Harwood Marine

Harwood Marine Precinct Planning Proposal

31 October 2012

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1. Introduction

1.1 Purpose of this report

The purpose of this report is to seek Council's support for a site specific planning proposal to rezone the land so that it can be sent to DOPI for gateway approval

This report supports the site specific rezoning by:

- providing Council with an outline of the marine precinct concept for the subject land on Harwood Island;
- assessing the concept against the DOPI guidelines and relevant legislation and policy; and
- reviews the concept against key issues and constraints including flooding, traffic and agricultural land.

1.2 Scope and limitations

This report has been prepared by GHD for Harwood Marine and may only be used and relied on by Harwood Marine and Clarence Valley Council for the purpose agreed between GHD and Harwood Marine as set out in this report.

GHD otherwise disclaims responsibility to any person other than Harwood Marine arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Harwood Marine and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Background and Site Characteristics

2.1 Site description

The subject land is Lots 1, 2, 3 and 4 DP 1155528, Careys Lane, Harwood Island, Harwood. The Deposited Plan is at Figure 1. The three contiguous lots have a combined total area of 42.64 ha and are owned by Harwood Marine. The planning proposal also covers a narrow Crown Reserve located east of Lot 1 and an irregular shaped area of accretion that is also Crown land and is located immediately east of Lots 1,2 3 and 4. The combined area of Crown land is approximately 10 ha. The planning proposal also covers an additional strip of water approximately 50 m wide that is located immediately east of the accretion land owned by the Crown.

The subject land is located at the south eastern corner of Harwood Island and is accessed from River Road East and Careys Lane. An air photo of the wider area is at Figure 2.

Lots 1-4 are located immediately to the east and adjoining Lots 5 and 6 of the same Deposited Plan. These lots have a combined area of 7.091 ha and are the location of the existing Harwood Slipway and marine industry business. Lots 5 and 6 are not part of this planning proposal.

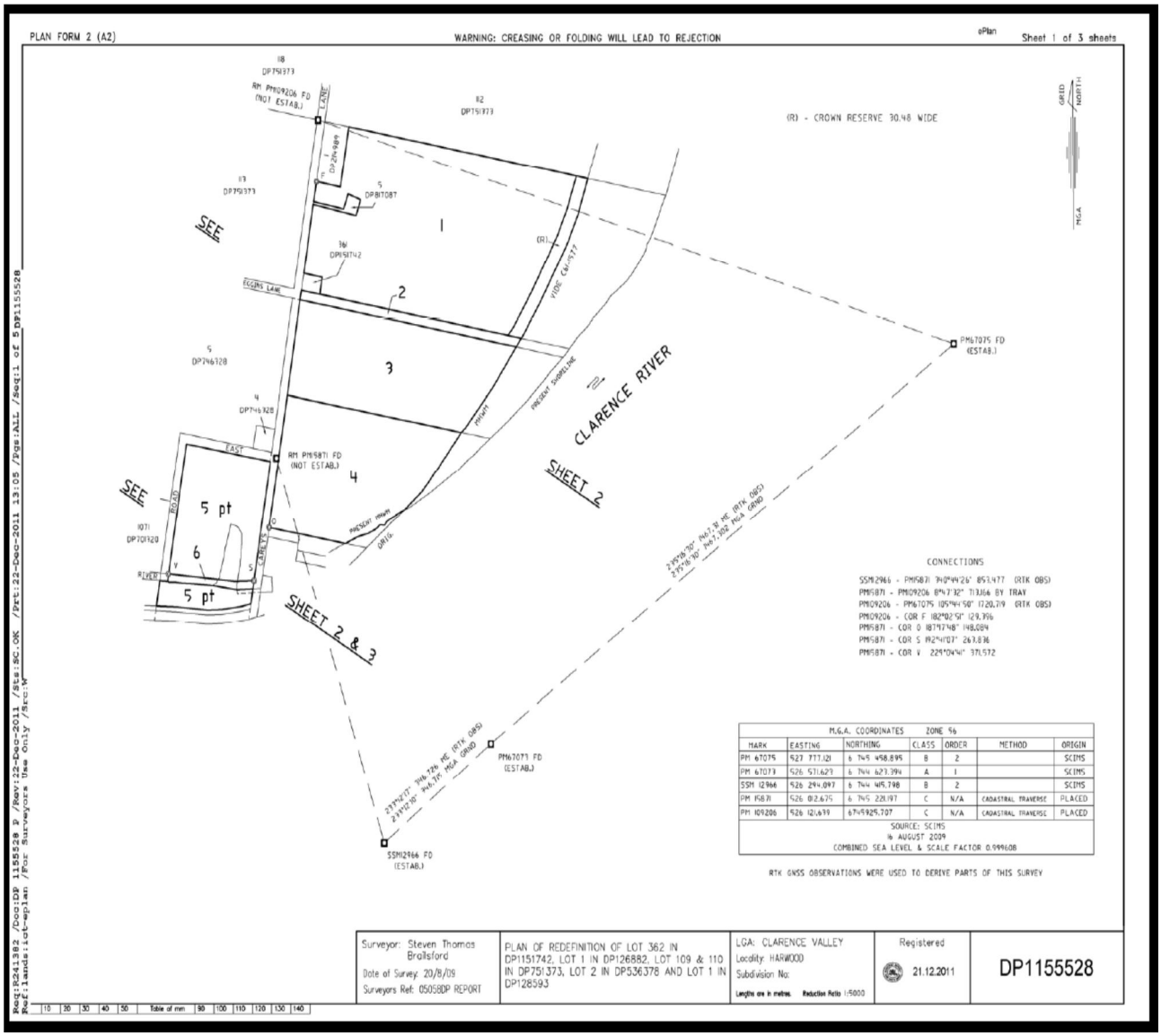


Figure 1 (a) Deposited Plan for Subject Land

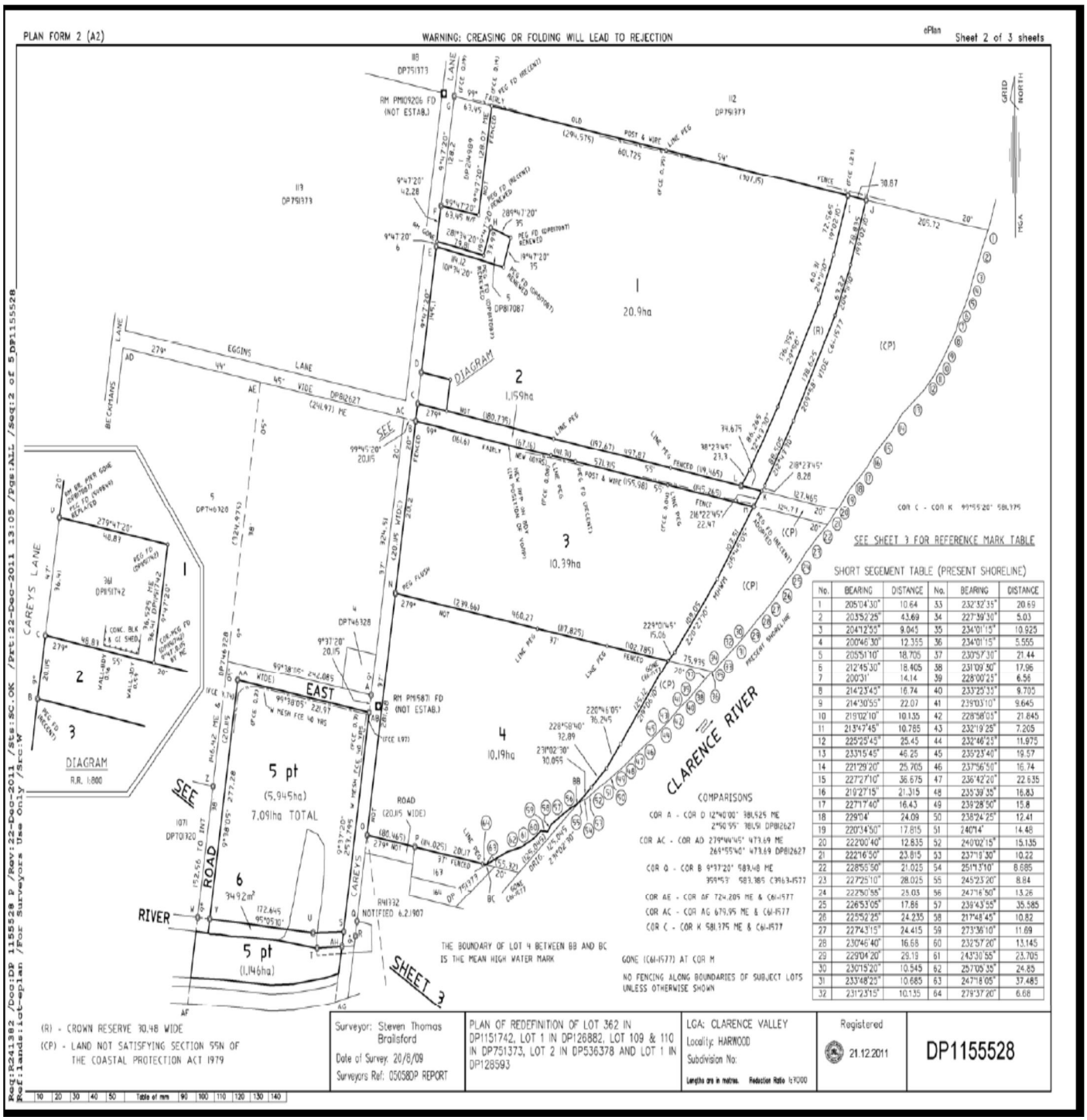


Figure 1 (b) Deposited Plan for Subject Land

Figure 2 Harwood Island Locality

2.2 Current land use zones of the site and surrounding land

Lots 1-4 of the subject land are entirely zoned RU1 Primary Production under Clarence Valley LEP 2011. The accretion land to the east of Lots 1-4 appears to be zoned predominantly W2 Recreational Waterways even though it is not actually a waterway. An LEP extract is at Figure 3.

The adjacent land on which Harwood Slipway currently operates is zoned partly IN4 Working Waterfront and partly W3 Working Waterways.

The Harwood Sailing Club land that is located adjacent to the subject land is also zoned RU1 Primary Production. The Harwood Sugar Mill and Refinery is also zoned RU1 Primary Production with its water frontage zoned W3 Working Waterways.

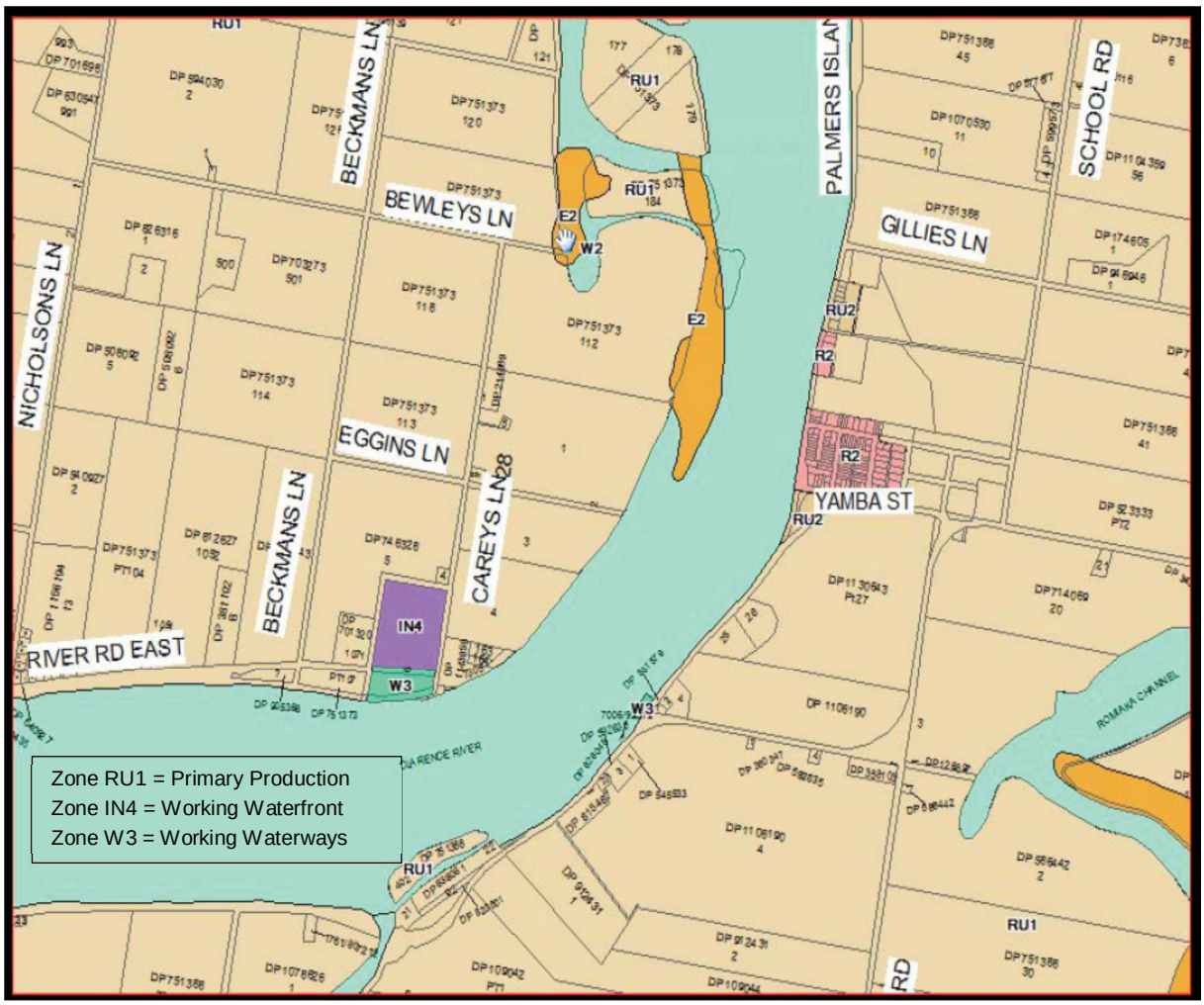


Figure 3 Clarence Valley LEP as it Applies to the Subject Land

2.3 Site context and history

The subject land is currently partly used for sugar cane production (approximately 16 ha), partly used for grazing of beef cattle and is also partly used to locate three large sediment ponds. The ponds (about 2.5 ha in area and 1.5 m deep) have been specifically constructed to store silt and sediment that washes into the slipway entrance during flooding events. As the flood recedes, sediment is pumped out of the slipway to the ponds where it is contained and settled. As the ponds fill up they are periodically cleaned out and the flood sediment is used on farm land. There are some areas of native vegetation located on Lot 1 DP 1155528 and some gallery stands of mangroves and Casuarina located on the immediate edge of the Clarence River in scattered locations. The accretion land is used for grazing cattle.

A dwelling is located on Lot 4 DP 1155528 in the south western corner.

The majority of the subject land is surrounded by sugar cane production land interspersed with grazing land. Sugar cane is the dominant agricultural land use on Harwood Island. The Harwood Sugar Mill and refinery is located 1.5 km away to the west along River Road.

Immediately south of the subject land is the Harwood Sailing club located on Crown Land. It includes a small club house and storage building, a managers' residence and a beach launching area.

There are four dwellings on small concessional lots located along Careys Lane in the vicinity of the subject land. A number of these are owned by Harwood Marine.

The Clarence River at the subject land is fully tidal and between 500 m and 600 m wide. It has a depth of more than 5 m in the main channel and at the existing approach to the slipway it has a depth of 5 m at high tide.

2.4 Port of Yamba

The Clarence River between its training walls at Yamba to the Harwood Bridge (located 2 km west of the subject land) is a designated port (the port of Yamba) under the Section 47 of the *Ports and Maritime Administration Act, 1995*. Only 6 ports are designated in NSW and the port of Yamba is the only one north of Newcastle. Other marine facilities within the port of Yamba include the marina, boat ramp and trawler harbour at Yamba, the trawler harbour, boat ramp, slipway and wharves at Iluka, a small commercial wharf at Goodwood Island, a small commercial wharf at Palmers Island (opposite the subject land) and the wharves in front of the Harwood sugar mill. Upstream of the Harwood Bridge there are a number of wharves, boat ramps and moorings as far upstream as Grafton. They are predominantly used by commercial fisherman and the recreational boating community.

3. The Concept

Harwood Marine currently operates on a 7 ha parcel of land being Lots 5 and 6 of DP 1155528, Harwood. The company employs approximately 40 permanent staff plus contract and temporary staff during periods of high workloads. The company uses this site for ship building, barge construction, ship repairs, and yacht fit outs, all forms of marine construction, as well as abrasive blasting, painting, stevedoring and international shipping. The existing site includes a large slipway that allows ships up to 90 m long, 26 m wide and 2500 tonnes be either launched or retrieved from the site. The photos at Appendix A show the existing operation at ground level and from the air.

The concept that requires a site specific rezoning affects Lots 1- 4 of DP 1155528 which has a combined area of approximately 42.64 ha. It also affects the Crown land (without a property description) east of Lots 1-4 and a 50 m wide strip of water east of that. The objective is to get this land into an appropriate employment lands zone that will enable its owners to create a genuine marine industry precinct on the Clarence River. The precinct would allow large areas of land that can be easily accessed from the existing slipway and the river to be dedicated to marine industry. In particular the site would target boat builders and repairers as well as electricians, electronics experts, hydraulic, diesel, timber and metal trades as well as engineers and other marine industry experts. All these site users require both good access to the Clarence River and Pacific Ocean to get boats into the site and then back out again. The proximity to the Pacific Highway makes it easy to access materials and labour as well. The precinct would grow into a deep water repair and construction facility that caters to the east coast recreational and commercial boating industry. Large boats need large areas to manoeuvre both in and out of the water and this site has both these characteristics.

The port of Yamba is ideally located between Brisbane and Newcastle and the Harwood Island site has sufficient flat land with minimal ecological value and excellent river access to accommodate the marine precinct. The Pacific Highway provides an excellent transport link to the site and the Clarence River provides a totally underused transport link to Grafton and the North Coast Rail Line. Re-establishing a genuine transport link between the ocean and the rail system would be a real opportunity to move bulky cargo along the east coast of Australia without dependence on the road network.

It is envisioned a marine precinct would grow over many years with additional industries and site users setting up as the momentum of the precinct increased. In its ultimate stage it may have multiple boat builders with multiple slipway facilities as well as wharves and moorings with the potential for freight and materials storage. Both large and small boats manufactured on the site would be either sailed off to their destination, or if smaller, then freighted by road or rail.

The Henderson Shipyard in Western Australia (Appendix B) is an example of the space required to cater for a marine industrial precinct.

4. Key Issues

4.1 Traffic

The traffic impact assessment report in Appendix C reviews the traffic and access aspects of the Harwood Marine precinct concept. This report has been prepared with reference to the Roads and Maritime Services (RMS) document “Guide to Traffic generating Developments” (October 2002).

Watts Lane is the only formed and sealed road for vehicle access between the Pacific Highway and the site. Watts Lane intersects with the Pacific Highway as a four way junction with stop signs controlling traffic on the Watts Lane approaches. Access to and from Harwood village is via River Street which passes beneath the highway. Watts Lane between Pacific Highway and Nicholsons Lane is a sealed road with narrow grassed shoulders. Nicholsons Lane between Watts Lane and River Road is a sealed road in generally good condition and has wide grassed shoulders. River Road has a 3.9 metre wide bitumen sealed pavement with grassed shoulders and a narrow verge adjacent to the Clarence River.

Traffic on the Pacific Highway has a historical growth rate of approximately 2.6% per annum. It carried 7,500 vpd in 2004 and is estimated to currently carry 12,000 vpd. At a growth rate of 2.5% per annum it is estimated to carry 14,400 vpd by 2020. Most traffic using Watts Lane is generated by the Harwood Mill and Refinery site in Mill Road.

SIDRA capacity analysis was undertaken for peak period traffic flows at the intersection of Pacific Highway and Watts Lane. The results show that the intersection currently operates at a good level of service. By 2020 the effect of continued growth on the Highway alone would not have a significant adverse impact on the traffic movements to and from the development site. Similarly, with the addition of traffic expected to be generated by the proposed development expansion to 2020, the traffic movements between the site and locations to the south along the Highway would not be significantly adversely impacted.

The local road network between the Pacific Highway and the site is generally sufficient to carry the additional traffic to be generated by the proposed development expansion. River Road is the exception where the narrow sealed pavement and narrow verge separation from the Clarence River would require widening to safely accommodate the higher traffic volumes expected by 2020.

4.2 Flooding and Stormwater

The flooding and stormwater assessment report (Appendix D) assumes a future development option might be designed around a series of fill pads that will be the location of future sheds and work areas above the design flood level. The balance of the site will remain largely at existing ground levels.

4.2.1 Flooding

Whilst future development applications will address earthworks, platforms and building development within the proposed lots, a flood assessment has considered the impact of filling within the lot on the 100-year Average Recurrence Interval (ARI) flood event. Proposed building platforms have been used in the flood model to demonstrate that development within the proposed lots is not restricted by flooding.

The 100-year ARI storm event was simulated for the pre- and post-development scenarios, using Clarence Valley Councils flood model (Clarence Valley Council, 2004). The flood study investigation has shown, amongst others, the following:

- In a 100-year ARI flood event flood levels in the area of the proposed development range from 2.8 to 3.0 m AHD with a wide extent of flooding across the Lower Clarence River floodplain, in particular at, and downstream of Harwood Island. Flood depths in the area of the proposed development are in the order of 0.8 to 1.5 m at the peak of the event. Flood velocities (Figure B.3) across much of the site, on the floodplain average approximately 0.1-0.15 m/s and are thus slow flowing;
- The proposed development is expected to have a minimal impact on flood levels, due to the vast extent of the floodplain in the vicinity of the site. Within the existing site a small area is shown to have increased flood levels of up to 0.012 m, while a reduction in flood levels of some 0.015 m is noted adjacent to proposed buildings. This is likely due to a slight redistribution of flows in the immediate vicinity of the proposed development. Apart from a few minor model inconsistencies, flood velocities changes of more than 0.1 m/s are not expected due to the proposed development, anywhere on the floodplain.
- Flood levels during significant flood events are expected to gradually rise to the peak over a 2 to 3 day period. Thus adequate time for flood preparedness and evacuation is expected. Given that all egress routes are likely to be inundated, a “stay put” evacuation strategy would be appropriate. To further determine the most appropriate strategy, a flood evacuation plan should be prepared for any future development as part of any subsequent development application; and
- A compliance assessment, generally in accordance with relevant Flood Performance Criteria extracts from the Clarence Valley Council, Industrial Zones DCP 2011 and the Development in Environmental Protection, Open Spaces and Special Use Zones DCP, December 2011 has been provided in Appendix D. Prescriptive controls have not been considered at this early planning stage of the project. In general, it is considered that compliance with the relevant Clarence Valley Council DCP Flood Performance Criteria can be achieved.

In summary, it is considered that the potential development pads would provide for development within proposed lots and these would have negligible impacts on flooding.

4.2.2 Stormwater

To manage stormwater discharge from the site, Clarence Valley City Council’s Water Sensitivity Urban Design Objectives defined by the Clarence Valley Sustainable Water Information for Applicants, 2004, DCP were adopted. Stormwater quality has been modelled using the MUSIC software. Based on the assessment of stormwater at the site, a concept Stormwater Management Strategy outlining potential stormwater management is provided, which proposes:

- All pads will generally drain to a discharge point and swale/drain which would drain to the Clarence River;
- Each building will be provided with a rainwater tank collecting runoff from the roof area only. Rainwater tanks will be provided with an overflow pipe generally draining to internal building pad drainage. This would bypass the rain gardens;
- The runoff from hardstand areas would be routed to a rain garden situated at the low point of the pad; and
- Gross Pollutant Trap units would be provided before discharging to rain gardens or offsite, if appropriate. Depending on the proposed activities on individual building pads, it may be appropriate to include oil and water separation before discharge.

The MUSIC model results show that the key post-development pollutant load based targets are met. In addition, nutrient targets would also be met, although no target has been specified in the Clarence Valley Sustainable Water Information for Applicants, 2004, DCP.

4.3 Soils and Fill

The site is on a relatively flat corner of a large floodplain island in the lower Clarence River floodplain. It undulates but is typically between 0.9 m and 1.9 m AHD. (By comparison the existing slipway site is between 1.5 m and 2.95 m AHD.) Australian Soil and Concrete Testing P/L assessed the soils in the centre of Lots 3 and 4 in 2008 and described them as coarse grained alluvial sediments overlying coarse to medium grained marine sediments. The soils were sampled to a depth of 2.5 m and the water table was intercepted at between 0.5m and 0.9m below the ground surface. They noted that the subject land was mapped by Council as being class 2 and 3 acid sulfate soils (ASCT, 2008). When the soil samples were tested it was shown that soils within 1m of the surface were weakly acidic, while those below 1m were generally strongly acidic. It was concluded that the top 0.5m was unlikely to be potential or actual acid sulphate soils, while the soils below 1m were very likely to be potential acid sulphate soils, but not actual acid sulphate soils. No actual acid sulphate soils were found on the site. Liming rates of between 5 and 21 kg of $CaCo_3/m^3$ were recommended for any disturbed soils.

If the subject land were to be rezoned to allow marine industrial uses then parts of the site would need to be filled above the design flood levels to ensure equipment, materials and partly built boats were not affected by flood water. However, these flood free areas would be limited to large pads that could hold large sheds and ancillary storage areas. Most of the site would not be required to be filled. If it was assumed that 10 fill pads of say 0.5 ha each were to be created to raise the ground level by approximately 1.5 m above existing ground level, then approximately 75,000 m^3 of fill would be required. Assuming a main internal road was required to be elevated by 0.5 m to be out of nuisance flooding and local pondage in wet conditions then an additional 1200 m^3 of fill would be required. Sourcing this fill will not be easy as the Pacific Highway upgrade is likely to be competing for large quantities of good quality material and recently rezoned new residential areas in Yamba also require large quantities of fill. However, options include the maintenance dredging of shipping channels in the Clarence River, quarry overburden from Clarence valley quarries and the creation of sediment ponds on the subject land to replace the ones that are currently in the middle of Lots 3 and 4. In any case, the fill will not be required all at once and pads will only be created to match the demand for additional employment sites.

4.4 Agricultural Land

The approximate distribution of existing land uses on Lots 1-4 are as outlined in Table 1:

Table 1 Land use categories of Lots 1-4 DP 1155528

Land Use	Area (ha)
Sugar cane	16
Grazing land	18.5
Sediment ponds	2.5
House paddock	1.6
Remnant vegetation	4.0
Total area of Lots 1-4	42.6

All of the subject land is currently mapped as regionally significant farmland under the Mid North Coast Farmland Mapping Project, 2008 (DOP et al, 2008). The regionally significant farmland mapping included all land that is within a deltaic floodplain as being suitable for agriculture and worthy of protection. All of Harwood Island fits this description and is regarded as either currently being used for sugar cane production or capable of it.

So on face value 42.6 ha of regionally significant farmland will be lost from production if the planning proposal proceeds and the marine precinct is established. (An area of approximately 10 ha that is mapped as water, but is actually accreted land used for grazing will also be lost). However, approximately 18.5 ha of this land is currently grazed by beef cattle at low stocking rates and with minimal pasture improvement. A further 8 ha is either remnant vegetation, taken up by sediment ponds or within a house paddock. Only 16 ha is currently used for sugar production and in the most recent cane season this area produced only 983 tonnes of cane with a gross value of $10, 800 (at $11.16 per tonne). The Harwood Mill crushed 612,092 tonnes of cane in the season ending 2010. This compares to 585,661 tonnes in 2009 and 623,662 tonnes in 2008 (NSW Sugar Milling Co-operative, 2011). So the yield from the subject land represents 0.16% of the cane harvest that was processed at the Harwood mill in 2010. If all of the agricultural land was under cane production and similar yields were produced then the subject land might produce up to 0.33% of the cane harvest that is processed at the Harwood mill. Given that the Harwood mill crush rates varied by approximately 38,000 tonnes over the three year period 2008 to 2010, then the contribution from the subject land is not a significant amount and will have minimal impact on the viability of the Harwood mill and the sugar industry in general.

It should also be noted that the Mid North Coast Farmland Mapping Project states in its recommendations for the zoning of regional farmland that:

“Regionally significant farmland can be considered where there is a need to zone land for marine based industries that depend on access to navigable waterway”

The location of the subject land in proximity to the Clarence River and adjacent to an existing established marine industry makes it consistent with the above statement on the zoning of regional farmland.

4.5 Utilities

4.5.1 Water

A 50 mm reticulated water supply is available to the existing Harwood Slipway site. This could be easily extended to supply water for the proposed marine industries that will use the site. Water for general cleaning, fire fighting, etc could also be captured from the roofs of large sheds that will be placed on the site and stored in underground tanks.

4.5.2 Wastewater

There is no connection with Council’s reticulated wastewater system and no realistic opportunity to get a connection. However, there is ample room on the subject land for a wastewater treatment system that could deal with the waste from the site including a small amount of black water from workplace toilets and the waste generated by various industries. If a particular trade waste is generated on site that cannot be disposed of onsite then arrangements could be made to have this disposed of at the Townsend wastewater treatment plant on an “as required” basis.

4.5.3 Electricity

A major upgrade of electricity connections to the site will be required as marine industry is a significant power user. It would be expected that the site would use its large shed roof area to

produce solar energy for general use on the site, however, the base load power required for manufacturing (eg metal welding and fabrication) can only be reliably be sourced from a reticulated power source.

4.5.4 Communications

High quality broadband services are vital to any modern manufacturing precinct and it will be important that the National Broadband Network be connected to the subject site as soon as it is available in the Lower Clarence area.

4.6 Bank Erosion and Accretion

Generally the subject land is accreting along its river bank. The accretion area has been surveyed and is shown in the Deposited Plan in Figure 1. The accretion area is about 9 ha in size (there is also a Crown Reserve of approximately 1 ha). Lot 1 has between 127 m and 205 m of land deposited over time to its eastern bank. Lot 2 has 124 m. Lot 3 has between 75 and 124 m that has been deposited over time on its eastern bank. The northern half of lot 4 has accreted by between zero and 75 metres of land while the southern half has been eroded by up to 60 m. For a total shore line length of approximately 1080 m the erosion area affects approximately 200 m or 18% of its length, with 82 % either stable or accreting. It is likely that significant parts of the river bank will be armoured and stabilised to make it safe for vessels to use the shore line for temporary moorings similar to what occurs adjacent to the existing slipway entrance. This should resolve any erosion issues at the southern part of the subject land.

NSW Primary Industries (Lands Department) advised (Appendix E) that it acknowledges the accreted land as naturally occurring over time since 1862. It considers that any such areas are Crown lands. It has no objection to these lands being included in this planning proposal and does not rule out a future lease or sale of this land to the adjacent owner. It is imperative that the un-notified Crown Reserve and accreted land be included in this planning proposal to give access to the Clarence River along the entire foreshore of the subject land. Confirmation of the Department's support for the planning proposal can be verified with the Senior Manager at Grafton (David McPherson).

A further area of bank erosion occurs west of the subject land along River Road between the existing slipway and Nicholson's Lane. This road is quite low lying and is periodically inundated by flood water. There are some gallery stands of native vegetation along this road that are mature, indicating that the erosion is potentially quite slow. River Road is a public road and currently provides access to private homes, cane farms and the Harwood Slipway. Given that additional traffic will not exacerbate the erosion then it should not be a factor in deciding whether the planning proposal should proceed. Council will have to address the erosion at some point and it should be budgeted for accordingly. There is room to move the road reserve further away from the river bank if required, but this would need to be a Council decision.

4.7 Neighbouring Land Uses

On an immediate scale the closest neighbouring land uses are the individual dwellings along Careys Lane and the Harwood Sailing Club at the southern end of Careys lane. The subject land is large enough that substantial buffers can be established between adjoining uses and the marine industrial precinct. Marine industry does generate noise and dust and light emissions (at night), however the noise and dust would generally be within normal working hours and present no more major impact than dust from farming or noise from farm machinery or the Harwood Sugar Mill. Light spill is an issue that can be managed by use of shades and directional lighting. With Careys Lane staying open as a public road there will be no restriction of access to the sailing club and there is unlikely to be a conflict on the water as the sailing club will be most active on weekends when the commercial boat traffic will be at its lightest. However, should the

sailing club wish to move then a land swap could be considered if a better location can be established on the subject land and access can be arranged.

Boat traffic generated by the marine precinct would not be excessive with perhaps 20 new boats of various sizes being built on the site in any 12 month period (in the long term). Each would be tested for up to a week once finished and then transported to its ultimate destination. Boats coming in for repair would be moored along the shore line periodically before being placed on the slipway and transported into a workshop.

Truck movements would be limited to delivery of materials such as steel and aluminium plate. Boat pickup trucks to transport smaller vessels to their point of sale or use would also access the site. These are unlikely to be more frequent than the cane trucks and machinery that currently access the site.

The site will not be visible from the residential areas of Harwood village. Across the Clarence River the site will not be easily seen from Yamba Road due to the heavy mangrove stands along Palmers Island. It will be visible from Palmers Island village, but this is located more than 1 km away and gallery stands of mangroves will filter any visual impacts.

4.8 Native Title and Aboriginal Heritage

4.8.1 Native Title and Cultural Heritage

As at September 2012 two Native Title applications were registered under Commonwealth legislation. The initial claimant application has been made by the Yaegl People for the waters of the Clarence River from the point at which it enters the sea at Yamba upstream to the Harwood bridge. It includes the bed of the river and its banks. This claim is described as Federal Court File number NSD6052/98 and Tribunal File Number NC96/38. It was filed in November 1996.

The second claim is for an area of land and water covering the coast from the Wooli River to Yamba and includes the ocean and 1400 square km of land. This claim is described as Federal Court File number NSD168/11 and Tribunal File Number NC11/1. It was filed in February 2011.

An AHIMS Search was undertaken on 27 September 2012 and no Aboriginal sites or places were recorded as being located within 1km of the subject land.

Notwithstanding, the absence of Aboriginal sites or places on or close to the subject land the landowner is aware of the significance of the Clarence River to the local Aboriginal community and has no intention of degrading it in any way.

5. The Planning Proposal

5.1 Part 1 Objectives and Intended Outcomes

The objective of the planning proposal is to rezone the subject land at Careys Lane, Harwood Island, Harwood for marine industry purposes.

This objective will be achieved through an amendment of Clarence Valley Local Environmental Plan (LEP) 2011. The exact distribution of zones has not been finally determined and will be influenced by Councils position on land that has accreted over time adjacent to the subject land. However it is envisaged that Council will support the application of the IN4 Working Waterfront and W3 Working Waterways on the subject land. The Planning Proposal will enable a new employment area to be established based on a marine industry precinct.

5.2 Part 2 Explanation of Provisions

It is proposed that Clarence Valley LEP 2011 be amended by removing the current RU1 Primary Production zone and W2 Recreational Waterways zone and replacing it with a range of zones that reflect the desired future use of the land.

These zones would include the following:

IN4 Working Waterfront – to apply to all of lots 1, 2, 3 and 4 DP 1155528 being the areas predominantly used for grazing and cane production that are within the flood plain but otherwise relatively constraint free and will be suitable for marine industry. An un–notified Crown Reserve immediately east of Lot 1 should also be in this zone. A further area of accreted Crown land (without a property description) that is located on the eastern edge of lots 1-4 would also be suggested for inclusion in this zone.

W3 Working Waterways – to apply to a 50 m wide strip of water immediately adjacent to lots 1, 2, 3 and 4 DP 1155528 (and the accreted land in front of it) being an area that will be required for water based infrastructure such as wharves, jetties and moorings associated with the marine precinct.

5.3 Part 3 Justification

5.3.1 Section A – Need for the Planning Proposal

Is the planning proposal a result of any strategic study or report?

Yes. A marine precinct on the Clarence River has been considered for a long time and is referenced in many strategies and plans.

In particular the *Clarence Marine Precinct (CVC, 2009)* (see Appendix F) outlines the CVC concept of a marine precinct that stretches from Yamba to Grafton and beyond , that utilises the Clarence River in a multitude of ways including as a working port, with associated marine industry. The document states that the river

“provides scope for a wide range of industries to be considered as partners and participants in new development and offers a choice of sites for potential investment and future growth collaborations”

This clearly indicates that Council has a strategy to support new industry and the next step in doing this is to zone land to allow that industry to be established. This planning proposal should be regarded as a logical outcome of the *Clarence Marine Precinct*, and therefore consistent with it.

Another adopted plan of CVC that is supportive of this planning proposal is the *Clarence River Way Masterplan (Clouston,2008).* This adopted strategic plan of CVC states in relation to the Port of Yamba (that extends to the Harwood Bridge) that CVC should:

"Promote and develop port facilities as part of a regional harbour network. Maintain the port as a deep water anchorage and working port".

and

"Expand regional shipbuilding and repair facilities at Yamba by facilitating investment, and promoting the development of a marine industry cluster".

By supporting this planning proposal CVC will be implementing these objectives in a location that can support the proposed land uses.

A third adopted strategy that supports marine industry is the *Clarence Valley Industrial Lands Strategy (CVC, 2007).* This strategy states that CVC supports the provision of land on the Clarence River to leverage competitive locational advantages. It states in the Strategy that:

"There is potential to expand the current sector and to cluster supporting marine businesses……The preferred area for marine sector development and services would be in the Lower Clarence, close to existing industry, skilled labour force and with access to the Clarence River".

This planning proposal meets all of the locational requirements of the *Clarence Valley Industrial Lands Strategy* and should be supported by CVC consistent with its stated policy position on marine industry.

Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

Yes, a planning proposal is the only way for the subject land to be rezoned to permit the proposed marine industry needed to fulfil Council's strategies and policies.

Is there a net community benefit?

Yes. The landowner has not prepared a Net Community Benefit Test as it is not considered to be required given the site's consistency with Council's adopted strategies and policies on marine industry. However, there is a net community benefit in utilising the subject site to provide employment opportunities for the Clarence Valley.

While the proposal will benefit the land owners it will also benefit the wider community by providing additional employment as the marine industry and associated infrastructure is constructed and then ongoing employment from the manufacturing and other uses that will take place on the site.

Benefits from proceeding with a marine industry precinct on the subject land include:

- up to 300 jobs in the new marine industries that will locate on the site over a number of years;
- up to 50 jobs on each construction project and infrastructure upgrades as required;
- multiplier effect jobs from housing construction and service industries, etc.;
- an opportunity to create a port facility that can be the basis for reconnecting ocean based goods traffic with the east coast rail network providing opportunities further up the Clarence Valley.

5.3.2 Section B – Relationship to Strategic Planning Framework

Is the planning proposal consistent with the objectives and actions contained within the Mid North Coast Regional Strategy?

Yes. Although the site is not mapped as proposed employment lands in the MNCRS the document states the following in relation to marine industry:

"in the case of marine based industries that depend on access to navigable waterways, additional opportunities for industry may be provided outside growth areas. The Department will work with other agencies on suitable locational criteria to assist in guiding any future development opportunities"

On this basis, the subject land is consistent with the MNCRS. The DOPI has prepared draft locational criteria, but they have not been finalised. The draft criteria list the Clarence River as a genuine navigable waterway that could support marine industry. They also list local locational criteria where marine industry should occur and where it should not occur. Key aspects of the subject land in relation to these criteria are as follows.

The site is **not:**

1. Within a national park or nature reserve;
2. Within or accessed from a marine park;
3. Within a SEP 14 wetland or 26 littoral rainforest area;
4. Within a designated Ramsar listed bird habitat or Commonwealth protected species habitat;
5. Going to affect the habitat of threatened species, populations or ecological communities;
6. Going to affect or destroy seagrass, saltmarsh or mangroves;
7. Going to affect, destroy or impact on Aboriginal sites or places or non-Aboriginal heritage items.

The site **is:**

1. For industry dependant on a navigable waterway;
2. Suitable for vessels that require a draught of 5 m or less to gain entrance to the sea;
3. Suitable for vessels that are of sufficient size as to require transport by water.

Is the planning proposal consistent with the local council's Community Strategic Plan, or other local strategic plan?

Yes, see comments under Section A (see 5.3.1 above).

Is the planning proposal consistent with applicable state environmental planning policies?

The proposal is consistent or justifiably inconsistent with applicable state environmental planning policies. Refer to the checklist against these provided as Appendix G to this report.

Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

The proposal is generally consistent or justifiably inconsistent with applicable Section 117 Directions. Refer to the checklist against these Directions provided as Appendix H to this report.

5.3.3 Section C – Environmental, social and economic impact

Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

No – CVC recently reviewed the Shire wide LEP zones and determined that the site did not contain vegetation worthy of inclusion in an Environmental Conservation or Environmental management zone. There are two remnant patches of native vegetation on Lot 1 DP 1155528, which may constitute freshwater wetlands on coastal floodplains. These have a combined area of approximately 4 ha. They are in an ideal location to form a buffer to the houses located to the west and will not be directly impacted by marine industries. On this basis they will not be adversely affected as a result of the proposal.

The only other significant vegetation on the subject land is the occasional gallery stands of mangroves and Casuarina along the river foreshore. Although much of the present shore line is clear of mangroves, there may need to be some trees removed to allow wharves, moorings and jetties to be constructed. This would be done under the appropriate legislation and each application would be on its merits. Wherever possible the intent will be to protect significant vegetation and habitat on the subject site.

Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

Stormwater quality and quantity will be important environmental issues to manage as this largely rural catchment becomes industrialised over time. This issue is being considered from the outset with inclusion of areas suitable for stormwater retention and treatment systems on site that will capture and clean stormwater runoff from any hard surface areas. The site is large enough that this can be done on private land to ensure the water that enters the Clarence River is of suitable quality.

How has the planning proposal adequately addressed any social and economic effects?

The intended development of an expanded marine industry precinct on the subject land is anticipated to have a positive effect on the local community and economy. This planning proposal estimates that up to 300 equivalent full time jobs could be created over the long term. (By comparison, the Harwood Sugar Mill in 2010 employed 160 workers). The marine industry workers will use up to ten flood free pads to locate buildings, storage and fabrication areas across the site. Building the new marine industry precinct will generate significant employment over the construction phase of the development. It is generally accepted that for every $1 million in construction expenditure, twenty seven jobs are created throughout the broader economy. These jobs will benefit the entire Lower Clarence valley at a time that they are genuinely needed.

As more skilled and semi-skilled workers are required there will be more opportunity to employ local apprentices reducing the need for youth to leave the area to find work. CVC's Marine Precinct lists labour supply and education initiatives in marine careers as a key advantage of a Clarence based marine industry precinct. The document also lists the benefits to existing businesses, a low cost operating environment, a critical mass of marine industry, a growing tourism sector and a shortage of mooring and storage facilities as key factors that support a marine industry precinct on the Clarence River.

The proposed marine precinct is far enough away from the Harwood village as to avoid any conflicts, yet close enough that the local hotel and food outlets will benefit from the additional workers in the area. Those moving into the area will send their children to local schools, keeping local schools viable.

The marine industry traffic will not adversely impact either the village or the sugar mill, and as the Pacific Highway is upgraded, it will have even less impact.

Boat traffic to and from the site will vary according to what is being built or repaired, however the river is particularly wide at the subject site and can easily accommodate larger vessels as they manoeuvre into or out of the site. Industry related boat traffic will be not be excessive on weekends when recreational boating is at its peak.

No adverse social or economic impacts are predicted.

5.3.4 Section D – State and Commonwealth interests

Is there adequate public infrastructure for the planning proposal?

Yes. Section 4.5 of this report documents the availability of utilities to the subject land. A traffic assessment is included in section 4.1.

The site is well located in relation to existing transport infrastructure, utility services, roads and essential services. Being in proximity to the towns of Maclean and Yamba, all essential services such as schools, sporting facilities, hospitals, police and ambulance are also available to service a new marine precinct and the employees who will live in the Clarence Valley with their families.

What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

The State Government (NSW Transport Maritime) will need to be consulted in relation to the Port of Yamba. Office of Environment and Heritage will need to be consulted in relation to remnant vegetation areas. The Roads and Maritime Services will need to be consulted in relation to the Pacific Highway intersection both now and in the long term when a new bridge has been built at Harwood. NSW Trade and Investment will need to be contacted to gauge its support for the marine precinct as a regional business initiative.

There are no Commonwealth public authorities directly impacted by the planning proposal. However the Australian Customs and Border Protection Service may be interested in the long term if the marine precinct takes on a role of connecting road and rail with ocean going freight services.

Community Consultation

It is considered that community consultation for the planning proposal should, as a minimum, comprise an exhibition period of not less than twenty eight (28) days. Community consultation would be commenced by giving notice of the public exhibition of the planning proposal:

- in a newspaper that circulates in the area affected by the planning proposal;
- on the web-site of the Lismore City Council and the Department of Planning; and
- in writing to affected and adjoining landowners

The initial gateway determination will confirm the public consultation that must be undertaken in relation to the planning proposal.

In the interest of keeping communication open from the outset, key stakeholders should be contacted directly to ensure that they are aware of the planning proposal and are given the opportunity to communicate their concerns and ideas in regards to the development. These will include the Yaegl Local Aboriginal Land Council, the Yaegl people (native title claimants), the Harwood Sugar Mill, the Harwood Sailing Club and the owners of adjacent agricultural land and small rural lots.

6. Conclusion

The planning proposal submitted has merit and is worthy of Council support. Based on available information, the planning proposal substantially complies relevant SEPP's and Section 117 Directions, Council's key strategic documents including the *Clarence Marine Precinct*, *Clarence River Way Masterplan*, and the *Clarence Valley Industrial Lands Strategy*. It also substantially complies with the *Mid North Coast Regional Strategy*.

This planning proposal requests that an area be rezoned to allow a marine industry precinct to be established at Harwood. There is sufficient information to enable Council to support the planning proposal and forward it to the NSW Department of Planning and Infrastructure for its consideration and response.

7. References

Australian Soil and Concrete Testing P/L, 2008. ASS investigation for proposed sediment pond at Harwood Slipway, Harwood.

Clarence Valley Council, 2007. Clarence Valley Industrial Lands Strategy.

Clarence Valley Council, 2009. Clarence Marine Precinct.

Clouston Associates, 2008 Clarence River Way Masterplan

Dept of Planning, Dept of Environment and Climate Change, Dept of Primary Industries, and Northern Rivers Catchment Management Authority, 2008. Mid North Coast Farmland Mapping Project, Final Recommendations Report.

NSW Sugar Milling Co-operative, 2011. Annual Report for 2011.

Appendices

Appendix A Site Photos

Photo 1 Proposed marine precinct site viewed from the river

Photo 2 Proposed marine precinct site looking south

Photo 3 Proposed marine precinct site looking east

Photo 4 Proposed marine precinct site looking south west

Photo 5 River at proposed marine precinct site

Photo 6 Sugar cane east of flood mud ponds

Photo 7 Existing flood mud ponds to be relocated

Photo 8 Accretion land at eastern edge of proposed marine precinct

Photo 9 Grazing land at eastern edge of proposed marine precinct

Photo 10 Riparian vegetation at edge of proposed marine precinct

Photo 11 Proposed marine precinct site looking west

Photo 12 Undulations in proposed marine precinct site

Photo 13 Existing slipway outdoor construction areas

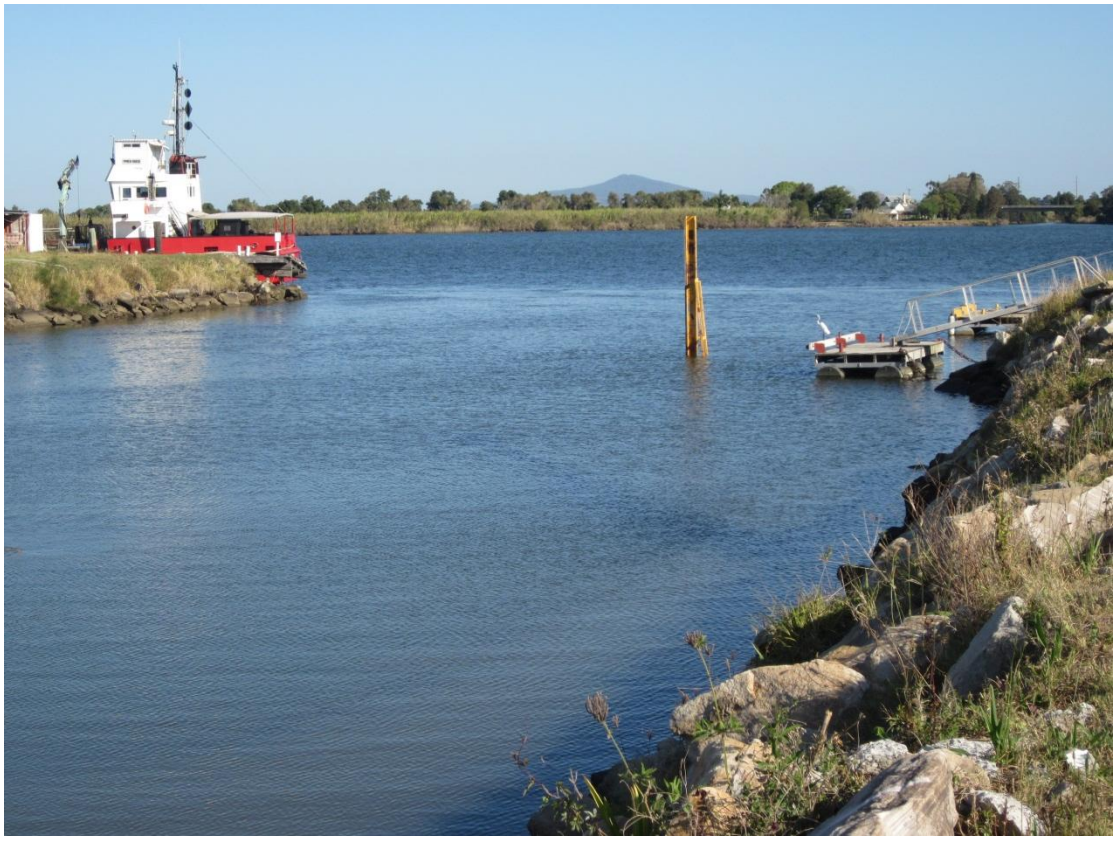


Photo 14 Existing slipway ramp and launching area

Photo 15 Existing slipway indoor construction areas

Photo 16 Existing slipway indoor construction areas

Photo 17 Existing slipway outdoor storage of finished product

Photo 18 Existing slipway in 2008

Photo 19 Existing slipway with proposed marine precinct in background

Appendix B Henderson Shipyard in WA

AE Systems Australia
2 Quill Way
enderson WA 6166
ustralia
elephone +61 8 9437 0437
acsimile +61 8 9410 2065
ww.baesystems.com/australia

Henderson Shipyard

BAE SYSTEMS

Appendix C Traffic Impact Assessment

Appendix D Flooding and Stormwater Assessment

Appendix E Department of Primary Industry (Lands Dept) letter

NSW GOVERNMENT | Primary Industries

Mr Ross Roberts
Harwood Marine
PO Box 96
HARWOOD ISLAND NSW 2465

Level 3, 49-51 Victoria Street GRAFTON NSW 2460
PO Box 272 GRAFTON NSW 2460
Ph: (02) 66403410
Fax: (02) 66425375
e-mail: Nessbit.Hurcum@lands.nsw.gov.au

Contact Officer: Nessbit (Bert) Hurcum
Your Ref:
Our Ref: 12/06800

Dear Mr Roberts

ACCRETED LANDS ADJOINING LOTS 1 – 4 DP 1155528 AT HARWOOD

Reference is made to our meeting of 27th September 2012 to discuss the status of accreted lands adjoining Lots 1 to 4 DP 1155528 and lands delineated as an un-notified Crown reserve 30.48 metre wide adjoining Lot 1 DP 1155528 at Harwood; and, for their inclusion in a rezoning proposal to establish a marine precinct.

The lands that are the subject of our discussions are delineated on DP 1155528 by the notations "CP" (Land not complying with s55N of the Coastal Protection Act 1979) and "R" (Crown reserve 30.48 wide). Investigations associated with the definition of the riparian boundaries of Lots 1 to 4 DP 1155528 prior to its registration determined that the accreted lands had most probably arisen through natural, gradual and imperceptible processes during the period 1862 to present. Due to the operation of s55N of the Coastal Protection Act 1979 these lands may not be brought under the Real Property Act 1900; however, the lands fronting Lots 2 to 4 DP 1155528 appear to be lands attaching to the freehold titles under the tenets of the common law Doctrine of Accretion.

The lands within the un-notified Crown reserve and the accreted area fronting Lot 1 DP 1155528 are Crown lands.

While Catchments & Lands is unable to provide any commitment to proceed with a sale or lease of the subject lands, it has no objection to your request to include all of the above described lands within your rezoning proposal for the lands within DP 1155528 to assist in establishing a marine precinct at Harwood.

Should you have any enquiries with respect to this matter please do not hesitate to contact me.

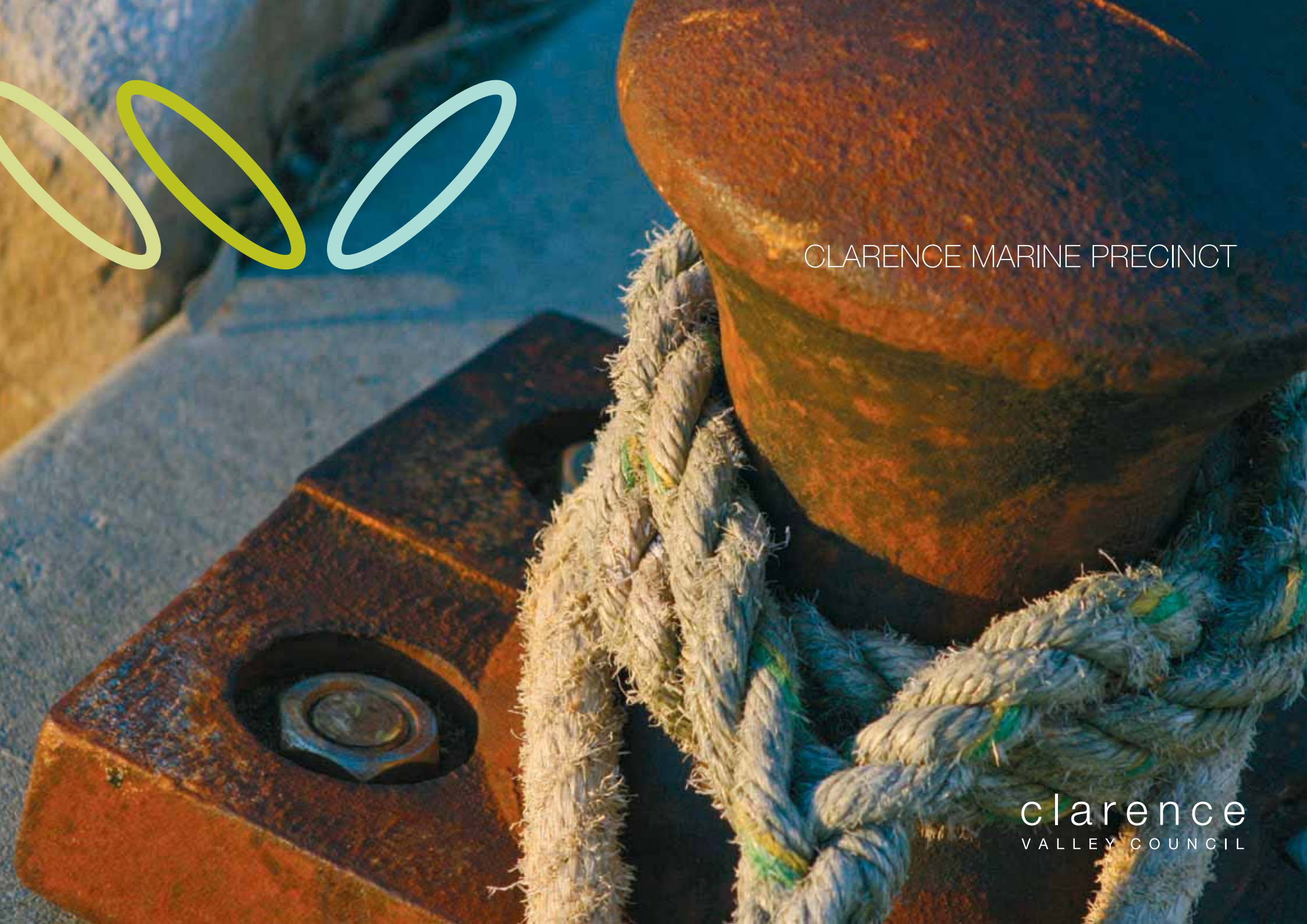
Yours Sincerely

8/10/2012

David McPherson
Senior Manager
Grafton

New South Wales Government

Appendix F Clarence Marine Precinct



CLARENCE MARINE PRECINCT

clarence
VALLEY COUNCIL

Introducing the clarence marine precinct

This document is based on the Clarence Marine Cluster Assessment (2009) prepared for Clarence Valley Council by Strategic Design + Development.

The Clarence Marine Precinct is a unique offering located on the Clarence River, the largest estuary on Australia's east coast.

The Clarence Marine Precinct presents domestic and international investors with an opportunity to grow and develop marine based businesses in an on-trend location. This once in a generation opportunity is targeted at a package of marine related industries and is supported by Clarence Valley Council.

It's all about tactical location

The Clarence Valley is strategically located 600kms north of Sydney with Brisbane and the growth centres of south east Queensland only 3 hours to the north by road. By 2026 the Clarence region will have an estimated 4.04million people residing just over its back fence.[1]

The Valley is at the intersection of three major highways (Pacific Highway, Summerland Way and Gwydir Highway) and the north-south state rail network. The Clarence has its own regional airport (at Grafton) and seaport at Yamba.

1 *Queensland Government, Population Projections: Queensland and Statistical Divisions, 3rd edition, 2008.*

Big boating region

Clarence Valley is also centrally located within the popular boating region that extends from the Mid-North Coast of New South Wales to the South East Queensland coast.

The Clarence is easily accessible by both road and sea with travel times substantially reduced as a result of on-going infrastructure upgrades.

This combined with the affordability and capacity of the Clarence opens doors for fresh thinking around moor, boat and drive particularly targeted at the south east Queensland recreational market.

Distances and voyage times

	From Yamba		
	Approximate Distance (Nautical Miles)	Time under sail at 4 knots (hours)	Time under motor at 13 knots (hours)
Ballina	35	8.7	2.7
Brunswick Heads	60	15.0	4.6
Coffs Harbour	60	15.0	4.6
Tweed Heads	90	22.5	6.9
Gold Coast	110	27.5	8.5
Port Macquarie	130	32.5	10
Harrington, Taree	160	40.0	12.3

Distances in Nautical Miles approximated; the analysis has assumed a conservative view of travel speeds and some vessels may achieve faster speeds.

Source: Ports Australia, formerly known as Association of Australian Ports & Marine Authorities (AAPMA).

Yamba – one of 5 internationally recognised ports

As an island, national Australia relies extensively on its ports for international trade by sea. Yamba, located at the mouth of the Clarence River is one of five internationally recognised ports in NSW, and provides maritime links for export timber and supply vessels to Norfolk Island, Lord Howe Island, New Zealand and other South-Pacific markets. From a domestic perspective the region generally competes for a share of commercial marine activities along the northern NSW coast and with the Gold Coast in South East Queensland.

The Port of Yamba offers Customs and Quarantine classification and unrestricted port of first entry for overseas imports status.

Goodwood Island Wharf

The main cargo berth is the Goodwood Island facility.

Key statistics:

- Wharf space: 70 metres
- Storage area: 5000sqm paved
- Permissible deck load: 2600 kg/sqm
- Depth alongside: 6 metres
- Maximum concentrated load: 8 tonnes
- Access: Goodwood Island Road, 10 km from the Pacific Highway

For more information on the Port of Yamba visit www.yamba.nsw.gov.au

"AT LAST SOMEONE'S REDEFINED THE CONCEPT OF MARINE DEVELOPMENT"

A market first

The Clarence Marine Precinct presents a market first in that it is not limited to a single geographical site, rather, the precinct is the Clarence River itself with existing marine industry located from Yamba and Iluka on the coast to the River City of Grafton, some 32 nautical miles upstream.

Recognising this large section of the River as the precinct area, provides scope for a wide range of industries to be considered as partners and participants in new development, and offers a choice of sites for potential investment and future growth collaborations.

What's it worth

The existing marine industry in the Clarence is currently valued at $800 million[2]. The industry is well established and viable in its own right.

The Clarence Marine Precinct already supports the largest concentration of commercial fishing vessels in New South Wales and is renowned for its innovative and award winning boat building industry; however the precinct also boasts a wider range of established marine services encompassing the following sectors:

1. Boat design,
2. Boat refit, repair and maintenance,
3. Commercial fishing support activities,
4. Recreational fishing and boating,
5. Marine tourism and water sports,
6. Aquaculture,
7. Marina services and vessel storage options, as well as
8. Commercial wharf activities via the Port of Yamba, a recognised port of entry to Australia complete with the provision of federal customs service.

2 Indirect value includes an average multiplier of 2.5

Key activities	Description and scope of activity
Commercial fishing & aquaculture	The Clarence Valley supports the largest commercial fishing region in NSW. There are currently 350 licensed vessels domiciled in the Clarence including Yamba, Iluka and Maclean.
Recreational fishing	The Mid-North Coast had an estimated 74,441 recreational fishers in 2001 with the highest proportion of fishers in NSW at 29.9% of the population. Recreational fishers in NSW spent more than $550 million on fishing related services and products during 2000-2001.
Recreational boating & marine based tourism	Includes a broad range of activities and organised events that are both land-based and water-based.
Boat building	Includes boat building, refit, repair and maintenance with well established operators offering aluminium and other metal fabrication.
Marina services and berthing facilities	Yamba Marina is located in Yamba Bay with 90 floating berths, dry storage and moorings. There are a range of proposed developments incorporating marine facilities sited within the Clarence Marine Precinct.
Commercial shipping	Wharfage, piloting and landside activities associated with commercial shipping for export timber and supply vessels for Norfolk Island, Lord Howe Island and New Zealand.
Associated services	Diesel and petrol mechanics, marine engineers, sign writers, trimmers, electricians, locksmiths, fitters, glaziers etc.

Our Valuable Estuaries, Coast and Marine Environs-Making Connections, Case Study: 4. The Lower Clarence Catchment River Fishing Industry, OceanWatch Australia 2008.
Survey of Recreational Fishing in NSW 2000-2001, NSW Department of Primary Industries.

The next big thing

Opportunities exist for the further development of marine and allied industries with the Clarence River as the focus. These opportunities are supported by:

1. The shortage of mooring and storage facilities for recreational craft in NSW. The Clarence River has excellent existing marina facilities as well as the opportunity to develop additional storage and mooring capacity at a number of points in the river,
2. An established and growing tourism sector, with the prestigious Australian Traveller Magazine awarding Yamba "Best Town in Australia" status. Tourism on the Clarence River includes recreational fishing, water based state and national competitions, community events, adventure sports, eco-tours, sailing, kayaking, canoeing, wakeboarding, river-side markets, house boating and regional food including the famous Yamba Prawns and Wooli Oysters,
3. The existing marine design, construct, refit and repair businesses that provide support for tourism based industries relating to the river,
4. Relatively lower cost operating environment,
5. Demonstrated critical mass in support of existing marine industry businesses; and
6. Clarence Valley Council strategic plans to develop the potential of the river, with an adopted infrastructure and investment framework in place.


"why clarence?"

Let's talk advantage

The Clarence Marine Precinct is clearly differentiated from other marine industry precincts on the basis of the following attributes:

- The quality of the precinct's natural resources. With the Clarence being one of the nation's last big, wild and working river systems,
- The location within the wider North Coast marine boating region,
- The strength of the existing marine industry base,
- Available port services that currently support commercial shipping,
- Open water access,
- The size and spread of the precinct. The 'traditional' view of marine industry precincts is one based on a fixed location. The Clarence Marine Precinct is not limited to a single location, but rather has development possibilities located between the river mouth at Yamba and the City of Grafton. This spread of geography ensures that development will not be limited by artificial boundaries,
- The sector's growth potential linked to tourism
- The potential to develop and supplement industries that support a marine precinct, such as metal fabrication, electrical services, and marine fit-out, and
- Goodwood Island Wharf infrastructure.

Support for a marine precinct

labour supply

The importance of the supply of skilled marine industry labour to the Clarence Marine Precinct is recognised in a number of industry training and development initiatives:

- The Clarence Industry Education Forum has developed a marine education pathway, CareerLink in Marine Services - a new model of engaging young people enrolled in Clarence Valley high schools in a package of education, certified training and workplace experience whilst at school, with access to advanced TAFE studies and University degree course options.
- The Clarence Valley's Maclean High School has been successful in securing Australian Government funding to establish a construction trade training centre in a partnership project with New South Wales TAFE.
- The North Coast College of Marine Studies (COMS) aims to establish a School of Excellence in 'all things marine' to equip people with skills to enter the local, national and global marine industries.

"IN THE CASE OF THE CLARENCE, THE PRECINCT IS THE CLARENCE RIVER ITSELF"

"great river experiences"

industrial land – lots of options

The Clarence Valley has seven industrial estates open for business. Industrial areas in the Clarence operate within a strategic planning framework that groups services, business types and infrastructure into locations with the capacity to support investor expectations. In addition to these lands Council is currently implementing an industrial lands strategy with expansion earmarked for Maclean, South Grafton, Trenayr and the Grafton Regional Airport.

Industrial estate use matrix

Yamba	Local services		
Iluka	Local services		
Maclean/Townsend	Local services	General/Mixed use	
South Grafton	Local services	General/Mixed use	Heavy industry
Koolkhan/Trenayr		General/Mixed use	Heavy industry
Harwood	Local services		
Grafton	Local services		

council planning

Council's adopted economic development plan and the newly released Clarence River Way masterplan have reinforced the value of the Clarence River to the region, and to future economic growth driven by commercial and recreational demand.

The Clarence River Way Masterplan aims to develop the Clarence as one of the nation's great river experiences and has gained significant stakeholder, community and agency support. An inter-agency group has been formed to guide and direct the masterplan's implementation.

COUNCIL IS COMMITTED TO THE GROWTH AND PROMOTION OF THE CLARENCE MARINE PRECINCT AS A COLLABORATIVE PROCESS BETWEEN THE PRIVATE SECTOR AND GOVERNMENT AGENCIES.

Strategic planning frameworks

The Clarence offers a supportive policy and investment environment for marine industry investment. For more information download these files from the Clarence Valley Council web site www.clarence.nsw.gov.au

- Clarence Valley sustainability framework
- Clarence river way masterplan
- Clarence Valley industrial lands strategy
- Clarence economic development strategic plan
- Mid North Coast planning strategy

Additionally, Council is implementing an ambitious set of infrastructure programs, moving forward with retail precinct and sport facility development, supporting existing business, facilitating investment and has commenced implementation of social, cultural, affordable housing and economic growth plans.

Clarence is growth ready

Use this check list to assist you consider the advantages of the Clarence Marine Precinct as the location for your next investment.

- ☑ proximity to both Sydney and Brisbane markets
- ☑ major highway accessibility
- ☑ rail linkages
- ☑ air services
- ☑ seaport (including customs facilities, wharfage and highway access)
- ☑ water supply
- ☑ telecommunications
- ☑ industrial land availability
- ☑ proximity to labour force
- ☑ strong business performance
- ☑ coastal location
- ☑ relative affordability
- ☑ established marine and support services sectors


"who can I talk to"

Clarence Valley Council can assist existing business grow and new investors relocate or establish a fresh in the Valley. Contact the team or visit www.clarence.nsw.gov.au to access a range of support and investment facilitation services including:

- industrial land matching
- planning and development pre-lodgement service
- access to the latest research, statistics and trends analysis on the region
- introductions to affiliated businesses, industry groups and government leaders; and
- micro case management allied to economic priorities.

Contact the economic development team @:

2 Prince Street, Grafton
50 River Street, Maclean
Locked Bag 23, Grafton NSW 2460

t 02 6643 0200
f 02 6642 7647
e edu@clarence.nsw.gov.au
w www.clarence.nsw.gov.au

"CLARENCE IS ONE OF THE BEST BOATING WATERWAYS IN THE COUNTRY. IN FACT, AS FAR AS BIG RIVER ADVENTURES GO, IT HOLDS THE MANTLE AFTER TRADITIONAL DESTINATIONS LIKE THE MURRAY."

KATHERINE STAUNTON, BOATPOINT

www.clarence.nsw.gov.au

Economic Development Team, Locked Bag 23 GRAFTON NSW 2460
t 02 6643 0200 **f** 02 6642 7647 **e** edu@clarence.nsw.gov.au **w** www.clarence.nsw.gov.au

clarence
VALLEY COUNCIL

Appendix G SEPP Checklist

Consistency with SEPP's

State Environmental Planning Policy	Consistency
SEPP No. 1 – Development Standards	N/A
SEPP No. 4 – Development Without Consent and Miscellaneous Exempt and Complying Development	N/A
SEPP No. 6 – Number of Storeys in a Building	N/A
SEPP No. 10 – Retention of Low Cost Rental Accommodation	N/A
SEPP No 14 – Coastal Wetlands	N/A
SEPP No. 15 – Rural Landsharing Communities	N/A
SEPP No. 19 – Bushland in Urban Areas	N/A
SEPP No. 21 – Caravan Parks	N/A
SEPP No. 22 – Shops and Commercial Premises	N/A
SEPP No. 26 – Littoral Rainforests	N/A
SEPP No. 29 – Western Sydney Recreation Area	N/A
SEPP No. 30 – Intensive Agriculture	N/A
SEPP No. 32 – Urban Consolidation (Redevelopment of Urban Land)	N/A
SEPP No. 33 – Hazardous and Offensive Development	N/A
SEPP No. 36 – Manufactured Home Estates	N/A
SEPP No. 39 – Spit Island Bird Habitat	N/A
SEPP No. 41 – Casino Entertainment Complex	N/A
SEPP No. 44 – Koala Habitat Protection	N/A
SEPP No. 47 – Moore Park Showground	N/A
SEPP No. 50 – Canal Estate Development	N/A
SEPP No. 52 – Farm Dams and Other Works in Land and Water Management Plan Areas	N/A
SEPP No. 53 – Metropolitan Residential Development	N/A
SEPP No. 55 – Remediation of Land	Consistent
SEPP No. 59 – Central Western Sydney Regional Open Space and Residential	N/A
SEPP No. 60 – Exempt and Complying Development	N/A
SEPP No. 62 – Sustainable Aquaculture	N/A
SEPP No. 64 – Advertising and Signage	N/A
SEPP No. 65 – Design Quality of Residential Flat Development	N/A

State Environmental Planning Policy	Consistency
SEPP No 70 – Affordable Housing (Revised Schemes)	N/A
SEPP No. 71 – Coastal Protection	Consistent
SEPP (Affordable Rental Housing) 2009	N/A
SEPP (Building Sustainability Index: BASIX) 2004	N/A
SEPP (Exempt and Complying Development Codes) 2008	N/A
SEPP (Housing for Seniors or People with a Disability) 2004	N/A
SEPP (Infrastructure) 2007	Consistent
SEPP (Kosciuszko National Park – Alpine Resorts) 2007	N/A
SEPP (Major Development) 2005	N/A
SEPP (Mining, petroleum Production and Extractive Industries) 2007	N/A
SEPP (Rural Lands) 2008	Justifiably Inconsistent
SEPP (Sydney Region Growth Centres) 2006	N/A
SEPP (Temporary Structures) 2007	N/A
SEPP (Western Sydney Employment Area) 2009	N/A
SEPP (Western Sydney Parklands) 2009	N/A
SEPP (North Coast Regional Environmental Plan)	Consistent

SEPP No. 55 – Remediation of Land

No land is proposed to be rezoned for residential, educational, recreational or child care purposes, or for the purposes of a hospital. On this basis clause 6 of the SEPP is not triggered to the extent that Council is required to determine if the land requires remediation before it can be subject ot a change of use. Although past use for agriculture may have resulted in some pesticide and heavy metals residues being present on the site would not necessarily be incompatible with the proposed marine industrial uses.

SEPP No. 71 – Coastal Protection

This SEPP requires Council to consider a range of matters when considering a planning proposal to rezone coastal land. The subject land is regarded as coastal land.

Public access is not currently readily available on the subject land as the Crown land that has accreted is largely land locked by private land. The marine precinct has the opportunity to increase public access at an appropriate point and could include public facilities such as a boat ramp and car parking if it is appropriate. No obstruction to the Harwood Sailing Club site is proposed.

The location of the proposed marine precinct fits ideally with its surrounds including deep water access, minimal riparian vegetation and a large area of flat land with good road access. There are good buffers to the nearest urban areas.

Visually the site is well placed with distant, filtered views likely from most vantage points including major public roads and village areas.

Impacts on threatened species and marine wildlife are minimal with little clearing required on the site and no dredging of sea grass proposed or required.

Impacts on estuarine processes will be minimal and the large site has the ability to deal with onsite storm water treatment as well as wastewater disposal. Storm water management will be improved from the current agricultural environment.

No archaeological or heritage areas will be affected or disturbed as a result of this planning proposal.

SEPP (Infrastructure) 2007

The planning proposal is within the Port of Yamba as defined by the *Ports and Administration Act, 1995* and therefore SEPP Infrastructure has some relevance. However, its application is minimal until the land is zoned as requested. At such time a range of port facilities can be undertaken on the subject land without consent if the applicant is the Port Corporation or Maritime NSW. Given the land is owned by Harwood Marine then any port facilities will require Council consent.

SEPP (Rural Lands) 2008

The objective of this SEPP is to protect the agricultural production value of rural land, facilitate its use for rural purposes, reduce land use conflicts and control subdivision.

This will not be possible in the context of the future industrialization of the Harwood Marine precinct. The majority of the land with agricultural value will be zoned for marine industry use. There are some areas of sugar cane and grazing land that will be lost from production, but the majority of the land is currently grazed at relatively low stocking rates and the loss to sugar production will be a small percentage of the overall yield. The impact on primary industry will be offset by employment and socioeconomic benefits of a new marine industry.

However the inconsistency is justified in this case because the need for a genuine marine industrial area on the Clarence has been mooted in multiple local and State strategies and policies for many years. The Mid North Coast Regional Strategy (MNCRS) clearly supports the identification of such an area and accepts that it could not be mapped at the time the strategy was produced. This site meets the draft locational criteria suggested by the MNCRS.

In this situation the Rural Planning Principles and Rural Subdivision Principles of the SEPP (Rural Lands) 2008 have limited application as this planning proposal will not permit rural residential development and will not alter the prevailing minimum lot size for any surrounding land that will remain zoned RU1 Primary Production.

The planning proposal is an attempt to balance the economic, social and environmental interests of the community by promoting the production of a new employment area in a strategic location within the Port of Yamba. It will not affect the

water quality of the Clarence River and important remnant habitat areas in other parts of the estuary will not be affected.

SEPP (North Coast Regional Environmental Plan)

Part 2 Rural Development

Division 1 Agricultural resources

The planning proposal is justifiably inconsistent with the provisions of the REP that require prime crop and pasture land to be included in an agricultural protection zone. The reasons for this inconsistency are that the loss of agricultural land is minor and the site is ideally located for marine industry. Surrounding agricultural land will not be impacted as the site is large enough to include buffer areas.

Division 2 Catchment management

Wetland or fishery habitats will not be significantly impacted by the planning proposal. Some gallery stands of vegetation will be lost, however, these are minor areas that are not currently mapped for environment protection.

Division 3 Geological resources

No geological resources will be sterilized or lost as a result of this planning proposal.

Division 4 Rural housing
No rural housing is proposed by this planning proposal.

Division 5 Forestry

No forestry will be affected by this planning proposal.

Part 3 Conservation and Environment

Division 1 The natural environment

The subject land is largely cleared and has a history of agriculture. Stormwater controls and scenic impacts will be addressed at the development assessment stage. The site is large enough to deal with stormwater and wastewater on site.

Division 2 Coastal development

The small parts of the site that are affected by river bank erosion can be stabilized through the future development. Scenic impacts wil be addressed also, although the site is not prominently viewed from scenic locations or public roads. Irt will be visible from the water, but this cannot be avoided given its need for proximity to the waterway.

Division 3 Heritage

No Aboriginal sites are known to exist on the subject land and no other heritage issues or sites are relevant.

Part 4 Urban Development

Division 1 Strategic planning

The use of the site for marine industry is consistent with the Mid North Coast Regional Strategy which accepts that marine industry will be located on flood prone agricultural land on a major waterway. It is also consistent with the Clarence valley Industrial Lands Strategy and the Clarence Valley Marine Precinct.

Division 2 Urban housing

No urban housing is proposed as part of this planning proposal.

Division 3 Environmental hazards

Acid sulfate soils exist on the site and can be dealt with in situ if they need to be disturbed as part of as marine industry.
Flooding affects all of the site and preliminary modeling suggests that up to 10 large fill pads could be located on the site to keep work areas above flood planning levels without causing any significant effects on other property or putting anyone at risk on the subject land.

Division 4 Commercial and industrial development

This planning proposal fulfills the objective of this part of the REP exactly. The purpose of the planning proposal is to ensure that there is sufficient land available for marine industry on the Clarence River over the long term.

Division 5 Tall buildings

No tall buildings are proposed.

Part 5 Regional Infrastructure

Division 1 Transport

Traffic generated by this planning proposal will link via local roads to the Pacific Highway at the Watts lane intersection. Modeling indicates that predicted traffic volumes will not bring service levels below acceptable levels. The pacific Highway upgrade will deliver a new grade separated intersection at his location by 2020 making it even safer to access the subject land.
The subject land is not in the flight path or vicinity of the nearest aerodrome at Palmers Island.
The planning proposal is consistent with this section of the REP.

Division 2 Utility Services

The planning proposal will make use of existing utility services available to the slipway located immediately adjacent to it. The site is sufficiently large to deal with wastewater and storm water treatment and disposal on site. The site is also consistent with the Clarence Valley Industrial Lands Strategy for the location of a marine industry precinct.

Division 3 health and Education

Neither residential nor rural residential development is proposed as part of this planning proposal.

Division 4 Community Services

Neither residential nor rural residential development is proposed as part of this planning proposal.

Part 6 Tourism and Recreation

Division 1 Tourism

No land is proposed to be zoned for tourism purposes as part of this planning proposal. No existing tourism development will be directly or indirectly affected by the proposed marine precinct.

Division 2 Recreation

No land is proposed to be zoned for recreation purposes and no existing land zoned for recreation purposes will be affected by the planning proposal. The adjacent Harwood Sailing Club is the closest recreation facility (on rural zoned land) that is not proposed to be affected by the planning proposal. Its access off Careys Lane will remain as it is. Additional boat traffic in the river adjacent to the sailing club will not be significant during weekends when the club is most often used.

Appendix H S.117 Direction Checklist

Consistency with Section 117 Directions

Ministerial Directions	Comment
1. Employment and Resources	
1.1 Business and Industrial Zones	Consistent. No business or industrial zones will be lost and an additional 42.6 ha ha of IN4 will be created and made available for employment generating marine industrial businesses. This will likely stimulate a range of other business and industrial areas within the Clarence Valley through the multiplier effect.
1.2 Rural Zones	Justifiably Inconsistent. The planning proposal will result in the loss of 42.6 ha of agricultural land. However, this loss is substantially consistent with the *Clarence Marine Precinct,* the *Clarence River Way Masterplan,* the *Clarence Valley Industrial Lands Strategy* and the *Mid North Coast Regional Strategy*. See below for more detail.
1.3 Mining Petroleum Production and Extractive Industries	Consistent. There are no identified extractive resources or mineral resources located within the planning proposal area. No state or regional resources are identified.
1.4 Oyster Aquaculture	Consistent. The nearest priority oyster aquaculture areas are located more than 10 km downstream of the subject land near the mouth of the Clarence River at Yamba. There is not likely to be any adverse impacts on these areas as a result of this planning proposal.
1.5 Rural Lands	Justifiably Inconsistent. The planning proposal will result in the loss of 42.6 ha of rural land all of which is currently zoned RU1. However, this loss is substantially consistent with the *Clarence Marine Precinct*, the *Clarence River Way Masterplan*, the *Clarence Valley Industrial Lands Strategy* and the *Mid North Coast Regional Strategy*. See below for more detail.
2. Environment and Heritage	
2.1 Environment Protection Zones	Consistent. The planning proposal is not removing any environment protection zones.
2.2 Coastal Protection	Consistent. The planning proposal is consistent with the nine goals of the NSW Coastal Policy. Key areas that will need to be addressed as development proceeds is water quality, maintenance or enhancement of public access where possible, and sustainable development and use of resources ie ensuring the highest and best use of this site as an employment generator that relies on water access. It is also consistent with the NSW Coastline Management Manual and Coastal Design Guidelines as relevant.
2.3 Heritage Conservation	Consistent. The planning proposal will not result in the disturbance of destruction of any Aboriginal heritage or non-Aboriginal heritage items as none are known to

Ministerial Directions	Comment
	exist on the subject site.
2.4 Recreation Vehicle Areas	N/A
3. Infrastructure and Urban Development	
3.1 Residential Zones	N/A
3.2 Caravan Parks and Manufactured Home Estates	N/A
3.3 Home Occupations	N/A
3.4 Integrating Land Use and Transport	Consistent. The site has sufficient capacity to provide access to freight transport for companies on the east coast of Australia that may need a water access point between Brisbane and Newcastle. It also could play a role in linking the Pacific Highway and the North Coast Rail Line to water based transport. The planning proposal is consistent with *Improving Transport Choice* as it better integrates land use and transport planning and development. The planning proposal is also consistent with *The Right Place for Business and Services – Planning Policy* because it will generate transport demand but is in a location where there will be choice. The site will be a marine hub that links the Pacific Highway to the open ocean freight movements and the rail line in Grafton. Employees at the site will have the option of commuting to work by road transport or water transport from the nearest urban areas.
3.5 Development Near Licensed Aerodromes	Consistent. The subject land will not create aircraft hazard issues in terms of obstacle heights. The nearest aerodrome is a grass strip at Palmers Island approximately 2.5 km to the south of the subject site. This is an east/west strip and the approaches are not in line with the subject land. It is not a CASA controlled aerodrome and has no commercial flights.
4. Hazard and Risk	
4.1 Acid Sulphate Soils	Consistent. The subject land has been assessed and is known to contain potential acid sulphate soils (ASS). It is mapped by Council as being class 2 and 3 acid sulphate soils. All of the uses that would disturb soils in the proposed IN4 zone would require Council consent and be subject to further assessment of ASS. The nature of ASS is that they can be treated if disturbed with little or no production of acid run off.
4.2 Mine Subsidence and Unstable Land	Consistent. There is no history of mining on or in the vicinity of the subject land and it is not within a mine subsidence district.
4.3 Flood Prone Land	Justifiably Inconsistent. The entire site is flood affected in major flood events and this planning proposal will permit marine industry on land that is currently zoned rural. However, no residential development is proposed

Ministerial Directions	Comment
	to be located on flood affected land. The location is not a mapped floodway and development of the site based on a series of elevated pads will not result in significant impact on other properties and will not require additional government spending on flood mitigation. Future development will require development consent. See below for more detail.
4.4 Planning for Bushfire Protection	Consistent. The subject land is not mapped as bushfire prone land.
5. Regional Planning	
5.1 Implementation of Regional Strategies	Consistent. The subject land is consistent with the Mid North Coast Regional Strategy (MNCRS). Although the site is not mapped as proposed employment lands in the MNCRS the document states the following in relation to marine industry: *"in the case of marine based industries that depend on access to navigable waterways, additional opportunities for industry may be provided outside growth areas. The Department will work with other agencies on suitable locational criteria to assist in guiding any future development opportunities".* On this basis it is consistent.
5.2 Sydney Drinking Water Catchments	N/A
5.3 Farmland of State and Regional Significance on the NSW Far North Coast	N/A
5.4 Commercial and Retail development along the Pacific Highway, North Coast	Consistent. Although this planning proposal does not apply to land with Pacific Highway frontage and is not proposing commercial or retail development it still has considered the potential for traffic impacts on the highway. No significant impacts are predicted.
5.8 Second Sydney Airport: Badgerys Creek	N/A
6. Local Plan Making	
6.1 Approval and referral requirements	Consistent. No consultation or concurrence requirements are proposed by this planning proposal. No designated development provisions are proposed.
6.2 Reserving Land for Public Purposes	Consistent. No RE1 Public Recreation land or other land reservations are proposed to be altered or removed as a result of this planning proposal.
6.3 Site Specific Provisions	Consistent. The proposal is only nominating land uses that are appropriate for the site and land use zones that are available in the Clarence Valley Shire wide LEP 2011.
7. Metropolitan Planning	
Implementation of the Metropolitan Strategy	N/A

1.2 Rural Zones
The objective of this direction is to protect the agricultural production value of rural land. This will not be possible in the context of the future industrialization of this marine precinct. The majority of the land with agricultural value will be zoned for marine industry use. This will result in 16 ha of land being lost from cane production, and 18 ha being lost from grazing. Neither of these losses are significant in terms of the production areas available for these two land uses.

The inconsistency is justified in this case because the land:

- Has good road access for materials and transport;
- Good river access for boat movements;
- Is located next to an existing marine industry;
- Is relatively flat and can be filled above flood planning levels without significant impacts;
- Is large enough to support a large facility; and
- Has minimal riparian vegetation.

The inconsistency is further justified as using the subject land for marine industry is substantially consistent with the Clarence Marine Precinct, the Clarence River Way Masterplan, the Clarence Valley Industrial Lands Strategy and the Mid North Coast Regional Strategy. All these strategic documents outline the need for a site such as this and accept that it will be located on constrained land.

There is no other suitable location with similar characteristics to this site that is not located on good agricultural land. The majority of floodplain locations are either good agricultural land or environmentally sensitive land.

1.5 Rural Lands
This direction has two objectives. The first is the same as the objective of Direction 1.2 and this has been addressed above. The second is to facilitate the orderly and economic development of rural lands for rural and related purposes.

This planning proposal applies to land that is currently zoned RU1 Primary Production in the Clarence Valley Council LEP 2011. The planning proposal will change the prevailing zones to predominantly IN4 Working Waterfront with a smaller area of W3 Working Waterways. In this situation the Rural Planning Principles and Rural Subdivision Principles of the SEPP (Rural Lands) 2008 have limited application as this planning proposal will not permit rural residential development and will not alter the prevailing minimum lot size for any land that will remain zoned RU1 Primary Production.

The planning proposal is an attempt to balance the economic, social and environmental interests of the community by promoting the establishment of new employment opportunities in close proximity to existing urban areas that have adequate infrastructure. The Clarence valley has identified the need to broaden its employment base and manufacturing is a labour intensive and has significant multiplier outcomes for housing, retail and service industries. The site could generate an additional 260 jobs over the long term.

The potential for conflict with adjacent agricultural areas will be minimized if all of the subject land is permitted to be rezoned as it will then be large enough to accommodate set backs and buffer areas on site. It will also be large enough to deal with stormwater and wastewater on site without impacting on the Clarence River. The edge effects in this case are reduced because the adjacent farmland is only on the north and west sides with the major frontage of the property being to the Clarence River.

Although the planning proposal does not promote the development of rural land for rural purposes this inconsistency with Direction 1.5 is justified in this case because using the subject land for marine industry is substantially consistent with the Clarence Marine Precinct, the Clarence River Way Masterplan, the Clarence Valley Industrial Lands Strategy and the Mid North Coast Regional Strategy.

4.3 Flood Prone Land

The objectives of this Direction are to ensure that flood prone land is developed consistent with NSW government Flood Prone land Policy; and to ensure LEP provisions on flood prone land are commensurate with flood hazard and include consideration of flood impacts both on and off the site.

All of the 42.6 ha of land proposed to be rezoned is in a location that is identified in Council's Flood Plain Management Plan as flood affected in a 1 in 100 year flood event. Depths are high in a major event at 0.8 m to 1.5 m but velocities are low at 0.1-0.15 m/s at peak times. The subject land is not a high hazard floodway but is a high hazard area when flood depths reach 1.0 m even though the water is moving quite slowly.

Residential development is not proposed for the subject land and industrial development can easily be accommodated on elevated fill pads that allow buildings to be constructed with floor levels above the design flood level. Ample flood warning is normal for major events in the Lower Clarence River and workers can be evacuated and sites made secure before the event arrives and the site is isolated.

Flood modeling concludes that the fill pad development option can be undertaken without significant flood impact on other properties in the flood plain. No significant increase in flood hazard will occur on the subject land. No increase in flood mitigation infrastructure or services will be required. No significant development, including filing and all structures will be able to be undertaken without Council consent should the rezoning proceed.

This planning proposal does not permit development in a high hazard floodway; and does not permit development that will be likely to significantly affect other properties. It does permit industrial development on a relatively small area of land that is flood prone and is therefore inconsistent with this Direction. However, in this case the inconsistency is justified because the development of this area for industrial use is consistent with the Grafton and Lower Clarence Floodplain Risk Management Plan 2007 and the area is small compared to the size of the Lower Clarence floodplain. The inconsistency is therefore of minor significance and justified.

GHD

Suite 2 317 River Street Ballina NSW 2478
PO Box 372 Ballina NSW 2478
T: 02 6620 6500 F: 02 6620 6501 E: bnkmail@ghd.com.au

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Harwood Marine

Traffic Assessment Report
Harwood Slipway Marine Project

October 2012

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Appendices

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1. Introduction

1.1 The Concept

Harwood Marine plans to create a marine industry precinct on the Clarence River. The precinct would allow large areas of land that can be easily accessed from the existing slipway and the river to be dedicated to marine industry. In particular the site would target boat builders requiring both good access to the Clarence River and Pacific Ocean to get boats in and out as well as the Pacific Highway to get materials and staff in and out.

This report forms part of a planning proposal submitted from Harwood Marine for land adjacent to its existing marine industry on Harwood Island.

1.2 Purpose of this report

The purpose of this traffic impact assessment report is to assess the traffic and access aspects of the Harwood Marine precinct concept.

This report has been prepared with reference to the Roads and Maritime Services (RMS) document “Guide to Traffic generating Developments” (October 2002).

1.3 Scope and limitations

The assessment considers road traffic access to the site from the Pacific Highway via the existing local road network. The assessment is based on information provided by the client and observations of existing conditions at the time of the site inspection.

1.4 Report Structure

The report follows the following structure:

Section 2 describes the existing road network and traffic conditions in the study area.

Section 3 presents the ‘no development’ and ‘with development’ cases including estimated future traffic volumes on the local road network. The results of peak period traffic analysis at the main access road intersection with the Pacific Highway are presented to indicate the performance of the intersection operating as an at-grade junction to year 2020.

Section 4 presents the conclusions and recommendations from the study.

2. Existing Conditions

2.1 Site Location

Access to the site is via Pacific Highway and Watts Lane. Watts lane is located approximately one kilometre to the north of Harwood bridge. The site is located on River Road approximately 250 metres east of Beckmans Lane, Harwood.

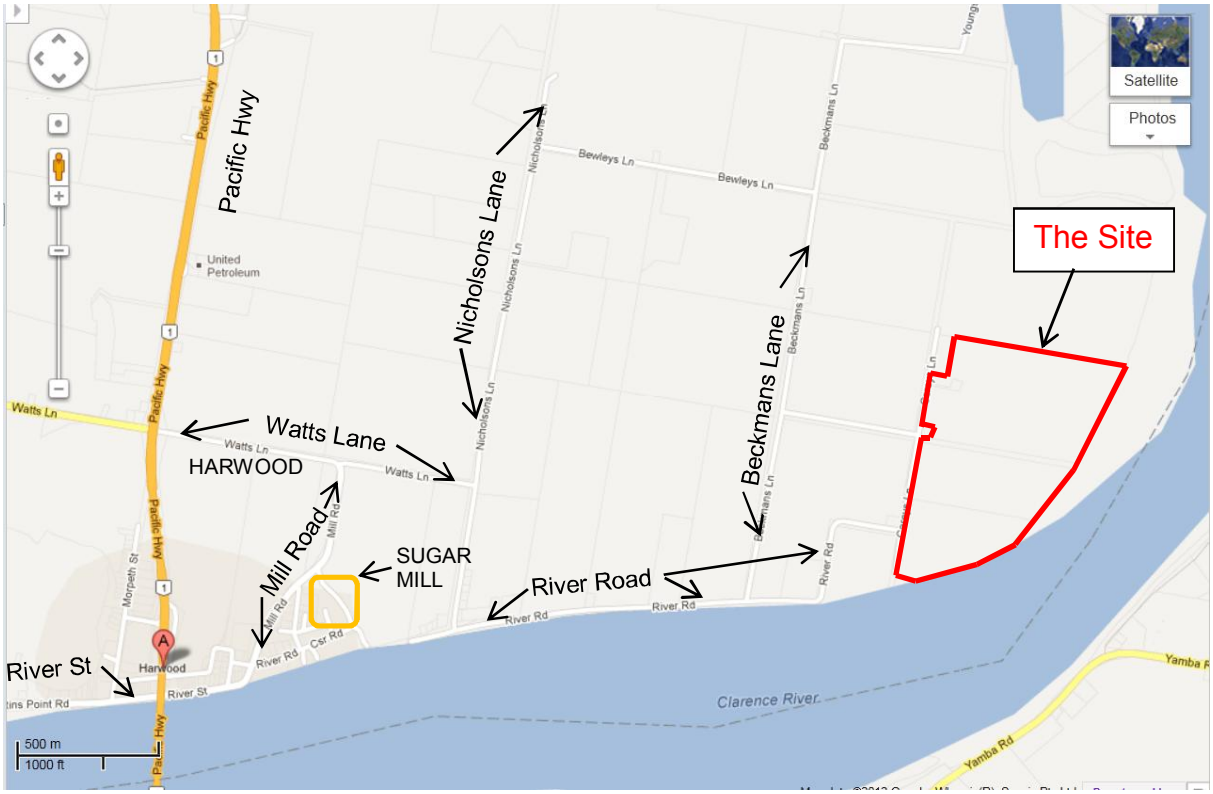

Figure 1 Site Location

Source: Google maps

2.2 Road Network

Watts Lane is the only formed and sealed road for vehicle access between the Pacific Highway and the site.

Watts Lane intersects with the Pacific Highway as a four way junction with stop signs controlling traffic on the Watts Lane approaches. Sight lines for traffic turning at the highway are generally unobstructed and the terrain is level. Separate turn lanes are provided for vehicles turning from the highway.

Access to and from Harwood village is via River Street which passes beneath the highway. As there is no direct vehicular connection between River Street and River Road, vehicles that wish to access the site from Harwood would travel via Mill Road, Watts Lane, Nicholsons Lane and River Road.

There are a number of unsealed roads and road reserves that could be linked to provide a future alternative road access between the site and the Pacific Highway. One such route is Watts Lane (sealed road), Nicholsons Lane (gravel road), a road reserve connecting Nicholsons Lane and Careys Lane (no formed road), Careys Lane and River Road to the site.

2.3 Access to Site

Watts Lane between Pacific Highway and Mill Road has a sealed width of approximately six metres and grassed shoulders approximately one metre wide. The centreline is marked with a single broken line and there are no edge lines.

Watts Lane between Mill Road and Nicholsons Lane has a sealed pavement approximately six metres wide; there is no line marking.

The intersection of Watts Lane and Mill Road gives priority to the more heavily trafficked movement between Watts Lane (west) and Mill Road.

Nicholsons Lane between Watts Lane and River Road has a six metre wide bitumen seal in generally good condition and has wide grassed shoulders. Traffic has a sign posted speed limit of 100 km/hr. At its southern end Nicholsons Lane becomes River Road which runs in an approximately east west direction parallel to the river.

Nicholsons Lane

River Road runs parallel to the Clarence River providing vehicle access to approximately 12 properties and connecting to Beckmans Lane and Careys Lane. It also provides access to the Harwood Sailing Club. River Road has a 3.9 metre wide bitumen sealed pavement with grassed shoulders for most of its length.

All the road network is susceptible to flooding. Access to the site is not possible by road during major flooding. It is estimated that River Road carries up to 150 vehicles per day.

River Road

2.4 Traffic volumes

2.4.1 Pacific Highway Traffic

Traffic volume data was available from the Roads and Maritime Services (RMS) website for the Pacific Highway from the 'Wells Crossing to Iluka Road Upgrading the Pacific Highway Concept Design Report'. This data indicated an AADT in 2004 of approximately 7,500 vehicles (including 20% heavy vehicles) on the Pacific Highway south of Maclean. The RMS report identified an annual growth rate of 2.6%. By applying this growth rate to the AADT at the Harwood Bridge count station (04.001) over the 8 year period from 2004-2012, it is estimated that the current (2012) AADT on the highway is approximately 12,000. It is also assumed that the percentage of heavy vehicles has remained at approximately 20%.

Traffic volume data was available from Clarence Valley Council for only the western leg of Watts Lane intersection with the highway. The count data was provided for the period between 19th May to 2nd June 2010. An average two way daily volume of 774 was identified.

To assist in understanding the traffic flows at the intersection of Pacific Highway and Watts Lane during peak periods, intersection traffic turning movements were undertaken between 16:30 and 16:50 on Monday 3rd September and between 07:45 and 08:00 on Tuesday 4th September 2012.

2.4.2 Traffic generated by Harwood Mill and Refinery

The number of vehicles generated by the Harwood Mill and Refinery site was provided by the NSW Sugar Milling Co-operative Limited and is included in Appendix B. There are over 104,700 vehicle movements per year. Cane, raw sugar, molasses and mill mud are transported during the crushing season from June to December and generate a total of 89,900 truck movements over the six month period. Refined sugar, and boiler fuel is transported throughout the year and generates a total of 17,600 truck movements.

From this data, it is clear that the traffic generated by the Sugar Mill accounts for most of the traffic using Watts Lane. It is estimated that during the seasonal peak between June and December, there are approximately 120 truck movements per day, assuming equal distribution of traffic throughout the day and night.

In addition to the haulage of these materials, the Sugar Mill generates approximately 350 employee trips per day as well as deliveries of miscellaneous supplies.

2.4.3 Traffic generated by current Harwood Marine Operations

The current operations at Harwood Marine employ approximately 40 to 90 persons depending on the number of contractors working at the site. Working hours are between 06:30 and 17:00. The maximum number of work trips generated by the existing development is approximately 90 arrivals during the morning peak and 90 departures during the evening peak period.

In addition to employee traffic, two semi-trailers access the site each week to deliver materials.

2.5 Pacific Highway/ Watts Lane Intersection Analysis

The intersection counts on 3rd and 4th of September were used to estimate the AM and PM peak hour turning volumes for the turning movements at the intersection of Watts Lane with Pacific Highway. Estimates of peak period through traffic movements on the highway were derived from the average daily profile data provided in the 'Wells Crossing to Iluka Road Upgrading the Pacific Highway Concept Design Report'. A 50% directional split on the Highway during peak periods was assumed.

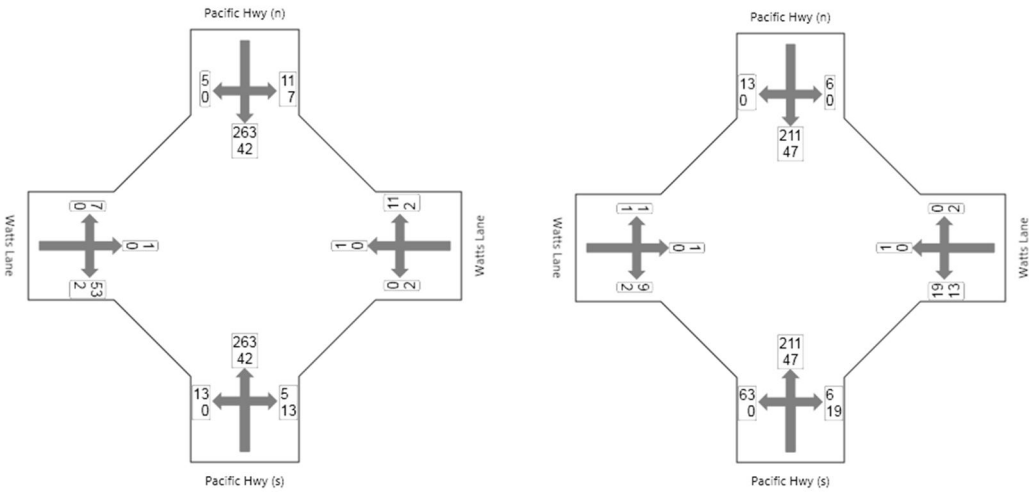

Figure 2 2012 AM and PM Peak Hour Traffic Volumes

The intersection traffic flows shown in Figure 2 were analysed using SIDRA Intersection Version 5.1 and the performance of the intersection operating under stop sign control is measured in terms of Average Delay, Level of service and Degree of Saturation for each movement. The description of each Level of Service (LoS) referred to in the SIDRA results tables are given in

Table 1. The results of the SIDRA intersection capacity analysis of existing traffic flows are given in Tables 2 and 3 with the SIDRA Movement Summaries provided in Appendix B.

Table 1 Description of Level of Service

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

Source: Guide to Traffic Generating Developments (RMS, 2002)

Table 2 Existing AM and PM Peak SIDRA Results - Pacific Highway/Watts Lane Intersection

Approach	Movement	Level of Service (AM Peak)	Level of Service (PM Peak)
Pacific Hwy (north)	Left	A	A
	Through	A	A
	Right	A	A
Watts Lane (east)	Left[1]	X	X
	Through	B	D
	Right	B	E
Pacific Hwy (south)	Left	A	A
	Through	A	A
	Right	A	A
Watts Lane (west)	Left	B	B
	Through	B	B
	Right	B	B

Notes:

1. The left turn from Watts Lane (east) is a continuous movement and LoS is not reported

From the SIDRA results in Table 2 the traffic turning between Watts Lane (east) and Pacific Highway (south) experience a good Level of Service. Traffic using the left turn lane from Watts Lane (east) does not conflict with highway traffic.

2.6 Crash Data

Crash data for the intersection of Pacific Highway and Watts Lane was provided by RMS for the five year period from 2007 to 2011. The incidents that were recorded during this period are summarised in Table 3.

Table 3 Pacific Highway/Watts Lane Intersection Crash Details

Date	Ambient conditions	Severity	Road User Movement Code	Description
19/04/07	Dry/Daylight	Property Only	30	Southbound car/ stationary southbound vehicle
18/08/07	Dry/Evening	Fatality	21	Northbound car turning right/ southbound semi-trailer through
16/02/11	Dry/Daylight	Property Only	10	Westbound utility through/southbound car through
11/05/11	Dry/Daylight	Property Only	21	Southbound truck right turn/northbound car through

There are a relatively low number of crashes reported at the site. There was one fatal crash, no injury crashes and three property damage crashes reported.

The data indicates that the fatality occurred in overcast conditions in the evening when ambient lighting would have been poor. The crash involved a passenger vehicle turning right into Watts Lane colliding with a semi-trailer travelling south of the highway. The crash resulted in one fatality and two persons injured.

Only four incidents were reported over the five year period which is less than one crash per year.

It can be concluded from the crash data that the crash rate at the intersection is relatively low considering the high volume of traffic on the highway. It is also concluded that the casualty crash that occurred may have been due to the poor visibility conditions rather than an inherent safety issue at the intersection.

2.7 Public transport, pedestrians and cyclists

A school bus service runs along Watts Lane and Nicholsons Lane and River Road. There were no formal bus stops.

There are no formed pedestrian paths along Watts Lane, Nicholsons Lane, River Road or Careys Lane. The only pedestrians observed during the site inspection were school children moving and to and from the bus stops.

There are no cycle paths in the study area. There were no cyclists observed on the roads during the site inspection.

2.8 Car parking

A large level gravelled area is currently available for employee and visitor car parking. Although there are no current plans available for future car parking, there is ample room to develop car parking facilities within the site.

3. Future Conditions

3.1 Introduction

The ultimate development of the precinct concept is likely to occur in a time frame well beyond the upgrade of the Pacific Highway and the provision of a grade-separated junction between the Pacific Highway and Watts Lane.

For the purposes of this assessment it is assumed that the highway would be upgraded by 2020. Prior to 2020, the intersection of Pacific Highway and Watts lane would continue to operate as an at-grade junction.

This section investigates the capacity of the highway intersection to accommodate the future traffic volumes for the 'no development' case and the 'with development' case.

3.2 Background traffic growth

An estimate of the growth in background traffic on the Pacific Highway was made by projecting a growth rate of 2.5% per annum to the 2004 traffic counts to the horizon year 2020. The resultant daily traffic volume on the Pacific Highway at Watts Lane is given in Table 4.

Table 4 2020 AADT on Pacific Highway

Year	AADT
2004	7,500[1]
2012	12,000[2]
2020	14,400

Notes:

1. *From RMS Count Station 04.400*
2. *Projection based on 2.5% pa growth applied to RMS Count Station 04.001*

Peak period intersection turning volumes were estimated by applying a 2.5% pa growth to highway traffic. The resulting 2020 AM and PM peak hour traffic volumes are shown in Figure 3

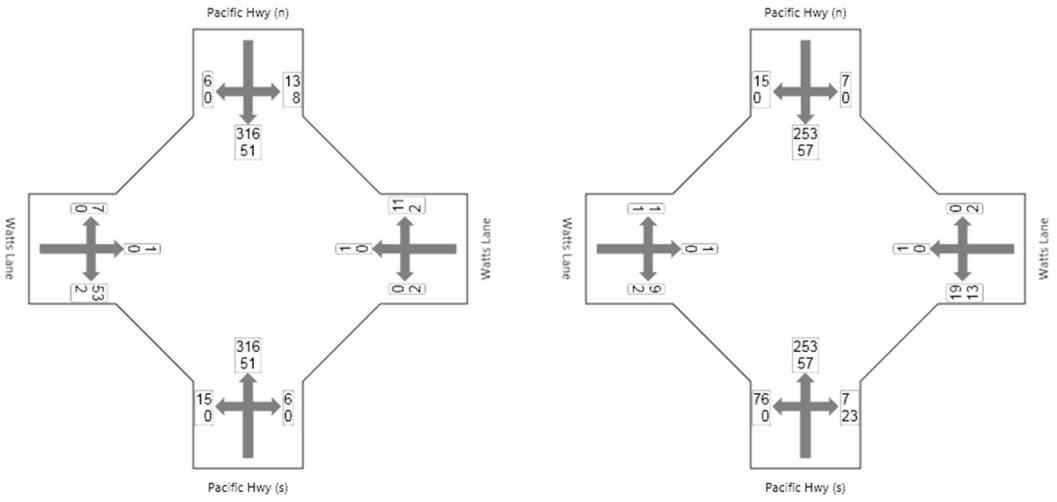

Figure 3 2020 Without Development - AM and PM Peak Hour Traffic Volumes

3.3 Traffic Impact Assessment - 'No Development' Case

It is assumed in the future case analysis that the Pacific Highway upgrade would not have been completed by 2020. The performance of the intersection of the Highway with Watts Lane in year 2020 without the proposed development was assessed by analysing the projected intersection turning volumes using SIDRA. The results of the analysis are given in Table 5.

Table 5 2020 Without Development AM and PM Peak SIDRA Results - Pacific Highway/Watts Lane Intersection

Approach	Movement	Level of Service (AM Peak)	Level of Service (PM Peak)
Pacific Hwy (north)	Left	A	A
	Through	A	A
	Right	A	A
Watts Lane (east)	Left[1]	X	X
	Through	C	F
	Right	C	F
Pacific Hwy (south)	Left	A	A
	Through	A	A
	Right	A	B
Watts Lane (west)	Left	B	C
	Through	B	B
	Right	B	B

Notes:

1. The left turn from Watts Lane (east) is a continuous movement and LoS is not reported.

The results indicate that the increased volume of traffic on the highway by 2020 would cause the through and right turn movements on the Watts Lane eastern approach to operate at LoS F. Although only a very small number of vehicles are involved in these movements, they would experience very long delays.

The left turn from Watts Lane to the Pacific Highway is a free left turn and the analysis results indicate a low level of delay (9.5 seconds). The right turn from the Pacific Highway to Watts Lane would operate at LoS B described as 'Acceptable delays and spare capacity'.

Figure 4 on the next page shows the layout of the Pacific Highway intersection with Watts Lane.

Figure 4 Pacific Highway/Watts Lane intersection

Source *Google Maps*

3.4 Traffic Impact Assessment - 'With Development' Case

3.4.1 Traffic Generation

The time frame under consideration is the 8 year period to 2020 at which time it is assumed that the intersection of Watts Lane with the Pacific Highway would be upgraded to a grade-separated interchange. The interchange would provide adequate traffic capacity for the ultimate development of the site.

At ultimate development it is understood that around 300 people will be employed at the site. Within the eight year time frame, employment at the development site is expected to increase from the existing maximum of 90 persons to approximately 150 persons.

The traffic generated by the proposed development in 2020 is therefore approximately 150 vehicle trips to the site on weekdays and Saturdays. It is therefore assumed that there will be 150 arrivals and 150 departures in the morning and evening peak hours respectively.

During the 8 year period to 2020, the two semi-trailers per week that currently serve the site to deliver materials are expected to be sufficient to meet the projected delivery needs of the development.

3.4.2 Traffic Distribution

The additional 60 employees that will access the proposed expanded development by 2020 are likely to travel to and from the south via the Pacific Highway. A small proportion may live in Harwood. It is therefore assumed that the majority of traffic would turn right from the Pacific Highway onto Watts Lane when travelling to the site in the morning, and turn left onto the highway when leaving the site in the evening. An alternative to attempting to turn right from Watts Lane would be to pass through Harwood village, beneath the Pacific Highway via River Street before joining the highway from Morpeth Street.

3.4.3 Pacific Highway/Watts Lane Intersection Capacity Assessment

The performance of the intersection of the Highway with Watts Lane in year 2020 with the additional traffic generated by the proposed development was assessed by analysing the projected intersection turning volumes using SIDRA. Shown in Figure 5.

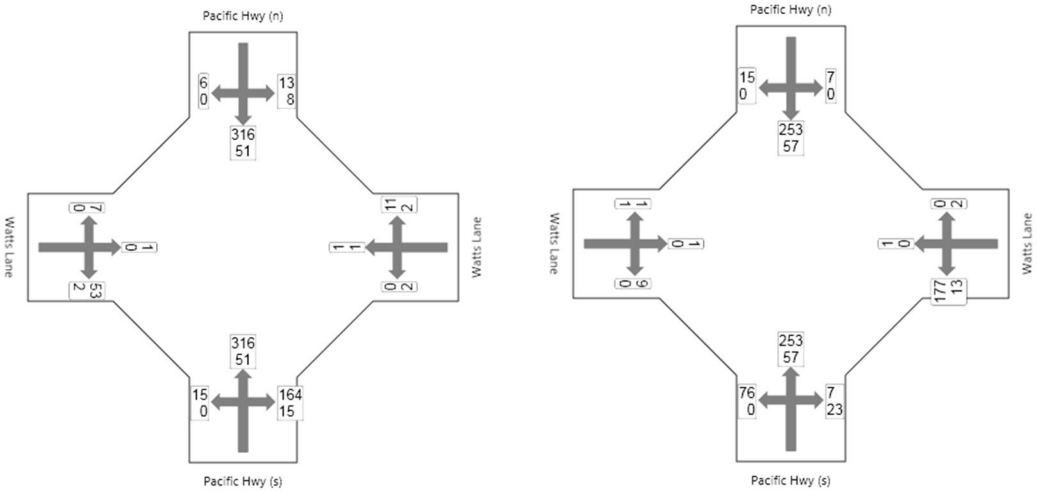

Figure 5 2020 With Development - AM and PM Peak Hour Traffic Volumes

The results of the SIDRA capacity analysis are given in Table 6. Movement Summary reports are included in Appendix A

Table 6 2020 With Development AM and PM Peak SIDRA Results - Pacific Highway/Watts Lane Intersection

Approach	Movement	Level of Service (AM Peak)	Level of Service (PM Peak)
Pacific Hwy (north)	Left	A	A
	Through	A	A
	Right	A	A
Watts Lane (east)	Left[1]	n/a	n/a
	Through	D	F
	Right	D	F
Pacific Hwy (south)	Left	A	A
	Through	A	A
	Right	A	B
Watts Lane (west)	Left	D	B
	Through	D	B
	Right	D	B

Notes:

1. *The left turn from Watts Lane (east) is a continuous movement and LoS is not reported in SIDRA*

A comparison of the results of the traffic analysis with and without the proposed development (refer to Table 5 and Table 6) shows that the right turn from the Pacific Highway is not significantly affected by the increase in employee traffic travelling to the development site in the morning peak which is expected to operate with a LoS A.

Similarly, the free left turn from Watts Lane to the Pacific Highway is not significantly affected in the PM peak as this is a free flow and unrestricted movement at the intersection.

3.4.4 Assessment of Local Roads

The local road network between the Pacific Highway and River Road via Watts Lane and Nicholsons Lane generally provides roads of sufficient width to carry the additional traffic to be generated by the proposed development expansion.

River Road is separated from the Clarence River by a narrow grassed verge that varies in width between three to five metres. There is no guard fence along the river bank. The existing road seal is approximately 3.9 metres wide so that two vehicles cannot pass without one leaving the sealed pavement. A drainage outlet opposite Beckmans Lane presents a serious hazard for errant vehicles.

Rural roads with a daily traffic volume of greater than 150 vehicles per day require a minimum pavement width of 6.2 metres (2 x 3.1 m lanes) and a formed shoulder width of 1.5 metres on each side (Austroads Guide to Road Design Part 3). As the proposed development expansion will result in a daily traffic volume in excess of 150 vehicles per day, the road will need to be widened to provide the required cross section. The existing verge adjacent to the river is narrow and widening along the northern edge is recommended for safety reasons.

4. Conclusions and Recommendation

The following conclusions are made:

1. The crash rate is low at the Pacific Highway/ Watts Lane intersection.
2. The major generator of traffic on Watts Lane is the Sugar Cane Mill in Mill Road
3. Background traffic growth alone on the Pacific Highway to 2020 is the major factor affecting the performance of the intersection at Watts Lane.
4. Traffic generated by the proposed development to 2020 does not significantly affect the level of service of traffic movements to and from the Pacific Highway (south) and Watts Lane (east).
5. Beyond about 2020 it is assumed that a grade separated interchange will be constructed as part of the Pacific Highway upgrade to remove the conflict between traffic flows on the Pacific Highway and Watts Lane.
6. The additional employee traffic from the proposed development could be satisfactorily accommodated on the local road network, subject to safety improvements on River Road.
7. There are alternative routes that could be developed between the development site and the Pacific Highway if required.

It is recommended that River Road be upgraded in accordance with the minimum standards required by Austroads to accommodate the increased traffic volume due to the proposed development. No upgrade of the Watts Lane / Pacific Highway intersection is warranted due to the additional traffic to be generated by the proposed Harwood Marine development.

Appendices

Appendix A – SIDRA Results

MOVEMENT SUMMARY

Site: Watts Hwy AM Existing

Pacific Hwy/ Watts Lane Intersection
Existing operation AM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Hwy (s)											
1	L	13	0.0	0.007	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	305	13.8	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	18	70.6	0.037	14.6	LOS B	0.1	1.5	0.51	0.73	44.5
Approach		336	16.3	0.171	1.1	NA	0.1	1.5	0.03	0.06	58.4
East: Watts Lane											
4	L	2	100.0	0.002	9.5	X	X	X	X	0.56	49.0
5	T	1	0.0	0.061	25.4	LOS B	0.2	1.6	0.74	0.99	36.3
6	R	13	16.7	0.061	25.8	LOS B	0.2	1.6	0.74	1.00	36.5
Approach		16	26.7	0.061	23.6	LOS B	0.2	1.6	0.64	0.94	37.9
North: Pacific Hwy (n)											
7	L	18	41.2	0.021	8.5	LOS A	0.1	0.7	0.12	0.55	49.1
8	T	305	13.8	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	5	0.0	0.005	9.8	LOS A	0.0	0.1	0.39	0.64	47.1
Approach		328	15.1	0.171	0.6	NA	0.1	0.7	0.01	0.04	59.0
West: Watts Lane											
10	L	7	0.0	0.202	21.2	LOS B	0.7	5.3	0.69	0.88	38.9
11	T	1	0.0	0.202	21.7	LOS B	0.7	5.3	0.69	1.01	38.6
12	R	55	3.8	0.202	21.4	LOS B	0.7	5.3	0.69	1.00	38.9
Approach		63	3.3	0.202	21.4	LOS B	0.7	5.3	0.69	0.99	38.9
All Vehicles		743	14.9	0.202	3.1	NA	0.7	5.3	0.09	0.15	55.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Pacific Hwy/ Watts Lane Intersection
Existing operation PM Peak
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Hwy (s)											
1	L	63	0.0	0.034	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	258	18.4	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	25	75.0	0.050	14.3	LOS A	0.2	2.2	0.49	0.72	44.9
Approach		346	19.1	0.148	2.5	NA	0.2	2.2	0.04	0.17	56.3
East: Watts Lane											
4	L	32	40.0	0.022	8.3	X	X	X	X	0.58	49.8
5	T	1	0.0	0.040	54.1	LOS D	0.1	1.3	0.86	0.95	24.7
6	R	2	100.0	0.040	58.7	LOS E	0.1	1.3	0.86	1.00	25.7
Approach		35	42.4	0.040	12.8	LOS A	0.1	1.3	0.08	0.62	45.5
North: Pacific Hwy (n)											
7	L	6	0.0	0.005	7.7	LOS A	0.0	0.1	0.12	0.56	49.1
8	T	258	18.4	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	13	0.0	0.012	9.8	LOS A	0.0	0.3	0.40	0.66	47.1
Approach		277	17.1	0.148	0.6	NA	0.0	0.3	0.02	0.04	59.0
West: Watts Lane											
10	L	2	50.0	0.056	24.9	LOS B	0.2	1.6	0.67	0.87	38.1
11	T	1	0.0	0.056	22.8	LOS B	0.2	1.6	0.67	0.97	37.8
12	R	12	18.2	0.056	23.3	LOS B	0.2	1.6	0.67	1.00	38.1
Approach		15	21.4	0.056	23.5	LOS B	0.2	1.6	0.67	0.98	38.0
All Vehicles		673	19.6	0.148	2.7	NA	0.2	2.2	0.05	0.16	56.1

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Watts Hwy AM 2020 no dev

Pacific Hwy/ Watts Lane Intersection
2020 AM Peak with no development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Hwy (s)											
1	L	15	0.0	0.008	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	366	13.8	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	6	0.0	0.007	9.9	LOS A	0.0	0.2	0.43	0.64	47.1
Approach		387	13.0	0.205	0.5	NA	0.0	0.2	0.01	0.04	59.2
East: Watts Lane											
4	L	2	100.0	0.002	9.5	X	X	X	X	0.56	49.0
5	T	1	0.0	0.077	30.2	LOS C	0.3	2.0	0.80	1.00	33.7
6	R	13	16.7	0.077	30.6	LOS C	0.3	2.0	0.80	1.00	33.8
Approach		16	26.7	0.077	27.7	LOS B	0.3	2.0	0.69	0.94	35.5
North: Pacific Hwy (n)											
7	L	21	40.0	0.024	8.4	LOS A	0.1	0.7	0.05	0.56	49.5
8	T	366	13.8	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	6	0.0	0.007	10.1	LOS A	0.0	0.2	0.43	0.65	46.8
Approach		394	15.0	0.205	0.6	NA	0.1	0.7	0.01	0.04	59.1
West: Watts Lane											
10	L	7	0.0	0.247	25.2	LOS B	0.9	6.7	0.76	0.96	36.3
11	T	1	0.0	0.247	25.7	LOS B	0.9	6.7	0.76	1.03	36.1
12	R	55	3.8	0.247	25.4	LOS B	0.9	6.7	0.76	1.02	36.3
Approach		63	3.3	0.247	25.4	LOS B	0.9	6.7	0.76	1.01	36.3
All Vehicles		860	13.5	0.247	2.9	NA	0.9	6.7	0.08	0.13	55.9

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Pacific Hwy/ Watts Lane Intersection
2020 AM Peak WITH development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Hwy (s)											
1	L	15	0.0	0.008	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	366	13.8	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	179	8.2	0.199	10.7	LOS A	0.8	6.2	0.49	0.76	46.5
Approach		560	11.7	0.205	3.6	NA	0.8	6.2	0.16	0.26	54.6
East: Watts Lane											
4	L	2	100.0	0.002	9.5	X	X	X	X	0.56	49.0
5	T	2	50.0	0.143	48.4	LOS D	0.4	3.7	0.89	1.00	27.2
6	R	13	16.7	0.143	46.4	LOS D	0.4	3.7	0.89	1.00	27.2
Approach		17	31.3	0.143	42.0	LOS C	0.4	3.7	0.77	0.95	29.1
North: Pacific Hwy (n)											
7	L	21	40.0	0.025	9.6	LOS A	0.1	0.9	0.34	0.58	48.0
8	T	366	13.8	0.205	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	6	0.0	0.007	10.1	LOS A	0.0	0.2	0.43	0.65	46.8
Approach		394	15.0	0.205	0.7	NA	0.1	0.9	0.02	0.04	58.9
West: Watts Lane											
10	L	7	0.0	0.349	34.9	LOS C	1.3	9.6	0.85	1.02	31.4
11	T	1	0.0	0.349	35.4	LOS C	1.3	9.6	0.85	1.05	31.2
12	R	55	3.8	0.349	35.1	LOS C	1.3	9.6	0.85	1.05	31.4
Approach		63	3.3	0.349	35.1	LOS C	1.3	9.6	0.85	1.05	31.4
All Vehicles		1034	12.7	0.349	5.1	NA	1.3	9.6	0.16	0.24	52.9

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Watts Hwy PM 2020 no dev

Pacific Hwy/ Watts Lane Intersection
2020 PM Peak with no development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Hwy (s)											
1	L	76	0.0	0.041	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	309	18.4	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	31	75.9	0.069	15.7	LOS B	0.3	3.0	0.54	0.77	43.7
Approach		416	19.2	0.178	2.6	NA	0.3	3.0	0.04	0.18	56.2
East: Watts Lane											
4	L	32	40.0	0.022	8.3	X	X	X	X	0.58	49.8
5	T	1	0.0	0.064	81.0	LOS F	0.2	2.0	0.91	1.00	19.0
6	R	2	100.0	0.064	85.6	LOS F	0.2	2.0	0.91	1.00	20.2
Approach		35	42.4	0.064	15.2	LOS B	0.2	2.0	0.08	0.62	43.3
North: Pacific Hwy (n)											
7	L	7	0.0	0.006	7.7	LOS A	0.0	0.1	0.13	0.56	49.0
8	T	309	18.4	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	15	0.0	0.016	10.2	LOS A	0.1	0.4	0.44	0.68	46.7
Approach		332	17.1	0.178	0.6	NA	0.1	0.4	0.02	0.04	59.0
West: Watts Lane											
10	L	2	50.0	0.074	29.8	LOS C	0.2	2.0	0.75	0.91	35.2
11	T	1	0.0	0.074	27.7	LOS B	0.2	2.0	0.75	1.00	35.0
12	R	12	18.2	0.074	28.1	LOS B	0.2	2.0	0.75	1.00	35.2
Approach		15	21.4	0.074	28.3	LOS B	0.2	2.0	0.75	0.99	35.2
All Vehicles		797	19.4	0.178	2.8	NA	0.3	3.0	0.05	0.16	55.9

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Pacific Hwy/ Watts Lane Intersection
2020 AM Peak WITH development
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Pacific Hwy (s)											
1	L	76	0.0	0.041	8.2	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	309	18.4	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R	31	75.9	0.069	15.7	LOS B	0.3	3.0	0.54	0.77	43.7
Approach		416	19.2	0.178	2.6	NA	0.3	3.0	0.04	0.18	56.2
East: Watts Lane											
4	L	189	6.7	0.107	7.7	X	X	X	X	0.60	49.8
5	T	1	0.0	0.064	81.0	LOS F	0.2	2.0	0.91	1.00	19.0
6	R	2	100.0	0.064	85.6	LOS F	0.2	2.0	0.91	1.00	20.2
Approach		193	7.7	0.107	9.0	LOS A	0.2	2.0	0.01	0.61	48.5
North: Pacific Hwy (n)											
7	L	7	0.0	0.006	7.7	LOS A	0.0	0.1	0.13	0.56	49.0
8	T	309	18.4	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	15	0.0	0.016	10.2	LOS A	0.1	0.4	0.44	0.68	46.7
Approach		332	17.1	0.178	0.6	NA	0.1	0.4	0.02	0.04	59.0
West: Watts Lane											
10	L	2	50.0	0.048	24.9	LOS B	0.2	1.2	0.70	0.89	38.1
11	T	1	0.0	0.048	22.9	LOS B	0.2	1.2	0.70	1.00	37.8
12	R	9	0.0	0.048	22.4	LOS B	0.2	1.2	0.70	1.00	38.1
Approach		13	8.3	0.048	22.9	LOS B	0.2	1.2	0.70	0.98	38.0
All Vehicles		953	16.0	0.178	3.5	NA	0.3	3.0	0.04	0.23	54.9

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model used.

Appendix B – Harwood Sugar Mill Traffic Data

NSW Sugar Milling Co-operative Ltd.

Estimate of traffic movements to & from Harwood Mill & Refinery site. (along Watts Lane)

1. Cane Haulage

Basis – 750,000 tonnes of cane PA
Crushing Season June - December
Net tonnes cane per load – 21.5 tonnes

Total Number of Loads to Mill – 34,900
Total number of empty Bins from Mill – 34,900

Breakdown as follows

West along Yamba road to Harwood Bridge	- 5,780
East from Maclean to Harwood Bridge	- 430
From South side of Bridge along Highway	- 16,200
Along Watts lane from the west side of Highway	- 4,070
Along the Highway from the North to Watts lane	- 6,420
Direct to Mill from farms east of mill	- 1,070
Total	**34,900**

Note: Movements doubles to account for empty bins leaving the Mill

Total 69,800

2. Raw Sugar transport

Basis - Raw sugar transported from Broadwater & Condong Mill to Harwood storage shed
Tonnes – 150,000
Crushing Season - June – December
Net Per load – 30 tonnes

Total Number of Loads to Mill (from the North) –	5,000
Total number of empty Trucks from Mill	5,000
Total	**10,000**

3. Refined Sugar transport

Basis - Refined Sugar transported from Harwood
Tonnes – 250,000 PA
Period - All year
Assume all B doubles @ 42 tonnes
125,000 t to Grafton as Bulk
125,000t as packaged product 90% to the south 10% north
Bulk Sugar to Grafton

Total Number of Loads	– 2,900
Total number of empty Trucks	- 2,900
Total	**5,800**

Packaged Refined Sugar - South

Total Number of Loads	- 2,600
Total number of empty Trucks	- 2,600

(Note Most Empty Trucks would come from the North)

Total	**5,200**

Packaged Refined Sugar - North

Total Number of Loads	- 300
Total number of empty Trucks	- 300
Total	**600**

Total for Refined Sugar = 11,600

4. Molasses transport

Basis - Molasses transported from Harwood to Various locations
Tonnes – 30,000
Period Crushing Season - June – December
Net Per load – 30 tonnes

Total Number of Loads	1,000
Total number of empty Trucks to Mill	1,000
Total	2,000

Note: some molasses sales are in 200litre drums. This increases the traffic by an estimated 500 trip per year. (Total movements 1000)

Total	**3,000**

5. Mill Mud Transport

Basis - Mud transported from Harwood to farms within the Mill area
Tonnes – 35,000t
Crushing Season - June – December
Net Per load – 10 tonnes
Assume even Distribution North and south

Total Number of Loads to Mill (from the North) –	3.500
Total number of empty Trucks from Mill	3,500
Total	**7,000**

6. Boiler fuel Transport

Wood waste is transported to the site throughout the year. It is expected that the requirements will be 50,000 t PA

Net Per load – 20 tonnes
Period – All year

Total Number of Loads to Mill (from the south) –	2,500
Total number of empty Trucks from Mill	2,500
Total	5,000
Total	**6,000**

Grand Total = 104,700 Movements per year

Miscellaneous Traffic

1. Employee traffic**.** Harwood site employees about 175 people who access the site.
2. Deliveries to and from the Mill/Refinery site. (eg overnight transport companies, bulk process chemical deliveries).

GHD

PO Box 2875 Port Macquarie NSW 2444
T: (02) 6586 8700 F: (02) 6586 8701 E: pqqmail@ghd.com.au

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	Mick Lyons	O Peel		Mike Svikis		31/10/12

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Harwood Marine

Harwood Marine Precinct - Planning Proposal
100yr ARI Flood and Stormwater Assessment

October 2012

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Appendices

1. Introduction

1.1 Background

This report has been prepared to accompany a planning proposal (a request for Council to commence an LEP amendment to rezone the land) submitted by Harwood Marine, for land adjacent to its existing marine industry on Harwood Island. The planning proposal requests that an area of 42.64 ha be rezoned to IN4 Working Waterfront and W3 Working Waterways under the Clarence Valley Local Environmental Plan 2011. The rezoning will allow marine based industry and associated infrastructure on the subject site.

Whilst future development applications will address earthworks, platforms and building development within the proposed lots, the flood assessment has considered the impact of filling within the lot on the 100-year Average Recurrence Interval (ARI) flood event. Proposed building platforms have been used in the flood model to determine the impact development would have on flood levels, if any. The 100-year ARI storm event was simulated for the pre- and post-development scenarios, using Clarence Valley Councils flood model (Clarence Valley Council, 2004).

In addition to flooding, this assessment investigates management of stormwater at the proposed site, based on Water Sensitive Urban Design. A concept strategy is proposed, recognising the potential development.

1.2 Limitations of this Report

This report has been prepared by GHD for Harwood Marine and may only be used and relied on by Harwood Marine and Clarence valley Council for the purpose agreed between GHD and the Harwood Marine.

GHD otherwise disclaims responsibility to any person other than Harwood Marine arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

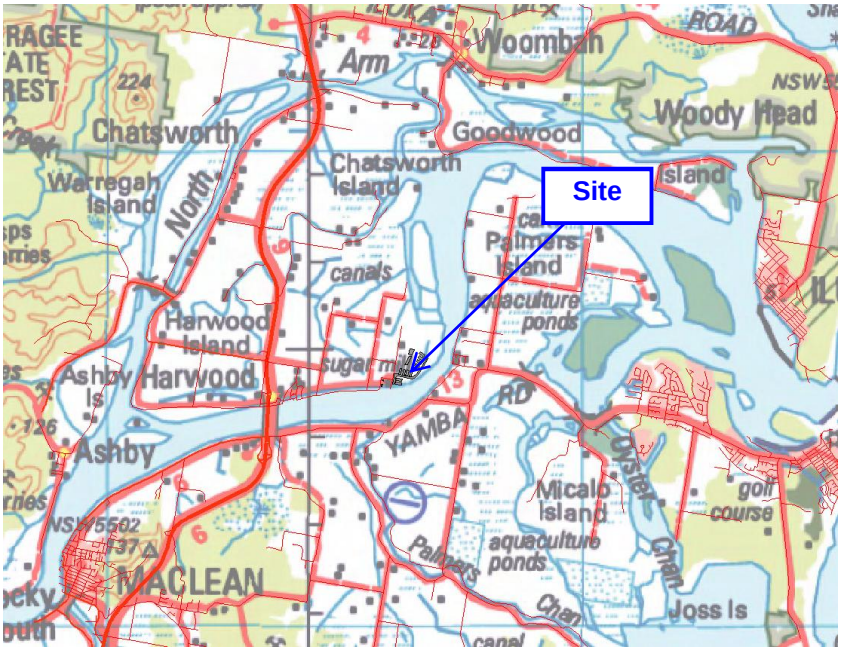
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD. GHD disclaims liability arising from any of the assumptions being incorrect.

1.3 Existing Drainage at the Site

The proposed development area is located on the northern bank of the Clarence River (Figure 1), east of the Pacific Highway. This area forms part of Harwood Island and is flood affected by the Clarence River. The island is bisected by a number for drainage flood runners/canals, which generally drain the area to the Clarence River.

Figure 1 Locality Map



1.4 Available Data

The flood assessments were based on the Lower Clarence River Flood Study Review undertaken by WBM Oceanics Australia for Clarence Valley Council, dated 2004. This study reviewed flooding in the lower Clarence River using a TUFLOW 2D flood model.

In order to maintain consistency, GHD approached Clarence Valley Council for permission to engage WBM to simulate the proposed development area within the existing flood models. The results were received from WBM and interpreted.

Other data available for the flood assessment comprised topographic levels provided by the Client.

1.5 Assessment Criteria

The guiding documents for this assessment have been the Clarence Valley Council, Industrial Zones DCP 2011, the Development in Environmental Protection, Open Spaces and Special Use Zones, DCP December 2011, the Grafton and Lower Clarence Floodplain Risk Management Plan 2007 and Sustainable Water Information for Applicants, 2004, DCP. The DCP's define Floodplain Management Controls, which have been adopted for the purposes of this assessment. Additionally, the study has considered the following guides, plans, and manuals:

- Australian Rainfall and Runoff - A Guide to Flood Estimation (2001); and
- NSW Floodplain Development Manual (2005).

It is acknowledged that future climate impacts have not been simulated to date. It is estimated that flood impacts associated with the post development PMF and future climate impact should be undertaken as part of any future development applications, and this requirement could be conditioned as part of a future development application.

2. Flood Assessment

2.1 Site Visit

Site visits were undertaken to gain an understanding of the topography, identify drainage and overland flow path routes, constraints, and provide the required background data. Known hydraulic controls and flow path surfaces for hydraulic roughness calculations were of particular interest. Site visits allowed the identification of overflow paths, flow controls upstream and downstream and sections where critical flow conditions might occur.

2.2 Existing Flooding Conditions

The existing flooding conditions for the 100-year ARI event were obtained from the Lower Clarence River Flood Study Review undertaken by WBM Oceanics Australia for Clarence Valley Council. The flood simulation results that defined the existing flooding conditions are provided in Appendix B. The results show that in a 100-year ARI flood event:

- Flood levels (Figure B.1) in the area of the proposed development range from 2.8 to 3.0 m AHD. The figure shows the wide extent of flooding across the Lower Clarence River floodplain, in particular at, and downstream of Harwood Island;
- Flood depths (Figure B.2) in the area of the proposed development are in the order of 0.8m to 1.5 m at the peak of the event. The majority of the proposed buildings are located in an area with higher topography on the floodplain, where flood depths of between 0.8 m and 1.0 m would be expected. It is noteworthy that it is intended to raise buildings above the 100-year ARI event by providing building pads, and as such these flow depths would be expected in areas where no building pads would be provided; and
- Flood velocities (Figure B.3) across much of the site, on the floodplain, average approximately 0.1-0.15 m/s and are thus slow flowing. Towards the centre of the Clarence River floodway, flow velocities increase to approximately 1.5 to 1.7 m/s. These flow velocities are also considered low, and are on account of the broad wide floodplain and flat topographic/bathymetric grades.

Given the majority of the proposed buildings are located in an area with higher topography on the floodplain, where flood depths of between 0.8 m and 1.0 m and flow velocities around 0.1 to 0.15 m/s would be expected, in accordance with the NSW Floodplain Development Manual (NSW Government, 2005), a provisional high hazard would prevail at the time of the peak, entirely due to the flood depth. Once flood depths recede to less than 0.8 m, provisional low hazard conditions would likely prevail.

Notwithstanding, the Clarence Valley Council, 2007, Grafton and Lower Clarence Floodplain Risk Management Plan 2007 notes that *"to some degree the high hazard rating of the Lower Clarence River floodplain is mitigated by the flood warning time available for people to evacuate their homes"*. This study delineates the Lower Clarence River into "General Floodplain" and "Floodways" Flood Management Areas for the purposes of applying planning and development controls. Figure 3.3 of the study identifies the proposed site as a "General Floodplain", and thus is designated as suitable for Commercial & Industrial Land Use in Clarence Valley Council, Industrial Zones DCP 2011, subject to appropriate Development Controls.

2.3 Potential Development Option

Referring to Appendix A, the potential development option is for a number of large sheds located on pads raised to at or above the 100-year ARI levels. This would provide building floor levels located 0.5 m above the 100-year ARI flood level, namely at the flood planning level.

It is also proposed to provide an internal road, raised to the 5-year ARI flood event level, and relocation of on-site dams, with embankments located at the 20-year ARI flood event level

2.4 Developed Flooding Conditions

The proposed development platforms, roads and on-site dams were configured in the Clarence River Flood Study TUFLOW model. Platforms and proposed topography were provided to WBM, who inserted the data and simulated the model. The TUFLOW results files were provided back to GHD for interpretation. The flood impacts as a result of the development are provided in Appendix C, only flood level impacts greater than 10mm are shown in accordance with advice from the modelling software vendor levels of accuracy. The investigation has shown the following:

- The proposed development is expected to have a minimal impact on flood levels, due to the vast extent of the floodplain in the vicinity of the site. Within the existing site a small area is shown to have increased flood levels of up to 0.012 m, while a reduction in flood levels of some 0.015 m is noted adjacent to the proposed buildings. This is likely due to a slight redistribution of flows in the immediate vicinity of the proposed development; and
- Apart from a few minor model inconsistencies, flood velocity changes of more than 0.1 m/s are not expected due to the proposed development, anywhere on the floodplain.

In summary, it is considered that the potential development platforms would provide for development within proposed lots and these would have negligible impacts on flood levels and flow velocities in a 100-year ARI flood event.

2.5 Flood Emergency and Evacuation

Flood levels during significant flood events are expected to gradually rise to the peak over a 2 to 3 day period. Thus adequate time for flood preparedness and evacuation is expected. Notwithstanding, as noted in Section 2.2, flood depths in the order of 0.8 m to 1.5 m are expected at the peak of the flood event, with flow velocities around 0.1 to 0.15 m/s. Thus while high flood hazard is likely to prevail at the time of the peak, once flood depths recede to less than 0.8m, low hazard conditions would likely prevail.

Given that all egress routes are likely to be inundated, a “stay put” evacuation strategy would be appropriate. To further determine the most appropriate strategy, a flood evacuation plan should be prepared for any future development as part of any subsequent development application.

2.6 Compliance Assessment

As noted before, Figure 3.3 in the Grafton and Lower Clarence Floodplain Risk Management Plan identifies the Flood Management Areas as a “General Floodplain”.

A compliance assessment, generally in accordance with relevant Flood Performance Criteria extracts from the Clarence Valley Council, Industrial Zones DCP 2011 and the Development in Environmental Protection, Open Spaces and Special Use Zones DCP, December 2011 has been provided in Appendix D. Prescriptive controls have not been considered at this early planning stage of the project. In general it is considered that compliance with the relevant Clarence Valley Council DCP Flood Performance Criteria can be achieved.

3. Stormwater Management

3.1 Compliance Requirements

Clarence Valley Council requires compliance with three Water Sensitive Urban Design (WSUD) stormwater quality targets prior to approval of Commercial Developments over 500m^2. These targets are documented in the Clarence Valley Council Sustainable Water Information for Applicants, 2004, also referred to the Clarence Valley Council Sustainable Water Policy, 2011.

All developments must comply with a set of objectives based on greatest treatment of stormwater. The key stormwater pollution reduction performance targets set by Clarence Valley Council are listed, amongst others, as:

- Retain 80% of average annual Gross Pollutant Load; and
- Retain 50% of average annual Total Suspended Solid Load (coarse and medium sediments).

For the scale of development proposed, no nutrient targets are specified.

3.2 Stormwater Treatment Measures

Water Sensitive Urban Design (WSUD) encompasses all aspects of integrated urban water cycle management, including water supply, sewerage and stormwater management. In terms of stormwater management in developments, the WSUD philosophy has a number of objectives. These include:

- **Protect natural systems** - protect and enhance natural water systems within urban developments;
- **Integrate stormwater treatment into the landscape** - use stormwater in the landscape by incorporating multiple use corridors that maximise the visual and recreational amenity of urban developments;
- **Protect water quality** - protect the water quality draining from urban developments;
- **Reduce run off and peak flows** - reduce peak flows from urban developments by local detention measures and minimising impervious areas; and
- **Add value while minimising development costs** - minimise the drainage infrastructure cost of urban developments.

For this development a number of source control measures can be implemented.

3.2.1 Rainwater Tanks

Rainwater tanks at lot scale will allow capture of roof rainwater (stormwater harvesting) for outdoor use, toilet flushing and other non-potable uses. Rainwater tanks will be fitted with a first flush device if necessary. Rainwater tanks generally attenuate runoff as well as aiding in pollution capture processes.

3.2.2 Rain Gardens

Rain gardens would provide treatment of stormwater through fine filtration, extended detention and some biological uptake. They would also provide flow retardation and are particularly efficient at removing nitrogen. Runoff will be filtered through a fine media layer as it percolates downwards. It is then collected via a perforated pipe and discharged either directly or via conventional stormwater pipes. Vegetation is a crucial component of rain garden systems.

Above-ground, appropriate vegetation acts to retard and distribute flows and protects the surface of the system. Under these circumstances the vegetation also helps the trap suspended sediments. Below ground the root zone is high in biological activity aiding in pollutant uptake.

3.2.3 Gross Pollutant Trap (GPTs) and Oil and Water Separators

Gross Pollutant traps retain litter, debris and coarse/fine sediment from stormwater. There are a variety of GPT's available to suit a range of requirements for water treatment. Some of these, for example the Humeguard are able to separate oil and water.

3.2.4 Swales and Vegetated Overland Flow Paths

Overland flow buffer strips and vegetated swales provide flow attenuation and pollutant removal. These measures will be used to direct stormwater to the rain gardens.

3.3 Stormwater Quality Management (MUSIC)

Stormwater quality treatment effectiveness has been modelled using the software Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 5.0. MUSIC is a widely accepted means of assessing stormwater treatment and has been used to demonstrate compliance with pollution reduction targets at the site.

3.3.1 MUSIC Model Configuration

The MUSIC configuration was based on the Water by Design (2010) MUSIC Modelling Guidelines (WBD, 2010). This recommended typical rainfall-runoff and pollutant generation parameters.

Given the potential development option (Appendix A), and the distribution of pads across the site, Water Sensitive Urban Design facilities could be provided as either of both of the following scenarios:

- On a development scale, where the facilities could treat run-off from a number of building pads; or
- On individual building pads.

On the basis of the proposed layout, it is likely that treatment would be provided on individual building pads and the MUSIC assessment was undertaken for a typical building pad scenario. The predevelopment condition for the site was represented by a single lumped catchment node. In the post-development scenario, the site was subdivided to represent hardstand, roofs and pervious areas. Roof area was approximated at 50% of a typical building pad.

Table 1 below list typical building pad catchments assumed for the MUSIC assessment, for both the pre and post-development scenarios.

Table 1 Pre/Post development impervious surfaces

Land Type	Area (m^2)
Pre-Development	
Natural Ground	600
Post-Development	
Hardstand	180
Roof	300
Ground	120

3.4 Proposed Stormwater Treatment Train

The proposed stormwater treatment train for individual building pads would comprise the following strategy:

- All pads will generally drain to a discharge point and swale/drain which would drain to the Clarence River;
- Each lot will be provided with a rainwater tank collecting runoff from the roof area only. Rainwater tanks will be provided with an overflow pipe generally draining to internal building pad drainage. This would bypass the rain gardens;
- The runoff from hardstand areas would be routed to a rain gardens situated at the low point of the pad; and
- GPT units would be provided before discharging to rain gardens or offsite, if appropriate. Depending on proposed activities on individual building pads, it may be appropriate to include oil and water separation before discharge.

3.5 MUSIC Modelling Results

The MUSIC model results in Table 2 below show that the key post-development pollutant load based targets outlined above in Section 3.1 are met. In addition, nutrient targets would also be met, although no target has been specified in the Clarence Valley Sustainable Water Information for Applicants, 2004, DCP.

Table 2 Pollution reduction

Pollutant	Post-development without treatment	Post-Development with treatment	% Reduction	% Reduction Target
Total Suspended Solids (kg/yr)	86.9	15.1	82.6	50
Total Phosphorus (kg/yr)	0.205	0.13	58.4	N/A
Total Nitrogen (kg/yr)	1.67	1.12	39.7	N/A
Gross Pollutants (kg/yr)	12.9	0.541	100	80

4. Summary and Conclusions

This report has been prepared to accompany a planning proposal (a request for Council to commence an LEP amendment to rezone the land) submitted from Harwood Marine for land adjacent to its existing marine industry on Harwood Island. The planning proposal requests that an area of 42.64 ha be rezoned to IN4 Working Waterfront and W3 Working Waterways under the Clarence Valley Local Environmental Plan 2011. The rezoning will allow marine based industry and associated infrastructure on the subject site.

Whilst future development applications will address earthworks, platforms and building development within the proposed lots, a flood assessment has considered the impact of filling within the lot on the 100-year Average Recurrence Interval (ARI) flood event. Proposed building platforms have been used in the flood model to demonstrate that development within the proposed lots is not restricted by flooding.

The 100-year ARI storm event was simulated for the pre- and post-development scenarios, using Clarence Valley Councils flood model (Clarence Valley Council, 2004). The flood study investigation has shown, amongst others, the following:

- In a 100-year ARI flood event flood levels in the area of the proposed development range from 2.8 to 3.0 m AHD with a wide extent of flooding across the Lower Clarence River floodplain, in particular at, and downstream of Harwood Island. Flood depths in the area of the proposed development are in the order of 0.8 to 1.5 m at the peak of the event. Flood velocities (Figure B.3) across much of the site, on the floodplain average approximately 0.1-0.15 m/s and are thus slow flowing;
- The proposed development is expected to have a minimal impact on flood levels, due to the vast extent of the floodplain in the vicinity of the site. Within the existing site a small area is shown to have increased flood levels of up to 0.012 m, while a reduction in flood levels of some 0.015 m is noted adjacent to proposed buildings. This is likely due to a slight redistribution of flows in the immediate vicinity of the proposed development. Apart from a few minor model inconsistencies, flood velocities changes of more than 0.1 m/s are not expected due to the proposed development, anywhere on the floodplain.
- Flood levels during significant flood events are expected to gradually rise to the peak over a 2 to 3 day period. Thus adequate time for flood preparedness and evacuation is expected. Given that all egress routes are likely to be inundated, a “stay put” evacuation strategy would be appropriate. To further determine the most appropriate strategy, a flood evacuation plan should be prepared for any future development as part of any subsequent development application; and
- A compliance assessment, generally in accordance with relevant Flood Performance Criteria extracts from the Clarence Valley Council, Industrial Zones DCP 2011 and the Development in Environmental Protection, Open Spaces and Special Use Zones DCP, December 2011 has been provided in Appendix D. Prescriptive controls have not been considered at this early planning stage of the project. In general, it is considered that compliance with the relevant Clarence Valley Council DCP Flood Performance Criteria can be achieved.

In summary, it is considered that the potential development pads would provide for development within proposed lots and these would have negligible impacts on flooding.

To manage stormwater discharge from the site, Clarence Valley City Councils Water Sensitivity Urban Design objectives defined by the Clarence Valley Sustainable Water Information for Applicants, 2004, DCP were adopted. Stormwater quality has been modelled using the MUSIC software. Based on the assessment of stormwater at the site, a concept Stormwater Management Strategy outlining potential stormwater management is provided, which proposes:

- All pads will generally drain to a discharge point and swale/drain which would drain to the Clarence River;
- Each lot will be provided with a rainwater tank collecting runoff from the roof area only. Rainwater tanks will be provided with an overflow pipe generally draining to internal building pad drainage. This would bypass the rain gardens;
- The runoff from hardstand areas would be routed to a rain gardens situated at the low point of the pad; and
- GPT units would be provided before discharging to rain gardens or offsite, if appropriate. Depending on the proposed activities on individual building pads, it may be appropriate to include oil and water separation before discharge.

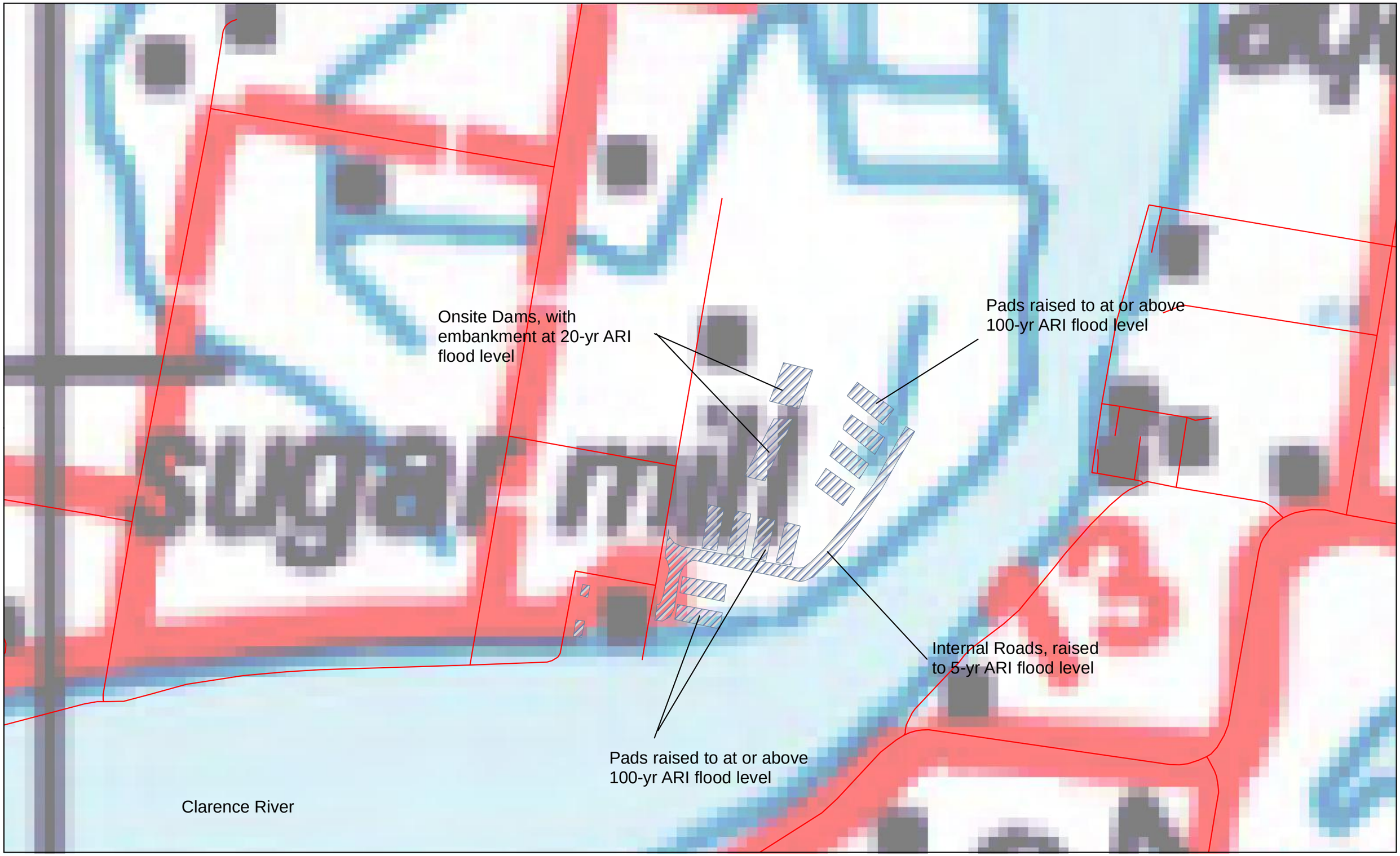
The MUSIC model results show that the key post-development pollutant load based targets are met. In addition, nutrient targets would also be met, although no target has been specified in the Clarence Valley Sustainable Water Information for Applicants, 2004, DCP.

5. References

- NSW Government, 2005, NSW Floodplain Development Manual.
- Clarence Valley Council, 2004, Lower Clarence River Flood Study Review undertaken by WBM Oceanics Australia;
- Clarence Valley Council, 2007, Grafton and Lower Clarence Floodplain Risk Management Plan undertaken by Bewsher Consulting;
- Clarence Valley Council, 2011 Development in Environmental Protection, Open Spaces and Special Use Zones, December 2011;
- Clarence Valley Council, 2004, Sustainable Water Information for Applicants, November 2004;
- Australian Rainfall and Runoff - A Guide to Flood Estimation (1987); and
- Water By Design (2010) – MUSIC Modelling Guidelines for South-East Queensland.

Appendices

Appendix A – Potential Development Option



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0 0.1 0.2 0.4

Kilometres (at A3)

Map Projection:
Horizontal Datum: ADG84
Grid: Zone 56

O

LEGEND

Potential Development Option

Harwood Slipway Marine Precinct - Planning Proposal

Potential Development Option

Job Number	22-16424
Revision	A
Date	10/03/2012

Figure A.1

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Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by: C Pappin

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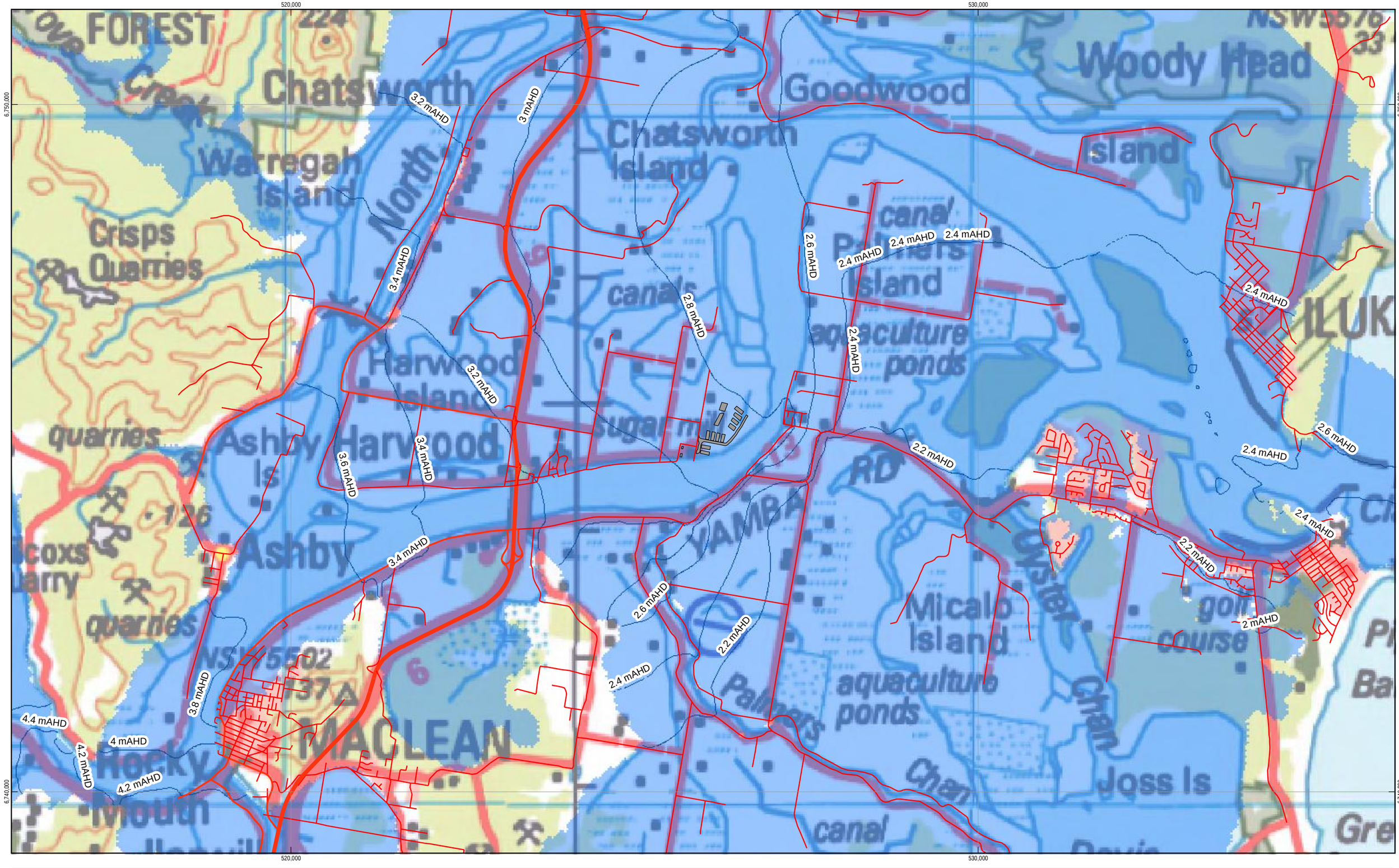
Appendix B – Existing Flood Conditions



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Kilometres (at A3)

Map Projection:
Horizontal Datum: ADG84
Grid: Zone 56

LEGEND

Flood Level Contours

100yr Flood Innundation

Proposed Development

Harwood Slipway Marine Precinct - Planning Proposal

100-year ARI Flood Event Existing Conditions

Job Number	22-16424
Revision	A
Date	10/03/2012

Figure B.1

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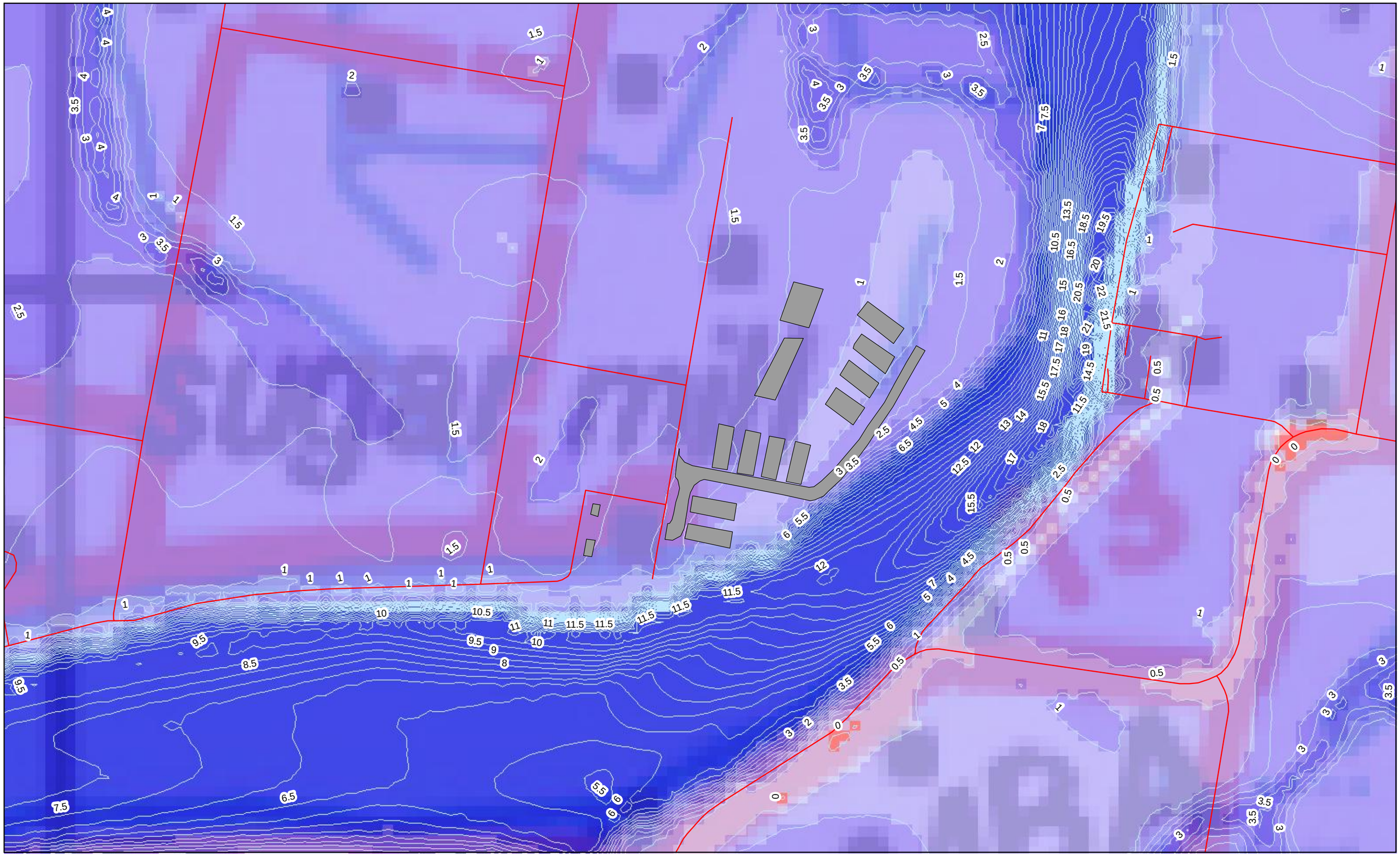

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Kilometres (at A3)

Map Projection:
Horizontal Datum: ADG84
Grid: Zone 56

O

LEGEND

Flood Depth Contour

Flood Depth (m)

0 - 0.5

0.5 - 1

1 - 2

2 - 3

3 - 5

5 - 30

GHD

Harwood Slipway Marine Precinct - Planning Proposal

100-year ARI Flood Event Existing Conditions

Job Number	22-16424
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Date	10/03/2012

Figure B.2

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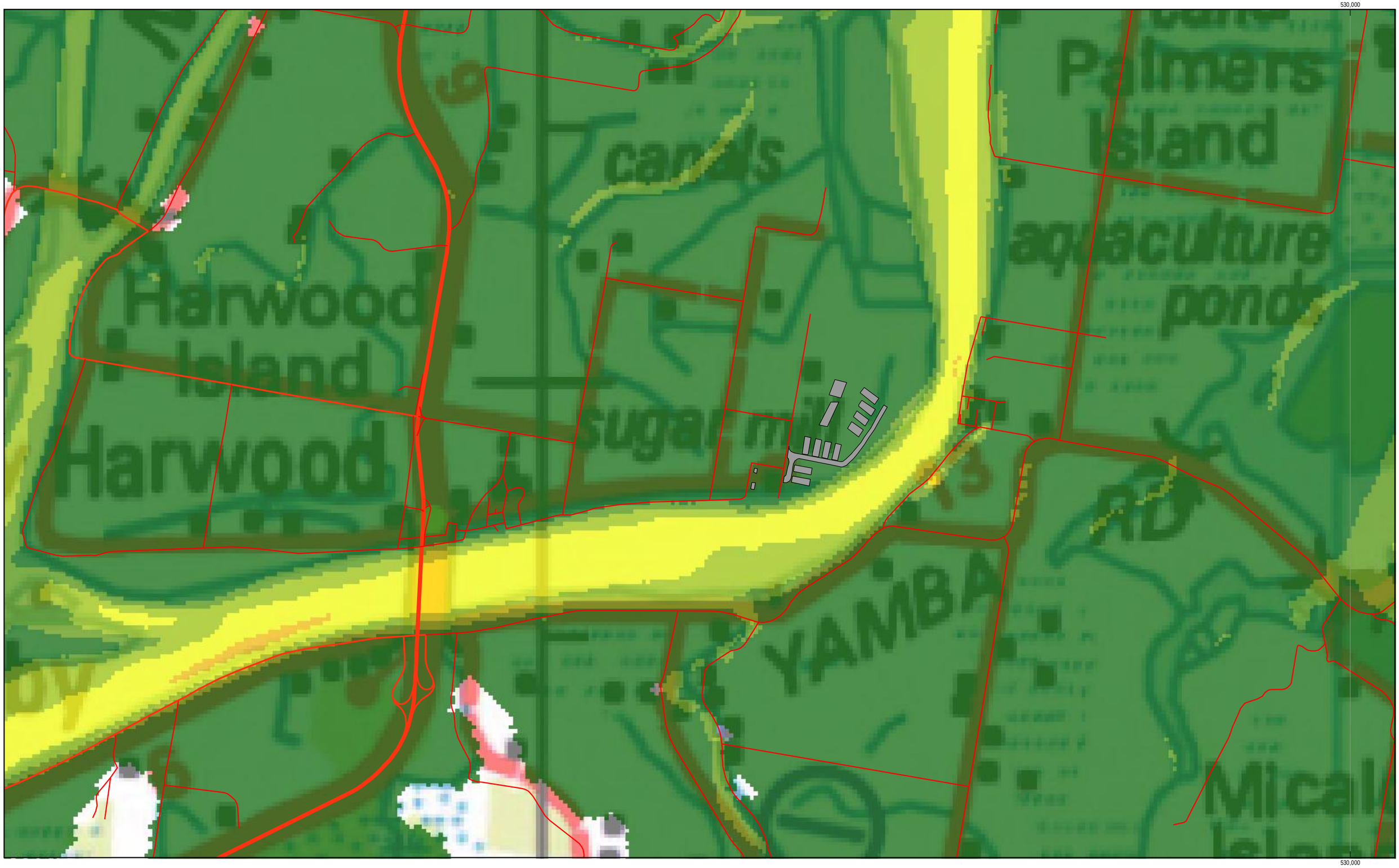

1:25,000

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Kilometres (at A3)

Map Projection:
Horizontal Datum: ADG84
Grid: Zone 56

N

LEGEND

Velocity (m/s)
0 - 0.5
0.5 - 1
1 - 1.5
1.5 - 2
2 - 3
3 - 5
5 - 10

Harwood Slipway Marine Precinct - Planning Proposal

100-year ARI Flood Event Existing Conditions

Job Number	22-16424
Revision	A
Date	10/03/2012

Figure B.3

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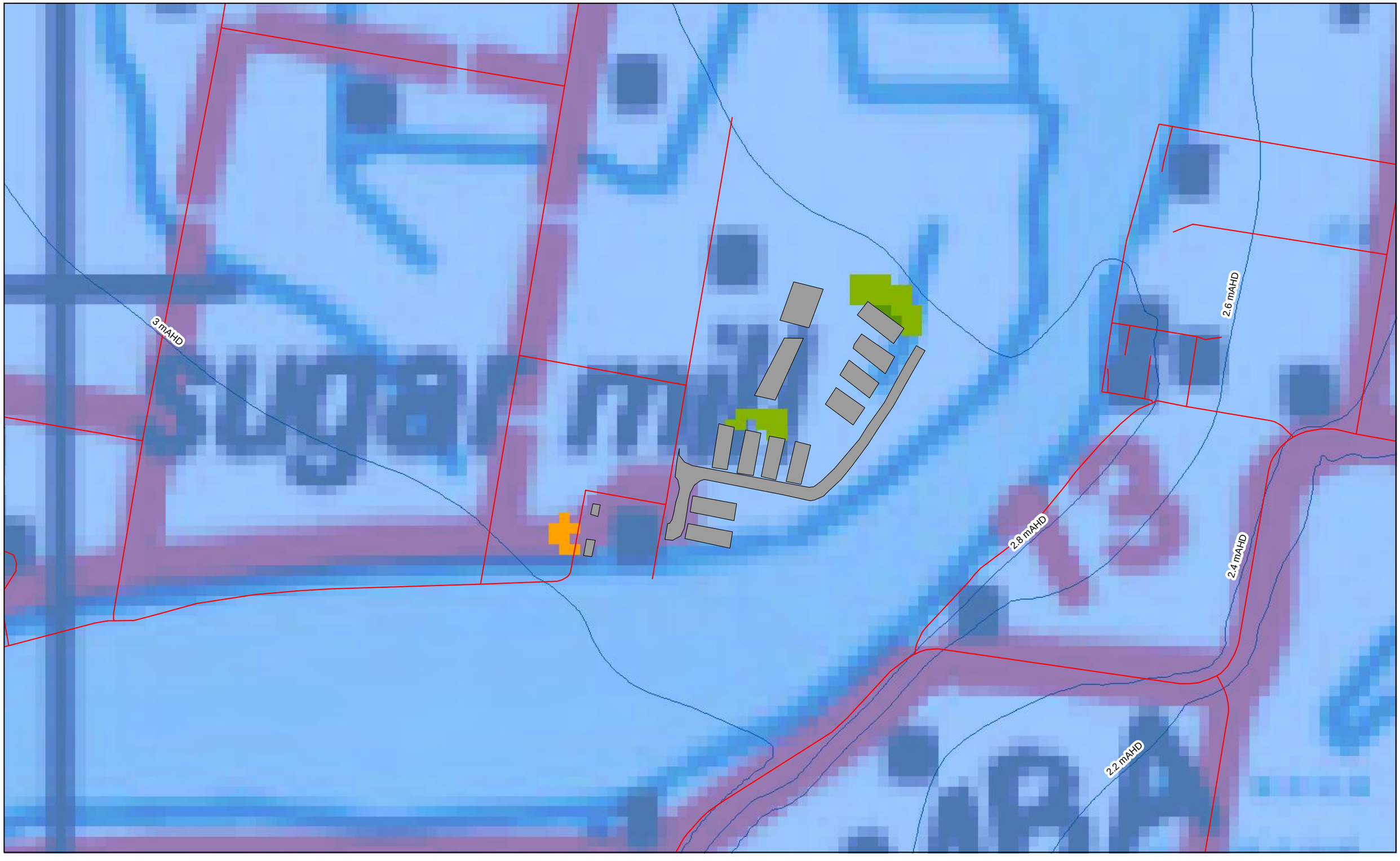
Appendix C – Flood Impacts



1:10,000

0 0.1 0.2 0.4

Kilometres (at A3)

Map Projection:
Horizontal Datum: ADG84
Grid: Zone 56

O

LEGEND

Flood Level Impacts
- gt -0.1m reduction
- -0.1m - -0.05m
- -0.05m - -0.02m
- -0.02m - -0.01m
- -0.01m - -0.005m (not shown)
- -0.005m - 0m (not shown)
- 0m - 0.005m (not shown)
- 0.005m - 0.01m (not shown)
- 0.01m - 0.02m
- 0.02m - 0.05m
- 0.05m - 0.1m
- gt 0.1m increase

Flood Level Contours

100yr Flood Innundation

Proposed Development

Harwood Slipway Marine Precinct - Planning Proposal

100-year ARI Flood Event Existing Conditions

Job Number	22-16424
Revision	A
Date	10/03/2012

Figure C.1

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Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by: C Pappin

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Appendix D – Compliance Assessment

Performance Criteria	Comments
D3.1	
(a) The proposed development should not result in any increased risk to human life.	Increased risk to human life is not expected, on the condition that the future site will be operated and supported by an appropriate Flood Emergency and Evacuation Plan.
(b) The additional economic and social costs which may arise from damage to property from flooding should not be greater than that which can reasonably be managed by the property owner and general community.	Given the nature and form of the development, it is considered likely that this criteria can be met.
(c) The proposal should only be permitted where effective warning time and reliable access is available for evacuation from an area potentially affected by floods to an area free of risk from flooding. Evacuation should be consistent with any relevant flood evacuation strategy.	Flood levels during significant flood events are expected to gradually rise to the peak over a 2 to 3 day period. Thus adequate time for flood preparedness and evacuation is expected. Notwithstanding, as noted in Section 2.2, flood depths in the order of 1 m to 1.5 m are expected at the peak of the flood event, with flow velocities around 0.1 to 0.15 m/s. Thus while high flood hazard is likely to prevail at the time of the peak, once flood depths recede to less than 0.8 m, low hazard conditions would likely prevail. Given that all egress routes are likely to be inundated, a “stay put” evacuation strategy would be appropriate. To further determine the most appropriate strategy, a flood evacuation plan should be prepared for any future development as part of any subsequent development application.
(d) Development should not detrimentally increase the potential flood effects on other development or properties either individually or in combination with the cumulative impact of development that is likely to occur in the same floodplain.	As discussed in Section 2.4 it is considered that the potential development platforms would provide for development within proposed lots and these would have negligible impacts on flood levels and flow velocities in a 100-year ARI event.
(e) Motor vehicles are able to be relocated, undamaged, to an area with substantially less risk from flooding, within effective warning time.	Given the form of the development and that the pad will be provided with floor levels 0.5m above the 100-year ARI flood level, motor vehicle could be raised in the event of a flood
(f) Procedures would be in place, if necessary, (such as warning systems, signage or evacuation drills) so that people are aware of	It has been recommended that a flood evacuation plan should be prepared for any future development as part of any subsequent

the need to evacuate and relocate motor vehicles during a flood and are capable of identifying an appropriate evacuation route	development application.
(g) Development should not result in significant impacts upon the amenity of an area by way of unacceptable overshadowing of adjoining properties, privacy impacts (eg. By unsympathetic house-raising) or by being incompatible with the streetscape or character of the locality.	Given the location and proposed development this criteria is not considered relevant
(h) Proposed development must be consistent with Ecological Sustainable Development (ESD) principles.	To be determined
(i) Development should not prejudice the economic viability of any Voluntary Acquisition Scheme.	Not applicable
D5.1	
(a) The filling of flood liable land must not increase the flood risk on other land within the floodplain	As discussed in Section 2.4 it is considered that the potential development platforms would provide for development within proposed lots and these would have negligible impacts on flood levels and flow velocities in a 100-year ARI event.
(b) Filling and associated works must not have any unacceptable associated environmental impacts such as detrimental affects on the ecology of riparian corridors	Given impacts to flow velocities is minimal, and the explanation of the aforementioned item, impacts such as detrimental affects on the ecology of riparian corridors are not expected

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GHD

230 Harbour Drive
Coffs Harbour NSW 2450
T: (02) 6650 5600 F: (02) 6650 5601 E: cfsmail@ghd.com.au

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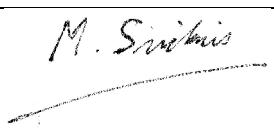
1	R Berg	B. Luffman		M. Svikis		30/10/12

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