access Sight Distance

CONCEPT ONLY



DATUM 0.000															
DESIGN LEVELS ROAD CENTRELINE	6.433	6.574	6.714	6.854	6.994	7.135	7.246	7.246	7.129	6.896	6.575	6.248	6.086	6.234	6.693
CONTROL LINE CHAINAGE ROAD CL	380.000	400.000	420.000	440.000	460.000	480.000	500.000	520.000	540.000	560.000	580.000	600.000	620.000	640.000	660.000

SHUTE HARBOUR ROAD LONG SECTION

HOR. 10 0 10 20 30 40 50m 1:1000
VERT. 1 0 1 2 3 4 5m 1:100
SCALE BEFORE REDUCTION

Cardno Eppell Olsen

BRISBANE
Level 1, 9 Gardner Close
Milton Qld 4064
P.O. Box 388
Toowong Qld 4066
Tel: (07) 3310 2401
Fax: (07) 3369 9722

GOLD COAST
Suite 2, 20 Nerang Street
Nerang Qld 4211
P.O. Box 391
Nerang Qld 4211
Tel: (07) 5502 1585
Fax: (07) 5502 1586

SYDNEY
910 Pacific Highway
Gordan NSW 2072
Tel: (02) 9496 7700
Fax: (02) 9499 3902

eeo@eeo.com.au www.cardno.com.au/eeo

Issue	Description	Date	By
A	ISSUE FOR COMMENT	09.01.08	A.X.

PRELIMINARY PRINT
NOT FOR CONSTRUCTION

20 0 20 40 60 80 100 METRES
SCALE 1 : 1000 @ A1 SCALE 1 : 2000 @ A3

North

Base Information Supplied By: CARDNO

Design	Drawn	Checked
	A.X.	A.B.

Certified .....
RPEQ No. .....

Project Title: SHUTE HARBOUR MARINA

Client: SHUTE HARBOUR MARINA DEV PTY LTD

Drawing Title: SHUTE HARBOUR ROAD SIGHT DISTANCES

Drawing No. 5668-106

Sheet	Issue
1 of 1	A

Scale 1:1000 at A1
Project CE005668
Xref NIL
ACAD file 5668-100.dwg

Appendix F

Traffic Generation & Distribution

CE005668 Shute Harbour Marina
Cardno Eppell Olsen
PO Box 388 Toowong QLD 4066
Phone 07 3310 2401 Fax 07 3369 9722

Generation Rates

Type	Yield		Daily Generation Rate		Peak Hour Generation Rate		Source
Single lot dwellings	61	dwellings	6 vpd	per dwelling	0.6 vph	per dwelling	TAG medium density
1 bedroom	42	units	4 vpd	per unit	0.4 vph	per unit	TAG high density
2 bedroom	88	units	4 vpd	per unit	0.4 vph	per unit	TAG high density
3 bedroom	128	units	4 vpd	per unit	0.4 vph	per unit	TAG high density
Commercial	991	sq m GFA	10 vpd	per 100 sq m GFA	3.4 vph	per 100 sq m GFA	TAG
Retail	595	sq m GFA	120 vpd	per 100 sq m GFA	12.0 vph	per 100 sq m GFA	RTA
Restaurant	396	sq m GFA	60 vpd	per 100 sq m GFA	5.0 vph	per 100 sq m GFA	TAG
Marina Berths	669	berths	1 vpd	per berth	0.1 vph	per berth	CEO previous work

Traffic Generation

Type	Yield		Daily Generation	Peak Hour Generation
Single lot dwellings	61	dwellings	366	37
1 bedroom	42	units	168	17
2 bedroom	88	units	352	35
3 bedroom	128	units	512	51
Commercial	991	sq m GFA	99	34
Retail	595	sq m GFA	714	71
Restaurant	396	sq m GFA	238	20
Marina Berths	669	berths	669	67
TOTAL			**3,118**	**332**

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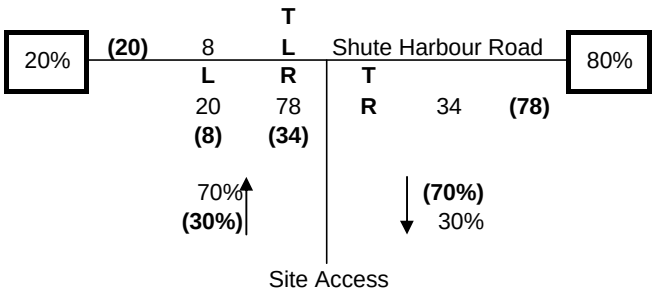
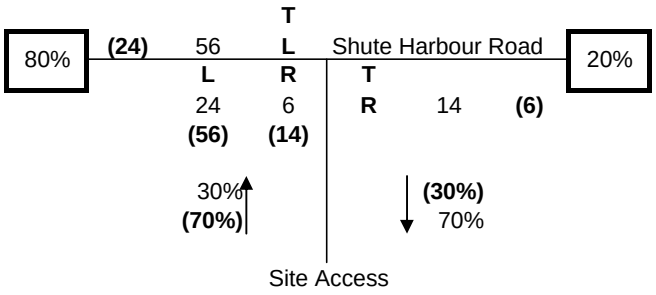
Tourism Accommodation
No Trips 140

10	AM Peak
(10)	**PM Peak**



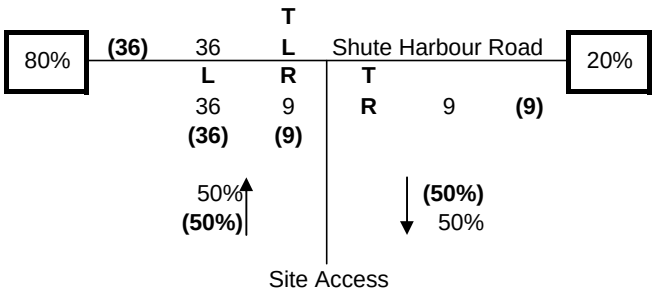
Commercial & Marina Traffic
No Trips 101

10	AM Peak
(10)	**PM Peak**



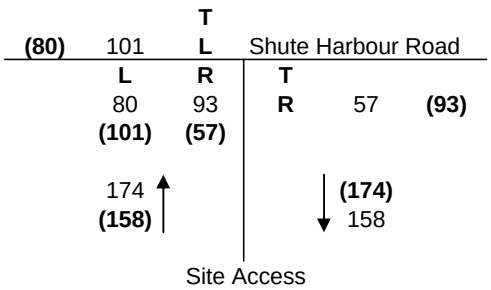
Retail & Restaurant
No Trips 91

10	AM Peak
(10)	**PM Peak**



Total Development Traffic (Operation)

10	AM Peak
(10)	**PM Peak**



55%	1865
45%	1515
	3380

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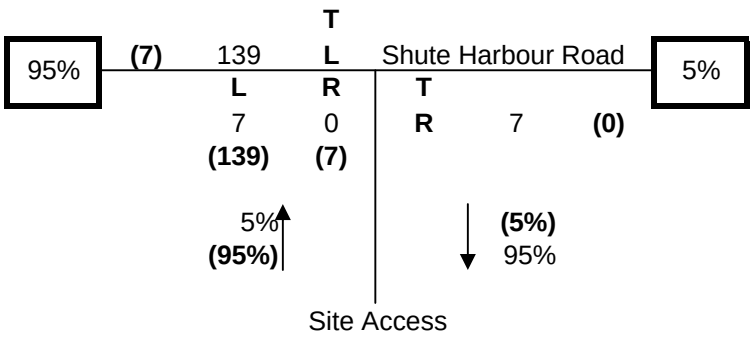
Construction Workers

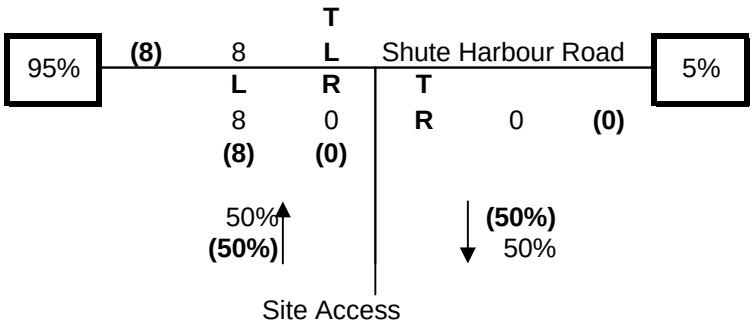
Peak Construction Workers	192
Occupancy	1.25
No Trips	154



10	AM Peak
(10)	**PM Peak**

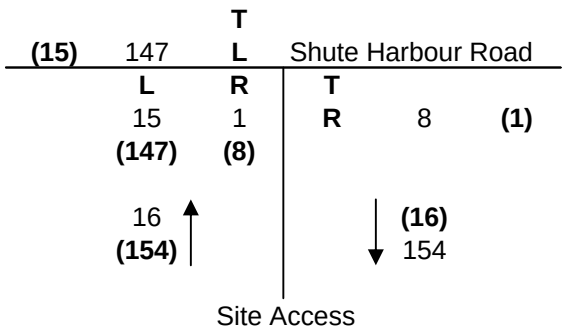
Construction Deliveries

Daily Delivery Vehicles Construction Peak	85
Peak to Daily	10
No trips	17



10	AM Peak
(10)	**PM Peak**

Total Construction Traffic



10	AM Peak
(10)	**PM Peak**

CE005668 Shute Harbour Marina
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Phone 07 3310 2401 Fax 07 3369 9722

AM Peak hour (05:45 - 06:45am)

Date	Time	Eastbound	Westbound	Total
30/08/2007	5:45:00 AM	50	2	52
30/08/2007	6:00:00 AM	98	3	101
30/08/2007	6:15:00 AM	55	11	66
30/08/2007	6:30:00 AM	25	9	34
TOTAL		**228**	**25**	**253**

PM Peak hour (04:30 - 05:45pm)

Date	Time	Eastbound	Westbound	Total
30/08/2007	4:30:00 PM	24	12	36
30/08/2007	4:45:00 PM	21	56	77
30/08/2007	5:00:00 PM	26	147	173
30/08/2007	5:15:00 PM	12	86	98
TOTAL		**83**	**301**	**384**

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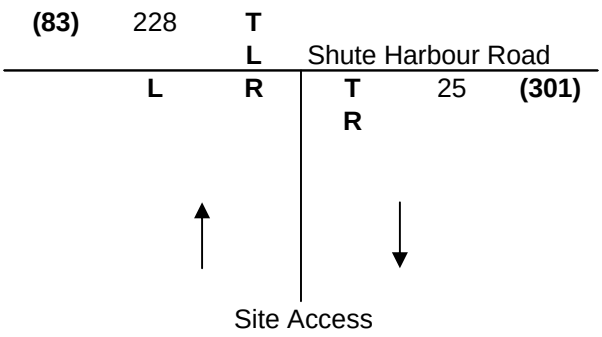
2007 Existing Traffic

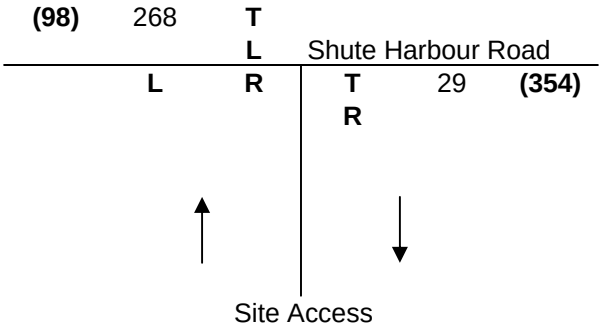
10	AM Peak
(10)	**PM Peak**



2012 Background Traffic

Growth Rate 3.5%

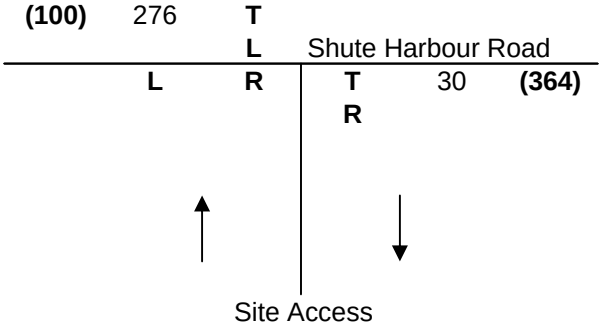
10	AM Peak
(10)	**PM Peak**



2013 Background Traffic

Growth Rate 3.5%

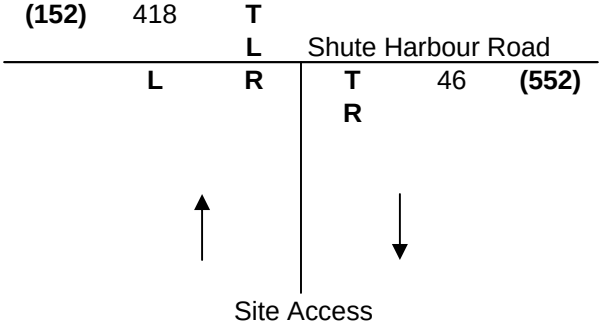
10	AM Peak
(10)	**PM Peak**



2023 Background Traffic

Growth Rate 3.5%

10	AM Peak
(10)	**PM Peak**



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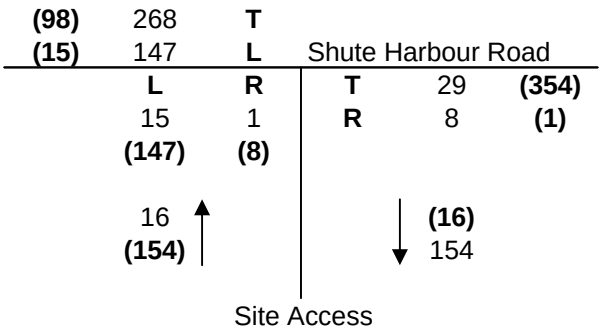
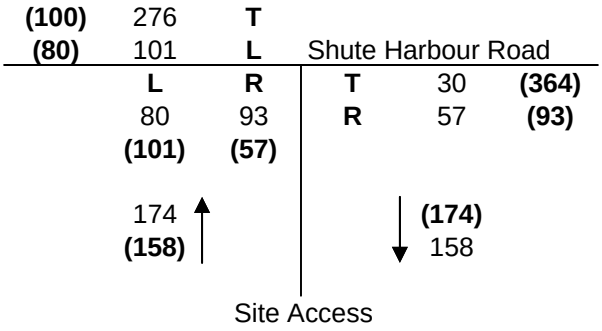
2012 Background & Construction Traffic

10	AM Peak
(10)	**PM Peak**



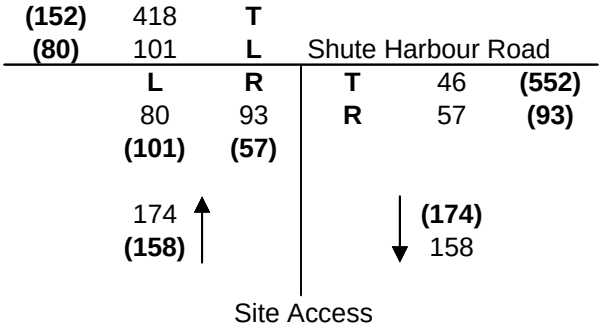
2013 Background & Development Traffic

10	AM Peak
(10)	**PM Peak**



2023 Background & Development Traffic

10	AM Peak
(10)	**PM Peak**



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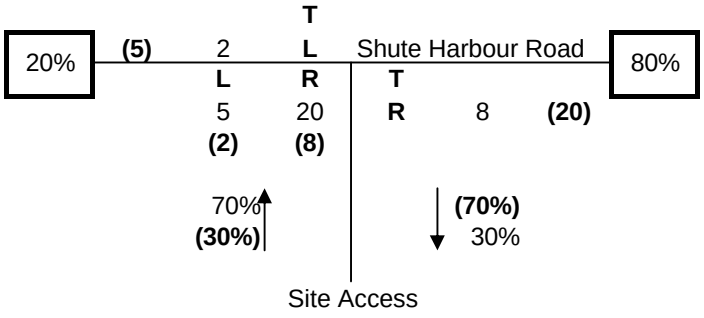
Tourism Accommodation - 15 minute peak

No Trips 35

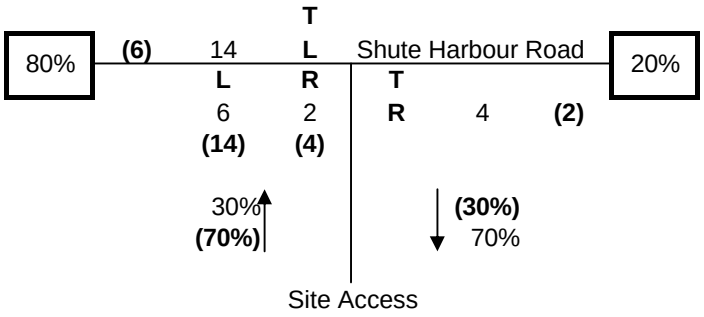
10	AM Peak
(10)	**PM Peak**



Commercial & Marina Traffic - 15 minute peak

No Trips 25

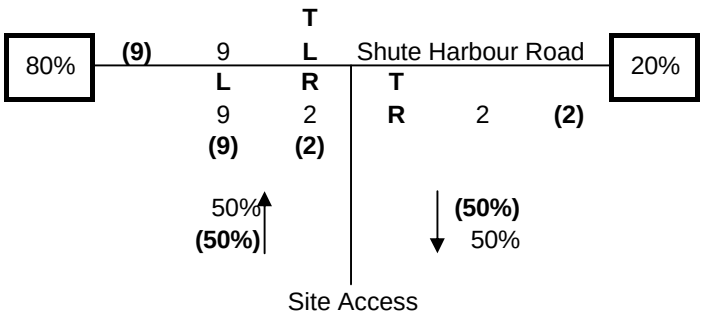
10	AM Peak
(10)	**PM Peak**



Retail & Restaurant - 15 minute peak

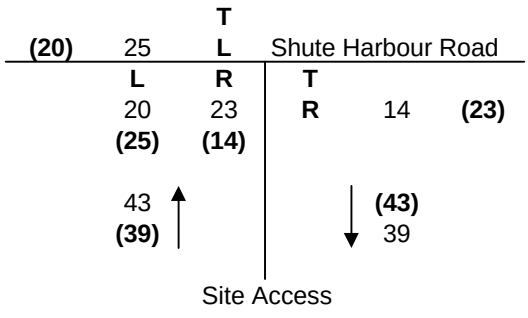
No Trips 23

10	AM Peak
(10)	**PM Peak**



Total Development Traffic (Operation) - 15 minute peak

10	AM Peak
(10)	**PM Peak**



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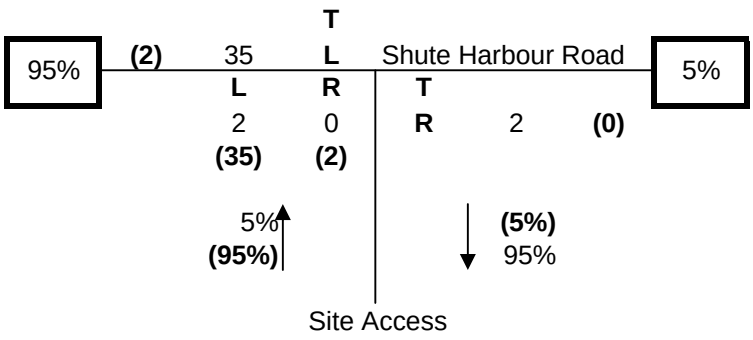
Construction Workers - 15 minute peak

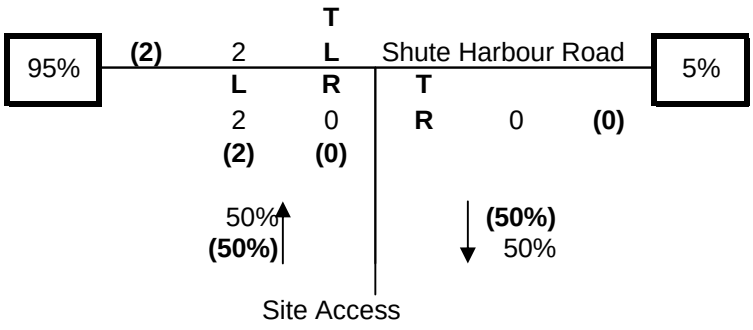
Peak Construction Workers	192
Occupancy	1.25
No Trips	38



10	AM Peak
(10)	**PM Peak**

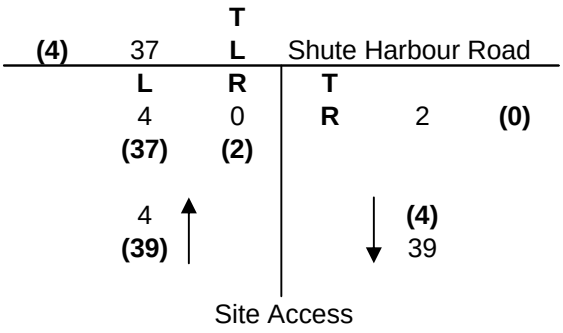
Construction Deliveries - 15 minute peak

Daily Delivery Vehicles Construction Peak	85
Peak to Daily	10
No trips	4



10	AM Peak
(10)	**PM Peak**

Total Construction Traffic - 15 minute peak



10	AM Peak
(10)	**PM Peak**

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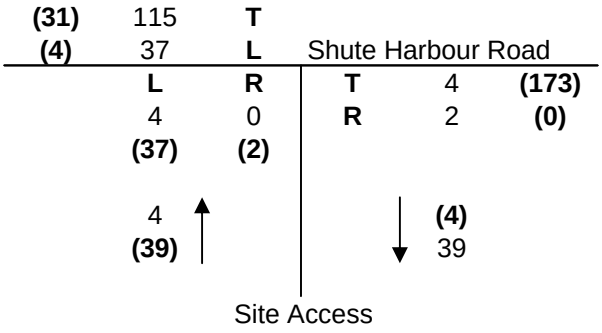
PO Box 388 Toowong QLD 4066
Phone 07 3310 2401 Fax 07 3369 9722

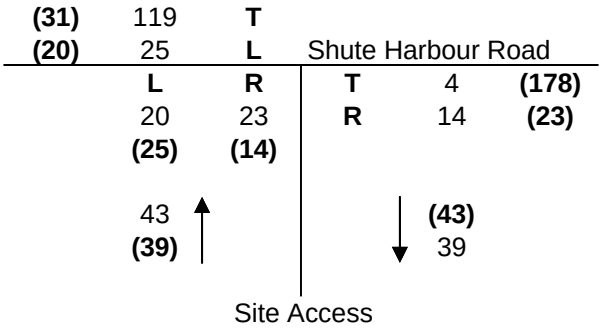
2012 Background & Construction Traffic - 15 minute peak

10	AM Peak
(10)	**PM Peak**



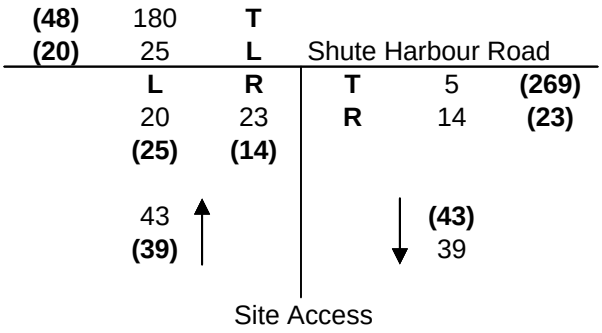
2013 Background & Development Traffic - 15 minute peak

10	AM Peak
(10)	**PM Peak**



2023 Background & Development Traffic - 15 minute peak

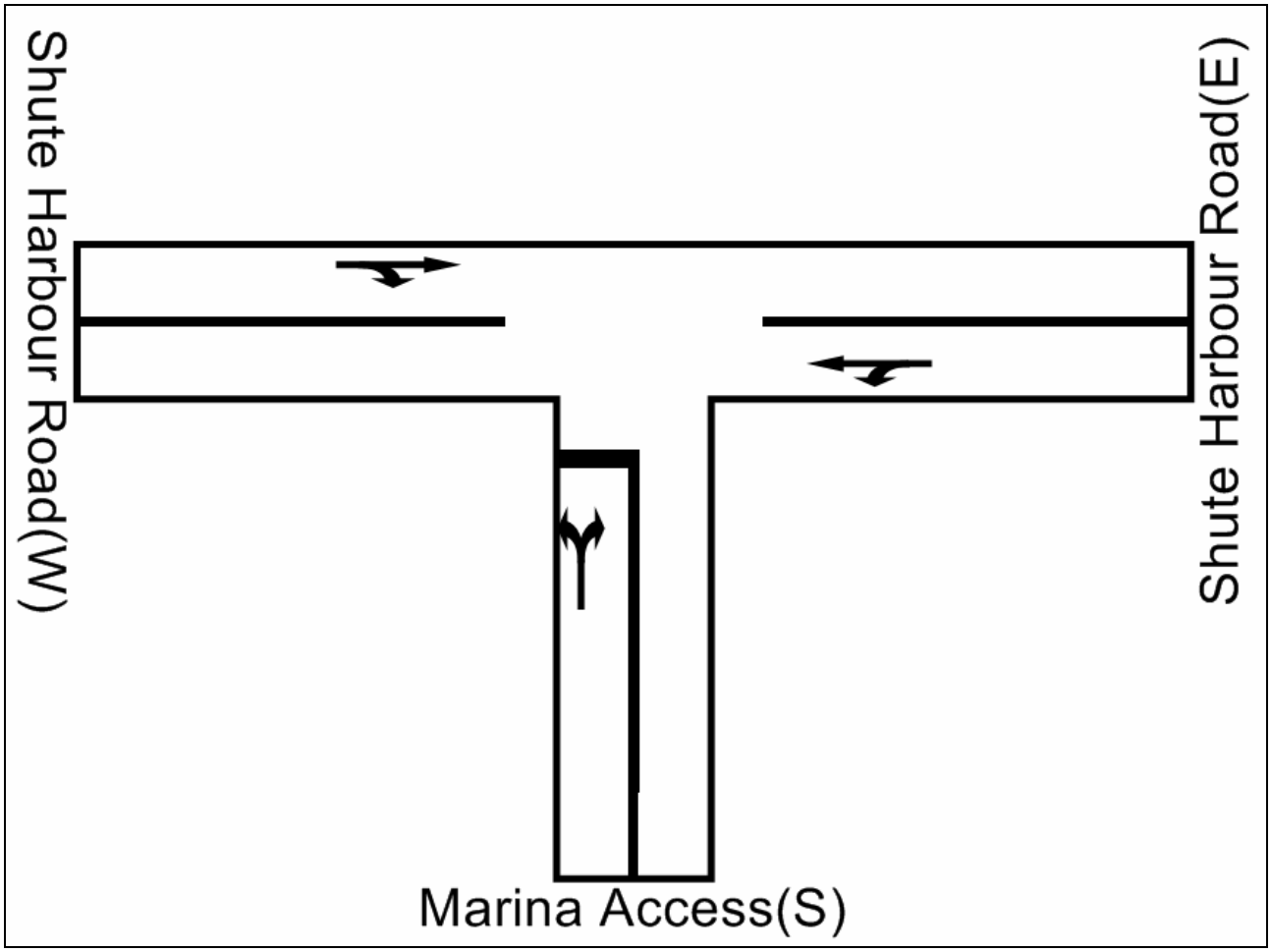
10	AM Peak
(10)	**PM Peak**



Appendix G

Shute Harbour Road/ Site Access

– aaSIDRA Analysis Results


Shute Harbour Road(W)
Shute Harbour Road(E)
Marina Access(S)

Shute Harbour Marina
2012 BG + Construction Traffic AM
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	16		2	18	17				0.020	12.0	1	500
	16	0	2	18	17				0.020	12.0	1	
East: Shute Harbour Road(E)												
1 LT	8	29		37	11				0.022	1.8	0	500
	8	29	0	37	11				0.022	1.8		
West: Shute Harbour Road(W)												
1 TR		268	147	415	10				0.243	3.3	12	500
	0	268	147	415	10				0.243	3.3	12	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	470	10	0.243	3.5	12

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2012 BG + Construction Traffic PM
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	147		8	155	10				0.216	14.1	7	500
	147	0	8	155	10				0.216	14.1	7	
East: Shute Harbour Road(E)												
1 LT	2	354		356	10				0.205	0.0	0	500
	2	354	0	356	10				0.205	0.0		
West: Shute Harbour Road(W)												
1 TR	98	16		114	11				0.071	2.9	4	500
	0	98	16	114	11				0.071	2.9	4	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	625	10	0.216	4.0	7

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2013 BG + Development Traffic AM
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	80		93	173	5				0.200	12.6	6	500
	80	0	93	173	5				0.200	12.6	6	
East: Shute Harbour Road(E)												
1 LT	57	30		87	7				0.051	5.5	0	500
	57	30	0	87	7				0.051	5.5		
West: Shute Harbour Road(W)												
1 TR	276	101		377	9				0.220	2.6	10	500
	0	276	101	377	9				0.220	2.6	10	
ALL VEHICLES	Total Flow	% HV							Max X	Aver. Delay	Max Queue	
	637	8							0.220	5.7	10	

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2013 BG + Development Traffic PM
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	101		57	158	5				0.239	14.6	7	500
	101	0	57	158	5				0.239	14.6	7	
East: Shute Harbour Road(E)												
1 LT	93	364		457	9				0.264	1.7	0	500
	93	364	0	457	9				0.264	1.7		
West: Shute Harbour Road(W)												
1 TR		100	88	188	7				0.137	6.1	6	500
	0	100	88	188	7				0.137	6.1	6	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	803	8	0.264	5.3	7

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2023 BG + Development Traffic AM
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	80		93	173	5				0.232	13.7	7	500
	80	0	93	173	5				0.232	13.7	7	
East: Shute Harbour Road(E)												
1 LT	57	46		103	8				0.060	4.6	0	500
	57	46	0	103	8				0.060	4.6		
West: Shute Harbour Road(W)												
1 TR	418	101		519	9				0.302	2.1	16	500
	0	418	101	519	9				0.302	2.1	16	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	795	8	0.302	5.0	16

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2023 BG + Development Traffic PM
Intersection ID: 0
Stop Sign Controlled Intersection

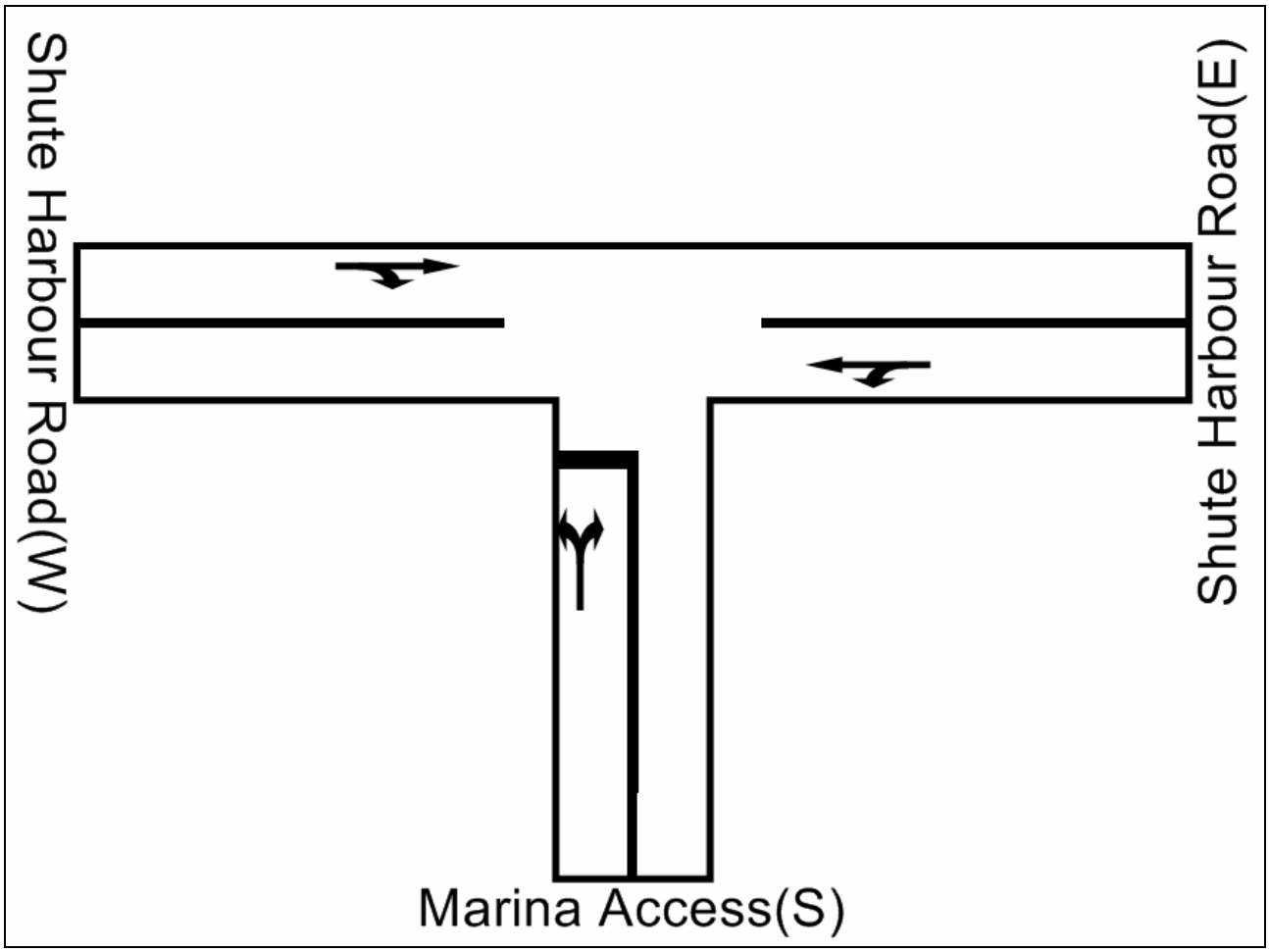
Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	101		57	158	5				0.333	18.4	11	500
	101	0	57	158	5				0.333	18.4	11	
East: Shute Harbour Road(E)												
1 LT	93	552		645	9				0.373	1.2	0	500
	93	552	0	645	9				0.373	1.2		
West: Shute Harbour Road(W)												
1 TR		152	80	232	8				0.182	6.8	10	500
	0	152	80	232	8				0.182	6.8	10	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1035	8	0.372	5.1	11

Peak flow period = 60 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.


Shute Harbour Road(W)
Shute Harbour Road(E)
Marina Access(S)

Shute Harbour Marina
2012 BG + Construction Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	16		5	21	14				0.026	12.8	1	500
	16	0	5	21	14				0.026	12.8	1	
East: Shute Harbour Road(E)												
1 LT	8	16		24	13				0.014	2.9	0	500
	8	16	0	24	13				0.014	2.9		
West: Shute Harbour Road(W)												
1 TR		460	148	608	10				0.353	2.3	19	500
	0	460	148	608	10				0.353	2.3	19	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	653	10	0.353	2.6	19

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2012 BG + Construction Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	148		8	156	10				0.402	21.7	14	500
	148	0	8	156	10				0.402	21.7	14	
East: Shute Harbour Road(E)												
1 LT	5	692		697	10				0.402	0.1	0	500
	5	692	0	697	10				0.402	0.1		
West: Shute Harbour Road(W)												
1 TR		124	16	140	10				0.095	5.8	7	500
	0	124	16	140	10				0.095	5.8	7	
ALL VEHICLES		Total Flow	% HV						Max X	Aver. Delay	Max Queue	
		993	10						0.417	4.3	14	

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2013 BG + Development Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	80		92	172	5				0.234	13.7	7	500
	80	0	92	172	5				0.234	13.7	7	
East: Shute Harbour Road(E)												
1 LT	56	16		72	7				0.042	6.5	0	500
	56	16	0	72	7				0.042	6.5		
West: Shute Harbour Road(W)												
1 TR	476	100		576	9				0.334	1.8	17	500
	0	476	100	576	9				0.334	1.8	17	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	820	8	0.334	4.7	17

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2013 BG + Development Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	100		56	156	5				0.437	23.1	15	500
	100	0	56	156	5				0.437	23.1	15	
East: Shute Harbour Road(E)												
1 LT	92	712		804	9				0.464	1.0	0	500
	92	712	0	804	9				0.464	1.0		
West: Shute Harbour Road(W)												
1 TR		124	80	204	8				0.195	9.3	11	500
	0	124	80	204	8				0.195	9.3	11	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1164	9	0.465	5.4	15

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2023 BG + Development Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	80		92	172	5				0.313	16.6	11	500
	80	0	92	172	5				0.313	16.6	11	
East: Shute Harbour Road(E)												
1 LT	56	20		76	7				0.045	6.2	0	500
	56	20	0	76	7				0.045	6.2		
West: Shute Harbour Road(W)												
1 TR	720	100		820	9				0.474	1.5	30	500
	0	720	100	820	9				0.474	1.5	30	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1068	9	0.474	4.3	30

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina
2023 BG + Development Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

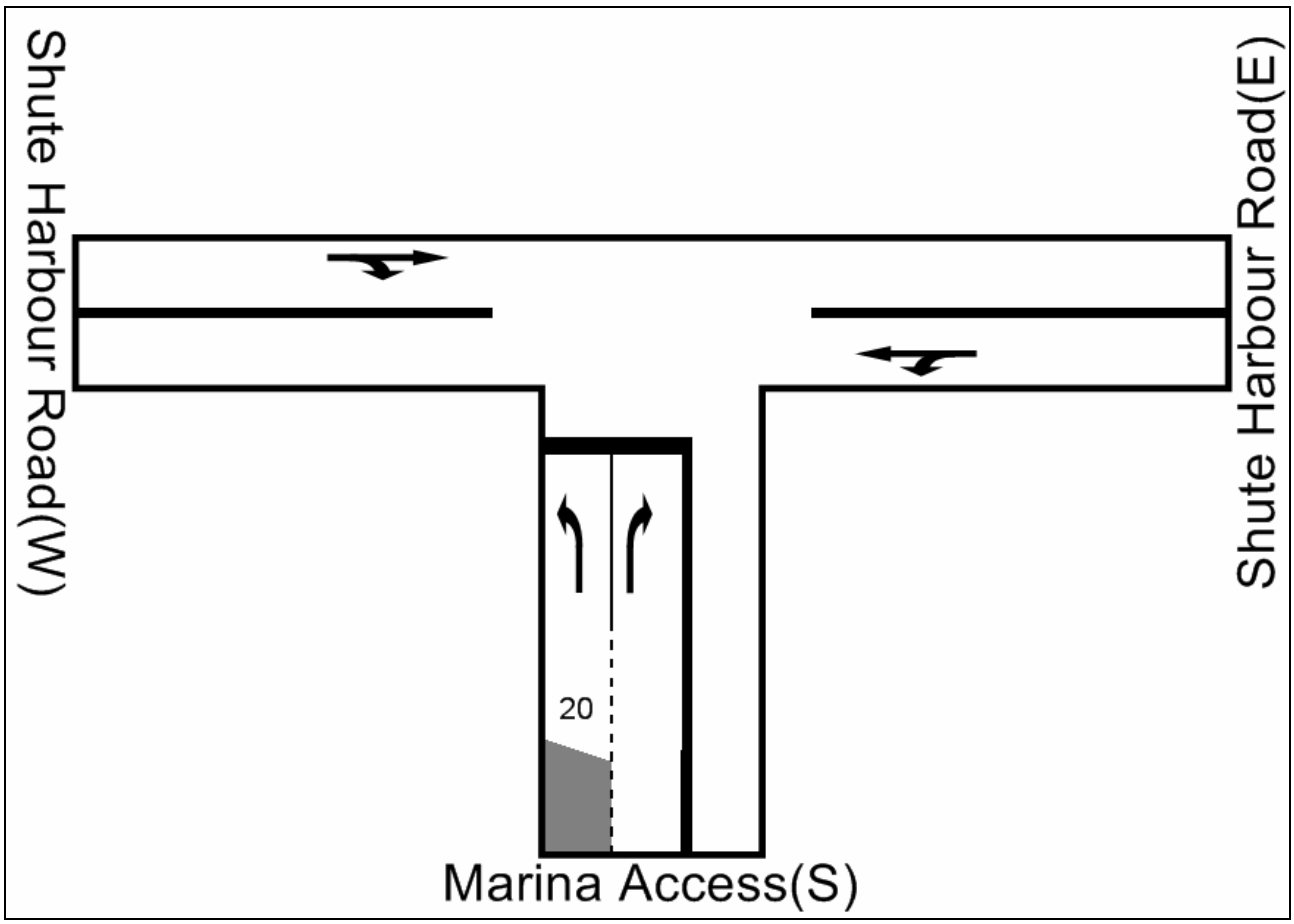
Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 LR	100		56	156	5				1.189	161.6	97	500
	100	0	56	156	5				1.189	161.6	97	
East: Shute Harbour Road(E)												
1 LT	92	1076		1168	10				0.674	0.7	0	500
	92	1076	0	1168	10				0.674	0.7		
West: Shute Harbour Road(W)												
1 TR		192	80	272	8				0.411	25.1	32	500
	0	192	80	272	8				0.411	25.1	32	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1596	9	1.191	20.6	97

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.


Shute Harbour Road(W)
Shute Harbour Road(E)
20
Marina Access(S)

Shute Harbour Marina - Slip Lane Layout
2012 BG + Construction Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	16			16	13				0.021	11.4	0	20
2 R			5	5	20				0.012	17.0	0	500
	16	0	5	21	14				0.021	12.7	0	
East: Shute Harbour Road(E)												
1 LT	8	16		24	13				0.014	2.9	0	500
	8	16	0	24	13				0.014	2.9		
West: Shute Harbour Road(W)												
1 TR		460	148	608	10				0.353	2.2	19	500
	0	460	148	608	10				0.353	2.2	19	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	653	10	0.353	2.6	19

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Slip Lane Layout
2012 BG + Construction Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	148			148	10				0.379	21.3	13	20
2 R			8	8	13				0.023	19.5	1	500
	148	0	8	156	10				0.379	21.2	13	
East: Shute Harbour Road(E)												
1 LT	5	692		697	10				0.402	0.1	0	500
	5	692	0	697	10				0.402	0.1		
West: Shute Harbour Road(W)												
1 TR		124	16	140	10				0.095	5.8	7	500
	0	124	16	140	10				0.095	5.8	7	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	993	10	0.417	4.2	13

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Slip Lane Layout
2013 BG + Development Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	80			80	5				0.097	11.2	2	20
2 R			92	92	5				0.164	15.5	5	500
	80	0	92	172	5				0.164	13.5	5	
East: Shute Harbour Road(E)												
1 LT	56	16		72	7				0.042	6.5	0	500
	56	16	0	72	7				0.042	6.5		
West: Shute Harbour Road(W)												
1 TR		476	100	576	9				0.334	1.8	17	500
	0	476	100	576	9				0.334	1.8	17	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	820	8	0.334	4.7	17

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Slip Lane Layout
2013 BG + Development Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	100			100	5				0.264	20.1	8	20
2 R			56	56	5				0.173	20.9	5	500
	100	0	56	156	5				0.264	20.4	8	
East: Shute Harbour Road(E)												
1 LT	92	712		804	9				0.464	1.0	0	500
	92	712	0	804	9				0.464	1.0		
West: Shute Harbour Road(W)												
1 TR		124	80	204	8				0.195	9.3	11	500
	0	124	80	204	8				0.195	9.3	11	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1164	9	0.465	5.0	11

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Slip Lane Layout
2023 BG + Development Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	80			80	5				0.098	11.2	2	20
2 R			92	92	5				0.242	19.9	7	500
	80	0	92	172	5				0.242	15.8	7	
East: Shute Harbour Road(E)												
1 LT	56	20		76	7				0.045	6.2	0	500
	56	20	0	76	7				0.045	6.2		
West: Shute Harbour Road(W)												
1 TR		720	100	820	9				0.474	1.5	30	500
	0	720	100	820	9				0.474	1.5	30	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1068	9	0.474	4.1	30

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Slip Lane Layout
2023 BG + Development Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	100			100	5				0.769	63.5	25*	20
2 R			56	56	5				0.421	44.9	11	500
	100	0	56	156	5				0.769	56.8	25	
East: Shute Harbour Road(E)												
1 LT	92	1076		1168	10				0.674	0.7	0	500
	92	1076	0	1168	10				0.674	0.7		
West: Shute Harbour Road(W)												
1 TR		192	80	272	8				0.411	25.0	32	500
	0	192	80	272	8				0.411	25.0	32	

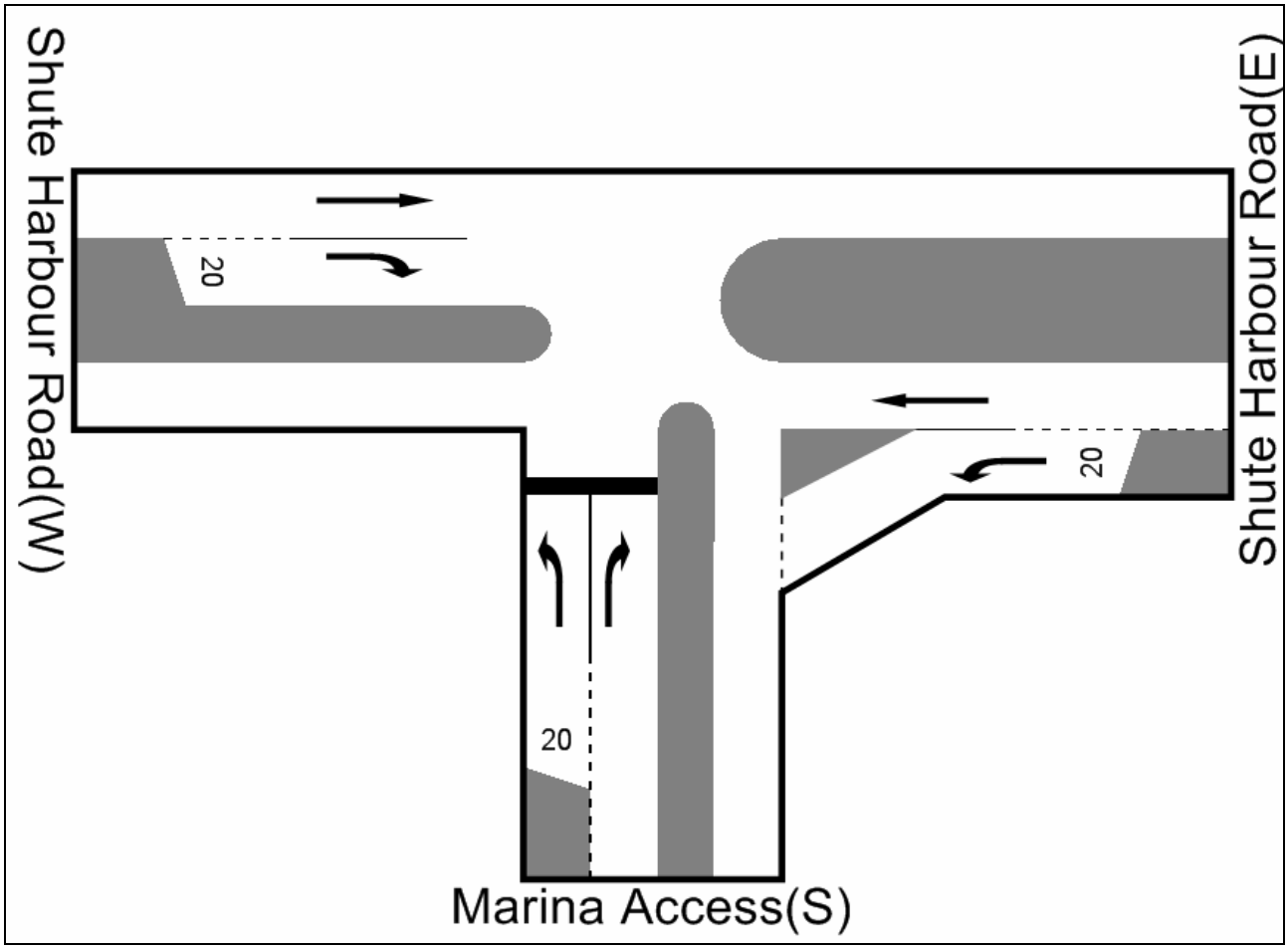
ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1596	9	0.769	10.3	32

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

* Queue length exceeds short lane length due to specification of a percentile queue in the Tools-Options (Model tab). For calculation of this statistic, you may specify the lane with full length.


Shute Harbour Road(W)
Shute Harbour Road(E)
20
20
20
Marina Access(S)

Shute Harbour Marina - Final Layout
2012 BG + Construction Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	16			16	13				0.021	11.4	0	20
2 R			5	5	20				0.011	16.7	0	500
	16	0	5	21	14				0.021	12.6	0	
East: Shute Harbour Road(E)												
1 L	8			8	13				0.005	7.9	0	20
2 T		16		16	13				0.009	0.0	0	500
	8	16	0	24	13				0.009	2.6		
West: Shute Harbour Road(W)												
1 T		460		460	10				0.265	0.0	0	500
2 R			148	148	10				0.138	8.8	4	20
	0	460	148	608	10				0.265	2.1	4	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	653	10	0.265	2.5	4

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Final Layout
2012 BG + Construction Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	148			148	10				0.325	19.1	12	20
2 R			8	8	13				0.021	18.7	1	500
	148	0	8	156	10				0.325	19.1	12	
East: Shute Harbour Road(E)												
1 L	5			5	20				0.003	7.8	0	20
2 T		692		692	10				0.398	0.0	0	500
	5	692	0	697	10				0.398	0.1		
West: Shute Harbour Road(W)												
1 T		124		124	10				0.071	0.0	0	500
2 R			16	16	13				0.021	12.2	1	20
	0	124	16	140	10				0.071	1.4	1	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	993	10	0.398	3.2	12

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Final Layout
2013 BG + Development Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	80			80	5				0.098	11.2	2	20
2 R			92	92	5				0.158	15.4	5	500
	80	0	92	172	5				0.158	13.4	5	
East: Shute Harbour Road(E)												
1 L	56			56	5				0.033	7.7	0	20
2 T		16		16	13				0.009	0.0	0	500
	56	16	0	72	7				0.033	6.0		
West: Shute Harbour Road(W)												
1 T		476		476	10				0.274	0.0	0	500
2 R			100	100	5				0.089	8.6	2	20
	0	476	100	576	9				0.274	1.5	2	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	820	8	0.274	4.4	5

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Final Layout
2013 BG + Development Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	100			100	5				0.220	17.9	6	20
2 R			56	56	5				0.155	19.8	4	500
	100	0	56	156	5				0.220	18.6	6	
East: Shute Harbour Road(E)												
1 L	92			92	5				0.054	7.7	0	20
2 T		712		712	10				0.410	0.0	0	500
	92	712	0	804	9				0.410	0.9		
West: Shute Harbour Road(W)												
1 T		124		124	10				0.071	0.0	0	500
2 R			80	80	5				0.106	12.4	3	20
	0	124	80	204	8				0.106	4.9	3	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1164	9	0.410	4.0	6

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Final Layout
2023 BG + Development Traffic AM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	80			80	5				0.098	11.2	2	20
2 R			92	92	5				0.222	18.9	7	500
	80	0	92	172	5				0.222	15.3	7	
East: Shute Harbour Road(E)												
1 L	56			56	5				0.033	7.7	0	20
2 T		20		20	10				0.012	0.0	0	500
	56	20	0	76	7				0.033	5.7		
West: Shute Harbour Road(W)												
1 T		720		720	10				0.414	0.0	0	500
2 R			100	100	5				0.089	8.7	2	20
	0	720	100	820	9				0.414	1.1	2	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1068	9	0.415	3.7	7

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Shute Harbour Marina - Final Layout
2023 BG + Development Traffic PM - 15 minute peak
Intersection ID: 0
Stop Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	Longest Queue (m)	Shrt Lane (m)
South: Marina Access(S)												
1 L	100			100	5				0.419	29.8	13	20
2 R			56	56	5				0.310	33.7	8	500
	100	0	56	156	5				0.419	31.2	13	
East: Shute Harbour Road(E)												
1 L	92			92	5				0.054	7.7	0	20
2 T		1076		1076	10				0.620	0.0	0	500
	92	1076	0	1168	10				0.620	0.6		
West: Shute Harbour Road(W)												
1 T		192		192	10				0.110	0.0	0	500
2 R			80	80	5				0.180	16.7	5	20
	0	192	80	272	8				0.180	4.9	5	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	1596	9	0.619	4.3	13

Peak flow period = 15 minutes.

Queue values in this table are 95% back of queue (metres).

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Appendix H

Swept Paths

CONCEPT ONLY

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Issue	Description	Date	By
A	ISSUE FOR COMMENT	09.01.07	A.X.

PRELIMINARY PRINT
NOT FOR CONSTRUCTION

15 0 15 30 45 60 75 METRES
SCALE 1 : 1500 @ A1 SCALE 1 : 3000 @ A3

North

Base Information Supplied By: CARDNO

Design | Drawn: A.X. | Checked: A.B.

Certified .....

RPEQ No. .....

Project Title: SHUTE HARBOUR MARINA

Client: SHUTE HARBOUR MARINA DEV PTY LTD

Drawing Title: SHUTE HARBOUR MARINA SITE PLAN

Drawing No. 5668-101

Sheet 1 of 1 | Issue A

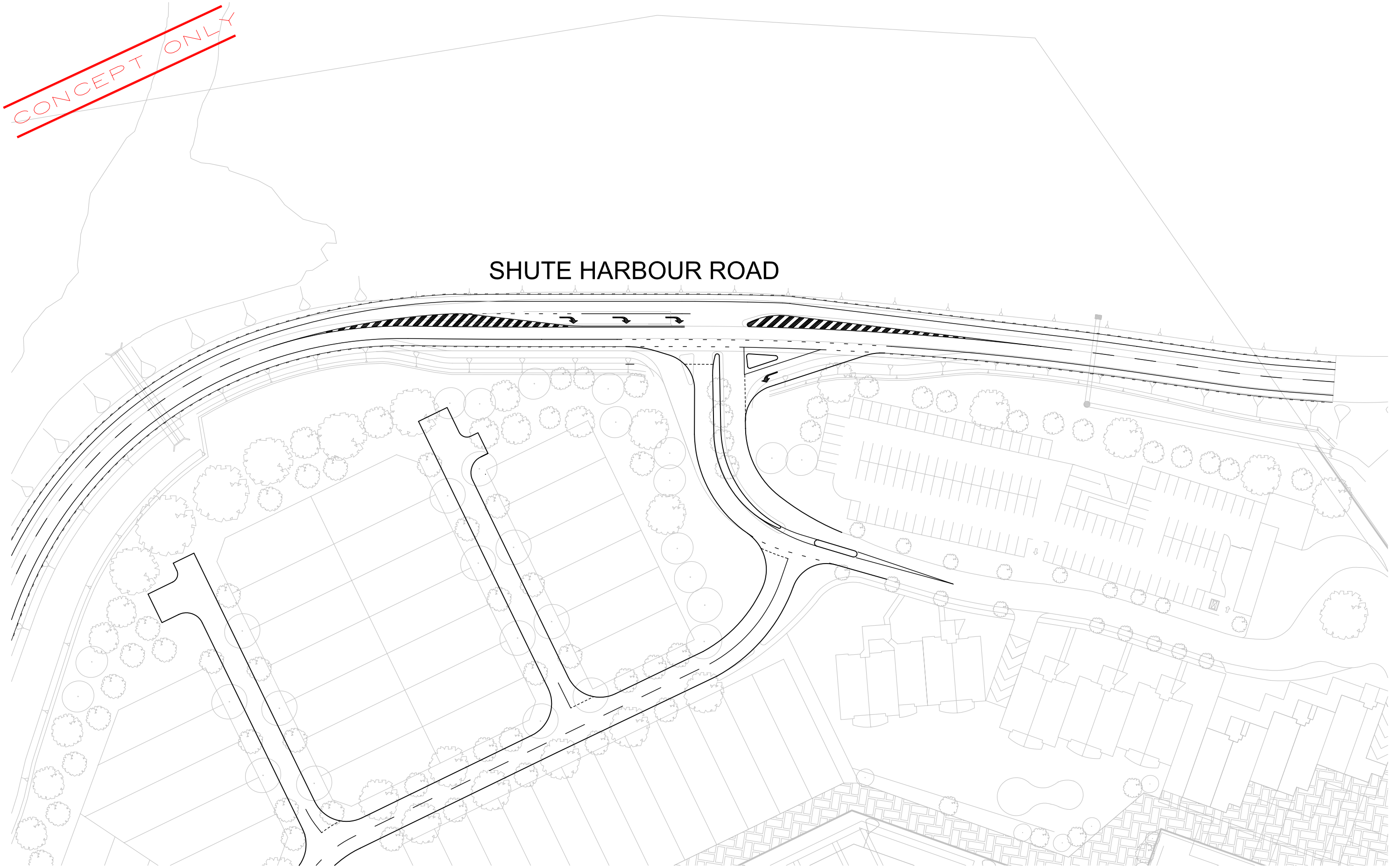
Scale 1:1500 at A1

Project CE005668

Xref NIL

ACAD file 5668-100.dwg

CONCEPT ONLY



Cardno Eppell Olsen

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Issue	Description	Date	By
A	ISSUE FOR COMMENT	09.01.07	A.X.

PRELIMINARY PRINT
NOT FOR CONSTRUCTION

10 0 10 20 30 40 50 METRES
SCALE 1 : 500 @ A1 SCALE 1 : 1000 @ A3

North

Base Information Supplied By: CARDNO

Design	Drawn	Checked
	A.X.	A.B.

Certified .....

RPEQ No. .....

Project Title: SHUTE HARBOUR MARINA

Client: SHUTE HARBOUR MARINA DEV PTY LTD

Drawing Title: SHUTE HARBOUR ROAD INTERSECTION CONCEPT

Drawing No. 5668-102

Sheet 1 of 1 | Issue A

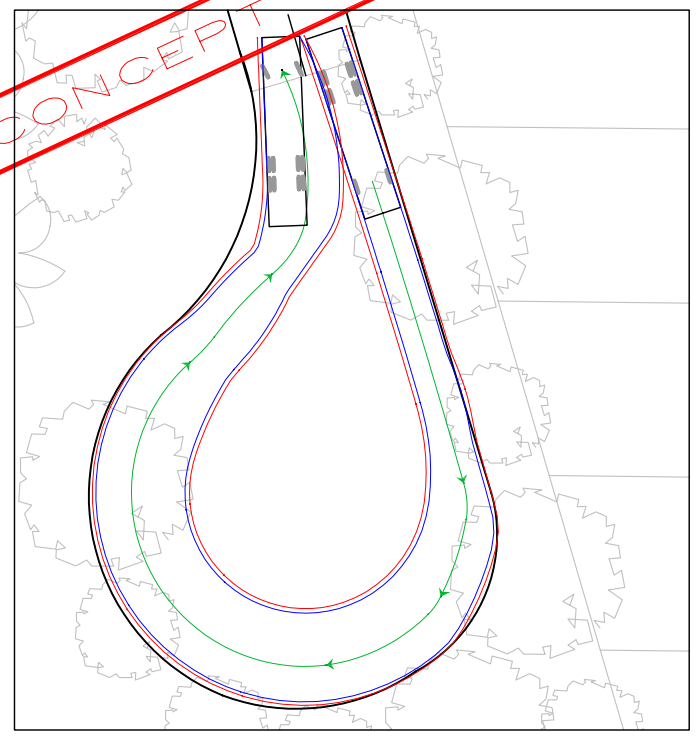
Scale 1:500 at A1

Project CE005668

Xref NIL

ACAD file 5668-100.dwg

CONCEPT ONLY



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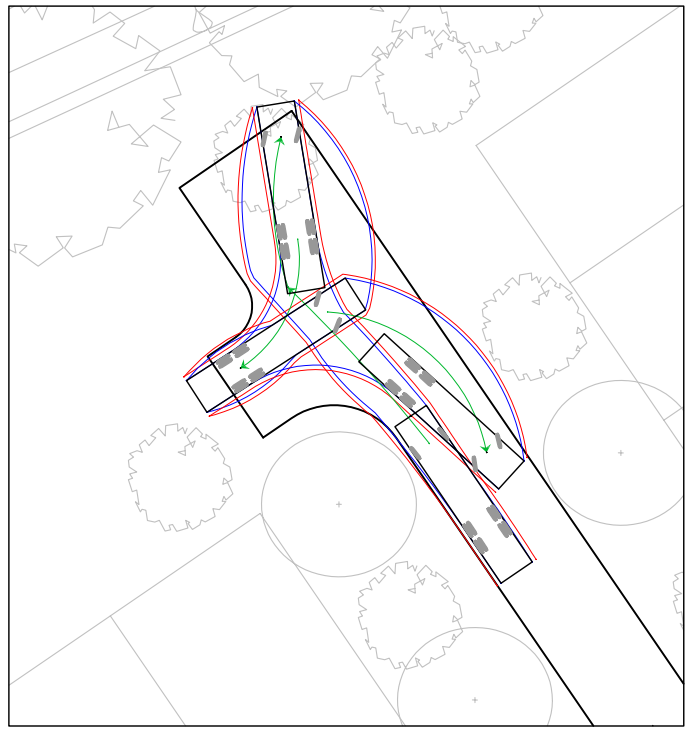
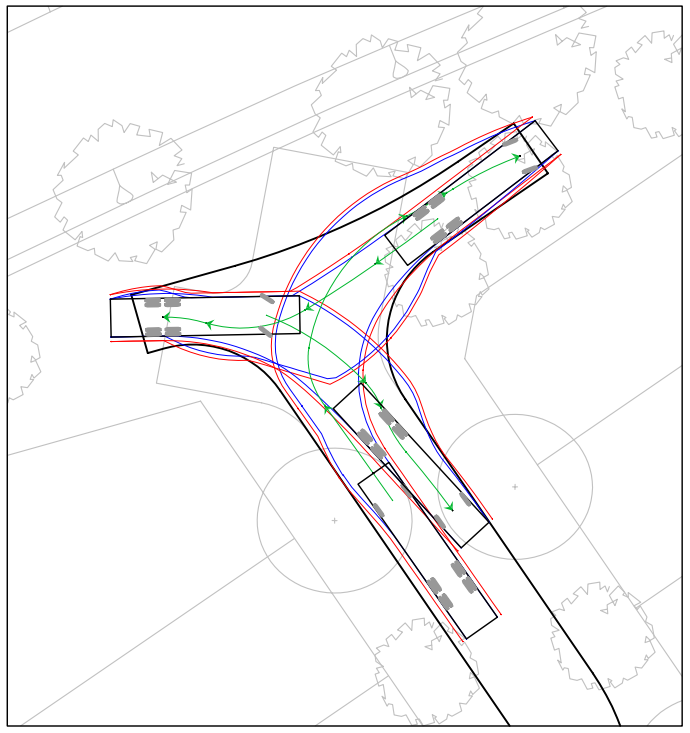


LOCATION B



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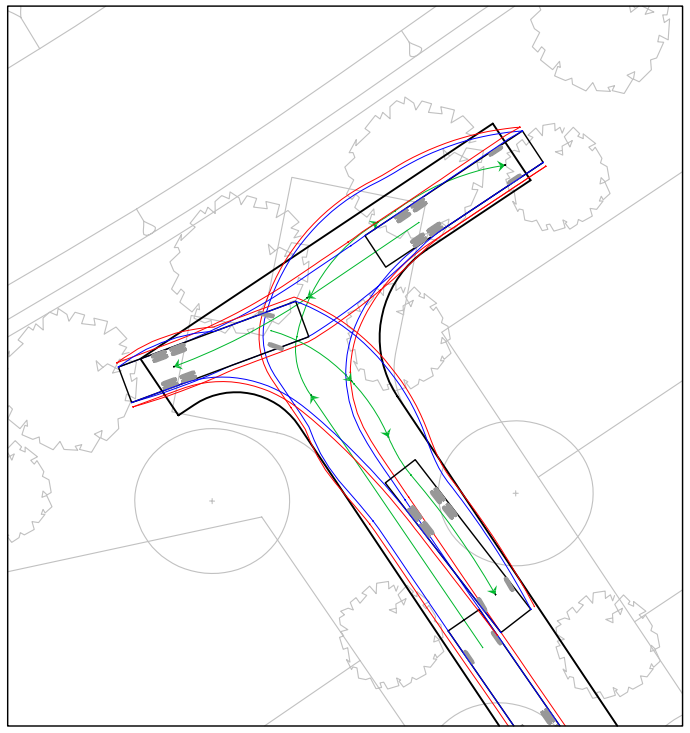
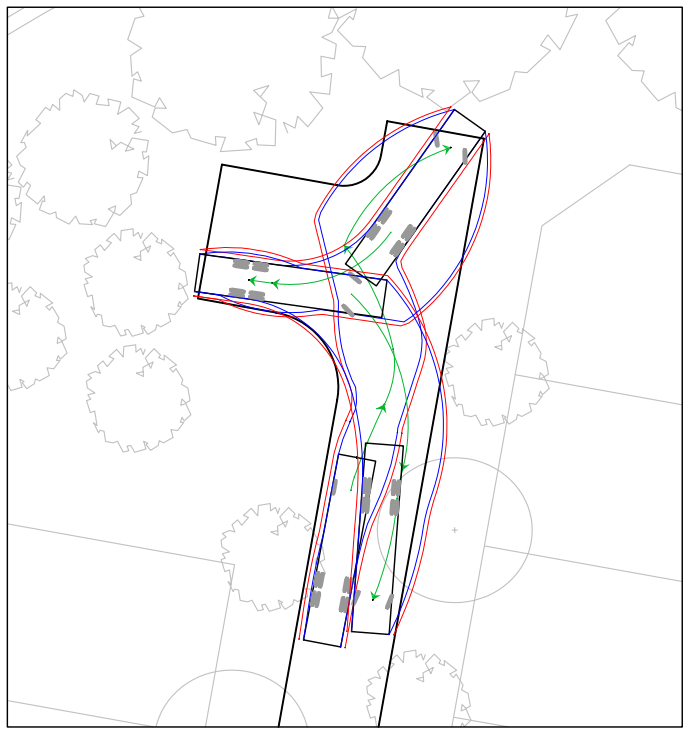


LOCATION D



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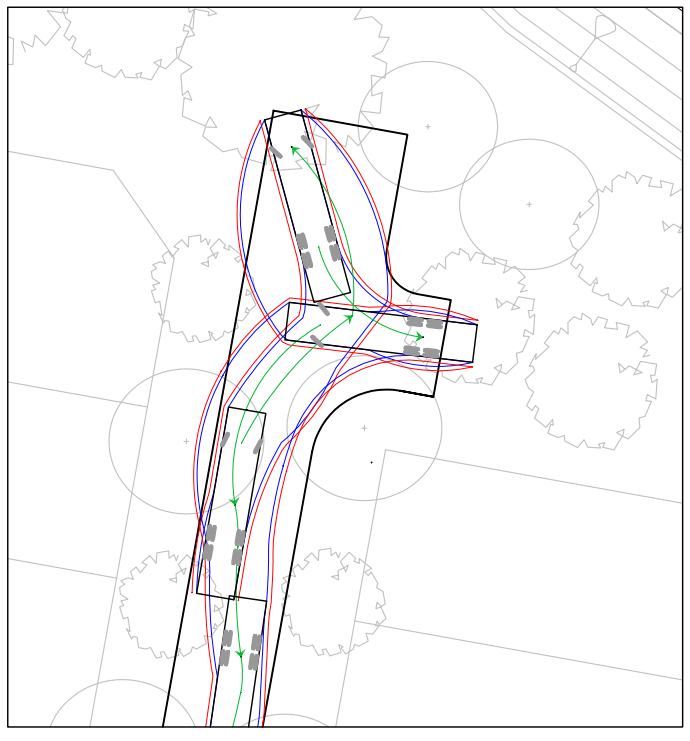
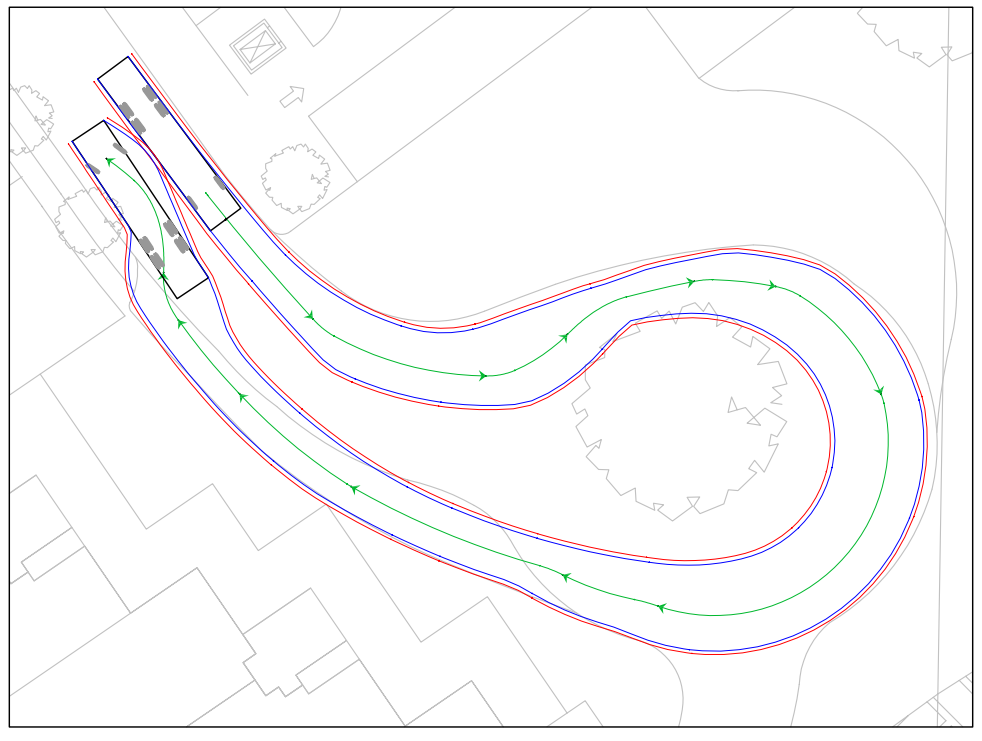


LOCATION F



BUS SET DOWN AREA

NOTE
REFER DWG No. 5668-101 FOR OVERALL VIEW OF LOCATIONS

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Issue	Description	Date	By
A	ISSUE FOR COMMENT	09.01.07	A.X.

PRELIMINARY PRINT
NOT FOR CONSTRUCTION

5 0 5 10 15 20 25 METRES
SCALE 1 : 250 @ A1 SCALE 1 : 500 @ A3

North

Base Information Supplied By: CARDNO

Design | Drawn: A.X. | Checked: A.B.

Certified .....

RPEQ No. .....

Project Title: SHUTE HARBOUR MARINA

Client: SHUTE HARBOUR MARINA DEV PTY LTD

Drawing Title: 12.5m HEAVY RIGID VEHICLE SWEPT PATHS

Drawing No. 5668-103

Sheet 1 of 1 | Issue A

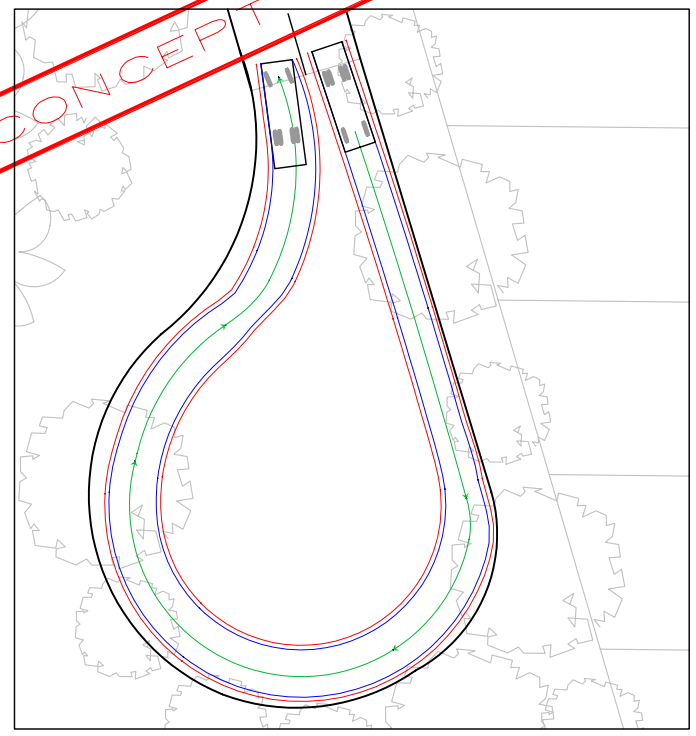
Scale 1:250 at A1

Project CE005668

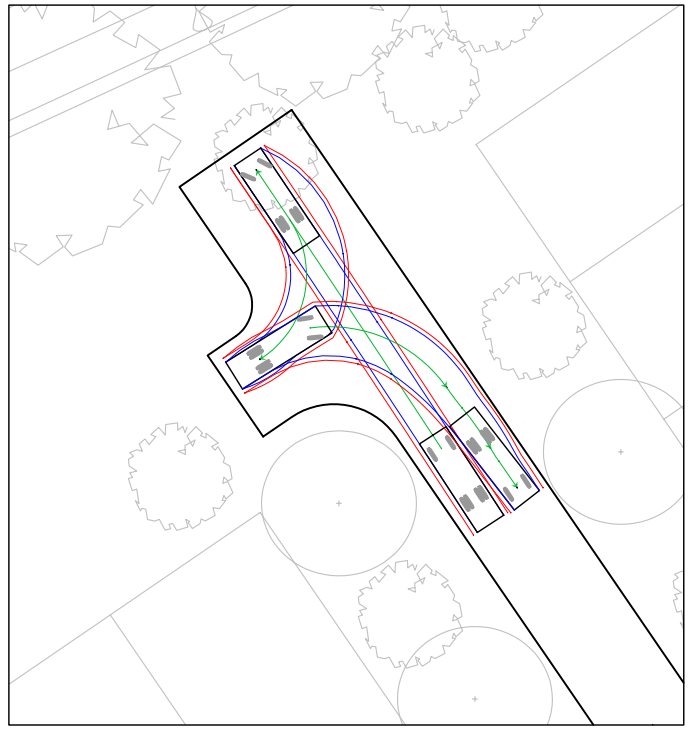
Xref NIL

ACAD file 5668-100.dwg

CONCEPT ONLY



LOCATION A



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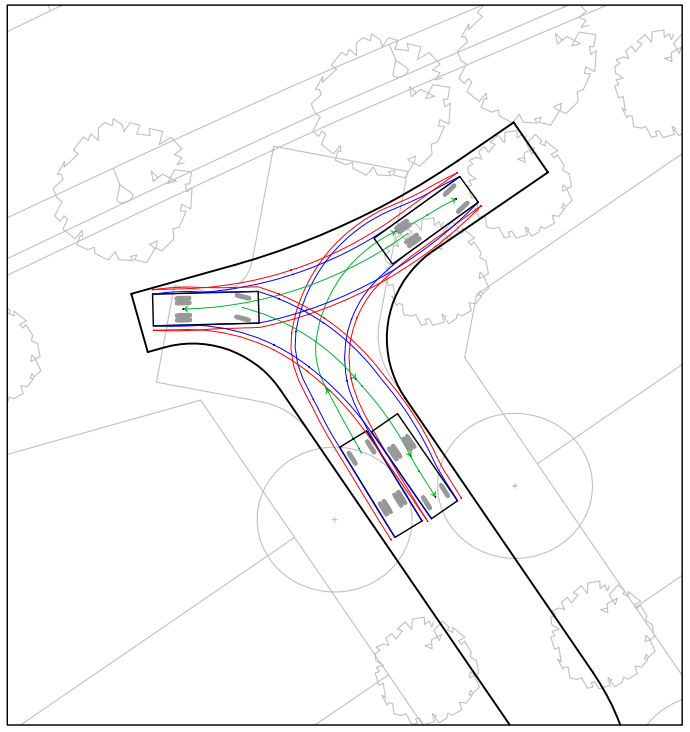

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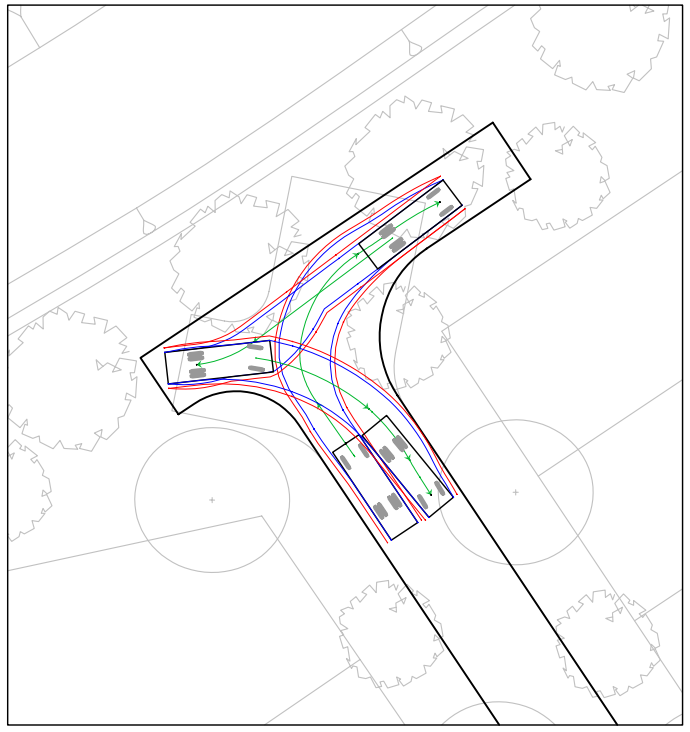

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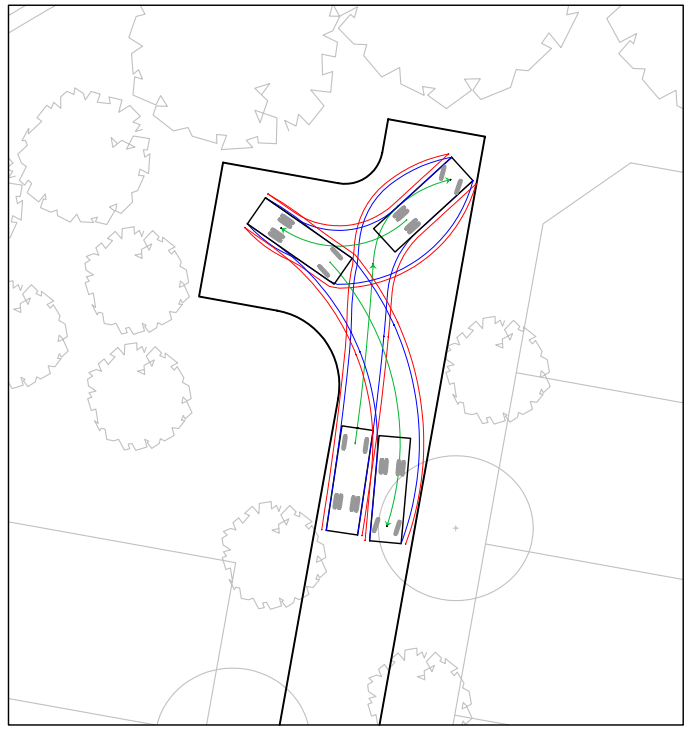

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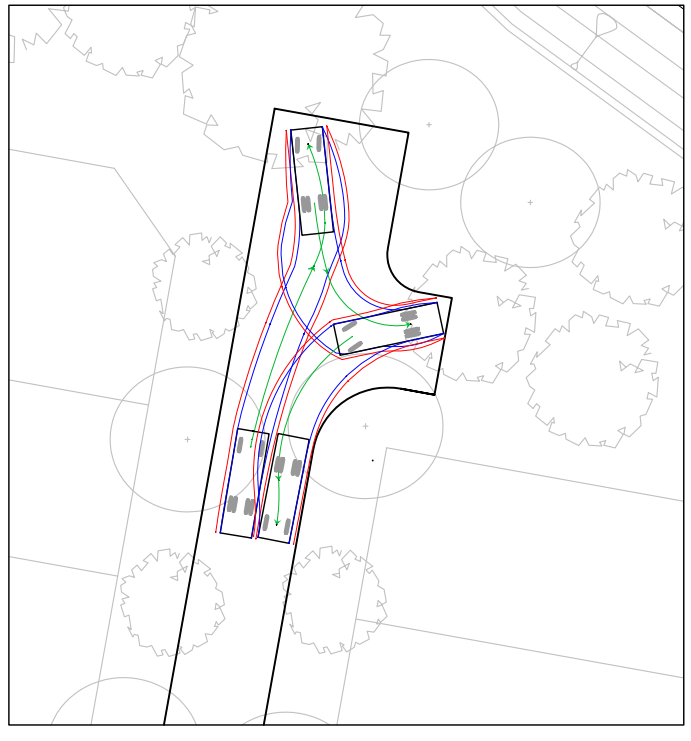

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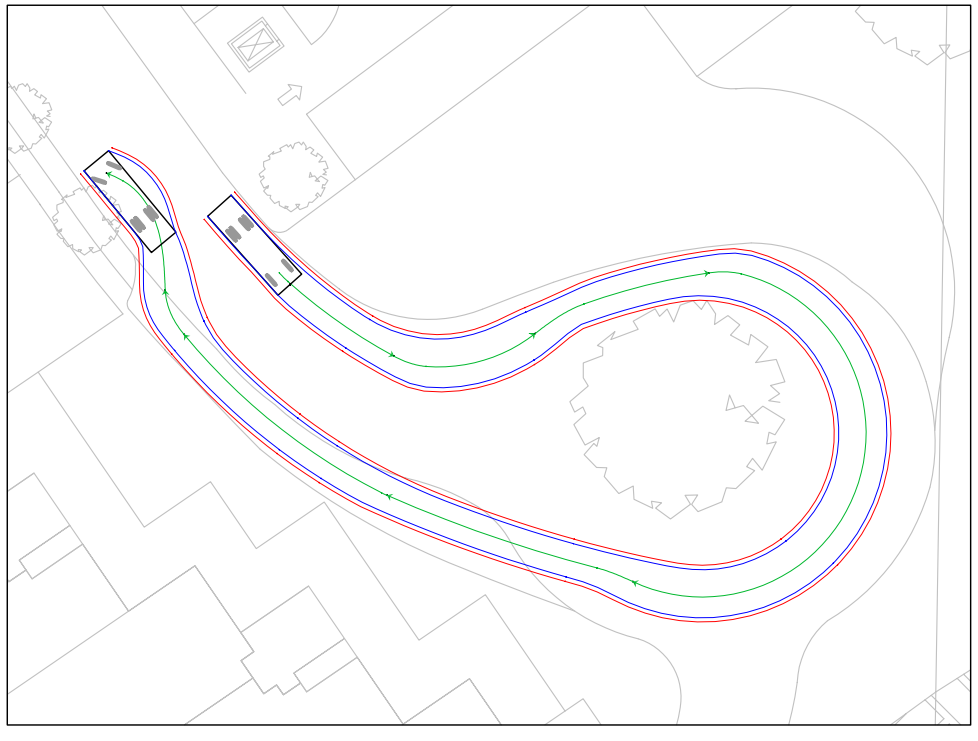
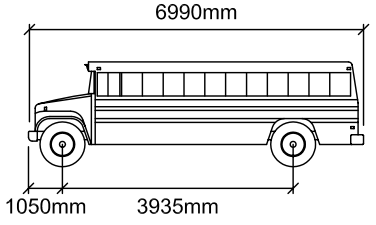


BUS SET DOWN AREA



MINI BUS

Width	:	2095mm
Track	:	1690mm
Lock to Lock Time	:	6 sec
Steering Angle	:	30 deg

NOTE
REFER DWG No. 5668-101 FOR OVERALL VIEW OF LOCATIONS

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Issue	Description	Date	By
A	ISSUE FOR COMMENT	09.01.07	A.X.

PRELIMINARY PRINT
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5 0 5 10 15 20 25 METRES
SCALE 1 : 250 @ A1 SCALE 1 : 500 @ A3

North

Base Information Supplied By: CARDNO

Design	Drawn	Checked
	A.X.	A.B.

Certified .....
RPEQ No. .....

Project Title: SHUTE HARBOUR MARINA

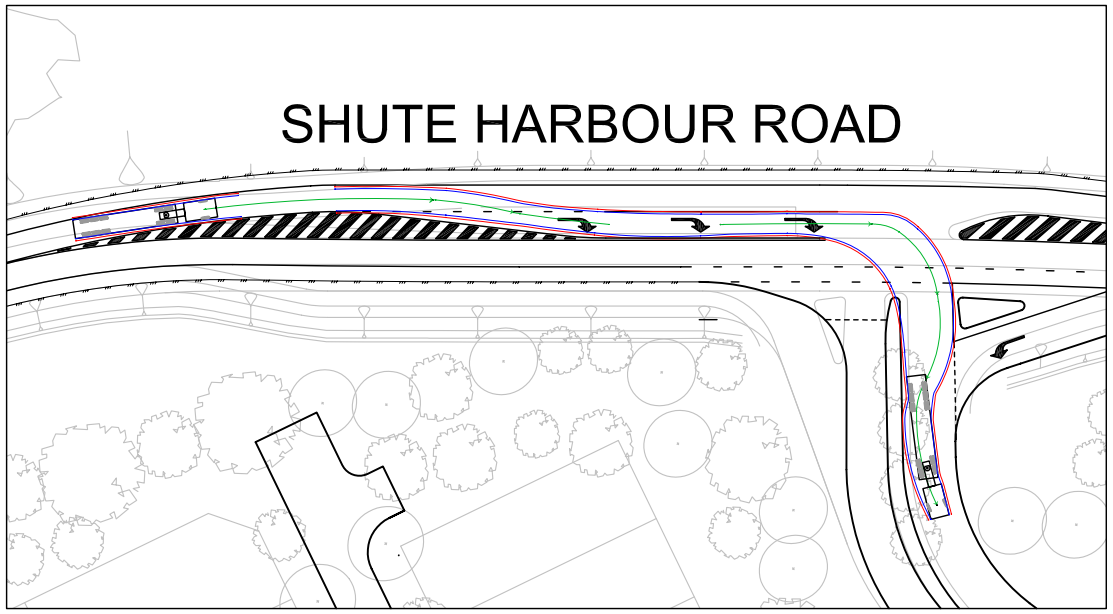
Client: SHUTE HARBOUR MARINA DEV PTY LTD

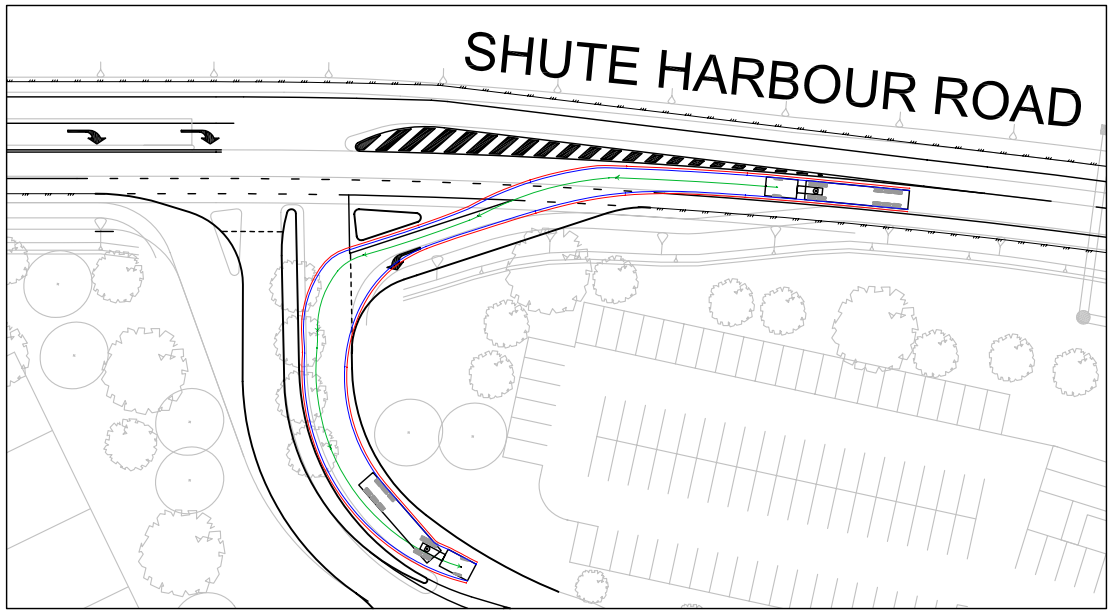
Drawing Title: 6.9m MINI BUS SWEPT PATHS

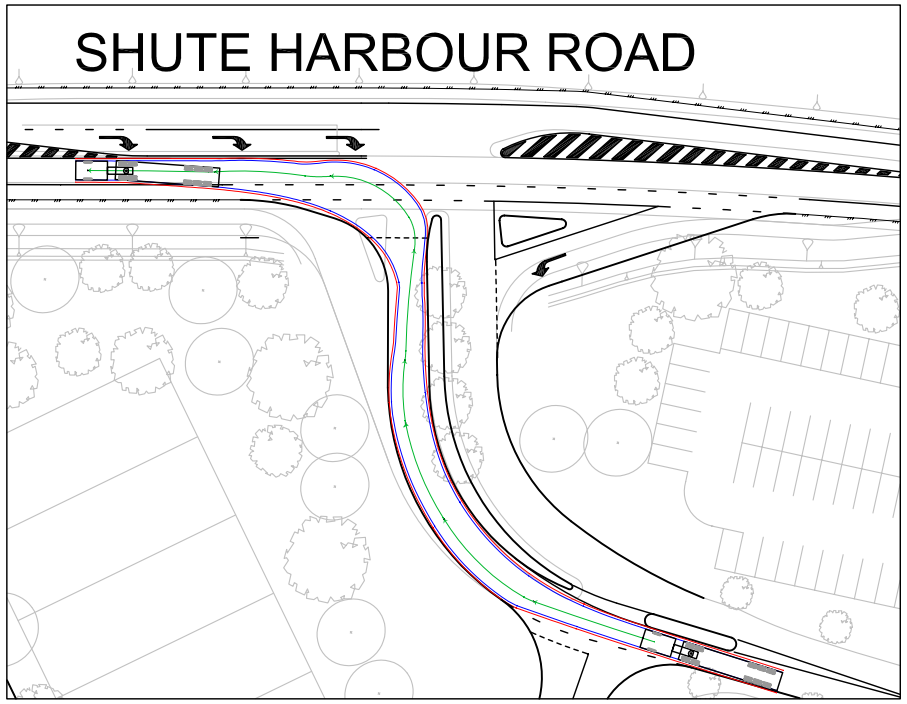
Drawing No. 5668-104

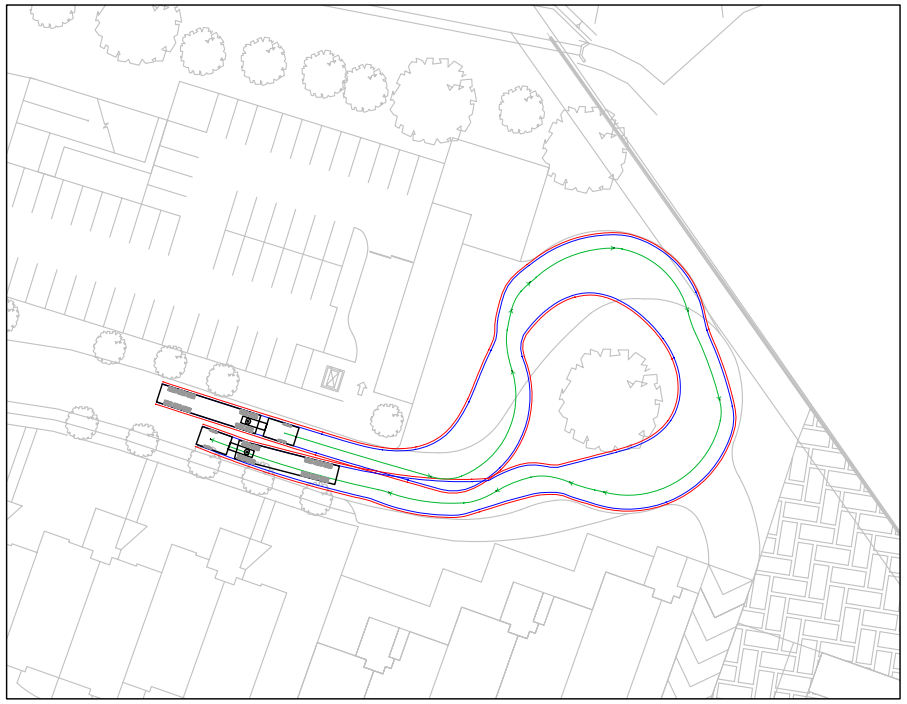
Sheet	1 of 1
Issue	A
Scale	1:250 at A1
Project	CE005668
Xref	NIL
ACAD file	5668-100.dwg

CONCEPT ONLY









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Issue	Description	Date	By
A	ISSUE FOR COMMENT	09.01.08	A.X.

PRELIMINARY PRINT
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10 0 10 20 30 40 50 METRES
SCALE 1 : 500 @ A1 SCALE 1 : 1000 @ A3

North

Base Information Supplied By: CARDNO

Design	Drawn	Checked
	A.X.	A.B.

Certified .....

RPEQ No. .....

Project Title: SHUTE HARBOUR MARINA

Client: SHUTE HARBOUR MARINA DEV PTY LTD

Drawing Title: 19m ARTICULATED VEHICLE SWEPT PATHS

Drawing No. 5668-105

Sheet	1 of 1
Scale	1:500 at A1
Project	CE005668
Xref	NIL
ACAD file	5668-100.dwg

Issue: A