Gold Coast International
marine precinct

APPENDIX 4

Addendum Offset Options Report

Prepared By

Earthtrade

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Earthtrade
ENVIRONMENTAL BROKERS

Progress Report to PlanIt Consulting

Gold Coast International Marine Precinct Project

Property Analysis –Baffle Creek Declared Fish Habitat Area

Date: 11th October 2012

OUR REFERENCE 20121541

Contents

Document Control	
Item	**Detail**
Project Name	GCIMP – Progress Report to PlanIt Consulting: Property Analysis - Baffle Creek Declared Fish Habitat Area
Project Number	F001
Project Manager	Alan Key 07 4194 5009 PO Box 1069 Hervey Bay QLD 4655
Prepared by	Jade Gesell David Sasse Alan Key
Approved by	Alan Key
Status	Released
Version Number	20121541A
Last saved on	11th October 2012

1. Executive Summary

The Gold Coast International Marine Precinct (GCIMP) project proposes a new integrated marine industry facility on 64 hectares (ha) of land adjacent to the existing Gold Coast marine precinct at Shipper Drive, Coomera.

The offset obligation of the project comprises 13.34ha of marine plant communities below HAT and 3.74ha of marine plant communities above HAT.

The Queensland Department of Agriculture, Fisheries and Forestry (DAFF) has identified several properties within and around the Baffle Creek declared Fish Habitat Area (FHA) as properties of interest for addition to the FHA. The subject Baffle Creek properties as prioritised by DAFF are: Lot 73 FD391 and Lot 81 FD485 (of equal and top priority) and Lot 2 RP 847317 (of secondary priority). Baffle Creek is located approximately 60km north of Bundaberg.

Earthtrade has conducted an analysis of these properties and their use to ascertain their suitability and availability for potential offsets. This report details the analysis of these target properties and the progress of communications with the property owners to determine the level of interest in any potential sale.

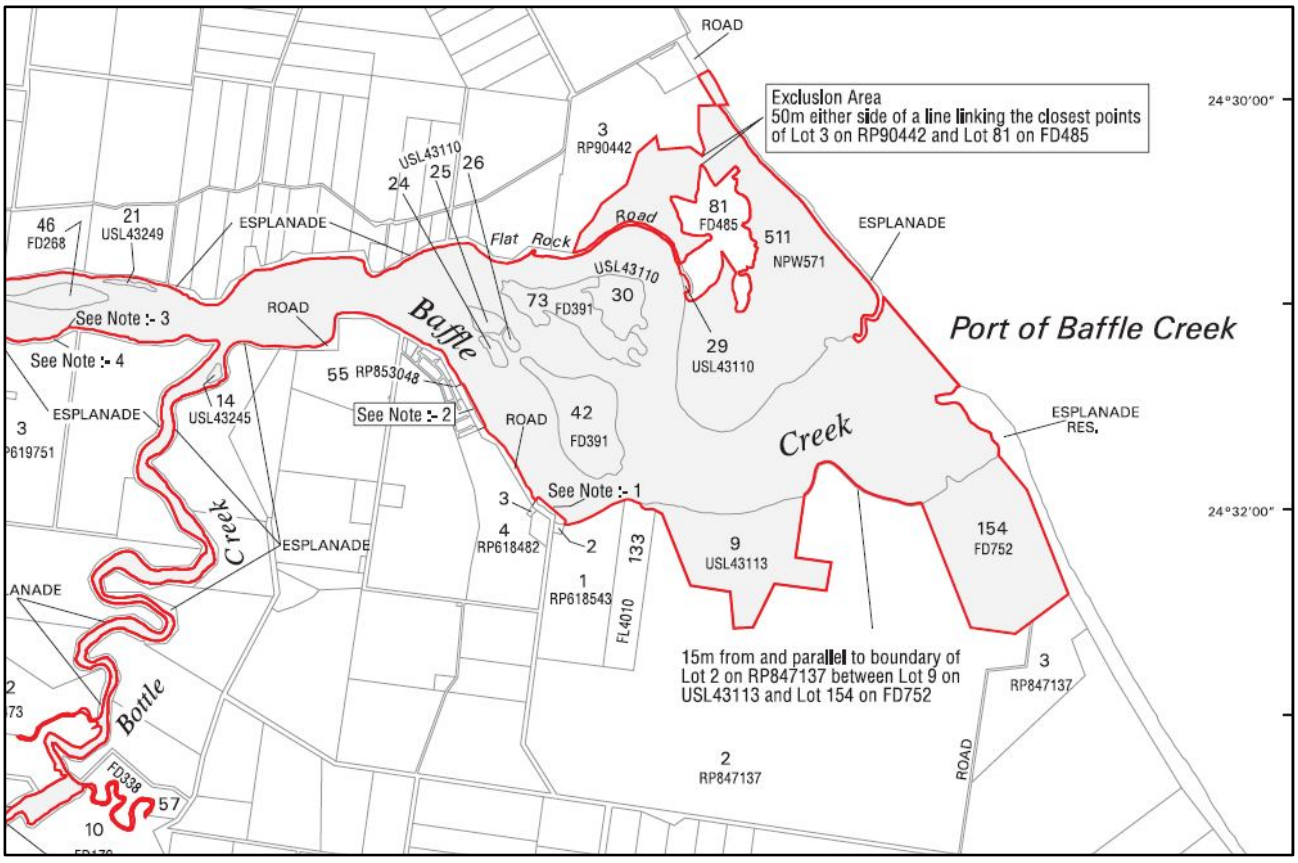

Figure 1: Locality Map of Subject Lots

2. Target Properties

2.1 Lot 73 FD 391

This lot forms an island some 2km in from the mouth of Baffle Creek, and is 35.92ha in area. The lot is freehold vacant land with a history of use as cattle grazing. The current owners acquired the property from a local grazier in 2008.

Figure 2: Lot 73 on FD391

Preliminary discussions have been held with the owners to determine whether they would be interested in a sale of the lot. They have indicated that they would give positive consideration to an offer that would provide them with a gain on the amount that the property owes them. This amount would most likely be in the range of $500,000 to $600,000. Based on a ratio of 3:1, the total required offset area for the project would be 51.24ha. The 35.92ha potentially available on this lot would represent some 70% of the total area of offsets required, subject to approval by DAFF.

2.2 Lot 81 FD 485

With an area of 53.84ha, this lot forms a tidal island close to the northern side of the mouth of Baffle Creek. The lot is freehold vacant land with a history of use as cattle grazing, and forms part of an aggregation of some 226.96ha. The balance of the aggregation comprises land to the north and east of the island, which includes some 300m of ocean frontage and some 700m of frontage to Baffle Creek. The current owners, who represent a mid-sized private development company, acquired the property from a local grazier in 2009.

Figure 3: Lot 81 on FD485, aggregated with Lot 3 on RP 904422 and Lot 4 on SP164522

We have been unable to speak with the owners of this parcel of land to date, with their contact details not being readily accessible. Appropriate corporate searches have been conducted and written correspondence has been directed to the registered office of the holding company in an effort to open discussions about the possibility of a sale. As mentioned above, based on a ratio of 3:1, the total required offset area for the GCIMP project would be 51.24ha. The 53.84ha area of this lot may potentially be sufficient to satisfy the offset requirement, subject to approval by DAFF.

2.3 Lot 2 RP847137

On the southern side of Baffle Creek, this freehold lot is of 890.1ha with records indicating a history of use for cattle grazing and/or dairy cattle. At its northernmost point, the lot has a frontage to Baffle Creek of approximately 780m. This lot is aggregated with 3 lots to the east that between them have some 2km of ocean frontage. The owners of this lot, who are a long term local family, have established a holiday/fishing village on the creek frontage which appears to comprise of between 15 and 20 waterfront shacks and outbuildings (see Figure 5). Local anecdotal evidence indicates that the village is well used by locals and family members. It is considered highly unlikely that the owners would contemplate a sale of this lot, due to the income potential of the village, and the long family history of ownership of the property.

Figure 4: Lot 2 on RP847137

Figure 5: Aerial view of the fishing village located on the northern boundary of Lot 2 on RP847137

2 Recommendations/Plan to Proceed

We would recommend that the project proponent consider whether an offer to purchase be put forward to the owners of Lot 73 on FD391. Meanwhile we would continue to attempt to make contact with the owners of Lot 81 on FD485 to ascertain their interest in a sale, and if so, an indication of the price range that they would consider.

It may be the case that if Lot 81 is available for purchase at a suitable price the offset obligation would be satisfied with this parcel alone. However, as this is not known at this stage, we would recommend that discussions be initiated with the Burnett Mary Regional Group for Natural Resource Management to determine if there are any suitable catchment management or habitat protection programs for the Baffle Creek catchment and FHA that may be suitable for consideration for funding by the project proponent, as an indirect offset. This would allow for a combination offset package encompassing the acquisition of Lot 73 and the indirect offset to be put forward for consideration by DAFF.

Gold Coast International marine precinct

APPENDIX 5

The Coomera River Tidal Weir Fish Ladder Costings

Prepared By

Gold Coast City Council

PROJECT: CONSTRUCTION OF FISH LADDER ON THE TIDAL WEIR, COOMERA RIVER

Included are the conceptual design, notes, and cross section design below for the fish ladder and high-flow bypass (Jan 2012). Final engineering design is still required.

The approximate cost is $ 885.000 (incl GST).

Item	Description	Nominal cost
Fish ladder	supply and install	$100,000.00
High flow bypass	supply and install	$220,000.00
Weir adjustment and repair	supply and repair	$ 85,000.00
Bund to hold back water during works	supply and install	$300,000.00
Preliminaries, final engineering design and documentation. Project and onsite management		$100,000.00
Restoration of Foreshore bank		$ 80,000.00
	TOTAL	**$885,000.00**

SITE ANALYSIS & PHOTOS
SITE 1.1 COOMERA RIVER CAUSEWAY GCCC PARKLAND

1. Flood modelling of the Coomera River by Flood Strategies GCCC (2009) shows that the existing causeway across the river is subject to peak velocity in excess of 5 m/s and can potentially move large rocks in the causeway area. Removal of the Causeway will lead to a significant increase in channel velocity upstream at the Tamborine - Oxenford Rd Bridge, causing upstream erosion. Also, removing the Causeway will allow an estimated 300,000 cubic metres of sediment to enter the Estuary from the upstream freshwater lake. It is recomended that the Causeway remain in place with appropriate provisions for fish passage as shown on concept drawings.
2. The site has been subject to ongoing emergency works at the location marked as the High Flow Bypass. The existing rock revetment has not been tightly packed with smaller rocks and has several large voids in between rocks. This structure is likely to fail in the next series of major food events. It is proposed that a high flow bypass be constructed at this location as shown by cross section 1, 2, & 3, using existing rocks and new larger rocks to secure the structure.
3. A fish ladder channel has been incorporated into the high flow bypass concept design. This fish ladder should be constructed at a minimum grade of 1(v) to 15(h). Small 100mm steps can be incorporated into the fish ladder channel and the channel should have an average depth of 300mm. All voids should be tightly packed with smaller rock. Backfill and wash small voids with mixed Sandy Gravelly COBBLE stabilised with 10% cement. Each boulder should only be moderately cemented in place, allowing it to break away from other boulders under significant hydraulic stress. This will prevent the whole structure from failing as a whole, which would make it difficult to maintain and repair.
4. It is recommended that this proposed fish ladder concept design should be used in place of the existing fish ladder proposal by Engineering Services, GCCC (2006) as:
    - the design will better withstand degradation during major flood events and will be easier to maintain and repair;
    - the design is potentially cheaper and easier to construct;
    - can be constructed at the same time of the high flow bypass;
    - the rock work required to create a bench for the fish ladder will dissipate hydraulic energy and reduce erosion on the northern foreshore.
5. The existing causeway should be repaired using the adjacent rocks and using larger boulders (min mass 3500kg) placed intermittently to better secure the smaller rocks, see cross section 4. All voids should be tightly packed with smaller rock. Backfill and wash small voids with mixed sandy gravelly COBBLE stabilised with 5% cement. Each boulder should only be weakly cemented in place, allowing it to break away from other boulders under hydraulic stress. This will prevent the whole structure from failing as a whole, which would make it difficult to maintain and repair.
6. The foreshore on the northern bank represented by cross section 5 has been subject to scour and bank erosion during the 2010 flood event. The erosion has been limited to the overlying Medium Dense Silty Clayey Sands. Foreshore engineering treatments have focused on battering vertical banks consisting of the overlying loose to Medium Dense Brown Silty Clayey SANDS to a maximum depth of 0.7m RL. Native riparian sedges and grasses should be planted at a density of $0.3m^2$ in these areas to limit further erosion. Only isolated trees (one per $5m^2$) are recommended to be planted in this zone as they are likely to be destroyed by high channel velocities during significant flood events while establishing. Preliminary investigations for potential acid sulphate soils (PASS) show that it is not likely that PASS will be disturbed during excavation.
7. PASS are found at Bore Hole (BH) 1 at approximately -0.5m RL to -3.0m RL. These are likely to be strong acid sulphate soils, which may be exposed during the construction of footings for the High Flow Bypass. Further acid sulphate investigations are required at the footing location of the High Flow Bypass.

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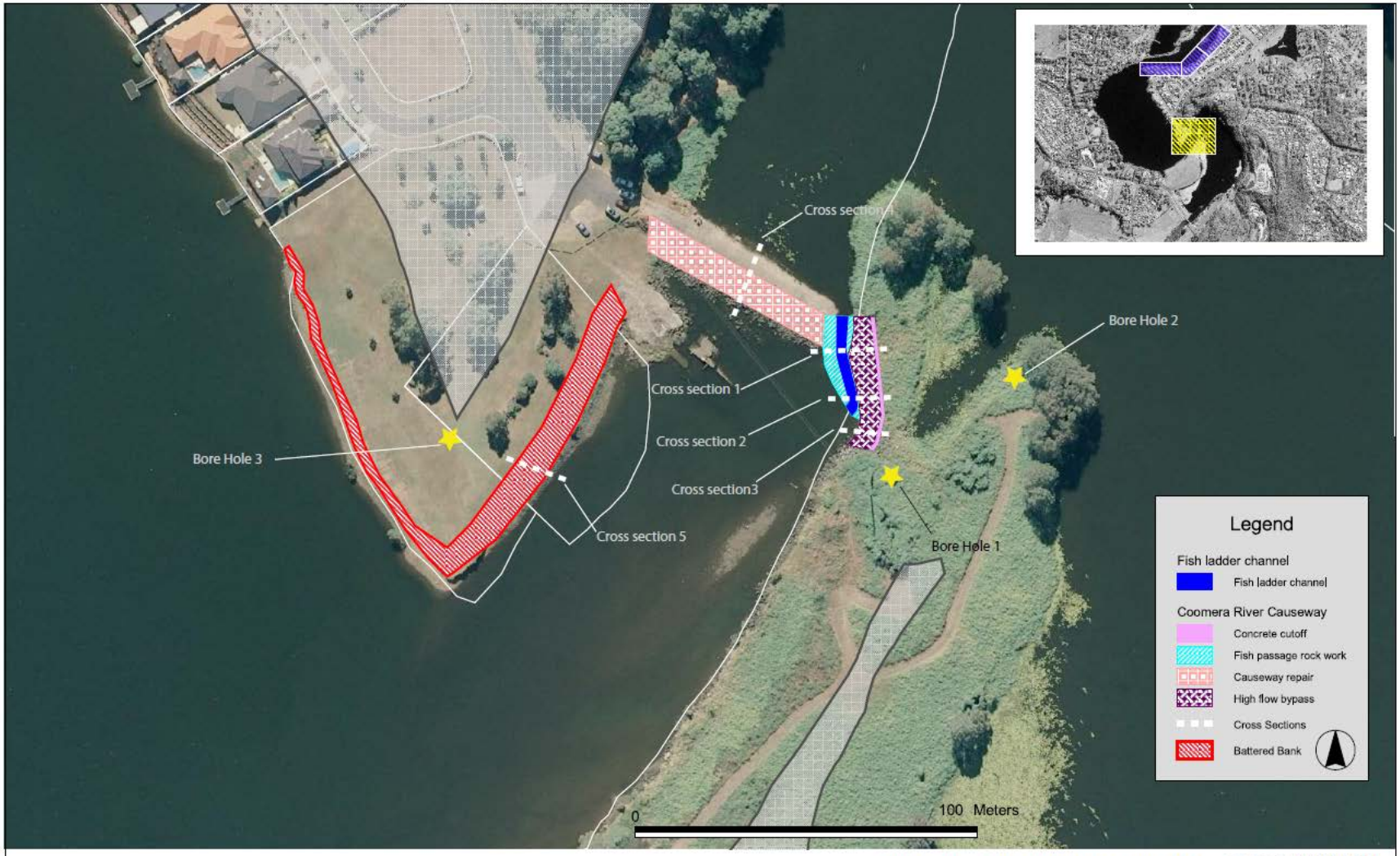
Project No	Scale	Coordinate System	Project	Drawing Title	Client	Figure No	Revision
RE 2/2011	1:100 @ A3	MGA Z56	Coomera River Estuary Processes Study	Site Analysis & Site Photos SITE 1.1 COOMERA RIVER CAUSEWAY	Catchment Management Unit (CMU) Gold Coast City Council Grant Periott	F1.1.1 Page:000009	A



SITE 1.1 COOMERA RIVER CAUSEWAY GCCC PARKLAND

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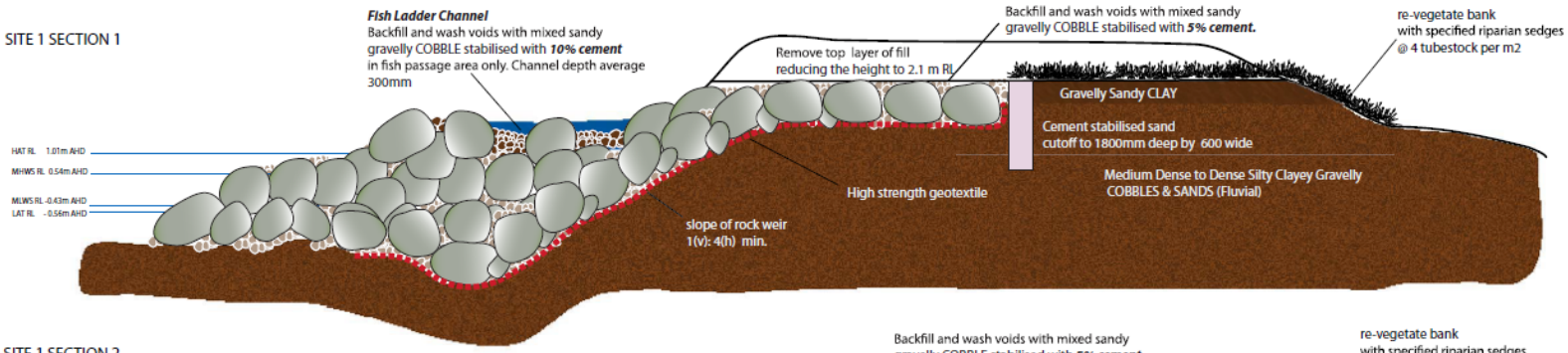
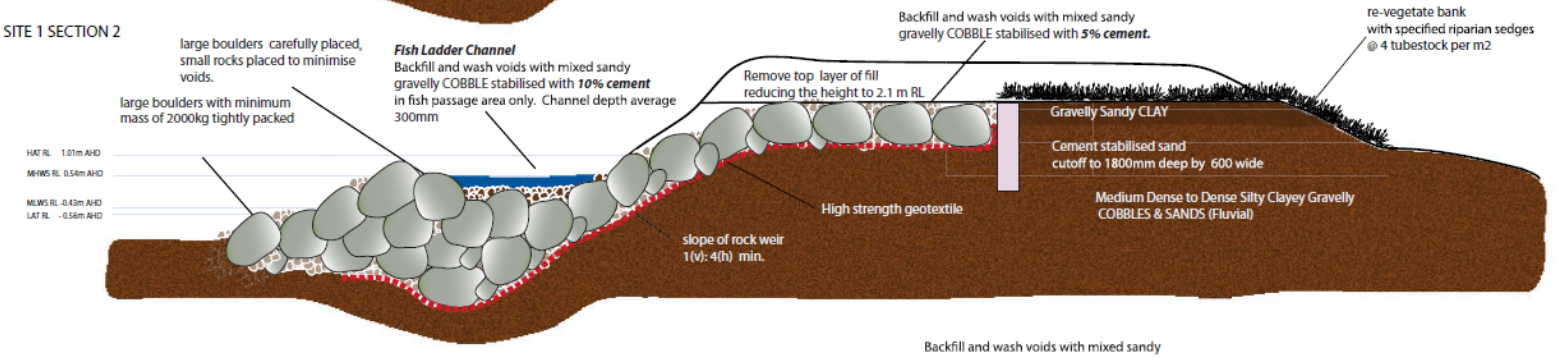
Project No	Scale	Coordinate System	Project	Drawing Title	Client	Figure No	Revision
RE 2/2011	1:1000 @ A3	MGA Z56	Coomera River Estuary Processes Study	Foreshore Treatment, Causeway Repair, High Flow Bypass & Fish Ladder Planview SITE 1.1 COOMERA RIVER CAUSEWAY	Catchment Management Unit (CMU) Gold Coast City Council Grant Perrott	F1.1.2 Page:000010	A

SITE 1 SECTION 1



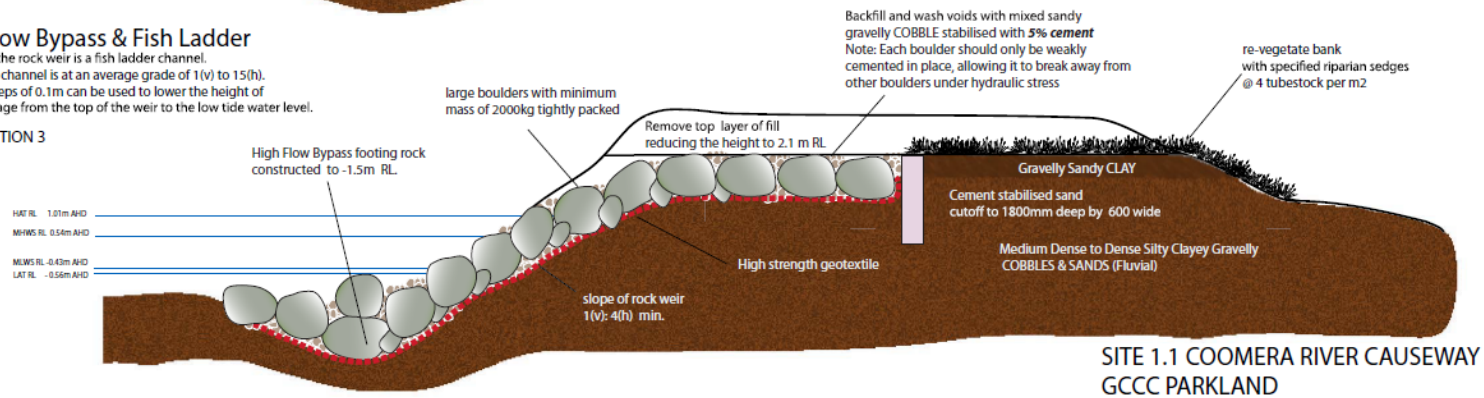
SITE 1 SECTION 2



High Flow Bypass & Fish Ladder

Attached to the rock weir is a fish ladder channel.
Fish passage channel is at an average grade of 1(v) to 15(h).
Small rock steps of 0.1m can be used to lower the height of the fish passage from the top of the weir to the low tide water level.

SITE 1 SECTION 3



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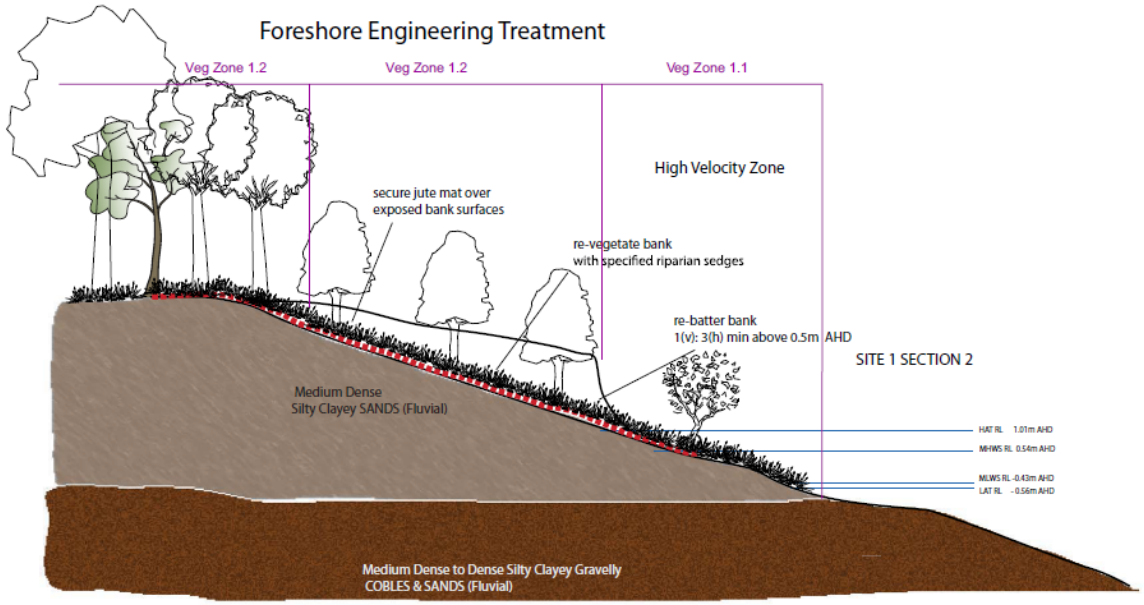
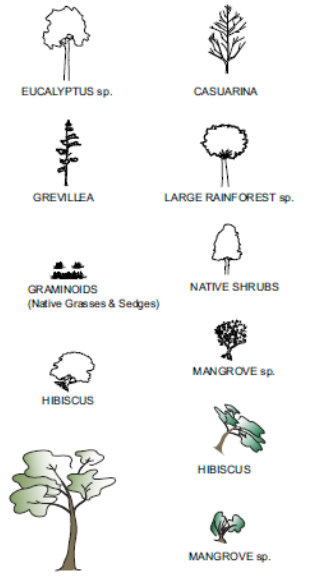
Project No	Scale	Coordinate System	Project	Drawing Title	Client	Figure No	Revision
RE 2/2011	1:100 @ A3	MGA Z56	Coomera River Estuary Processes Study	High Flow Bypass & Fish Ladder Sections 1, 2, & 3 SITE 1.1 COOMERA RIVER CAUSEWAY	Catchment Management Unit (CMU) Gold Coast City Council Grant Periott	F1.1.3 Page:000011	A

Foreshore Engineering Treatment

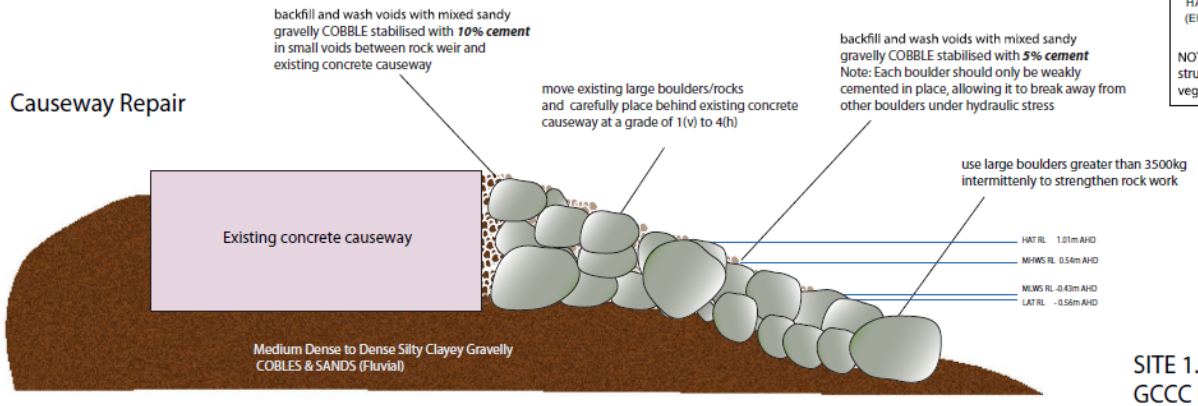


GENERAL NEW VEGETATION STRUCTURE TYPE



NOTE: Simplified representation of general vegetation structure only, used to assist interpretation of structural vegetation layers for each specified veg zone.

Causeway Repair



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Project No	Scale	Coordinate System	Project	Drawing Title	Client	Figure No	Revision
RE 2/2011	1:100 @ A3	MGA Z56	Coomera River Estuary Processes Study	Causeway Repair & Foreshore Treatment Sections 4 & 5 SITE 1.1 COOMERA RIVER CAUSEWAY	Catchment Management Unit (CMU) Gold Coast City Council Grant Periott	F1.1.4 Page:0000012	A

Veg Zone 1.1	
Lower bank and intertidal zone: Reconstruction and assisted natural regeneration	This strategy is suitable for tidal areas that are exposed to periodic high velocities • Mangrove seedlings are naturally threatened by the energy of water in these areas • The process involves direct planting of salt tolerant graminoids (i.e. Phragmites) • Graminoids may protect mangrove propagules during establishment and aid the process of formation of root systems sufficient to anchor seedlings in place during tidal inundation and higher flow events ➢ Natural mangrove seed bank supply should be sufficient given that propagules can migrate large distances through the river system
Veg Zone 1.2	
Bank stabilisation: Reconstruction	This strategy is suitable for river banks with both exposed areas after earthworks • Successful regeneration of native species has been largely limited due to land management and ongoing erosion • The process involves stabilising and binding the substrate with native graminoids and infill planting with native shrubs • Cover and secure jute over exposed area • Blanket plant native graminoids (high density plantings) as a stabilising species (minimum 3 tubes/m^2) • Infill plant pockets of the bank with native shrubs • High flow areas or impact areas should be managed with a focus on soft landscaping principles (i.e. graminoids in the ground layer as a stabilising species). Works should be focused several metres beyond the impact area (based on assessment) and may also require allowing a sacrificial zone that is likely to be lost prior to re-establishment
Veg Zone 1.3	
Upper bank stabilisation: Assisted regeneration in conjunction with infill or supplementary planting	This strategy is suitable for upper river banks with both exposed areas and areas that have some vegetation structure at ground and canopy height, including native and exotic species • Although areas contain existing native vegetation, the complete regeneration of native species has been largely limited due to land management and the levels of invasive species • The process involves broader weed control applications and replanting of native vegetation. This form of reconstruction should use well suited endemic plants to perform the function of re-establishing the terrestrial side of riparian communities and to prevent edge effects into these communities • Working from the high bank and moving back, prepare manageable sized parcels by controlling all ground weeds, ground vines and woody weeds. Foliar spray treatments should be followed up after initial treatment and then monitored and re-treated until the weed population has largely diminished or stabilised • Review appropriate areas that can be mulched, based on flood frequency, level on inundation of the planting area. Existing dead weed biomass (green mulch) can supplement imported mulch if the area is in a dynamic flood zone. Alternative to this, supply and install forest mulch at a depth of 100mm. Jute mesh (soil saver) can be installed and pinned over the forest mulch with long jute pins • Install plants for the upper bank and plant at densities of 1m^2 • Existing trees and copses provide immediate benefit for restoration and should be infill planted: ➢ No planting (reconstruction) or mulching is to be undertaken within approximately two (2) metres of drip-lines of existing riparian vegetation margins or individual mature trees. It is likely that, in these areas, surface roots of existing mature trees will be present, particularly in shallow or skeletal soils and planting within this area may inhibit the growth of planted tubestock and/or cause some damage to extant trees. Due to the presence of a continuing source of viable seed from adjacent mature trees, natural regeneration will be able occur in niche gaps between surface roots and at the margins of drip zones and this is influenced by natural selection pressures. It is expected that targeted weed control alone will stimulate the native seed bank in these locations

Vegetation details		Site 1 Veg Zones		
Species	**Common name**	**1.1**	**1.2**	**1.3**
Mangroves				
Aegiceras corniculatum	river mangrove	x		
Avicennia marina	grey mangrove	x		
Graminoids and ground layers				
Crinum pedunculatum	river lily	x		
Cymbopogon refractus	barbed wire grass		x	x
Dianella brevipedunculata	blue flax lily		x	x
Juncus kraussii	sea rush	x	x	
Themeda triandra	kangaroo grass		x	x
Phragmites australis	common reed	x	x	
Isolepis inundata	swamp club-rush	x	x	
Lomandra longifolia	matrush		x	x
Shrubs and small trees				
Acacia aulacocarpa	brush ironbark wattle			x
Acacia disparrima	hickory wattle			x
Acacia melanoxylon	black wattle			x
Alphitonia excelsa	red ash			x
Casuarina glauca	swamp oak		x	x
Ficus coronata	creek sandpaper fig		x	x
Glochidion ferdinandi	cheese tree			x
Mallotus philippensis	red kamala			x
Melaleuca bracteata	river tea tree			x
Melaleuca leucadendra	weeping paperbark			x
Melaleuca salignus	white bottlebrush			x
Jagera pseudorhus	foambark			x
Canopy and large tree species				
Aphananthe philippinensis	rough-leaved elm			x
Commersonia bartramia	brown kurrajong			x
Corymbia citriodora	spotted gum			x
Corymbia intermedia	pink bloodwood			x
Cupaniopsis anacardioides	tuckeroo			x
Eucalyptus crebra	narrow-leaved ironbark			x
Eucalyptus microcorys	tallowwood			x
Eucalyptus propinqua	grey gum			x
Eucalyptus siderophloia	grey ironbark			x
Eucalyptus tereticornis	queensland blue gum			x
Ficus obliqua	small-leaved fig			x
Ficus virens	white fig			x
Ficus watkinsiana	strangler fig			x
Grevillea robusta	silky oak			x
Lophostemon confertus	brushbox			x
Lophostemon suaveolens	swamp box			x
Melaleuca quinquenervia	broad-leaved paperbark			x

SITE 1.1 COOMERA RIVER CAUSEWAY GCCC PARKLAND

FORESHORE VEGETATION MANAGEMENT SPECIFICATIONS

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Project No	Scale	Coordinate System	Project	Drawing Title	Client	Figure No	Revision
RE 2/2011	1:100 @ A3	MGA Z56	Coomera River Estuary Processes Study	Foreshore Vegetation Management Specifications SITE 1.1 COOMERA RIVER CAUSEWAY	Catchment Management Unit (CMU) Gold Coast City Council Grant Periott	F1.1.5 Page:000013	A

Gold Coast International marine precinct

APPENDIX 6

Supplementary Social and Economic Impact Assessment

Prepared By

Norling Consulting

Norling Consulting Pty Ltd
Business & Property Economics

Our Ref: 07103/270913.LD

27 September 2013

Boyd Sargeant
Director
Planit Consulting
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Nobby Beach QLD 4218

Email: boyd@planitconsulting.com.au

Dear Boyd,

RE: GOLD COAST INTERNATIONAL MARINE PRECINCT – SUPPLEMENTARY INFORMATION

Norling Consulting completed a Social and Economic Impact Assessment as input into the Environmental Impact Statement (EIS) prepared for the proposed Gold Coast International Marine Precinct in Coomera. It is understood that the Proponent has been liaising with the Coordinator Generals' office to address key matters raised in submissions received in respect of this proposal. It is understood that as a response to submissions received, some minor revisions have been undertaken to the preferred master plan. In addition, a sixth development option based on agency responses has also been prepared. As such, you require a brief economic assessment comparing both options. It is noted that this response should be read in conjunction with the Social and Economic Impact Assessment submitted as part of the EIS with amended tables corresponding to tables provided as part of the Social and Economic Impact Assessment.

Development Options

FIGURES 1 and 2 appended to this letter, illustrate the proposed layout for the Amended Preferred Option and Alternative Option 6. The following Amended Table 5.6 (in correlation with the Social and Economic Impact Assessment) provides a summary of the various development options proposed with respect to the Gold Coast International Marine Precinct (GCIMP).

AMENDED TABLE 5.6: GCIMP DEVELOPMENT OPTIONS

Land Use	Option 1 (Preferred Option)	Option 2	Option 3	Option 4	Option 5 (Status Quo)	Amended Preferred Option	Alternative Option 6
TAFE	1.6 ha	1.6 ha	-	1.6 ha	-	-	-
Mixed Use	5.3 ha	5.3 ha	6.9 ha	3.1 ha	-	10.9ha	8.8ha
Maritimo	4.8 ha	4.8 ha	5.1 ha	4.8 ha	-	4.9ha	4.9ha
Boat Stack Storage	0.8 ha	0.8 ha	-	0.8 ha	-	0.8ha	0.8ha
Ship Lift Industry	3.2 ha	3.2 ha	2.0 ha	3.2 ha	-	5.2ha	5.2ha
Marine Industry	16.5 ha	11.4 ha	21.2 ha	11.9 ha	-	18.0ha	15.0ha
Marina Berths							
(a) External	280	280	168	78	-	264	122
(b) Internal	110	110		110	-	110	110
Dredge Spoil Area	2.2 ha	9.0 ha	1.4 ha	1.8 ha	-	2.2ha	2.2ha

Based on the above comparisons, it is considered that the Amended Preferred Option is comparable within the Option 1 (Preferred Option). However, it is noted that the Amended Preferred Option results in an increased mixed use precinct as a result of the removal of the dedicated TAFE facility. It is noted that this would not negate the ability of some form of educational facility to be located as part of the mixed use precinct. The Alternative Option 6 results in a significant reduction in the quantum of marina berths, the removal of the TAFE and a decrease in the mixed use and marine industry precincts.

Multi-Criteria Analysis

As per Chapter 5 of our Social and Economic Impact Assessment, Norling Consulting has undertaken a Multi-Criteria Analysis (MCA) for the Amended Preferred Option and Alternative Option 6. Norling Consulting has adopted the same methodology as outlined in Chapter 5 of the Social and Economic Impact Assessment to undertake a Multi-Criteria Analysis for the additional development options. Amended TABLES 6.2, 7.2 and 8.1 appended to this letter provide a summary of the economic, social and environmental scores applied to each criteria and development option including the Amended Preferred Option and Alternative Option 6. TABLES 5.14 and 5.15 also appended to this letter provide the weighting and scoring of the economic, social and environmental criteria for the Amended Preferred Option and Alternative Option 6. These tabulated results are summarised in the following amended TABLE 5.12 in comparison to the original options outlined within the EIS.

AMENDED TABLE 5.12: Summarised MCA Results

Development Option	Social	Economic	Environmental	Overall
1 – Preferred Option	69.3	92.0	61.0	74.1
2	63.2	87.3	61.5	70.6
3	64.0	92.0	63.7	73.2
4	67.0	87.3	64.6	72.9
5 – Status Quo	27.1	1.0	70.5	32.9
Amended Preferred Option	67.8	91.3	62.7	73.9
Alternative Option 6	60.6	71.5	67.2	66.4

Most notably, the Alternative Option 6 delivers a higher environmental score albeit lower social and economic scores in comparison to the Amended Preferred Option, reflective of the significant reduction in marina berths and increased setbacks. In contrast, the Amended Preferred Option scored higher economic and social scores albeit these are marginally lower than the Option 1 Preferred Option, further highlighting the similarities between the two. As illustrated in the above table the Amended Preferred Option results in a higher overall score than the Alternative Option 6.

The Circle of Sustainability graphs for the Amended Preferred Option and Alternative Option 6 are illustrated in FIGURES 3 and 4 appended to this letter. These graphs clearly illustrate the 'footprint' of each Option in terms of scores and also show which criteria contributed to the overall score.

FIGURE 5 (appended to this letter) illustrates the benefits/disbenefits of moving from the Alternative Option 6 to the Amended Preferred Option. The blue shaded areas represent community benefits (gains) recorded by improvements in scores for each of the relevant criteria and community disbenefits (losses) recorded by reductions in scores for each of the relevant criteria. Community benefits have been shaded blue and community disbenefits have been shaded red, with the extent of blue clearly outweighing the extent of the red.

Based on this graphical illustration, it is noted that the community would result in significant community benefits and minimal community disbenefits moving from the Alternative Option 6 to the Amended Preferred Option. In this scenario, it is clearly demonstrated that the community benefits of the Amended Preferred Option significantly outweigh the community disbenefits.

Cost Benefit Analysis

The Social and Economic Impact Assessment advocates that the MCA provides a more comprehensive assessment of the net benefit test than the Cost Benefit Analysis (CBA). Notwithstanding, a CBA has been undertaken for the proposed GCIMP. Consistent with the limitations of a CBA, this analysis incorporates quantitative values of economic benefits and costs and the quantitative values of the environmental lands gained/lost. In particular, the CBA includes:

(a) capital costs of constructing the proposed development;
(b) ongoing maintenance costs of the proposal;
(c) returns to the proponent calculated by way of rents obtained on development elements;
(d) value added economic benefits of the businesses conducted at the proposed development (which implicitly exclude rents and the potential for double counting); and
(e) the community values of environmental lands gained/lost, as calculated by FRC Environmental.

Indirect economic impacts from other businesses likely to benefit from the proposed development have been excluded. All other social and environmental impacts, which are not able to be readily quantified have also been excluded, but are all incorporated within the MCA.

Key assumptions underpinning the CBA are as follows:

(a) a 30 year period of cash flows, commencing in 2012;
(b) all dollar values expressed in 2012 dollar values;
(c) a two-year construction program for civil works commencing in 2013, with the last building being erected in 2024;
(d) a (pre-inflationary) discount rate of 10% for economic cash flows relating to the proposed development and a (pre-inflationary) discount rate of 6% for the community value of environmental lands.

The results of the CBA are set out below in amended TABLE 5.13 to include the Amended Preferred Option and Alternative Option 6.

AMENDED TABLE 5.13: Summarised CBA Results

Development Option	Net Present Value (NPV)	Cost/Benefit Ratio
Option 1 (Preferred Option)	$1 366M	4.59
Option 2	$1 245M	4.52
Option 3	$1 055M	3.40
Option 4	$1 218M	4.10
Amended Preferred Option	$1 364M	4.56
Alternative Option 6	$1 266M	4.53

The resulting high NPVs and Cost/Benefit Ratios are due to high intensity of business activity within the proposed development. It is noted that the Amended Preferred Option results in a greater Net Present Value and higher Cost/Benefit Ratio than the Alternative Option 6, suggesting that the Amended Preferred Option is more supportable than Alternative Option 6.

Economic and Employment Generation

Total construction costs for the Amended Preferred Option and Alternative Option 6 have been estimated as summarised the TABLE A. Value Added Multipliers were utilised to determine the additional value generated from every dollar invested during the construction phase for the Amended Preferred Option and Alternative Option 6 as summarised in the following TABLE A.

TABLE A: Value Added Benefits

Development Option	Construction Cost	Value Added	
		Gold Coast	Qld
Amended Preferred Option	$405.7M	$426.1M	$466.6M
Alternative Option 6	$328.2	$344.6M	$377.4M

The Amended Preferred Option would generate greater indirect flow-on effects to the Gold Coast and Queensland economy in comparison to the Alternative Option 6.

The following Amended TABLE 6.1 summarises the estimated full-time equivalent (FTE) positions that would be generated as a result of each development option. It also summarises the flow-on benefits of this employment in full-time equivalent position years to the Gold Coast and Queensland during construction and operation.

AMENDED TABLE 6.1: GCIMP Estimated Jobs – Construction and Operational

Option	Construction			Operational		
	No. of Jobs	Gold Coast	State	No. of Jobs	Gold Coast	State
Option 1 (Preferred Option)	2,248	4,159	4,946	2,693	4,792	5,424
Option 2	2,017	3,732	4,438	2,550	4,506	5,081
Option 3	1,251	4,464	5,308	2,369	4,157	4,670
Option 4	1,251	4,464	5,308	2,557	4,520	5,099
Option 5 (Status Quo)	-	-	-	-	-	-
Amended Preferred Option	2,353	4,354	5,178	2,706	4,831	5,476
Alternative Option 6	1,903	3,521	4,188	2,254	4,090	4,665

It is noted that the Amended Preferred Option is estimated to result in a greater number of full-time equivalent positions to the Gold Coast and Queensland in comparison to the Alternative Option 6, reflective of the conversion of the TAFE precinct to a mixed use precinct under the Amended Preferred Option.

Conclusion

Based on economic modelling undertaken in comparing the Amended Preferred Option with the Alternative Option 6, it is apparent that the Amended Preferred Option would result in a significant economic outcome for the Gold Coast and Queensland. In particular, it is considered that the community benefits significantly outweigh any community disbenefits as a result of moving from the Alternative Option 6 to the Amended Preferred Option.

We trust this information is sufficient for your purposes at this stage. Should you have any further queries or concerns, please do not hesitate to contact us to discuss.

Yours faithfully,
Norling Consulting

Louisa Davies
Research Consultant

Jon Norling
Director

AMENDED TABLES

TABLE 6.2: Multi-Criteria Assessment – Economic Values

Economic Criteria (Value)	Development Options						
	1	2	3	4	5	Amended Preferred Option	Alternative Option 6
Labour Market							
(a) Construction	10	9.5	10	9.5	0	10	7
(b) Operation	10	9.5	10	9.5	0	10	7
Housing Market							
(a) Construction	5	4.5	5	4.5	0	5	4.5
(b) Operation	7	6.5	7	6.5	0	7	6.5
Gross Regional Product							
(a) Construction	8	7.5	8	7.5	0	8	7
(b) Operation	10	9.5	10	9.5	0	10	8
Employment Generation							
(a) Construction	10	9.5	10	9.5	0	10	7
(b) Operation	10	9.5	10	9.5	0	10	7
Regional Tourism Industry	10	9	10	9	0.5	10	7
Activity Centres Network	8	8	8	8	0	8	8
Council Rate Base	10	9.5	10	9.5	0.5	10	9
Property Market	7	7	7	7	0	7	7
Region's Competitive Advantage	9	8.5	9	8.5	0	8.5	7
Export Dollars	10	9.5	10	9.5	0	10	7
QLD Boat Building and Service Industry	10	9.5	10	9.5	0	9.5	6

Source: GCIMP Project Team, Norling Consulting's Analysis

AMENDED TABLE 7.2: Multi-Criteria Assessment – Social Values

Social Criteria (Value)	Development Option						
	1	2	3	4	5	Amended Preferred Option	Alternative Option 6
Traffic & Transport (a) Impact on existing State and Local Government Roads	6.5	6.5	6.5	6.5	2	6.5	6.5
Land Use (a) Amenity impacts on surrounding land use (b) Compatibility with planning intent for the site (c) Local Community Values	7 9 8	6.7 7.6 2	7.3 7.1 7	8.3 7.6 6	7 2.2 4	7 9 8	7 7.6 2
Health and Safety (a) Use of public safety emergency and medical facilities (b) Vulnerability to natural disasters	8 6	8 6	7 7	7 8	5 9	8 6	7 8
Telecommunication Infrastructure	6	5	5	5	3	6	5
Cultural Heritage Values (a) Indigenous values (b) Non-indigenous values	 5 6	 5 6	 5 6	 5 6	 6 5	 5 6	 5 6
Local Community Values and Lifestyles	7	6.5	7	8	1	7	6.5
Community Service Needs	4	4	4	4	1	3.5	4
Educational Needs	9	9	9	9	0	8	6
Recreational, Leisure and Sporting Needs	7	7	6.5	7	2	7	7
Urban Character (a) Built Form (b) Visual Amenity	 9 8	 8 6.5	 6 5	 7 6	 0 6	 9 8	 8 6.5

Source: GCIMP Project Team, Norling Consulting's Analysis

AMENDED TABLE 8.1: Multi-Criteria Assessment – Environmental Values

Environmental Criteria (Value)	Development Option						
	1	**2**	**3**	**4**	**5**	**Amended Preferred Option**	**Alternative Option 6**
Land Values							
(a) Topography and Landscape Character	8	8	7.5	7.5	5.5	8	8
(b) Geology and Soils – erosion and sedimentation	8	8	6	6	3	8	8
(c) Minimise disturbance of Acid Sulphate Soils	5	5	7	6	9	5	6
(d) Containment of Contaminated Land	8	8	8	8	9	8	8
(e) Terrestrial Ecology							
a. Fauna Values	6.5	6.5	6.5	7.5	5	6.5	7
b. Flora Values	7	7	7.5	8	5.5	7	7.5
Water Values							
(a) Groundwater Values	5	5	7	6	9	5	6
(b) Surface Water Quality							
a. Stormwater Drainage	8	8	8	8	7.5	8	8
b. Quantity	8	8	8	8	8	8	8
c. Quality	8	8	8	8	7	8	8
(c) Surface Water Flooding	5.3	5.4	5.2	5.5	6.4	5.5	5.5
Aquatic Ecology							
(a) Marine	3	3	4	4	5	5	6
(b) Freshwater	4	4	4	5	6	4	6
(c) Wetlands	4	4	4	5	6	5	6
Energy Footprint	5	5.5	6	6	8.5	5	6
Water Supply	7	7	7	7	9	7	7
Vulnerability to Change	6	6	6	6.5	8	6	6
Waste Generation							
(a) Solid Waste							
a. Construction	6	6	6	6	8	6	6
b. Operation	5	5	5	5	8	5	5
(b) Sewerage							
a. Construction	6	6	6	6	8	6	6
b. Operation	5	5	5	5	8	5	6
(c) Marine							
a. Construction	7	7	7	7	8	7	7
b. Operation	5	5	5	5	8	5.5	6
Air Quality							
(a) Construction	7.5	7.5	7.5	7.5	8	7.5	7.5
(b) Operation	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Noise and Vibration							
(a) Construction	6	6	7	6	9	6	6
(b) Operation	6	7	7	7	8	6	7

Source: GCIMP Project Team, Norling Consulting's Analysis

TABLE 5.14: Gold Coast International Marine Precinct Multi-Criteria – Amended Preferred Option

Social	Score (/10)	Weight (%)	Adjusted Score
1. Traffic & Transport			
(a) Impact on exisitng State and Local Government Roads	6.5	150%	9.8
2. Land Use			
(a) Amenity impacts on surrounding land use	7.0	50%	3.5
(b) Compatibility with planning intent for the site	9.0	50%	4.5
(c) Local Community Values	8.0	50%	4.0
3. Health and Safety			
(a) Use of public safety emergency and medical facilities	8.0	25%	2.0
(b) Vulnerabiltiy to natural disasters	6.0	25%	1.5
4. Telecommunication Infrastructure	6.0	50%	3.0
5. Cultural Heritage Values			
(a) Indigenous Values	5.0	50%	2.5
(b) Non-indigenous values	6.0	50%	3.0
6. Local Community Values and Lifestyles	7.0	100%	7.0
7. Community Services Needs	3.5	100%	3.5
8. Educational Needs	8.0	100%	8.0
9. Recreational, Leisure and Sporting Needs	7.0	100%	7.0
10. Urban Character			
(a) Built Form	9.0	50%	4.5
(b) Visual Amenity	8.0	50%	4.0
TOTAL	104.0	N/A	67.8

Economic	Score (/10)	Weight (%)	Adjusted Score
1. Labour Market			
(a) Construction	10.0	25%	2.5
(b) Operation	10.0	25%	2.5
2. Housing Market			
(a) Construction	5.0	25%	1.3
(b) Operation	7.0	25%	1.8
3. Gross Regional Product			
(a) Construction	8.0	75%	6.0
(b) Operation	10.0	75%	7.5
4.Employment Generation			
(a) Construction	10.0	100%	10.0
(b) Operation	10.0	100%	10.0
5.Regional Tourism Industry	10.0	100%	10.0
6. Activity Centres Network	8.0	50%	4.0
7. Council Rate Base	10.0	100%	10.0
8. Property Market	7.0	100%	7.0
9. Region's Competitive Advantage	8.5	50%	4.3
10. Export Dollars	10.0	50%	5.0
11. QLD Boat Building and Service Industry	9.5	100%	9.5
TOTAL	133	N/A	91.3

Environmental	Score (/10)	Weight (%)	Adjusted Score	TOTAL SCORE
1. Land Values				
(a) Topography and Landscape Character	8.0	70%	5.6	6.0
(b) Geology and Soils - erosion and sedimentation	8.0	30%	2.4	1.6
(c) Minimise disturbance of Acid Sulphate Soils	5.0	60%	3.0	1.0
(d) Containment of Contaminated Land	8.0	40%	3.2	2.2
(e) Terrestrial Ecology				1.9
(i) Fauna Values	6.5	50%	3.3	3.0
(ii) Flora Values	7.0	50%	3.5	1.2
2. Water Values				2.7
(a) Groundwater Values	5.0	50%	2.5	3.8
(b) Surface Water Quality				
(i) Stormwater Drainage	8.0	40%	3.2	2.1
(ii) Surface Water Quality				3.3
► Quantity	8.0	40%	3.2	4.4
► Quality	8.0	40%	3.2	1.9
(c) Surface Water Flooding	5.5	80%	4.4	5.8
(d) Aquatic Ecology				
(i) Marine	5.0	50%	2.5	4.5
(ii) Freshwater	4.0	50%	2.0	0.7
(iii) Wetlands	5.0	50%	2.5	5.3
3. Energy Footprint	5.0	40%	2.0	5.7
4.Water Supply	7.0	40%	2.8	4.7
5. Vulnerability to Change	6.0	40%	2.4	2.5
				1.5
6. Waste Generation				4.5
(a) Solid Waste				
(i) Construction	6.0	15%	0.9	0.3
(ii) Operation	5.0	15%	0.8	0.3
(b) Sewerage				
(i) Construction	6.0	15%	0.9	0.3
(ii) Operation	5.0	15%	0.8	0.3
(c) Marine				
(i) Construction	7.0	15%	1.1	0.4
(ii) Operation	5.5	15%	0.8	0.3
7. Air Quality				
(a) Construction	7.5	25%	1.9	0.6
(b) Operation	6.5	25%	1.6	0.5
8. Noise and Vibration				
(a) Construction	6.0	20%	1.2	0.4
(b) Operation	6.0	20%	1.2	0.4
TOTAL	169.5	N/A	62.7	73.9

Source: GCIMP Project Team, Norling Consulting's Analysis

TABLE 5.15: Gold Coast International Marine Precinct Multi-Criteria – Alternative Option 6

Social	Score (/10)	Weight (%)	Adjusted Score
1. Traffic & Transport			
(a) Impact on exisitng State and Local Government Roads	6.5	150%	9.8
2. Land Use			
(a) Amenity impacts on surrounding land use	7.0	50%	3.5
(b) Compatibility with planning intent for the site	7.6	50%	3.8
(c) Local Community Values	2.0	50%	1.0
3. Health and Safety			
(a) Use of public safety emergency and medical facilities	7.0	25%	1.8
(b) Vulnerabiltiy to natural disasters	8.0	25%	2.0
4. Telecommunication Infrastructure	5.0	50%	2.5
5. Cultural Heritage Values			
(a) Indigenous Values	5.0	50%	2.5
(b) Non-indigenous values	6.0	50%	3.0
6. Local Community Values and Lifestyles	6.5	100%	6.5
7. Community Services Needs	4.0	100%	4.0
8. Educational Needs	6.0	100%	6.0
9. Recreational, Leisure and Sporting Needs	7.0	100%	7.0
10. Urban Character			
(a) Built Form	8.0	50%	4.0
(b) Visual Amenity	6.5	50%	3.3
TOTAL	92.1	N/A	60.6

Economic	Score (/10)	Weight (%)	Adjusted Score
1. Labour Market			
(a) Construction	7.0	25%	1.8
(b) Operation	7.0	25%	1.8
2. Housing Market			
(a) Construction	4.5	25%	1.1
(b) Operation	6.5	25%	1.6
3. Gross Regional Product			
(a) Construction	7.0	75%	5.3
(b) Operation	8.0	75%	6.0
4.Employment Generation			
(a) Construction	7.0	100%	7.0
(b) Operation	7.0	100%	7.0
5.Regional Tourism Industry	7.0	100%	7.0
6. Activity Centres Network	8.0	50%	4.0
7. Council Rate Base	9.0	100%	9.0
8. Property Market	7.0	100%	7.0
9. Region's Competitive Advantage	7.0	50%	3.5
10. Export Dollars	7.0	50%	3.5
11. QLD Boat Building and Service Industry	6.0	100%	6.0
TOTAL	105.0	N/A	71.5

Environmental	Score (/10)	Weight (%)	Adjusted Score	TOTAL SCORE
1. Land Values				
(a) Topography and Landscape Character	8.0	70%	5.6	5.7
(b) Geology and Soils - erosion and sedimentation	8.0	30%	2.4	1.4
(c) Minimise disturbance of Acid Sulphate Soils	6.0	60%	3.6	1.2
(d) Containment of Contaminated Land	8.0	40%	3.2	2.2
(e) Terrestrial Ecology				1.6
(i) Fauna Values	7.0	50%	3.5	2.0
(ii) Flora Values	7.5	50%	3.8	1.3
2. Water Values				2.3
(a) Groundwater Values	6.0	50%	3.0	3.7
(b) Surface Water Quality				
(i) Stormwater Drainage	8.0	40%	3.2	1.9
(ii) Surface Water Quality				2.3
► Quantity	8.0	40%	3.2	3.4
► Quality	8.0	40%	3.2	1.9
(c) Surface Water Flooding	5.5	80%	4.4	4.8
(d) Aquatic Ecology				
(i) Marine	6.0	50%	3.0	4.5
(ii) Freshwater	6.0	50%	3.0	1.0
(iii) Wetlands	6.0	50%	3.0	5.3
3. Energy Footprint	6.0	40%	2.4	5.1
4.Water Supply	7.0	40%	2.8	4.4
5. Vulnerability to Change	6.0	40%	2.4	2.0
				1.3
6. Waste Generation				3.1
(a) Solid Waste				
(i) Construction	6.0	15%	0.9	0.3
(ii) Operation	5.0	15%	0.8	0.3
(b) Sewerage				
(i) Construction	6.0	15%	0.9	0.3
(ii) Operation	6.0	15%	0.9	0.3
(c) Marine				
(i) Construction	7.0	15%	1.1	0.4
(ii) Operation	6.0	15%	0.9	0.3
7. Air Quality				
(a) Construction	7.5	25%	1.9	0.6
(b) Operation	6.5	25%	1.6	0.5
8. Noise and Vibration				
(a) Construction	6.0	20%	1.2	0.4
(b) Operation	7.0	20%	1.4	0.5
TOTAL	180.0	N/A	67.2	66.4

Source: GCIMP Project Team, Norling Consulting's Analysis

FIGURES

FIGURE 1: AMENDED PREFERRED OPTION – DEVELOPMENT LAYOUT

FIGURE 2: Alternative Option 6 Development Layout

FIGURE 3: GCIMP Circle of Sustainability – Amended Preferred Option

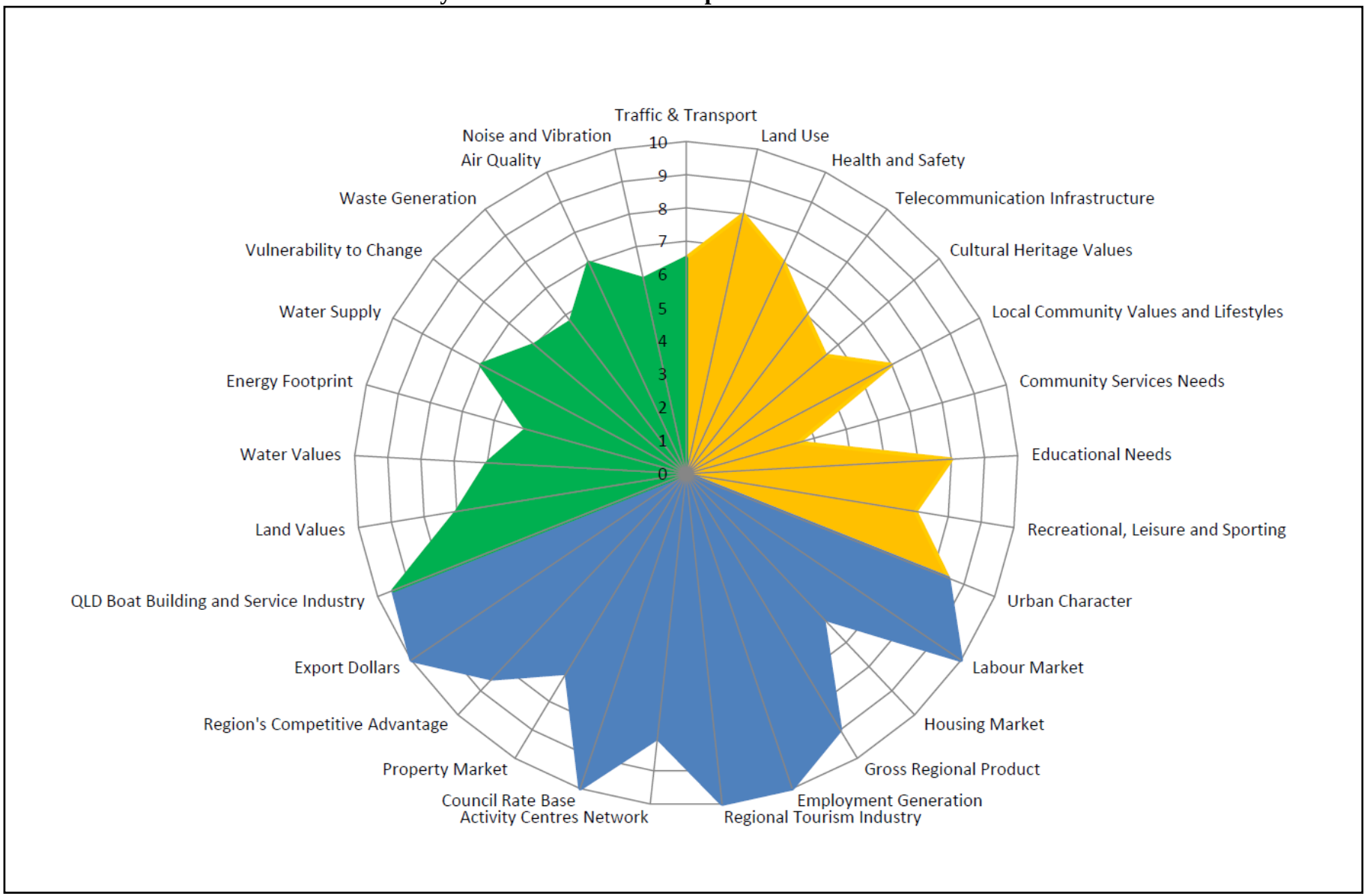


FIGURE 4: GCIMP Circle of Sustainability – Alternative Option 6

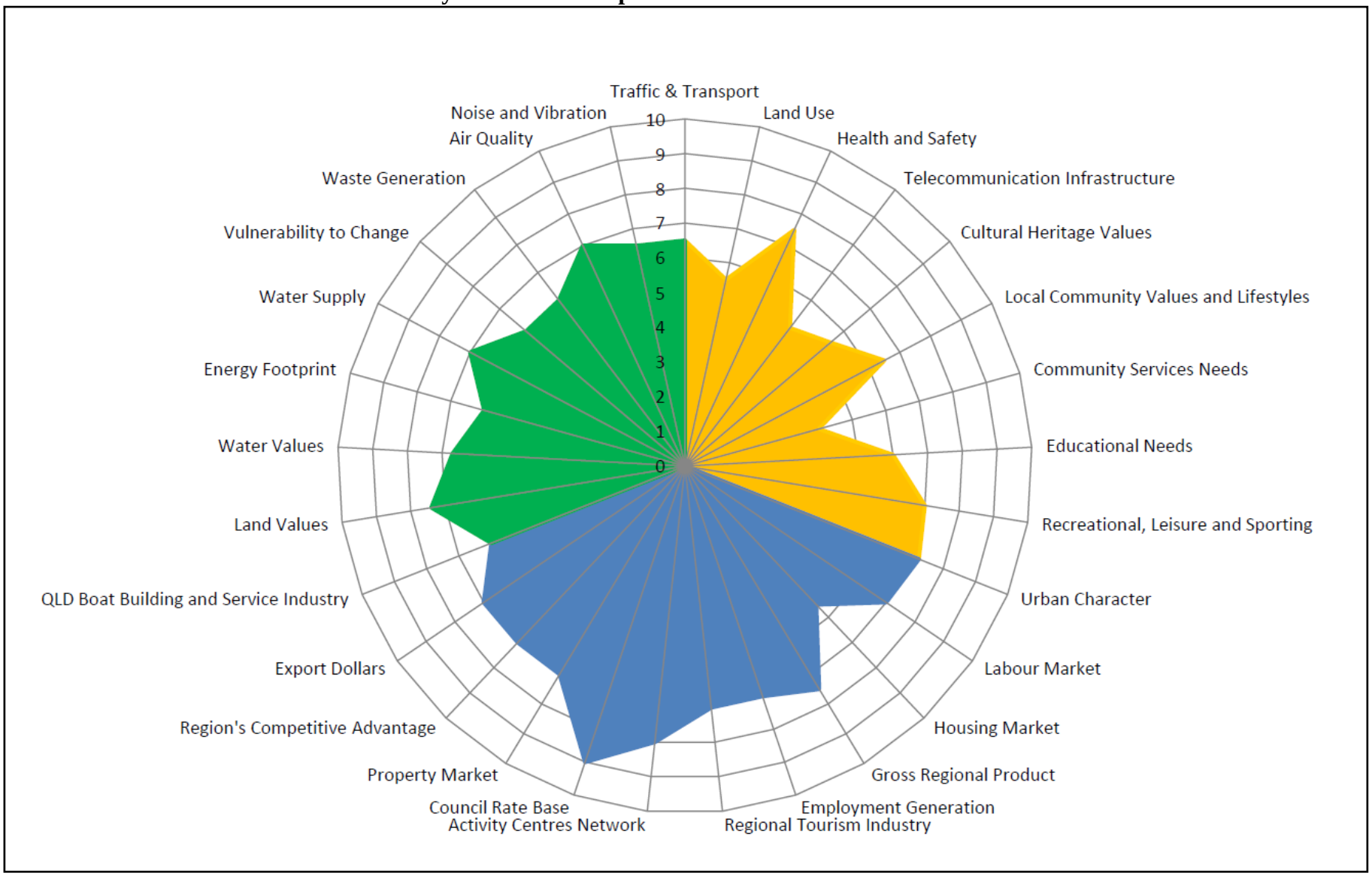
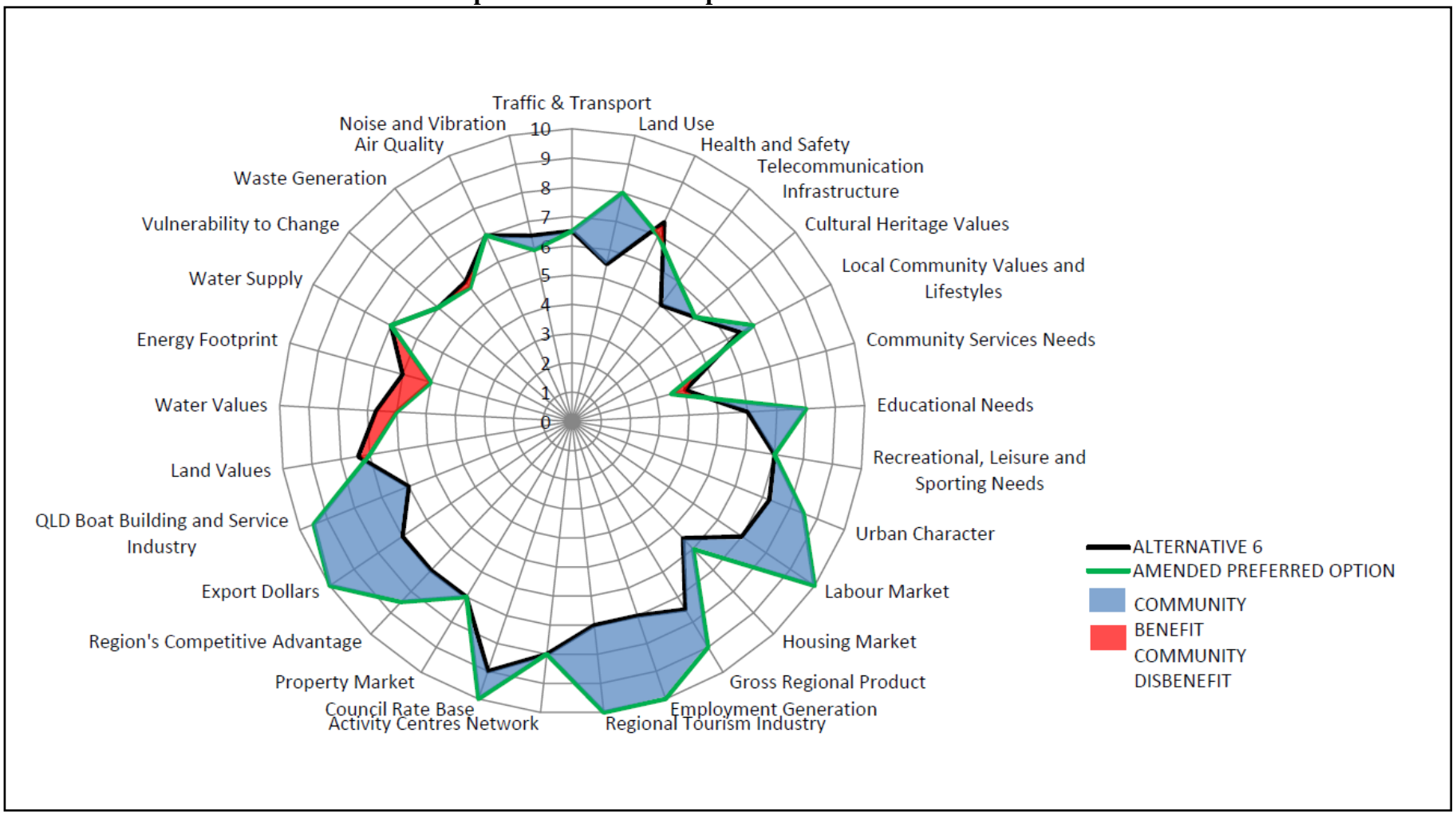


FIGURE 5: GCIMP Amended Preferred Option v Alternative Option 6



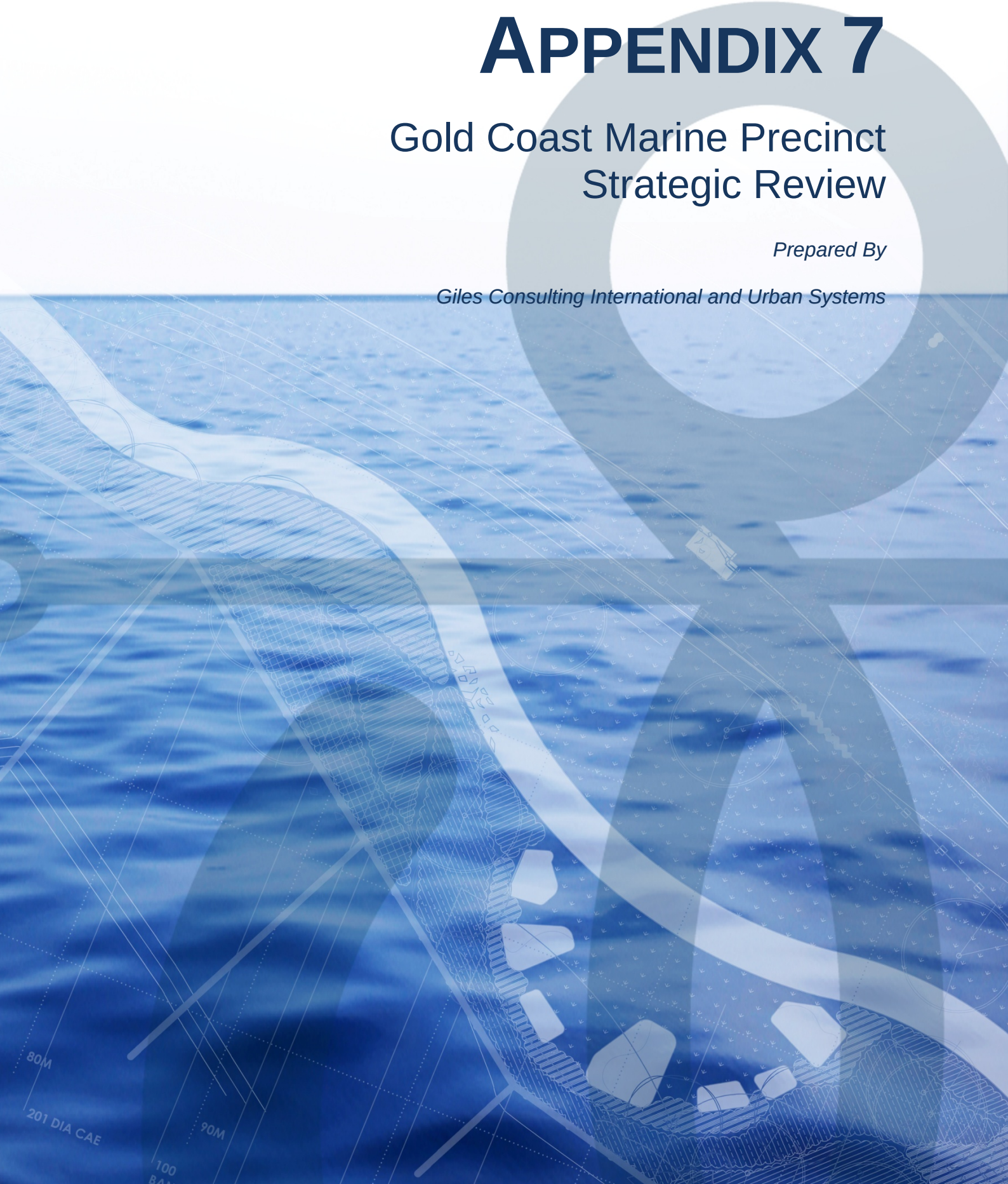
Gold Coast International marine precinct

APPENDIX 7

Gold Coast Marine Precinct Strategic Review

Prepared By

Giles Consulting International and Urban Systems



Gold Coast International
marine precinct

APPENDIX 8

Traffic and Transport Impact Assessment Addendum

Prepared By

CRG Traffic

TRAFFIC & TRANSPORT IMPACT ASSESSMENT

This report has been prepared in response to Item *4.12 Infrastructure Impacts – Traffic and Transport*.
This is an amended version of the original report prepared and responds to issues raised by the Gold Coast City Council and the Department of Transport and Main Roads.

Executive Summary

- This Traffic Impact Assessment has been prepared on behalf of Harbour Island Pty Ltd (Harbour Island) for a proposal to develop a large marine industry precinct in Shipper Drive at Coomera. The subject site is located on the northern side of Shipper Drive and has an area of 63.6 hectares. The site is currently undeveloped. As identified in the Gold Coast City Council Coomera LAP, the subject site is located within the Marine Precinct.

- While several design options have been prepared for the subject development, this assessment examines the Master Plan option, as this represents the most intensive development of the site and will therefore have a greater impact upon the surrounding road network.

- The proposed development will consist of two distinct precincts, divided by the future Inter-Regional Transport Corridor (IRTC) which runs through the site to the west of Waterway Drive. The western precinct will consist of an industrial subdivision with a total area of approximately 18ha. The eastern precinct will consist of a mix of uses including commercial / showroom, retail, hotel, tavern, boat storage, marine berth, education and factory uses.

- It is estimated that the proposed development will generate in the order of 10,132 daily trips and up to 1,099 peak hour trips on the surrounding road network.

- With regard to the State controlled road network, the Pacific Motorway, Foxwell Road & Days Road interchange as well as the Beattie Road / Service Road intersections will be at or near capacity by 2021 regardless of the proposed development and will require upgrading within the next 10 years. It is noted that the proposed development traffic will increase the degree of saturation at each of the above intersections only marginally and therefore have a relatively minor impact upon their performance.

- Any contribution rate applied should consider the net impact of the proposed development in the context of what could be developed on the site under a Self Assessable application. It is considered that the trip generation of the proposed development will be similar to that of a scheme comprising of uses currently allowable under the LAP.

- With regard to the Local Road Network, this assessment has revealed that the Shipper Drive / Foxwell Road intersection, Waterway Drive / Beattie Road intersection, as well as the proposed access intersections in Shipper Drive, will operate satisfactorily for the foreseeable future with the proposed development traffic. Thus the proposed development will not have any adverse impact upon the performance of the local road network.

- This report demonstrates that there is sufficient car parking proposed within the eastern precinct to accommodate expected car parking demands generated by the various uses on the site.

- It is recommended that Bicycle parking be supplied in accordance with the requirements set out in Table 10-1 of the Austroads publication 'Guide to Traffic Engineering Practice - Part 14: Bicycles'. End of trip facilities (lockers, showers) should also be provided where appropriate to encourage cycling trips.

- It is recommended that the proposed access intersections in Shipper Drive each be constructed as a single lane roundabout with a 20m centre island diameter, similar to the existing roundabout at the Waterway Drive / Beattie Road intersection.

- It is recommended that indented bus bays and bus shelters be constructed on both sides of Shipper Drive adjacent to the subject site to accommodate additional passenger demands in this area resulting from the proposed development.

Table of Contents

1 Introduction

1.1 Background

CRG Traffic Pty Ltd has been engaged by Harbour Island Pty Ltd (Harbour Island) to undertake a traffic impact assessment of its proposal to develop a large marine industry precinct in Shipper Drive at Coomera.

The assessment examines how the existing transport infrastructure will need to be upgraded to accommodate the proposal and whether any additional road infrastructure is required to that already planned by the Gold Coast City Council and the Department of Transport and Main Roads.

It is important to note from the outset that the subject site could be developed for a range of uses on a Self Assessable basis. That is, without any impact assessment required. In particular, the site has been earmarked for waterfront industry for many years and was envisaged as being used for such during the preparation of major transport planning studies in the Coomera area. The potential impact of the proposed development needs to be carried out in the context of what could be developed on the site as part of a Self Assessable application.

With regard to the State controlled road network, the assessment has been undertaken in accordance with the Department of Main Roads' *Guidelines for the Assessment of Road Impacts of Development (2006)*.

At the local level, the assessment addresses road network impacts upon the local road network, car parking supply, service vehicle access, pedestrian access, public transport access and bicycle parking.

1.2 Items Raised by the GCCC and the DTMR

The following traffic / transport related items have been raised by the Gold Coast City Council and the Department of Transport and Main Roads. A brief response is provided to each item.

Items from GCCC Committee report:

A	Oversized Vehicles	Impacts of Oversized vehicles on bridges	Identify potential impacts of heavy and oversized loads on the local road network, highlighting any vulnerable bridges, structures and considerations to be made when desiging new intersections along the route

Response:

The site is located within the primary marine precinct of the Gold Coast. The existing marine precinct already generates a significant number of oversized vehicles. The only bridge required to be used (if the Foxwell Road Route is to be avoided) is the railway bridge on Beattie Road. Oversized vehicles would be escorted by a pilot who would manage traffic flow as required. This would be an occasional need and is not considered to be a significant issue.

B	Construction Plans	Production of Traffic Construction Plans	Proposed construction plans of all required transport infrastructure works, including public transport, cycling and pedestrian, in accordance with relevant and accepted authority standards and practices.

Response:

Construction traffic management plans will be produced for any external transport infrastructure upgrade works, as per usual requirements.

D	Road Transportation	Details of Road Transportation Requirements	Details of road transportation requirements on public roads for both construction and operational phases of the GCIMP, including the timing of works and the responsible parties for these works

Response:

Mitigation works required during the construction phase will be detailed as part of the construction management plan. It is not anticipated that any external road works will be required to facilitate construction traffic. Only frontage works, and those required to facilitate access will be required for the operational phases of the project.

In relation to “Trip Generation and Traffic Impact Assessment Items”:

A	Trip Generation		Trip generation to be applied to Waterfront Industry within the application area (28.9 ha) is: Peak Trip Generation - 0.9 peak hour trips per 100m2 GFA and Daily Trip Generation - 9 trips per 100m2 GFA

Response:

The standard light industry rate is not considered to be appropriate given the integrated nature of the proposed development and the variety of co-related uses proposes.

CRG has surveyed the existing marine industry to the south and applied the surveyed rate to the proposed marine industry development and associated uses. Given the specific nature of the proposed development being marine industry, this is a more appropriate approach than application of the standard light industrial trip generation rate. Applicable guides recommend a survey of a similar use where such is possible.

A rate of 7 trips / 100m2 GFA was adopted for the industrial subdivision on the western area of land. This rate has been adopted by the DTMR for industrial subdivisions where there is likely to be a mix of light and medium – heavy industry users.

B	TAFE		The operation of the TAFE has not been substantiated. Therefore, it is not plausible to support the assumptions made by the traffic consultant. It is assumed that a high proportion of attendances to the TAFE will travel by private vehicle.

Response:

A TAFE campus is no longer proposed on the master plan. Allowance has been made for the inclusion of small training facilities, which may be incorporated into the development.

C	Base Data	Base Data for the Marina	No base data has been provided around the operation of the Marina - including wet and dry berths.

Response:

The number of wet and dry berths is provided in Table 8.2 of this report. That is: 528 x dry berths, 374 x wet berths.

D	Timing		The expected timing of completion of the GCIMP is not clear

Response:

The timing of the development will be in accordance with economic conditions, which are unclear. It is the Applicant's intention to develop the property as quickly as possible but within economic constraints.

E	Future Traffic Volumes		In order to estimate future traffic volumes on the surrounding local road network for a 10 year design horizon, the following growth rates are to be applied per annum: Foxwell Road, east of the Coomera Interchange and including the intersection with Shipper Drive - 6% p.a. compounded. Shipper Drive, Waterways Drive and Beattie Road - 4% p.a. compounded.

Response:

The assessment is based on a background growth rate of 3% per annum. The subject site is the primary development site in the marina precinct and will account for a large proportion of traffic growth on Waterways Drive, Shipper Drive and Beattie Road. The resultant growth rate (ie background rate of 3% plus the proposed development) will be at least 4% - 6% per annum. Applying a background rate of 4% - 6% per annum and then adding development traffic would result in an unrealistic level of growth.

F	Intersection Template		The intersection template is to be adjusted in assidra to reflect the existing road environment at the intersection of Foxwell Road / Shipper Drive. Approach lanes to the intersection serve a dual purposes, being left and through and right lanes. The current template identifies separate right, through and left lanes.

Response:

The intersection template adopted for SIDRA modeling purposes is consistent with that currently in place.

The adopted layout is shown below.

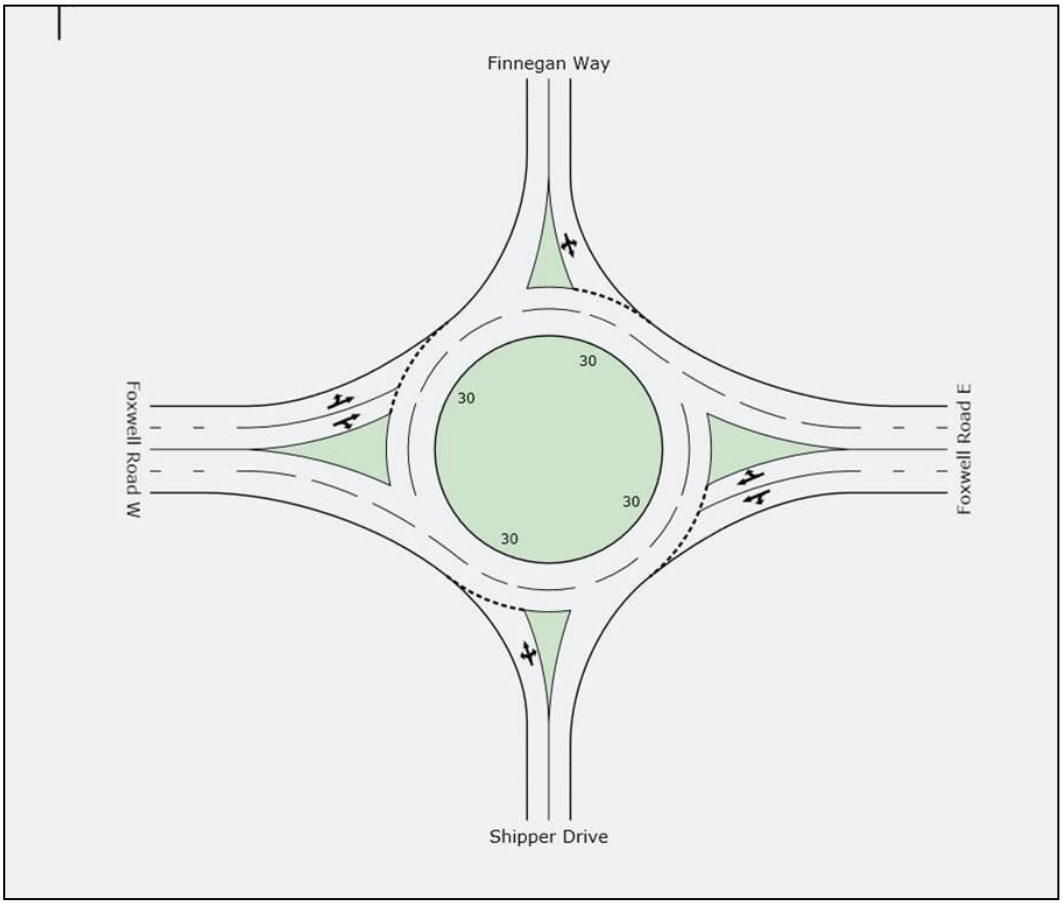


Figure 1 – Adopted intersection layout at Foxwell Rd / Shipper Drive for SIDRA modelling

With respect to the concerns raised by the DTMR, our comments are as follows:

1.4	Traffic	Proponent needs to confirm validity/accuracy of the existing local road traffic data.	

Response:

As stated in the CRG report, traffic count data for State controlled roads were provided by the DTMR. The data was collected in November 2010.

Traffic data on local roads was collected by CRG. There is no reason to suggest that the traffic data is inaccurate.

1.5	Traffic	Proponent needs to outline the rate or staging of development with predicted traffic requirements for each stage of development

Response:

As identified within the EIS, a preliminary ROL staging plan has been prepared by Gassman Development Perspectives. However, the proposed development staging is unable to be finalized at this time as it will be subject to economic conditions. An estimated traffic generation for each stage of development based on the preliminary staging plans is provided in Section 5.1, Table 5.5.

1.6	Marine Traffic	Proponent needs to justify the appropriateness of their survey/area adjustment and trip generation predictions for the proposed marina development

Response:

Justification for the trip generation survey of the adjoining marine industry development was provided in the CRG Traffic Report. The adjoining the marine industry development is of a similar nature and size to the proposed development. The survey of such is therefore considered to be appropriate and in accordance with various guidelines.

1.7	Traffic		Proponent needs to explain and correct the inconsistencies in stated traffic generation from each part of the development as shown in Figure 5.5. Proponent must not assume any traffic connectivity between the west and east precincts of the proposed development. No roads between these precincts will be permitted over, under or within the IRTC corridor.

Response

We have reviewed the traffic generation estimates and Figure 5.5 and are not aware of any inconsistencies. Whether or not there is a connection between the east and west precincts does not have any implications for the State controlled road network (ie the Pacific Motorway). However, any connection currently shown will be removed as requested.

1.8	Traffic	The proponent has presented the daily traffic volumes for the development assuming the Coomera Town Centre is partially developed by 2021. The data presented suggests that 40% of the trips generated by the full development are to/from dwellings associated with the Coomera Town Centre. Should the proposed development proceed quickly in the short term (i.e. before the Coomera Town Centre dwellings have been developed) then	Proponent needs to confirm the predicted impact on the state-controlled network for each development stage. In addition to the scenarios outlined, the proponent should also include a "worst case" scenario, to assess impacts if the assumptions about trip origins and destinations are not achieved.

Response

The tables shown in Figure 1.1, the EMME 2 model indicates the following trip distribution to / from the Coomera Town Centre for the short and long term scenarios.

Base Year 2011 – 26%
Year 2031 – 42%

These are only trips distributed to the town centre, not the general Coomera / Pimpama area located to the east of the Motorway.

To be conservative, CRG assumed that only 40% of trips generated by the development would be contained to the eastern side of the Motorway. The above figures indicate that this is likely to be the case for the base (current) scenario and that the percentage will be significantly higher when the area has been fully developed (ie beyond 2031).

2011

Origin	Destination	Trips	Percentage
743	514	266	8%
	515	70	2%
	516	57	2%
	517	483	14%
	Rest	2453	74%
	Total	3328	100%

Destination	Origin	Trips	Percentage
743	514	252	8%
	515	70	2%
	516	56	2%
	517	454	14%
	Rest	2472	75%
	Total	3304	100%

2031

Origin	Destination	Trips	Percentage
743	514	264	9%
	515	451	15%
	516	40	1%
	517	473	16%
	Rest	1699	58%
	Total	2925	100%

Destination	Origin	Trips	Percentage
743	514	266	9%
	515	450	15%
	516	40	1%
	517	473	16%
	Rest	1724	58%
	Total	2953	100%

Figure 1.1 – Trip Distribution to / from the Site and Coomera Town Centre (Extracted from the Gold Coast EMME 2 model by Bitzios Consulting)

1.9	Traffic	Proponent needs to confirm the impacts on the state-controlled road network through all stages of development, considering the varying trip generation from the Coomera Town Centre.

Response

A staged impact assessment can be carried out when the development staging is known. However, given the current state of the Pacific Motorway / Foxwell road interchange and the need for a major upgrade, a detailed capacity analysis of the western roundabout (at Days Road) is not considered to be practical. The traffic impact of the proposed development will be similar to that of a Self Assessable development scenario over the site. On that basis, only local traffic impacts are considered to be necessary so that an appropriate road works can be carried out along the frontage and at the proposed access points. The net impact of the development upon the Motorway and its interchanges will be negligible.

1.10	Traffic	Proponent needs to review the proposed upgrading option taking into account TMR's comments on the timing and staging of the various developments affecting the proposed development site traffic generation.	This is required to confirm the feasibility of the proposed signal metering for all stages of development scenarios, to show it forms an acceptable basis for determining proposed contributions to TMR.

Response

The signal metering option is a suggestion that would provide some short term relief to existing congestion problems. The DTMR should investigate such interim measures to address current congestion problems, particularly on the western side of the Pacific Motorway / Foxwell Road / Days Road interchange.

These suggestions were offered in response to the DTMR's Information Request. It is not considered that such should be the responsibility of the Applicant given that the proposal will not have any additional impact, to that already allowed for in the DTMR's planning.

1.12	Traffic	A check on trip generation from the ultimate development can be obtained from the minimum number of car parks. 2.5 x 2537 equals a predicted 6,343 trips generated per day from the eastern precinct, compared to the stated estimate of 4,462 trips per day

Response

An estimate of trip generation based on car parking numbers is not considered to be appropriate given the nature of the uses. The trip generation estimates included in the assessment are based on published rates and surveys of actual similar developments. An assessment of trip generation based on car parking numbers is generally only carried out for high turnover developments and where published trip rates are not applicable.

1.15		The proponent recognises the proposed development causes significant impacts on the state-controlled road network and concludes/recommends a contribution towards the cost of works to mitigate these impacts should be made. The EIS suggests the contributions should be based on the Gold Coast Priority Infrastructure Plan. Whilst an impact mitigation contribution is warranted, TMR is not able to agree to these contributions being based on the Gold Coast Priority Infrastructure Plan. This is because the plan does not include a current schedule of	It is recommended the proponent further discuss impact mitigation contribution calculation methodologies with TMR after the proponent has revised the traffic impact assessment in light of the various comments provided above.

Response

The traffic impact of the proposed development compared to a Self Assessable development scenario over the site would be negligible and not bring forward or trigger the need for road upgrade works on the State controlled road network. On this basis, contributions are not considered to be applicable.

Furthermore, the following comments are provided:

It is acknowledged that the State controlled road network at Coomera is to be upgraded to accommodate development envisaged in the Coomera locality. Furthermore, that the Foxwell Road interchange is operating below levels of service and with future planned growth will worsen without works. However, consideration needs to be given to the fact that the Planning Scheme already allows for a development of the site and that such needs to be accounted for when assessing the impact of the proposed uses.

A review of the Coomera LAP identifies that the following uses, which are also proposed within the GCIMP, are Self Assessable and could occur without departmental referral or approval:

- **Shop** where only for marine goods and services which are used in any water based activity;
- **Manufacturer's Shop;**
- **Warehouse** where directly associated with waterfront industry.

In addition to this, Waterfront Industry is Code Assessable and a waterfront industry development could occur without referral to the DTMR.

Significantly, the LAP is within the Planning Scheme which was reviewed by the DTMR as part of its adoption. Development which is compatible with the scheme is thus accommodated by the Department's strategic planning and program of works. The GCIMP is, as a consequence, accommodated in the Department's strategic planning for the Coomera locality.

The additional land uses sought in the GCIMP, from those allowable under the Scheme, do not result in an increase in traffic above 5% of background modelled traffic. As such the GCIMP does not warrant or require upgrades to the state controlled road network.

2 Proposed Development

2.1 The Subject Site

The subject site (Figure 2.1) is located on the northern side of Shipper Drive and has an area of 63.6 hectares. The site is currently undeveloped.

As identified in the Gold Coast City Council Coomera LAP (Figure 2.2), the subject site is located within the Marine Precinct.

Figure 2.1: The Subject Site

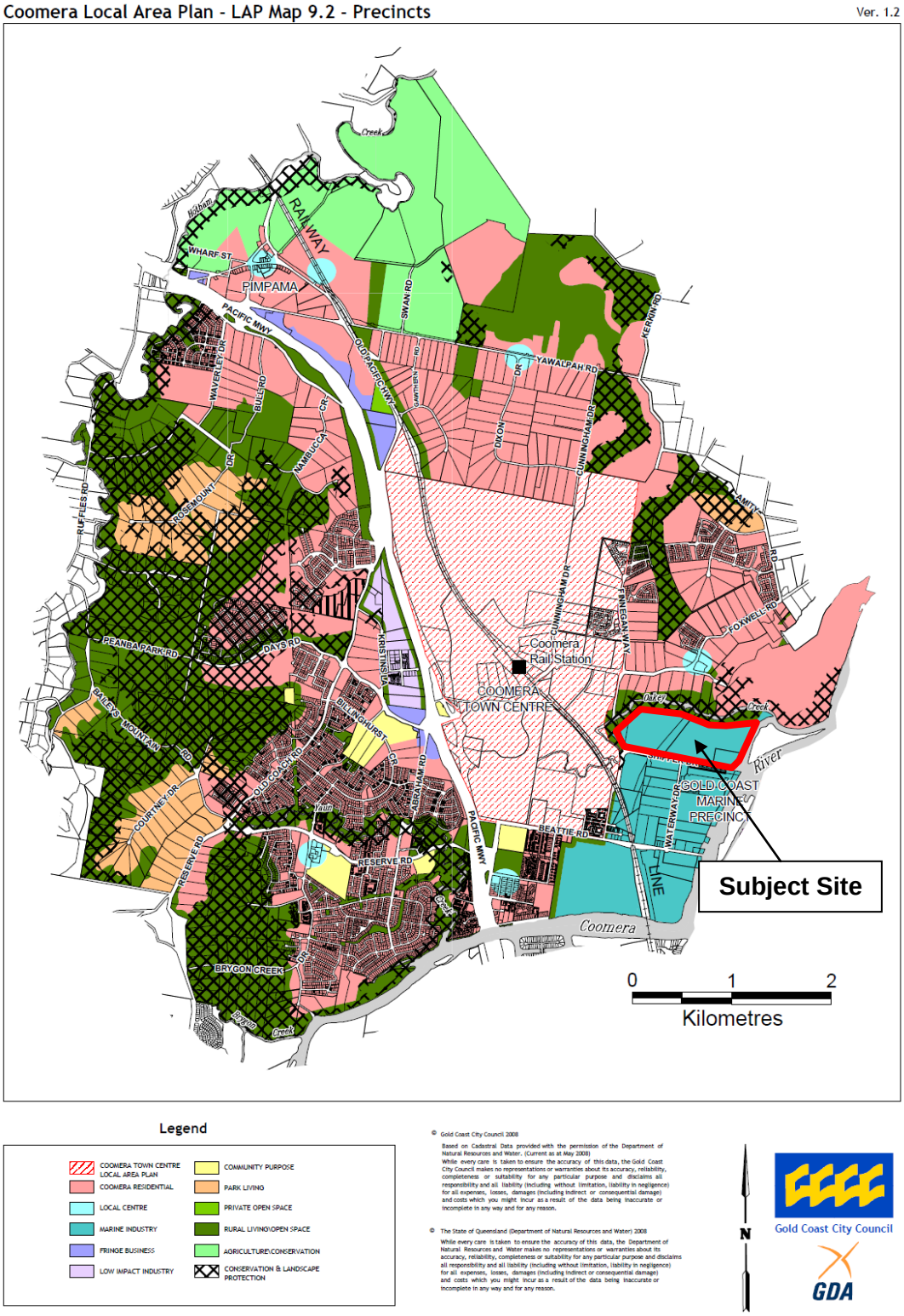


Figure 2.2: GCCC Marine Precinct

2.2 Development Proposal

The proposal is to develop a large marine industry precinct on the subject site.

The proposed development will consist of two distinct precincts, divided by the future Inter-Regional Transport Corridor (IRTC) which runs through the site to the west of Waterway Drive.

The western precinct will consist of an industrial subdivision with a total area of approximately 18ha.

The eastern precinct will comprise a mix of uses with the following indicative floor areas and number of berths:

Mixed Use Precincts (Total site area 6.1ha)	
Commercial / showroom	19,145m^2
Showroom	10,625m^2
Marina Services	2,210m^2
Retail and Office	5,800m^2
Hotel (110 rooms)	7,345m^2
Tavern	1,500m^2
Boat Stack Storage (528 boats)	4,325m^2
Marina	
External Marina	264 berths
Internal Marina	110 berths
Maritimo (Total site area 4.9ha)	
Glass Factory	6,500m^2
Ship Building Factory	10,151m^2
Office + Amenities	3,215m^2
Ship Lift Industry (Total Site Area 5.2ha)	
Ship Industry Warehouse	10,470m^2
Industrial Showroom (Total Site Area 0.7ha)	
Showrooms	3,000m^2

Access to Shipper Drive is proposed for each precinct in the form of a single lane roundabout. The eastern access has been aligned with the existing Shipper Drive / Waterway Drive intersection, while the western access has been aligned with the Shipper Drive / Ford Road intersection.

The proposed master plan is shown in Figure 2.3. The preliminary ROL staging plans for the development are presented in Figures 2.4 – 2.7 on the following pages.

Figure 2.3: Proposed Master Plan

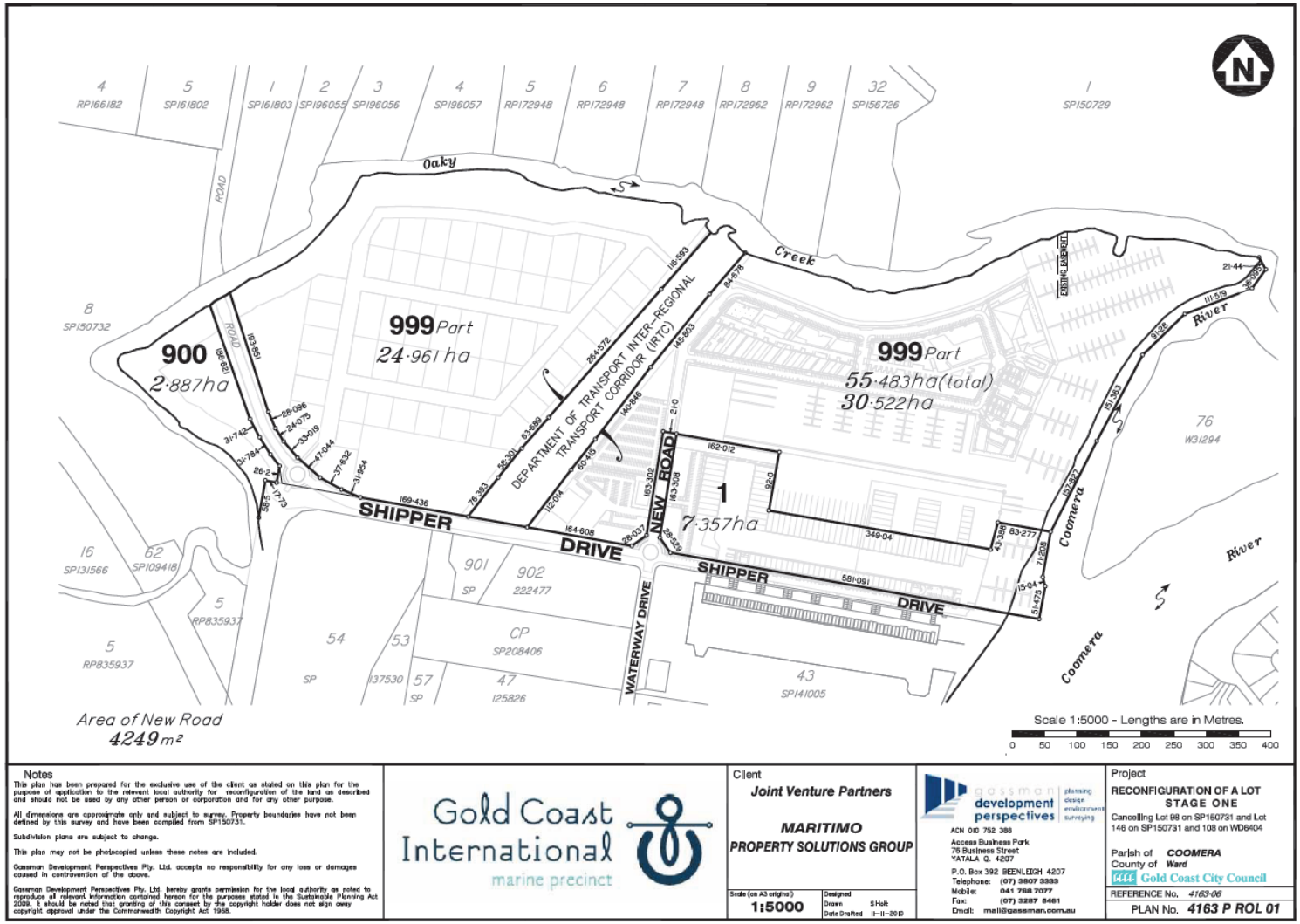


Figure 2.4: Proposed ROL Stage 1 Plan

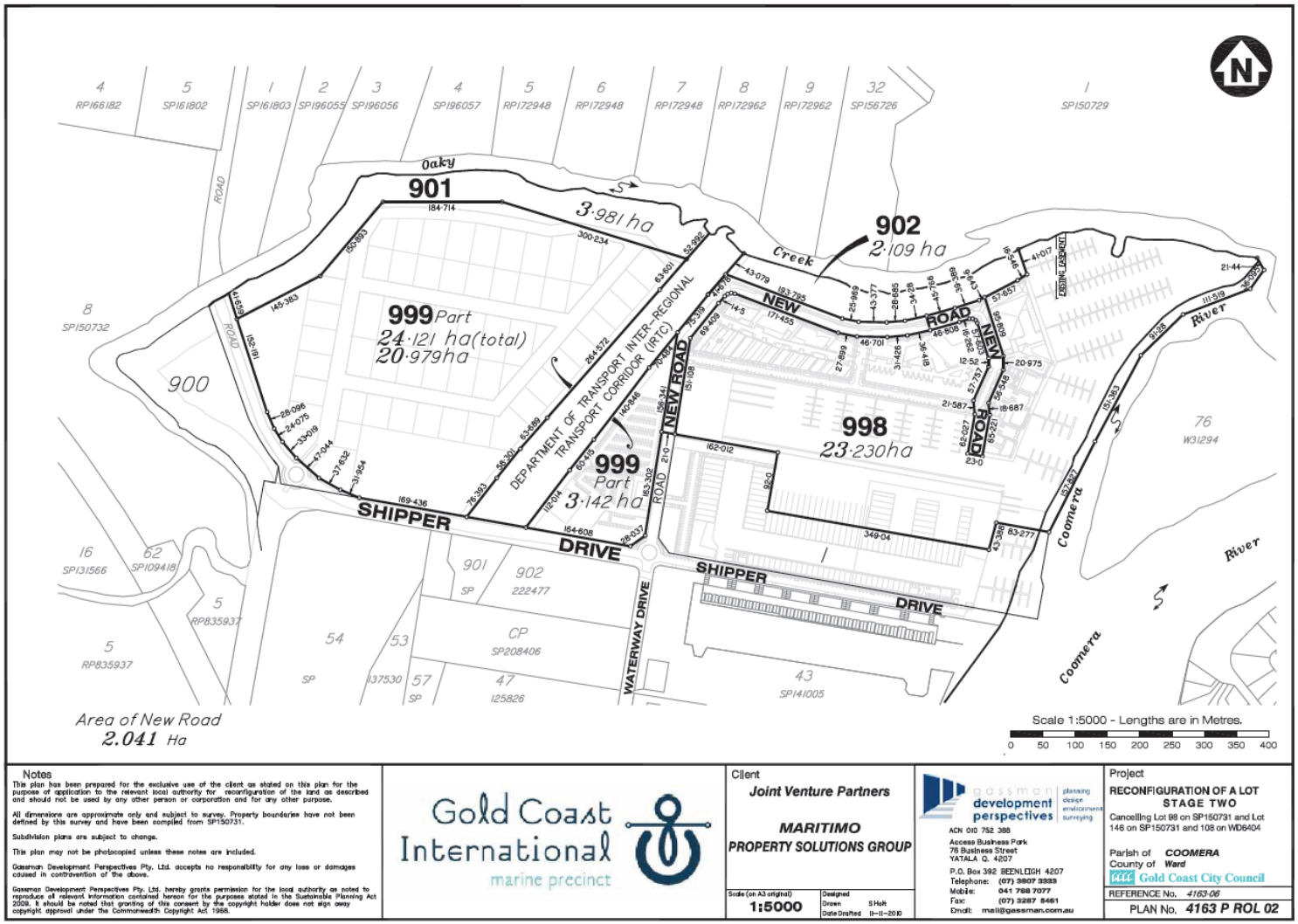


Figure 2.5: Proposed ROL Stage 2 Plan

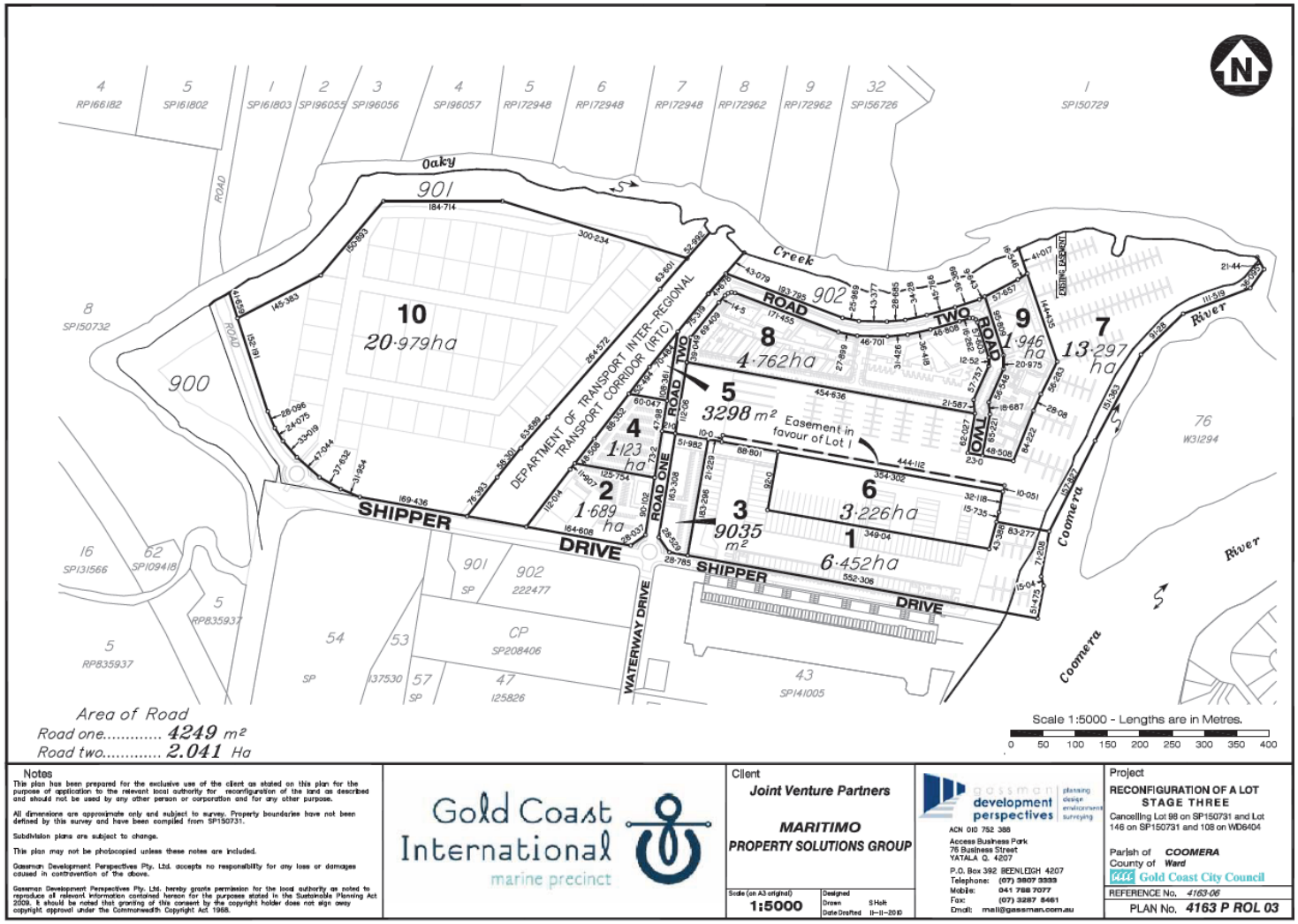


Figure 2.6: Proposed ROL Stage 3 Plan

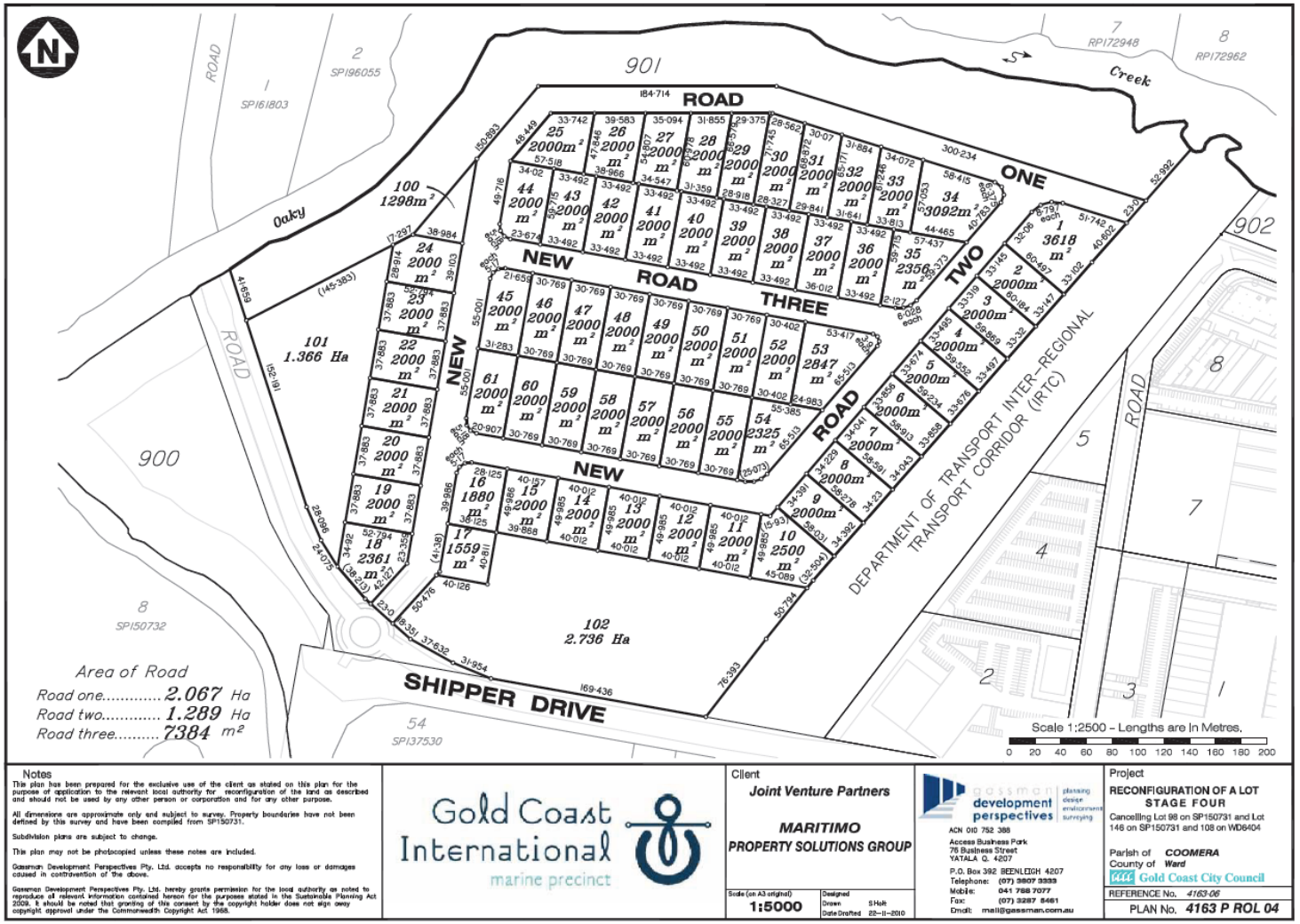


Figure 2.7: Proposed ROL Stage 4 Plan

3 Existing Road and Traffic Conditions

3.1 Road Network Layout

The subject site is located within the 'Gold Coast Marine Precinct' of Coomera, as identified in the Gold Coast City Council's Coomera Local Area Plan (LAP). The Coomera locality enjoys the convenience of connection to both the Brisbane metropolitan area and the urbanized parts of the Gold Coast City area via the Pacific Motorway, which passes through the local area.

Connectivity between the marine precinct and the Pacific Motorway is provided via Foxwell Road which is designated as an Arterial Road, and Beattie Road which is designated as a Sub-Arterial Road. The road hierarchy assigned to the major road network through the Coomera area by the Gold Coast City Council is presented in Figures 3.1 and 3.2.

Foxwell Road has recently been duplicated by the Gold Coast City Council between Oakey Creek Road and the Coomera railway station providing 2 traffic lanes in each direction in this section. Elsewhere Foxwell Road provides a single traffic lane in each direction. Beattie Road is a two-lane road with a posted speed limit of 60km/hr.

Waterway Drive and Shipper Drive provide access to frontage properties within the marine precinct and are classified as Industrial / Commercial roads. Both roads have been constructed to Gold Coast City Council standards for an Industrial Collector Street, with a total pavement width of 14 metres. Waterway Drive has a posted speed limit of 50km/hr while Shipper Drive has a posted speed limit of 60km/hr west of Waterway Drive.

The intersection of Waterway Drive and Beattie Road is controlled by a single lane roundabout, while the intersection of Shipper Drive and Foxwell Road is controlled by a double lane roundabout.

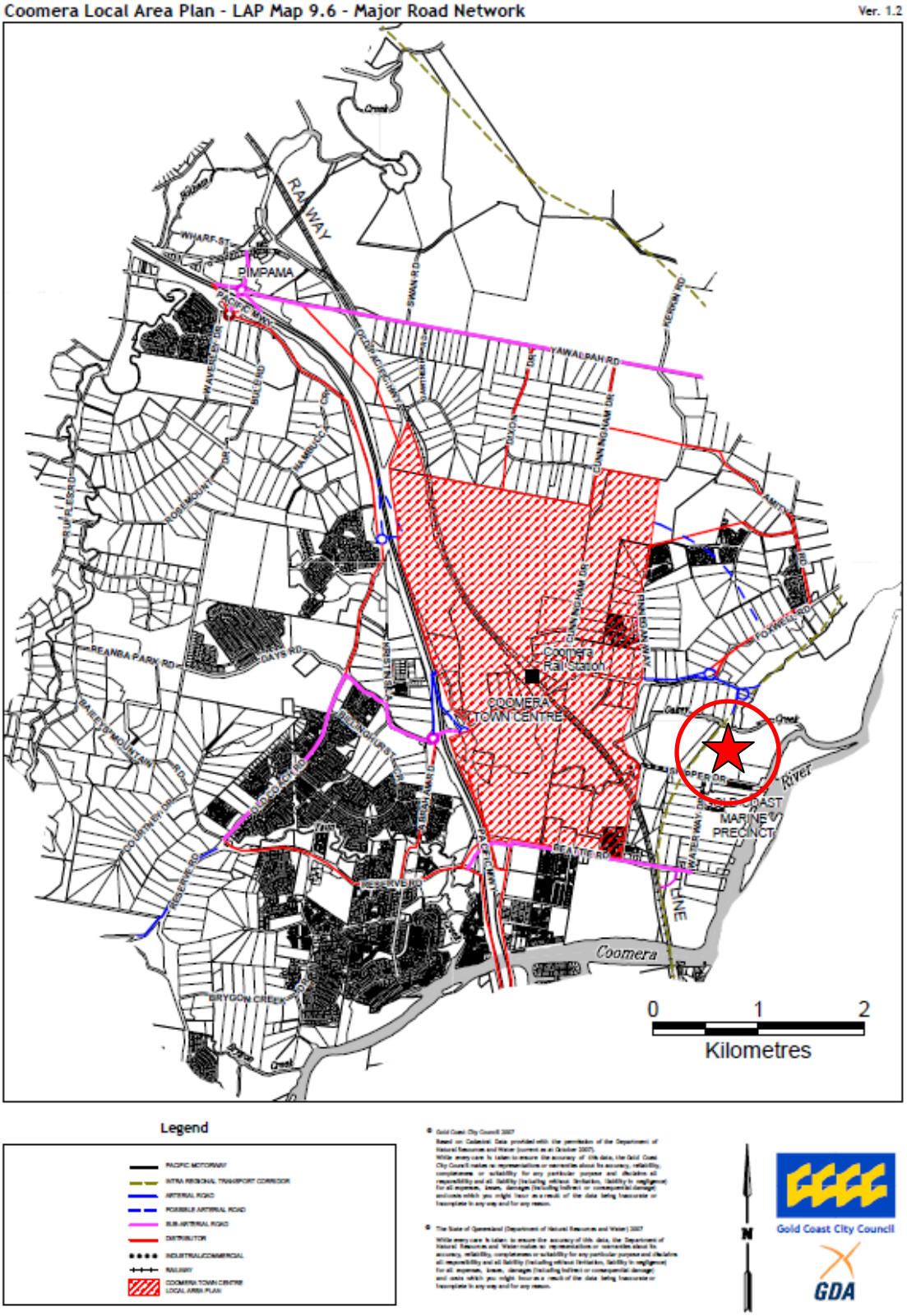


Figure 3.1: Major Road Network (GCCC Coomera LAP)

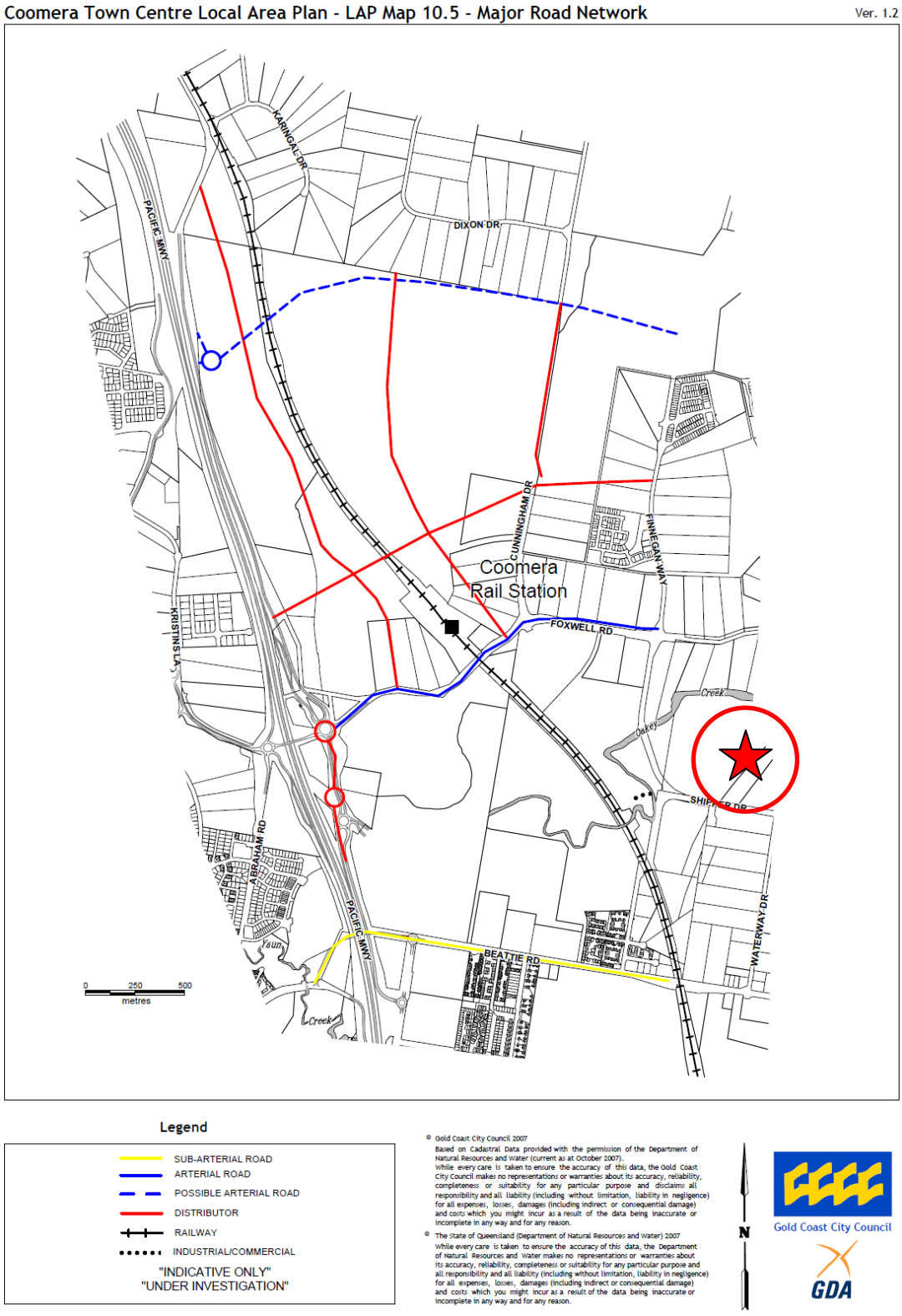


Figure 3.2: Major Road Network (Coomera Town Centre LAP)

3.2 Traffic Volumes

CRG has undertaken traffic counts at the Waterway Drive / Beattie Road & Waterway Drive / Shipper Drive intersections. The counts were conducted on Thursday 25th March 2010 from 7.00am to 6.00pm. Traffic volumes at the Foxwell Road interchange were obtained from the Department of Transport & Main Roads. The data provided by the Department is from November 2010.

Existing traffic volumes are summarised in Figures 3.3 and 3.4 for the AM and PM peak hour respectively. Estimated daily traffic volumes at the Pacific Motorway / Foxwell Road interchange are shown in Figure 3.5. These estimates have been derived through application of a 0.1 peak hour factor.

3.3 Current Conditions

The western side of the Pacific Motorway / Foxwell Road interchange has reached capacity with significant queuing and delays occurring at the intersection of Days Road / Abraham Road and the overpass during morning and afternoon peak hour periods. In particular, the northbound off-ramp and Days Road approaches are heavily congested. The roundabout has insufficient geometry to accommodate five legs, and the heavy peak hour demands are generated by the numerous schools located on the western side of the Motorway.

The roundabout on the eastern side of the Motorway overpass is generally performing satisfactorily during normal peak traffic periods.

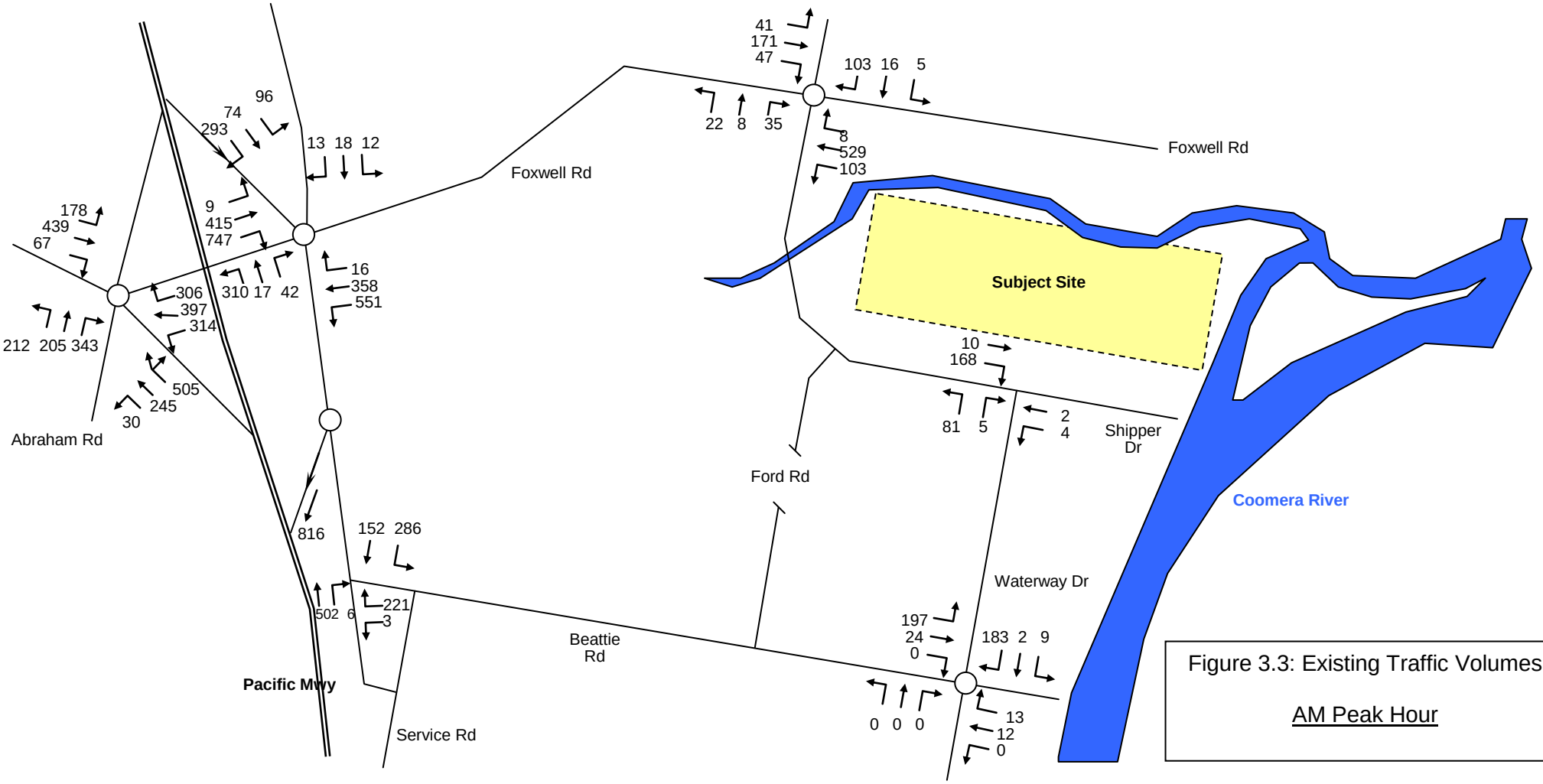


Figure 3.3: Existing Traffic Volumes

AM Peak Hour

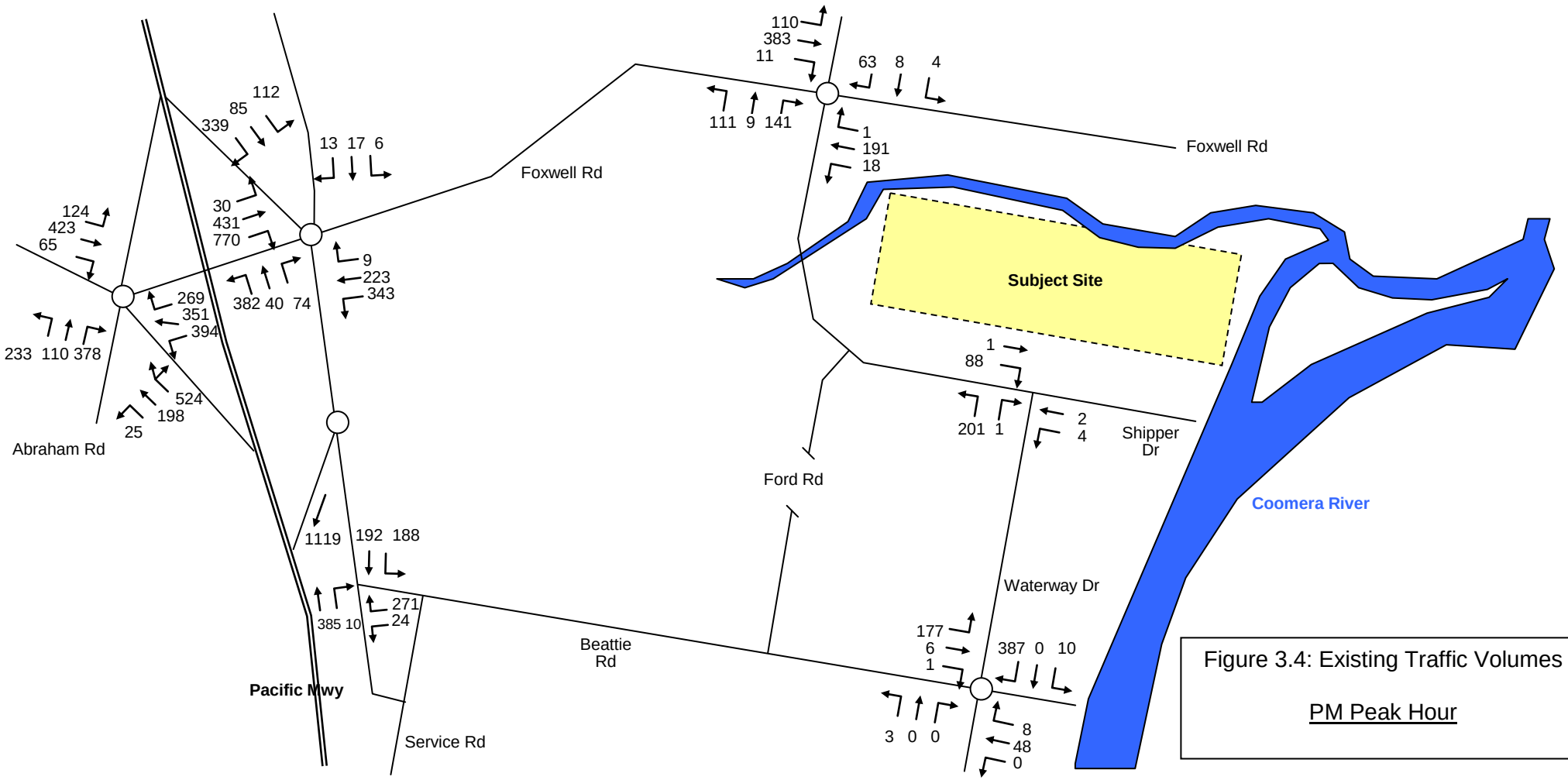


Figure 3.4: Existing Traffic Volumes

PM Peak Hour

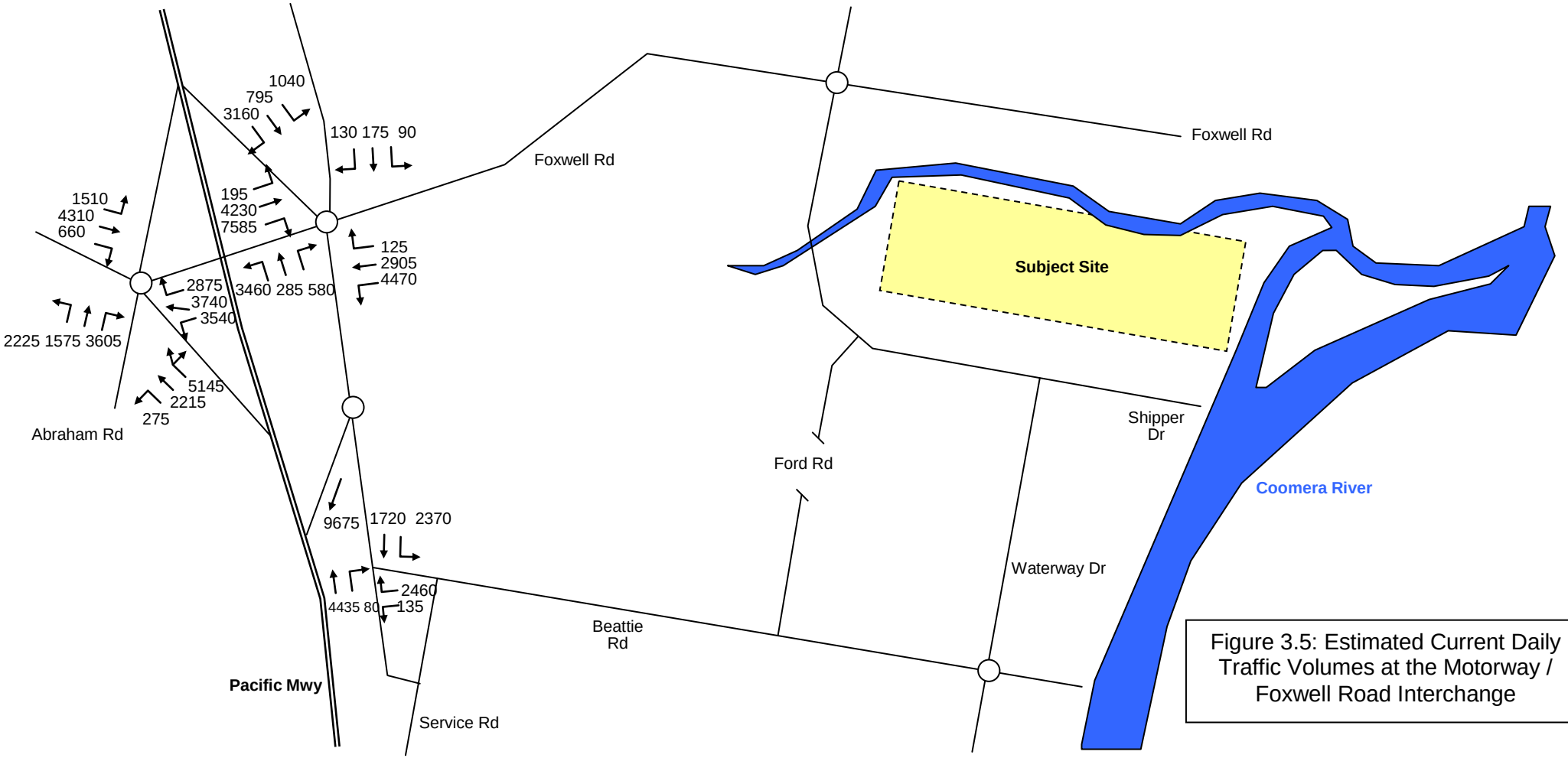


Figure 3.5: Estimated Current Daily Traffic Volumes at the Motorway / Foxwell Road Interchange

4 Transport Planning

4.1 Road Network

As noted in the Gold Coast City 'Coomera Town Centre Structure Plan', the successful development of the Town Centre is largely dependent on the achievement of an efficient network of trunk roads. The development of the Town Centre will dramatically increase the demand on the existing road network creating the need to upgrade existing routes and provide new road connections.

Figure 4.1 shows the planned future road network in the area. As shown, three Pacific Motorway interchanges will facilitate access to the town centre and marine precinct. Connecting these interchanges will be a 'ring road' that links Beattie Road to Foxwell Road and Foxwell Road to the Le Mans interchange.

The existing Foxwell Road interchange will be upgraded in stages to match the development of the Coomera Town Centre. A new Coomera North (Le Mans) partial interchange is proposed, providing for M1 directional traffic movements to and from the north. A new Coomera South (Beattie Road) partial interchange is also proposed, providing for M1 directional traffic movements to and from the south. Both these proposed interchanges are conditional, subject to the 4 lane eastern Coomera Town Centre ring road being provided.

The planned Intra Regional Transport Corridor (IRTC) extends from Stapylton to Nerang. This road is intended to provide for arterial movement and reduce the pressure on the Pacific Motorway. Under the South East Queensland Infrastructure Plan, the road is planned to be constructed by 2026 and has $1.6 billion allocated to it. It is expected that the southern section, between Coomera and Nerang would be constructed first and then the Coomera – Stapylton section. While the IRTC corridor runs through the subject site, connections are not proposed to either Shipper Drive or Beattie Road. An interchange is likely to be constructed at Foxwell Road.

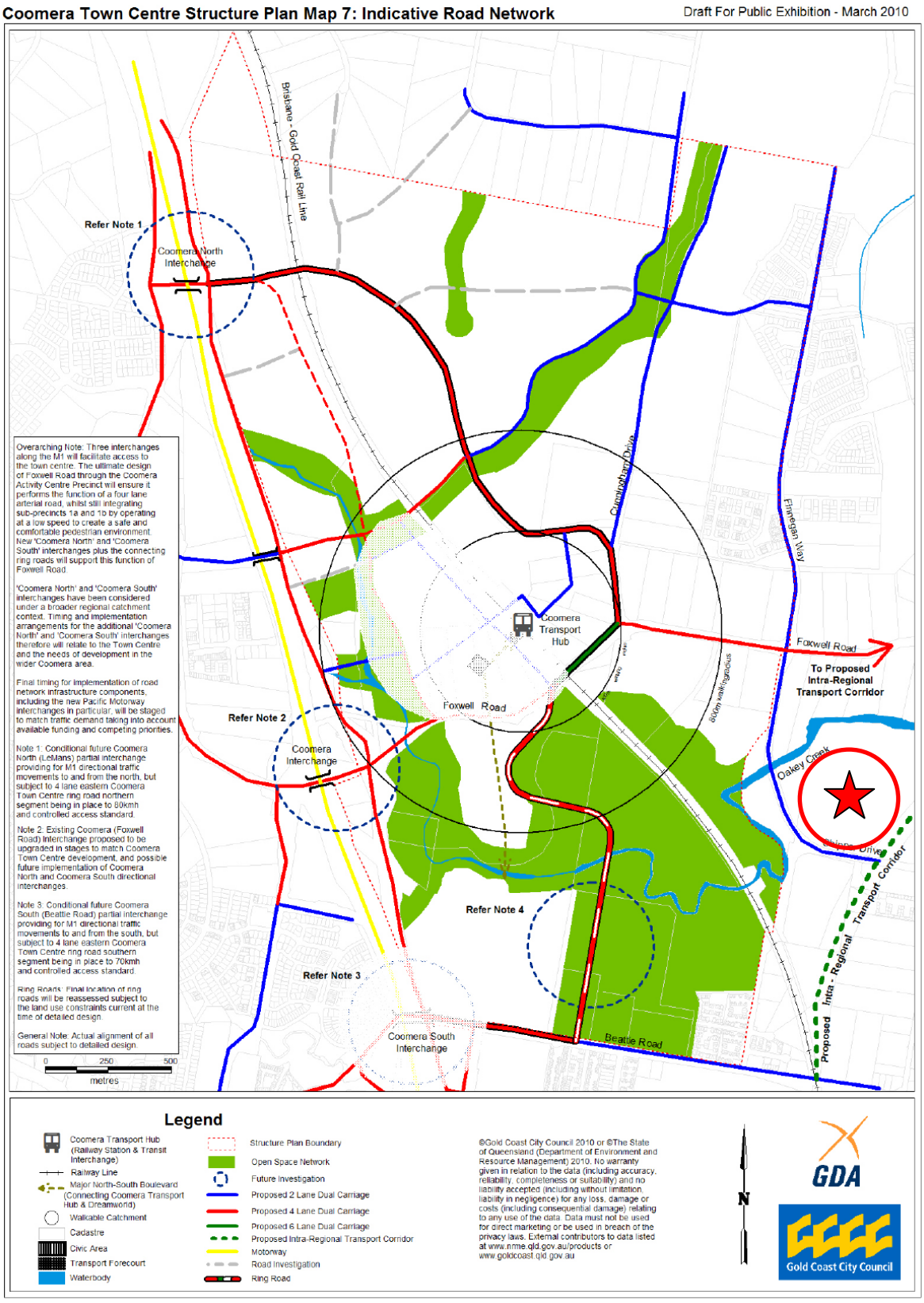


Figure 4.1: Indicative Road Network (Coomera Town Centre Structure Plan)

In order to estimate future traffic volumes on the surrounding road network, a 3% p.a. compound growth rate has been applied. While historically, the growth rate at the Motorway interchanges has been higher than this, it is noted that the development of the Coomera Town Centre will reduce the need for local traffic to travel on the external road network. It is therefore considered that growth rates at the Foxwell Road interchange will significantly reduce as this development occurs.

Future estimates of 2021 traffic volumes on the surrounding road network are shown in Figures 4.2 and 4.3 for the morning and afternoon peak periods respectively.

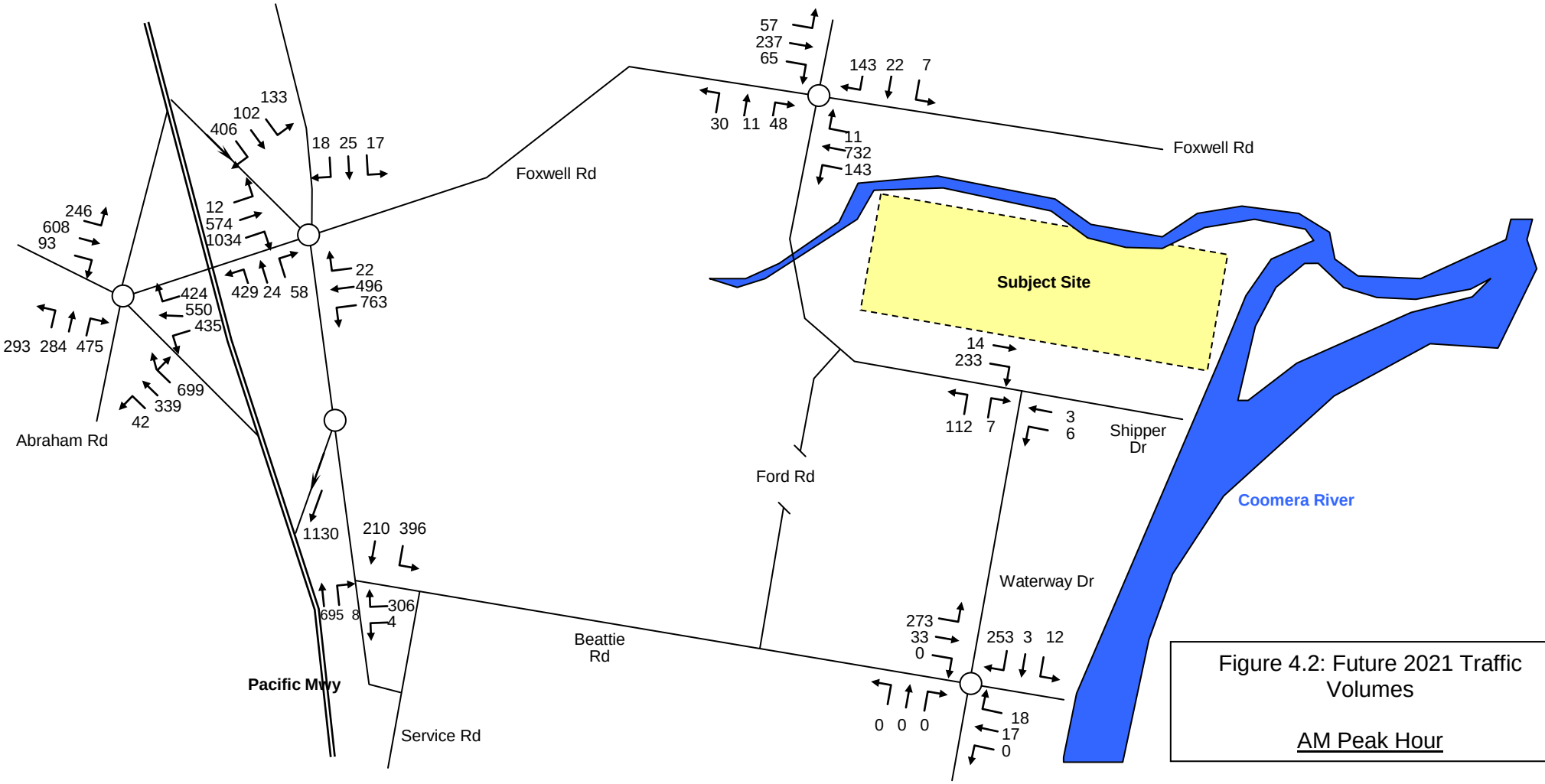


Figure 4.2: Future 2021 Traffic Volumes

AM Peak Hour

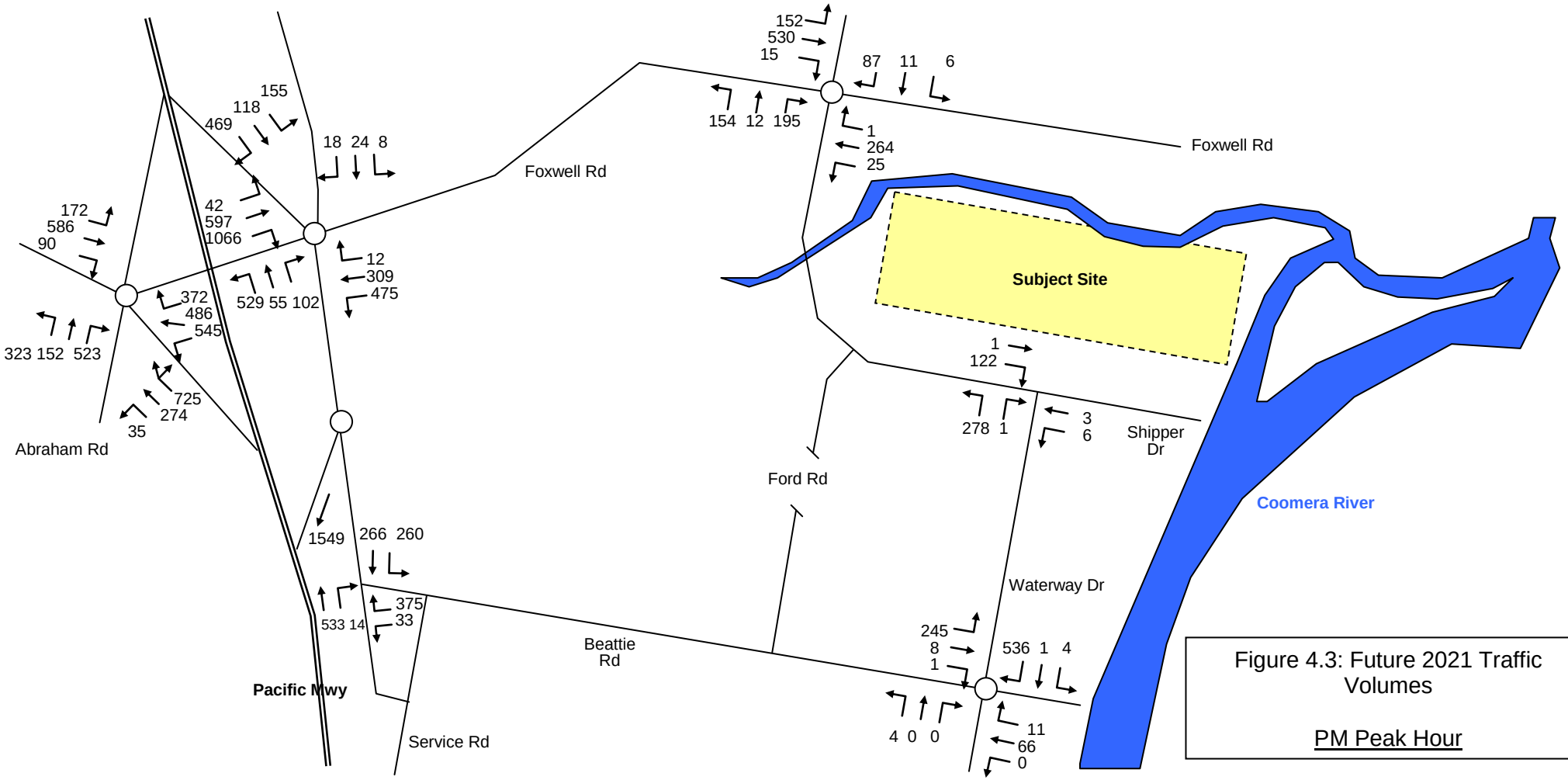


Figure 4.3: Future 2021 Traffic Volumes

PM Peak Hour

4.2 Public Transport

The Coomera Rail Station is located on Foxwell Road, at the heart of the Coomera Town Centre. It is a key element of the Town Centre and local planning in the area encourages maximum use of rail services. The rail line through Coomera connects Coomera to Brisbane via a 53 minute service with trains departing at approximately 30 minute intervals during standard business hours. Southbound services to Robina / Varsity Lakes also depart every 30 minutes.

Various bus services also operate through the Coomera area. As shown in Figure 4.4, the Route 725 service operates along Shipper Drive directly past the subject site. The Route 725 service provides connectivity to the Coomera Town Centre and Coomera Rail Station as well as the Helensvale Town Centre and Rail Station. Services operate every 30-60 minutes through the Marine Precinct and are coordinated with rail services at Coomera and Helensvale.

Public transport routes through the Coomera area are presented in Figures 4.5 and 4.6.

4.3 Cyclists & Pedestrians

As shown in Figures 4.7 and 4.8, the regional cycleway corridor runs adjacent to the rail line through Coomera, in close proximity to the subject site.

On-road bicycle lanes are also provided along Beattie Road and Foxwell Road east of the Coomera Rail Station.

This allows good connectivity for cyclists between the Marine Precinct and the Coomera Town Centre and Coomera Rail Station.

Bicycle lanes should be implemented on Shipper Drive so to link the marine precinct to Foxwell Road, and such should be provided regardless of the proposed development. It is noted that there is currently sufficient pavement width to allow this and therefore can be achieved through pavement markings.

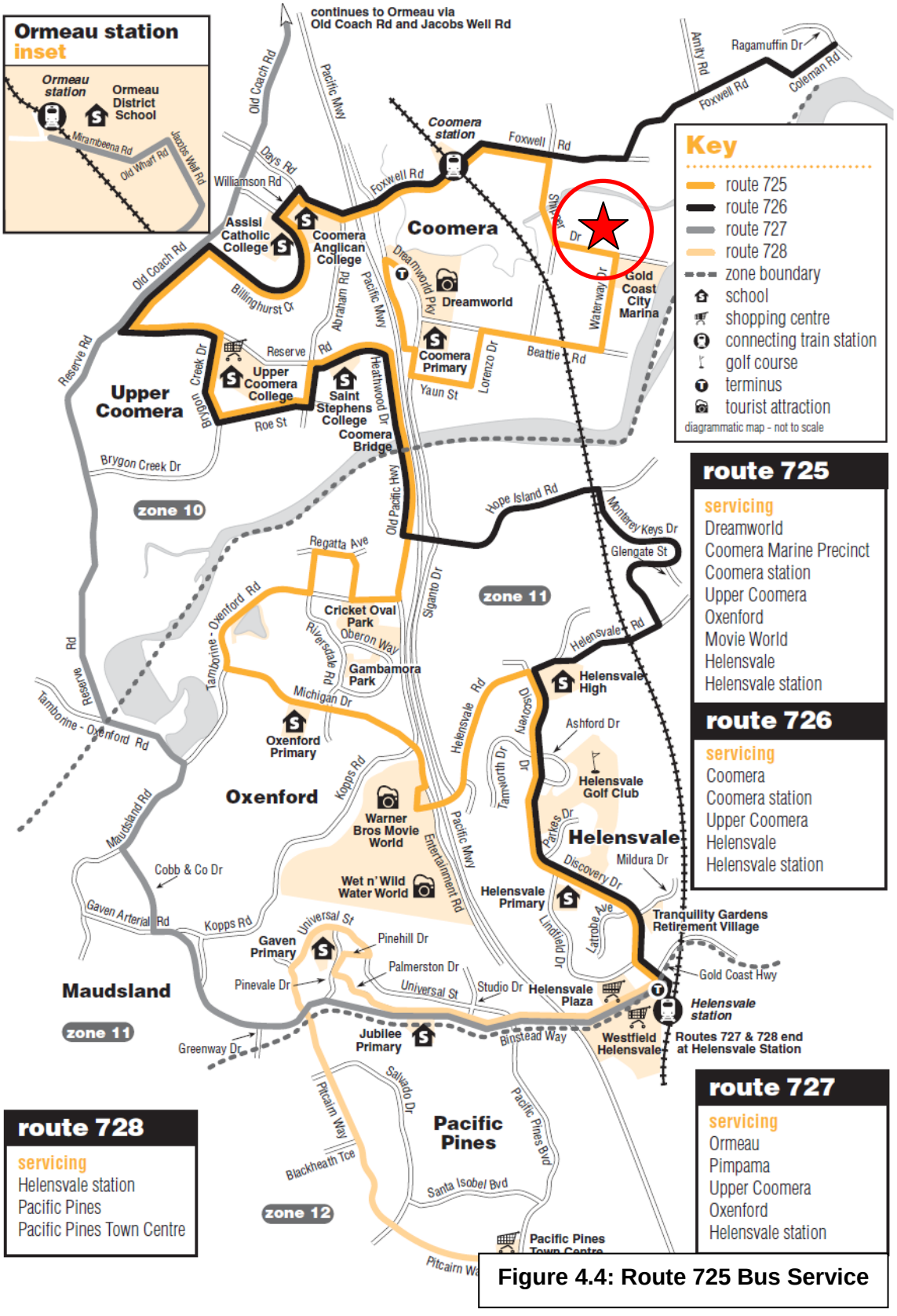
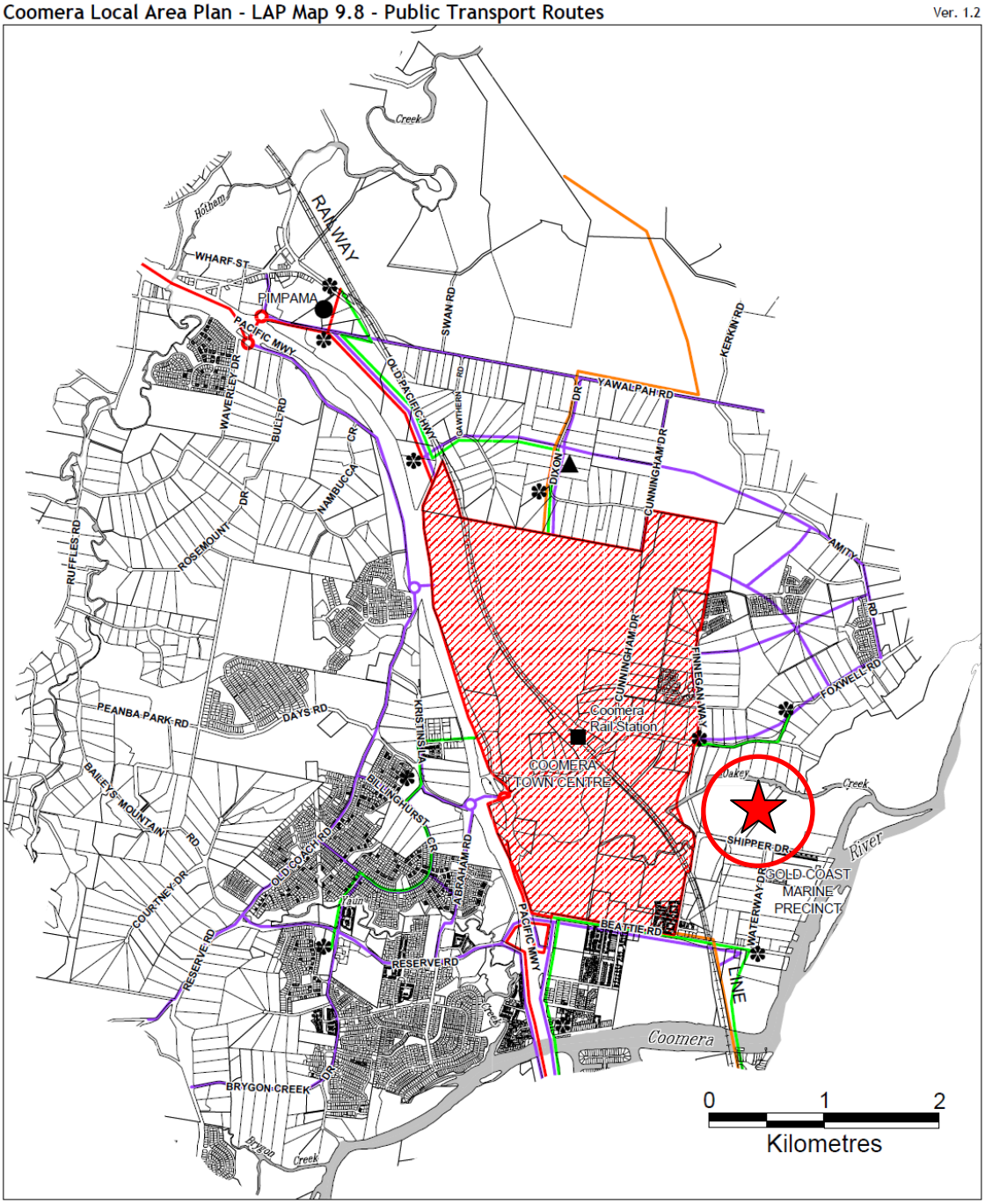


Figure 4.4: Route 725 Bus Service

Coomera Local Area Plan - LAP Map 9.8 - Public Transport Routes

Ver. 1.2



Legend

- INTERCITY SERVICE
- REGIONAL SERVICE
- EXPRESS SERVICE
- LOCAL SERVICE
- COOMERA TOWN CENTRE LOCAL AREA PLAN
- INTERCITY BUS STOP
- REGIONAL BUS STOP
- EXPRESS BUS STOP

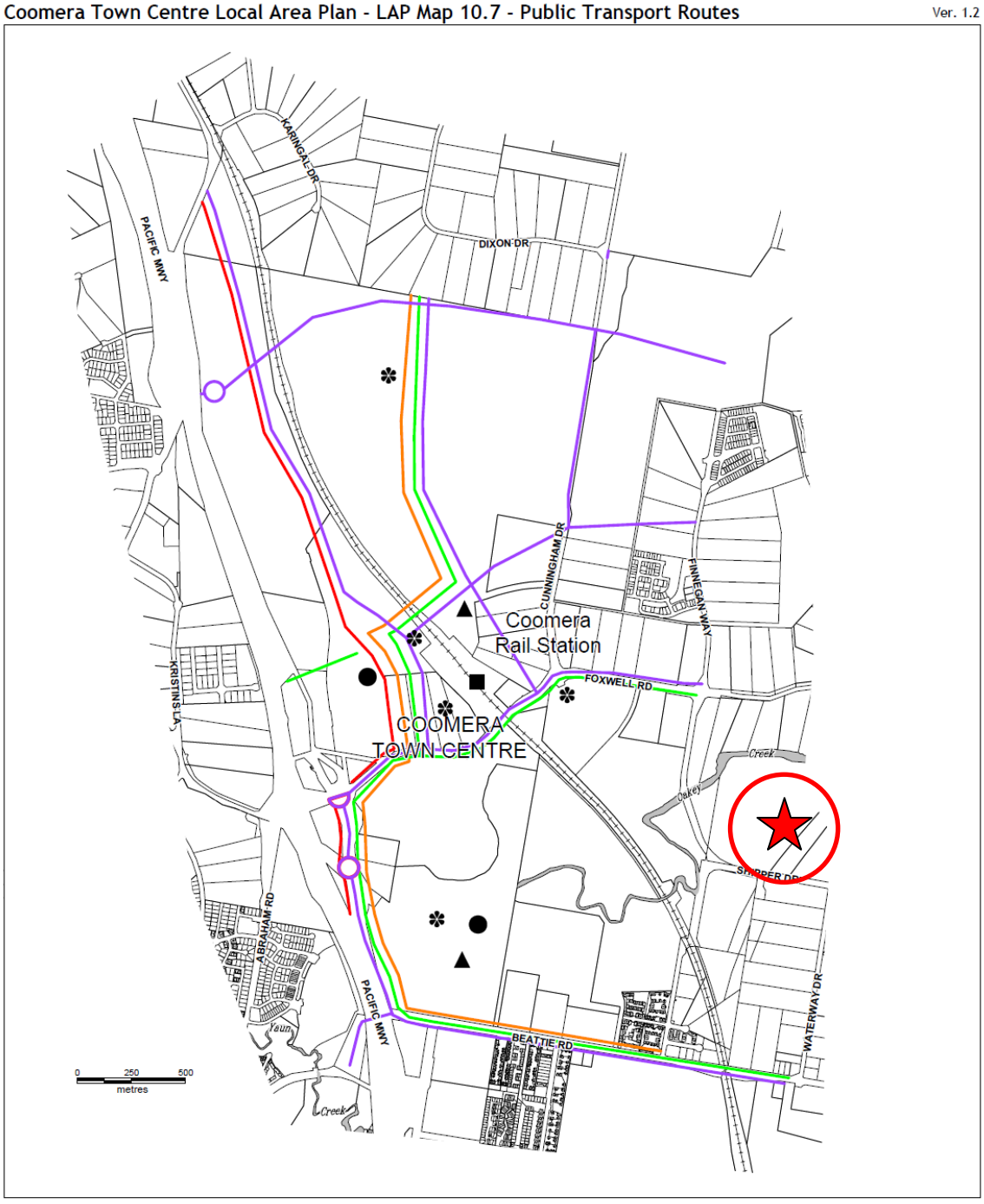
NOTE:
LOCAL BUS STOPS TO BE DETERMINED AT TIME OF RESIDENTIAL DEVELOPMENT.

N

Gold Coast City Council

Figure 4.5: Public Transport Routes

Coomera Town Centre Local Area Plan - LAP Map 10.7 - Public Transport Routes Ver. 1.2



Legend

- INTERCITY SERVICE
- REGIONAL SERVICE
- EXPRESS SERVICE
- LOCAL SERVICE
- INTERCITY BUS STOP
- REGIONAL BUS STOP
- EXPRESS BUS STOP

"INDICATIVE ONLY"
"UNDER INVESTIGATION"

NOTE:
LOCAL BUS STOPS TO BE DETERMINED AT TIME OF RESIDENTIAL DEVELOPMENT.

N

Gold Coast City Council

Figure 4.6: Public Transport Routes

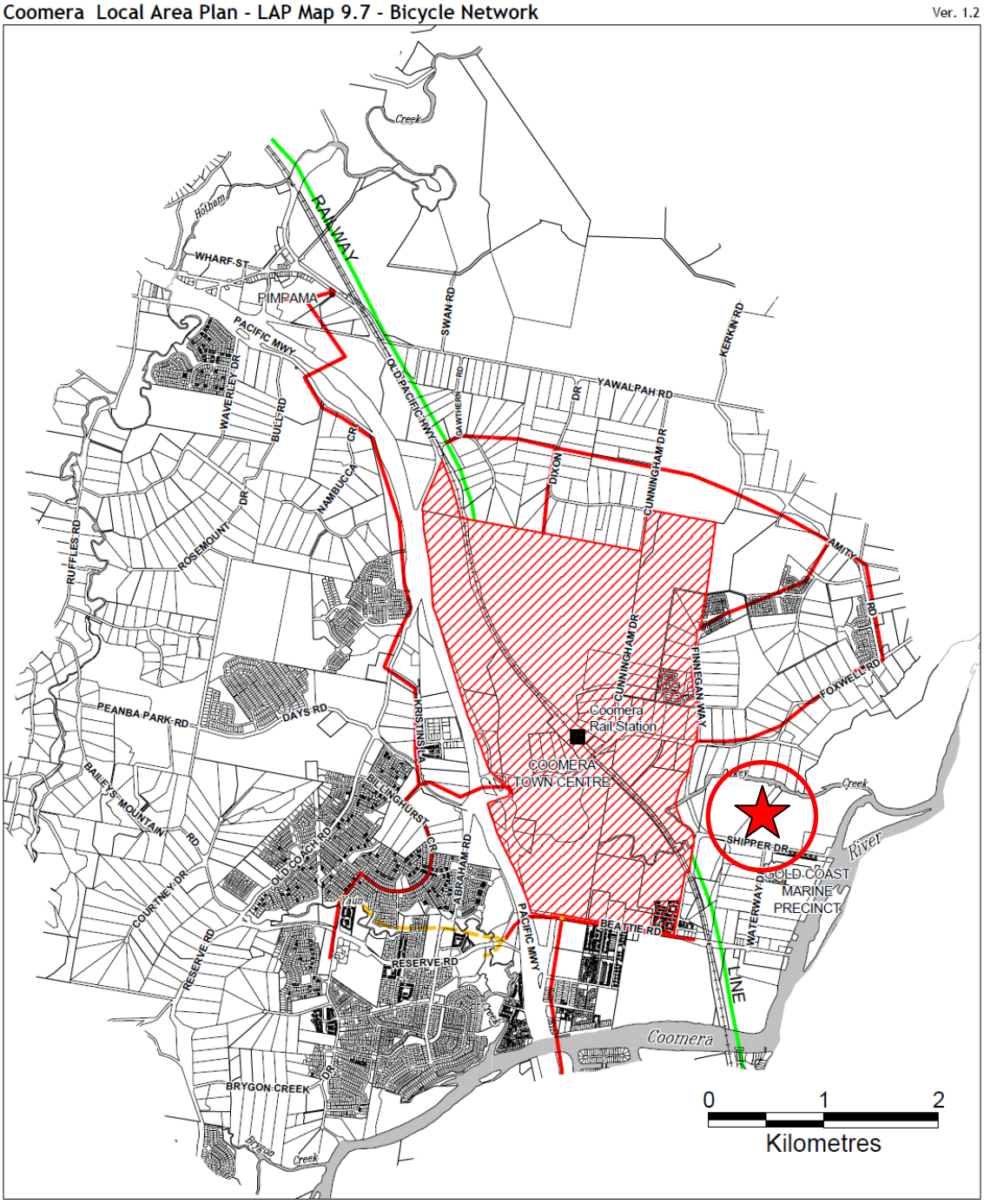
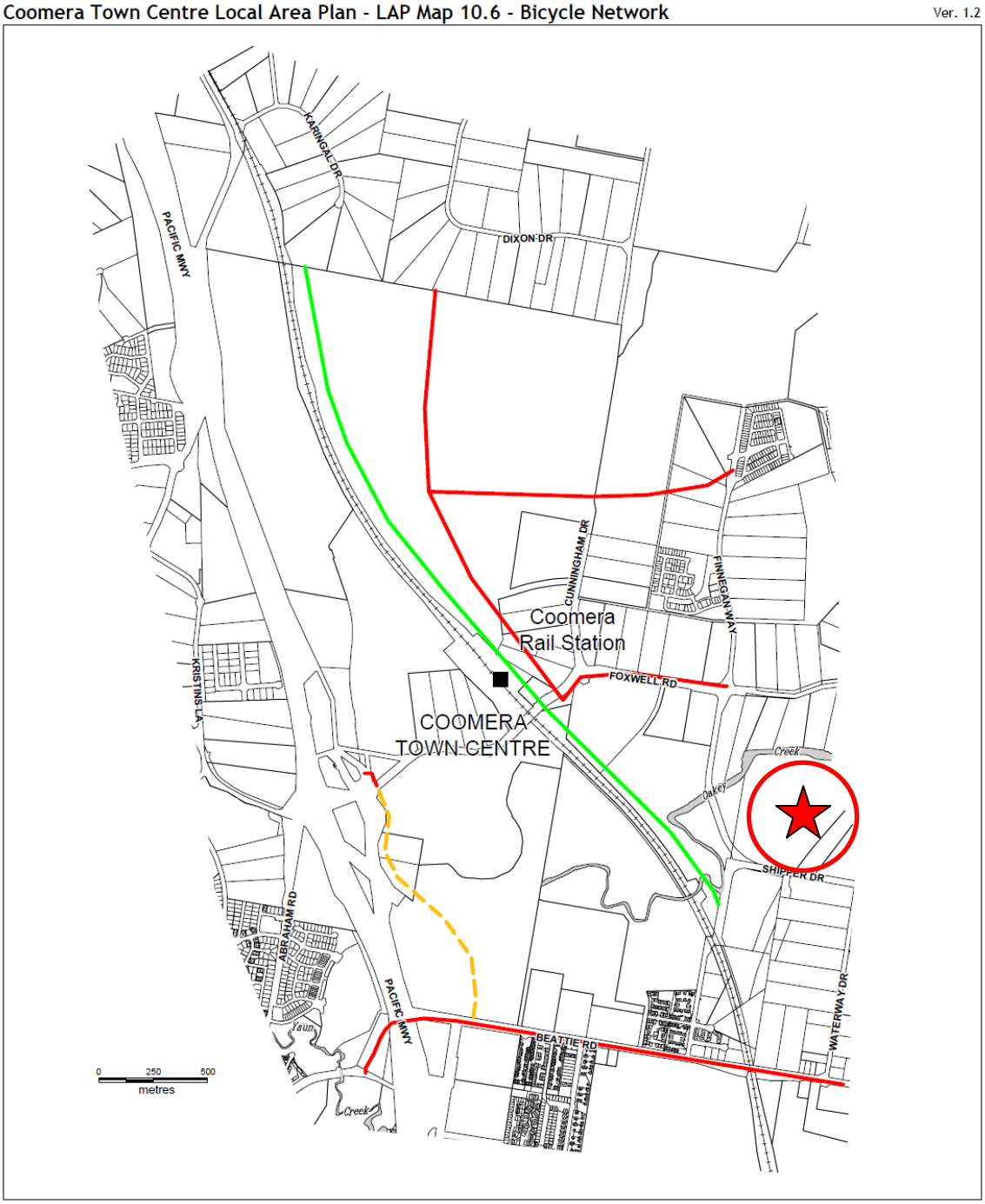


Figure 4.7: Bicycle Network

Coomera Town Centre Local Area Plan - LAP Map 10.6 - Bicycle Network

Ver. 1.2



Legend

- REGIONAL CYCLEWAY
- CITY CYCLEWAY (ON ROAD)
- CITY CYCLEWAY (OFF ROAD)

"INDICATIVE ONLY"
"UNDER INVESTIGATION"

N

Gold Coast City Council

Figure 4.8: Bicycle Network

5 Traffic Generation Estimates

5.1 Traffic Generation of Proposed Development

The existing marine precinct on Waterway Drive comprises a range of commercial, showroom, boat storage, warehouse and factory uses as well as marine berths. It is therefore considered prudent to examine the traffic generation relating to this existing marine precinct to estimate the potential traffic generation of comparable uses for the proposed development in Shipper Drive.

A survey of all traffic movements associated with the existing development shown in Figure 5.1 was conducted on Tuesday 23 March, Wednesday 24 March and Thursday 25 March 2010, between the hours of 7.00am and 6.00pm. The results are presented in full in Appendix A and are summarised in Table 5.1.

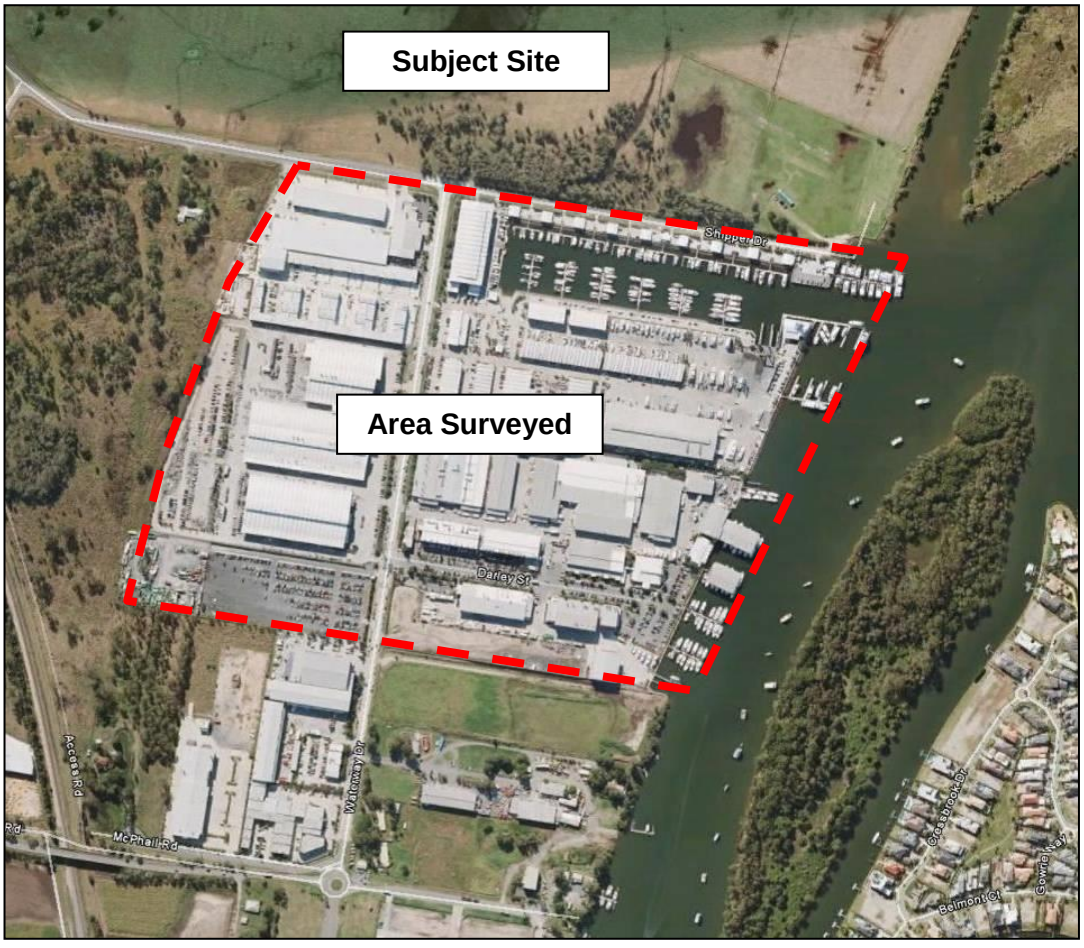


Figure 5.1: Existing Marine Development Surveyed

Table 5.1: Traffic Generation of Surveyed Marine Development

Day / Date	Daily Trips	AM Peak Hour		PM Peak Hour	
	TOTAL	IN	OUT	IN	OUT
Tuesday 23 March 2010	3,025	172	101	96	275
Wednesday 24 March 2010	3,242	179	98	48	340
Thursday 25 March 2010	2,965	192	97	40	350
Total Average	**3,077**	**181**	**99**	**61**	**322**

The total development area surveyed is approximately 426,506m^2 (42.65ha) including marina berth areas. Therefore the resultant traffic generation rates are:

Table 5.2: Traffic Generation Rates of Surveyed Marine Development

Traffic Generation Rate	Daily Trips	AM Peak Hour		PM Peak Hour	
	TOTAL	IN	OUT	IN	OUT
Trips per Hectare	72.1	4.2	2.3	1.4	7.5

The above rates will be applied to the proposed marina berths, showroom, factory, boat storage and warehouse uses.

The proposed Industry Subdivision will incorporate a mix of light industry and warehouse style uses. Based on standard DTMR trip generation rates for Industry development, it is therefore considered appropriate to apply a rate of 7 daily trips per 100m^2 GFA and 0.7 peak hour trips per 100m^2 GFA to this component, where GFA is approximately 45% of site area. The GFA therefore equates to 81,000m^2 (180000 × 0.45 = 81,000).

The proposed development also includes Retail, Hotel, Tavern and Educational Establishment uses. It is considered reasonable to assume that a large proportion of the retail, hotel and tavern patrons will be associated with other uses in the development. The hotel and tavern are primarily intended to serve persons visiting the marine precinct on business. They will therefore generate significantly less vehicle trips on the external road network when compared to stand-alone development. In this instance, the following rates are considered to be appropriate:

Table 5.3: Traffic Generation Rates

Land Use	Peak Hour	Daily
Retail	AM 1.5 trips / 100m^2 PM 3.0 trips / 100m^2	30 trips / 100m^2
Hotel	0.2 trips per room	2 trips / room
Tavern	AM - CLOSED PM 3.0 trips / 100m^2	30 trips / 100m^2

The Educational Establishment use is intended to allow for the inclusion small training facilities associated with the marine industry use. For example, a boat building factory or upholsterer may offer training courses for its employees and others. A total of 300 daily trips have been assumed for this component, which is considered to be conservative.

Application of the above rates to the proposed development yields the following traffic generation potential:

Table 5.4: Proposed Development Traffic Generation

Component	Daily Trips	AM Peak Hour		PM Peak Hour	
	TOTAL	IN	OUT	IN	OUT
Marina berths, Showroom, Factory, Boat Storage & Warehouse Uses (Approx. 24.3ha)	1,752	102	56	34	182
Industry Subdivision (81,000m^2)	5,670	454	113	113	454
Retail (5,800m^2)	1,740	70	17	87	87
Hotel (110 rooms)	220	18	4	13	9
Tavern (1,500m^2)	450	-	-	22	23
Allowance for Educational Establishment	300	60	15	30	45
TOTAL	**10,132**	**704**	**205**	**299**	**800**

Based on the proposed Staging Plans presented in Figures 2.3 - 2.6, the following is an estimate of traffic generation for each stage of development:

Table 5.5: Proposed Development Traffic Generation for each Stage

Component	Daily Trips	AM Peak Hour		PM Peak Hour	
	TOTAL	IN	OUT	IN	OUT
Stage 1	526	102	17	10	55
Stage 2	300	60	15	30	45
Stage 3	3,636	88	60	146	246
Stage 4	5,670	454	113	113	454
TOTAL	**10,132**	**704**	**205**	**299**	**800**

5.1.1 Traffic Generation of Dredge Spoil Component

The proposed design options includes a Dredge Spoil component. The intention of this area is to store dredge spoil associated with maintaining the proposed marina. Any traffic generation of the dredge spoil area will be infrequent and of relatively low volume. The resultant impact upon the surrounding road network will not be significant.

It is noted that a regional dredge spoil is not proposed on the current master plan.

5.2 Traffic Distribution (EMME Transport Modelling)

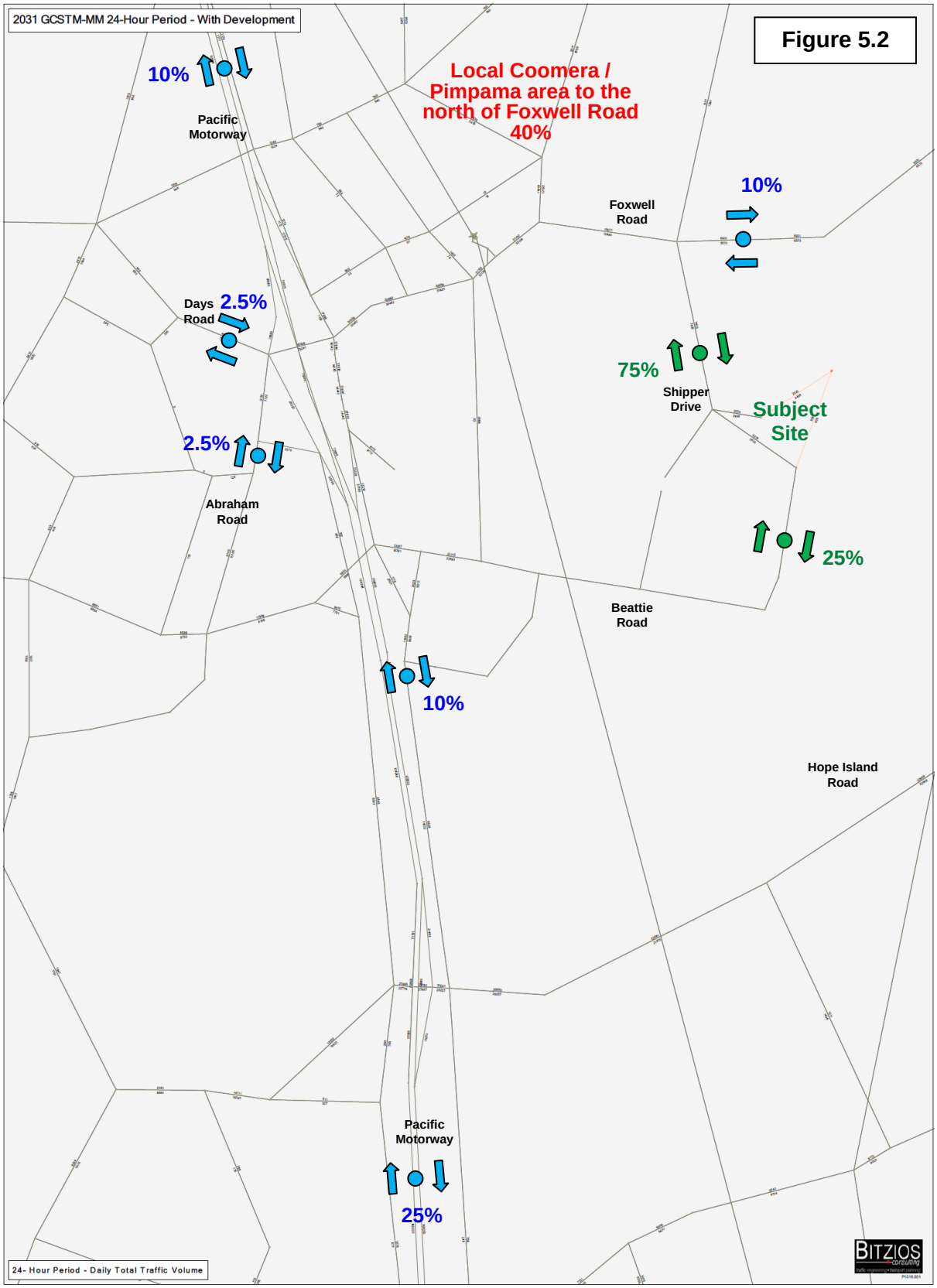
Bitzios Consulting was engaged by CRG to apply the Gold Coast EMME 2 transport model to assign the proposed development traffic to the surrounding road network.

The methodology adopted by Bitzios Consulting was as follows:

1. Review the model zoning in the area of the development;
2. Split the zones in the 2011 and 2031 base models to add a new zone specifically for the development;
3. Extract Daily, AM & PM peak (2 hour) link volumes for 2011 and 2031 in the area of influence of the development; (base case)
4. Modify the demographics in the 2011 and 2031 models to reflect the traffic generation for the development;
5. Run the 2011 and the 2031 “with development” models and extract the Daily, AM Peak 2 hour and PM peak 2 hour volumes for the area of influence.

The resultant distribution of traffic through the road network is approximated in Figure 5.2 overleaf.

Resultant estimates of development turning movement volumes on the surrounding road network are shown in Figures 5.3 - 5.5.


2031 GCSTM-MM 24-Hour Period - With Development
Figure 5.2
10%
Pacific Motorway
Local Coomera / Pimpama area to the north of Foxwell Road 40%
Foxwell Road
10%
Days Road
2.5%
75%
Shipper Drive
Subject Site
2.5%
Abraham Road
25%
Beattie Road
10%
Hope Island Road
Pacific Motorway
25%
24- Hour Period - Daily Total Traffic Volume
BITZIOS consulting

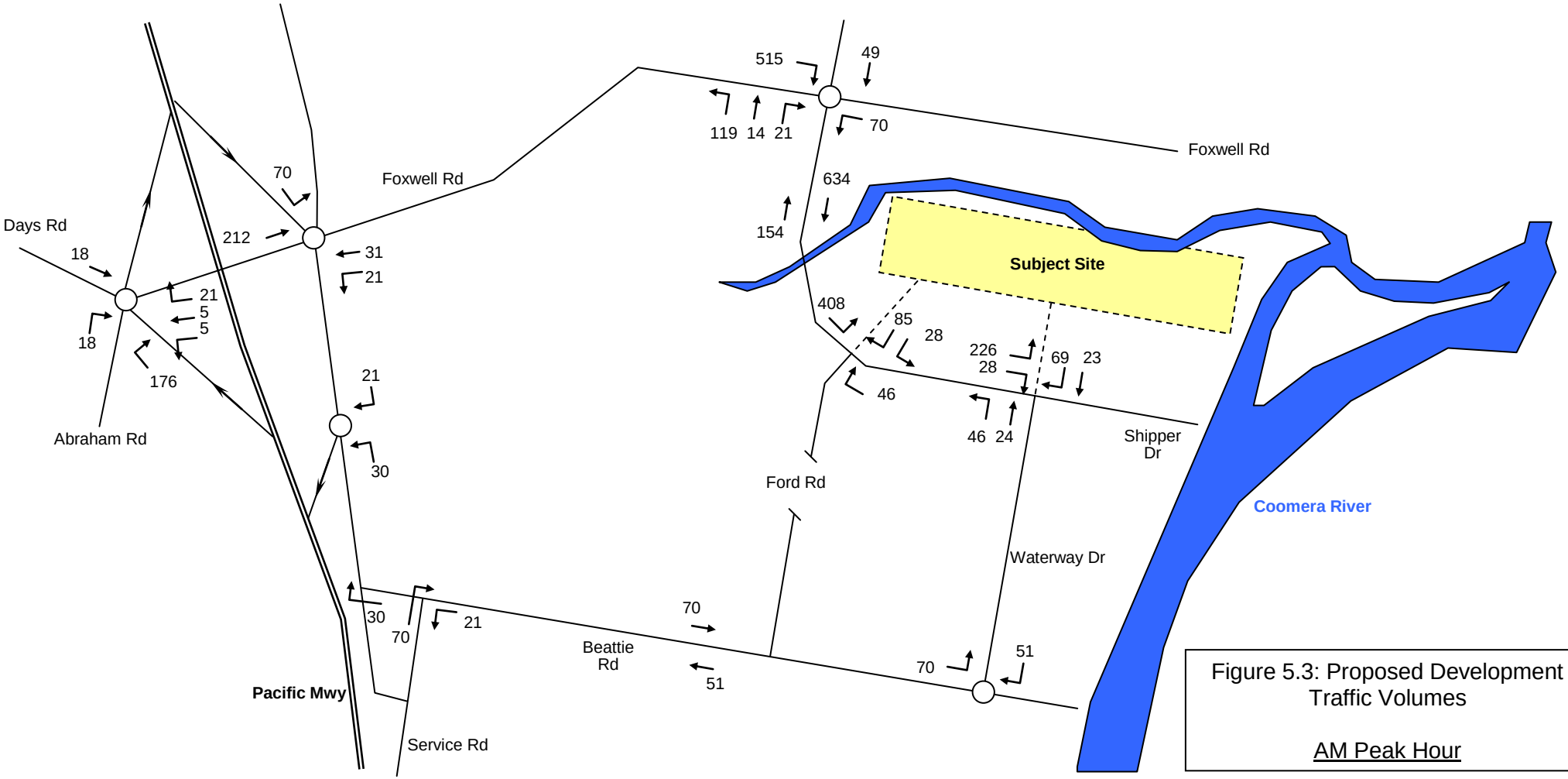


Figure 5.3: Proposed Development Traffic Volumes

AM Peak Hour

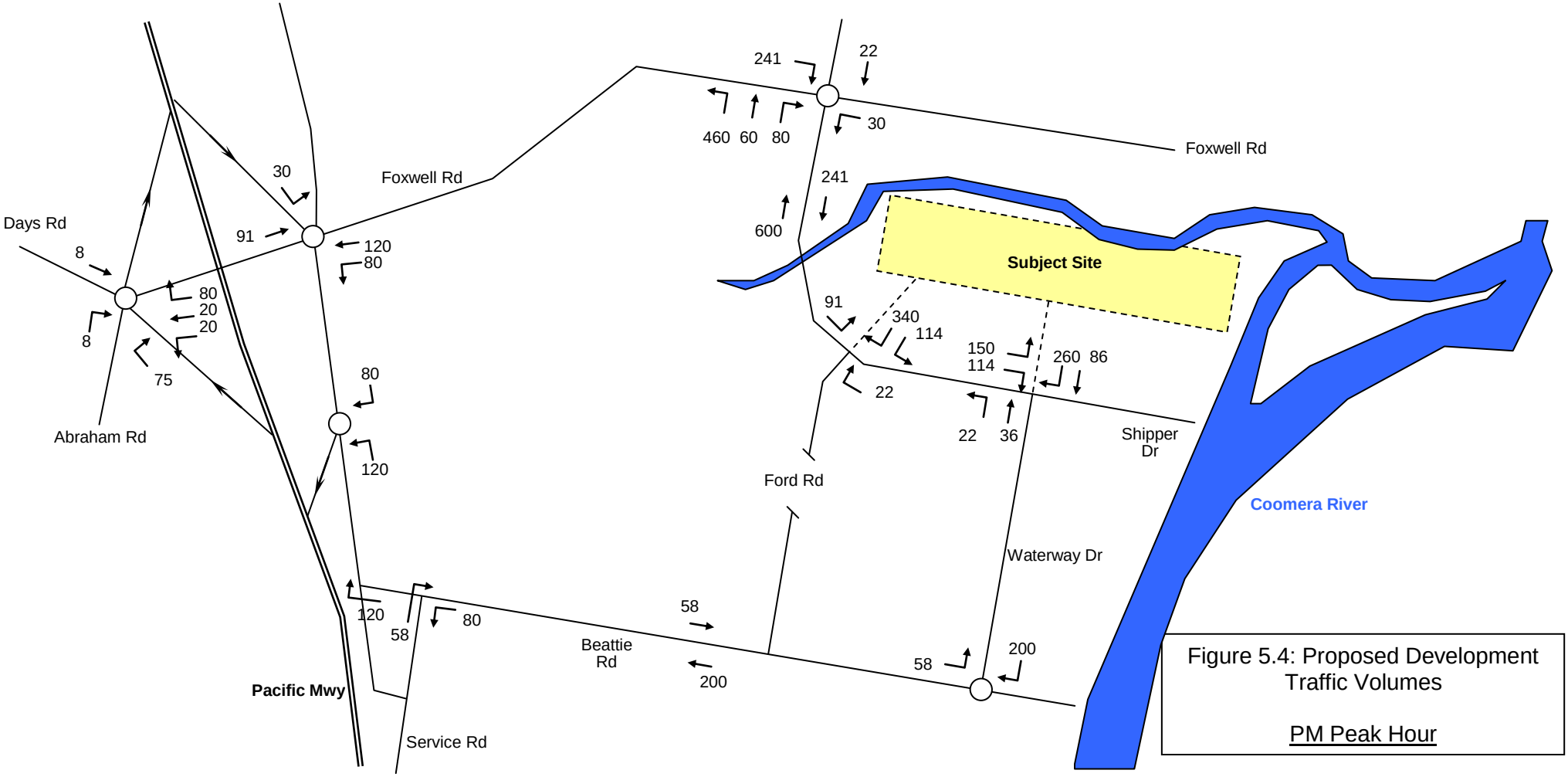


Figure 5.4: Proposed Development Traffic Volumes

PM Peak Hour

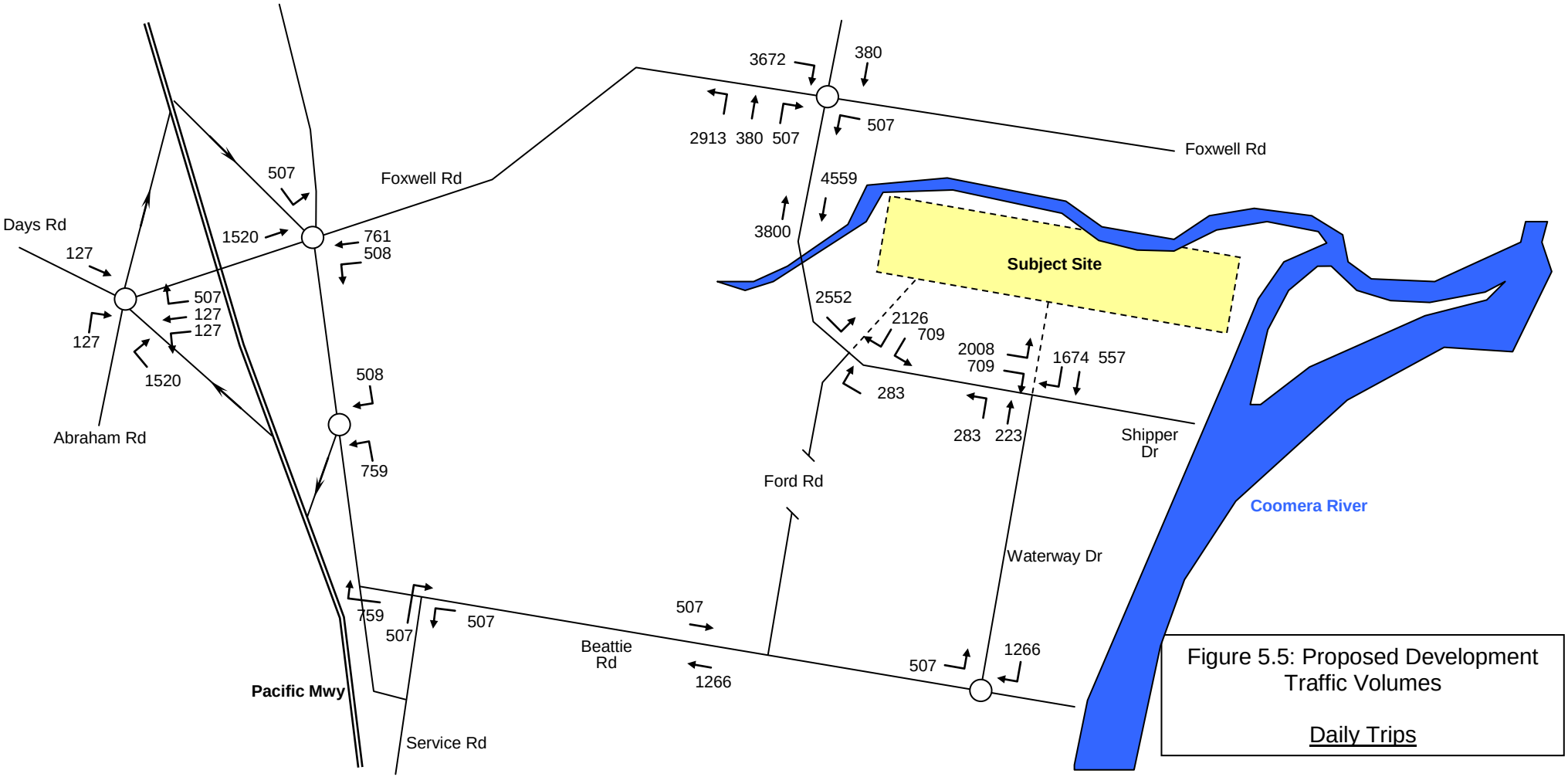


Figure 5.5: Proposed Development Traffic Volumes

Daily Trips

6 Road Network Impact Assessment

As required by the DTMR and Council, CRG has considered the potential impact of the proposed development upon the local and State controlled road network. Such has been carried out in accordance with the standard procedure of adding the predicted development traffic volumes to existing and future base volumes.

However, the Applicant should only be responsible for that portion of impact which is in excess of that which would be generated by an "as of right" use of the site. This is discussed further in Section 6.3.

6.1 Local Road Network

Scope of Assessment

For the purposes of this assessment, a capacity analysis has been undertaken at the following intersections:

- Shipper Drive / Ford Road / Proposed Access
- Shipper Drive / Waterway Drive / Proposed Access
- Foxwell Road / Shipper Drive
- Waterway Drive / Beattie Road

The proposed access intersections in Shipper Drive have each been modelled as a single lane roundabout with a 20m centre island diameter, similar to the existing roundabout at the Waterway Drive / Beattie Road intersection. The design of the proposed roundabouts is detailed in Section 8 of this report.

Capacity Analysis

The above intersections have been modeled using SIDRA for the morning and afternoon peak periods in 2021 with the proposed development traffic.

The results are presented in full in Appendix B and are summarised in Table 6.1.

Table 6.1: Summary of SIDRA Analysis

Scenario	Level of Service	Degree of Saturation	Average Delay (sec)	95th Percentile Queue (m)
Foxwell Rd / Shipper Drive				
AM 2021 – Without Development	A	0.364	6.7	18.2
AM 2021 – With Development	B	0.550	10.6	34.8
PM 2021 – Without Development	A	0.361	7.1	15.2
PM 2021 – With Development	B	0.855	10.2	89.5
Waterway Drive / Beattie Road				
AM 2021 – Without Development	A	0.211	8.5	10.7
AM 2021 – With Development	A	0.247	8.5	10.9
PM 2021 – Without Development	A	0.351	9.5	18.7
PM 2021 – With Development	A	0.457	9.8	23.9
Shipper Drive / Waterway Dr / Proposed Access				
AM 2021 – With Development	A	0.498	8.4	28.5
PM 2021 – With Development	A	0.451	9.7	22.8
Shipper Drive / Ford Rd / Proposed Access				
AM 2021 – With Development	A	0.414	6.3	20.9
PM 2021 – With Development	A	0.417	7.5	20.8

As shown in Table 6.1, each of the intersections will operate satisfactorily for the foreseeable future with the proposed development traffic, with minimal delays and vehicle queuing on all approaches and movements.

It is therefore concluded that the proposed development will not have any adverse impact upon the performance of the local road network.

6.2 State Controlled Road Network

The proposed development will generate a significant number of jobs and therefore will serve to contain trips in the local area. Whilst the proposed development will generate some new vehicle trips on the State controlled road network it will also significantly reduce the need for local residents to use the Pacific Motorway and other State controlled roads for work related travel.

In this respect, it is considered that the proposed development will provide a positive outcome for the local transport system in that it will:

- Contain a significant volume of work trips in the local area;
- Provide a local service to other development in the area, including educational facilities.

Scope of Assessment

In accordance with Main Roads policy, the extent of proposed development traffic impacts must be assessed where the development proposal is likely to result in an increase of at least 5% of existing daily volumes on any State controlled road section or 5% of existing daily volumes on any individual turning movement at a State controlled intersection.

Proportional Impact of the Proposed Development

Based on the trip generation rates discussed in Section 5.1, it is estimated that the proposed development will generate in the order of 10,132 vehicles per day.

A summary of the daily development traffic volumes using the State controlled road network (expressed also as a percentage of existing daily volumes) for each individual turning movement is shown in Figure 6.1.

As shown, the percentage impact is greater than 5% on some turning movements at the Foxwell Road interchange as well as the Beattie Road / Service Road intersection. A detailed capacity analysis is therefore required at these intersections and is presented in the following section of this report.

It is noted, however, that these estimates do not discount traffic that would be generated by a Self Assessable development plan over the site. The net impact of the proposed development, considering such uses is discussed in Section

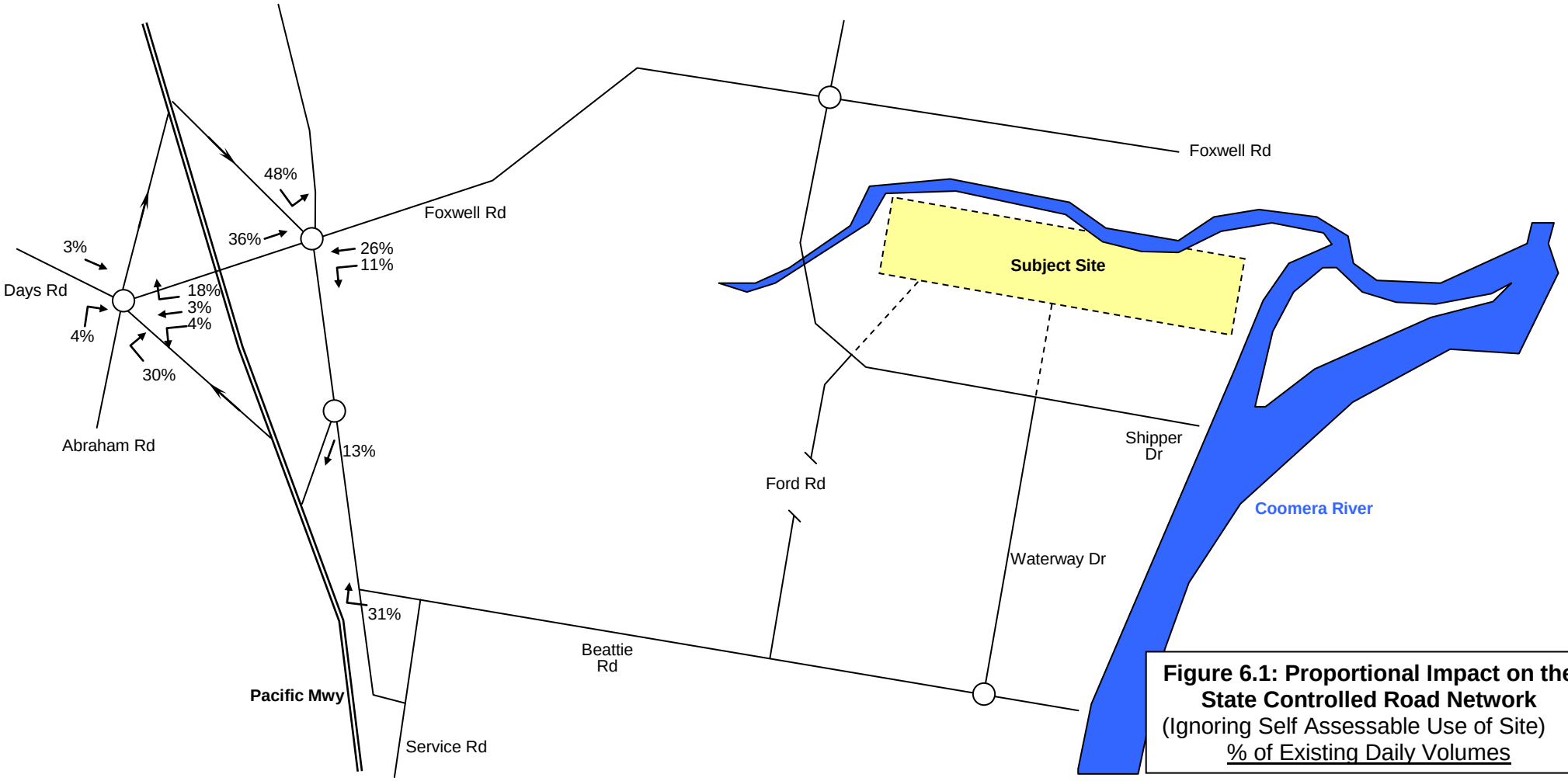


Figure 6.1: Proportional Impact on the State Controlled Road Network
(Ignoring Self Assessable Use of Site)
% of Existing Daily Volumes

Capacity Analysis

The above intersections have been modeled using SIDRA for the morning and afternoon peak periods in 2021 with the proposed development traffic.

The results are presented in full in Appendix B and are summarised in Table 6.2.

Table 6.2: Summary of SIDRA Analysis

Scenario	Level of Service	Degree of Saturation	Average Delay (sec)	95th Percentile Queue (m)
Pacific Motorway / Foxwell Rd Roundabout				
AM 2021 – Without Development	B	0.907	17.8	121.8
AM 2021 – With Development	D	1.218	43.1	535.0
PM 2021 – Without Development	E	1.308	59.8	753.0
PM 2021 – With Development	F	1.558	141.2	1830.9
Pacific Motorway / Days Rd Roundabout				
AM 2021 – Without Development	F	1.377	121.4	1100.4
AM 2021 – With Development	F	1.619	201.0	1694.9
PM 2021 – Without Development	F	1.255	77.0	688.5
PM 2021 – With Development	F	1.615	156.9	1281.4
Service Rd / Beattie Rd Intersection				
AM 2021 – Without Development	N/A	0.607	5.4	33.0
AM 2021 – With Development	N/A	0.666	5.9	40.8
PM 2021 – Without Development	N/A	0.737	7.0	53.5
PM 2021 – With Development	N/A	0.972	16.6	177.5

6.3 Required Road Network Upgrades

Any contribution rate applied should consider the net impact of the proposed development in the context of what could be developed on the site under a Code or Self Assessable application.

In general, the following comments are provided:

It is acknowledged that the State controlled road network at Coomera is to be upgraded to accommodate development envisaged in the Coomera locality. Furthermore, that the Foxwell Road interchange is operating below levels of service and with future planned growth will worsen without works. However, consideration needs to be given to the fact that the Planning Scheme already allows for a development of the site and that such needs to be accounted for when assessing the impact of the proposed uses.

A review of the Coomera LAP identifies that the following uses, which are also proposed within the GCIMP, are Code or Self Assessable and could occur without Departmental referral or approval:

- **Shop** where only for marine goods and services which are used in any water based activity;
- **Manufacturer's Shop;**
- **Warehouse** where directly associated with waterfront industry.

In addition to this, Waterfront Industry is Code Assessable and a waterfront industry development could occur without referral to the DTMR.

A comparison of the proposed uses against the LAP is presented in Table 6.3 on the following page.

Significantly, the LAP is within the Planning Scheme which was reviewed by the DTMR as part of its adoption. Development which is compatible with the scheme is thus accommodated by the Department's strategic planning and program of works. The GCIMP is, as a consequence, accommodated in the Department's strategic planning for the Coomera locality.

The additional land uses sought in the GCIMP, apart from those allowable under the Scheme, do not have a significantly higher traffic generation than those uses already contained in the LAP. It is considered that a development scheme, comprising of uses already allowable under the LAP, could be formulated which has an equivalent or higher trip generation than the uses proposed.

As such the GCIMP does not warrant or require upgrades to the State controlled road network.

Table 6.1: Comparison of Proposed Uses against the Coomera LAP

Exempt	Self Assessable	Code Assessable	Impact Assessable
Precinct 3 - Marine Industry			
Agriculture **Conservation** (natural area management) **Low-Impact Telecommunications Facility** **Minor Change** in the scale or intensity of an existing lawful use **Open Sports Ground** **Park** **Public Utility**	**Caretaker's Residence** **Estate Sales Office** **Shop** where only for marine goods and services which are used in any water based activity **Manufacturer's Shop** **Temporary Use** **Warehouse** where directly associated with a waterfront industry **Additional Uses** **Car Park** **Industry** **Kiosk** **Office** **Outdoor Storage Facility** **Shop** **Showroom** **Storage** **Substantial Structure** **Take Away Food Premises** **Transport Terminal** **Waterfront Industry -**	**Cafe** where located above ground floor level **Car Park** **Convenience Shop** **Laundromat** **Restaurant** where located above ground floor level **Service Station** where including the sale of fuel directly to water marine craft **Shop** (where the GFA is less than 100m^2) **Take-Away Food Premises** (where the GFA is less than 100m^2) **Telecommunications Facility n.e.i.** **Tourist Shop** (where located above ground floor level) **Transport Terminal** where including water based transport **Waterfront Industry** (excluding Fish and Seafood Processing and Storage) **Additional Uses** **Brothel** **Childcare Centre** **Commercial Services –** **Educational Establishment** **Helipad** **Marina** **Market** **Motel** **Motor Vehicle Repairs** **Office** **Outdoor Storage Facility** **Reception Room** **Resort Hotel** **Restaurant** **Service Industry** **Shopping Centre Development** **Showroom** **Storage** **Substantial Structure** **Tavern** **Vehicle Hire Office** **Vehicle Hire Premises** **Vehicle Sales Premises** **Warehouse**	**Aquaculture** **Cafe n.e.i.** **Commercial Services** **Fuel Depot** **Hostel Accommodation** (above ground floor level) **Marina** **Place of Worship** **Restaurant n.e.i.** **Tavern** **Tourist Facility** **Tourist Shop n.e.i.** **Transit Centre** **Waterfront Industry** where including Fish and Seafood Processing and Storage **Additional Uses** **Indoor Recreation Facility** **Industry** **Medical Centre** **Office** **Shop** **Showroom** **Take Away Food Premises** **Vehicle Hire Office** **Vehicle Hire Premises** **Vehicle Sales Premises**

7 Public Transport

The Coomera Rail Station is located on Foxwell Road, at the heart of the Coomera Town Centre. It is a key element of the Town Centre and local planning in the area encourages maximum use of rail services. The rail line through Coomera connects Coomera to Brisbane via a 53 minute service with trains departing at approximately 30 minute intervals during standard business hours. Southbound services to Robina / Varsity Lakes also depart every 30 minutes.

Various bus services also operate through the Coomera area. As shown in Figure 4.4, the Route 725 service operates along Shipper Drive directly past the subject site. The Route 725 service provides connectivity to the Coomera Town Centre and Coomera Rail Station as well as the Helensvale Town Centre and Rail Station. Services operate every 30-60 minutes through the Marine Precinct and are coordinated with rail services at Coomera and Helensvale.

It is recommended that bus stops (indented bus bays / shelters) be located on Shipper Drive in the vicinity of both access intersections to accommodate additional passenger demands in this area. Suggested bus stop locations are shown in Figure 7.1.

Pedestrian refuges should also be installed in Shipper Drive to facilitate safe pedestrian movement between bus stops and the proposed development.

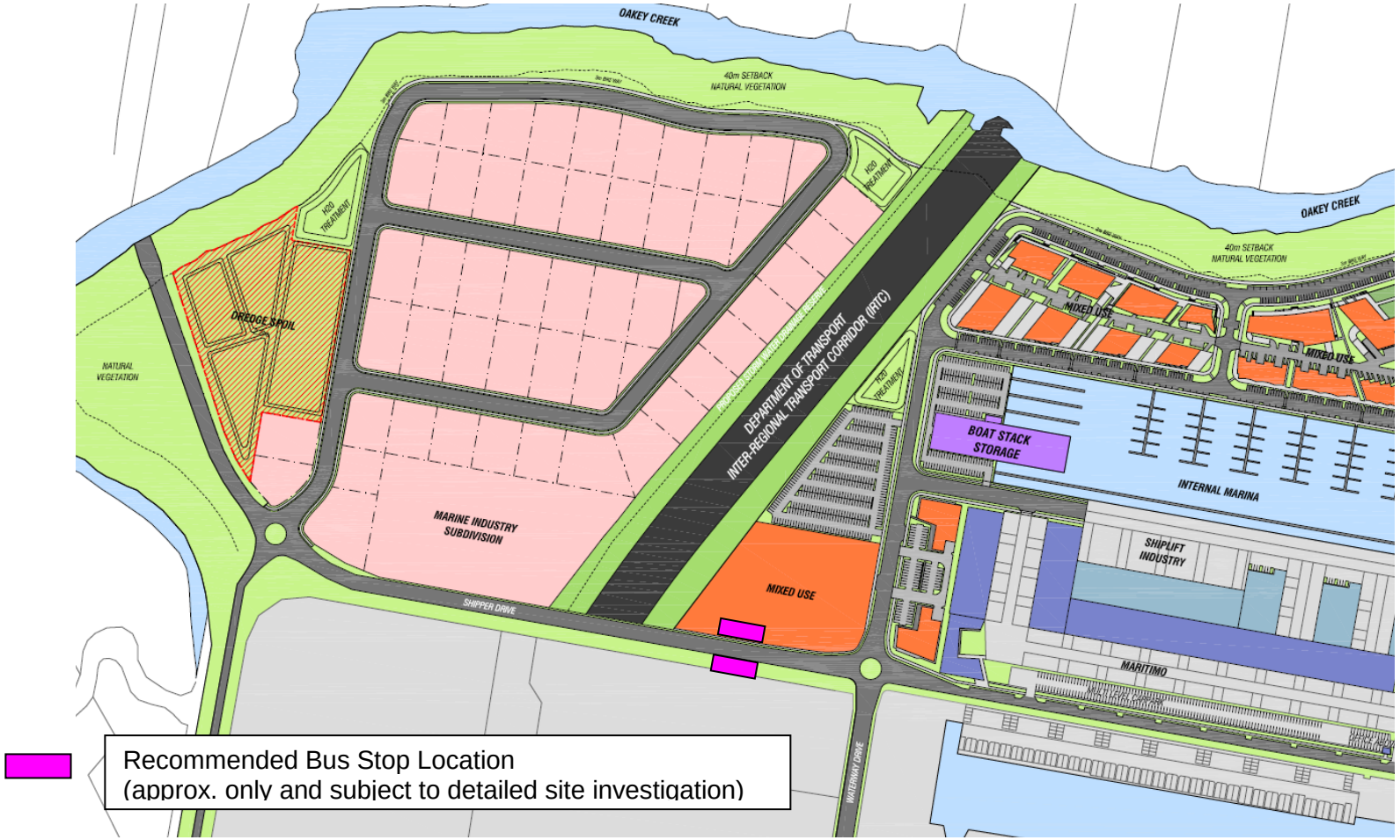


Figure 7.1: Recommended Bus Stop Locations

8 On-Site Transport Provisions

8.1 Access

Vehicular access to the development is proposed for each precinct in the form of a single lane roundabout in Shipper Drive. The eastern access has been aligned with the existing Shipper Drive / Waterway Drive intersection, while the western access has been aligned with the Shipper Drive / Ford Road intersection. An indicative design of the roundabouts is shown in Figures 8.1 and 8.2.

The access intersection (roundabout) serving the eastern precinct should be provided upon completed of Stage 1 of the development. The roundabout serving the western precinct should be provided prior to the completion of the first stage within that precinct.

As demonstrated in Section 6.1 of this report, the proposed roundabouts will satisfactorily accommodate the proposed development traffic for the foreseeable future and will operate with minimal vehicle delays and queuing.

The proposed internal road network will be constructed in accordance with Council's standard design requirements.

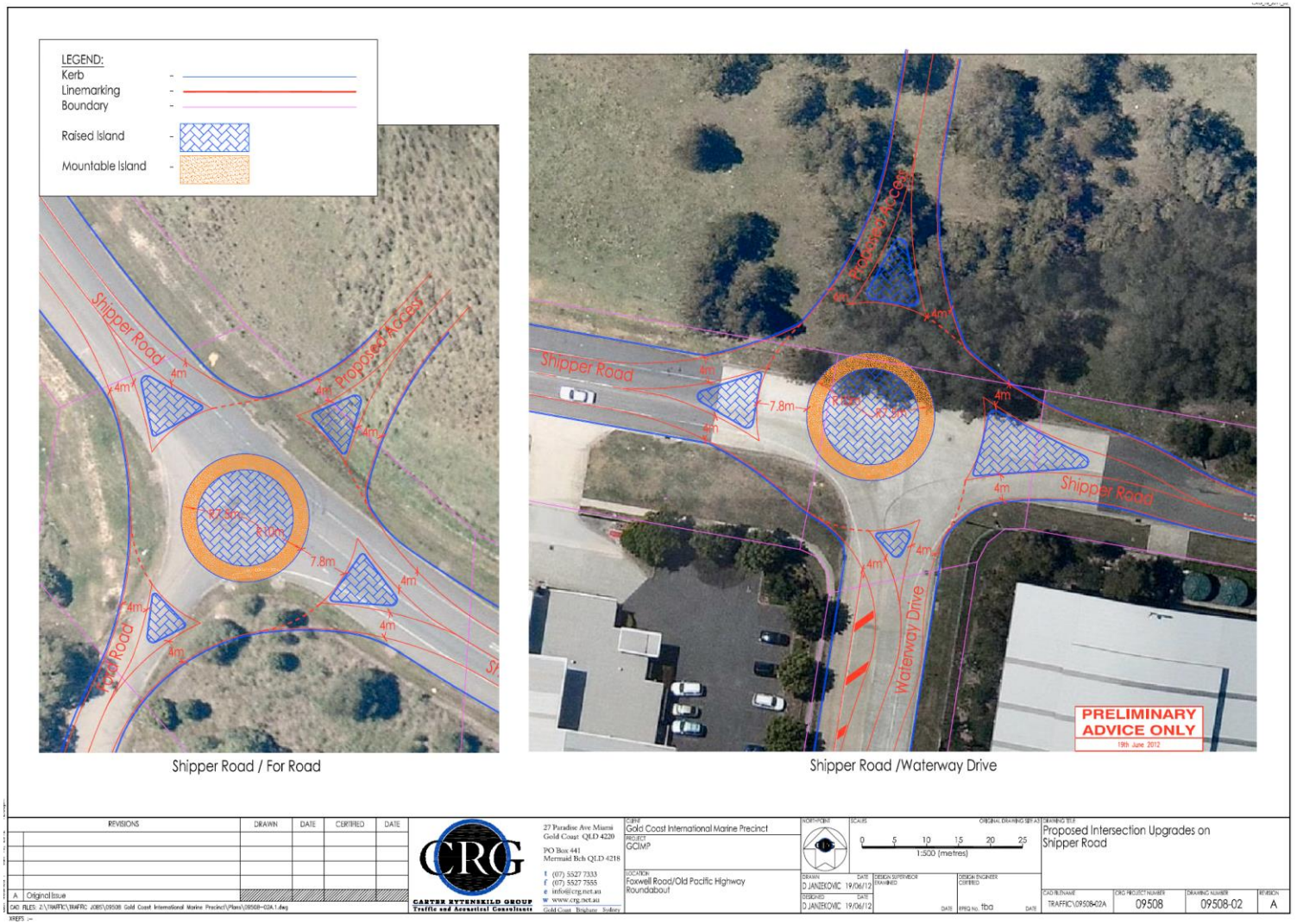
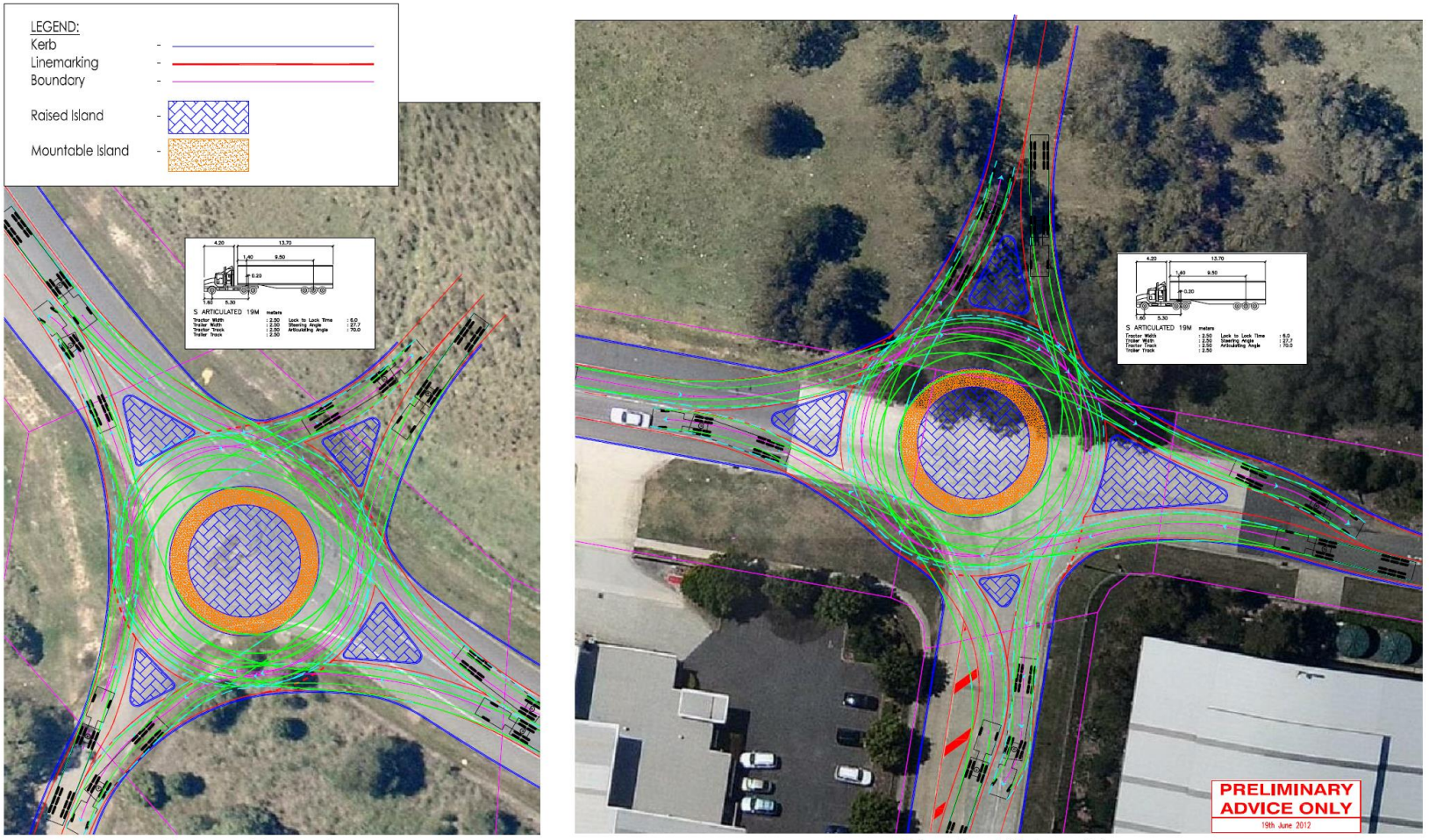


Figure 8.1: Indicative Roundabout Access Design in Shipper Drive



Shipper Road / For Road

Shipper Road /Waterway Drive

Figure 8.2: Indicative Roundabout Access Design in Shipper Drive

8.2 Car Parking

The applicable car parking rates for the proposed development are provided in the Gold Coast City Council 'Car Parking, Access and Transport Integration' Code, and are shown in Table 8.1 on the following page.

In this instance, it is suggested that the car parking requirement for the Retail component be reduced to 67% of the Planning Scheme rate on the basis that the retail shops proposed will benefit from a high proportion of walk-up trips from staff and visitors of other uses (e.g. marina berths, hotel staff & guests, office staff etc.).

It is also suggested that the car parking requirement for the Tavern component be reduced to 80% of the Planning Scheme rate given that it will draw a proportion of its patronage (including lunch & evening trade) from surrounding businesses and guests of the adjoining Hotel, many of whom will walk.

A comparison of Council car parking requirements and recommended car parking requirements is shown in Table 8.1 overleaf.

Table 8.1: Car Parking Rates

Land Use	Planning Scheme Requirement	Recommended Requirement
Office	3 spaces per 100sqm	As per Planning Scheme
Showroom	2 spaces per 100sqm	As per Planning Scheme
Shop (Retail)	6.7 spaces per 100sqm	67% of Planning Scheme Rate
Hotel	▪ 1 space per room (first 75 rooms) ▪ 0.1 spaces per room thereafter ▪ Parking for associated commercial facilities at 75% of standard rate	As per Planning Scheme
Tavern	10 spaces per 100sqm	80% of Planning Scheme Rate
Marina		
Dry Berth	0.2 spaces per berth	As per Planning Scheme
Wet berth (≤10m)	0.6 spaces per berth	As per Planning Scheme
Wet berth (10-15m)	0.8 spaces per berth	As per Planning Scheme
Wet berth (>15m)	1 space per berth	As per Planning Scheme
Waterfront Industry	2 spaces per 100sqm	As per Planning Scheme

Application of the recommended car parking rates to the proposed development yields a total car parking requirement of 2537 car parking spaces for the Eastern Precinct.

A total of 2720 spaces are proposed (including on-street car parking) which exceeds this minimum requirement. The inclusion of on-street car parking is considered to be acceptable in this instance given that the proposed development will act as an isolated 'closed' catchment. Car parking demands will only be generated by those uses on the site and there will be no external uses generating demands for on-street car parking within the eastern precinct.

It is therefore considered that the proposed car parking supply is satisfactory and will not result in any adverse car parking conditions.

Table 8.2: Car Parking Requirements

Land Use	Planning Scheme Requirement	Proposed Car Parking Supply
Precinct 1		
Office (8110m^2) Showroom (5382m^2)	8110 × (3/100) = 243 spaces 5382 × (2/100) = 108 spaces **TOTAL = 351 spaces**	Basement = 110 spaces On-site = 63 spaces On-street = 232 spaces **TOTAL = 405 spaces**
Precinct 2		
Office (2212m^2) Shop (5796m^2) Hotel (110 rooms) Tavern (1500m^2)	2212 × (3/100) = 67 spaces 5796 × (6.7/100) × 0.67 = 260 spaces 75 + (35 × 0.1) = 79 spaces 1500 × (10/100) × 0.8 = 120 spaces **TOTAL = 526 spaces**	Basement = 502 spaces On-site = 82 spaces On-street = 19 spaces **TOTAL = 603 spaces**
Precinct 3		
Office (11035m^2) Showroom (5245m^2)	11035 × (3/100) = 331 spaces 5245 × (2/100) = 105 spaces **TOTAL = 436 spaces**	Basement = 181 spaces On-site = 45 spaces On-street = 139 spaces **TOTAL = 365 spaces**
Boat Stack Storage		
Dry berths (528)	528 × 0.2 = 106 spaces **TOTAL = 106 spaces**	On-site = 173 spaces **TOTAL = 173 spaces**
External Marina		
Wet berths 10-15m (198) Wet berths >15m (36)	198 × 0.8 = 158 spaces 36 × 1 = 36 spaces	On-site = 190 spaces **TOTAL = 190 spaces**
Internal Marina		
Wet berths <10m (110)	110 × 0.6 = 66 spaces **TOTAL = 260 spaces**	
Shiplift Industry		
Warehouse (10472m^2)	10472 × (2/100) = 209 spaces **TOTAL = 209 spaces**	On-site = 15 spaces On-street = 194 spaces **TOTAL = 209 spaces**
Maritimo		
Office (3215m^2) Industry (16651m^2)	3215 × (3/100) = 96 spaces 16651 × (2/100) = 333 spaces **TOTAL = 429 spaces**	On-site = 31 spaces Multi Level parking = 537 spaces **TOTAL = 568 spaces**
Industry Showroom		
Showroom (3000m^2)	3000 × (2/100) = 60 spaces **TOTAL = 60 spaces**	On-site = 60 spaces **TOTAL = 60 spaces**
Education		
Office (4227m^2) Industry (1647m^2)	4227 × (3/100) = 127 spaces 1647 × (2/100) = 33 spaces **TOTAL = 160 spaces**	On-site = 147 spaces **TOTAL = 147 spaces**
TOTAL	**2537 spaces**	**2720 spaces**

8.3 Provision for Service Vehicles

It is recommended that each use within the proposed marine precinct provide loading facilities capable of accommodating the design vehicle specified in Council's Table to Acceptable Solution AS14.1 of the Car Parking, Access and Transport Integration Code.

As a guide, it is recommended that the following service vehicle provisions be implemented:

Table 8.3: Recommended Service Vehicle Provision

Use	Design Vehicle	No. of Loading Bays
Office	SRV	0.5 per 1000m^2
Showroom	HRV	1 per 1000m^2
Shop GFA <400m^2 GFA 400-1500m^2 GFA >1500m^2	 SRV HRV AV	 1 per 1000m^2
Resort Hotel	HRV	1 total
Tavern	HRV	1 total
Marina	AV	1 total
Industry	AV	1 per tenancy / lot
Waterfront Industry	HRV	1 per tenancy
Educational Establishment	SRV	1 total

8.4 Pedestrian Access

Pedestrian footpaths are proposed along all roads within the proposed development to encourage pedestrian movement between various uses and buildings.

A cycleway and walking track also follows the perimeter road and links to the western 'Marine Industry' precinct via a pedestrian / cycle bridge over the future IRTC corridor. This cycleway and walking track also connects to the future proposed pedestrian and cycle bridge linking the future residential development on the northern bank of Oakey Creek.

As discussed in Section 7, it is recommended that pedestrian refuges be installed in Shipper Drive adjacent to the proposed bus stops to facilitate safe pedestrian movement between bus stops and the proposed development.

8.5 Provision for Cyclists

It is recommended that Bicycle parking be supplied in accordance with the requirements set out in Table 10-1 of the Austroads publication 'Guide to Traffic Engineering Practice - Part 14: Bicycles'. Relevant bicycle parking rates are shown below in Table 8.3.

Table 8.3: Bicycle Parking Rates (Austroads Part 14)

Land Use	Bicycle Parking Rate	
	Employee	**Visitor**
Office	1 per 200m^2 GFA	1 per 750m^2 GFA (over 1000m^2)
Showroom	1 per 750m^2 sales floor	1 per 1000m^2 sales floor
Shop (Retail)	1 per 300m^2 GFA	1 per 500m^2 GFA (over 1000m^2)
Hotel (Motel Rate)	1 per 40 rooms	-
Tavern	1 per 200m^2 GFA	1 per 200m^2 GFA
Marina Berths	-	-
Education	1 per 100 full time students	2 per 100 full time students
Light Industry	1 per 1000m^2 GFA	-

End of trip facilities (lockers, showers) should also be provided where appropriate to encourage cycling trips.

As noted in Section 8.4, a cycleway and walking track follows the perimeter road and links to the western 'Marine Industry' precinct via a pedestrian / cycle bridge over the future IRTC corridor. This cycleway and walking track also connects to the future proposed pedestrian and cycle bridge linking the future residential development on the northern bank of Oakey Creek

9 Conclusions & Recommendations

- The subject site (Figure 2.1) is located on the northern side of Shipper Drive and has an area of 63.6 hectares. The site is currently undeveloped.

- The proposal is to develop a large marine industry precinct on the subject site.

- The proposed development will consist of two distinct precincts, divided by the future Inter-Regional Transport Corridor (IRTC) which runs through the site to the west of Waterway Drive.

- The western precinct will consist of an industrial subdivision with a total area of approximately 18ha. The eastern precinct will consist of a mix of uses including commercial / showroom, retail, hotel, tavern, boat storage, marine berth, factory and educational uses.

- Access to Shipper Drive is proposed for each precinct in the form of a single lane roundabout. The eastern access has been aligned with the existing Shipper Drive / Waterway Drive intersection, while the western access has been aligned with the Shipper Drive / Ford Road intersection. The access intersection (roundabout) serving the eastern precinct should be provided upon completed of Stage 1 of the development. The roundabout serving the western precinct should be provided prior to the completion of the first stage within that precinct.

- As detailed in Section 5, it is estimated that the proposed development will generate in the order of 10,132 daily trips and up to 1,099 peak hour trips.

- A SIDRA capacity analysis has been undertaken at the Pacific Motorway, Foxwell Road & Days Road interchange as well as the Beattie Road / Service Road intersections. As shown in Table 6.2, each of these intersections will be at or near capacity by 2021 regardless of the proposed development and will require upgrading within the next 10 years. The Department of Main Roads and the Gold Coast City Council are well aware of this need. It is noted that the proposed development traffic will increase the degree of saturation at each of the above intersections only marginally and therefore have a relatively minor impact upon their performance.

- A SIDRA capacity analysis has been undertaken at the Shipper Drive / Foxwell Road and Waterway Drive / Beattie Road intersections as well as the proposed access intersections in Shipper Drive. As shown in Table 6.1, each of the intersections will operate satisfactorily for the foreseeable future with the proposed development traffic, with minimal delays and vehicle queuing on all approaches and movements. It is therefore concluded that the proposed development will not have any adverse impact upon the performance of the local road network

- It is recommended that the proposed access intersections in Shipper Drive each be constructed as a single lane roundabout with a 20m centre island diameter, similar to the existing roundabout at the Waterway Drive / Beattie Road intersection.

- It is recommended that bus shelters be constructed on both sides of Shipper Drive adjacent to the subject site to accommodate additional passenger demands in this area resulting from the proposed development.

- The traffic impact of the proposed development upon the local and State controlled road network will not be significantly higher than a development scheme over the site comprising of Self and / or Code Assessable uses currently allowable under the LAP. On this basis, the Applicant should not be required to upgrade or contribute to the future upgrading of the Pacific Motorway and associated interchanges.

- It is suggested that the car parking requirement for the Retail and Tavern components be reduced to 67% and 80% of the Planning Scheme rate respectively, on the basis that these uses will benefit from a high proportion of walk-up trips from staff and visitors of other uses.

- Application of the recommended car parking rates to the proposed development yields a total car parking requirement of 2537 car parking spaces for the Eastern Precinct. A total of 2720 spaces are proposed (including on-street car parking) which exceeds this minimum requirement.

- The inclusion of on-street car parking is considered to be acceptable in this instance given that the proposed development will act as an isolated ‘closed’ catchment. Car parking demands will only be generated by those uses on the site and there will be no external uses generating demands for on-street car parking within the eastern precinct.

- It is recommended that each use within the proposed marine precinct provide loading facilities capable of accommodating the design vehicle specified in Council's Table to Acceptable Solution AS14.1 of the Car Parking, Access and Transport Integration Code. As a guide, it is recommended that service vehicle provisions be implemented in accordance with Table 8.3 of this report.

- Pedestrian footpaths are proposed along all roads within the proposed development to encourage pedestrian movement between various uses and buildings.

- It is recommended that Bicycle parking be supplied in accordance with the requirements set out in Table 10-1 of the Austroads publication 'Guide to Traffic Engineering Practice - Part 14: Bicycles'. End of trip facilities (lockers, showers) should also be provided where appropriate to encourage cycling trips.

APPENDIX A

Traffic Survey Data


Manual Traffic Survey Location 1—Coomera Marina
N
FORD DRV
SHIPPER DRIVE
WATERWAY DRIVE
1
2
3
4
5
6
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8
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11
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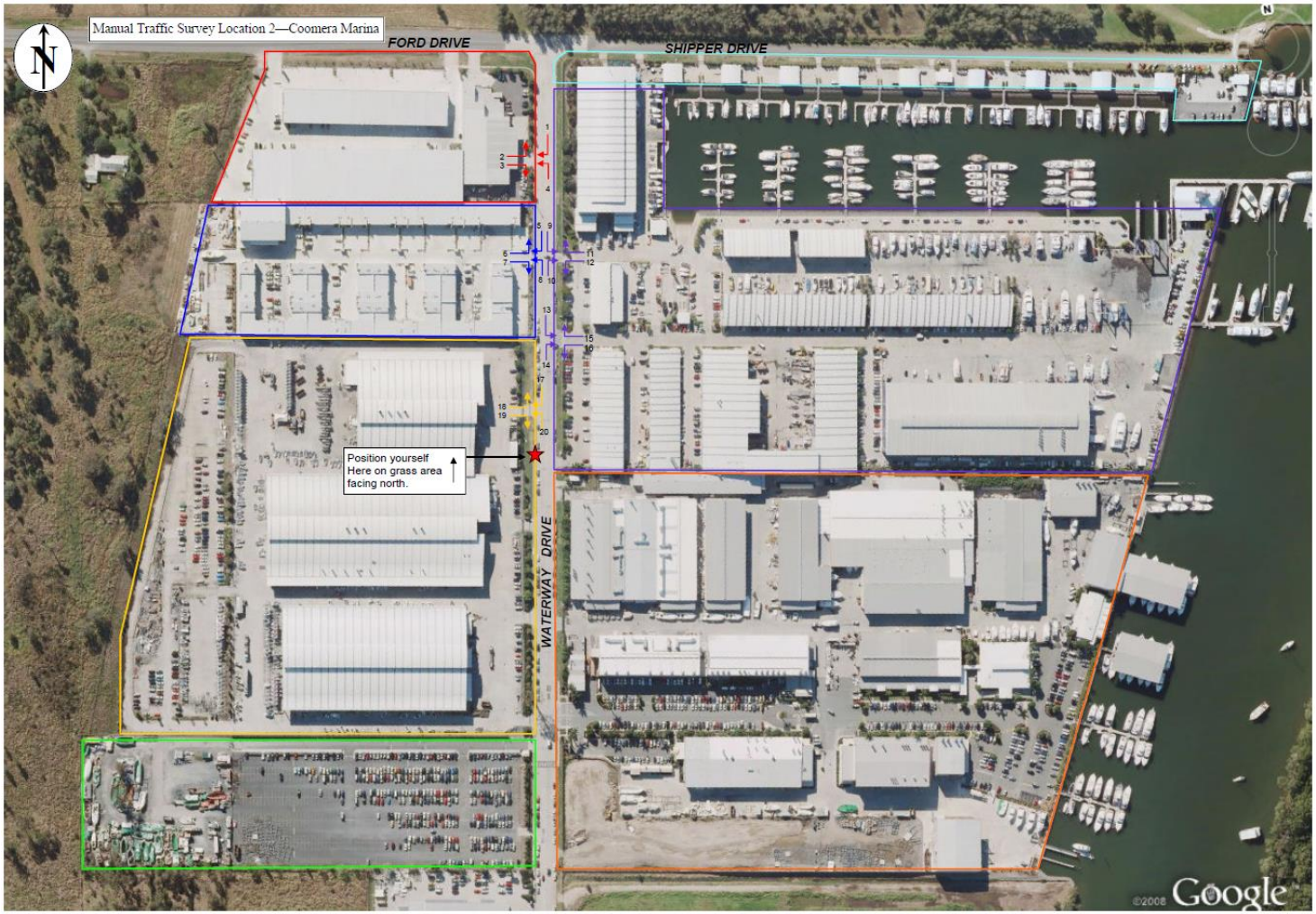
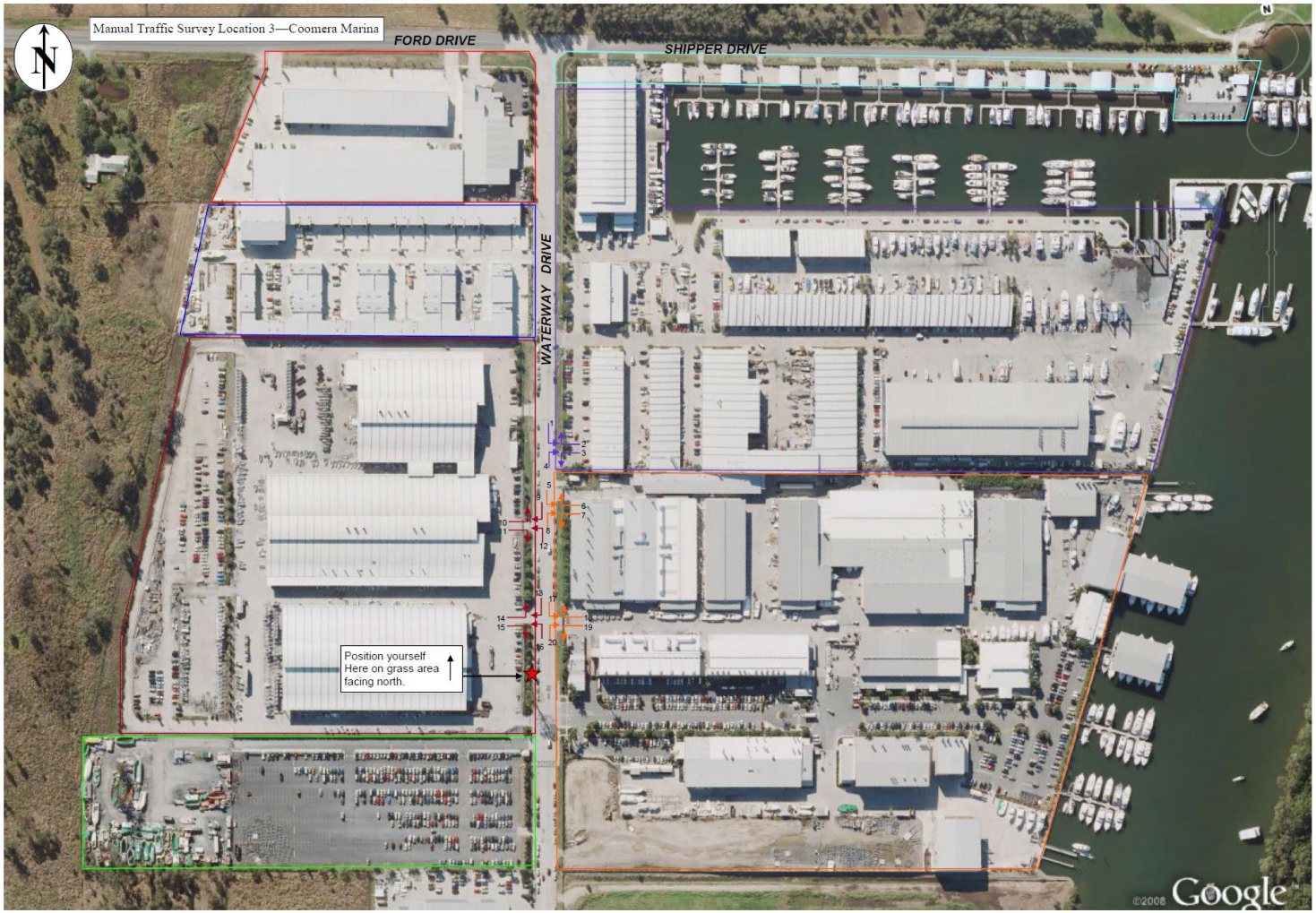
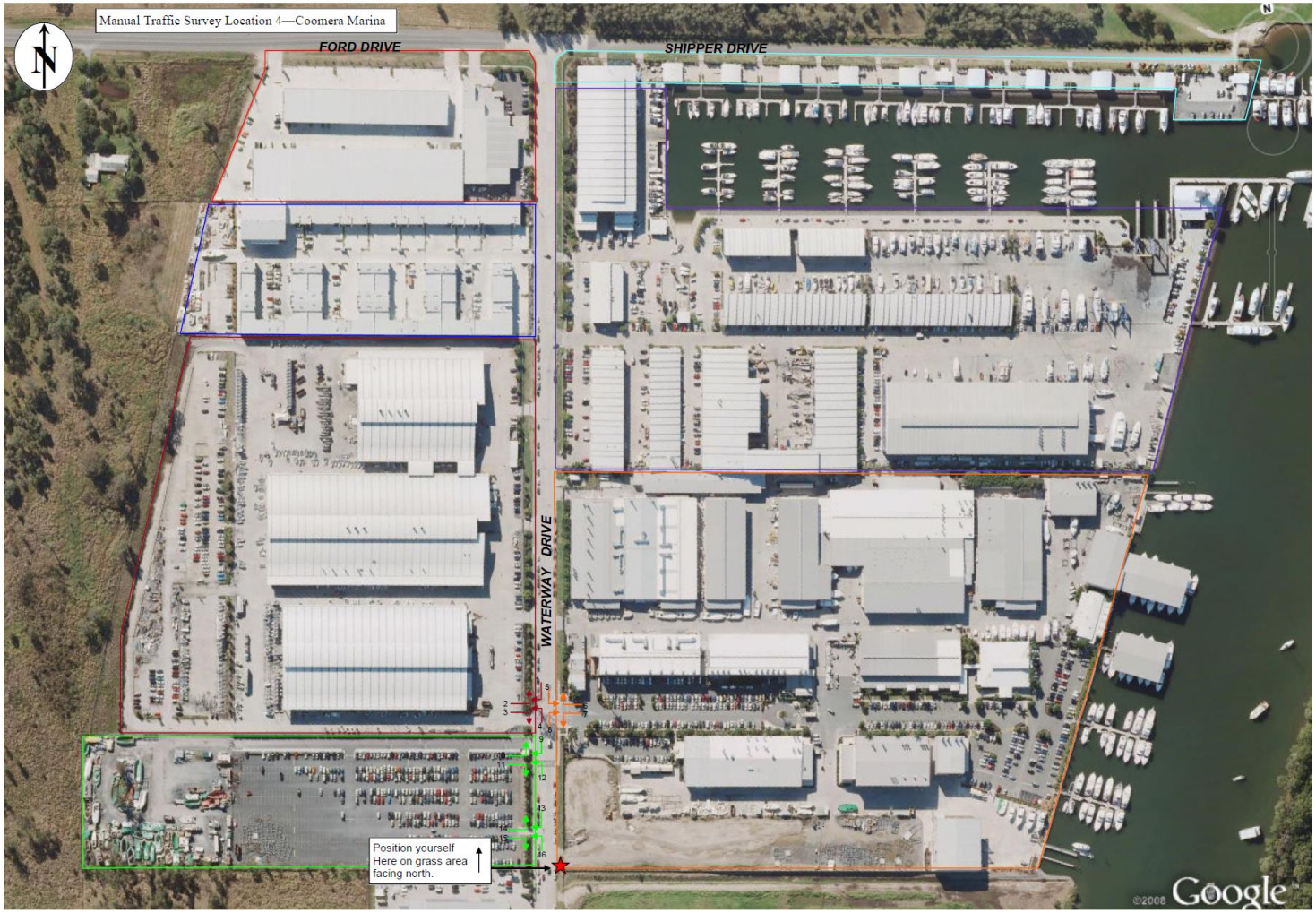
28
29
30
31


Manual Traffic Survey Location 2—Coomera Marina
FORD DRIVE
SHIPPER DRIVE
WATERWAY DRIVE
Position yourself Here on grass area facing north.
©2008 Google


Manual Traffic Survey Location 3—Coomera Marina
FORD DRIVE
SHIPPER DRIVE
WATERWAY DRIVE
Position yourself
Here on grass area
facing north.
Google


Manual Traffic Survey Location 4—Coomera Marina
FORD DRIVE
SHIPPER DRIVE
WATERWAY DRIVE
Position yourself
Here on grass area
facing north.
©2008 Google

Traffic Survey

Date: Thursday 25th March 2010
Address: Gold Coast Marina, Coomera
Name: Kevin Hughes
Intersection Type: Survey Location 1
Job no: 10007t

TIME	LOCATION 1 - MOVEMENT																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
7:00 - 7:15	0	17	20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7:15 - 7:30	0	22	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
7:30 - 7:45	1	28	15	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 - 8:00	0	30	16	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 - 8:15	2	39	22	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
8:15 - 8:30	0	57	17	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
8:30 - 8:45	1	51	25	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 - 9:00	0	21	25	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
9:00 - 9:15	2	13	17	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
9:15 - 9:30	0	14	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
9:30 - 9:45	0	12	17	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 - 10:00	1	21	27	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
10:00 - 10:15	1	16	10	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 - 10:30	0	23	17	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
10:30 - 10:45	4	19	16	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 - 11:00	1	10	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
11:00 - 11:15	0	9	20	8	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
11:15 - 11:30	1	19	25	3	3	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
11:30 - 11:45	0	9	7	4	4	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	3
11:45 - 12:00	0	10	15	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
12:00 - 12:15	0	18	20	4	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 - 12:30	0	15	11	3	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
12:30 - 12:45	0	17	20	1	4	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3	0
12:45 - 1:00	0	19	14	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1:00 - 1:15	2	23	18	3	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 - 1:30	1	13	16	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
1:30 - 1:45	3	17	18	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1:45 - 2:00	0	8	28	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
2:00 - 2:15	2	16	17	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2:15 - 2:30	1	23	19	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
2:30 - 2:45	1	37	60	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2:45 - 3:00	1	34	33	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3:00 - 3:15	1	17	41	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 - 3:30	1	15	64	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
3:30 - 3:45	0	11	64	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 - 4:00	0	16	45	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4:00 - 4:15	0	7	32	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 - 4:30	1	10	28	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 - 4:45	0	13	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:45 - 5:00	3	15	79	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 - 5:15	0	14	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 - 5:30	1	8	38	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 - 5:45	1	5	35	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:45 - 6:00	1	18	32	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	34	829	1177	71	60	29	0	0	0	0	0	0	0	0	1	1	0	4	3	2	1	0	0	0	0	0	0	0	0	25	26

Thursday 25th March 2010
Gold Coast Marina, Coomera
Charmaine
Location 2
10007t

LOCATION 2 - MOVEMENT																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	2	0	0	0	0	10	20	5	5	0	0	0	0
0	0	0	0	0	0	0	2	2	2	0	3	5	11	2	5	0	0	0	0
0	0	0	0	2	0	2	1	3	2	0	1	8	16	0	9	0	0	0	0
0	0	0	0	2	1	0	2	1	3	0	1	6	14	7	5	0	0	0	0
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0	0	0	0	3	0	0	8	2	5	0	2	7	13	3	5	0	0	0	0
0	0	0	0	1	2	5	6	0	0	0	2	11	18	6	12	0	0	0	0
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0	0	1	1	2	1	3	4	3	1	0	0	2	14	6	12	0	0	0	0
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0	0	2	0	1	1	4	4	6	0	2	2	3	12	6	8	0	0	0	0
0	0	1	0	3	0	2	1	5	3	2	1	6	17	5	17	0	0	0	0
0	0	0	1	2	0	3	0	3	2	1	2	4	14	3	15	0	0	0	0
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0	0	0	0	1	1	2	3	5	0	0	3	6	9	4	7	0	0	0	0
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0	0	3	0	0	0	1	5	0	0	1	2	2	7	5	12	0	0	0	0
0	0	1	0	2	2	4	0	1	2	0	4	7	13	2	9	0	0	0	0
0	0	1	0	1	1	3	1	1	1	0	2	3	10	3	13	0	0	0	0
0	0	0	0	1	1	1	1	1	5	0	1	4	7	3	8	0	0	0	0
0	0	0	0	0	1	0	0	0	3	1	0	0	6	2	7	0	0	0	0
0	0	0	0	0	1	3	1	2	3	3	5	6	13	7	21	0	0	0	0
0	0	0	0	1	2	1	0	1	4	3	3	1	8	3	10	0	0	0	0
0	0	0	0	2	1	5	3	1	4	1	4	5	10	5	11	0	0	0	0
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0	0	1	0	0	0	0	3	1	0	1	3	2	8	2	20	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	2	1	3	6	5	11	0	0	0	0
0	0	0	0	0	1	2	0	0	2	0	2	1	6	7	18	0	0	0	0
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0	0	0	0	0	0	3	1	0	0	0	0	0	3	6	12	0	0	0	0
0	0	0	0	0	1	2	0	0	0	0	0	2	3	1	1	0	0	0	0
0	2	14	10	34	34	91	85	53	64	43	80	185	497	218	500	0	0	0	0

Thursday 25th March 2010
Gold Coast Marina, Coomera
Tiarna Passfield
Location 3
10007t

LOCATION 3 - MOVEMENT																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
0	0	0	2	0	0	0	0	1	0	0	3	0	1	0	0	0	0	0	0
0	0	0	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
3	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
2	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0
0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	4	2	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
2	0	2	2	0	0	0	0	0	1	0	2	1	1	0	2	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0
0	0	3	1	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0
1	1	5	2	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	2	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	23	41	0	0	2	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	4	7	0	2	2	0	0	0	0	0	0
0	0	0	1	0	0	0	0	1	5	4	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	3	1	0	1	0	0	0	0	0	0	0
0	0	5	2	0	0	0	0	2	9	3	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	2	1	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	6	4	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0
14	3	31	30	0	0	0	0	25	68	80	15	6	7	0	9	0	0	0	0

Thursday 25th March 2010

Gold Coast Marina, Coomera

Brett

Location 4

10007t

MOVEMENT																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
0	0	0	1	3	0	1	9	0	0	0	0	0	0	0	0	99
0	0	0	2	2	1	0	9	0	0	0	0	0	0	0	0	78
0	0	0	1	4	2	1	10	0	0	0	0	0	0	0	0	109
1	1	0	0	3	0	2	6	0	0	0	0	0	0	0	0	110
0	0	1	2	2	0	3	6	0	0	0	0	0	0	0	0	130
1	0	1	2	1	2	3	4	0	0	0	0	0	0	0	0	151
0	1	1	1	1	0	0	5	0	0	0	0	0	0	0	0	159
0	0	0	4	5	1	1	4	0	0	0	0	0	0	0	0	126
1	0	0	2	1	0	3	6	0	0	0	0	0	0	0	0	108
0	0	0	1	1	0	0	3	0	0	0	0	0	0	0	0	76
1	2	0	4	0	2	2	5	0	0	0	0	0	0	0	0	90
0	0	0	5	2	1	3	3	0	0	0	0	0	0	0	0	121
0	0	0	2	1	0	3	0	0	0	0	0	0	0	0	0	106
1	0	0	1	2	1	2	2	0	0	0	0	0	0	0	0	103
0	0	3	1	4	0	3	2	0	0	0	0	0	0	0	0	124
1	0	0	1	1	1	1	3	0	0	0	0	0	0	0	0	76
0	0	0	1	2	0	2	5	0	0	0	0	0	0	0	0	107
0	2	0	1	4	3	1	2	0	0	0	0	0	0	0	0	122
0	1	1	2	1	1	8	5	0	0	0	0	0	0	0	0	97
0	0	0	0	4	0	2	6	0	0	0	0	0	0	0	0	78
1	1	0	1	1	3	2	5	0	0	0	0	0	0	0	0	102
0	1	0	1	4	0	3	3	0	0	0	0	0	0	0	0	80
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117
0	1	2	2	4	1	3	3	0	0	0	0	0	0	0	0	93
2	0	0	1	3	3	0	4	0	0	0	0	0	0	0	0	137
1	0	0	0	0	1	1	6	0	0	0	0	0	0	0	0	85
0	2	0	1	3	2	3	3	0	0	0	0	0	0	0	0	107
1	0	0	3	1	1	2	2	0	0	0	0	0	0	0	0	95
0	0	2	0	2	1	3	2	0	0	0	0	0	0	0	0	88
0	0	0	2	0	3	1	3	0	0	0	0	0	0	0	0	81
0	1	5	0	0	3	8	1	0	0	0	0	0	0	0	0	251
0	3	4	0	1	1	6	1	0	0	0	0	0	0	0	0	142
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	123
0	0	5	0	1	5	2	2	0	0	0	0	0	0	0	0	137
0	1	1	0	0	4	8	3	0	0	0	0	0	0	0	0	192
0	0	0	0	1	2	12	2	0	0	0	0	0	0	0	0	144
0	0	0	0	0	6	10	0	0	0	0	0	0	0	0	0	97
0	0	0	0	0	18	22	1	0	0	0	0	0	0	0	0	119
0	0	0	0	0	25	87	0	0	0	0	0	0	0	0	0	229
0	0	0	0	0	7	28	0	0	0	0	0	0	0	0	0	166
0	0	0	0	0	9	20	0	0	0	0	0	0	0	0	0	146
0	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	94
0	0	0	0	0	4	13	0	0	0	0	0	0	0	0	0	96
0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	74
11	17	26	45	65	121	283	136	0	0	0	0	0	0	0	0	5165

Traffic Survey

Date: Wednesday 24 March 2010
Address: Gold Coast Marina, Coomera
Name: Kevin Hughes
Intersection Type: Survey Location 1
Job no: 10007t

TIME	LOCATION 1 - MOVEMENT																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
7:00 - 7:15	0	19	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 - 7:30	0	13	9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 - 7:45	3	80	10	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 - 8:00	1	35	19	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
8:00 - 8:15	1	31	13	4	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 - 8:30	1	55	17	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0
8:30 - 8:45	1	78	26	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 - 9:00	1	15	32	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	
9:00 - 9:15	0	14	13	4	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
9:15 - 9:30	0	12	21	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	
9:30 - 9:45	0	20	11	5	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
9:45 - 10:00	0	15	28	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
10:00 - 10:15	0	15	18	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	
10:15 - 10:30	2	16	7	5	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
10:30 - 10:45	3	12	18	7	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	
10:45 - 11:00	0	17	25	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	2	
11:00 - 11:15	1	13	16	6	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	
11:15 - 11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
11:30 - 11:45	2	12	15	2	3	2	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	
11:45 - 12:00	2	8	17	4	1	2	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	
12:00 - 12:15	0	19	16	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	
12:15 - 12:30	0	14	19	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
12:30 - 12:45	2	17	11	1	5	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
12:45 - 1:00	1	11	21	4	2	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	
1:00 - 1:15	1	16	22	1	5	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	2	3
1:15 - 1:30	1	16	24	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
1:30 - 1:45	2	6	11	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
1:45 - 2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:00 - 2:15	1	9	14	3	1	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	2	
2:15 - 2:30	2	24	19	3	3	2	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2	
2:30 - 2:45	3	41	58	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	
2:45 - 3:00	0	35	33	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	
3:00 - 3:15	0	11	35	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	
3:15 - 3:30	0	14	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
3:30 - 3:45	1	18	52	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3:45 - 4:00	0	11	36	0	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
4:00 - 4:15	0	12	34	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:15 - 4:30	4	13	47	1	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
4:30 - 4:45	1	16	89	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 - 5:00	0	22	55	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
5:00 - 5:15	0	11	45	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
5:15 - 5:30	0	8	37	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
5:30 - 5:45	0	16	35	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
5:45 - 6:00	0	10	30	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
TOTAL	37	850	1128	82	72	31	0	0	0	1	1	0	3	3	6	5	0	7	7	1	1	0	0	0	0	1	1	0	0	38	46

Wednesday 24 March 2010

Gold Coast Marina, Coomera

Charmaine

Location 2

10007t

LOCATION 2 - MOVEMENT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	3	0	0	0	0	13	26	6	7	0	0	0	0
0	0	0	0	0	0	0	2	2	4	0	0	6	11	2	6	0	0	0	0
0	0	0	0	0	0	1	0	2	2	1	4	9	21	2	9	0	0	0	0
0	0	0	0	3	1	1	1	2	2	1	2	5	12	5	9	0	0	0	0
0	0	1	0	1	0	1	4	0	3	0	1	6	11	2	7	0	0	0	0
0	1	0	1	0	0	1	7	0	2	1	3	5	14	3	10	0	0	0	0
0	0	0	0	3	1	4	3	0	4	0	0	9	8	4	8	0	0	0	0
0	0	1	0	1	0	4	4	1	0	0	2	8	20	3	9	0	0	0	0
0	0	0	3	2	2	3	5	0	2	0	1	7	10	4	9	0	0	0	0
0	0	0	0	1	1	4	7	2	2	0	3	2	15	7	8	0	0	0	0
0	0	0	0	0	1	5	2	2	1	0	2	10	19	5	5	0	0	0	0
0	0	0	0	0	0	3	8	1	2	0	2	4	18	7	13	0	0	0	0
0	0	1	1	1	1	4	2	2	2	1	5	4	13	4	20	0	0	0	0
0	0	1	1	1	1	3	3	1	6	0	3	8	14	3	15	0	0	0	0
0	0	1	0	2	0	3	3	2	2	3	3	2	8	3	12	0	0	0	0
0	0	0	0	1	0	2	6	2	0	1	3	5	16	7	9	0	0	0	0
0	0	0	0	0	1	4	1	1	1	1	0	5	17	4	11	0	0	0	0
0	0	0	1	0	2	2	3	0	2	0	3	6	10	1	11	0	0	0	0
1	0	0	0	0	1	2	7	1	2	2	1	6	15	11	15	0	0	0	0
0	0	1	0	0	0	5	4	3	3	1	2	4	13	2	18	0	0	0	0
0	0	0	3	0	1	4	2	1	1	1	2	9	10	3	13	0	0	0	0
0	0	0	0	1	1	4	0	2	3	1	8	4	16	2	13	0	0	0	0
0	0	0	0	0	0	5	5	2	3	1	6	13	16	6	11	0	0	0	0
0	0	1	1	0	1	3	2	1	1	5	3	7	20	6	16	0	0	0	0
0	0	2	0	1	0	2	3	1	2	1	1	8	15	5	23	0	0	0	0
0	0	0	0	1	0	2	1	1	0	0	1	8	8	6	12	0	0	0	0
0	0	0	1	0	0	0	1	1	0	0	2	2	15	4	11	0	0	0	0
1	0	0	0	0	0	2	3	0	0	0	3	2	9	3	13	0	0	0	0
0	0	0	0	0	1	2	0	1	2	1	3	5	12	5	10	0	0	0	0
0	0	2	0	1	1	2	3	3	0	4	1	3	10	6	15	0	0	0	0
0	0	0	0	2	2	5	2	3	1	2	4	6	6	3	17	0	0	0	0
0	0	0	0	0	0	5	7	1	3	1	3	5	8	7	12	0	0	0	0
0	0	0	0	2	1	3	1	2	1	4	4	6	5	3	8	0	0	0	0
0	0	0	1	2	4	2	3	1	1	3	2	4	7	8	9	0	0	0	0
0	0	0	1	0	2	4	2	1	3	3	5	1	7	11	26	0	0	0	0
0	0	1	0	0	0	2	2	0	1	6	3	3	5	2	15	0	0	0	0
0	0	0	0	0	0	1	0	2	2	5	4	1	6	4	26	0	0	0	0
0	0	0	0	1	0	3	0	1	0	2	3	1	5	7	12	0	0	0	0
0	0	0	0	0	2	2	1	2	1	3	5	0	6	9	16	0	0	0	0
0	0	0	0	1	0	2	0	0	0	2	2	1	4	4	13	0	0	0	0
0	0	0	0	1	0	9	0	0	0	5	2	1	8	5	12	0	0	0	0
0	0	0	0	0	3	3	0	1	0	3	1	1	3	5	16	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	7	0	0	0	0
0	0	0	0	0	0	2	1	0	0	0	0	1	2	1	1	0	0	0	0
2	1	12	14	29	31	121	114	51	67	65	108	217	492	201	538	0	0	0	0

Wednesday 24 March 2010

Gold Coast Marina, Coomera

Ron Patterson

Location 3

10007t

LOCATION 3 - MOVEMENT																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0
1	0	1	2	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0
0	0	1	0	0	0	0	0	2	0	1	3	1	0	0	1	0	0	0	0
0	0	2	2	0	0	0	0	2	0	2	0	0	1	0	1	0	0	0	0
1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	1	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0
0	0	4	0	0	0	0	0	2	1	0	0	2	0	0	0	0	0	0	0
0	0	1	3	0	0	0	0	0	0	2	2	0	1	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	1	2	0	1	0	0	0	0	0	0
0	0	1	2	0	0	0	0	0	0	0	1	1	1	1	3	0	0	0	0
0	0	2	5	0	0	0	0	0	1	2	0	1	1	0	2	0	0	0	0
1	1	2	0	0	0	0	0	1	2	2	0	1	1	0	0	0	0	0	0
0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
0	0	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
0	0	3	2	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0
0	0	1	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0
0	0	3	0	0	0	0	0	2	2	0	0	0	1	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2	2	0	0	0	0	0	3	1	0	1	0	0	0	0	0	0	0
0	1	3	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	1	0	3	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0
0	2	2	2	0	0	0	0	3	1	0	1	0	1	1	0	0	0	0	0
1	0	5	1	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0
0	0	2	1	0	0	0	0	0	1	1	0	2	0	2	1	0	0	0	0
0	0	1	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0
1	1	2	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
0	0	4	1	0	0	0	0	0	24	42	0	0	4	9	2	0	0	0	0
1	0	1	0	0	0	0	0	0	3	1	0	0	2	2	0	0	0	0	0
0	0	2	2	0	0	0	0	0	4	2	0	0	1	2	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	5	1	0	0	2	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
0	0	2	1	0	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0
0	1	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
0	0	6	3	0	0	0	0	0	3	4	0	0	0	0	0	0	0	0	0
0	0	2	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	9	67	42	0	0	0	0	20	61	82	17	12	23	24	12	0	0	0	0

Wednesday 24 March 2010

Gold Coast Marina, Coomera

Brett

Location 4

10007t

LOCATION 4 - MOVEMENT																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
0	0	0	0	2	0	0	11	0	0	0	0	0	0	0	0	102
0	0	2	0	2	1	4	7	0	0	0	0	0	0	0	0	77
1	1	1	0	7	1	3	5	0	0	0	0	0	0	0	0	173
0	0	5	0	4	2	0	9	0	0	0	0	0	0	0	0	132
0	0	1	1	2	1	1	6	0	0	0	0	0	0	0	0	113
0	0	2	0	1	1	0	6	0	0	0	0	0	0	0	0	141
0	0	0	0	3	1	0	7	0	0	0	0	0	0	0	0	168
0	1	0	0	2	2	1	3	0	0	0	0	0	0	0	0	123
0	0	0	2	2	1	4	7	0	0	0	0	0	0	0	0	108
0	0	0	0	4	3	4	4	0	0	0	0	0	0	0	0	113
0	0	1	0	1	2	5	3	0	0	0	0	0	0	0	0	115
2	0	2	0	1	2	3	3	0	0	0	0	0	0	0	0	129
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113
2	0	1	0	1	1	6	1	0	0	0	0	0	0	0	0	112
0	0	1	0	4	1	2	3	0	0	0	0	0	0	0	0	111
0	0	2	3	3	3	4	4	0	0	0	0	0	0	0	0	134
1	2	1	3	0	1	3	6	0	0	0	0	0	0	0	0	112
0	3	0	2	1	2	2	0	0	0	0	0	0	0	0	0	62
0	0	1	2	0	0	3	2	0	0	0	0	0	0	0	0	115
0	1	3	0	2	1	1	1	0	0	0	0	0	0	0	0	112
0	1	0	1	2	0	2	2	0	0	0	0	0	0	0	0	110
0	0	1	0	3	1	6	3	0	0	0	0	0	0	0	0	115
0	1	0	1	0	3	3	6	0	0	0	0	0	0	0	0	135
0	0	0	0	3	0	1	4	0	0	0	0	0	0	0	0	131
0	0	0	2	2	1	0	4	0	0	0	0	0	0	0	0	136
0	0	0	0	2	1	3	1	0	0	0	0	0	0	0	0	101
0	0	0	1	1	0	2	2	0	0	0	0	0	0	0	0	68
0	0	1	1	0	1	1	3	0	0	0	0	0	0	0	0	47
0	0	0	2	1	2	1	2	0	0	0	0	0	0	0	0	95
0	0	0	0	0	3	2	1	0	0	0	0	0	0	0	0	120
0	3	8	0	1	1	6	1	0	0	0	0	0	0	0	0	267
0	0	6	0	3	1	10	4	0	0	0	0	0	0	0	0	161
0	1	2	0	0	1	4	5	0	0	0	0	0	0	0	0	116
0	0	2	0	0	4	2	0	0	0	0	0	0	0	0	0	131
0	1	3	1	2	0	4	2	0	0	0	0	0	0	0	0	160
0	0	1	0	0	4	4	3	0	0	0	0	0	0	0	0	107
0	0	0	0	0	2	13	1	0	0	0	0	0	0	0	0	124
0	0	0	0	1	3	16	2	0	0	0	0	0	0	0	0	132
0	0	0	0	0	34	65	1	0	0	0	0	0	0	0	0	272
0	0	0	0	0	19	39	0	0	0	0	0	0	0	0	0	173
0	0	0	0	0	7	10	0	0	0	0	0	0	0	0	0	125
0	0	0	0	0	3	10	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	4	9	0	0	0	0	0	0	0	0	0	83
0	0	0	0	0	5	10	0	0	0	0	0	0	0	0	0	68
6	15	47	22	63	126	269	135	0	0	0	0	0	0	0	0	5442

Traffic Survey

Date: Tuesday 23rd March 2010
Address: Gold Coast Marina, Coomera
Name: Kevin Hughes
Intersection Type: Survey Location 1
Job no: 100071

TIME	LOCATION 1 - MOVEMENT																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
7:00 - 7:15	0	14	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
7:15 - 7:30	0	22	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 - 7:45	0	24	7	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 - 8:00	3	33	26	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	
8:00 - 8:15	2	34	18	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
8:15 - 8:30	3	49	13	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
8:30 - 8:45	2	52	24	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	
8:45 - 9:00	1	30	29	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
9:00 - 9:15	1	21	17	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
9:15 - 9:30	2	20	23	8	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9:30 - 9:45	1	20	19	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
9:45 - 10:00	1	13	12	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:00 - 10:15	0	19	15	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
10:15 - 10:30	1	14	18	4	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2
10:30 - 10:45	0	18	19	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:45 - 11:00	1	15	22	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
11:00 - 11:15	0	13	17	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11:15 - 11:30	0	12	20	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11:30 - 11:45	1	18	20	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
11:45 - 12:00	2	15	15	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
12:00 - 12:15	0	18	15	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:15 - 12:30	1	5	14	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 - 12:45	1	24	18	1	3	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:45 - 1:00	1	15	21	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 - 1:15	1	17	16	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
1:15 - 1:30	0	11	13	3	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1:30 - 1:45	0	12	14	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0
1:45 - 2:00	1	11	13	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
2:00 - 2:15	20	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 - 2:30	0	18	21	2	3	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
2:30 - 2:45	0	34	72	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
2:45 - 3:00	0	22	20	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
3:00 - 3:15	0	19	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 - 3:30	0	13	60	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 - 3:45	1	23	62	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
3:45 - 4:00	1	16	34	2	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2
4:00 - 4:15	3	5	21	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	
4:15 - 4:30	0	8	39	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
4:30 - 4:45	0	6	73	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 - 5:00	1	15	50	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00 - 5:15	0	12	35	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
5:15 - 5:30	1	15	39	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
5:30 - 5:45	0	9	40	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 - 6:00	1	16	40	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
TOTAL	54	812	1128	56	49	21	0	0	0	0	1	3	2	3	4	2	0	2	0	4	1	0	0	1	1	1	1	0	0	18	39

Tuesday 23rd March 2010

Gold Coast Marina, Coomera

Charmaine

Location 2

10007t

LOCATION 2 - MOVEMENT																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	2	0	0	0	0	8	22	4	6	0	0	0	0
0	0	0	0	0	0	6	2	4	5	0	1	11	13	2	6	0	0	0	0
0	0	0	0	0	0	1	0	1	1	0	1	3	13	3	1	0	0	0	0
0	0	0	0	1	0	0	1	1	4	0	8	9	15	3	8	0	0	0	0
0	0	0	0	0	1	0	1	1	5	1	1	5	16	5	10	0	0	0	0
0	0	1	0	2	2	2	3	1	0	1	0	8	15	3	5	0	0	0	0
0	0	0	0	2	2	3	4	0	1	3	3	8	11	2	5	0	0	0	0
0	0	0	0	2	1	2	2	3	1	1	2	4	11	1	10	0	0	0	0
0	0	0	0	3	0	1	5	0	0	2	2	5	17	2	7	0	0	0	0
0	0	1	1	0	0	4	3	1	4	0	3	4	18	8	9	0	0	0	0
0	2	0	0	1	0	5	2	3	2	1	2	9	14	5	15	0	0	0	0
0	0	1	0	1	1	1	1	1	2	0	2	8	18	2	9	0	0	0	0
0	0	1	0	0	0	0	1	1	1	1	0	5	15	5	10	0	0	0	0
0	0	0	2	0	1	0	3	0	3	2	2	5	6	8	14	0	0	0	0
0	0	2	0	3	0	3	3	3	2	0	0	5	8	4	4	0	0	0	0
0	0	1	0	2	1	5	4	2	1	1	3	9	14	7	5	0	0	0	0
0	0	0	0	2	1	4	3	0	4	1	2	5	8	9	13	0	0	0	0
0	0	0	0	1	1	0	4	2	1	1	3	5	8	2	12	0	0	0	0
0	0	0	1	0	0	1	1	0	1	0	3	4	6	4	14	0	0	0	0
0	0	0	2	0	0	4	0	2	3	1	3	3	8	4	10	0	0	0	0
0	0	0	0	0	0	2	3	2	2	1	3	3	14	3	10	0	0	0	0
0	0	1	2	0	2	3	2	2	1	0	2	3	17	7	12	0	0	0	0
0	0	0	1	0	3	6	3	1	2	1	0	9	13	7	15	0	0	0	0
0	0	1	1	1	2	3	1	0	1	1	1	6	12	7	15	0	0	0	0
0	0	0	1	1	0	3	7	0	0	0	4	5	10	7	14	0	0	0	0
0	0	0	0	1	1	5	4	1	4	2	1	6	11	5	7	0	0	0	0
0	0	0	0	0	0	2	3	1	0	1	1	4	16	5	11	0	0	0	0
0	0	0	0	0	1	1	2	1	0	0	0	4	11	4	11	0	0	0	0
0	0	0	0	0	0	4	2	0	0	1	2	11	6	2	8	0	0	0	0
0	0	0	0	0	0	3	3	0	2	3	1	7	13	5	12	0	0	0	0
1	1	0	1	1	1	2	1	2	2	0	5	1	5	8	17	0	0	0	0
0	0	1	2	0	0	4	1	4	1	2	5	4	13	4	20	0	0	0	0
0	0	0	1	1	2	4	3	1	0	4	3	3	8	4	19	0	0	0	0
0	0	0	1	1	1	3	1	0	0	3	2	3	10	2	6	0	0	0	0
0	0	0	0	0	5	4	4	1	1	4	0	2	8	12	37	0	0	0	0
0	0	1	0	0	0	2	0	0	0	2	2	3	3	5	13	0	0	0	0
0	0	0	0	0	2	2	0	0	2	5	4	3	6	12	26	0	0	0	0
0	0	0	0	0	0	1	0	0	1	2	1	1	3	6	15	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	5	2	3	18	16	0	0	0	0
0	0	0	0	0	0	3	1	0	0	3	1	0	6	1	8	0	0	0	0
0	0	0	0	0	3	4	0	0	0	0	3	0	3	7	16	0	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	2	3	2	7	0	0	0	0
0	0	0	0	2	1	8	0	0	0	0	0	2	2	5	6	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	5	0	0	0	0
1	3	11	16	28	35	112	86	42	60	52	87	208	453	224	499	0	0	0	0

Tuesday 23rd March 2010

Gold Coast Marina, Coomera

Ron Patterson

Location 3

10007t

LOCATION 3 - MOVEMENT																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	0	1	2	0	0	0	1	0	0	0	0
0	0	0	1	0	0	0	0	2	1	2	3	0	0	1	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0
0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
1	1	2	2	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	2	2	0	0	1	0	0	0	0	0
0	1	1	0	0	0	0	0	1	2	2	1	1	0	0	0	0	0	0	0
0	0	4	3	0	0	0	0	2	3	0	0	0	0	1	0	0	0	0	0
0	2	3	3	0	0	0	0	0	3	1	0	1	1	0	1	0	0	0	0
0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	2	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0
1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	2	1	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	3	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	2	0	0	0	0	1	0	2	2	0	1	1	0	0	0	0	0
0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	2	0	0	0	0	1	0	1	1	0	2	0	0	0	0	0	0
1	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	0	1	3	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	24	30	0	0	8	12	0	0	0	0	0
0	0	2	0	0	0	0	0	0	6	3	0	0	1	2	0	0	0	0	0
0	0	2	1	0	0	0	0	0	1	3	0	0	1	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
0	0	4	0	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	9	47	34	0	0	0	0	16	56	72	17	4	19	20	5	0	0	0	0

Tuesday 23rd March 2010

Gold Coast Marina, Coomera

Brett

Location 4

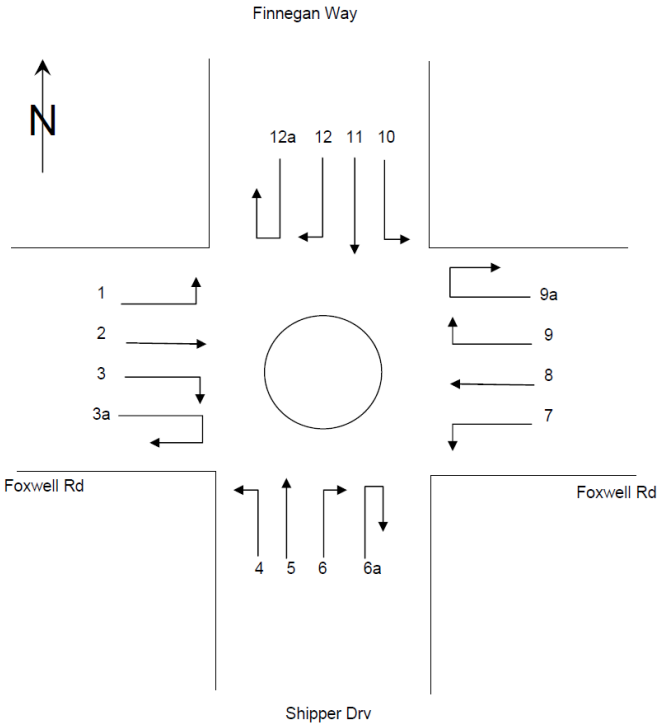
10007t

MOVEMENT															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	1	1	4	0	2	6	1	0	0	0	0	0	0	0
0	2	0	1	1	0	0	5	0	0	0	0	0	0	0	0
0	0	1	0	7	0	1	4	0	0	0	0	0	0	0	0
0	0	0	1	6	0	1	7	0	0	0	0	0	0	0	0
0	0	0	2	5	1	3	2	0	0	0	0	0	0	0	0
0	0	1	1	0	1	3	6	0	0	0	0	0	0	0	0
0	0	0	0	5	0	2	4	0	0	0	0	0	0	0	0
0	0	0	0	3	0	2	8	0	0	0	0	0	0	0	0
1	0	1	1	5	1	7	12	0	0	0	0	0	0	0	0
0	1	0	5	1	2	6	3	0	0	0	0	0	0	0	0
0	1	1	3	4	2	2	4	0	0	0	0	0	0	0	0
0	0	0	1	5	1	7	2	0	0	0	0	0	0	0	0
0	1	2	0	1	2	6	4	0	0	0	0	0	0	0	0
0	0	0	0	1	1	0	6	0	0	0	0	0	0	0	0
0	0	0	0	1	3	41	5	0	0	0	0	0	0	0	0
1	0	0	1	1	1	10	1	0	0	0	0	0	0	0	0
0	0	2	0	1	2	2	3	0	0	0	0	0	0	0	0
0	1	1	0	3	1	3	4	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	1	0	2	3	5	1	0	0	0	0	0	0	0	0
0	0	2	1	0	0	7	0	0	0	0	0	0	0	0	0
0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	0
0	0	0	0	1	2	1	3	0	0	0	0	0	0	0	0
0	0	0	1	1	3	2	5	0	0	0	0	0	0	0	0
0	0	3	1	0	2	1	5	0	0	0	0	0	0	0	0
0	0	1	1	2	1	2	2	0	0	0	0	0	0	0	0
0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	2	2	2	0	0	0	0	0	0	0	0
0	0	1	1	2	1	1	2	0	0	0	0	0	0	0	0
0	0	0	0	1	2	3	2	0	0	0	0	0	0	0	0
2	4	8	1	3	1	4	2	0	0	0	0	0	0	0	0
0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0
0	1	7	1	2	2	4	2	0	0	0	0	0	0	0	0
0	1	6	0	2	4	4	2	0	0	0	0	0	0	0	0
0	0	1	0	1	2	3	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	9	5	0	0	0	0	0	0	0	0
0	0	0	0	0	6	16	1	0	0	0	0	0	0	0	0
0	0	0	0	0	5	13	0	0	0	0	0	0	0	0	0
0	0	0	0	0	22	82	0	0	0	0	0	0	0	0	0
0	0	0	0	0	12	35	1	0	0	0	0	0	0	0	0
0	0	0	0	0	5	12	0	0	0	0	0	0	0	0	0
0	0	0	0	0	4	8	1	0	0	0	0	0	0	0	0
0	0	0	0	0	4	7	1	0	0	0	0	0	0	0	0
0	0	0	0	0	6	3	1	0	0	0	0	0	0	0	0
4	13	43	26	74	109	325	126	1	0	0	0	0	0	0	0

Traffic Survey

Date: Wednesday 21st April 2010
Location: Finnegan Way / Shipper Drv, Coomera
Name: Tiama Passfield / Brigid Fitzgerald
Intersection Type: 4 - way unsignalised intersection

TIME (AM)	MOVEMENT																
	1	2	3	3a	4	5	6	6a	7	8	9	9a	10	11	12	12a	TOTAL
7:00 - 7:15	26	39	5	0	4	0	5	0	6	106	3	0	2	1	36	0	**233**
7:15 - 7:30	20	28	12	0	4	1	2	0	8	132	0	0	2	3	26	0	**238**
7:30 - 7:45	16	41	24	0	3	1	5	0	16	163	1	0	1	6	45	0	**322**
7:45 - 8:00	9	26	12	0	6	2	9	0	6	144	2	0	1	2	20	0	**239**
8:00 - 8:15	3	36	7	0	10	2	4	0	20	167	4	0	1	2	31	0	**287**
8:15 - 8:30	12	45	16	0	3	2	4	0	38	131	1	0	3	8	26	0	**289**
8:30 - 8:45	17	64	12	0	3	2	18	0	39	87	1	0	0	4	26	0	**273**
8:45 - 9:00	15	62	11	0	5	2	14	0	18	77	2	0	0	3	21	0	**230**
9:00 - 9:15	16	64	7	0	5	2	19	0	8	72	1	0	1	2	21	0	**218**
9:15 - 9:30	14	44	3	0	7	3	5	0	6	81	2	0	1	1	19	0	**186**
9:30 - 9:45	10	33	7	0	5	1	6	0	7	55	1	0	0	0	17	0	**142**
9:45 - 10:00	21	53	6	0	5		9	0	10	50	2	0	0	1	16	0	**173**
TIME (PM)	**MOVEMENT**																
	1	2	3	3a	4	5	6	6a	7	8	9	9a	10	11	12	12a	TOTAL
3:00 - 3:15	23	79	1	0	15	6	29	0	11	77	0	0	5	1	14	0	**261**
3:15 - 3:30	21	63	4	0	14	3	35	0	4	70	2	0	10	1	19	0	**246**
3:30 - 3:45	24	120	4	0	27	4	35	0	4	54	2	0	1	2	21	0	**298**
3:45 - 4:00	29	90	4	0	11	4	25	0	7	60	0	0	0	2	7	0	**239**
4:00 - 4:15	21	82	5	0	38	3	23	0	9	38	1	0	0	4	13	0	**237**
4:15 - 4:30	15	72	8	0	10	3	25	0	10	46	1	0	3	5	15	0	**213**
4:30 - 4:45	23	72	4	0	74	2	37	0	10	53	0	0	0	3	18	0	**296**
4:45 - 5:00	32	112	3	0	16	4	44	0	3	40	0	0	1	3	21	0	**279**
5:00 - 5:15	29	70	1	0	11	1	31	0	3	50	1	0	1	1	8	0	**207**
5:15 - 5:30	26	129	3	0	10	2	29	0	2	48	0	0	2	1	16	0	**268**
5:30 - 5:45	23	125	2	0	10	1	29	0	5	33	0	0	0	1	7	0	**236**
5:45 - 6:00	42	103	0	0	7	0	23	0	1	57	0	0	0	1	18	0	**252**



Traffic Survey

Date: Wednesday 21st April 2010

Location: Finnegan Way / Shipper Drv, Coomera

Name: Tiarna Passfield / Brigid Fitzgerald

Intersection Type: 4 - way unsignalised intersection

1 HOUR SUMMARY

TIME (AM)	MOVEMENT															
	1	2	3	3a	4	5	6	6a	7	8	9	9a	10	11	12	12a	TOTAL
7:00 - 8:00	71	134	53	0	17	4	21	0	36	545	6	0	6	12	127	0	**1032**
7:15 - 8:15	48	131	55	0	23	6	20	0	50	606	7	0	5	13	122	0	**1086**
7:30 - 8:30	40	148	59	0	22	7	22	0	80	605	8	0	6	18	122	0	**1137**
7:45 - 8:45	41	171	47	0	22	8	35	0	103	529	8	0	5	16	103	0	**1088**
8:00 - 9:00	47	207	46	0	21	8	40	0	115	462	8	0	4	17	104	0	**1079**
8:15 - 9:15	60	235	46	0	16	8	55	0	103	367	5	0	4	17	94	0	**1010**
8:30 - 9:30	62	234	33	0	20	9	56	0	71	317	6	0	2	10	87	0	**907**
8:45 - 9:45	55	203	28	0	22	8	44	0	39	285	6	0	2	6	78	0	**776**
9:00 - 10:00	61	194	23	0	22	6	39	0	31	258	6	0	2	4	73	0	**719**
TIME (PM)	**MOVEMENT**															
	1	2	3	3a	4	5	6	6a	7	8	9	9a	10	11	12	12a	TOTAL
3:00 - 4:00	97	352	13	0	67	17	124	0	26	261	4	0	16	6	61	0	**1044**
3:15 - 4:15	95	355	17	0	90	14	118	0	24	222	5	0	11	9	60	0	**1020**
3:30 - 4:30	89	364	21	0	86	14	108	0	30	198	4	0	4	13	56	0	**987**
3:45 - 4:45	88	316	21	0	133	12	110	0	36	197	2	0	3	14	53	0	**985**
4:00 - 5:00	91	338	20	0	138	12	129	0	32	177	2	0	4	15	67	0	**1025**
4:15 - 5:15	99	326	16	0	111	10	137	0	26	189	2	0	5	12	62	0	**995**
4:30 - 5:30	110	383	11	0	111	9	141	0	18	191	1	0	4	8	63	0	**1050**
4:45 - 5:45	110	436	9	0	47	8	133	0	13	171	1	0	4	6	52	0	**990**
5:00 - 6:00	120	427	6	0	38	4	112	0	11	188	1	0	3	4	49	0	**963**

Traffic Survey

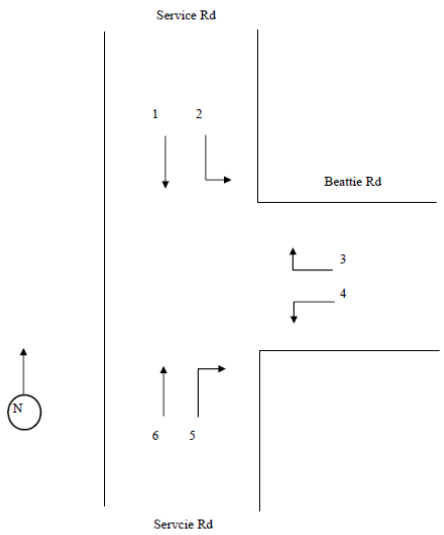
Date: Wednesday 21st April 2010

Location: Service Rd / Beattie Rd, Coomera (Location 2)

Name: Brian Donges / Tania Cassamatti

Intersection Type: 4 - way unsignalised intersection

TIME (AM)	MOVEMENT						
	1	2	3	4	5	6	TOTAL
7:00 - 7:15	25	17	25	0	0	38	**105**
7:15 - 7:30	35	17	33	2	0	37	**124**
7:30 - 7:45	32	30	38	1	0	49	**150**
7:45 - 8:00	35	40	53	1	1	107	**237**
8:00 - 8:15	30	56	53	0	0	160	**299**
8:15 - 8:30	40	98	41	1	0	139	**319**
8:30 - 8:45	47	92	74	1	5	96	**315**
8:45 - 9:00	43	37	59	2	0	72	**213**
9:00 - 9:15	50	33	24	0	0	42	**149**
9:15 - 9:30	27	25	30	0	0	34	**116**
9:30 - 9:45	39	23	17	1	2	30	**112**
9:45 - 10:00	30	16	20	2	0	31	**99**
TIME (PM)	**MOVEMENT**						
	1	2	3	4	5	6	TOTAL
3:00 - 3:15	44	57	77	1	10	143	**332**
3:15 - 3:30	45	58	80	2	0	114	**299**
3:30 - 3:45	51	30	63	0	0	71	**215**
3:45 - 4:00	52	43	51	21	0	57	**224**
4:00 - 4:15	43	31	66	2	0	59	**201**
4:15 - 4:30	56	37	40	0	2	54	**189**
4:30 - 4:45	36	34	106	2	2	65	**245**
4:45 - 5:00	56	21	40	0	2	58	**177**
5:00 - 5:15	52	36	41	1	0	70	**200**
5:15 - 5:30	47	39	34	2	0	64	**186**
5:30 - 5:45	59	28	39	0	0	77	**203**
5:45 - 6:00	43	24	28	0	0	36	**131**



Traffic Survey

Date: Wednesday 21st April 2010

Location: Service Rd / Beattie Rd, Coomera (Location 2)

Name: Brian Donges / Tania Cassamatti

Intersection Type: 4 - way unsignalised intersection

1 HOUR SUMMARY

TIME (AM)	MOVEMENT							
	1	2	3	4	5	6	TOTAL	
7:00 - 8:00	127	104	149	4	1	231	**616**	
7:15 - 8:15	132	143	177	4	1	353	**810**	
7:30 - 8:30	137	224	185	3	1	455	**1005**	
7:45 - 8:45	152	286	221	3	6	502	**1170**	AM PEAK
8:00 - 9:00	160	283	227	4	5	467	**1146**	
8:15 - 9:15	180	260	198	4	5	349	**996**	
8:30 - 9:30	167	187	187	3	5	244	**793**	
8:45 - 9:45	159	118	130	3	2	178	**590**	
9:00 - 10:00	146	97	91	3	2	137	**476**	
TIME (PM)	**MOVEMENT**							
	1	2	3	4	5	6	TOTAL	
3:00 - 4:00	192	188	271	24	10	385	**1070**	PM PEAK
3:15 - 4:15	191	162	260	25	0	301	**939**	
3:30 - 4:30	202	141	220	23	2	241	**829**	
3:45 - 4:45	187	145	263	25	4	235	**859**	
4:00 - 5:00	191	123	252	4	6	236	**812**	
4:15 - 5:15	200	128	227	3	6	247	**811**	
4:30 - 5:30	191	130	221	5	4	257	**808**	
4:45 - 5:45	214	124	154	3	2	269	**766**	
5:00 - 6:00	201	127	142	3	0	247	**720**	

Traffic Survey

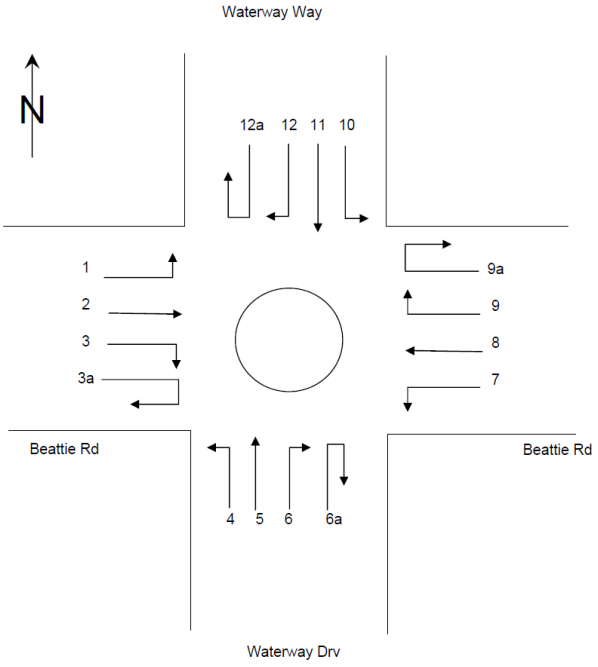
Date: Wednesday 21st April 2010

Location: Beattie Rd / Waterway Drv, Coomera (Location 3)

Name: Kevin Hughes

Intersection Type: 4 - way unsignalised intersection

TIME (AM)	MOVEMENT																
	1	2	3	3a	4	5	6	6a	7	8	9	9a	10	11	12	12a	TOTAL
7:00 - 7:15	27	6	0	3	0	0	0	0	0	3	4	0	2	0	11	0	56
7:15 - 7:30	21	5	0	2	0	0	0	0	0	0	2	0	3	0	7	0	40
7:30 - 7:45	41	2	0	2	0	0	0	0	0	3	2	0	3	0	26	0	79
7:45 - 8:00	62	13	0	1	0	0	0	0	0	2	3	1	0	0	20	1	103
8:00 - 8:15	51	6	0	1	0	0	0	0	0	6	4	0	3	0	39	0	110
8:15 - 8:30	45	7	0	0	0	0	0	0	0	3	1	0	1	0	46	0	103
8:30 - 8:45	46	6	0	0	0	0	0	0	0	1	6	0	3	0	63	0	125
8:45 - 9:00	55	5	0	1	0	0	0	0	0	2	2	0	2	2	35	1	105
9:00 - 9:15	52	6	0	0	0	0	0	0	1	3	2	0	3	0	30	1	98
9:15 - 9:30	33	10	0	0	0	0	1	0	0	1	1	0	2	0	19	0	67
9:30 - 9:45	36	7	0	0	0	0	1	0	1	3	2	0	2	0	26	0	78
9:45 - 10:00	34	12	0	1	1	0	2	0	1	5	3	0	3	1	34	0	97
10:00 - 10:15	58	3	0	1	2	0	2	0	1	14	2	0	1	1	48	0	133
TIME (PM)	**MOVEMENT**																
	1	2	3	3a	4	5	6	6a	7	8	9	9a	10	11	12	12a	TOTAL
3:00 - 3:15	20	1	0	3	1	0	0	0	1	3	1	0	2	0	55	0	87
3:15 - 3:30	45	7	0	7	0	0	0	0	0	8	3	0	2	0	73	0	145
3:30 - 3:45	60	2	0	5	8	0	0	0	0	4	0	1	2	0	50	1	133
3:45 - 4:00	42	3	0	3	1	1	0	0	0	12	10	0	1	0	63	0	136
4:00 - 4:15	40	2	1	3	2	0	0	0	0	20	1	0	4	0	63	0	136
4:15 - 4:30	37	2	0	2	1	0	0	0	0	13	4	0	0	0	65	0	124
4:30 - 4:45	50	1	0	1	0	0	0	0	0	9	3	0	2	0	77	0	143
4:45 - 5:00	50	1	0	1	0	0	0	0	0	6	0	0	4	0	182	2	246
5:00 - 5:15	45	0	0	0	1	0	0	0	0	9	0	0	1	0	51	0	107
5:15 - 5:30	45	1	0	4	0	0	0	0	0	1	0	0	1	0	46	0	98
5:30 - 5:45	35	0	0	0	0	0	0	0	0	8	0	0	0	0	35	0	78
5:45 - 6:00	26	0	0	1	0	0	0	0	0	0	0	0	0	0	20	0	47



Traffic Survey

Date: Wednesday 21st April 2010

Location: Beattie Rd / Waterway Drv, Coomera (Location 3)

Name: Kevin Hughes

Intersection Type: 4 - way unsignalised intersection

1 HOUR SUMMARY

TIME (AM)	MOVEMENT																
	1	2	3	3a	4	5	6	6a	7	8	9	9a	10	11	12	12a	TOTAL
7:00 - 8:00	151	26	0	8	0	0	0	0	0	8	11	1	8	0	64	1	**278**
7:15 - 8:15	175	26	0	6	0	0	0	0	0	11	11	1	9	0	92	1	**332**
7:30 - 8:30	199	28	0	4	0	0	0	0	0	14	10	1	7	0	131	1	**395**
7:45 - 8:45	204	32	0	2	0	0	0	0	0	12	14	1	7	0	168	1	**441**
8:00 - 9:00	197	24	0	2	0	0	0	0	0	12	13	0	9	2	183	1	**443**
8:15 - 9:15	198	24	0	1	0	0	0	0	1	9	11	0	9	2	174	2	**431**
8:30 - 9:30	186	27	0	1	0	0	1	0	1	7	11	0	10	2	147	2	**395**
8:45 - 9:45	176	28	0	1	0	0	2	0	2	9	7	0	9	2	110	2	**348**
9:00 - 10:00	155	35	0	1	1	0	4	0	3	12	8	0	10	1	109	1	**340**
TIME (PM)	**MOVEMENT**																
	1	2	3	3a	4	5	6	6a	7	8	9	9a	10	11	12	12a	TOTAL
3:00 - 4:00	167	13	0	18	10	1	0	0	1	27	14	1	7	0	241	1	**501**
3:15 - 4:15	187	14	1	18	11	1	0	0	0	44	14	1	9	0	249	1	**550**
3:30 - 4:30	179	9	1	13	12	1	0	0	0	49	15	1	7	0	241	1	**529**
3:45 - 4:45	169	8	1	9	4	1	0	0	0	54	18	0	7	0	268	0	**539**
4:00 - 5:00	177	6	1	7	3	0	0	0	0	48	8	0	10	0	387	2	**649**
4:15 - 5:15	182	4	0	4	2	0	0	0	0	37	7	0	7	0	375	2	**620**
4:30 - 5:30	190	3	0	6	1	0	0	0	0	25	3	0	8	0	356	2	**594**
4:45 - 5:45	175	2	0	5	1	0	0	0	0	24	0	0	6	0	314	2	**529**
5:00 - 6:00	151	1	0	5	1	0	0	0	0	18	0	0	2	0	152	0	**330**

APPENDIX B

SIDRA Output

MOVEMENT SUMMARY

Site: AM 2021 Without Development

Foxwell Road & Shipper Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Shipper Drive											
1	L	32	0.0	0.116	8.0	LOS A	0.5	3.5	0.60	0.70	47.8
2	T	12	0.0	0.116	7.1	LOS A	0.5	3.5	0.60	0.63	47.8
3	R	51	0.0	0.116	13.9	LOS B	0.5	3.5	0.60	0.86	44.8
Approach		94	0.0	0.116	11.1	LOS B	0.5	3.5	0.60	0.78	46.1
East: Foxwell Road E											
4	L	151	0.0	0.359	6.4	LOS A	2.1	14.5	0.41	0.58	49.7
5	T	771	0.0	0.359	5.4	LOS A	2.1	14.5	0.42	0.49	50.1
6	R	12	0.0	0.359	12.3	LOS B	2.0	14.1	0.43	0.86	46.7
Approach		933	0.0	0.359	5.7	LOS A	2.1	14.5	0.42	0.51	50.0
North: Finnegan Way											
7	L	7	0.0	0.167	6.5	LOS A	0.7	4.8	0.41	0.56	49.1
8	T	23	0.0	0.167	5.6	LOS A	0.7	4.8	0.41	0.49	49.3
9	R	151	0.0	0.167	12.5	LOS B	0.7	4.8	0.41	0.74	45.3
Approach		181	0.0	0.167	11.3	LOS B	0.7	4.8	0.41	0.70	45.9
West: Foxwell Road W											
10	L	60	0.0	0.129	5.7	LOS A	0.6	4.4	0.19	0.50	51.0
11	T	249	0.0	0.129	4.6	LOS A	0.6	4.4	0.19	0.38	51.9
12	R	68	0.0	0.129	11.5	LOS B	0.6	4.3	0.20	0.78	46.5
Approach		378	0.0	0.129	6.0	LOS A	0.6	4.4	0.19	0.47	50.6
All Vehicles		1585	0.0	0.359	6.7	LOS A	2.1	14.5	0.37	0.54	49.3

MOVEMENT SUMMARY

Site: PM 2021 Without Development

Foxwell Road & Shipper Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Shipper Drive											
1	L	162	0.0	0.353	6.8	LOS A	1.7	11.9	0.48	0.59	48.7
2	T	13	0.0	0.353	5.9	LOS A	1.7	11.9	0.48	0.52	48.8
3	R	205	0.0	0.353	12.7	LOS B	1.7	11.9	0.48	0.79	45.4
Approach		380	0.0	0.353	10.0	LOS A	1.7	11.9	0.48	0.70	46.8
East: Foxwell Road E											
4	L	26	0.0	0.110	5.8	LOS A	0.5	3.6	0.24	0.51	50.7
5	T	278	0.0	0.110	4.8	LOS A	0.5	3.6	0.25	0.41	51.5
6	R	1	0.0	0.110	11.6	LOS B	0.5	3.6	0.25	0.87	46.8
Approach		305	0.0	0.110	4.9	LOS A	0.5	3.6	0.24	0.42	51.5
North: Finnegan Way											
7	L	6	0.0	0.127	7.7	LOS A	0.6	3.9	0.57	0.68	47.8
8	T	12	0.0	0.127	6.9	LOS A	0.6	3.9	0.57	0.61	47.8
9	R	92	0.0	0.127	13.7	LOS B	0.6	3.9	0.57	0.82	44.7
Approach		109	0.0	0.127	12.6	LOS B	0.6	3.9	0.57	0.79	45.2
West: Foxwell Road W											
10	L	160	0.0	0.282	6.2	LOS A	1.6	11.0	0.38	0.56	49.8
11	T	558	0.0	0.282	5.2	LOS A	1.6	11.0	0.39	0.47	50.3
12	R	16	0.0	0.282	12.1	LOS B	1.5	10.7	0.40	0.85	46.7
Approach		734	0.0	0.282	5.6	LOS A	1.6	11.0	0.39	0.50	50.1
All Vehicles		1528	0.0	0.353	7.0	LOS A	1.7	11.9	0.40	0.55	49.1

MOVEMENT SUMMARY

Site: AM 2021 With Development

Foxwell Road & Shipper Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Shipper Drive											
1	L	149	0.0	0.326	8.2	LOS A	1.7	11.9	0.72	0.73	47.3
2	T	25	0.0	0.326	7.4	LOS A	1.7	11.9	0.72	0.67	47.1
3	R	69	0.0	0.326	14.2	LOS B	1.7	11.9	0.72	0.95	44.8
Approach		243	0.0	0.326	9.9	LOS A	1.7	11.9	0.72	0.79	46.5
East: Foxwell Road E											
4	L	213	0.0	0.550	11.8	LOS B	5.0	34.8	0.84	0.94	45.8
5	T	732	0.0	0.550	11.5	LOS B	5.0	34.8	0.84	0.95	45.6
6	R	11	0.0	0.550	18.8	LOS B	4.6	32.3	0.83	1.07	42.1
Approach		956	0.0	0.550	11.6	LOS B	5.0	34.8	0.84	0.95	45.6
North: Finnegan Way											
7	L	7	0.0	0.266	8.4	LOS A	1.2	8.7	0.64	0.74	47.6
8	T	71	0.0	0.266	7.6	LOS A	1.2	8.7	0.64	0.67	47.5
9	R	143	0.0	0.266	14.4	LOS B	1.2	8.7	0.64	0.91	44.4
Approach		221	0.0	0.266	12.0	LOS B	1.2	8.7	0.64	0.83	45.4
West: Foxwell Road W											
10	L	57	0.0	0.239	5.9	LOS A	1.3	9.0	0.28	0.52	50.5
11	T	237	0.0	0.239	4.9	LOS A	1.3	9.0	0.28	0.42	51.2
12	R	580	0.0	0.377	11.6	LOS B	2.4	17.1	0.30	0.63	45.5
Approach		874	0.0	0.377	9.4	LOS A	2.4	17.1	0.29	0.57	47.1
All Vehicles		2294	0.0	0.550	10.6	LOS B	5.0	34.8	0.60	0.78	46.3

MOVEMENT SUMMARY

Site: PM 2021 With Development

Foxwell Road & Shipper Drive
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Shipper Drive											
1	L	614	0.0	0.855	11.7	LOS B	12.8	89.5	0.89	0.97	45.1
2	T	72	0.0	0.855	10.9	LOS B	12.8	89.5	0.89	0.95	45.2
3	R	275	0.0	0.855	17.7	LOS B	12.8	89.5	0.89	1.01	42.2
Approach		961	0.0	0.855	13.4	LOS B	12.8	89.5	0.89	0.98	44.2
East: Foxwell Road E											
4	L	55	0.0	0.137	6.7	LOS A	0.7	4.9	0.45	0.59	49.4
5	T	264	0.0	0.137	5.7	LOS A	0.7	4.9	0.46	0.52	49.8
6	R	1	0.0	0.137	12.6	LOS B	0.7	4.7	0.46	0.87	46.5
Approach		320	0.0	0.137	5.9	LOS A	0.7	4.9	0.46	0.53	49.8
North: Finnegan Way											
7	L	6	0.0	0.176	8.7	LOS A	0.8	5.9	0.69	0.77	47.2
8	T	33	0.0	0.176	7.9	LOS A	0.8	5.9	0.69	0.71	47.0
9	R	87	0.0	0.176	14.7	LOS B	0.8	5.9	0.69	0.91	44.1
Approach		126	0.0	0.176	12.7	LOS B	0.8	5.9	0.69	0.85	44.9
West: Foxwell Road W											
10	L	152	0.0	0.411	6.9	LOS A	2.9	20.2	0.59	0.61	48.7
11	T	530	0.0	0.411	5.9	LOS A	2.9	20.2	0.60	0.54	48.4
12	R	256	0.0	0.411	12.9	LOS B	2.8	19.3	0.61	0.79	45.3
Approach		938	0.0	0.411	8.0	LOS A	2.9	20.2	0.60	0.62	47.5
All Vehicles		2345	0.0	0.855	10.2	LOS B	12.8	89.5	0.70	0.77	46.2

MOVEMENT SUMMARY

Site: AM 2021 Without Development

Waterway Drive and Beatie Road
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Waterway Drive											
1	L	1	0.0	0.003	7.4	LOS A	0.0	0.1	0.41	0.50	48.7
2	T	1	0.0	0.003	6.5	LOS A	0.0	0.1	0.41	0.44	49.0
3	R	1	0.0	0.003	12.3	LOS B	0.0	0.1	0.41	0.68	45.7
Approach		3	0.0	0.003	8.8	LOS A	0.0	0.1	0.41	0.54	47.7
East: Beattie Road E											
4	L	1	0.0	0.033	7.4	LOS A	0.2	1.1	0.39	0.54	48.7
5	T	18	0.0	0.033	6.5	LOS A	0.2	1.1	0.39	0.48	49.1
6	R	19	0.0	0.033	12.2	LOS B	0.2	1.1	0.39	0.72	45.7
Approach		38	0.0	0.033	9.4	LOS A	0.2	1.1	0.39	0.60	47.3
North: Waterway Drive											
7	L	13	0.0	0.186	6.4	LOS A	1.0	7.0	0.14	0.47	50.1
8	T	3	0.0	0.186	5.5	LOS A	1.0	7.0	0.14	0.39	50.9
9	R	266	0.0	0.186	11.3	LOS B	1.0	7.0	0.14	0.66	46.0
Approach		282	0.0	0.186	11.0	LOS B	1.0	7.0	0.14	0.65	46.2
West: Beattie Road W											
10	L	287	0.0	0.203	6.3	LOS A	1.2	8.4	0.11	0.51	50.5
11	T	35	0.0	0.203	5.4	LOS A	1.2	8.4	0.11	0.42	51.4
12	R	1	0.0	0.203	11.2	LOS B	1.2	8.4	0.11	0.79	46.3
Approach		323	0.0	0.203	6.3	LOS A	1.2	8.4	0.11	0.50	50.6
All Vehicles		646	0.0	0.203	8.5	LOS A	1.2	8.4	0.14	0.57	48.3

MOVEMENT SUMMARY

Site: PM 2021 Without Development

Waterway Drive and Beatie Road
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Waterway Drive											
1	L	4	0.0	0.007	9.3	LOS A	0.0	0.3	0.60	0.58	47.6
2	T	1	0.0	0.007	8.4	LOS A	0.0	0.3	0.60	0.54	47.7
3	R	1	0.0	0.007	14.2	LOS B	0.0	0.3	0.60	0.70	44.3
Approach		6	0.0	0.007	10.0	LOS A	0.0	0.3	0.60	0.59	47.0
East: Beattie Road E											
4	L	1	0.0	0.088	9.1	LOS A	0.5	3.3	0.58	0.68	48.1
5	T	69	0.0	0.088	8.2	LOS A	0.5	3.3	0.58	0.63	48.1
6	R	12	0.0	0.088	14.0	LOS B	0.5	3.3	0.58	0.82	44.8
Approach		82	0.0	0.088	9.0	LOS A	0.5	3.3	0.58	0.66	47.6
North: Waterway Drive											
7	L	4	0.0	0.337	6.3	LOS A	2.1	14.9	0.08	0.47	50.6
8	T	1	0.0	0.337	5.4	LOS A	2.1	14.9	0.08	0.39	51.6
9	R	564	0.0	0.337	11.1	LOS B	2.1	14.9	0.08	0.68	46.2
Approach		569	0.0	0.337	11.1	LOS B	2.1	14.9	0.08	0.67	46.2
West: Beattie Road W											
10	L	258	0.0	0.165	6.3	LOS A	1.0	6.9	0.09	0.51	50.6
11	T	8	0.0	0.165	5.4	LOS A	1.0	6.9	0.09	0.42	51.6
12	R	1	0.0	0.165	11.2	LOS B	1.0	6.9	0.09	0.79	46.4
Approach		267	0.0	0.165	6.3	LOS A	1.0	6.9	0.09	0.51	50.7
All Vehicles		925	0.0	0.337	9.5	LOS A	2.1	14.9	0.13	0.62	47.5

MOVEMENT SUMMARY

Site: AM 2021 With Development

Waterway Drive and Beatie Road
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Waterway Drive											
1	L	1	0.0	0.003	7.7	LOS A	0.0	0.1	0.44	0.51	48.4
2	T	1	0.0	0.003	6.8	LOS A	0.0	0.1	0.44	0.45	48.7
3	R	1	0.0	0.003	12.5	LOS B	0.0	0.1	0.44	0.68	45.6
Approach		3	0.0	0.003	9.0	LOS A	0.0	0.1	0.44	0.55	47.5
East: Beattie Road E											
4	L	1	0.0	0.034	7.6	LOS A	0.2	1.2	0.43	0.56	48.5
5	T	18	0.0	0.034	6.7	LOS A	0.2	1.2	0.43	0.50	48.8
6	R	19	0.0	0.034	12.5	LOS B	0.2	1.2	0.43	0.73	45.6
Approach		38	0.0	0.034	9.6	LOS A	0.2	1.2	0.43	0.62	47.1
North: Waterway Drive											
7	L	13	0.0	0.220	6.4	LOS A	1.2	8.6	0.15	0.47	50.1
8	T	3	0.0	0.220	5.5	LOS A	1.2	8.6	0.15	0.39	50.9
9	R	320	0.0	0.220	11.3	LOS B	1.2	8.6	0.15	0.66	45.9
Approach		336	0.0	0.220	11.0	LOS B	1.2	8.6	0.15	0.65	46.1
West: Beattie Road W											
10	L	361	0.0	0.247	6.3	LOS A	1.6	10.9	0.12	0.51	50.5
11	T	35	0.0	0.247	5.4	LOS A	1.6	10.9	0.12	0.42	51.3
12	R	1	0.0	0.247	11.2	LOS B	1.6	10.9	0.12	0.78	46.3
Approach		397	0.0	0.247	6.3	LOS A	1.6	10.9	0.12	0.50	50.5
All Vehicles		774	0.0	0.247	8.5	LOS A	1.6	10.9	0.15	0.57	48.3

MOVEMENT SUMMARY

Site: PM 2021 With Development

Waterway Drive and Beatie Road
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Waterway Drive											
1	L	4	0.0	0.008	11.2	LOS B	0.0	0.3	0.70	0.61	45.8
2	T	1	0.0	0.008	10.3	LOS B	0.0	0.3	0.70	0.58	46.2
3	R	1	0.0	0.008	16.0	LOS B	0.0	0.3	0.70	0.70	42.9
Approach		6	0.0	0.008	11.8	LOS B	0.0	0.3	0.70	0.62	45.4
East: Beattie Road E											
4	L	1	0.0	0.103	10.9	LOS B	0.6	4.2	0.69	0.74	46.6
5	T	69	0.0	0.103	10.0	LOS A	0.6	4.2	0.69	0.71	46.9
6	R	12	0.0	0.103	15.7	LOS B	0.6	4.2	0.69	0.85	43.5
Approach		82	0.0	0.103	10.8	LOS B	0.6	4.2	0.69	0.73	46.4
North: Waterway Drive											
7	L	4	0.0	0.457	6.3	LOS A	3.4	23.9	0.09	0.47	50.5
8	T	1	0.0	0.457	5.4	LOS A	3.4	23.9	0.09	0.39	51.5
9	R	775	0.0	0.457	11.2	LOS B	3.4	23.9	0.09	0.67	46.2
Approach		780	0.0	0.457	11.1	LOS B	3.4	23.9	0.09	0.67	46.2
West: Beattie Road W											
10	L	319	0.0	0.201	6.3	LOS A	1.3	8.9	0.09	0.51	50.6
11	T	8	0.0	0.201	5.4	LOS A	1.3	8.9	0.09	0.42	51.6
12	R	1	0.0	0.201	11.2	LOS B	1.3	8.9	0.09	0.79	46.4
Approach		328	0.0	0.201	6.3	LOS A	1.3	8.9	0.09	0.51	50.6
All Vehicles		1197	0.0	0.457	9.8	LOS A	3.4	23.9	0.13	0.63	47.3

MOVEMENT SUMMARY

Site: AM 2021 With Development

Shipper Drive, Waterway Drive and Proposed Access Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Waterway Drive											
1	L	138	0.0	0.162	6.8	LOS A	0.9	6.4	0.30	0.53	49.4
2	T	66	0.0	0.162	5.9	LOS A	0.9	6.4	0.30	0.46	50.0
3	R	7	0.0	0.162	11.7	LOS B	0.9	6.4	0.30	0.76	46.1
Approach		212	0.0	0.162	6.7	LOS A	0.9	6.4	0.30	0.52	49.4
East: Shipper Drive E											
4	L	6	0.0	0.010	8.0	LOS A	0.1	0.4	0.48	0.55	48.3
5	T	3	0.0	0.010	7.1	LOS A	0.1	0.4	0.48	0.50	48.6
6	R	1	0.0	0.010	12.8	LOS B	0.1	0.4	0.48	0.72	45.5
Approach		11	0.0	0.010	8.2	LOS A	0.1	0.4	0.48	0.55	48.1
North: Proposed Access											
7	L	1	0.0	0.135	7.6	LOS A	0.7	5.1	0.44	0.57	48.2
8	T	38	0.0	0.135	6.7	LOS A	0.7	5.1	0.44	0.52	48.5
9	R	114	0.0	0.135	12.4	LOS B	0.7	5.1	0.44	0.72	45.2
Approach		153	0.0	0.135	11.0	LOS B	0.7	5.1	0.44	0.67	46.0
West: Shipper Drive W											
10	L	467	0.0	0.498	6.7	LOS A	4.1	28.5	0.32	0.50	49.1
11	T	15	0.0	0.498	5.8	LOS A	4.1	28.5	0.32	0.44	49.6
12	R	256	0.0	0.498	11.6	LOS B	4.1	28.5	0.32	0.69	45.7
Approach		738	0.0	0.498	8.4	LOS A	4.1	28.5	0.32	0.57	47.8
All Vehicles		1113	0.0	0.498	8.4	LOS A	4.1	28.5	0.33	0.57	47.8

MOVEMENT SUMMARY

Site: PM 2021 With Development

Shipper Drive, Waterway Drive and Proposed Access Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Waterway Drive											
1	L	299	0.0	0.358	9.0	LOS A	2.4	16.6	0.66	0.73	47.3
2	T	49	0.0	0.358	8.1	LOS A	2.4	16.6	0.66	0.69	47.3
3	R	1	0.0	0.358	13.8	LOS B	2.4	16.6	0.66	0.83	44.8
Approach		349	0.0	0.358	8.8	LOS A	2.4	16.6	0.66	0.72	47.3
East: Shipper Drive E											
4	L	6	0.0	0.014	10.2	LOS B	0.1	0.6	0.70	0.63	46.9
5	T	3	0.0	0.014	9.3	LOS A	0.1	0.6	0.70	0.60	47.1
6	R	1	0.0	0.014	15.1	LOS B	0.1	0.6	0.70	0.72	43.7
Approach		11	0.0	0.014	10.4	LOS B	0.1	0.6	0.70	0.63	46.6
North: Proposed Access											
7	L	1	0.0	0.451	7.3	LOS A	3.3	22.8	0.45	0.56	48.2
8	T	147	0.0	0.451	6.4	LOS A	3.3	22.8	0.45	0.51	48.5
9	R	442	0.0	0.451	12.2	LOS B	3.3	22.8	0.45	0.70	45.2
Approach		591	0.0	0.451	10.7	LOS B	3.3	22.8	0.45	0.65	45.9
West: Shipper Drive W											
10	L	178	0.0	0.233	6.5	LOS A	1.5	10.6	0.21	0.49	49.7
11	T	1	0.0	0.233	5.6	LOS A	1.5	10.6	0.21	0.41	50.4
12	R	164	0.0	0.233	11.3	LOS B	1.5	10.6	0.21	0.69	45.9
Approach		343	0.0	0.233	8.8	LOS A	1.5	10.6	0.21	0.59	47.8
All Vehicles		1294	0.0	0.451	9.7	LOS A	3.3	22.8	0.44	0.65	46.8

MOVEMENT SUMMARY

Site: AM 2021 With Development

Shipper Drive, Ford Rd and Proposed Access
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ford Road											
1	L	1	0.0	0.003	7.4	LOS A	0.0	0.1	0.41	0.50	48.7
2	T	1	0.0	0.003	6.5	LOS A	0.0	0.1	0.41	0.44	49.0
3	R	1	0.0	0.003	12.3	LOS B	0.0	0.1	0.41	0.68	45.7
Approach		3	0.0	0.003	8.7	LOS A	0.0	0.1	0.41	0.54	47.7
East: Shipper Drive E											
4	L	1	0.0	0.171	6.5	LOS A	1.0	7.1	0.19	0.53	50.1
5	T	226	0.0	0.171	5.6	LOS A	1.0	7.1	0.19	0.44	50.9
6	R	22	0.0	0.171	11.3	LOS B	1.0	7.1	0.19	0.82	46.4
Approach		249	0.0	0.171	6.1	LOS A	1.0	7.1	0.19	0.48	50.4
North: Proposed Access											
7	L	16	0.0	0.066	8.5	LOS A	0.3	2.4	0.53	0.61	47.5
8	T	1	0.0	0.066	7.6	LOS A	0.3	2.4	0.53	0.57	47.7
9	R	48	0.0	0.066	13.3	LOS B	0.3	2.4	0.53	0.72	44.6
Approach		65	0.0	0.066	12.1	LOS B	0.3	2.4	0.53	0.69	45.3
West: Shipper Drive W											
10	L	200	0.0	0.414	6.4	LOS A	3.0	20.9	0.14	0.53	50.4
11	T	474	0.0	0.414	5.5	LOS A	3.0	20.9	0.14	0.44	51.2
12	R	1	0.0	0.414	11.2	LOS B	3.0	20.9	0.14	0.83	46.4
Approach		675	0.0	0.414	5.8	LOS A	3.0	20.9	0.14	0.46	51.0
All Vehicles		993	0.0	0.414	6.3	LOS A	3.0	20.9	0.18	0.48	50.4

MOVEMENT SUMMARY

Site: PM 2021 With Development

Shipper Drive, Ford Rd and Proposed Access
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ford Road											
1	L	1	0.0	0.004	9.8	LOS A	0.0	0.2	0.67	0.57	47.1
2	T	1	0.0	0.004	8.9	LOS A	0.0	0.2	0.67	0.53	47.1
3	R	1	0.0	0.004	14.6	LOS B	0.0	0.2	0.67	0.66	44.0
Approach		3	0.0	0.004	11.1	LOS B	0.0	0.2	0.67	0.59	46.0
East: Shipper Drive E											
4	L	1	0.0	0.417	7.4	LOS A	3.0	20.8	0.48	0.61	48.7
5	T	505	0.0	0.417	6.5	LOS A	3.0	20.8	0.48	0.55	49.0
6	R	18	0.0	0.417	12.3	LOS B	3.0	20.8	0.48	0.80	46.2
Approach		524	0.0	0.417	6.7	LOS A	3.0	20.8	0.48	0.56	48.9
North: Proposed Access											
7	L	63	0.0	0.207	7.2	LOS A	1.1	7.9	0.37	0.54	48.6
8	T	1	0.0	0.207	6.3	LOS A	1.1	7.9	0.37	0.48	49.0
9	R	189	0.0	0.207	12.1	LOS B	1.1	7.9	0.37	0.69	45.2
Approach		254	0.0	0.207	10.8	LOS B	1.1	7.9	0.37	0.66	46.0
West: Shipper Drive W											
10	L	76	0.0	0.169	6.3	LOS A	1.0	6.9	0.11	0.53	50.6
11	T	189	0.0	0.169	5.4	LOS A	1.0	6.9	0.11	0.44	51.5
12	R	1	0.0	0.169	11.2	LOS B	1.0	6.9	0.11	0.85	46.4
Approach		266	0.0	0.169	5.7	LOS A	1.0	6.9	0.11	0.47	51.2
All Vehicles		1047	0.0	0.417	7.5	LOS A	3.0	20.8	0.36	0.56	48.7

MOVEMENT SUMMARY

Site: AM 2021 Without Development

Pacific Motorway / Foxwell Road Interchange
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Foxwell Road											
1	L	334	7.0	0.265	8.1	LOS A	1.9	13.8	0.81	0.75	47.8
2	T	34	0.0	0.265	7.8	LOS A	1.6	11.9	0.80	0.76	47.4
3	R	46	17.0	0.265	16.6	LOS B	1.6	11.9	0.80	0.96	44.3
Approach		414	7.5	0.265	9.1	LOS A	1.9	13.8	0.81	0.78	47.3
East: Foxwell Road											
4	L	536	7.0	0.907	19.2	LOS B	10.1	74.6	1.00	1.12	39.5
5	T	478	6.0	0.907	50.8	LOS D	16.6	121.8	1.00	1.66	25.5
6	R	7	0.0	0.907	64.6	LOS E	16.6	121.8	1.00	1.75	24.5
Approach		1021	6.5	0.907	34.3	LOS C	16.6	121.8	1.00	1.37	31.2
North: Service Road											
7	L	6	0.0	0.119	14.4	LOS B	0.9	6.3	0.99	0.88	44.0
8	T	60	4.0	0.119	13.4	LOS B	0.9	6.3	0.99	0.88	44.1
9	R	57	9.0	0.173	25.4	LOS C	0.9	7.1	0.89	0.96	37.7
Approach		123	6.1	0.173	19.0	LOS B	0.9	7.1	0.94	0.92	40.7
North West: Motorway Off-ramp											
27	L	137	12.9	0.182	6.4	LOS A	0.8	6.5	0.68	0.62	49.8
29	R	689	8.5	0.657	17.6	LOS B	5.7	42.8	0.84	1.08	42.6
Approach		826	9.2	0.657	15.8	LOS B	5.7	42.8	0.81	1.00	43.5
West: Motorway Overpass											
10	L	3	1.0	0.367	4.0	LOS A	2.9	21.6	0.31	0.38	52.0
11	T	536	6.0	0.367	3.0	LOS A	2.9	21.6	0.31	0.28	52.8
12	R	585	10.0	0.367	11.7	LOS B	2.9	21.6	0.32	0.65	46.4
Approach		1124	8.1	0.367	7.5	LOS A	2.9	21.6	0.31	0.47	49.0
All Vehicles		3508	7.8	0.907	17.8	LOS B	16.6	121.8	0.71	0.91	40.9

MOVEMENT SUMMARY

Site: PM 2021 Without Development

Pacific Motorway / Foxwell Road Interchange
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Foxwell Road											
1	L	488	7.0	0.423	9.4	LOS A	3.4	24.9	0.89	0.86	47.0
2	T	61	0.0	0.423	9.8	LOS A	3.0	22.4	0.87	0.92	46.2
3	R	91	17.0	0.423	18.6	LOS B	3.0	22.4	0.87	1.01	42.9
Approach		640	7.7	0.423	10.7	LOS B	3.4	24.9	0.88	0.89	46.2
East: Foxwell Road											
4	L	649	7.0	1.000 [3]	16.6	LOS B	10.1	74.6	1.00	1.06	41.5
5	T	606	6.0	1.308	302.1	LOS F	102.4	753.0	1.00	4.78	6.6
6	R	11	0.0	1.308	323.5	LOS F	102.4	753.0	1.00	4.97	7.0
Approach		1266	6.5	1.308	155.8	LOS F	102.4	753.0	1.00	2.87	11.5
North: Service Road											
7	L	6	0.0	0.109	12.3	LOS B	0.8	5.6	0.95	0.86	45.9
8	T	82	4.0	0.109	11.9	LOS B	0.8	5.6	0.93	0.86	45.2
9	R	23	9.0	0.109	22.0	LOS C	0.6	4.5	0.87	0.97	40.4
Approach		112	4.8	0.109	14.0	LOS B	0.8	5.6	0.92	0.88	44.1
North West: Motorway Off-ramp											
27	L	119	12.9	0.164	6.3	LOS A	0.8	5.9	0.68	0.61	49.7
29	R	707	8.2	0.683	18.0	LOS B	6.3	47.4	0.86	1.09	42.4
Approach		826	8.9	0.683	16.3	LOS B	6.3	47.4	0.84	1.02	43.2
West: Motorway Overpass											
10	L	44	1.0	0.330	4.3	LOS A	2.5	18.9	0.41	0.40	50.8
11	T	273	6.0	0.330	3.2	LOS A	2.5	18.9	0.41	0.32	51.2
12	R	649	10.0	0.330	12.0	LOS B	2.5	18.9	0.43	0.66	46.1
Approach		966	8.5	0.330	9.1	LOS A	2.5	18.9	0.42	0.55	47.5
All Vehicles		3811	7.7	1.308	59.8	LOS E	102.4	753.0	0.80	1.49	23.7

MOVEMENT SUMMARY

Site: AM 2021 With Development

Pacific Motorway / Foxwell Road Interchange
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Foxwell Road											
1	L	334	7.0	0.257	8.1	LOS A	1.8	13.5	0.80	0.75	47.9
2	T	34	0.0	0.257	7.8	LOS A	1.6	11.7	0.79	0.76	47.5
3	R	46	17.0	0.257	16.5	LOS B	1.6	11.7	0.79	0.94	44.4
Approach		414	7.5	0.257	9.0	LOS A	1.8	13.5	0.80	0.77	47.4
East: Foxwell Road											
4	L	558	7.0	1.000[3]	18.2	LOS B	10.1	74.6	1.00	1.02	40.2
5	T	511	6.0	1.218	240.2	LOS F	72.7	535.0	1.00	3.69	8.1
6	R	7	0.0	1.218	262.0	LOS F	72.7	535.0	1.00	3.86	8.5
Approach		1076	6.5	1.218	125.2	LOS F	72.7	535.0	1.00	2.31	13.7
North: Service Road											
7	L	6	0.0	0.166	20.0	LOS B	1.2	8.6	1.00	0.96	39.6
8	T	60	4.0	0.166	19.0	LOS B	1.2	8.6	1.00	0.96	39.8
9	R	57	9.0	0.256	32.9	LOS C	1.3	9.8	0.91	0.97	33.9
Approach		123	6.1	0.256	25.4	LOS C	1.3	9.8	0.96	0.97	36.6
North West: Motorway Off-ramp											
27	L	211	12.9	0.307	7.5	LOS A	1.5	12.0	0.76	0.73	49.1
29	R	689	8.5	0.718	20.4	LOS C	7.2	54.1	0.90	1.17	40.7
Approach		900	9.5	0.718	17.4	LOS B	7.2	54.1	0.87	1.07	42.2
West: Motorway Overpass											
10	L	3	1.0	0.438	4.0	LOS A	3.8	27.8	0.33	0.39	52.0
11	T	759	6.0	0.438	3.0	LOS A	3.8	27.8	0.33	0.29	52.8
12	R	585	10.0	0.438	11.7	LOS B	3.8	27.8	0.34	0.62	46.1
Approach		1347	7.7	0.438	6.8	LOS A	3.8	27.8	0.33	0.43	49.4
All Vehicles		3860	7.7	1.218	43.1	LOS D	72.7	535.0	0.71	1.16	28.3

MOVEMENT SUMMARY

Site: PM 2021 With Development

Pacific Motorway / Foxwell Road Interchange
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Foxwell Road											
1	L	488	7.0	0.463	11.3	LOS B	4.2	31.3	0.95	0.95	46.0
2	T	61	0.0	0.463	11.9	LOS B	3.7	27.5	0.92	0.99	44.2
3	R	91	17.0	0.463	20.7	LOS C	3.7	27.5	0.92	1.05	41.5
Approach		640	7.7	0.463	12.6	LOS B	4.2	31.3	0.95	0.97	45.0
East: Foxwell Road											
4	L	459	7.0	1.000 [3]	25.8	LOS C	10.0	74.6	1.00	1.15	35.3
5	T	733	6.0	1.558	530.8	LOS F	248.3	1830.9	1.00	8.13	4.0
6	R	11	0.0	1.558	539.2	LOS F	248.3	1830.9	1.00	8.16	4.4
Approach		1477	6.5	1.558	374.1	LOS F	248.3	1830.9	1.00	5.47	6.0
North: Service Road											
7	L	6	0.0	0.121	14.0	LOS B	0.9	6.4	0.99	0.89	44.4
8	T	82	4.0	0.121	13.6	LOS B	0.9	6.4	0.96	0.89	43.7
9	R	23	9.0	0.121	23.9	LOS C	0.7	5.0	0.89	0.98	39.3
Approach		112	4.8	0.121	15.8	LOS B	0.9	6.4	0.95	0.91	42.6
North West: Motorway Off-ramp											
27	L	151	12.9	0.212	6.6	LOS A	1.0	8.0	0.72	0.64	49.4
29	R	707	8.2	0.713	19.2	LOS B	7.0	52.7	0.89	1.14	41.6
Approach		858	9.0	0.713	17.0	LOS B	7.0	52.7	0.86	1.05	42.6
West: Motorway Overpass											
10	L	44	1.0	0.362	4.3	LOS A	2.9	21.7	0.43	0.40	50.8
11	T	368	6.0	0.362	3.2	LOS A	2.9	21.7	0.43	0.32	51.2
12	R	649	10.0	0.362	12.0	LOS B	2.9	21.7	0.44	0.66	46.0
Approach		1062	8.2	0.362	8.6	LOS A	2.9	21.7	0.44	0.53	47.7
All Vehicles		4148	7.6	1.558	141.2	LOS F	248.3	1830.9	0.82	2.11	15.4

MOVEMENT SUMMARY

Site: AM 2021 With Development & Traffic Signal

Pacific Motorway / Foxwell Road Interchange
Roundabout Metering

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Foxwell Road											
1	L	334	7.0	0.222	6.7	LOS A	1.5	11.1	0.71	0.61	48.6
2	T	34	0.0	0.222	6.0	LOS A	1.3	9.8	0.71	0.60	48.3
3	R	46	17.0	0.222	14.8	LOS B	1.3	9.8	0.71	0.87	45.6
Approach		414	7.5	0.222	7.5	LOS A	1.5	11.1	0.71	0.64	48.1
East: Foxwell Road											
4	L	558	7.0	0.952	14.9	LOS B	10.1	74.6	1.00	1.11	42.9
5	T	511	6.0	0.952	34.9	LOS C	14.1	103.8	1.00	1.54	31.0
6	R	7	0.0	0.952	46.2	LOS D	14.1	103.8	1.00	1.60	29.8
Approach		1076	6.5	0.952	24.6	LOS C	14.1	103.8	1.00	1.32	36.1
North: Service Road											
7	L	6	0.0	0.135	9.9	LOS A	0.7	4.9	0.84	0.90	48.2
8	T	60	4.0	0.135	8.9	LOS A	0.7	4.9	0.84	0.87	48.4
9	R	57	9.0	0.163	18.4	LOS B	0.6	4.8	0.82	0.93	42.0
Approach		123	6.1	0.163	13.4	LOS B	0.7	4.9	0.83	0.90	45.0
North West: Motorway Off-ramp											
27	L	211	12.9	0.330	5.6	LOS A	1.9	14.7	0.76	0.54	49.1
29	R	689	8.5	0.778	17.9	LOS B	9.3	69.9	1.00	0.99	42.4
Approach		900	9.5	0.778	15.0	LOS B	9.3	69.9	0.94	0.88	43.6
West: Motorway Overpass											
10	L	3	1.0	0.796	15.4	LOS B	24.6	181.2	0.92	0.76	43.2
11	T	759	6.0	0.796	14.4	LOS B	24.6	181.2	0.92	0.75	43.4
12	R	585	10.0	0.796	21.3	LOS C	24.6	181.2	0.92	0.79	40.0
Approach		1347	7.7	0.796	17.4	LOS B	24.6	181.2	0.92	0.77	41.7
All Vehicles		3860	7.7	0.952	17.7	LOS B	24.6	181.2	0.92	0.94	41.2

MOVEMENT SUMMARY

Site: PM 2021 With Development & Traffic Signal

Pacific Motorway / Foxwell Road Interchange
Roundabout Metering

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Foxwell Road											
1	L	488	7.0	0.447	5.9	LOS A	2.1	15.6	0.74	0.54	48.3
2	T	61	0.0	0.447	4.8	LOS A	1.6	12.2	0.73	0.50	47.9
3	R	91	17.0	0.447	13.6	LOS B	1.6	12.2	0.73	0.94	46.4
Approach		640	7.7	0.447	6.9	LOS A	2.1	15.6	0.74	0.59	48.0
East: Foxwell Road											
4	L	528	7.0	1.011	24.4	LOS C	10.0	74.3	1.00	1.49	36.1
5	T	733	6.0	1.324	298.6	LOS F	152.0	1120.1	1.00	7.93	6.7
6	R	11	0.0	1.324	307.0	LOS F	152.0	1120.1	1.00	7.97	7.3
Approach		1477	6.5	1.324	200.9	LOS F	152.0	1120.1	1.00	5.26	10.1
North: Service Road											
7	L	6	0.0	0.098	6.1	LOS A	0.4	2.8	0.71	0.56	49.5
8	T	82	4.0	0.098	5.1	LOS A	0.4	2.8	0.72	0.51	49.0
9	R	23	9.0	0.098	13.8	LOS B	0.3	2.1	0.73	0.96	46.3
Approach		112	4.8	0.098	7.0	LOS A	0.4	2.8	0.72	0.60	48.4
North West: Motorway Off-ramp											
27	L	151	12.9	0.216	3.8	LOS A	0.6	4.9	0.51	0.35	51.3
29	R	707	8.2	0.675	13.1	LOS B	3.7	27.9	0.75	0.75	43.9
Approach		858	9.0	0.675	11.5	LOS B	3.7	27.9	0.70	0.68	44.8
West: Motorway Overpass											
10	L	44	1.0	0.984	39.8	LOS D	21.7	161.0	1.00	1.88	28.8
11	T	368	6.0	0.984	38.8	LOS D	21.7	161.0	1.00	1.88	29.0
12	R	649	10.0	0.984	41.8	LOS D	21.7	161.0	1.00	1.66	30.5
Approach		1062	8.2	0.984	40.7	LOS D	21.7	161.0	1.00	1.75	29.9
All Vehicles		4148	7.6	1.324	85.5	LOS F	152.0	1120.1	0.89	2.31	20.5

MOVEMENT SUMMARY

Site: AM 2021 Without Development

Pacific Motorway / Days Rd Interchange
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Abraham Rd											
1	L	105	10.0	0.501	12.7	LOS B	3.5	26.0	0.90	1.03	45.6
2	T	252	6.0	0.501	11.2	LOS B	3.5	26.0	0.90	1.01	45.5
3	R	200	10.0	0.501	22.2	LOS C	2.9	21.9	0.86	1.04	39.0
Approach		557	8.2	0.501	15.5	LOS B	3.5	26.0	0.89	1.03	42.8
South East: Motorway Off-ramp											
21	L	488	6.6	1.377	370.0	LOS F	147.3	1100.4	1.00	6.34	5.4
23	R	785	10.0	1.377	381.4	LOS F	147.3	1100.4	1.00	5.48	5.8
Approach		1274	8.7	1.377	377.0	LOS F	147.3	1100.4	1.00	5.81	5.6
East: Motorway Overpass											
4	L	762	5.0	0.694	5.3	LOS A	10.6	77.5	0.32	0.42	50.7
5	T	508	7.0	0.694	3.7	LOS A	10.6	77.5	0.32	0.30	51.7
6	R	432	10.0	0.659	13.0	LOS B	2.5	18.9	1.00	0.35	42.7
Approach		1702	6.9	0.694	6.8	LOS A	10.6	77.5	0.49	0.37	48.5
West: Days Rd											
10	L	155	10.0	0.321	13.2	LOS B	1.7	13.3	0.84	0.92	44.3
11	T	585	7.0	0.891	32.8	LOS C	15.6	115.9	1.00	1.63	31.7
12	R	34	10.0	0.891	40.8	LOS D	15.6	115.9	1.00	1.62	31.0
Approach		774	7.7	0.891	29.2	LOS C	15.6	115.9	0.97	1.49	33.5
All Vehicles		4306	7.7	1.377	121.4	LOS F	147.3	1100.4	0.78	2.26	14.2

MOVEMENT SUMMARY

Site: PM 2021 Without Development

Pacific Motorway / Days Rd Interchange
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Abraham Rd											
1	L	148	10.0	0.462	10.2	LOS B	2.9	22.0	0.83	0.95	47.8
2	T	316	6.0	0.462	9.2	LOS A	2.9	22.0	0.82	0.88	46.7
3	R	157	10.0	0.462	18.6	LOS B	2.6	19.3	0.81	1.02	41.8
Approach		621	8.0	0.462	11.8	LOS B	2.9	22.0	0.82	0.93	45.5
South East: Motorway Off-ramp											
21	L	377	5.6	1.255	269.9	LOS F	92.6	688.5	1.00	4.59	7.1
23	R	619	10.0	1.255	281.2	LOS F	92.6	688.5	1.00	4.01	7.6
Approach		996	8.3	1.255	277.0	LOS F	92.6	688.5	1.00	4.23	7.4
East: Motorway Overpass											
4	L	838	5.0	0.717	5.9	LOS A	9.8	72.0	0.59	0.50	48.8
5	T	316	7.0	0.717	4.3	LOS A	9.8	72.0	0.59	0.42	49.0
6	R	501	10.0	0.717	13.3	LOS B	9.8	72.0	0.96	0.57	43.0
Approach		1655	6.9	0.717	7.9	LOS A	9.8	72.0	0.70	0.50	46.8
West: Days Rd											
10	L	221	10.0	0.418	13.7	LOS B	2.4	18.1	0.82	0.96	43.9
11	T	593	7.0	0.921	32.9	LOS C	17.9	133.4	1.00	1.74	31.4
12	R	114	10.0	0.921	41.0	LOS D	17.9	133.4	1.00	1.73	30.8
Approach		927	8.1	0.921	29.3	LOS C	17.9	133.4	0.96	1.55	33.6
All Vehicles		4199	7.7	1.255	77.0	LOS E	92.6	688.5	0.85	1.68	19.6

MOVEMENT SUMMARY

Site: AM 2021 With Development

Pacific Motorway / Days Rd Interchange
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Abraham Rd											
1	L	105	10.0	0.514	12.9	LOS B	3.6	26.9	0.90	1.04	45.5
2	T	252	6.0	0.514	11.2	LOS B	3.6	26.9	0.90	1.02	45.6
3	R	219	10.0	0.514	22.5	LOS C	3.0	22.7	0.86	1.05	38.7
Approach		576	8.3	0.514	15.8	LOS B	3.6	26.9	0.89	1.03	42.5
South East: Motorway Off-ramp											
21	L	488	6.6	1.619	583.9	LOS F	226.4	1694.9	1.00	8.11	3.5
23	R	971	10.0	1.619	595.0	LOS F	226.4	1694.9	1.00	7.02	3.9
Approach		1459	8.9	1.619	591.3	LOS F	226.4	1694.9	1.00	7.39	3.7
East: Motorway Overpass											
4	L	767	5.0	0.699	5.3	LOS A	10.8	79.5	0.32	0.42	50.7
5	T	514	7.0	0.699	3.7	LOS A	10.8	79.5	0.32	0.30	51.7
6	R	454	10.0	0.688	13.0	LOS B	2.7	20.1	1.00	0.35	42.7
Approach		1735	6.9	0.699	6.9	LOS A	10.8	79.5	0.50	0.37	48.4
West: Days Rd											
10	L	155	10.0	0.327	13.7	LOS B	1.8	13.7	0.85	0.93	43.9
11	T	604	7.0	0.950	48.4	LOS D	22.3	165.7	1.00	1.97	25.9
12	R	34	10.0	0.950	56.4	LOS E	22.3	165.7	1.00	1.96	25.8
Approach		793	7.7	0.950	41.9	LOS D	22.3	165.7	0.97	1.77	28.1
All Vehicles		4562	7.8	1.619	201.0	LOS F	226.4	1694.9	0.79	2.94	9.5

MOVEMENT SUMMARY

Site: PM 2021 With Development

Pacific Motorway / Days Rd Interchange
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Abraham Rd											
1	L	148	10.0	0.482	10.3	LOS B	3.1	23.4	0.84	0.96	47.7
2	T	316	6.0	0.482	9.2	LOS A	3.1	23.4	0.84	0.89	46.6
3	R	165	10.0	0.482	18.7	LOS B	2.7	20.4	0.82	1.03	41.8
Approach		629	8.0	0.482	11.9	LOS B	3.1	23.4	0.84	0.94	45.4
South East: Motorway Off-ramp											
21	L	377	5.6	1.615	590.2	LOS F	172.0	1281.4	1.00	6.32	3.5
23	R	698	10.0	1.615	601.1	LOS F	172.0	1281.4	1.00	5.45	3.8
Approach		1075	8.5	1.615	597.2	LOS F	172.0	1281.4	1.00	5.76	3.7
East: Motorway Overpass											
4	L	859	5.0	0.772	6.1	LOS A	12.2	89.4	0.65	0.50	48.4
5	T	337	7.0	0.772	4.5	LOS A	12.2	89.4	0.65	0.44	48.4
6	R	585	10.0	0.772	13.5	LOS B	12.2	89.4	0.94	0.57	43.2
Approach		1781	7.0	0.772	8.2	LOS A	12.2	89.4	0.75	0.51	46.4
West: Days Rd											
10	L	221	10.0	0.420	13.5	LOS B	2.4	18.1	0.83	0.96	44.1
11	T	601	7.0	0.940	36.0	LOS D	19.6	146.0	1.00	1.83	30.1
12	R	114	10.0	0.940	44.0	LOS D	19.6	146.0	1.00	1.82	29.6
Approach		936	8.1	0.940	31.7	LOS C	19.6	146.0	0.96	1.62	32.4
All Vehicles		4421	7.7	1.615	156.9	LOS F	172.0	1281.4	0.87	2.08	11.6

MOVEMENT SUMMARY

Site: AM 2021 Without Development

Service Road & Beattie Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Service Road Sth											
2	T	695	5.0	0.368	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	8	5.0	0.007	9.3	LOS A	0.0	0.2	0.30	0.62	47.5
Approach		703	5.0	0.368	0.1	NA	0.0	0.2	0.00	0.01	59.8
East: Beattie Road											
4	L	4	0.0	0.005	9.7	LOS A	0.0	0.1	0.43	0.61	47.5
6	R	306	5.0	0.607	18.0	LOS C	4.5	33.0	0.70	1.08	40.2
Approach		310	4.9	0.607	17.9	LOS C	4.5	33.0	0.69	1.07	40.3
North: Service Road Nth											
7	L	396	5.0	0.278	7.8	LOS A	1.4	10.4	0.06	0.58	49.5
8	T	210	5.0	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		606	5.0	0.278	5.1	NA	1.4	10.4	0.04	0.38	52.6
All Vehicles		1619	5.0	0.607	5.4	NA	4.5	33.0	0.15	0.35	52.3

MOVEMENT SUMMARY

Site: PM 2021 Without Development

Service Road & Beattie Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Service Road Sth											
2	T	533	5.0	0.282	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	14	5.0	0.013	9.6	LOS A	0.0	0.4	0.35	0.64	47.4
Approach		547	5.0	0.282	0.2	NA	0.0	0.4	0.01	0.02	59.6
East: Beattie Road											
4	L	33	0.0	0.042	9.7	LOS A	0.1	1.0	0.43	0.67	47.5
6	R	375	5.0	0.737	21.2	LOS C	7.3	53.5	0.78	1.23	38.0
Approach		408	4.6	0.737	20.3	LOS C	7.3	53.5	0.75	1.19	38.6
North: Service Road Nth											
7	L	260	5.0	0.184	7.8	LOS A	0.8	6.2	0.07	0.57	49.4
8	T	266	5.0	0.141	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		526	5.0	0.184	3.9	NA	0.8	6.2	0.04	0.28	54.2
All Vehicles		1481	4.9	0.737	7.0	NA	7.3	53.5	0.22	0.43	50.3

MOVEMENT SUMMARY

Site: AM 2021 With Development

Service Road & Beattie Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Service Road Sth											
2	T	695	5.0	0.368	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	8	5.0	0.007	9.3	LOS A	0.0	0.2	0.30	0.62	47.5
Approach		703	5.0	0.368	0.1	NA	0.0	0.2	0.00	0.01	59.8
East: Beattie Road											
4	L	4	0.0	0.005	9.7	LOS A	0.0	0.1	0.43	0.61	47.5
6	R	336	5.0	0.666	19.3	LOS C	5.6	40.8	0.73	1.14	39.3
Approach		340	4.9	0.666	19.2	LOS C	5.6	40.8	0.73	1.13	39.4
North: Service Road Nth											
7	L	396	5.0	0.278	7.8	LOS A	1.4	10.4	0.06	0.58	49.5
8	T	210	5.0	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		606	5.0	0.278	5.1	NA	1.4	10.4	0.04	0.38	52.6
All Vehicles		1649	5.0	0.666	5.9	NA	5.6	40.8	0.17	0.38	51.7

MOVEMENT SUMMARY

Site: PM 2021 With Development

Service Road & Beattie Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Service Road Sth											
2	T	533	5.0	0.282	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	14	5.0	0.013	9.6	LOS A	0.0	0.4	0.35	0.64	47.4
Approach		547	5.0	0.282	0.2	NA	0.0	0.4	0.01	0.02	59.6
East: Beattie Road											
4	L	33	0.0	0.042	9.7	LOS A	0.1	1.0	0.43	0.67	47.5
6	R	495	5.0	0.972	48.6	LOS E	24.3	177.5	0.99	2.15	25.7
Approach		528	4.7	0.972	46.2	LOS E	24.3	177.5	0.96	2.05	26.4
North: Service Road Nth											
7	L	260	5.0	0.184	7.8	LOS A	0.8	6.2	0.07	0.57	49.4
8	T	266	5.0	0.141	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		526	5.0	0.184	3.9	NA	0.8	6.2	0.04	0.28	54.2
All Vehicles		1601	4.9	0.972	16.6	NA	24.3	177.5	0.33	0.78	41.3

Gold Coast International marine precinct

APPENDIX 9

Floodplain Management Addendum Report

Prepared By

BMT WBM

A part of BMT in Energy and Environment

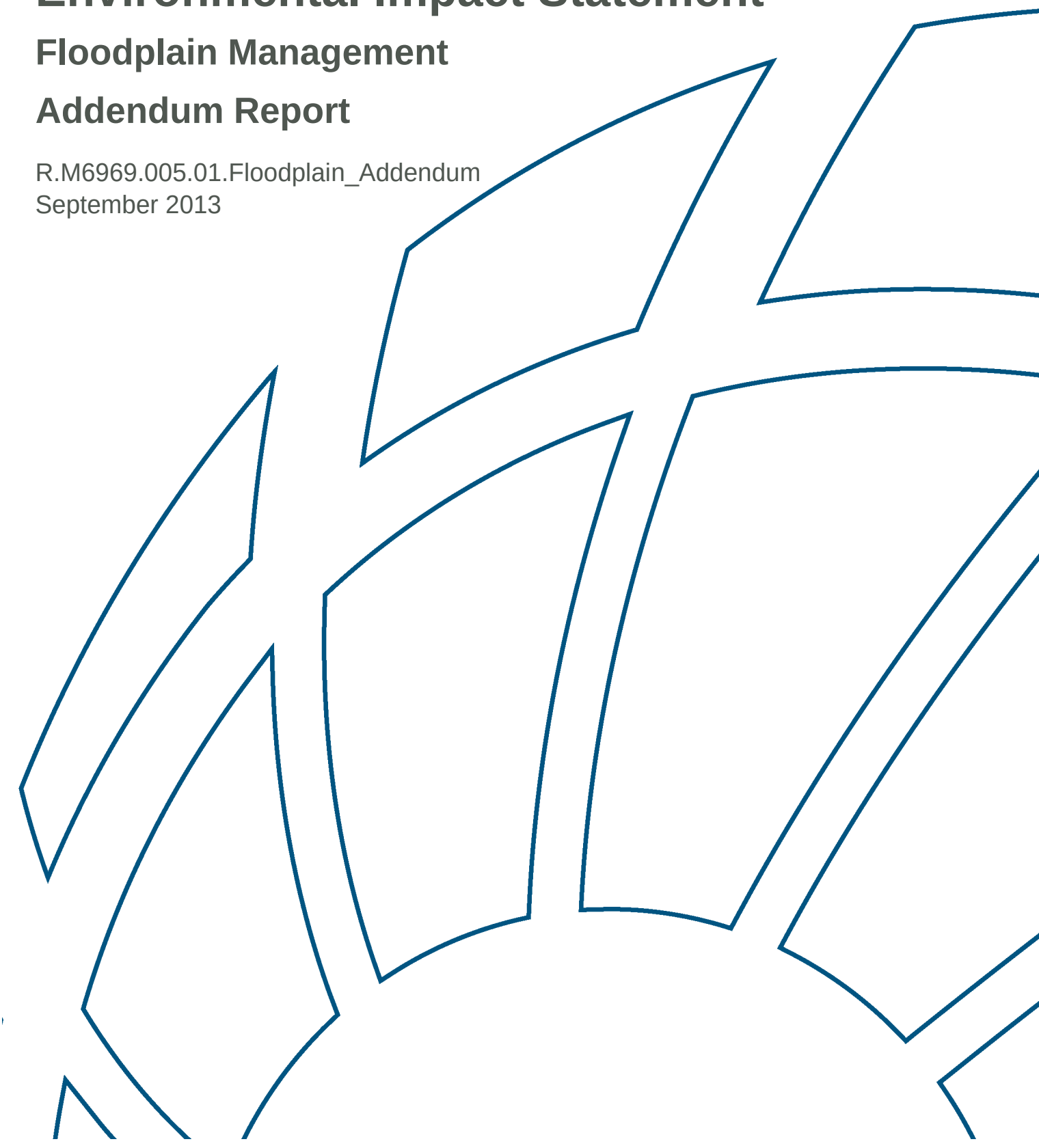
BMT WBM

Gold Coast International Marine Precinct Environmental Impact Statement

Floodplain Management

Addendum Report

R.M6969.005.01.Floodplain_Addendum
September 2013



DOCUMENT CONTROL SHEET

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Document :	R.M6969.005.01.Floodplain_Addendum
Project Manager :	Mark Jempson
Client :	Maritime Quays Pty Ltd c/- Planit Consulting
Client Contact:	Boyd Sargeant (Planit)
Client Reference	

Title :	Gold Coast International Marine Precinct Environmental Impact Statement Floodplain Management Addendum Report
Author :	Mark Jempson
Synopsis :	Floodplain management study for the Environmental Impact Statement for the Gold Coast International Marine Precinct

REVISION/CHECKING HISTORY

REVISION NUMBER	DATE OF ISSUE	CHECKED BY		ISSUED BY	
0	14/8/2012	JL		MAJ	
1	17/9/2013	DR		MAJ	

DISTRIBUTION

DESTINATION	REVISION		
	0	1	2
Planit Consulting	1	1	
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Contents

Figures

1.0 Introduction

The Gold Coast International Marine Precinct (GCIMP) development site (Site) is located on the northern banks of the Coomera River near Foxwell Island and covers an area of approximately 64 ha. The Site lies within the Gold Coast Marine Precinct (Precinct) and has been identified as principally Waterfront Industry on the relevant Gold Coast City Council (Council) Planning Scheme Map.

It is proposed to partially fill the site in accordance with Council guidelines (65% of the Site area), widen and deepen the channel between the Site and Foxwell Island and construct an internal marina basin. The Site will be filled to above the 100 year ARI flood level and the channel will be deepened to -4.0m AHD.

The BMT WBM report '*Gold Coast International Marine Precinct Environmental Impact Statement Floodplain Management'* (BMT WBM, 2012) presented investigations undertaken by BMT WBM in order to determine the fluvial flooding regime of the Site and quantify the likely impacts from the proposed development including:

- increased flood levels, increased flow velocities or increased time of flood inundation;
- increased hazard;
- real damages to private property.

BMT WBM (2012) also assessed the vulnerability of the proposed development to climate change influences associated with sea level rise and increased rainfall intensities.

This Addendum Report provides further information in response to issues submitted by Council and Queensland Rail. Specifically the submitted issues were (paraphrased):

- Increased flood levels may impact on the integrity of the railway infrastructure (Queensland Rail);
- Timing of the construction of the Department of Transport Main Roads (DTMR) Inter-Regional Transport Corridor (IRTC) is unknown and so an analysis should be undertaken without the IRTC corridor in the model (Council);
- An analysis should be undertaken with Oakey Creek only in flood (Council);
- The assessment against the Flood Affected Areas Code should be tabulated to assist in the review of the assessment.

This Addendum Report should be read in conjunction with BMT WBM (2012) so that the analyses and the interpretations of results are understood in context of the EIS framework.

2.0 Impacts on Queensland Rail Infrastructure

The Queensland Rail (QR) corridor is upstream (west) of the proposed GCIMP on the Oakey Creek catchment. QR requested that the Proponent contact Mark Batstone of QR to discuss changes to flood levels arising from the GCIMP project and the potential impact on the integrity of QR infrastructure. Mark Jempson of BMT WBM telephoned Mark Batstone on behalf of the Proponent on 20 August 2013 and then provided further information in an email on 27 August 2013. A copy of the email is provided in Appendix A.

Mark Batstone indicated that QR's areas of concern are that the proposed GCIMP would:

- increase flood levels causing overtopping and/or increasing the TOS of the rail line
- increase flood levels impacting on cabling (cabling typically runs alongside track but can be at ground level)
- increased flow rates and velocities through the culverts/bridges

BMT WBM undertook flood modelling as documented in BMT WBM (2012). On page 37 of the report, Table 3-1 lists the flood impact criteria and details compliance with the criteria. Criterion 1a (iii) states "*there should be only a minor increase in afflux upstream of the railway bridge adjacent to the Marine Precinct and this afflux should attenuate before any other properties are affected*". The compliance statement says "*The Site analysis indicates impacts of up to 0.044 m in the 100 year ARI event and up to 0.058 m in the 10 year ARI event. These increases do not result in overtopping of the railway*." The 100 year ARI flood level increases are mapped in Drawing No. 3-2 of the report.

The above comments refer to the rail line across the Oakey Creek floodplain. At this location the 100 year ARI flood level is approximately 3.3 m AHD, which is approximately 1 m below the rail embankment level. Therefore an increase of 0.044 m does not cause overtopping or significantly reduce the freeboard from flood level to embankment level. At the Coomera River and the Saltwater Creek bridges the deck is approximately 5 m above the 100 year ARI flood level and the increases in flood level are about 0.008 m at this location, and so there is no significant impact on the rail line at these locations.

With regards to impacts on duration of inundation, BMT WBM (2012) discusses this on page 58 with data presented in Figures 3-21 and 3-22. The discussion focuses on impacts on houses, but the data can be used to comment on the rail corridor at Oakey Creek. Because the rail is not overtopped there is no increase in duration of inundation of the rail. If considering the ground level around the rail (if cabling is running

at ground level), the report states that at a ground level of 1.15 m AHD the inundation under existing conditions would be more than 12 hours, and that the proposed development would increase this by 20 to 30 minutes. The general ground level at the rail corridor in the Oakey Creek floodplain would be similar to this if not a little higher. The increase in duration would be less at higher levels.

With regards to increased flow rates and velocities through the bridges/culverts, the modelling indicates that there would be no change or even a small decrease in velocity (and flow rate). This is shown in the velocity impact maps in BMT WBM (2012) (Drawing No 3-8 to 3-12). Around the rail line there is either no change or decreases in velocity.

Therefore it is concluded that the railway infrastructure will not be significantly impacted by the proposed GCIMP.

3.0 Assessment with no IRTC

The IRTC corridor passes through the GCIMP Site. BMT WBM considered it necessary to demonstrate an integrated solution (GCIMP and IRTC) with regards to management of flood flows, and so the flood modelling and impact assessment presented in BMT WBM (2012) included the proposed IRTC embankment and drainage structures (bridges and culverts). The IRTC was included in both the base case (no GCIMP) and developed case (with GCIMP) so that any impacts reported were from the GCIMP only.

Council submitted that it may be sometime before the IRTC is constructed and that the impact of the GCIMP on flood levels would be greater without the IRTC. Council came to this conclusion not by undertaking flood modelling, but by inference from a comparison of various models. This process was flawed because it did not take into account numerous upgrades to the Base Case model that were made by BMT WBM to better represent the existing conditions: these updates are documented in BMT WBM (2012).

For this Addendum report, BMT WBM has undertaken additional modelling with the IRTC removed from both the Base and Developed Cases. The assessment was undertaken for the Master Plan option only. The change in flood level for the 100, 50, 20, 10 and 5 year ARI events without the IRTC is shown in Figure 3-1 to Figure 3-5 respectively. A comparison between these figures and Figure 3-2 to Figure 3-6 in BMT WBM (2012) demonstrates that the presence or otherwise of the IRTC does not significantly alter the impacts.

In Figure 3-4 there is an unusual patterns of changes in flood level in the vicinity of Montereys Keys. A similar pattern was also evident in Figure 3-4 in BMT WBM (2012). This is a result of a minor numerical instability in the model in this region and is not representative of changes as a result of the GCIMP. In the immediate vicinity but away from this unusual pattern there are no changes in flood level within the 5 mm tolerance, and so it can be reasonably assumed that there are also no changes in the Monterey Keys area.

Therefore it is concluded that the results from the additional modelling without the IRTC does not alter the conclusions presented in BMT WBM (2012).

PROJECT TITLE
Gold Coast International Marine Precinct

DRAWING TITLE
Master Plan with IRTC removed
Change in Peak 100 Year ARI Flood Levels (static storm tide)
BASE PROVIDED BY GCCC

NO	DATE	REVISION	BY
A	13-09-13	Original Issue	DR

SCALE: 1:35,000 @ A4	DATE: September 2013
DESIGN: Planit Consulting	CHECKED: MJ
DRAWN: DR	DRAWNING NO: 3-1

BMT WBM

NORTH

Gold Coast International marine precinct

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BASE PROVIDED BY GCCC	

NO	DATE	REVISION	BY
A	13-09-13	Original Issue	DR

SCALE: 1:35,000 @ A4	DATE: September 2013
DESIGN: Planit Consulting	CHECKED: MJ
DRAWN: DR	DRAWNING NO: 3-2

BMT WBM

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Gold Coast International marine precinct

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PROJECT TITLE	Gold Coast International Marine Precinct
DRAWING TITLE	Master Plan with IRTC removed Change in Peak 20 Year ARI Flood Levels (static storm tide)
BASE PROVIDED BY GCCC	

NO	DATE	REVISION	BY
A	13-09-13	Original Issue	DR

SCALE: 1:35,000 @ A4	DATE: September 2013
DESIGN: Planit Consulting	CHECKED: MJ
DRAWN: DR	DRAWNING NO: 3-3

BMT WBM

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Gold Coast International marine precinct

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PROJECT TITLE
Gold Coast International Marine Precinct

DRAWING TITLE
Master Plan with IRTC removed
Change in Peak 10 Year ARI Flood Levels (static storm tide)
BASE PROVIDED BY GCCC

NO	DATE	REVISION	BY
A	13-09-13	Original Issue	DR

SCALE: 1:35,000 @ A4	DATE: September 2013
DESIGN: Planit Consulting	CHECKED: MJ
DRAWN: DR	DRAWNING NO: 3-4

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Gold Coast International marine precinct

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PROJECT TITLE
Gold Coast International Marine Precinct

DRAWING TITLE
Master Plan with IRTC removed
Change in Peak 5 Year ARI Flood Levels (static storm tide)

BASE PROVIDED BY GCCC

NO	DATE	REVISION	BY
A	13-09-13	Original Issue	DR

SCALE: 1:35,000 @ A4	DATE: September 2013
DESIGN: Planit Consulting	CHECKED: MJ
DRAWN: DR	DRAWNING NO: 3-5

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Gold Coast International marine precinct

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4.0 Local Catchment Analysis

Council submitted that the impact of the GCIMP should be considered under local catchment only flood conditions, the local catchment being the Oakey Creek catchment. Whilst the assessment in BMT WBM (2012) included local catchment flows, it was in combination with a longer duration regional flooding (Coomera River). For this Addendum report BMT WBM has undertaken an assessment of the impacts caused by the proposed GCIMP in a 100 year ARI local catchment only flooding.

To assist in undertaking the assessment, Council provided to BMT WBM a report *'Coomera – Oakey Creek Catchment, Stormwater Drainage Management Plan'* prepared by GHD for Council (GHD, 2004). For this report, GHD prepared an XP-RAFTS hydrological model and a HEC-RAS one-dimensional (1D) hydraulic model of the Oakey Creek catchment. Council provided these models to BMT WBM.

BMT WBM reviewed the models and determined that the XP-RAFTS model was fit-for-purpose for the GCIMP analysis but that the HEC-RAS model was not. The HEC-RAS model was considered unsuitable because it was steady state and 1D. Being steady state it is not properly representing the effects of storage, which are significant in the lower floodplain areas. The floodplain flow in the vicinity of the GCIMP and the potentially impacted areas is strongly two-dimensional (2D) in nature and it was considered the 1D HEC-RAS model was not adequately representing these flow patterns and would not adequately represent the altered flow patterns and loss of storage resulting from the GCIMP.

Therefore the analysis was done using the 2D MIKE21 hydraulic model used in BMT WBM (2012). Unsteady inflow boundaries for the local catchment flows were adopted from the XP-RAFTS model and the tailwater boundary of 2.32 m AHD was adopted from the HEC-RAS model. No regional flows from the Coomera River were included in the model. The 100 year ARI event was assessed for the 30 minute, 1, 3 and 6 hour storm events. It was found the peak flood levels typically occurred in the 1 hour storm event. A maximum envelope of flood levels was prepared using all duration events. The model was run for the Base and Developed (Master Plan only) cases.

Changes in peak flood level as a result of the proposed GCIMP are mapped in Figure 4-1and changes in peak flood velocity are mapped in Figure 4-2. These changes are for the local catchment flooding event (not the regional flood event). In both these figures the changes are colour mapped in bands to give an indication of the changes across the broader floodplain. Also shown in the figures are actual values at selected points to give an indication of the magnitude within the mapped

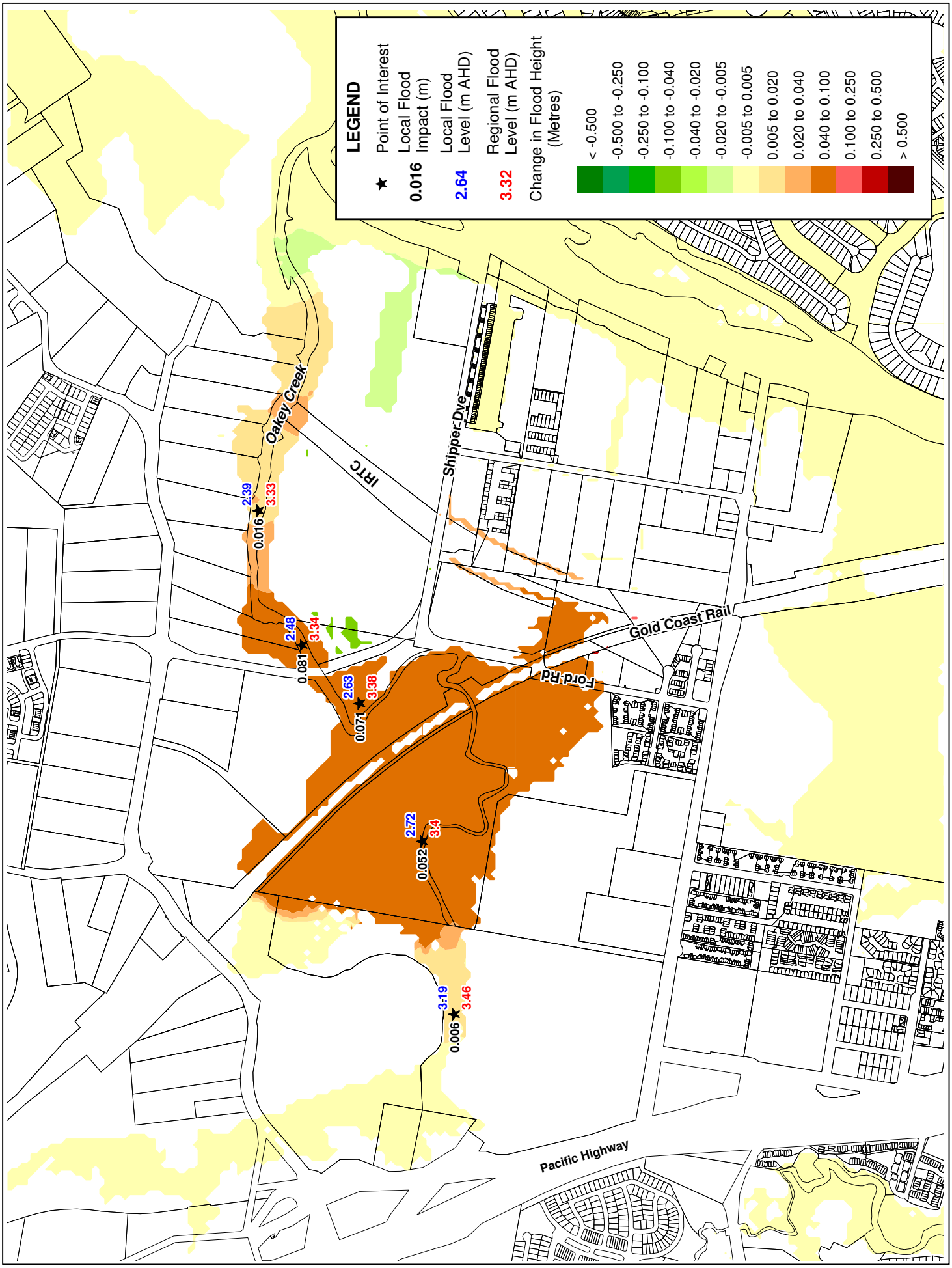
range. In Figure 4-1 design flood levels are shown at these locations as well as the change in flood level. One of the flood levels is the local catchment flood level and the other is the regional flood level: note that the difference shown on the maps is that between the developed and existing cases for the local catchment flood event, it is not the difference between the regional and local catchment flood level.

A comparison between Figure 4-1in this report (change in 100 year ARI local catchment flood levels) and Figure 3-2 in BMT WBM (2012) (change in 100 year ARI regional catchment flood levels) shows that the pattern of changes is very similar. In the 100 year ARI local catchment flood event the maximum change in flood level is approximately 0.081 m, and in the regional catchment flood the maximum change is approximately 0.044 m. Importantly though, the local catchment flood level is significantly lower than the regional flood level such that the greater increase in the local catchment flood level does not worsen the designated 100 year ARI flood level. For example and with reference to Figure 4-1, at the location where there is 0.081 m increase in the local catchment flood level, the actual local catchment flood level is 0.86 m lower than the regional flood level. The 100 year ARI flood level from local catchment flooding is typically between the 10 and 20 year ARI flood level from regional flooding.

Under local catchment flood conditions there are localised increases in velocity of up to 0.46 m/s in the 100 year ARI event. This compares with increases in the regional event as reported in BMT WBM (2012) of 0.3 m/s. The following conclusion in BMT WBM (2012) is still valid.

> *'In the rare floods such as the 20 to 50 year ARI events, the increases of up to about 0.3 m/s may cause minor localised scouring of the creek bed and of the banks if bare soil is exposed. If it is determined during the detailed design stage that there is a risk of erosion at this location, then minor reshaping and/or adjustment to the fill extent at this location would minimise the impacts.'*

Therefore it is concluded that the results from the additional modelling of the local catchment flooding does not alter the conclusions presented in BMT WBM (2012).



PROJECT TITLE
Gold Coast International Marine Precinct

NO	DATE	REVISION	BY
A	13-09-13	Original Issue	DR

DRAWING TITLE
Master Plan
Change in Peak 100 Year ARI Flood Levels (Oakey Creek Flooding)
BASE PROVIDED BY GCCC

SCALE: **1:15,000 @ A4**	DATE: **September 2013**
DESIGN: **Planit Consulting**	CHECKED: **MJ**
DRAWN: **DR**	DRAWNING NO: **4-1**

BMT WBM

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Gold Coast International marine precinct

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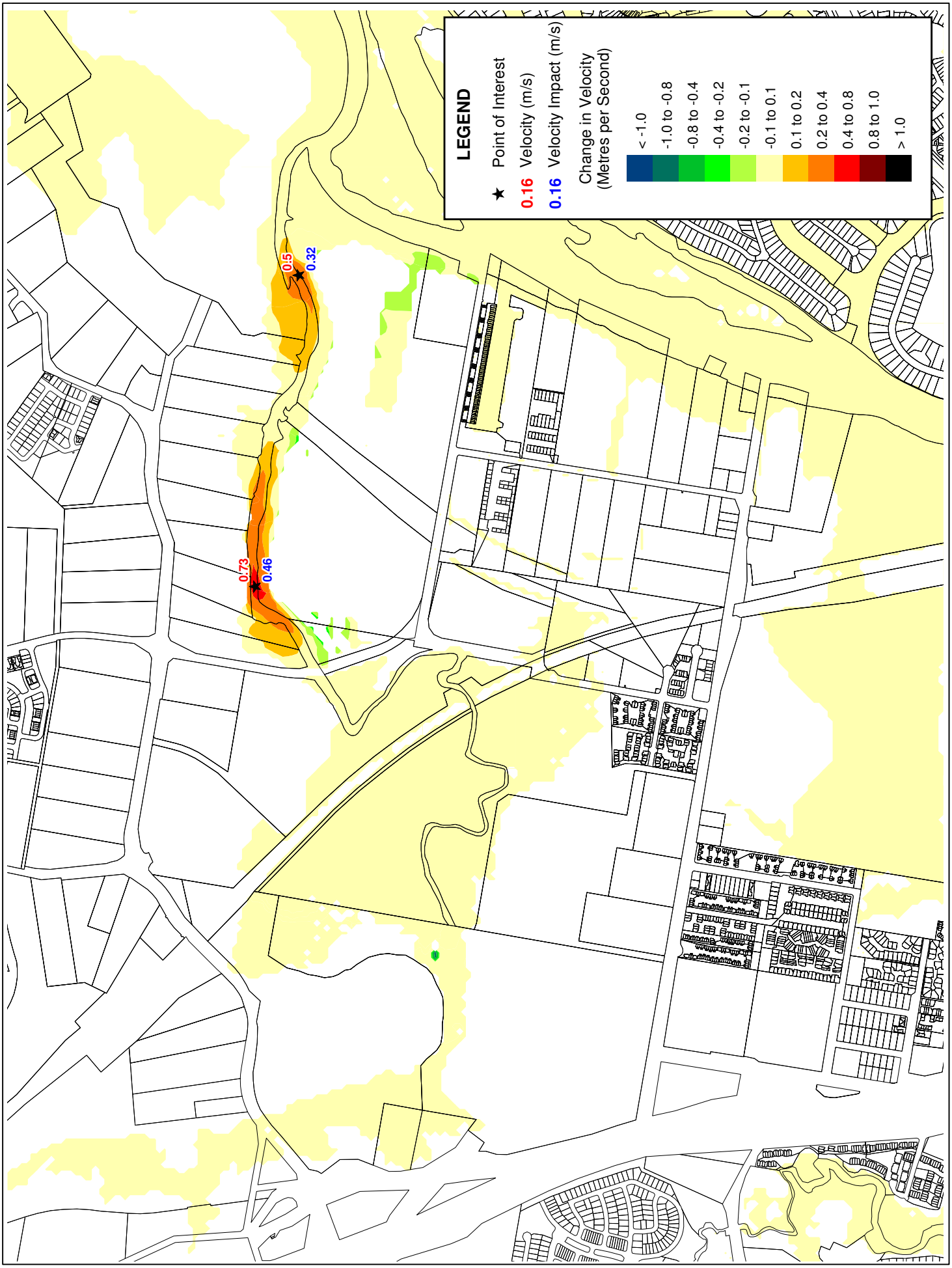

PROJECT TITLE
Gold Coast International Marine Precinct

DRAWING TITLE
Master Plan
Change in Peak 100 Year ARI Flood Velocity (Oakey Creek Flooding)
BASE PROVIDED BY GCCC

NO	DATE	REVISION	BY
A	13-09-13	Original Issue	DR

SCALE: 1:15,000 @ A4	DATE: September 2013
DESIGN: Planit Consulting	CHECKED: MJ
DRAWN: DR	DRAWNING NO: 4-2

BMT WBM

NORTH

Gold Coast International marine precinct

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5.0 Flood Affected Areas Code

The completed Flood Affected Areas Code table is in Appendix B.

6.0 References

BMT WBM (2012), *Gold Coast International Marine Precinct Environmental Impact Statement Floodplain Management*, BMT WBM Report R.M6969.005.01.Floodplain_Addendum.docx, August 2012

GHD (2004), *Coomera – Oakey Creek Catchment, Stormwater Drainage Management Plan Final Report'*, GHD report for Gold Coast City Council, Report No. 41/12244/72695, May 2004

Hyder (2012[a]), *Gold Coast International Marine Precinct Environmental Impact Statement Tidal Compartment and Site Filling – Civil Engineering Report*, Hyder Consulting Report, Revision B, June 2012

Hyder (2012[b]), *Gold Coast International Marine Precinct Environmental Impact Statement Tidal Compartment and Site Filling – Stormwater Management Plan*, Hyder Consulting Report, Revision C, June 2012

APPENDIX A: Email to Mark Batstone (QR) of 27 August 2013

Mark Jempson

From: Mark Jempson
Sent: Tuesday, 27 August 2013 10:31 AM
To: 'Mark.Batstone@qr.com.au'
Cc: Cheri Hill (cheri@planitconsulting.com.au)
Subject: Gold Coast International Marin Precinct - Flood Impact at Railway Corridor

Dear Mark,
Further to our telephone conversation on 20/8/2013 I have provided below a summary of the flood impacts at the QR rail line of the proposed GCIMP as per our discussion. You indicated that your areas of concerns are that the proposed GCIMP would:

- increase flood levels causing overtopping and/or increasing the TOS of the rail line
- increase flood levels impacting on cabling (cabling typically runs alongside track but can be at ground level)
- increased flow rates and velocities through the culverts/bridges

BMT WBM undertook flood modelling as documented in our August 2012 report that formed part of the EIS "Gold Coast International Marine Precinct, Environmental Impact, Statement, Floodplain Management". I understand that you were provided with a copy of the report. If not please let me know and I will arrange a copy.

On page 37 of the report, Table 3-1 lists the flood impact criteria and details compliance with the criteria. Criterion 1a (iii) states "*there should be only a minor increase in afflux upstream of the railway bridge adjacent to the Marine Precinct and this afflux should attenuate before any other properties are affected*". The compliance statement says "*The Site analysis indicates impacts of up to 0.044 m in the 100 year ARI event and up to 0.058 m in the 10 year ARI event. These increases do not result in overtopping of the railway*." The flood level increases are mapped in Drawing No. 3-2 of the report.

The above comments refer to the rail line across the Oakey Creek floodplain. At this location the 100 year ARI flood level is approximately 3.3 m AHD, which is approximately 1 m below the rail embankment level, and hence an increase of 0.044 m does not cause overtopping or significantly reduce the freeboard from flood level to embankment level. At the Coomera River and the Saltwater Creek bridges the deck is approximately 5 m above the 100 year ARI flood level and the increases in flood level are about 0.008 m at this location, and so there is no significant impact on the rail line at these locations.

With regards to impacts on duration of inundation, the report discusses this on page 58 with data presented in Figures 3-21 and 3-22. The discussion focuses on impacts on houses, but the data can be used to comment on the rail corridor at Oakey Creek. Because the rail is not overtopped there is no increase in duration of inundation of the rail. If considering the ground level around the rail (if cabling is running at ground level), the report states that at a ground level of 1.15 m AHD the inundation under existing conditions would be more than 12 hours, and that the proposed development would increase this by 20 to 30 minutes. The general ground level at the rail corridor in the Oakey Creek floodplain would be similar to this if not a little higher. The increase in duration would be less at higher levels.

With regards to increased flow rates and velocities through the bridges/culverts, the modelling indicates that there would be no change or even a small decrease in velocity (and flow rate). This is shown in the velocity impact maps in the report (Drawing No 3-8 to 3-12). In these figures the yellow shade indicates no change in velocity, green shades are decreases and red/browns are increases (in accordance with the legend). Around the rail line there is either no change on decreases.

I trust that this satisfies your requirements. Please do not hesitate to contact me should you require further information or a copy of our report.

Regards

Dr Mark Jempson
Associate
Manager Water & Environment Victoria
National Practice Leader Flooding
BMT WBM Pty Ltd

APPENDIX B: Flood Affected Areas Code

Part 7 Codes
Division 3 Constraint Codes
Chapter 8 Flood Affected Areas

1.0 Purpose

To ensure that, where premises within flood affected areas are to be developed, adequate measures are taken to:

- ensure that the development does not cause, or have the cumulative potential to cause, real damage (as defined below);
- provide standards for development in these areas that will ensure that the runoff from land and/or premises does not create any adverse environmental impacts.

Key objectives include:

a) avoiding, if practicable, or otherwise lessening, the adverse impacts of flooding;
b) maintaining or improving the City's counter disaster response efforts during a flood emergency;
c) equitably sharing development constraints and development potential within a single river catchment and its sub catchments;
d) equitably sharing the costs and benefits of flood mitigation infrastructure within a river catchment and its sub-catchments;
e) protecting the flood storage function of the City's flood plains;
f) protecting the flood discharge capacity of the City's rivers, streams and canals;
g) achieving and maintaining a best practice approach to flood plain management;
h) protecting ocean beaches and the shores and banks of estuaries, lakes, canals, rivers, streams and other waterbodies from erosion.

This code seeks to manage the effects of flooding on flood prone land, where it relates to new and existing development, infrastructure and ecosystems, by requiring:

- certified engineering hydraulic management plans or studies;
- specific design criteria for certain types of land uses.

All such proposals for development will be fully evaluated against the following criteria:

- real damage: whether the development is likely to cause damage that would adversely affect land and/or premises to an extent likely to be actionable;
- cumulative impact: whether the cumulative impact of development is likely to cause real damage;
- flood hazard: whether the development is likely to cause or worsen flood hazard;
- risks: whether the risks associated with the development are fully known, quantifiable and capable of being dealt with to Council's satisfaction, without any uncertainties; and
- flood mitigation: whether flood mitigation works, intended to reduce flood risk, hazard and damage, do so without adversely impacting upon other land and/or premises.

2.0 Application

2.1 This code applies to development that is indicated as self, code or impact assessable in the Table of Development to the domain or Local Area Plan (LAP) within which the development is proposed. In particular, this code applies to any site that is located within a Flood Affected Area*, defined as follows:

- flood prone land; or
- premises where access would be adversely affected during a range of floods, up to and including the designated flood.

*Refer to **Overlay Map OM17 – Natural Hazard (Flood) Management Areas** sheets 1-35.

2.2 This code does not apply to Class 1 or Class 10 buildings as defined in the **Building Code of Australia**, except where Council has declared an area to be flood liable under **Section 53** of the **Queensland Building Regulations**. However, this code provides recommendations for minimum floor levels for Class 1 and Class 10 buildings within flood prone land.

2.3 Note that where Operational Work is being undertaken within flood affected areas that results in a disturbance to the surface of the land, **Specific Development Code 11 – Changes to Ground Level and Creation of New Waterbodies** and **Constraint Code 14 – Sediment and Erosion Control** are also relevant.

2.4 Performance Criteria PC1-PC14 apply to all code and impact assessable development subject to this code. For development identified as self assessable in the relevant domain or LAP, only the acceptable solutions to Performance Criteria PC1-PC4 apply.

3.0 Development Requirements

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Development that is Self Assessable, Code Assessable or Impact Assessable			
Flood Storage			
PC1 All development activity conducted on land below the designated flood level must not detrimentally affect the flood storage capacity of the catchment and the drainage regime.	AS1 The flood storage volume on the site is maintained up to the Designated Flood Level. ***Note:*** ***The Designated Flood Level can be obtained from Council's Flood Search.***	PC1 is not applicable. Council's committee recommendation C99.0326.003 provides a concession in this regard in that it in essence allows for filling of up to 65% of the site. Refer BMT WBM (2012) and Hyder (2012[a]) for further information. Hyder (2012[a]) indicates compliance with C99.0326.003 for the Master Plan and Alternatives 1 & 3 and that Alternative 2 has a loss of 69.7%.	
Building Floor Levels			
PC2 Building floor levels of habitable rooms must be raised to provide an allowance for the hydraulic gradient above the main floodway, so as to meet the requirements of the	AS2.1.1 An allowance of at least 300mm is added to the Designated Flood Level for habitable rooms, or other allowance amount specified in a Local Area Plan.	Habitable floor levels will be designed at a minimum of 300 mm above the designated flood level.	

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Standard Building Regulation and **Building Code of Australia**. ***Note:*** ***Performance criteria for setting building floor levels are set out in the Standard Building Regulation and Building Code of Australia. However, it should be noted that Designated Flood Levels provided by Council relate to mainstream flood flow paths and do not include allowances for the hydraulic gradients from residential areas to the main floodway.***	OR AS2.1.2 Damaged residential buildings are reconstructed to have a Design Floor Level at or above the level that existed prior to the building's damage, provided that the building work is limited to reinstatement. AS2.2 Where the building has been destroyed by flood, the reconstructed floor level accords with **AS2.1.1**.		
PC3 Building floor levels of garages and non habitable rooms must be constructed at a height that reflects an acceptable flood risk for their purpose. ***Note:*** ***PC3 does not apply to:*** **a)** ***extensions to existing buildings;*** **b)** ***structures detached from a dwelling, for which the use is ancillary to that of a dwelling, provided that use is not listed in column 1 of Table to Acceptable Solution AS7.1.***	AS3.1 Building floor levels of garages and non habitable rooms, constructed at approximately the same level as, and attached to, the main dwelling, is constructed at a height above the Designated Flood Level, except where the dwelling has a suspended floor, constructed one metre or more above ground, or where the building is to be constructed within a Rural Domain. AS3.2 Non-habitable rooms and garages, detached from the fabric but within the curtilage of a building, that are not for the storage of goods are constructed above or below the Designated Flood Level.	Building floor levels of garages and non-habitable rooms will be designed at a minimum level as required by the Code	
Overland Flow			
PC4 Building work must not provide obstructions to the free passage of stormwater through a property.	AS4 Overland flowing stormwater is allowed free passage between the street and any waterway at the rear of the property, in accordance with the provisions of the **Building Code of Australia**.	The GCIMP is a new development that will be designed in accordance with Best Practice Stormwater Management. Refer to the Stormwater Management Plan (Hyder, 2012[b]).	

Development that is Code Assessable or Impact Assessable

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Flooding Risk			
PC5 Development in flood affected areas must not cause, or have the cumulative potential to cause, real damage, must not increase the level of risk to life, or be to the detriment of flood evacuation procedures.	AS5 Development does not: a) increase the number of people calculated to be at risk from flooding; b) increase the number of people likely to need evacuation; c) shorten flood warning times; d) impact on the ability of traffic to use evacuation routes, or unreasonably increase traffic volumes on evacuation routes, or as identified within Council's Counter Disaster Plan (flooding); e) place additional burdens on Council's resources or emergency services; f) increase the duration of flooding, unless that increase is part of a Council approved flood mitigation strategy.	The development does not a) increase the number of people calculated to be at risk from flooding; b) increase the number of people likely to need evacuation; c) shorten flood warning times; d) impact on the ability of traffic to use evacuation routes, or unreasonably increase traffic volumes on evacuation routes, or as identified within Council's Counter Disaster Plan (flooding); e) place additional burdens on Council's resources or emergency services; f) increase the duration of flooding. The hydraulic analysis presented in BMT WBM (2012) found that 11 properties would likely be subjected to real damage in very specific flood events as a result of flood level increases causing inundation of habitable floors that would otherwise not occur. All of the 11 properties are currently subject to inundation in events up to the 100 year ARI and the increase in flood level is small (10 to 20 mm). Therefore for each property there is a very narrow band of floods that would result in material damage, e.g., the band for one property is the 13.9 to 14.4 year ARI events – this means that material damage wold not occur in floods smaller than or larger than this band. Because of these narrow bands, the probability of material damages occurring is rare, ranging from about 1 in 300 to 1 in 4000 in any given year.	

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Flood Storage and Conveyance			
PC6 Development with plans for earthworks in a floodplain on or over a water body or within a flood affected area below the Designated Flood Level must allow for the maintenance of flood storage, and flood conveyance of flood and drainage channels and overland flow paths.	AS6.1 Provide flood storage calculations that demonstrate that flood storage volume, over the site below the Designated Flood Level, is maintained or increased. AS6.2 A certified hydraulic study (and, if necessary, a hydrologic study) is prepared by a suitably qualified and experienced engineer to investigate the hydraulic characteristics of both the undeveloped and developed site and make comparisons between them. Proposed developments in, on or over a water body, or within a flood affected area, must be tested for: a) the 50%, 20%, 10%, 5%, 2% and 1% Annual Exceedance Probability (AEP) for local flood events; b) the 5%, 2%, and 1% AEP floods and the designated flood and design flood AEP (as specified in **Table to Acceptable Solution AS7.1**) for riverine flood events, c) any resultant afflux or increase in flood velocities sufficient to cause real damage to premises. The Assessment Manager may also require the development to be assessed against rarer floods. AS6.3 The Assessment Manager may decide that a hydraulic and/or hydrological study is not necessary if in the Assessment Manager's opinion: a) a relevant study, that is not outdated, demonstrates there are no significant flooding impacts that were not covered in the relevant study; or b) the flooding impact of the approval, in relation to the development, is minor,	PC6 is not applicable. Council's committee recommendation C99.0326.003 provides a concession in this regard in that it in essence allows for filling of up to 65% of the site. Refer BMT WBM (2012) and Hyder (2012[a]) for further information. Hyder (2012[a]) indicates compliance with C99.0326.003 for the Master Plan and Alternatives 1 & 3 and that Alternative 2 has a loss of 69.7%.	

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	c) in which event the Assessment Manager must provide a written notice to that effect to the applicant.		
Development for Certain Purposes			
PC7 Development listed in **Table to Acceptable Solution AS7.1** must allow for flood events and be constructed at a level above most floods.	AS7.1 Development is designed for the Design Flood AEP, as specified in **Table to Acceptable Solution AS7.1**. ***Note:*** ***The designated flood level for residential buildings in general is a 1% flood level except for:*** **a)** ***Broadwater – the 1% AEP storm surge level, plus an allowance of 0.27 metres, to account for sea level rise resulting from climate change;*** **b)** ***Logan and Albert Rivers – the designated flood is based, in part, on rainfall that occurred during the January 1974 flood and assumptions made regarding the ultimate level of development, in accordance with the relevant local planning instruments; and*** **c)** ***Historical flood level is the only information available to be specified designated flood level.*** AS7.2 Development is constructed at or above the Design Flood Reclamation Level, shown in the **Table to Acceptable Solution AS7.1**, where the Designated Flood is the 1% AEP flood event, except as follows: a) Broadwater: the 1% AEP storm surge level, plus an allowance of 0.27 metres, to account for sea level rise resulting from climate change; b) Logan and Albert Rivers: the designated flood is based, in part, on rainfall that occurred during the January 1974 flood and assumptions made regarding the	The GCIMP is designed for the Design Flood AEP including allowance for sea level rise. Refer BMT WBM (2012).	

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	ultimate level of development, in accordance with the relevant local planning instruments; and c) Coomera River: the designated flood is based on the modelled 1% AEP flood event or historic levels, whichever is the higher.		
PC8 Development must consider hydrologic and hydraulic impacts of development in flood affected areas with regard to future climate change.	AS8 No acceptable solution provided. ***Note:*** ***As part of a Hydrologic and hydraulic impact assessment, investigation has been undertaken to determine the impacts of future climate change. The findings of the investigation may be used to modify modelling parameters and boundary conditions used in modelling the hydrologic and hydraulic impacts of development in flood affected areas.***	BMT WBM (2012) considers the effects of up to 0.8 m sea level rise and increased rainfall.	

Table to Acceptable Solution AS7.1

Land Use	Design Flood
Disaster management facilities	0.2% AEP
Hospitals	0.2% AEP
Major electrical switchyards, power stations, water treatment plants	0.2% AEP
Fire/police stations	0.5% AEP
Places of refuge	0.5% AEP
Electricity substations	0.5% AEP
Sewage treatment plants	0.5% AEP
Homes for the aged, hospice	0.5% AEP
Regional fuel storage	0.5% AEP
Food storage warehouses	0.5% AEP
Hotel residential	Designated flood

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Educational facilities		Designated flood	
Residential buildings		Designated flood	
Camping grounds, caravan parks and relocatable homes reclamation levels		Designated flood	
Commercial		Designated flood	
Light industrial/warehousing		Designated flood	
Theme parks		Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in **AS10.1**	
Clubs/non-habitable buildings associated with enjoyment of public open space		Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in **AS10.1**	
Car parking below buildings		Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in **AS10.1**	
Open space		Not specified, but ancillary structures are subject to appropriate hazard conditions in the designated flood, as specified in **AS10.1**	
Rural		Not specified	

Hazard Considerations for Development

PC9 Development listed in the **Table to Acceptable Solution AS9** below must be designed and constructed to avoid causing exposure to undue flood hazard.	AS9 Development is to be designed and constructed so that users are not exposed to a greater degree of hazard than shown in **Table to Acceptable Solution AS9** for the range of flows specified in **AS7.1**.	Development is to be designed and constructed so that users are not exposed to a greater degree of hazard than shown in **Table to Acceptable Solution AS9** for the range of flows specified in **AS7.1**.	

Table to Acceptable Solution AS9

Land-Use	Appropriate Degree of Hazard				
	Nil	Low	Medium	High	Extreme
Public open space/recreation	✓	✓	✓	✓	✓
Theme parks	✓	✓	✓	✓	
Clubs/non-habitable buildings associated with enjoyment of public open space	✓	✓	✓	✓	
Commercial/industrial	✓	✓	✓		
Residential	✓	✓	✓		

Performance Criteria	Acceptable Solutions		How does the proposal comply with the Acceptable Solution or Performance Criteria?		Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Public institutions	✓	✓	✓		
Car parking below buildings	✓	✓	✓	✓	
Caravan parks	✓	✓	✓		
Council offices	✓	✓			
Schools	✓	✓			
Homes for the elderly	✓	✓			
Hospitals	✓	✓			
SES	✓	✓			
Police/fire stations	✓	✓			
Museums/libraries/archives/ infrastructure plan repositories	✓				
Telephone exchanges	✓				

Note: ✓ ***Indicates an appropriate land use.***

The above table examines the appropriateness of land use decisions from the aspect of flood hazard only. As such, it does not confer any land use rights or provide any indication that Council will reject or favourably consider various uses in particular areas. Such consideration will be dealt with appropriately, in the context of the Planning Scheme, and based upon full consideration of all relevant issues.

Access Criteria with Respect to Hazard

PC10 All proposed development must demonstrate that sufficient access or egress will be available to enable evacuation during a range of floods, up to and including the designated flood.	AS10.1 Development, not including underground car parks, must ensure that evacuation opportunities exist in accordance with the minimum levels of exposure outlined in **Table to Acceptable Solution AS10.1**, where means of access or egress may be: a) an access route that is below the level of the designated flood, provided that route is classed as a low hazard, as defined in **Table to Acceptable Solution AS10.1**; or b) an access route that is not the main access route. However, it must remain effective for the duration of a range of flood events, up to and including the	Safe egress is available to Shipper Drive and then to Waterway Drive for all floods up to and including the 1% AEP.	

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	designated flood; or c) a temporary access arrangement, provided that access can be gained without significant preparation time being required; The access or egress must: a) in the event of a designated flood: ▪ not expose users to undue risk; ▪ not cause, or have the cumulative potential to cause, real damage to land and/or premises; ▪ not interrupt or materially change the surface water drainage from or onto adjoining land; b) not create, in the event of a flood, a sudden change in flow distributions, flood level or velocity that could result in: ▪ the breaking of a levee; or ▪ the establishment of blockage of a breakout; or ▪ excessive scour; or ▪ sedimentation; or ▪ increased flood hazard.		

Table to Acceptable Solution AS10.1

Criteria	Degree of Flood Hazard			
	Low	Medium	High	Extreme
Wading ability	If necessary children and the elderly could wade. (Generally, safe wading velocity depth product is less than 0.25.)	Fit adults can wade. (Generally, safe wading velocity depth product is less than 0.4.)	Fit adults would have difficulty wading. (Generally, where wading velocity depth product is less than 0.6.)	Wading is not an option.
Evacuation distances	< 200 metres	200 – 400 metres	400 – 600 metres	> 600 metres
Maximum flood depths	< 0.3 metres	< 0.6 metres	< 1.2 metres	> 1.2 metres
Maximum flood velocity	< 0.4 metres per second	< 0.8 metres	< 1.5 metres	> 1.5 metres
Typical means of egress	Sedan	Sedan early, but 4WD or trucks later	4WD or trucks only in early stages, boats or helicopters	Large trucks, boats or helicopters

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?		Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Timing **Note: This category cannot be implemented until evacuation times have been established in the Counter Disaster Plan (flooding).**	Ample for flood forecasting. Warning and evacuation routes remain passable for twice as long as evacuation time.	Evacuation routes remain trafficable for 1.5 times as long as the evacuation time.	Evacuation routes remain trafficable for only up to minimum evacuation time.	There is insufficient evacuation time.

Note: ***The evacuation times for various facilities or areas would (but not necessarily) be included in the Counter Disaster Plan (flooding).***

Generally, safe wading conditions assume even walking surfaces with no obstructions, steps, soft underfoot, etc.

Filling, Excavation and Contouring

PC11 Any change to ground level, by way of filling, excavation or contouring, must not result in real damage, flood hazard or impediment to any Counter Disaster Plan, measure or create unreasonable change in the exposure to flood hazard.	AS11.1.1 Changes to ground level, by way of filling, excavating or contouring, comply with a hydraulic master plan approved by Council. OR AS11.1.2 A flood study is prepared in accordance with the requirements set out in **AS6.1** and **AS6.2**, is approved by Council, and it is established that the development complies with, or does not impede, any Counter Disaster Plan measure.	BMT WBM (2012) demonstrates that the GCIMP would not increase hazard across the floodplain. The development would increase the depth of flooding and velocities at the Shipper Drive Crossing of Oakey Creek in 50 year ARI and above floods, but this is not an evacuation route for the proposed development or existing developments and so this change would not impact on emergency management response during floods.	
PC12 Filling, excavation or contouring must not cause sedimentation, erosion or adverse impact on the City's drainage network.	AS12 No acceptable solution provided. For guidance, please refer to **Constraint Code 14 – Sediment and Erosion Control**.	The GCIMP is a new development that will be designed in accordance with Best Practice Stormwater Management. Refer to the Stormwater Management Plan (Hyder, 2012[b]).	

Landscaping

PC13 Landscaping must not impede a natural watercourse, a flood channel or an overland flow path.	AS13.1.1 Landscaping complies with a hydraulics master plan approved by Council. OR AS13.1.2 A flood study, allowing for the landscaping, is prepared in accordance with the requirements of **AS6.2**, and is approved by the Assessment Manager.	BMT WBM (2012) demonstrates the impacts of the proposed filling in the floodplain. Flood flows from Oakey Creek to the south of Shipper Drive are maintained through the provision of a floodway adjacent to the DTMR IRTC corridor.	

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Building Floor Levels			
PC14 Buildings that are to be constructed on flood prone land shall not be inundated by floodwaters during a designated flood event.	AS14.1 Development is constructed at or above the Specified Minimum Flood AEP plus the Minimum Design Freeboard, as set out in column 2 of the **Table to Acceptable Solution AS14.1**. AS14.2 Where a proposed land use does not reasonable apply to any land use listed in the **Table to Acceptable Solution AS14.1**, the applicant is to submit: a) the proposed minimum flood AEP for building floor levels; b) the proposed design freeboard above the specified flood level; and c) a flood hazard and flood risk assessment for the proposed development, assessing the effects on costs, safety, access and potential losses. AS14.3 It is noted that **PC14** does not apply to: a) garages below residential buildings; b) garages below commercial premises; and c) garages below industrial premises, provided there are suitable means to restrict motor vehicles being washed away during a flood event.	Development will be designed at or above the Specified Minimum Flood AEP plus the Minimum Design Freeboard, as set out in column 2 of the **Table to Acceptable Solution AS14.1**.	

Table to Acceptable Solution 14.1

Land Use	Specified Minimum Flood AEP Plus Minimum Design Freeboard
Disaster management facilities	0.2% AEP + 500mm
Hospitals	0.2% AEP + 500mm
Major electrical switchyards, Power stations, Water treatment plants[1]	0.2% AEP + 500mm

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
Fire and Police stations[2]		0.5% AEP + 400mm	
Places of refuge		0.5% AEP + 400mm	
Electricity Substations[1]		0.5% AEP + 400mm	
Sewage Treatment Plants[3]		0.5% AEP + 400mm	
Homes for the aged, Hospice[4]		0.5% AEP + 400mm	
Regional fuel storage		0.5% AEP + 400mm	
Food storage warehouses		0.5% AEP + 400mm	
Hotel residential		Designated flood + 300mm	
Educational facilities[5]		Designated flood + 300mm	
Residential buildings		Designated flood + 300mm	
Camping grounds, Caravan parks and Relocatable homes reclamation levels		Designated flood + 300mm	
Commercial[6]		Designated flood	
Light Industrial / Warehousing[6]		Designated flood	
Theme Parks		Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.	
Clubs/ Non-habitable buildings associated with enjoyment of public open space		Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.	
Car parking below buildings		Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.	
Open space		Not specified, but ancillary structures are subject to appropriate hazard considerations at the designated flood.	
Rural		Not specified	

Note: AEP is the Annual Exceedence Probability

Notes for Table of AS14.1

1. ***Applies to switchyard components necessary for the operation of the facility during a flood emergency. This shall be determined by Powerlink.***
2. ***Excludes 'shop front' facilities and those not likely to be utilised during a flood emergency.***
3. ***Specifically, bunds, electrical and mechanical equipment necessary for the continued operation of a sewage treatment plant shall not be at risk of inundation during a flood emergency.***
4. ***The flood immunity specified is to meet the objective of not adding to the burden of flood emergency services.***
5. ***It is not necessary that all rooms within an education facility be above the 1% AEP level. However, there should be sufficient space to accommodate***

Performance Criteria	Acceptable Solutions	How does the proposal comply with the Acceptable Solution or Performance Criteria?	Internal Use: Has compliance with the Acceptable Solution/ Performance Criteria been demonstrated? Is a request for further information required?
	the whole of the school population for the continuation of education, immediately after a flood.		
6.	***Freeboard is not specified, as it is considered that commercial risk provisions should apply. If such land is developed to a flood immunity less than 1% AEP (as may be permitted by any local planning instrument), Council may endorse rates notices accordingly.***		

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Gold Coast International
marine precinct

APPENDIX 10

Air Quality Assessment

Prepared By

Simtars

Air Quality Assessment

Executive Summary

Simtars has assessed the potential air quality impacts resulting from the construction and operation of the Gold Coast International Marine Precinct at Coomera. Subsequently, Hyder Consulting has commissioned ASK Consulting Engineers to update the assessment with minor changes to the project description and traffic predictions.

The assessment has been conducted with consideration to the following legislation:

- Environmental Protection Act 1994;
- Environmental Protection (Air) Policy 2008; and
- National Environment Protection (Ambient Air Quality) Measure (2003) [National Environment Protection Council (Queensland) Act 1994].

Terms of Reference Item	Report Section	Page Number
4.7 Description of existing air quality	Section 2	Page 6
4.7 Potential impacts on air quality and mitigation measures (first two paragraphs)	Sections 3	Page 19
4.7 Potential impacts on air quality and mitigation measures (last paragraph)	Section 4	Page 28
8 References	Section 5	Page 29

Tasks undertaken included site inspection, review of monitoring data and emission inventories, identification of sensitive land uses, computer modeling of wind fields and existing and proposed air emissions sources, predictions of air pollution levels, and comparison with acceptable levels.

The existing air quality is compromised by levels of suspended particles that are higher than goals due to dust storms, and bushfire events. Air emission sources in the vicinity include existing boat building activities, motor vehicles and boat engines.

Fifteen residences have been chosen as representative of the communities within 1 km of the development. In addition levels were predicted at the

proposed tavern and two levels of the hotel. Finally pollution contours were predicted across the domain within 2 km of the development.

During construction sources of dust and gases include a dozer, excavators, dump trucks and wind. Gas sources will generate less than 20% of the existing combustion gases generated in the area, and are not likely to cause any impact. Dust generated will also be less than that already generated across the area. Provided it is controlled by watering, and wind-break nets, dust is not expected to cause nuisance. Potential source of odour is dredged material, but this will be kept wet and treated for acid drainage, so odour should be minimal.

Ongoing air emissions during operation will arise from boat building activities and vehicles and boat engines. Predicted levels of particles and engine gases are well within acceptable amounts. Styrene from current boat building activities is predicted to be close to the amenity criterion, but not considered likely to cause nuisance. Styrene from the development is predicted to be slightly higher than existing levels at the most exposed residences, but not considered likely to cause nuisance.

1 Introduction

The following section provides background information relevant to item 4.7 of the Terms of Reference

1.1 Project Description

Simtars has undertaken an air quality impact assessment for the proposed Gold Coast International Marine Precinct (GCIMP or the 'Precinct'), which seeks to extend the existing Gold Coast Marine Precinct and show case through design a purpose built marine industry complex of international standard. Subsequently, along with finalization of the terms of reference, there have been minor changes to the project description and traffic predictions. ASK Consulting Engineers was commissioned by Hyder Consulting to update the air quality impact assessment.

The Precinct Master Plan embodies best practice designs for a working industrial marina's, supply chain management, management and control of manufacturing processes and opportunities, research and design, workforce training and continual education.

The Precinct is a 64 hectare site located on the Gold Coast within the 250 hectare Gold Coast Council Marine Precinct. The site is located on the Coomera River on land located at 2, 54 and 110 Shipper Drive, Coomera. This land contains the following allotments:

- Lot 108 WD6404 (4.047ha)
- Lot 98 SP150731 (54.6608ha)
- Lot 146 SP150731 (4.8467ha)
- Part of Shipper Drive adjacent to Lot 98 on SP 150731

The site is identified on the relevant Gold Coast City Council Planning Scheme Map principally for Waterfront Industry. An Open Space designation affects the sites' northern boundary.

The development proposal involves the following components:

- A large external marina comprising 280 multiple sized berths situated in the Coomera River. This will be constructed via a seven (7) hectare widening of the Coomera River;
- An internal marina comprising 110 berths, allowing for the provision of a calm water environment for the launch and retrieval of vessels and for on water display of vessels by retailers and manufacturers on site;
- A dry stacked boat storage facility with gantry crane access accommodating approximately 290 vessels;

- A marine industry zone of approximately 28.9 hectares inclusive of boat and yacht manufacturers and repairers, ship lift facilities and associated businesses;
- A TAFE educational institute inclusive of a 3000 square meter Centre of Excellence and a 1500 square meter workshop; and
- A 9.3 hectare mixed use precinct incorporating display of marine parts, sales, showrooms, fittings and fixtures, small scale light industry, corporate office space and services such as yacht clubs, restaurants and retail outlets.

Approximately 42 hectares of the total site will be developed for marine industry use. The remaining area includes a 40 meter naturally vegetated setback along Oakey Creek and other public access facilities.

1.2 Subject Site

The map showing the location of the proposed development site is shown in Figure 1.1.

The proposed marine precinct development site is located on Shipper Drive at Coomera, and is bound on the northern and western sides by Oakey Creek and on the eastern side by the Coomera River. A State Reserve for Recreational Purposes, which is maintained by the Gold Coast City Council as Trustee, is located on the southern boundary of the site.

The freehold land, currently owned by the proponent, and also the Reserve are zoned for Marine Industry under the Gold Coast Planning Scheme. Approximately 60 hectares of the Gold Coast Marine Precinct has already been developed. The project will encompass a further 64 hectares of which approximately 42 hectares will be developed for marine industry use.

The existing Gold Coast Marine Precinct is directly to the south of the proposed site, and includes marine industrial zone (ship lift facilities, boat and yacht manufactures), stack dry boat storage, marina and mixed use businesses. Further to the south across Beattie Road exists an additional marine centre with small boat and yacht manufacturers and mixed use shops.

The main boat manufacturing industrial sites in the vicinity include Maritimo Offshore Pty, Riviera, Telwater (Quintrex/Stacer), Azzura Marine and Hancock Marine, which are all located to the south of the proposed site along Waterways Drive.

1.3 Coordinator-General Requirements

On 18 April 2008, the Coordinator-General declared the Gold Coast International Marine Precinct to be a "significant project" under Section 26 of the Queensland *State Development and Public Works Organisation Act 1971 (SDPWO Act)*. The declaration initiates the statutory environmental impact assessment procedure of Part 4 of the *SDPWO Act*, which requires the proponents to prepare an Environmental Impact Statement (EIS) for the projects. The Department of Tourism, Regional Development and Industry is responsible for managing the EIS process on behalf of the Coordinator-General. The purpose of the EIS is to provide information on the type and extent of potential environmental, social and economic impacts arising from the design, construction and operation of the project. The EIS also provides information on the nature and extent of management measures to ensure potential damaging impacts are avoided or mitigated where possible.

This air quality assessment has been undertaken to address the existing air quality that may be affected by the Precinct as outlined in *Part B: Section 4.7 Air Quality* of the Terms of Reference.

2 Existing Air Quality

The following section addresses item 4.7 “Description of existing air quality”” of the Terms of Reference

2.1 Scope of this Section

The purpose of this assessment is to describe the existing air quality that may be affected by the Precinct in the context of environmental values as defined by the Environmental Protection Act 1994 and Environmental Protection (Air) Policy 1997. These descriptions include any baseline monitoring results. Emissions sources (quantity and characteristics) in the vicinity of the Project site and nearby sensitive receptors are identified and presented with the aid of an appropriately scaled map.

The tasks undertaken include:

1. identifying environmental values (referring to the Environmental Protection (Air) Policy 2008 and the Environmental Protection Act 1994) that may be affected by the Project;
2. describing any relevant baseline monitoring results;
3. describing sources of relevant emissions in the vicinity and their annual emission quantities based on the NPI and SEQ inventory;
4. locating nearby sensitive receptors using Google Earth Pro;
5. inspect the site and surrounds to identify receptors and minor emission points, appreciate land uses; and
6. illustrate these sources and receptors along with the Project site on a Google Earth Pro overlay.

2.2 Environmental Values

2.2.1 Queensland Environmental Protection (Air) Policy

The Environmental Protection (Air) Policy of 2008, referred to as the EPP (Air) sets out ambient air quality goals by which pollutant levels can be assessed for their potential to cause harm to human health and wellbeing in Queensland.

Table 2.1 Ambient air criteria from the EPP (Air)

Indicator	Value	Objective (µg/m^3)	Period
TSP	health & wellbeing	90	1 year
PM_{10}	health & wellbeing	50 [1]	24 hours
$PM_{2.5}$	health & wellbeing	25	24 hours
	"	8	1 year
carbon monoxide	health & wellbeing	11,000 [2]	8 hours
nitrogen dioxide	health & wellbeing	250 [2]	1 hr
	"	62	1 year
sulfur dioxide	health & wellbeing	570 [2]	1 hour
	"	230 [2]	1 day
	"	57	1 year
	ecosystems	22	1 year
benzene	health & wellbeing	10	1 year
styrene	aesthetic environment	75 [3]	30 minutes
	health & wellbeing	280	1 week
toluene	health & wellbeing	4100	24 hours
	"	410	1 year
	aesthetic environment	1100	30 minutes
xylenes	health & wellbeing	1200	24 hours
	"	950	1 year

Notes: 1. Allowance is made to exclude 5 days but these should only be during identified bushfires or dust storms.
2. Allowance is made to exclude 1 day but this should only be during identified bushfires.
3. The odour threshold for styrene is approximately 800 µg/m3, being the geometric mean of those thresholds published by AIHA (1989), Amoore and Hautala (1983), and Devos et al (1990). Thus the criteria has built in an order of magnitude allowance for the uncertainties of assessments and the short-term peak fluctuations of concentrations

2.2.2 National Air Quality

The Environment Protection and Heritage Council (EPHC) specifics goals for Australian ambient air within the National Environment Protection (Ambient Air Quality) Measure, also known as the Air NEPM. These goals are included in the EPP (Air).

2.3 Baseline Monitoring

The nearest ambient air monitoring station is the DERM station at Springwood. This is not in the same catchment as Coomera, but has a similar mixture of light industry and residential land uses. Hence it can be used to provide an indication of likely regional air quality at Coomera.

Average and hourly maximum concentrations are provided in Table 2.2. With the exception of styrene and carbon monoxide, the results are for the year 2005 from Springwood. Carbon monoxide was obtained from Woolloongabba. Styrene monitoring was undertaken by Simtars at Coomera in November 2007.

Table 2.2 Ambient air monitoring data

Indicator	Concentration (µg/m^3)	Averaging Time	Site
PM_{10}	17.4 [1]	24 hours	Springwood [2]
$PM_{2.5}$	7.9 6.6	24 hours 1 year	Springwood [2]
carbon monoxide	802 (0.7 ppm)	8 hours	Woolloongabba [2]
nitrogen dioxide	19 (0.010 ppm) 11 (0.006 ppm)	1 hour 1 year	Springwood [2]
sulfur dioxide	3 (0.001 ppm) 3 3	1 hour 1 day 1 year	Springwood [2]
styrene	14	1 hour	Coomera [3]
benzene	3 (0.8 ppb)	1 year	Springwood [2]
toluene	7 (1.8 ppb) 6	24 hours 1 year	Springwood [2]
p-xylene	4 (1.0 ppb) 4	24 hours 1 year	Springwood [2]

Notes:

1. *There were three days identified as due to dust storms. The fourth highest PM_{10} was 40.6 µg/m^3.*
2. *For averaging times shorter than 1 year, these values are the 75th percentiles from DERM (2005)*
3. *Simtars (2007), Simtars (2008)*

2.4 Inventory of Emissions

Styrene emissions for Riviera Marine were calculated from the National Pollutant Inventory report for the year 2007 – 2008. Styrene emissions for smaller boat builders were derived from the emission rates in the National Pollutant Inventory diffuse sources report for the postcode area 4209.

Emission rates for motor vehicles and boating were derived from the SEQ Emissions Inventory (EPA 2004) raw data. Emission rates by inventory grid cell were averaged over the modelling domain in this study. The emission rates were then averaged over day of the week, to derive a winter average and a summer average. The annual average is included in Table 2.3.

Table 2.3 Existing sources of air emissions

Source	Pollutants	Emission rate (g/s)	Source of data
Maritimo Offshore 6 bays	styrene	0.0056 0.57 0.17 0.16 0.11 0.11	Simtars (2007). Simtars (2008)
Riviera Marine	styrene	6.3	DEWHA (2010a)
Smaller boat builders in Gold Coast Marine Centre & Gold Coast City Marina	styrene	0.46	DEWHA (2010b)
Motor vehicles and boating [1]	NO_x CO PM_{10}	0.22 2.9 0.03	EPA (2004)

.Notes: 1. Winter, autumn and spring emission rates shown. Winter emission rates were lower.

2.5 Sensitive Receptors

Small residential and acreage allotments exist in the vicinity surrounding the proposed site to the south west and to the north across Oakey Creek. New residential estates are currently being developed off Foxwell Road to the north. To the south-west a gated community exists along Ford Road and to the east across the Coomera River lies residential suburbs' including Santa Barbara and Hope Island. Approximately 2km to the east-north-east lies the residential suburb of Upper Coomera. Dreamworld amusement park is approximately 1km to the east-north-east.

The nearest sensitive receptors are summarised in Table 2.4 including the approximate distance from the proposed marine precinct.

Table 2.4: Nearest Sensitive Receptors (Refer Figure 2.1)

Site	Address	Distance from Proposed Marine Precinct (km)	Direction from Proposed Marine Precinct
A	87 Shipper Drive	0.1	S
B	190 Shipper Drive	0.2	NW
C	East side of Shipper Drive, last house before Foxwell Rd	0.3	NW
D	220 Foxwell Road	0.5	NW
E	240 Foxwell Road	0.4	NNW
F	266 Foxwell Road	0.2	N
G	274 Foxwell Road	0.2	N
H	308 Foxwell Road	0.2	N
I	Lot 4 Foxwell Road	0.3	N
J	20 Foxwell Road	0.3	N
K	158 Beattie Road	1	S
L	19 Mcphail Road	0.8	S
M	Gated Community, Ford Road	0.7	SSW
N	Hansen Court	0.7	SSW
O	Rosebank Way West	0.3	ESE
P	Proposed tavern dining	internal	NE corner
Q	Proposed hotel 7th floor	internal	NE corner
R	Proposed hotel 4th floor	internal	NE corner

Figure 1:
Location of proposed development and discrete receptors

Aerial image courtesy of
Google Earth Professional

2.6 Dispersion Modelling Methodology

2.6.1 Choice of Models

In order to predict the fate of the pollutants after they are emitted to air, a mathematical model is used to simulate their dispersion. These models have a large uncertainty associated with them, but are useful in estimating statistical averages over long simulation times.

With sources close to ground level, the critical wind conditions tend to be near-calm i.e. low wind speeds. Gaussian plume models such as Ausplume cannot model calm conditions, and have low accuracy in light winds, especially in valleys where katabatic flows are present and where drainage flows turn to follow the valley. Calpuff, being a non-steady-state Lagrangian puff model, is able to simulate stagnation over time, which is critical in calm conditions. Its meteorological pre-processor Calmet performs diagnostic simulation of terrain effects on the wind field. It has a specific slope flow algorithm, which predicts katabatic flows (J.S.Scire & F.R.Robe, Fine-Scale Application of the CALMET Meteorological Model to a Complex Terrain Site, Air and Waste Management Association's 90th Annual Meeting, 1997).

Due to the low source height, the worst conditions may be calm conditions. Thus Calpuff was chosen as the most appropriate model. Version 6.4.2 was used by ASK.

2.6.2 TAPM Meteorological Modelling Configuration

The prognostic meteorological model TAPM, was used to generate data for the period. TAPM is a model developed by CSIRO Division of Atmospheric Research in Australia. It incorporates 3-dimensional prognostic spatial and temporal meteorological prediction using the Bureau of Meteorology Local Area Prediction Scheme (LAPS) synoptic analysis data (Puri et al 1998). LAPS uses a network of observational data at large scale to provide meteorological forecasts for TAPM over the period of the modelling run (2000).

In addition to the observational meteorological data, TAPM requires gridded land use and topographic data. The land use data includes categories such as urban structures, different vegetation types and coverage, surface roughness, and water bodies. The USGS data set is provided with the model and is used as the default. This has a resolution of approximately 900 m, which is adequate for regional scale modelling.

TAPM was setup using three nested 30 x 30 grids centred on latitude 27°52'00"south, longitude 153°20'00" east, which are coordinates in Waterway Drive:

- 420 km x 420 km with 14 km resolution;
- 105 km x 105 km with 3.5 km resolution; and
- 33 km x 33 km with 1.1 km resolution.

25 vertical levels were used with lower level steps at 10 m, 25 m, 50 m and 100 m up to 8 km altitude. The maximum wind speeds were set to 30 m/s with conditions varying in three dimensions and in time. Boundary conditions on the outer grid were derived from the synoptic analysis. Non-hydrostatic pressures were ignored due to the flat terrain. However, rain, prognostic eddy dissipation and surface vegetation were incorporated. Deep soil volumetric moisture were estimated by the AussieGRASS model (Carter et al 2000) and set to the values given in *Table 2.5*.

Table 2.5: Deep soil moisture data used in model

Month	Deep soil moisture (mm water /mm depth)
Jan 2000	0.13
Feb	0.11
Mar	0.13
Apr	0.12
May	0.13
Jun	0.12
Jul	0.12
Aug	0.11
Sep	0.10
Oct	0.10
Nov	0.11
Dec	0.11

No local meteorological data was assimilated into the model run as the LAPS data was expected to be adequately representative of this location.

2.6.3 Calmet Modelling Configuration

Calmet, the meteorological pre-processor for Calpuff, was run over the full year 2000 based on TAPM surface data near the sources plus upper air meteorological profiles at two points toward the outside of the Calmet grid:

- Oakley Creek Rd to the north of the site; and
- Regatta Waters to the south of the site.

The output was a three dimensional grid of wind-field data for incorporation into Calpuff.

The Calmet grid covered 8 x 8 km with 40 x 40 cells spaced at 200 m. The vertical grid was divided into cells with face heights of 20, 40, 80, 220, 380, 650 and 920 m. Default conversions from the land use were used to derive roughness height (except that urban roughness height was set to 2 m), Bowen ratio, soil heat flux, anthropogenic heat flux and leaf area index.

Mixing height calculation parameters were set to default values except that the depth of the inversion layer was set to 160 m above the mixing height and the maximum mixing height was set to 750 m to accommodate limitations in the number of layers exported from TAPM. The latter setting will tend to reduce vertical velocity and hence mixing on turbulent days, which is a conservative approach for low sources. Temperature prediction parameters were set to default except that the radius of influence for temperature observations was set to 250 km.

Surface wind observations were not extrapolated vertically. Kinematic effects of terrain on vertical velocity were included with the empirical factor set to the default value of 0.1. Divergence minimisation was used. The critical Froude number was set to 1. The radius of influence of terrain features was set to 4 km, the widest width of the valley.

The maximum radius of influence of observational data in the step 2 field was set to 3 km at the surface and 4 km aloft. The relative weighting of the diagnostic field over observations was set to 0.3 km at the surface and 0.6 km aloft. The O'Brien procedure was left off and smoothing left at one pass near the surface.

2.6.4 Calpuff Configuration

The three dimensional wind fields from Calmet were entered into Calpuff for the full year 2000. Calpuff was run over a smaller computational grid 3 km x 3 km with spacing of 200 m andwith receptors gridded over the same domain 3 km x 3 km but , for future impacts, with 100 m spacing. Chemical transformation was not modelled, which will cause over-prediction of concentrations.

Dry and wet deposition were modelled with vegetation state set to active and stressed, which will tend to reduce deposition, and hence over predict suspended concentrations.

Wind speed profile was set to the ISC Urban exponents. Calm conditions were not invoked until the wind speed dropped below 0.2 m/s. Transitional plume rise, partial penetration of boundary layers, and vertical wind shear (abrupt changes in direction with height) were included. The model included the turbulence generated around each chimney stack, called stacktip downwash, which tends to spread the emissions toward the ground.

Puff-splitting was turned on to allow for vertical wind shear during night-time flows. The maximum number of puffs released per time step was set to 60. The structure of the shed was included in the dispersion of emissions. Building downwash, or the turbulence generated immediately downwind of a building, was predicted according to the more sophisticated Schulman-Scire model for all sources with building dimensions calculated by the USEPA Building Profile Input Program, BPIP. Downwash spreads the plume toward the ground, which can either increase or decrease concentrations depending on the situation. Concentrations within the downwash zone are calculated using the ISC algorithm.

Dispersion coefficients were derived by the model using turbulence generated by micrometeorology, the default recommended in the Calpuff User's Guide. The PDF method was used to calculate vertical dispersion in convective conditions. Heffter curve was used to compute time-dependent dispersion beyond 550 m. The partial plume height adjustment method was used to allow winds to approach hills as terrain increases. Coefficients were set to 0.5 for unstable and 0.35 for stable conditions allowing the plume to approach the ground faster in stable conditions.

2.6.5 Averaging Times and Peak to Mean Ratios

In order to determine the thirty minute average concentrations, the power law was used:

$$C_p / C_m = A \left(T_m / T_p \right)^p$$

where C_p = peak concentration;
C_m =mean hourly average concentration;
T_m = mean time of 60 minutes;
T_p = peak time of 30 minutes;
A = constant close to unity; and
p = coefficient traditionally set to 0.2 for wake-affected stacks.

This gives a value of 1.2 meaning that the 30 minute average will be 1.2 times higher than the one hour average. For volume and wake-affected stack sources, the factors are independent of stability class. Thus the adjustment factors were applied to the results rather than to the emission rates.

For those pollutants that have regulatory criteria with short averaging times of less than one hour, the normal practice (Vic EPA 2001, NSW DECC 2005) is to use the 99.9 percentile or 9th highest hour in the year.

2.6.6 Contour Generation

The coordinates of a grid representative of residential areas around the plant were derived using WGS84 coordinates and Google Earth Professional. The rectangular grid chosen had a southwest corner of (530000, 6915000), a northeast corner of (536000, 6921000) and a grid interval of 100 m with zero height receptors.

Contours of pollution concentrations were generated using the GIS software Surfer 7. Surfer was then used to overlay the model outputs onto a scan of a rectified aerial photograph of the area. Contours shown in this report were generated using the Kriging method with a grid spacing of 10 m and contours created with smoothing set to high.

2.7 Limitations

The uncertainties associated with this type of assessment are normally only dealt with in a qualitative manner. Typical 95% confidence intervals require a multiplicative factor of 2 or 3. In this case, the uncertainty is high due to assumptions regarding the details of construction sources and future land uses. Hence the results should be interpreted as providing an indication of impacts.

2.8 Model Results for Existing Scenario

Table 2.5: Predicted maximum concentrations ($\mu g/m^3$) at nearest sensitive receptors

Pollutant	PM_{10}	carbon monoxide	nitrogen dioxide	nitrogen dioxide	styrene	styrene
Averaging period	24 hrs	8 hrs	1 hr	1 year	30 min [1]	1 week
A	0.2	62	9	0.4	45	6
B	0.3	61	9	0.4	42	5
C	0.3	61	9	0.4	40	5
D	0.3	60	9	0.4	44	5
E	0.3	60	8	0.4	41	5
F	0.3	62	9	0.4	41	5
G	0.3	62	9	0.4	40	5
H	0.3	62	8	0.4	40	5
I	0.2	60	8	0.4	36	5
J	0.2	57	8	0.4	41	6
K	0.2	57	9	0.4	83	9
L	0.2	58	9	0.4	134	25
M	0.2	58	10	0.4	45	7
N	0.2	58	9	0.4	90	11
O	0.2	58	9	0.4	63	6
criterion	50	11,000	250	62	75	280

Notes: 1. Styrene 30 minute maxima are based on 99.9 percentile hour.

Predicted concentrations of PM_{10}, carbon monoxide and nitrogen dioxide are less than measured background shown in Table 2.2, most likely due to regional pollution. The highest measured 1 hour average styrene concentration of 14 $\mu g/m^3$ is between the maximum predicted 30 minute and weekly averages at all except the receptor closest to the existing Maritimo plant. This is expected although the predicted values are high in comparison to the measured. This indicates that the modelling is erring on the conservative side and that the existing marine precinct is probably the dominant source.

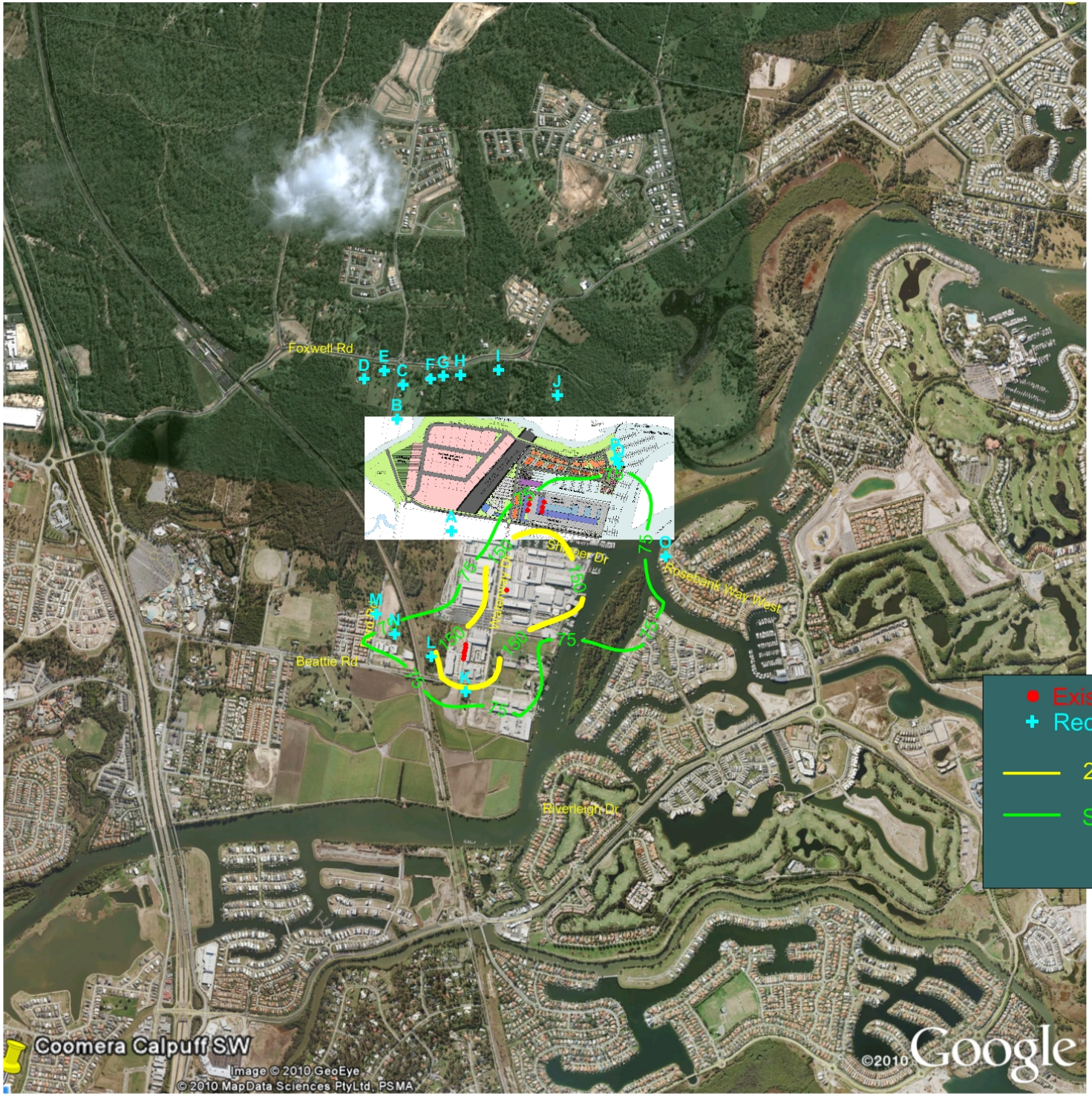

Figure 2:
Modelling prediction of existing styrene concentrations (ug/m3)

Aerial image courtesy of
Google Earth Professional

3 Impact of Proposed Development

The following section addresses the first two paragraphs of item 4.7 “Potential impacts on air quality and mitigation measures” of the Terms of Reference

3.1 Scope of this Section

This section of the EIS describes in detail the expected quantity and quality of all air emissions (including particulates, gaseous, and odorous compounds) from the Project during construction and operation. The proposed level of emissions of dust, fumes and odours includes emissions during both typical and worse case conditions. The assessment of air emissions considers the following matters:

- construction activities likely to cause air emissions including excavation and filling, site compounds and stockpiles;
- a review of operational impacts associated with increased road and river traffic emissions and air quality issues associated with servicing the Project;
- the human health risk associated with emissions from all hazardous or toxic pollutants; and
- the potential for nuisance and amenity impacts associated with the Project.

The tasks undertaken include:

1. Examine the Project description including proposed measures to minimize emissions.
2. Estimate typical and worst emission rates of dust, PM_{10}, CO and NO_x from construction activities including excavation, filling, site compounds, stockpiles and other significant activities.
3. Identify operational emissions of particulates, gases and odour including styrene from boat manufacture, PM_{10}, CO and NO_x from increased road and waterway traffic, any potential hazardous or toxic air releases, and any other sources identified, based on the Project description, traffic impact assessment and available data.
4. Identify relevant criteria according to the relevant environmental values from the EPP Air 2008 and other regulatory tools.
5. Undertake dispersion modeling of the above typical and worst emissions to predict ambient concentrations at sensitive receptors during construction and operation. Due to the low source height, the worst conditions may be calm conditions. Gaussian plume models such as Ausplume cannot model calm conditions, and have low accuracy in light winds. When domains include large water bodies, the boundary layer parameters should be calculated by a more sophisticated model. Calpuff/Calmet uses a profile technique using air-

sea temperature differences to compute the micrometeorological parameters in the marine boundary layer. Thus Calpuff v6.267 is chosen as the most appropriate model. TAPM will be used to provide one year of windfields for input into Calpuff/Calmet.

6. Incorporate background concentrations into the model, including other source emissions for the most sensitive pollutants.
7. Illustrate pollution contours onto a Google Earth Pro aerial.
8. Assess the human health risk and potential for nuisance and amenity impacts based on predicted concentrations, specific criteria and other standard criteria in the EPA. Note that the NHMRC guidelines 1985 have been withdrawn and criteria from the Victorian SEPP and NSW EPP will be used instead.

3.2 Construction Emission Inventory

The phases of construction are listed in Table 3.1 along with plant involved, potential pollutants, and duration. The phases will overlap substantially within an overall construction period of approximately 30 months.

Semi-quantitative emission rates are also provided in Table 3.1. These have been estimated based on the National Pollutant Inventory Emission Estimation Technique Manual for Mining v2.3.

Table 3.1 Proposed sources from significant activities in Stage 1, to the east of the transport easement

Activity	Pollutants	Anticipated duration
Phase 1: Clearing & top soil stripping using D6 dozer, water truck, 2 x 30tonne excavators, 4 x Cat 740 dump trucks	TSP dust PM_{10} CO NO_x	months
Phase 2: Bunding construction using D6 dozer, water truck, 1 x 30tonne excavators, 1 x Cat 740 dump trucks	TSP dust PM_{10} CO NO_x	8 months
Phase 3: Earthworks using D6 dozer, water truck, 1 x 30tonne excavators, 1 x 65 tonne excavator, 1 x Cat 740 dump truck, wind	TSP dust PM_{10} CO NO_x	10 months
Phase 4: Fill earthworks using 1 x Cat 740 dump truck, road truck and tipper for fill, water truck, wind	TSP dust PM_{10} CO NO_x	“
Phase 4 - 8: Excavator soil stockpiles to be kept under water where possible, preloaded and treated as required for fill	odour	“
Phase 7: Dry excavation of internal marina using 1 x Cat 740 dump truck, road truck and tipper for fill, D6 dozer, and water truck	TSP dust PM_{10} CO NO_x	“
Phase 8: Wet excavation of Coomera River using long reach excavator, Cat 740 dump truck, D6 dozer, and water truck	TSP dust PM_{10} CO NO_x	“
Phase 10 Placement of fill using excavator and Cat 740 dump truck, wind	TSP dust PM_{10} CO NO_x	6 months
Roadworks using graders, road truck	PM_{10} CO NO_x	12 months

Stage 2, to the west of the transport easement will involve similar phases except without dredging.

The construction method is described in the Draft Hyder Construction Methodology Report. The internal marina will be created using dry excavation of approximately 500,000 m^3. As each block is completed, it will be flooded and the water treated for acidity. The external marina will be created using wet excavation of approximately 120,000 m^3. Little dredging is proposed. Wet excavation removed underwater sediments using a backhoe either on a barge or on-shore. In the west and east precincts there will be approximately 500,000 m^3 and 600,000 m^3 of fill respectively.

Dredged material will be kept wet and treated to prevent acid leachate. Hence odour should not be generated by storage of material. Odour occurring during dredging activities should be minimal.

Table 3.2 Source inventory

Mobile plant	Pollutants	Emission rate (g/s)	Anticipated duration	Percentage of existing domain inventory [1]
D6 dozer, water truck, 30 tonne excavator, 65 tonne excavator, 4 x Cat 740 dump trucks	TSP (dust)	17	Throughout the year	-
"	PM_{10} (both dust and exhaust)	7.9	"	10%
"	CO (exhaust)	1.4	"	3%
"	NO_x (exhaust)	3.5	"	18%

Notes: 1. Existing inventory listed in Table 2.2

Emissions of PM_{10}, CO & NO_x from construction will be less than 20% of the existing inventory, and the impacts will be less than that of operation of the development. Given the temporary nature of the construction, impacts are not considered likely to have any human health impacts.

Emissions of TSP dust are substantially less than the PM_{10} emissions across the domain, and are not expected to create a significant nuisance dust impact

across the domain. This assumes that the water cart remains operational. However the impact on amenity of local residences will need to be managed, and fabric wind-break / catch nets are recommended.

Dust generation will be minimised by watering of working areas with consideration for water efficiency. All equipment and plant in use within the site will be properly maintained and regularly serviced to minimise discharge of airborne emissions.

3.3 Operational Emission Inventory

Table 3.3 New proposed sources

Source	Pollutants	Typical Scenario Emission rate (g/s)	Worst Case Scenario Emission rate (g/s)	Source of data
Maritimo Offshore 6 bays	styrene	0.00	0.057 (each bay)	Simtars (2007). Simtars (2008)
Riviera Marine	styrene	6.3	6.3	DEWHA (2010a)
Smaller boat builders and TAFE	styrene	1.1	1.1	Factored up by land use area
New Maritimo facility	styrene	0.001 0.057 0.017 0.016 0.011 0.011	0.057 (each bay)	Simtars (2007). Simtars (2008)
Motor vehicles and boating [1]	NO_x CO PM_{10}	0.65 8.8 0.09	0.93 13 0.13	Factored up by traffic from CRG EIS reports

Notes: 1. Winter, autumn and spring emission rates shown. Winter emission rates were lower.

The CRG marine surveys report assumes that boating will increase in proportion to the size of the marina development. The existing size is 23.9 ha and the proposed upgrade is an additional 33.3 ha. This corresponds to an increase being the factor of 2.39. In the worst case scenario, fugitive styrene emissions from small scale boat manufacturing activities are also assumed to expand according to this factor.

The CRG traffic report states that existing marina generates 3,077 daily trips, and predicts that the proposed development will generate 10,132 extra trips. This corresponds to an increase being the factor of 4.29.

These do not include traffic passing through so applying this increase factor to air emissions is conservatively worst case. In the worst case future scenario, engine emissions are assumed to increase by 4.29. In the best estimate scenario, they are assumed to increase by a factor of 3.

Other assumptions made in the modelling of styrene are:

- installation of 6 m stacks and carbon filters with 90% removal efficiency on the new styrene bays in the development, and the existing Maritimo bays; and
- existing Maritimo bays are only utilised under the worst case scenario.

3.4 Modelling Results

Table 3.4: Predicted concentrations ($\mu g/m^3$) at nearest sensitive receptors for **worst** case

Pollutant	PM_{10}	carbon monoxide	nitrogen dioxide	nitrogen dioxide	styrene	styrene
Averaging period	24 hrs	8 hrs	1 hr	1 year	30 min [2]	1 week
A	0.6	160	22	1.2	58	8
B	0.7	150	22	1.0	56	7
C	0.7	150	21	1.0	54	7
D	0.7	150	22	1.0	53	7
E	0.7	150	21	1.0	54	7
F	0.7	150	22	1.0	55	7
G	0.7	150	22	1.0	52	7
H	0.7	150	20	1.0	51	7
I	0.6	150	18	1.0	49	7
J	0.5	150	21	1.0	46	8
K	0.6	140	23	1.2	60	9
L	0.6	140	23	1.1	60	11
M	0.6	140	24	1.1	59	9
N	0.6	140	24	1.1	60	10
O	0.6	160	24	1.1	59	8
P	0.5	150	22	1.1	62	9
Q	0.06	15	2	0.1	54	3
R	0.07	21	3	0.2	58	4
background	17	800	19	11	14 (1 hour)	
criterion	50	11,000	250	62	75	280

Notes: 1. Values are rounded off to no more than two significant figures.
2. Styrene 30 minute maxima are based on 99.9 percentile hour.

Table 3.5: Predicted concentrations (μg/m^3) at nearest sensitive receptors for **typical** case (with existing Maritimo shed vacant)

Pollutant	PM_{10}	carbon monoxide	nitrogen dioxide	nitrogen dioxide	styrene	styrene
Averaging period	24 hrs	8 hrs	1 hr	1 year	30 min	1 week
A	0.4	110	15	0.8	58	8
B	0.5	110	15	0.7	54	7
C	0.5	110	15	0.7	54	7
D	0.5	100	15	0.7	52	7
E	0.5	100	15	0.7	54	7
F	0.5	110	15	0.7	53	7
G	0.5	110	15	0.7	52	7
H	0.5	110	14	0.7	50	7
I	0.4	110	12	0.7	48	7
J	0.4	100	15	0.7	46	7
K	0.4	95	16	0.8	60	9
L	0.4	95	16	0.8	60	9
M	0.4	99	16	0.8	59	9
N	0.4	96	16	0.8	59	10
O	0.4	110	16	0.8	59	8
P	0.4	100	15	0.7	53	8
Q	0.04	11	1	0.1	46	3
R	0.05	15	2	0.1	50	3
background	17	800	19	11	14 (1 hour)	
criterion	50	11,000	250	62	75	280

Notes: 1. Values are rounded off to no more than two significant figures
2. Styrene 30 minute maxima are based on 99.9 percentile hour
3. Background values are from Table 2.2.

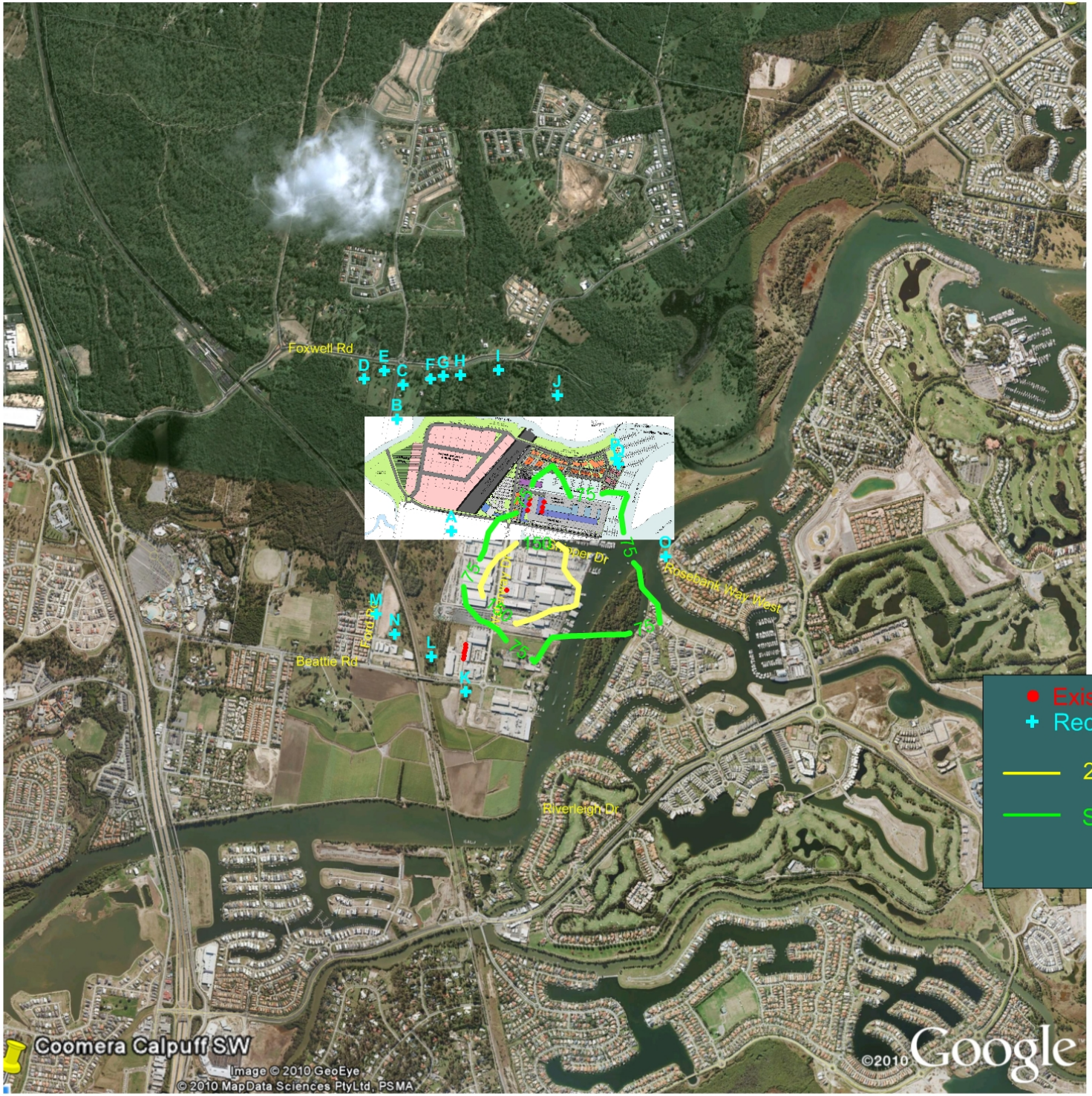

Figure 3:
Modelling prediction of worst case styrene concentrations (ug/m3)

Aerial image courtesy of
Google Earth Professional

3.5 Discussion

Predicted concentrations, from the development, of PM_{10}, carbon monoxide, nitrogen dioxide are an order of magnitude or more within the criteria. This provides sufficient safety margin to allow for modelling uncertainties and assumptions as discussed in Section 2.7. Including background listed in Table 2.1, predicted concentrations are still within the criteria. The likelihood of any impacts arising from these emissions is very low.

Predicted existing styrene concentrations exceed the amenity criterion at the nearest sensitive receptor reaching 134 $\mu g/m^3$ compared to the amenity criterion of 75 $\mu g/m^3$. Thus the predicted existing concentration is almost double the criterion. The criterion is based on a published odour threshold of styrene, so this prediction is effectively 2 odour units. There is low likelihood of this being detected in ambient air by the average person, and it is not likely to cause nuisance, unless there is an especially sensitive individual living nearby.

Worst case predicted styrene concentrations are well within the one week health criterion of 280 $\mu g/m^3$. The highest predicted 30 minute styrene concentration is 62 $\mu g/m^3$ which is close to the amenity criterion of 75 $\mu g/m^3$. Figure 3 shows that the 75 $\mu g/m^3$ contour marginally enters the residential area to the east. Hence the worst case prediction represents a concentration of approximately 1 odour unit. Predictions for the worst case, with the Maritimo shed emissions diverted through a filter and up a stack are less than for the existing scenario, but also reach 62 $\mu g/m^3$.

As discussed in Section 2.7, there are absolute uncertainties associated with these predictions. However the prediction that future concentrations will be less than existing concentrations is largely based on proposed improvements to the Maritimo emissions, and is therefore a relative prediction and therefore more accurate.

There is low likelihood of odour being detected, and so nuisance is unlikely, depending on the uptake of boat building activities, and the subjective sensitivity of the neighbouring residents. Given the prevailing marine industry land use of the area, odour, at these low levels, reaching commercial properties should not give rise to nuisance complaints.

4 Mitigation Measures

The following section addresses the final paragraph of item 4.7 “Potential Impacts on air quality and mitigation measures” of the Terms of Reference

4.1 Scope

Features of the Project designed to suppress or minimize emissions including dusts and odours, are detailed in this section. Objectives for protecting and or enhancing environmental values for air quality should be identified, including a discussion on how nominated quantitative standards and indicators may be achieved.

4.2 Construction Measures

Throughout construction, a water cart will be used to damp haul routes, and during windy conditions, other exposed dry surfaces.

Fabric wind-break / catch nets should be used at the edge of exposed areas:

- on the southern boundary adjacent to receptor A and the existing marine precinct;
- on the western boundary adjacent to receptor B; and
- if nuisance dust complaints are received on the northern boundary.

4.3 Operational Measures

If odour complaints are received, an assessment should be undertaken to determine the major source(s) of odorous emissions, including fugitive sources. Where necessary, appropriate extraction and filter systems should be installed to reduce emissions.

5 References

The following section addresses item 8 of the Terms of Reference

AIHA (1989) *OdorThresholds for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association*

Amoore J. and Hautala E. (1983) *Odor as an Aid to Chemical Safety, Journal of Applied Toxicology,, pp272 - 290.*

Carter JO, WB Hall, KD Brook, GM McKeon, KA Day a& CJ Paull (2000) AussieGRASS: Australian Grassland and Rangeland Assessment by Spatial Simulation, in Applications of seasonal climate forecasting in agricultural and natural ecosystems – the Australian experience, Eds G.Hammer, N.Nicholls & C.Mitchell, pp229-249, Kluwer Academic Press, Netherlands.

DERM (2005) *Ambient air quality monitoring in Queensland 2005 annual summary and trend report*, Queensland Government environment technical report No.61.

Devos M., F.Patte, J.Rouault, P.Laffort, L.J.Van Gemert (1990*) "Standarized Human Olfactory Thresholds", Oxford University Press*

DEWHA (2010a), www.npi.gov.au accessed on 17 March 2010, National Pollutant Inventory: Detailed facility emission report for Riviera Marine (Int), 2007 - 2008, Department of the Environment, Water, Heritage and the Arts.

DEWHA (2010b), www.npi.gov.au accessed on 17 March 2010, National Pollutant Inventory: NPI location report – Diffuse sources: Postcode 4209, 2007 - 2008, Department of the Environment, Water, Heritage and the Arts.

EPA (2004), Air Emissions Inventory: South-east Queensland region, Queensland Environmental Protection Agency.

QEPP (2008), Queensland Environmental Protection (Air) Policy 2008, Queensland Environmental Protection Agency.

NSW DECC (2005) Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, Department of Environment and Conservation.

Puri K., Dietachmayer G.S., Mills G.A., Davidson N.E., Bowen R.A. & Logan L.W. 1998, The new BMRC Limited Area Prediction System, LAPS, Aust. Met. Mag. Vol 47 pp 203-223.

Scire & Robe (1997) Fine-Scale Application of the CALMET Meteorological Model to a Complex Terrain Site, Air and Waste Management Association's 90th Annual Meeting,

Simtars (2007) *Report oe101865f2a: Assessment of Styrene from Boat Manufacturing Plant* for Maritimo Offshore, Queensland Government Department of Mines and Energy.

Simtars (2008) *Report oe101946f1: Assessment of Styrene from Boat Manufacturing Plant* for Maritimo Offshore, Queensland Government Department of Mines and Energy.

Vic EPA (2001) State Environment Protection Policy (Air Quality Management), Victoria.

Gold Coast International marine precinct

APPENDIX 11

Cultural Heritage Assessment

Prepared By

Jabree Limited

Jabree Limited

Report on the Desktop Cultural Heritage Assessment of the Gold Coast International Marine Precinct, Shipper Drive, Coomera

Prepared for

Harbour Island Pty Ltd

by

Jabree Limited

June 2013

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Table of Contents

Abbreviations

CHMP	Cultural Heritage Management Plan
DATSIMA	Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (Qld)
EIS	Environmental Impact Statement
GCIMP	Gold Coast International Marine Precinct
The Act	*Aboriginal Cultural Heritage Act 2003 (Qld)*

Acknowledgement

Jabree Limited acknowledges the support of Mr J Gamack from JGCO Services in preparation of this report.

Cover plate

Aerial view of the project area – north of the existing Gold Coast City Marina (Photo: courtesy of Planit Consulting).

1 Executive summary

Harbour Island Pty Ltd is proposing to construct and operate a world class industrial marina at Shipper Drive, Coomera. The proposed project, known as the Gold Coast International Marine Precinct, involves developing the remaining 63.5 hectares of the existing Marine Industry Precinct located on the Coomera River.

The GCIMP's declared status as a "significant project" requires the preparation and submission of an Environmental Impact Statement to the Queensland Coordinator General and therefore under the terms of the *Aboriginal Cultural Heritage Act 2003 (Qld)*, the development of a Cultural Heritage Management Plan with the Aboriginal Party for the project area. Jabree Limited is acting on behalf of the Aboriginal Party, as Cultural Heritage Body for the project area.

This desktop cultural heritage assessment details the desktop assessment and recommendations for the project area defined as the Gold Coast International Marine Precinct.

Given the nature and extent of significant Aboriginal Cultural Heritage sites within the project vicinity, the findings of previous archaeological surveys and excavations and the relatively undisturbed nature of the ground surface, Jabree recommends further cultural heritage assessment of the GCIMP site.

The proposed disturbance to the project area to construct and operate an industrial marina and ancillary facilities is considered to be additional surface disturbance under the Cultural Heritage Duty of Care Guidelines. The project is considered a (Category 5) high risk activity to Aboriginal cultural heritage in the area.

In consideration of the Act and this desktop assessment's findings, the following recommendations are made:

- Jabree Limited and Harbour Island Pty Ltd are required to develop a Cultural Heritage Management Plan that addresses the potential impacts to Aboriginal cultural heritage associated with further ground disturbing activities related to the construction and operation of the GCIMP.
- The findings of this desktop assessment and the recommendations contained in the CHMP ought to replace and supersede all Aboriginal Cultural Heritage recommendations contained in the Gold Coast International Marine Precinct Environmental Impact Statement. This desktop assessment is the precursor to a further detailed cultural heritage assessment.
- The CHMP will detail the approach to further cultural heritage assessment and archaeological excavations at the GCIMP that will include:
    - Test trenches dug with the aid of a small excavator at intervals within the project area
    - Material from the test trenches to be "wet sieved" using a water truck and 5mm sieve
    - Charcoal located within the trenches may be used to date the site using radio-carbon dating technology
    - The archaeological excavations will be supported by a report that outlines the methodology used, details the cultural heritage finds located on site, provides mapping of the finds and outlines further cultural heritage assessment of the site (if required).
- Jabree Limited would appreciate the assistance of the proponent in identifying the on-ground project boundary as part of the further cultural heritage assessment.

- The CHMP will include a schedule for the delivery of Cultural Heritage awareness and induction sessions to project personnel.

2 Introduction

Harbour Island Pty Ltd is proposing to expand the existing marina facilities at Shipper Drive, Coomera. The project, known as the Gold Coast International Marine Precinct (GCIMP), involves the construction and operation of an industrial marina. This entails developing the remaining 63.5 hectares of the existing Marine Industry Precinct located on the Coomera River, to incorporate best practice design for a working industrial marina[1].

The GCIMP was originally declared to be a "significant project" on 18 April 2008 and was re-declared on 7 July 2011. The declaration as a "significant project" requires the preparation and submission of an Environmental Impact Statement (EIS) under section 26(1) (a) of the *State Development and Public Works Organisation Act 1971*, by the Queensland Coordinator General[2].

The requirement for an EIS triggers the development of a Cultural Heritage Management Plan (CHMP) between the proponent and the Aboriginal Party for the project area under Part 7 (section 87) of the *Aboriginal Cultural Heritage Act 2003 (Qld)* (the Act).

Harbour Island Pty Ltd is the Sponsor of the CHMP as defined by the Act. Planit Consulting is acting on behalf of the sponsor in regard to the EIS and the CHMP. Under the Act, Jabree Limited is the Registered Aboriginal Cultural Heritage Body for the Queensland portion of the claim area of the Gold Coast Native Title Group QUD346/2006. As the project falls within the claim area, Jabree Limited is the registered Aboriginal Cultural Heritage Body for the project area.

On 1 November 2012, Harbour Island Pty Ltd issued to Jabree Limited 'Written Notice' of its intention to develop a Cultural Heritage Management Plan. On 20 November 2012 Jabree Limited advised that the named applicants on the registered Native Title claim QUD346 of 2006 are the Aboriginal Party for the Cultural Heritage Management Plan.

Jabree Limited forwarded a fee proposal to Planit Consulting on 25 February 2013 for the conduct of a desktop assessment of the site and the development of a CHMP under Part 7 of the Act. Planit responded on behalf of the sponsor on 26 April 2013, accepting Jabree Limited's fee proposal.

The role of Jabree Limited is to represent the Traditional Owners and prepare a report on the cultural heritage issues affecting the site. In doing so, Jabree Limited facilitates all aspects of the work including site visits, technical reporting and agreement development.

[1] Planit Consulting, *Gold Coast International Marine Precinct, Shipper Drive, Coomera, Environmental Impact Statement* (August 2012), p vii.

[2] Ibid, p xix.

3 Project description and site location

The GCIMP involves the development of an integrated industrial marina on the Coomera River, bordering Oaky Creek. The land that is the subject of the development is located at 2, 54 and 110 Shipper Drive, Coomera and takes in the following allotments[3]:

- Lot 108 on WD4604
- Lot 98 on SP150731
- Lot 146 on SP150731
- Part of Shipper Drive adjacent to Lot 98 on SP150731

This Desktop Cultural Heritage Assessment Report covers all parcels of land noted above and depicted in **Figure 1**. The parcel of land cutting across the project area (Lot 35 on SP150730) has been preserved by the Queensland Government for the proposed Intra-Regional Transport Corridor.

[3] Ibid, p 3.

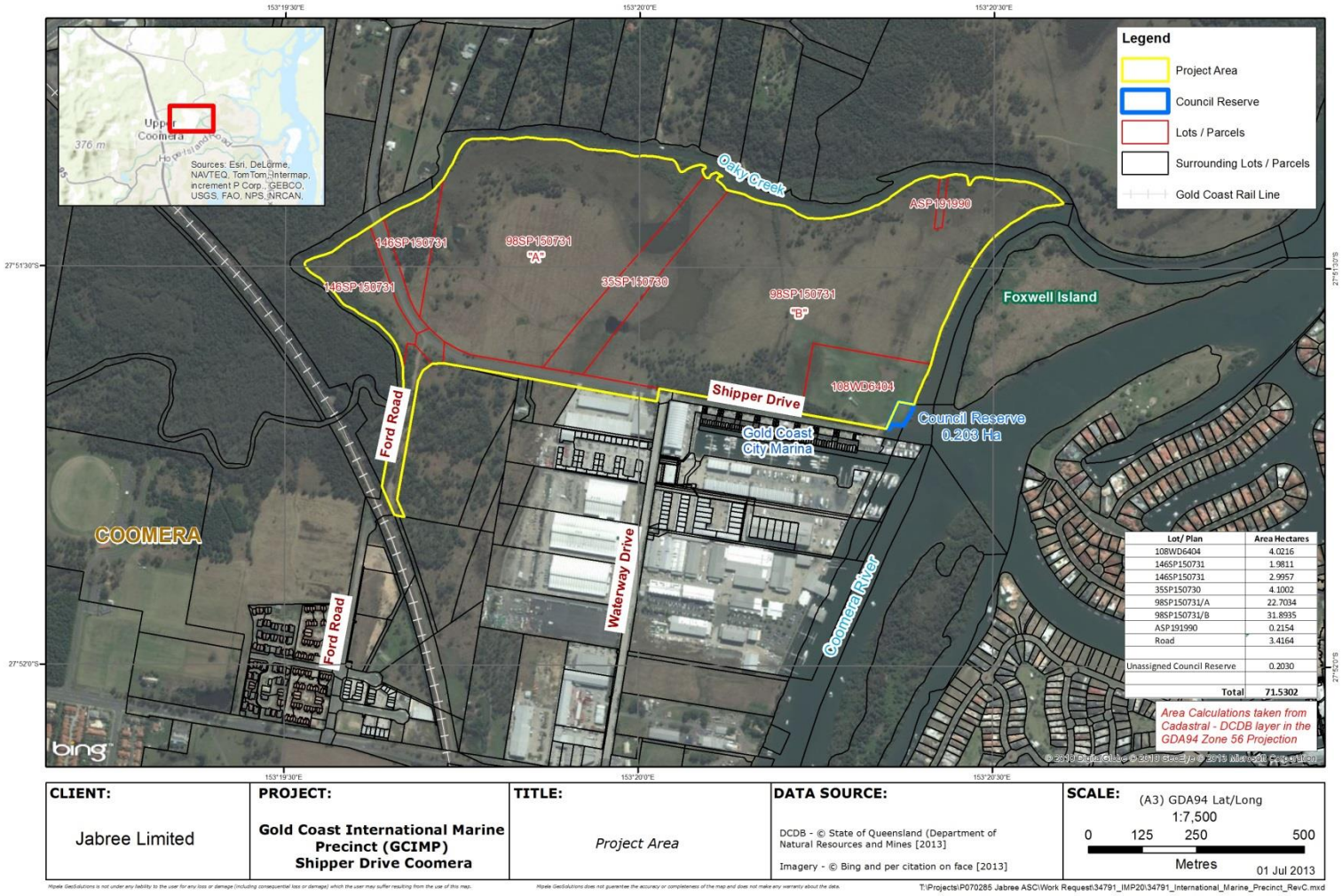

Figure 1 - Gold Coast International Marine Precinct Project Area

4 Cultural Heritage Assessment

This report assesses the Aboriginal Cultural Heritage significance of the GCIMP site based on the following:

- desktop review of Aboriginal cultural heritage databases
- desktop review of relevant cultural heritage and environmental reports
- proposed disturbance to the site

4.1 Aboriginal cultural heritage databases

A desktop review of the Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA) Indigenous cultural heritage database was conducted. A total of 31 sites have been located within a 5km radius of the GCIMP site (see Table 1 below).

A desktop review was also conducted of the Jabree Limited cultural heritage database. A number of cultural heritage finds were identified during site surveys and excavations for Transport and Main Roads (TMR), Coomera Ambulance Service (CAS) and Coomera East State High School (PS). These finds were predominantly stone artefacts made from silcrete or chert.

All recorded cultural heritage sites and recent finds have been mapped relative to the project area in **Figure 2**. DATSIMA sites are recorded in red and Jabree Limited surface finds are recorded in yellow (see acronyms from the paragraph above).

The number and nature of the recorded sites is evidence that the GCIMP site is within an area of high Aboriginal cultural heritage significance. A shell midden site, LB:J54 is mapped adjacent to the GCIMP.

Table 1 – DATSIMA Cultural Heritage Database Finds

DATSIMA Ref	Location	Description	Registered	Registered by
LA:A36	Coombabah Creek Middens	Shell Midden	01/01/1987	Unknown
LB:D63	Oyster Lake Shell Mound 1	Shell Midden	05/11/1982	J. Hall
LB:D64	Oyster Lake Shell Mound 2	Shell Midden, Artefact	05/11/1982	J. Hall
LB:E89	Site 6	Artefact	21/03/1985	G. Alfredson
LB:F25	South Coast Motorway Site 5	Artefact	01/01/2004	G. Alfredson
LB:F25	South Coast Motorway Site 5	Artefact	01/01/2004	G. Alfredson
LB:F25	South Coast Motorway Site 5	Artefact	01/01/2004	G. Alfredson
LB:F26	South Coast Motorway Site 6	Artefact	01/01/2004	G. Alfredson
LB:F26	South Coast Motorway Site 6	Artefact	01/01/2004	G. Alfredson

DATSIMA Ref	Location	Description	Registered	Registered by
LB:F26	South Coast Motorway Site 6	Artefact	01/01/2004	G. Alfredson
LB:H16	Coomera Scatter	Artefact	01/02/1995	E. Crosby and D. Dillon
LB:J48	Hope Island Site 13	Shell Midden	01/01/1963	V. V. Ponosov
LB:J49	Hope Island Site 14	Shell Midden	01/01/1987	I. Walters
LB:J54	Coomera Map Site 16	Shell Midden	01/01/1963	V. V. Ponosov
LB:J56	Coombabah Lake Site 19 (Serenity Lake)	Shell Midden	01/01/1996	A. Wallin
LB:J67	Coombabah Creek 2	Shell Midden	01/01/1963	V. V. Ponosov
LB:J68	Coombabah Creek 3	Shell Midden	01/01/1963	V. V. Ponosov
LB:M19	Oxenford - Mount Tamborine Road Site 1	Artefact	01/01/1997	B. King
LB:M20	Oxenford - Mount Tamborine Road Site 2	Artefact	01/01/1997	B. King
LB:O08	Coomera Waters 1	Shell Midden, Artefact	01/03/2003	E. Crosby
LB:O09	Coomera Waters 2 - Seaward Midden	Shell Midden	01/03/2003	E. Crosby
LB:O10	Coomera Waters 3 - Landward Midden	Shell Midden	01/03/2003	E. Crosby
LB:O11	Coomera Waters 4	Shell Midden	01/03/2003	E. Crosby
LB:O14	Yawalpah T7	Artefact	04/10/2003	E. Crosby
LB:O15	Yawalpah T8	Artefact	04/10/2003	E. Crosby
LB:O32	Riverside Gardens Scatter	Artefact	18/11/2002	J. Craib
LB:O44	CWF1 - Coombabah Waterfuture 1	Shell Midden	01/01/2004	G. Alfredson
LB:O44	CWF1 - Coombabah Waterfuture 1	Shell Midden	01/01/2004	G. Alfredson
LB:O44	CWF1 - Coombabah Waterfuture 1	Shell Midden	01/01/2004	G. Alfredson
LB:O77	Amity Road 1	Tree	14/01/2005	G. Alfredson
LB:O78	Amity Road 2	Artefact	14/01/2005	G. Alfredson
LB:O79	Amity Road 3	Shell Midden	14/01/2005	G. Alfredson
LB:O79	Amity Road 3	Shell Midden	14/01/2005	G. Alfredson

DATSIMA Ref	Location	Description	Registered	Registered by
LB:O80	Amity Road 4	Tree	14/01/2005	G. Alfredson
LB:O81	Amity Road 5	Artefact	14/01/2005	G. Alfredson
LB:O82	Amity Road 6	Tree	14/01/2005	G. Alfredson
LB:O82	Amity Road 6	Tree	14/01/2005	G. Alfredson
LB:O82	Amity Road 6	Tree	14/01/2005	G. Alfredson
LB:O83	Finnegan Way	Artefact	01/07/2005	E. Crosby
LB:O88	Old Pacific Highway 1	Artefact	04/08/2006	G. Alfredson

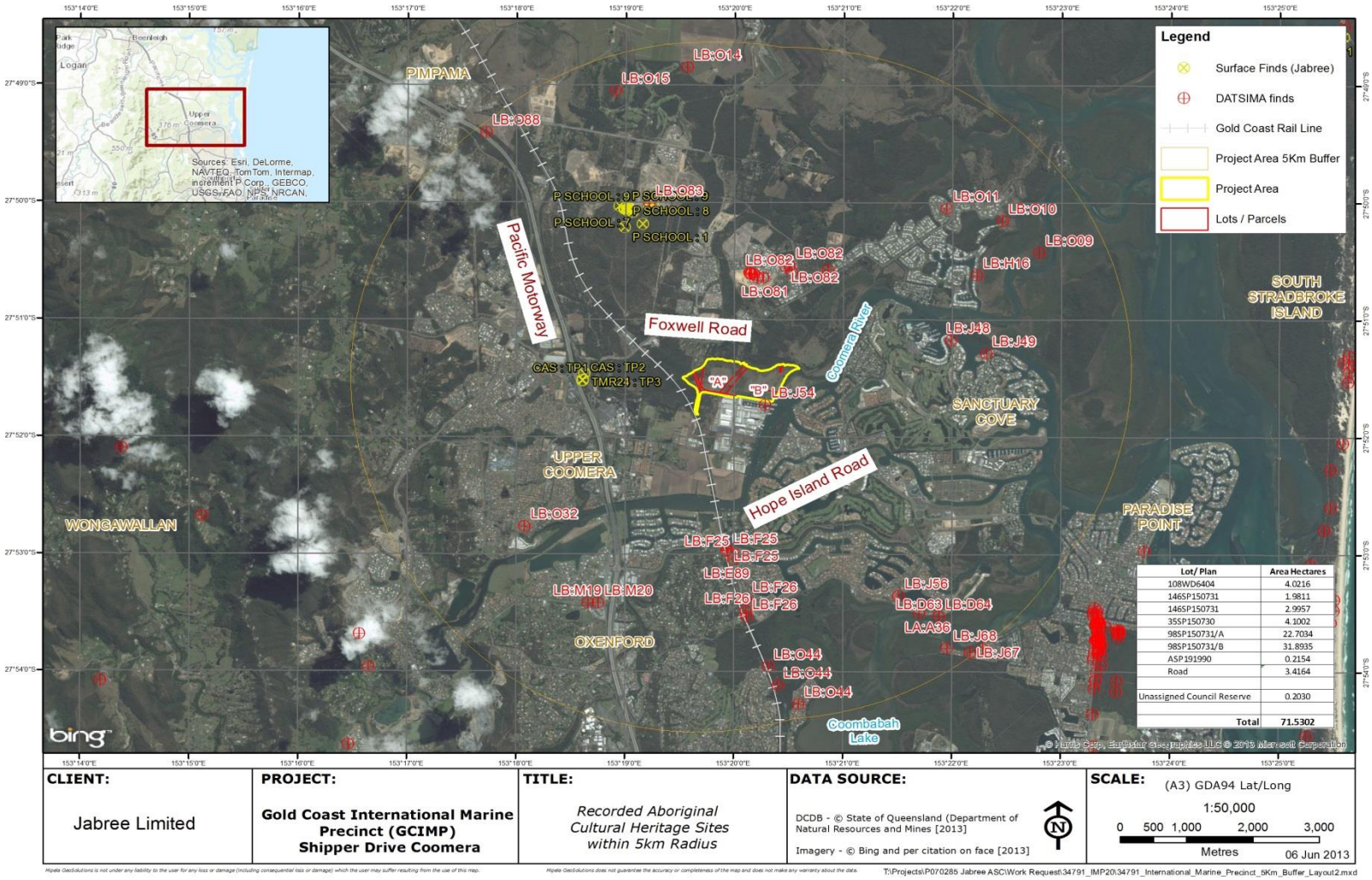

Figure 2 - DATSIMA / Jabree Cultural Heritage Finds

4.2 Cultural Heritage and Environmental Reports

There have been a number of archaeological surveys and reports for the project area that provide insight into the Aboriginal cultural heritage significance of the project area and the general vicinity of Coomera.

The banks of creeks and rivers are known to be potential camp site areas and high food and resource areas[4]. Crosby conducted a survey in 1995 of the project area and found that the "wide spread of find spots confirm that the area was extensively exploited for its economic resources"[5]. A small camp site (annotated as PS1) was located on a hill, on the northern side of Oaky Creek opposite the GCIMP site. Further investigation of the site was recommended to determine its significance. The report notes it is a possibility that PS1 could be an ancient site over 10,000 years old. Salvage excavations were recommended in the event that the site is impacted[6].

Crosby's 1995 report was updated in 2010 as part of the ongoing planning and approvals process for the GCIMP (then referred to as the Shipper Marine Precinct). The report makes some significant predictions about the possibility of Aboriginal occupation of the area. Fresh water would have been a crucial factor for Aboriginal usage of the area and the "river flats would have provided fresh water in the swamps, together with a range of useful plants and animals"[7]. A water well on Lot 98 SP150731 provides evidence of fresh water within the GCIMP site. The well has been shored with timber palings (see **Figure 3**)[8].

Figure 3 - Water well located on the north eastern side of Lot 98 SP150731 (Photo courtesy of Planit Consulting)

[4] Strong, MK, *Predictive Landscape and Cultural Environment Modelling of the Blackfellow Creek Focal Area*, Lockyer Valley (2009) p 30.

[5] Crosby, E, *Waterway Downs Cultural Heritage Survey*, Turnix Report 193 (1995, amended 2010), p 2.

[6] Ibid, pp 2, 4, 13, 22-23.

[7] Crosby, E, *Shipper Marine Precinct Cultural Heritage Assessment*, Report to Planit Consulting, Turnix Report 193b (2010), pp 5, 8.

[8] Planit Consulting, *Gold Coast International Marine Precinct, Shipper Drive, Coomera, Environmental Impact Statement* (August 2012) p 256.

As oysters were almost certainly harvested from the banks of Oaky Creek and the Coomera River, it is possible that shell middens may be located along the banks of these waterways and Foxwell Island[9]. Shell middens were located by Walters (et al) during a 1986 excavation at Hope Island as part of the Sanctuary Cove development. A survey of the area located stone artefact scatters and an extensive shell midden on the southern bank of the Coomera River. This site was later recorded as Hope Island Site 14 with DATSIMA reference LB:J49 as mapped in Figure 2. The shell midden contained discarded oyster, cockles, whelks and mussels. Radiocarbon dating of charcoal deposits located during the excavation provided an age for the site of between 1500 to 4350 years old (approximately). First occupation of the Hope Island site coincides "with a cluster of dates for the earliest occupation of a set of rocks-shelters in the southeast Queensland hinterland which were presumably used by" the traditional owners of the area[10].

The Coomera River is included in an Aboriginal legend of the local area that tells the story of the formation of the rivers that lead into the Broadwater (Logan, Pimpama and Coomera). The story tells of a fight where a dolphin was speared. The dolphin

> blew the spear out with a mighty blast and a torrent of blood and water flowed from the wound, flooding all the neighbouring country. This resulted in the islands, swamps, channels and creeks at the mouth of the Logan River and southwards towards the Broadwater[11].

The Cultural Heritage Duty of Care Guidelines (clause 6.2) provides a list of landscape features that may have cultural heritage significance. These include: areas of biogeographical significance such as natural wetlands, permanent and semi-permanent waterholes and natural springs.

Natural Wetlands, Permanent and Semi-Permanent Waterholes and Natural Springs

The GCIMP site is "contextually within a riverine / estuarine environment…3 km from the Moreton Bay Marine Park" that forms part of an "international chain of wetlands recognised for their importance to shorebirds"[12]. The wetlands are recognised as significant by local, state and federal government instruments. The GCIMP has been deemed a "controlled action" under the *Environmental Protection and Biodiversity Conservation Act 1999 (Cth)* with specific reference to provisions governing: wetlands of international importance (ss 16 and 17D), listed threatened species and communities (ss18 and 18A) and listed migratory species (ss 20 and 20A)[13]. **Figure 4** shows the central wetland in Lot 98 SP150731 that may also be recognised in the aerial view of Figure 1. The photo of the water well in figure 3 above depicts the existence of a natural spring within the GCIMP site.

The EIS emphasises the significance of the wetland within the project site. The traditional owners for the project area (as represented by Jabree Limited) consider the natural wetland and spring as highly significant from a living and historic Aboriginal cultural heritage perspective.

A review of relevant reports for the project is evidence that the GCIMP site is within an area of high Aboriginal cultural heritage significance.

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[9] Crosby, E, *Shipper Marine Precinct Cultural Heritage Assessment*, Report to Planit Consulting, Turnix Report 193b (2010), p 8.

[10] Walters, I, Lauer, P, Nolan, A, Dillon, G, Aird, M, *Hope Island: Salvage Excavation of a Kombumerri Site* (1986), pp 80, 81, 88, 91.

[11] Steele, JG, *Aboriginal Pathways of Southeast Queensland and the Richmond River*, University of Queensland Press, St Lucia (1983) pp 65-66.

[12] Planit Consulting, *Gold Coast International Marine Precinct, Shipper Drive, Coomera, Environmental Impact Statement* (August 2012) p 106.

[13] Ibid, p 107.

Figure 4 - Central wetland view east from the centre of Lot 98 SP150731 (photo courtesy of Planit Consulting)

4.3 Proposed Disturbance to the Project Area

Aboriginal Cultural Heritage is protected in Queensland under the *Aboriginal Cultural Heritage Act 2003* (the Act). The main purpose of the Act is "to provide effective recognition, protection and conservation of Aboriginal cultural heritage". Section 23 of the Act places all persons in Queensland under a duty of care to take all **reasonable and practicable measures** to ensure they do not harm Aboriginal cultural heritage (tangible and intangible) whenever they undertake an activity. The Cultural Heritage Duty of Care Guidelines identifies "reasonable and practicable measures for ensuring activities are managed to avoid or minimise harm to Aboriginal cultural heritage" (see s28 of the Act).

The Duty of Care Guidelines assigns risk category ratings to development activities that range from:

- no surface disturbance (Category 1- low risk of harm to Aboriginal cultural heritage) to
- additional surface disturbance (Category 5 – high risk of harm to Aboriginal cultural heritage).

Historic Past Land Use

Past land use of the Coomera area included grazing of cattle and horses[14]. The presence of cattle yards on Lot 146 SP150731 provides evidence of ongoing grazing. The Coomera River was an important waterway for the timber-getters living and working in the hinterland[15]. No evidence has been found to indicate any significant ground disturbing activities previously conducted on the GCIMP site.

[14] Hanlon, WE, *The Early Settlement of the Logan and Albert Districts*, read before the Historical Society of Queensland 27/3/1934, pp 214, 219-220.

[15] http://www.goldcoast.qld.gov.au/thegoldcoast/coomera-history-2717.html

Proposed Ground Disturbance

The GCIMP is expected to be constructed over a period of 30 months. The construction methodology provides for significant ground disturbing earthworks to construct the marina and ancillary facilities[16].

Based on the definitions for ground / surface disturbance in clause 3 of the Cultural Heritage Duty of Care Guidelines, surface disturbance caused by past land use detailed above is not consistent with the surface disturbance associated with the construction and operation of an industrial marina and ancillary facilities. Consequently, the project area is considered to have good ground integrity, the GCIMP will cause additional disturbance and is considered to be a (Category 5) high risk of harm to Aboriginal cultural heritage in the area.

The Cultural Heritage Duty of Care Guidelines provides that activities assessed under Category 5 "should not proceed without cultural heritage assessment" (clause 5.14). The guidelines also make specific reference to "activities causing additional surface disturbance to features likely to have cultural heritage significance" (clause 5.15). These features are identified in clause 6 of the guidelines and include natural wetlands, permanent and semi-permanent waterholes and natural springs (as detailed in 4.2 above). The guidelines further provide at 5.16 that:

> It is important to be informed about any cultural heritage significance that may attach to these features and extra care must be taken prior to proceeding with any activity that may cause additional surface disturbance of the feature, or the area immediately surrounding the feature. Where an activity is proposed under category 5, it is necessary to notify the Aboriginal Party and seek…agreement as to how best the activity may be managed to avoid or minimise harm to Aboriginal cultural heritage.

The high Aboriginal cultural heritage significance of the GCIMP site has been detailed in this section and the conclusion section provides a methodology for managing the site to avoid or minimise harm to Aboriginal cultural heritage, and comply with the Act and Cultural Heritage Duty of Care Guidelines .

[16] Planit Consulting, *Gold Coast International Marine Precinct, Shipper Drive, Coomera, Environmental Impact Statement* (August 2012) p 117-124.

5 Conclusion

The traditional owners (as represented by Jabree Limited) consider the GCIMP site to be of high Aboriginal cultural heritage significance. The waterways of Oaky Creek and the Coomera River are considered to have high cultural and spiritual value for the present as well as past occupation and usage[17].

Given the nature and extent of significant Aboriginal Cultural Heritage sites within the project vicinity, the findings of previous archaeological surveys and excavations and the relatively undisturbed nature of the ground surface, Jabree recommends further cultural heritage assessment of the GCIMP site.

The proposed disturbance to the project area to construct and operate an industrial marina and ancillary facilities is considered to be additional surface disturbance under the Cultural Heritage Duty of Care Guidelines. The project is considered a (Category 5) high risk activity to Aboriginal cultural heritage in the area.

In consideration of the Act and this desktop assessment's findings, the following recommendations are made:

- Jabree Limited and Harbour Island Pty Ltd are required to develop a Cultural Heritage Management Plan that addresses the potential impacts to Aboriginal cultural heritage associated with further ground disturbing activities related to the construction and operation of the GCIMP.
- The findings of this desktop assessment and the recommendations contained in the CHMP ought to replace and supersede all Aboriginal Cultural Heritage recommendations contained in the Gold Coast International Marine Precinct Environmental Impact Statement. This desktop assessment is the precursor to a further detailed cultural heritage assessment.
- The CHMP will detail the approach to further cultural heritage assessment and archaeological excavations at the GCIMP that will include:
    - Test trenches dug with the aid of a small excavator at intervals within the project area
    - Material from the test trenches to be "wet sieved" using a water truck and 5mm sieve
    - Charcoal located within the trenches may be used to date the site using radio-carbon dating technology
    - The archaeological excavations will be supported by a report that outlines the methodology used, details the cultural heritage finds located on site, provides mapping of the finds and outlines further cultural heritage assessment of the site (if required).
- Jabree Limited would appreciate the assistance of the proponent in identifying the on-ground project boundary as part of the further cultural heritage assessment
- The CHMP will include a schedule for the delivery of Cultural Heritage awareness and induction sessions to project personnel.

[17] Compare this with the Environmental Values recorded in the GCCC Report "Environmental Inventory of the Coomera River Catchment and its Tributaries" found in Planit Consulting, *Gold Coast International Marine Precinct, Shipper Drive, Coomera, Environmental Impact Statement* (August 2012) p 352. Coomera River and Oaky Creek are rated as having Medium and Low value respectively.

6 References

- Aird, M, *Traditional Lifestyles and Recent History of South East Queensland Aborigines (A Literature Analysis)* (May 1992) prepared for Ngutana-Lui, The Aboriginal and Islander Studies Centre for Catholic Education.
- Crosby, E, *Shipper Marine Precinct Aboriginal Cultural Heritage Assessment*. Report to Planit Consulting, Turnix Report 193b (2010).
- Crosby, E, *Waterway Downs Cultural Heritage Survey* Turnix Report 193 (1995, amended 2010).
- Hanlon, WE, *The Early Settlement of the Logan and Albert Districts*, read before the Historical Society of Queensland 27/3/1934.
- Planit Consulting, *Gold Coast International Marine Precinct, Shipper Drive, Coomera Environmental Impact Statement* (August 2012).
- Steele, JG, *Aboriginal Pathways of Southeast Queensland and the Richmond River*, University of Queensland Press, St Lucia, 1983.
- Strong, MK, *Predictive Landscape and Cultural Environment Modelling of the Blackfellow Creek Focal Area, Lockyer Valley* - SEQ Catchments Healthy Waterways Project (2009).
- Walters, I, Lauer, P, Nolan, A, Dillon, G, Aird, M, Hope Island: Salvage Excavation of a Kombumerri Site (1986).
- *Aboriginal Cultural Heritage Act (Qld) 2003* and Section 28 Duty of Care Guidelines (Gazettal Date: 16/4/2004).
- www.goldcoast.qld.gov.au

Limitations and Exceptions of Report

The findings of this report are based on the scope of work as per project brief from the client. No warranties, expressed or implied, are made.

This assessment is based on background research and site survey conducted by Jabree Limited. All conclusions and recommendations made in the report are the professional opinion of Jabree Limited and while normal checking of the accuracy of data has been conducted. Jabree Limited assumes no responsibility or liability for errors in data obtained from regulatory agencies or any other external sources, nor from occurrences outside the scope of this project.

The client acknowledges that this report is for the exclusive use of the client, its representatives and advisers. The client agrees that this report or correspondences will not be, except as set forth herein, used or reproduced in full or in parts for any such promotional purposes, and may not be used or relied upon in any prospectus or offering circular.

Gold Coast International marine precinct

APPENDIX 12

Draft Cultural Heritage Management Plan

Prepared By

Jabree Limited

Cultural Heritage Management Plan

Parties

Harbour Island Pty Ltd (ACN: 122 548 467)

And

Jabree Limited (ACN: 147 546 405), on its own behalf and on behalf of the Native Title Party

Contents

Background

A The Proponent is undertaking the Project in the Project Area.

B The Proponent wishes to ensure it complies with its obligations under the *Aboriginal Cultural Heritage Act 2003* in undertaking the Project.

C Jabree Limited (a company limited by Guarantee) is the Aboriginal Cultural Heritage Body for the area in which the project is located and represents the Native Title Party for the purposes of this Agreement.

D In this Agreement the Parties have agreed on how the Proponent's obligations under the ACHA will be discharged with the assistance of Jabree Limited.

E The Project's declared status as a "significant project" under the *State Development and Public Works Organisation Act 1971 (Qld)*, requires the preparation and submission of an Environmental Impact Statement to the Queensland Coordinator General and therefore under the terms of the *Aboriginal Cultural Heritage Act 2003 (Qld)*, the development of a Cultural Heritage Management Plan with the Aboriginal Party for the project area under Part 7 of the ACHA.

F This Agreement's scope is limited to compliance with the ACHA. The resolution of matters (if any) relating to Native Title will be addressed pursuant to the *Native Title Act 1993 (Cth).*

1. Agreed terms

1.1. Interpretations

Unless otherwise specified terms used in this Agreement have the same meanings as is given to them in the ACHA.

Aboriginal Cultural Heritage has the same meaning as it has in the ACHA.

ACHA means the *Aboriginal Cultural Heritage Act 2003 (Qld)*.

Agreement means this Cultural Heritage Management Plan.

Cleared Areas means the area depicted in the Completion Certificate as cleared for the purposes of this Agreement.

Commencement Date means the date that the last Party executes this CHMA, or a later date which the Parties agree in writing to be the Commencement Date of this CHMA.

Completion Certificates means a certificate in the form of **schedule** 3, for each body of Contracted Works or part thereof. Completion Certificates may be partial or final.

Confidential Information means the Risk Assessments, the Contracts and includes any information about Aboriginal Cultural Heritage Jabree or its representative nominee considers on its behalf and on behalf of the Native Title Party, to be confidential.

Construction Works means all physical works including ground breaking, excavation and construction activities necessary for, or incidental, to the project works.

Contracts means the Contracts entered into between the Parties for the undertaking of the Contracted Works.

Contracted Works means Cultural Heritage Assessments, being cultural heritage investigation and clearance work the subject of the Contracts, any additional investigation work recommended in a Completion Certificate, any cultural heritage induction work or other consulting services related to the implementation of this Agreement for which the Parties may choose to contract.

Cultural Heritage Assessment means an assessment of the Project Area or part of the Project Area, as described in **clause 4**.

Cultural Heritage Induction means a cultural heritage induction conducted in accordance with clause 7.

Development Approvals mean all approvals, permits, licences and permissions necessary to enable the Project to proceed.

Fee Schedule means the fee schedule set out as **schedule** 5 to this Agreement.

Native Title Party means Mr Wesley Aird, Mr Ian Levinge, Ms Jacqueline McDonald, Mr Earl Sandy, Mr Kevin Slabb and Ms Eileen Williams on their own behalf and on behalf of the Gold Coast Native Title Group Native Title Determination Application QC06/10 (QUD 346/06), which was registered by the National Native Title Tribunal on 23 September 2010.

Parties means Jabree Limited and Harbour Island Pty Ltd.

Project means the Project called the Gold Coast International Marine Precinct being undertaken by the Proponent in the City of Gold Coast.

Project Area means the area shown on the plan attached at **schedule** 2.

Project Works means all planning, design and physical works including clearing and construction works associated with the Project.

Proponent means Harbour Island Pty Ltd.

2. Cultural Heritage Management Plan and the ACHA

2.1. On 1 November 2012 the Proponent issued Written Notice – Cultural Heritage Management Plan pursuant to section 91 of the ACHA.

2.2. On 20 November 2012 Jabree Limited advised the Proponent that the applicants for the Gold Coast Native Title Group (QUD 346/2006) are the Aboriginal Party for the area identified in the notice as well as advising the contact details and address for service of the Aboriginal Party.

2.3. The Parties intend that this Agreement be a Cultural Heritage Management Plan under Part 7 of the ACHA and may be referred to by the Parties as the Gold Coast International Marine Precinct Cultural Heritage Management Plan.

2.4. The Parties agree that compliance with this Agreement will constitute compliance with the ACHA duty of care set out in section 23 of the ACHA.

2.5. The Agreement is to be implemented in the main by the Proponent commissioning Jabree to undertake Contracted Works in accordance with the terms of this Agreement.

3. Proponent and the Project

3.1. The Proponent's proposed project consists of the construction and operation of an industrial marina. Specifically the project involves developing the remaining 63.5 hectares of the existing Gold Coast Marine Precinct located on the Coomera River, to incorporate best practice design for a working industrial marina. The project area comprises the property lots listed below and is shown in the map at Schedule 2:

- Lot 108 on WD4604
- Lot 146 on SP150731
- Lot 98 on SP150731
- Part of Shipper Drive adjacent to Lot 98 on SP150731

3.2. The Proponent will seek, and hopes to obtain, Development Approvals for the Project.

3.3. The Project may be developed in stages over a number of years.

3.4. Subject to clause 3.6, on completion of Contracted Works and the issuing of Completion Certificates (Partial or Final) indicating that work has been completed by Jabree it is agreed by the Parties that the Proponent may proceed with clearing and construction activities over the cleared areas referred to in the Certificate. Once Contracted Works have been completed the Proponent will be taken to have complied with any obligation under the ACHA with respect to the identification and management of cultural material within those cleared areas the subject of the Completion Certificates.

3.5. The Parties acknowledge however that other obligations may continue to exist under the ACHA with respect to the management of any cultural material that may be discovered during ongoing operations in the course of the Project which were not found during the undertaking of Contracted Works.

3.6. Partial Completion Certificates shall be provided by Jabree for particular parts of the Project Area for which Contracted Works involving Cultural Heritage Assessments are undertaken as they are cleared, so that clearing and construction activities can commence in those particular areas before other areas the subject of such Contracted Works are cleared.

4. Cultural Heritage Assessment

4.1. The Parties acknowledge that Jabree Limited has identified an approach and methodology to assess prospective Aboriginal cultural heritage values in the Project Area.

4.2. Jabree will undertake a Cultural Heritage Assessment of the Project Area (as Contracted Works) as requested by the Proponent.

4.3. The purpose of the Cultural Heritage Assessment is to ensure that prior to the commencement of clearing and construction works in the Project Area:

(a) that part of the Project Area that the Parties agree should be assessed for the presence of Aboriginal Cultural Heritage has been investigated for the presence of Aboriginal Cultural Heritage; and

(b) where the Assessment has not disclosed the presence of Aboriginal Cultural Heritage that warrants further investigation or management, the Assessment can be relied upon for the issuing of a Completion Certificate (Partial or Final) on which the Proponent can rely for the undertaking of clearing and construction work in the area the subject of the Certificate; and

(c) in those areas where further investigation and management measures are warranted in the opinion of Jabree, the Certificate will properly identify further investigative and/or management measures by way of recommendations identified in the Certificate.

4.4. The Parties agree to negotiate in good faith in relation to the undertaking of any further cultural heritage work or investigations or other management measures, recommended in a Completion Certificate.

4.5. The Parties agree that Cultural Heritage Assessments or any other cultural heritage work or investigations to be undertaken as Contracted Works will be undertaken pursuant to the Proponent's standard professional services agreement (**Proponent's Contract**).

4.6. The Parties further agree that any additional Cultural Heritage work or investigations recommended by Jabree for any particular part of the Project Area following Assessment, and agreed to by the Proponent, will also be undertaken pursuant to the Proponent's Contract.

5. Contract

5.1. The Parties acknowledge and agree:

(a) they will enter into a Contract to perform the Contracted Works in the interests of ensuring identification, protection and management of Aboriginal Cultural Heritage under the ACHA;

(b) Jabree will carry out the Contracted Works as soon as reasonably possible following the entering into of a Contract;

(c) on completion of Contracted Works involving Cultural Heritage Assessments (as described in 4.3), or any part of such Contracted Works, Jabree or its nominated representatives will issue a Completion Certificate (Partial or Final) to the Proponent for the Contracted Works or that part which they have completed, whereupon it shall be deemed the Contracted Works the subject of the Completion Certificate will have been fully performed;

(d) a partial Certificate must be issued, if requested by the Proponent, and if Jabree or its nominated representatives have completed Assessment of the area the subject of the request.

(e) Final Completion Certificates must be supplied to the Proponent no later than seven (7) days following the completion of the Contracted Works. Should the Final Completion Certificates not be received by the Proponent within the seven (7) day period it will be deemed that the work has been completed and that the Proponent may proceed with work in the area the subject of the Contracted Works;

(f) the Completion Certificates will be available to any Native Title Party by request;

(g) the Contracts will remain confidential to the Parties who have entered into them;

(h) clearing and construction work may commence in any area to which a Completion Certificate (Partial or Final) relates, immediately after the certificate is issued subject to the Project having received Development Approvals necessary to undertake the clearing or construction.

5.2. The terms of this clause 5 relating to the issuing of Certificates will be incorporated into any Contract for Works involving Cultural Heritage Assessment.

5.3. The Parties agree that the Project Schedule may reasonably require that Contracted Works be undertaken for the Project Area or part of the Project Area even if Development Approvals for the Project have not been obtained.

6. Contracts for Cultural Heritage Assessment and other investigations – Fees

6.1. It is intended that work to be undertaken by Jabree under this Agreement, and pursuant to a Contract for Contracted Works, will be undertaken at the rates set out in **schedule 5**.

6.2. The rates in **schedule 5** will be fixed for one year from the Commencement Date save that they will be adjusted annually according to the Consumer Price Index for the Brisbane area.

6.3. **Schedule 5** shall be reviewed by the Parties three years after the Commencement Date, if, by that time the Cultural Heritage Assessment has not been concluded.

6.4. If additional cultural heritage work or investigations are recommended in a Final or Partial Completion Certificate, those works will be undertaken at the rates specified in **schedule 5**, provided the Parties first reach agreement on implementing the investigation recommendations.

6.5. If a programme for subsequent detailed analysis such as, but not limited to, carbon dating or lithic/residue testing is agreed by the Parties to be undertaken, those works will be undertaken at the rates specified in **schedule 5**, provided the Parties first reach agreement on implementing the investigation recommendations.

7. Cultural Heritage Induction

7.1. It is intended that the senior Proponent employees (supervisors and above) and their equivalent level contractors involved in the Project Works will undergo Cultural Heritage Induction during the course of the Project.

7.2. The Proponent will use its best endeavours to ensure that relevant employees, contractors and subcontractors engaged in the Project will undergo a Cultural Heritage Induction during the course of the project to ensure that they are aware of cultural heritage significance of the region, their obligations and duties under the ACHA and under this Agreement.

7.3. Cultural Heritage Inductions are to be:

(a) conducted by no more than two suitably qualified people nominated by Jabree Limited;

(b) consistent in content at all cultural heritage inductions.

7.4. In the event of any dispute concerning the Induction, the Parties agree that the Project can continue in the absence of the inductions and that the lack of induction will not delay the commencement of the construction works.

8. Aboriginal Cultural Heritage located during Project Work and Assessment

8.1. If a site containing significant Aboriginal Cultural Heritage as described within the Cultural Heritage Induction is encountered during the Project Works, work will cease immediately within a 25 metre radius around the Aboriginal Cultural Heritage site

and the Site Supervisor will immediately inform the Jabree representative who will determine the most appropriate means by which the find should be managed in consultation with the Proponent.

8.2. If any human remains are encountered during the Project Works they shall be managed in accordance with the *Aboriginal Cultural Heritage Act 2003* Human Remains Guidelines. Refer also to **schedule** 4.

8.3. Should any Jabree representative locate a site containing significant Aboriginal Cultural Heritage during Contracted Work they will immediately provide a written summary of the find, its description and location to the Proponent. The Proponent must not use the summary for any purpose other than a purpose connected with the Project such as informing workers and contractors of the find.

8.4. All Cultural Heritage objects located during Project works and which Jabree or its representatives wish to salvage from the Project Area are to be stored at the direction of Jabree allowing reasonable and adequate time required for any scientific or other examination of the objects by Jabree.

8.5. It is recognised that certain scientific analysis, such as residue analysis can only be undertaken once, and in this regard, if scientific examination is to include residue analysis this will only be undertaken at facilities that are recognised as being able to perform such analysis. A summary of the findings of the facility will be made available to the Proponent.

9. Review of Certificates or Reports

9.1. Within 45 days of the completion of any Contracted Works involving Cultural Heritage Assessment, Jabree will prepare a report a copy of which will be provided to the Proponent on completion. Any such reports will not require assessment by any third party.

9.2. It is acknowledged by the Parties that all Intellectual Property associated with any reports (to the extent that Jabree may choose to prepare and provide them) will remain with the author of the reports and their authorised agents.

9.3. Notwithstanding that Jabree may prepare reports for such Contracted Works, preparation of such reports will not hold up the issuing of Completion Certificates (Partial or Final) upon which the Proponent may rely as they are issued.

10. Historical and Legacy Issues

10.1. Requests for any Cultural Heritage based legacy items for the Project, such as interpretative trails, bollards, brochures and books will be considered by the Proponent as part of the overall Project. Agreement to the inclusion of such matters in the Project will be at the discretion of the Proponent. If agreed to be included, the

content of any such matters will then be agreed upon by the Parties prior to their development and integration into the Project.

11. Access to Project Area

11.1. Jabree may seek the consent of the Proponent to access the Project Area to inspect the Project during construction from time to time. The Proponent agrees to instruct relevant contractors to grant access to such inspection subject to:

(a) Access times being when it is operationally convenient and safe to do so;

(b) Jabree demonstrating it holds appropriate insurance and, if necessary, workplace health and a “visitor level” safety induction. Should Jabree representatives wish to travel on site unaccompanied, higher level inductions will be required.

12. Warranties as to signing

12.1. Native Title Parties

Any person who signs this Agreement on behalf of Jabree Limited warrants that he/she is authorised to sign it on behalf of Jabree and the Native Title Party.

13. Entire Agreement

13.1. This Agreement constitutes the entire Agreement between the Parties as to its subject matter and supersedes all prior representations, arrangements, understandings and negotiations in connection with it.

14. Counterpart

14.1. This Agreement may be signed in Counterpart.

15. Dispute Resolution

15.1. The intention of the Parties is that they will work cooperatively together in the implementation of this Agreement.

15.2. In the event a dispute arises with respect to this Agreement or any Contract the Parties will first seek to resolve any dispute through discussion and consensus.

15.3. If they are unable to resolve the dispute a meeting will be arranged between representatives of Jabree and representatives of the Proponent for the specific purpose of negotiating a resolution. If that meeting has been held and the dispute remains unsolved for more than 7 days from the date of the meeting, any party may request mediation of the issue in dispute under the following paragraph.

15.4. Where mediation of an issue in dispute is sought, the mediator will be a person agreed by the Parties within 5 days of mediation of the dispute being requested. If agreement cannot be reached on a mediator, the mediator will be appointed by the President of the Queensland Law Society Incorporated.

15.5. The mediation will be conducted as determined by the mediator within the shortest timeframe which the mediator considers reasonable. Costs incurred in attending mediation will be met by the individual parties in dispute, however the mediator's costs will be borne by the Proponent up to a maximum of $5000 per dispute.

15.6. If the dispute is unable to be resolved pursuant to this clause then any of the Parties to the dispute may initiate such proceedings in a Court or Tribunal of appropriate jurisdiction as they see fit. Costs incurred in attending the Court or Tribunal will be met by the individual parties in dispute.

16. Contracts Generally

16.1. Notwithstanding **clause** 5 dealing with Contracts, nothing in this Agreement prevents the Parties from entering into contracts in relation to any other matter or thing connected with the Project. By way of example, such matter or thing may include matters related to consulting services and provision of signage.

17. Termination

17.1. This Agreement terminates on the fifth anniversary of the Commencement Date (the "**Termination Date**"). If by the Termination Date, further Cultural Heritage Assessments remain to be done in the Project Area the Parties agree they will use their best endeavours and negotiate in good faith to secure a new Cultural Heritage Management Agreement to facilitate the undertaking of those Assessments and any additional Contracted Works, the Parties may agree upon.

17.2. In negotiating any new agreement pursuant to **clause 17.1**, the Parties will have regard to the terms and conditions of this Agreement with a view to ensuring any new agreement is substantially similar to this Agreement other than in relation to those matters which, for good reason, the Parties agree might require change.

17.3. Notwithstanding **clause 17.1** and **clause 17.2** this Agreement terminates if the Contract to perform the Contracted Works is terminated before Jabree Limited has issued a Completion Certificate or Completion Certificates covering the entire Project Area.

Schedule 1 – Contact Details

For Jabree Limited

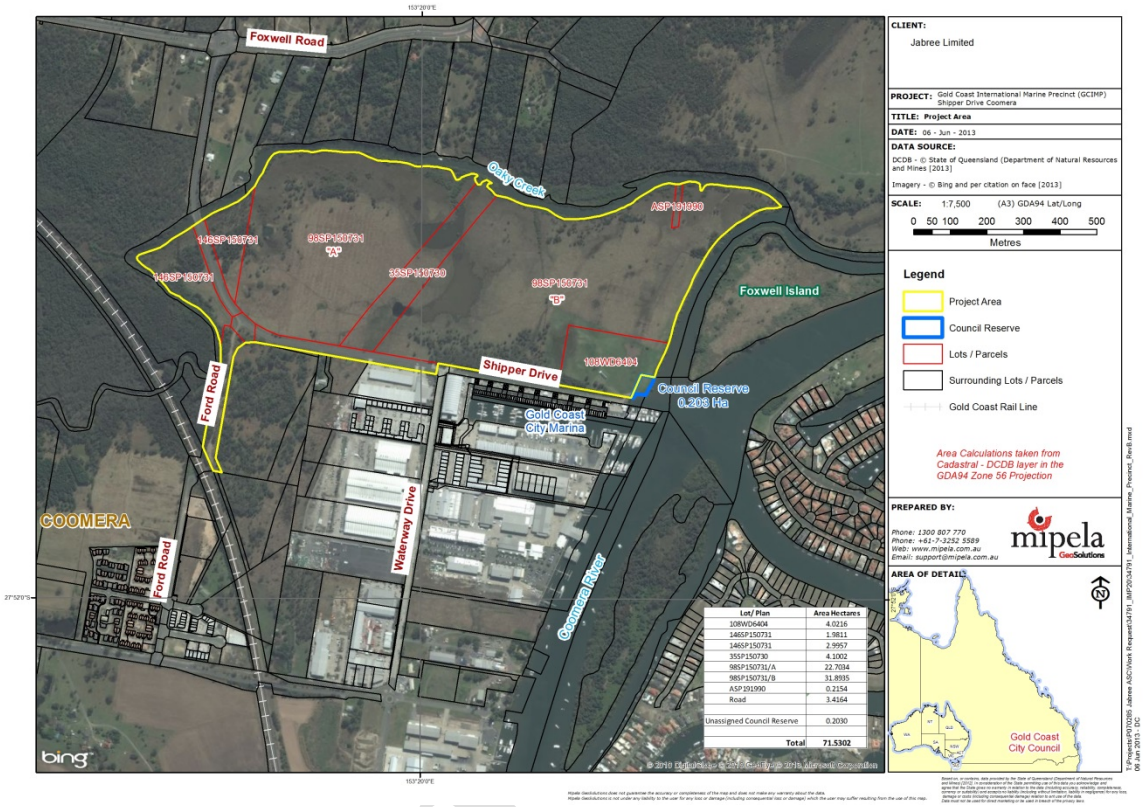
Mr Wesley Aird
Telephone: 0402 00 3 721
Email: 25g@optusnet.com.au
PO Box 1233
COORPAROO DC, QLD, 4151

For the Proponent

Boyd Sargeant
Planit Consulting Pty Ltd
Telephone: 07 5526 1500
Email: boyd@planitconsulting.com.au
PO Box 206
NOBBY BEACH QLD 4218

Schedule 2 – Project Area

Map below to be amended in line with final project scope.



Schedule 3 – Completion Certificate

Gold Coast International Marine Precinct Cultural Heritage Management Plan – Completion Certificate (Contract No. ....)

1 Final or partial

This Completion Certificate is a Final/Partial (delete as appropriate) Certificate for that part of the Project Area shown on the plan attached.

(**note**: A Final Certificate is for all of the area the subject of a Contract. A Partial Certificate is for part of that area).

2 Clearance

The area shown hatched on the plan attached has been "cleared" for purposes of the Gold Coast International Marine Precinct Cultural Heritage Management Plan meaning that it has been investigated for the purpose of determining the presence of Aboriginal Cultural Heritage which may require further investigation or management.

Project Work may commence in the hatched area with no further management measures required.[1]

3 Recommendations

There are/are no recommendations for additional cultural heritage investigations or management in the area the subject of this Certificate (delete as appropriate).

If there are recommendations, detail those here[2];

4 Report

A report is/is not intended to be prepared in connection with the recommendations (delete as appropriate).

5 Assessment

Assessment of the area the subject of this Certificate occurred between ... and ... [insert dates]. It was carried out by [insert names].

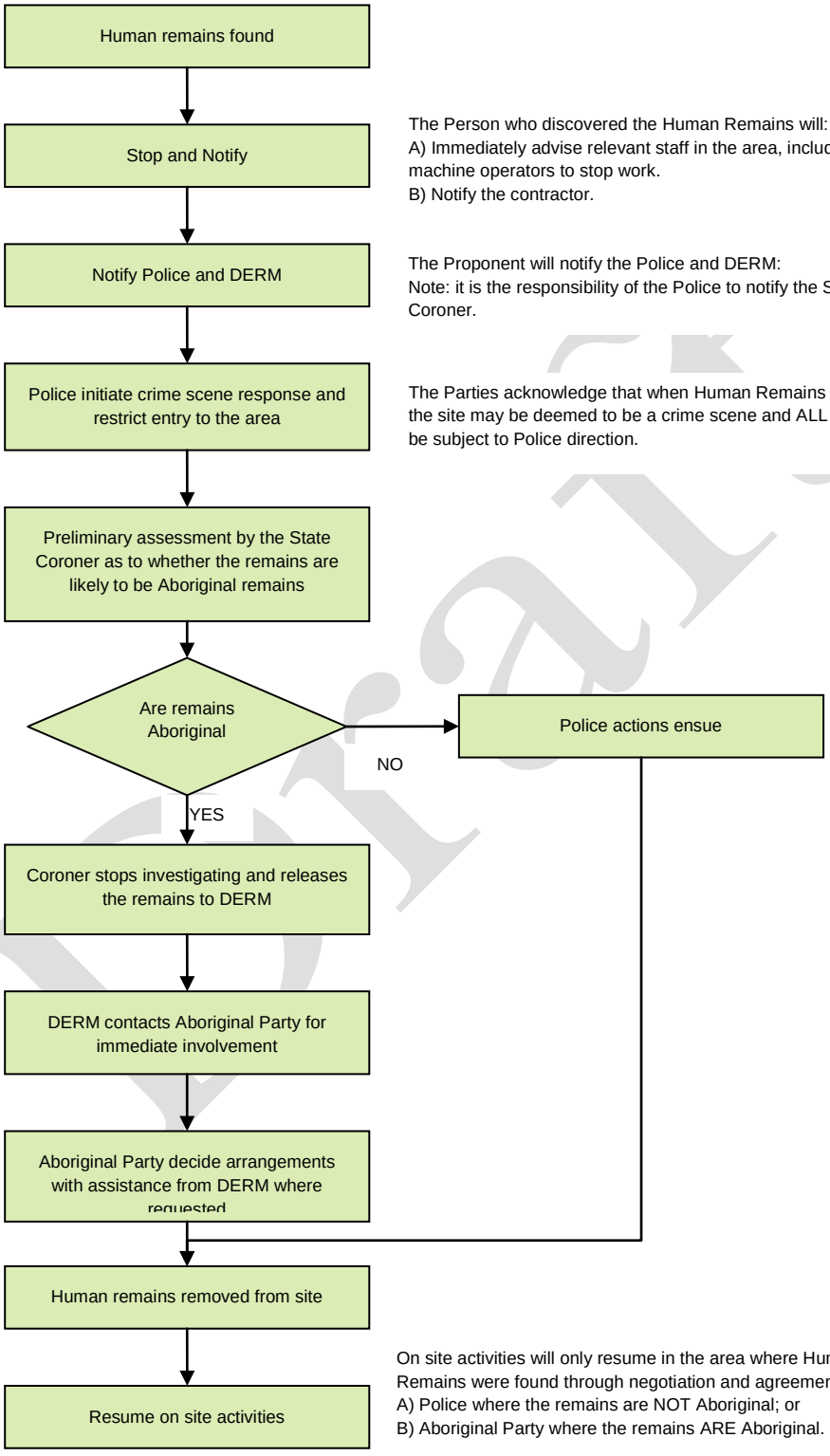
Signed for and on behalf of)
Jabree Limited)
)

Date _____

[1] **note**: Notwithstanding this Certificate, Clause [3.5] of the Agreement cautions that Aboriginal Cultural Heritage may be encountered during Project Works. The Proponent and its Contractors should remain aware of their obligations under the ACHA and the Agreement in that regard.

[2] **note**: Pursuant to clause [4] of the Agreement, the Parties are to meet and endeavour to agree on implementation of recommendations.

Schedule 4 – Human Remains Guidelines



Schedule 5 – Fee Schedule

Executed as an Agreement by the Parties on the dates appearing below:

Executed by **Harbour Island Pty Ltd**

In the presence of:	Signature, a person duly authorised to execute this Deed
Witness signature	Print name and position of person signing Deed
	Dated this day of 2013
Print name of witness	

Executed in accordance with section 127(1) of the *Corporations Act 2001* and section 36(1) of the *Aboriginal Cultural Heritage Act 2003* by the Commercial Entity, **Jabree Limited** ACN 147 546 405

In the presence of:	Director
Witness signature	Print name of Director
	Dated this day of 2013
Print name of witness	
In the presence of:	Director / Secretary [Delete one]
Witness signature	Print name of Director / Secretary [Delete one]
	Dated this day of 2013
Print name of witness	