MAUNSELL AECOM

Pitt Street Waterfront Rezoning

Maritime Assessment

Greater Taree City Council

2 October 2008

Pitt Street Waterfront Rezoning

6/2007R

Prepared for

Greater Taree City Council

Prepared by

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Executive Summary

Maunsell has been commissioned by Greater Taree City Council, to investigate the maritime feasibility of establishing a marina at the Pitt Street Waterfront as part of the rezoning process. The study generally comprises a maritime market assessment to investigate current and potential future demand for a marina and related facilities as well as a maritime constraints analysis to inform a preliminary marina concept design.

It is noted that the name of the Pitt Street Waterfront site has recently changed to 'Figtrees on the Manning'. For the purposes of this report, the site now known as 'Figtrees on the Manning' will be referred to as the Pitt Street Waterfront site.

The study estimates the market potential for a marina on the site based on existing local and regional vessel usage, socio-economic factors and case studies of similar marinas. The report also provides commentary regarding the types of vessels that would berth at Pitt Street and recommends ancillary facilities that would improve the viability of a marina development on the subject site. This market assessment provides sufficient basis for demonstrating the suitability of the site as part of the rezoning process, but is not intended to constitute a commercial or financial marina feasibility study.

A site assessment is provided to demonstrate the potential for developing a marina on the site considering existing physical constraints. The findings of this Maritime Assessment are summarised in the following sections.

Qualitative analysis

With no established marina in Taree or in the immediate vicinity, it is difficult to establish existing local influences on the demand for marina berths. Accordingly, the market analysis incorporates a qualitative review of similar facilities elsewhere and provides a description of the likely influences on demand for marina facilities at Pitt Street.

Stakeholder feedback

Overall, anecdotal evidence suggests that a marina at Pitt Street would experience a reasonable level of demand, with potential to generate more demand in the future if the visitor experience is enhanced. However, this is tempered by a range of constraints, including:

- distance from coast, which is a deterrent for non-powered and smaller vessels to access the ocean
- existence of the Manning River bar, which restricts ocean access for large periods of the year
- no wash zones limit the speed and relative size of motor vessels
- navigability of route to the coast makes it difficult for boats under-sail to negotiate the river into the wind
- obstacles over the River constraining height clearance for vessels, including the Pacific Highway bridges crossing both the north and south passages and power lines, which are of similar height.

Local facilities

Greater Taree contains two existing marinas, at Harrington and Crowdy Head, which would influence the demand for marina berths at the Pitt Street Marina.

Facilities provided in marina catchment are described in **Table S1**.

Table S1 Local facilities

Facilities	Crowdy Head Marina	Harrington
Wet berths	22 - 30	24 (+20 berths planned in future)
Dry berths	No	No
Maximum length	NA	16m (approx)
Pricing per week (based on 10m boat)	unknown	$35-40
Fuel	Diesel (perm.)	No
Sullage pump out	Yes	Yes
Shiplift / Slipway and maintenance	Yes	No
Retail (onsite)	Takeaway outlets Chandlery	Café / restaurant Accommodation Shops

A survey of the private jetties located along the Manning River between the coast and the proximity of Mount George was undertaken using aerial photography. The findings are described in **Table S2**.

Table S2 Manning River private jetties

Mooring	Number
Private jetties	83
Private jetties with vessel	11
Swing moorings	18

Boat ramp facilities are also provided in Taree CBD adjacent to the Council buildings and on River Street near the Rowing Club buildings. All of these facilities would influence the demand for marina berths at Pitt Street Marina.

Case studies

Case studies of similar marinas are reviewed to enable comparison of the Pitt Street Waterfront situation with similar locations elsewhere in Australia and other similar economies (United States of America and United Kingdom). The comparative analysis discusses relevant synergies with similar marinas.

The Pitt Street Marina situation is relatively unique in that it is on a river and does not have direct ocean access. There appears to be very few river marinas that do not have either ocean or lake access.

The case studies assessed include:

- North Haven (NSW)
- Forster-Tuncurry (NSW)
- Port Macquarie (NSW) – currently undergoing expansion
- River Glen Marina (SA)
- Anchorage Marina (NSW)
- Batemans Bay Marina (NSW)
- Newcastle Cruising Yacht Club (NSW)
- Mulgrave Marina (QLD).

Preliminary qualitative model for marina

The primary finding of the qualitative analysis shows the majority of marinas either provide convenient ocean access or are part of a network of river based marinas (which also typically have some degree of ocean access). Based on the case studies and the limited ocean access, due to the Manning River Bar and the distance from the ocean, it is likely that the demand for marina berths will be for predominantly river based vessels. The Pitt Street marina would have less ocean-going vessels, such as yachts and large motor cruisers due to some significant river constraints including road bridges, power lines and speed restrictions. This would indicate that vessels that are likely to moor in the marina would be slow moving powered vessels.

River marinas are also supported through a range of ancillary attractions, such as eco-tours, Parks and gardens, national parks, heritage locations, scenic areas and fishing. These marinas are likely to be supported by a tourism strategy from the local authority or marine authority. A critical mass of river facilities for boating would generate additional demand for marina berths, which may induce further demand through improved boating convenience and increased attraction for visitors

The likely marina facilities identified from the survey of similar marinas throughout NSW, Australia and overseas, provide an indication of the size of the marina, types of vessels and the associated facilities that could locate at the marina. These marina elements are described below:

- approximately 100 marina berths (long term)
- staged development is an important consideration, while allowing space for expansion in the longer term (when demand dictates)
- berths to provide for houseboats, larger river cruising vessels and commercial tour operators
- depth of marina should account for low water levels – this is to be further investigated as part of detailed design
- refuelling (high demand in Manning River for fuelling) and sullage pump out
- accessible parking: requirements under *Australian Standard* (AS) *3962-2001 Guidelines for design of marinas*
- chandlery
- café and/or restaurant
- shop – grocery items and the like
- amenities – toilets, showers, rubbish collection, internet, fax and like facilities
- maintenance facility with travel lift (travel lift could provide for houseboats/Stebercraft vessels if possible, otherwise crane can be used)
- boat ramp preferable to be located on site within a marina complex, which needs associated car and trailer parking
- associated residential, commercial offices and retail development is important
- proximity to existing centres is important (e.g. Taree CBD and other historic towns)
- tour operator facilities
- tourist accommodation.

This study recommends the inclusion of the facilities described above where these are commercially viable. This Maritime Assessment tests the preliminary qualitative marina model as far as practical utilising vessel registration data and other relevant information. The marina facilities included within the Pitt Street Marina Concept Design are described in the Concept Plan section of this Executive Summary.

Tourism, diversity of experiences and visitor attraction is vital to a successful Marina at Pitt Street. As the Pitt Street Marina would be targeted towards river cruising and river fishing boating activities, to maximise the visitation, and therefore the demand for marina berths, the establishment of the marina at Pitt Street should be accompanied by a Manning River Tourist Strategy and Implementation Plan.

This strategy would identify the tourism product for the area and identify locations along the river of particular interest for tourists. Facilities for tourists could be established at strategic locations along the Manning River, such as, picnic spots, heritage places, museums, fishing spots, scenic view points, accommodation and other areas of interest.

Quantitative analysis

Socio-economic findings

The Taree LGA population is growing and ageing, which would indicate a high probability of an increase in the number of vessel registrations over the next 20 years. This is tempered by the low income profile for the Taree area, which, combined with typically large inexpensive blocks of land in the Taree area, indicates a potentially high propensity to trailer vessels instead of mooring vessels at a marina on the Manning River. This indicates that if the marina is to be a viable alternative to trailering vessels, mooring rates will need to be competitively priced.

Further, anecdotal evidence provided by Council suggest that larger vessel owners often have waterfront properties and would not utilise a marina berth (pers comm. GTCC, 2008). Instead, these vessel owners may utilise fuel, sullage and maintenance facilities.

Potential marina demand

A summary of the analysis of potential demand for marina berths at Pitt Street Waterfront Precinct is provided in **Table S3**.

Table S3 Summary of potential vessel demand

Potential market modelling calculations	Results	
Base Component (2007)		
Potential market – vessels of right type and size to use a marina in the Manning River as determined by vessel matrix (Table 11)	330	
Number of vessels likely to use a marina – equates to 55% of potential market.	182	
Current supply of marina berths – Harrington Marina and Crowdy Head	74	
Potential unmet demand for marina berths in the Manning River	108	
Growth Component (2007 - 2031)		
Growth scenario	**Year 2021**	**Year 2031**
Standard Case – Projections of growth in potential vessel demand is calculated based on past trends of vessel registration growth assumed to continue at the same rate over time (see **Table 18** for projections)	146 (56 wet berths, 90 dry berths)	180 (68 wet berths, 112 dry berths)
Optimistic Case – Projections of growth in potential vessel demand is calculated based on projected population growth rates over time (see **Table 19** for projections)	191 (73 wet berths, 118 dry berths)	262 (100 wet berths, 162 dry berths)

Note: The above figures are estimates to provide an indication of the potential market.

The market assessment carried out suggests there is potential demand for 110 berths in 2007, based on vessel licensing data. The projections suggest increasing potential demand for marina berths at Pitt Street in the future. Based on the potential demand for marina berths in 2007, over the medium term (2021) there is likely to be demand for between 150 – 190 berths and over the long term (2031) there is likely to be potential demand for between 180 – 260 berths.

An indication of induced demand can be provided based on the findings of the *Inland Marina Investment Guide* (2006), prepared by British Waterways, which suggests that the proportion of boats requiring inland long term moorings in the UK is currently 55% but could go up to 66% once induced demand is included. A sensitivity test provided in this report that indicates with this level of induced demand, the projections in the medium term (2021) could be 176 (standard case) – 230 (optimistic case) vessels.

However, potential for induced demand to significantly increase potential demand for moorings at Pitt Street should be treated as a potential upper limit of demand rather than the likely scenario.

The potential demand projections provided in this assessment rely on the marina offering a concentration of ancillary facilities (such as boat ramp, dry storage, commercial and retail developments, maintenance facilities and/or tourist accommodation). The projections also take into account recommendations of the qualitative analysis to prepare a Tourism Strategy and Implementation Plan for the Manning River to facilitate a network of visitor and boating activities along the river in support of the Pitt Street Marina.

The analysis undertaken is dependent on a number of assumptions. The most crucial is the proportion of vessel owners that will use a marina, which is taken to be 55% based on UK evidence for similar facilities. For more certainty, it is suggested further information is gathered to refine this figure through a survey of local vessel owners.

Site analysis

Opportunities for marina development

The primary maritime/hydrological constraints that may limit the development of a marina on the site are:

- the site is prone to flooding
- river depths adjacent to the central portion of the site are shallow, which restricts navigation and means river dredging is likely to be required for a marina in this location
- berths in the river would be exposed to moderate wave conditions
- marina excavation would be in potential acid sulphate soils.

Much of the undeveloped area of the site lies below the 0.1% AEP flood level, which means development on the site would necessitate significant filling to raise floor levels to approximately 5.7 m AHD. Compensation for the loss of flood storage would be needed for any site filling and a suitable source of large quantities of fill material has yet to be identified, notwithstanding those identified in *Geotechnical Investigation - Regional Boat Ramp, Endeavour Place* (Greater Taree City Council, 1993), which would not be of sufficient quantity. Filling of the site would require excavation to compensate for loss of flood plain storage. Sediments available on site for excavation comprise Potential Acid Sulphate Soils (PASS – Greater Taree City Council, 1993). The disposal or treatment of PASS is likely to be expensive and could present as an ecological risk for the project.

Long river fetches prevail along predominant wind directions, which provides for ‘moderate’ mooring conditions only within the river channel. To provide better than ‘moderate’ conditions, being either ‘excellent’ or ‘good’ mooring conditions, moorings would need protection by excavation into the embankment of the North Passage or by creation of a breakwater.

Water depths adjacent to much of the site present significant constraints for a marina development. For small vessels up to 8 m length, power boats would need channels dredged to −2.0 m AHD and keel boats would need channels dredged to −2.6 m AHD. Larger vessels would need bottom levels to −3.0 m AHD or greater.

Generally, along the shores of the central portion of the site, where a reasonable size marina could be excavated, the river bed shoals gently from 0 m AHD and reaches the −2.5 m AHD isobath some 80 m out from the bank. In this location considerable dredging within the river bed would be required for the development of a marina. There is potential for maintenance dredging requirements should infilling occur with flooding events.

Potential marina berths

The site does not contain a natural basin that could provide suitable mooring for a marina. Further, the Manning River conditions do not provide appropriate conditions for mooring the number of vessels that is suggested in the demand analysis (see **Section 3.4.7** of this report), without appropriate protection from river swell and flood debris. Berths in the river channel would not experience good mooring conditions. Good or excellent mooring conditions could be developed by excavation of part of the shore to provide protection from the waves that can be generated along the long river fetches approaching the site. The optimum solution to providing suitable marina berths would be to excavate a marina basin that provides suitable protection for vessels at an appropriate depth. This marina basin could also incorporate a breakwater in the River to provide additional moorings if required.

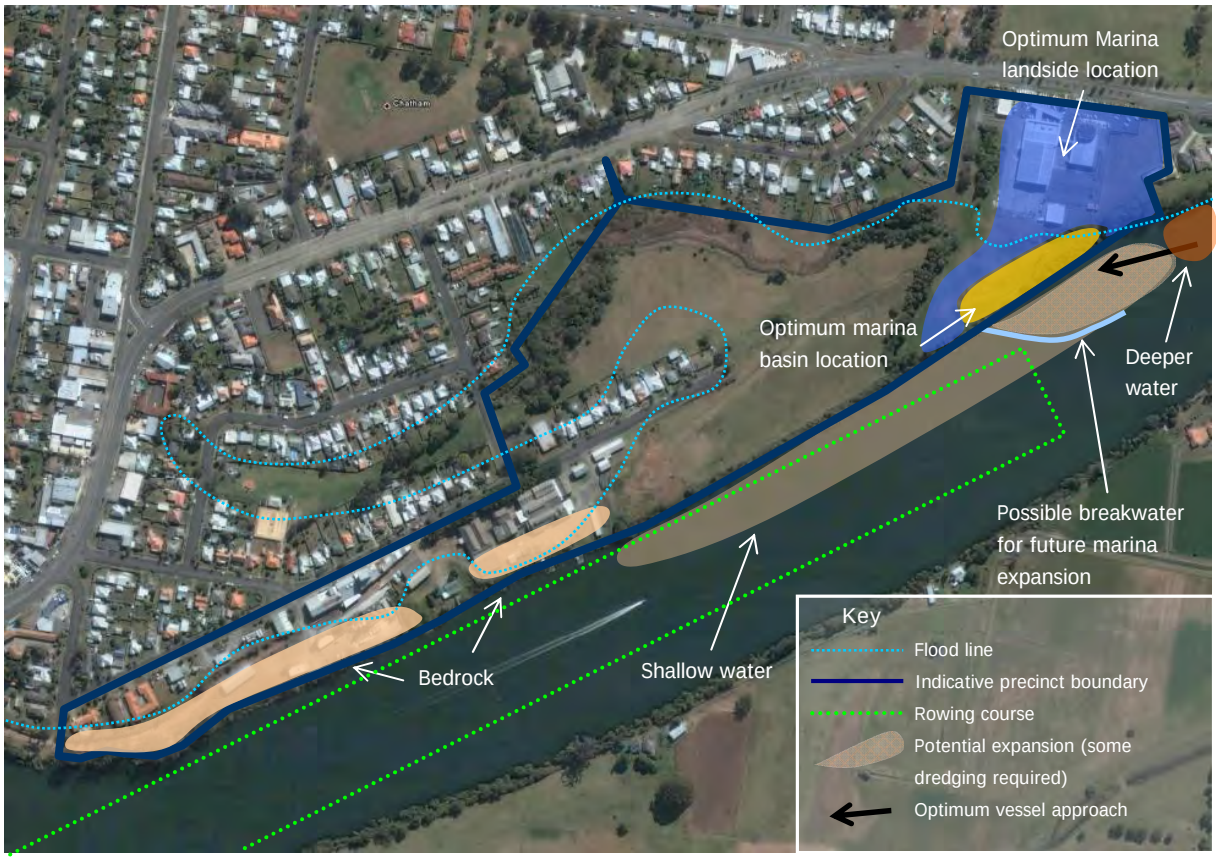
Figure S1 shows deep water occurs naturally in the Manning River at the north-eastern end of the site (near the 'The Big Oyster' site) near to an underlying bedrock ridge, which has potential for an artificial marina basin. At the north eastern end of the Precinct, the river embankment is naturally indented, providing some natural sheltering for moorings. It is recommended that a geotechnical survey be carried out in this area to confirm presence of rock and the extent to which a marina basin can be excavated. If further excavation here is feasible, an artificial marina site could be developed in this location. However, creating a marina basin capable of mooring more than approximately 20 vessels would necessitate significant excavation, which is likely to encounter rock.

The optimum marina location in light of the key site constraints is shown in **Figure S1**, along with an indication of the potential for expansion of the marina into the Manning River. The proposed concept avoids the existing rowing course.

A deeply-incised excavated harbour with a narrow entrance is not recommended for the reason of obviating the poor water quality that is likely to develop such a facility in the absence of any strong hydraulic energy gradients that, otherwise, could be tapped to enhance water turnover/harbour flushing (The Anchorage, Port Stephens). An incised mooring basin would present a wide opening to the river, although floating mooring pontoons with sub-aqueous wave-protection skirts could enclose such a basin while providing still for adequate water circulation. A small entrance would result in a high likelihood that poor water quality would develop within the marina. PIANC Report No. 98-2008 entitled *Protecting water quality in marinas* provides expert guidance and state of the art information and recommendations on good practice for marina design in respect of water quality. In respect of the physics of basin circulation, the maximum basin aspect ratio (L/B) recommended is 4. However, PIANC advises that once the aspect ratio exceeds 2 the tidal flushing efficiency declines rapidly as multiple circulation gyres are likely to form inside the basin with the inner gyres unable to exchange water through the entrance.

Should the north-eastern most area of the site be explored for further marina development opportunities, more detailed geotechnical information would be required to assess the excavation potential for this site. The numbers and types of vessels for design would need to be confirmed and preliminary marine ecological surveys and assessments carried out. In this regard a key challenge for development of a marina at Pitt Street would be the capability of the site to provide an adequate number of berths to meet expectations.

Figure S1 Preliminary marina concept plan



Source: Google Earth Pro, 2007 *Not to scale*

Concept design

This section describes the preliminary conceptual model for the Pitt Street Marina arising from this Maritime Assessment.

The findings of this study provide sufficient basis, in light of the information presented herein, for demonstrating the suitability of the site as part of the rezoning process. This model should be read in conjunction with the entire Maritime Assessment and Concept Design discussion with this report, including caveats and assumptions made as part of forecasting potential demand. It is noted that this assessment does not consider non-maritime related matters such as urban design, traffic and other matters that are being addressed by others as part of the site rezoning process. Further, it is recommended that this preliminary maritime model for Pitt Street Marina be subject to commercial and financial feasibility analyses as part of the ongoing design process.

It is noted that the commercial return from the marina would be generated predominantly from commercial development of land rather than the marina operations. Marinas alone are only profitable where they can generate income from activities such as berth rental, dry boat storage, boat repair and maintenance and ancillary retail like chandlery, restaurant and marine related office rentals. Although no commercial feasibility has been carried out, it appears that the proposed marina is unlikely to be of a scale where it can generate sufficient income from these types of activities and as such, may require incentives for vessel owners to utilise the berths and incentives for a developer to establish and operate the marina.

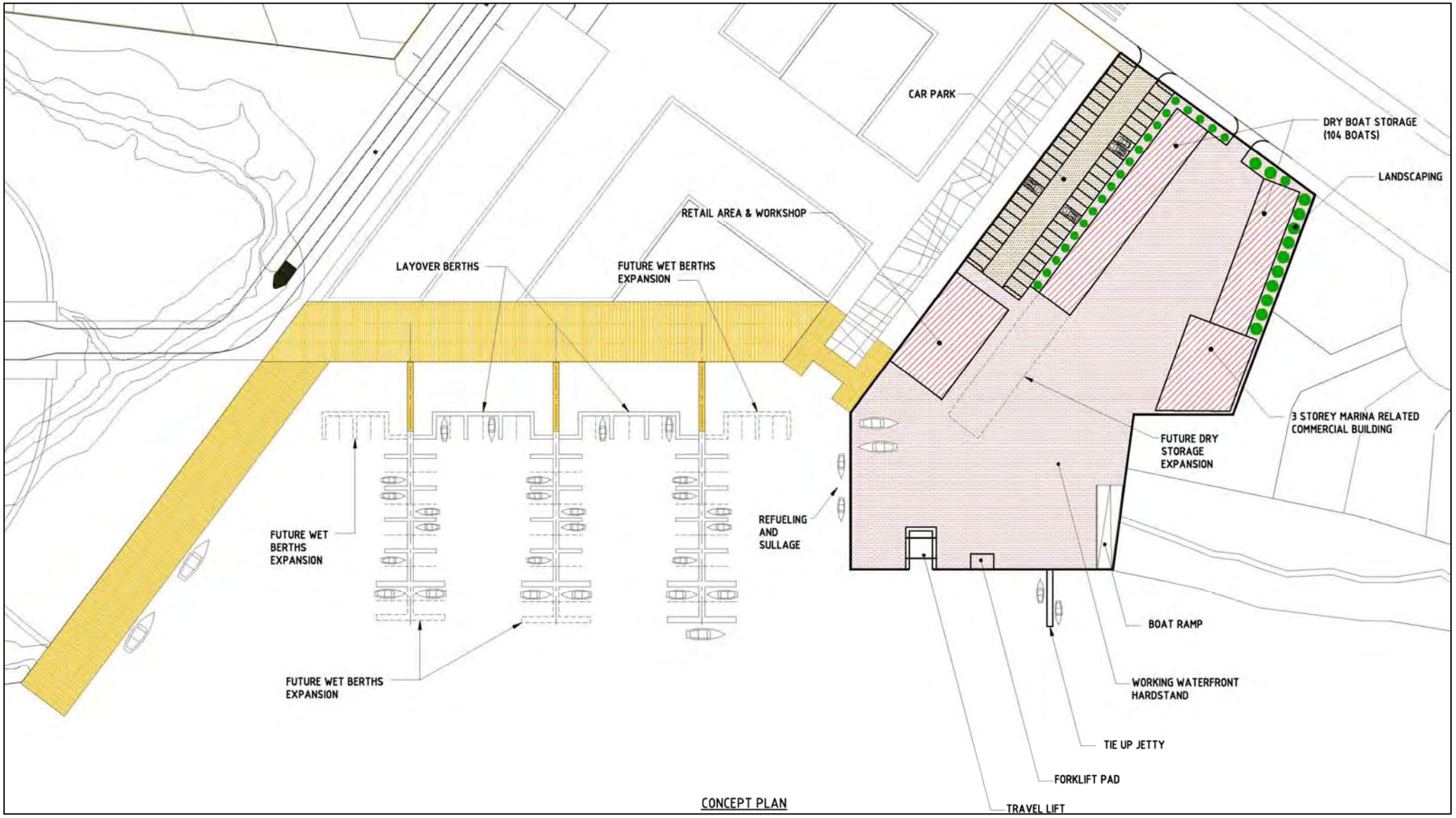
Based on the most recent architectural master plan concept for the Pitt Street Waterfront Precinct prepared by Suters Architects, a concept layout for the Pitt Street Marina based on the analysis provided in this report has been prepared. This is presented in **Figure S2** (full version of the concept plan drawing is provided in **Appendix G**). The concept design provides a medium term development concept that addresses site constraints and, due to the inherent difficulty in accurately estimating vessel demand and feasibility of a marina on the site, has potential for staging and long term expansion to respond to actual demand experienced.

Key features of the concept design are:

- wet berths;
  - 64 wet berths (expansion potential for additional 16 wet berths)
  - 12 layover wet berths are provided for temporary mooring of dry berthed boats from the adjacent dry boat storage
  - wet berths, including layover wet berths, are designed to cater for;
    - houseboats
    - larger river cruising vessels
    - commercial tour operators
    - single hull yachts up to 12 m
    - other vessels up to 1.8 m / 2.0 m draught (approximately 30 m length)
- flexible arrangement of dry boat storage, comprising;
  - 104 dry berths in two structures over four and two levels respectively (a mix of vessel sizes up to 7 m in length)
  - potential building expansion for additional 48 dry storage spaces, which would be used for hardstand storage of larger vessels in the interim
  - four dry berths on hardstand outside the dry storage structures footprints for larger vessels
  - potential first stage (prior to construction of dry storage buildings) hard stand storage space for 32 vessels (equivalent to one level of the two dry storage structures), excluding hardstand outside dry storage building footprint
- car parking for 50 vehicles
- two marina related commercial buildings for marina related retail/offices, workshop, amenities, marina administration offices, chandlery, café and/or restaurant, tour operator facilities, as well as space for collocation of clubs and Fisherman's Coop
- hardstand area, including provision for:
  - boat ramp
  - temporary dry storage of boat for repair and light maintenance/repairs
  - travel lift[1]
  - forklift pad
  - tie up jetty
  - refuelling and sullage pump out
- potential future flood protection breakwater (for future marina extension).

[1] Note: The requirement for lift and size is dependent on commercial feasibility. Council preference is for a 50 tonne travel lift to be included on site. Appropriate space in the concept design has been provided.

Figure S2 Preliminary marina concept plan



1.0 Introduction

1.1 Study scope

Maunsell has been commissioned by Greater Taree City Council, to investigate the maritime feasibility of establishing a marina at the Pitt Street Waterfront as part of the rezoning process. The study generally comprises a maritime market assessment to investigate current and potential future demand for a marina and related facilities as well as a maritime constraints analysis to inform a preliminary marina concept design.

It is noted that the name of the Pitt Street Waterfront site has recently changed to 'Figtrees on the Manning'. For the purposes of this report, the site now known as 'Figtrees on the Manning' will be referred to as the Pitt Street Waterfront site.

The study considers the market potential for a marina in the Pitt Street Waterfront Precinct based on existing local and regional vessel usage (vessel registration data), socio-economic factors and case studies of similar marinas. Based on this information, the report also provides commentary regarding the types of vessels that would berth at Pitt Street and recommends ancillary facilities that would improve the viability of a marina development on the subject site. A maritime engineering site analysis is provided to demonstrate the potential for developing a marina on the site considering existing physical constraints. This market assessment provides sufficient basis for demonstrating the suitability of the site as part of the rezoning process, but is not intended to constitute a commercial or financial marina feasibility study.

The assessment methodology is described in **Figure 1**.

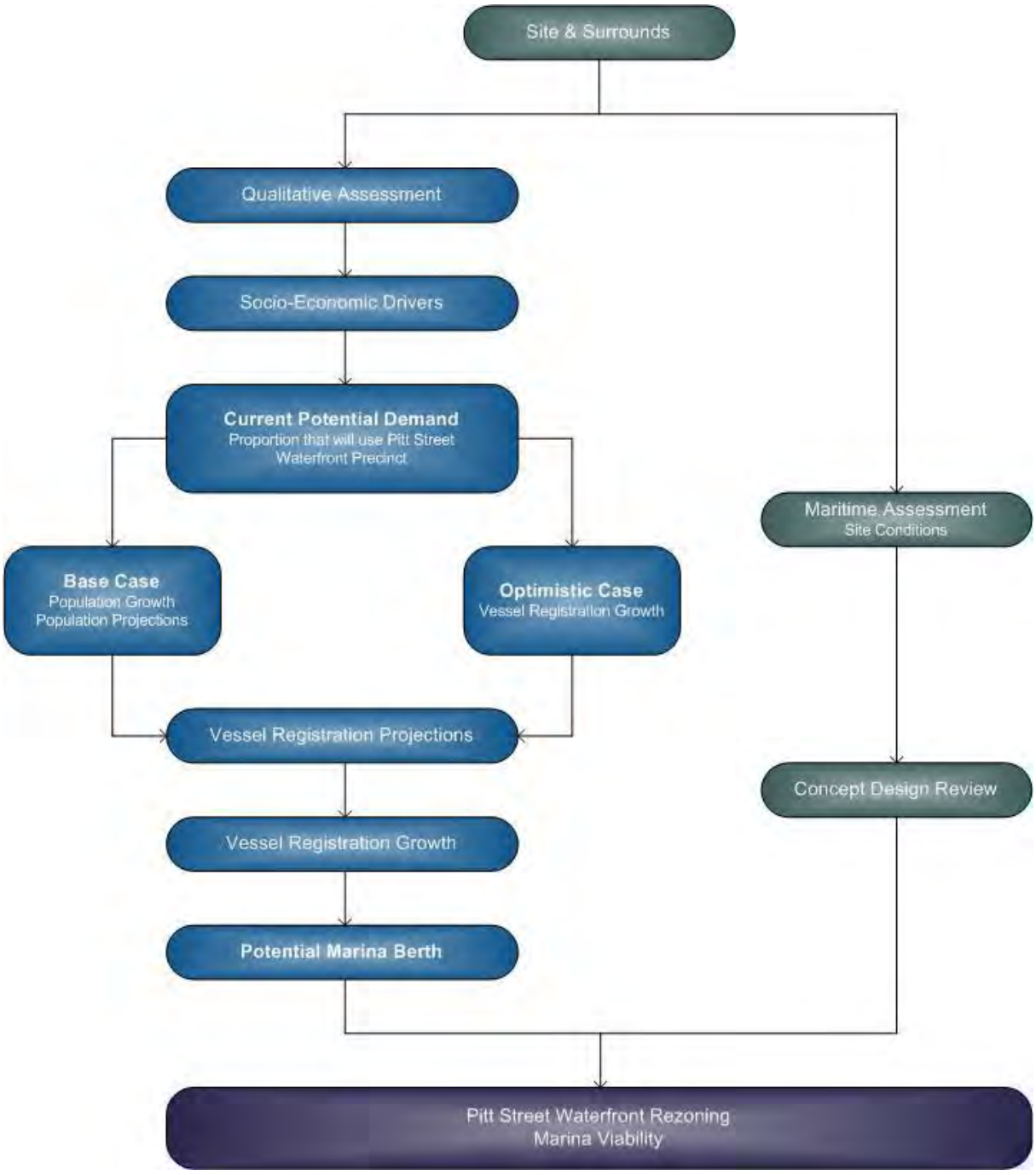
The recent sale of the disused Dairy Factory in Pitt Street, Chatham, has created an opportunity to master plan future development of this strategically significant waterfront site. This site represents a significant opportunity for comprehensive redevelopment and to capitalise on the water frontage with existing wharfs along the Manning River. An integral component of the initial rezoning and subsequent development of the Pitt Street Waterfront Precinct is the potential to develop a marina as part of the mixed land use.

Council has previously called for concept designs for the precinct, for which four architects were commissioned to provide a Concept Master Plan for the site. The four submitted concept master plans are discussed in **Section 4.5** of this report. From these concepts, Suters was selected as the preferred architect, who will be responsible for implementing the findings of this study into a preferred master plan.

1.2 Report structure

- **Section 1: Introduction** – Describes the purpose of the report and the background to investigations.
- **Section 2: Strategic Context** – Provides a description of the study area, facilities and surrounding land uses.
- **Section 3: Market Assessment** – Provides the analysis of:
  - qualitative assessment of the potential market and associated facilities
  - potential socio-economic influences on demand for berths
  - prevailing supply and demand factors
  - the potential future demand and develop projections for the number of berths required to year 2031.
- **Section 4: Maritime Engineering Assessment** – Provides an assessment of the maritime engineering characteristics of the site, reviews four short-listed concept master plans and provides preliminary concept assessment for the marina component.

Figure 1 Methodology flow chart



2.0 Site description

This section provides an analysis of the site, surrounding land uses and existing local marina facilities that would influence the establishment of a marina on the subject site.

The Pitt Street Waterfront Precinct (the Precinct) is located on the north bank of the North Passage of the Manning River approximately 2 km north east from the Taree City Centre. The precinct is bound to the east by the Manning River and to the north, south and west by existing residential development.

Areas within the Precinct are currently zoned as follows:

- 1(a) Rural General
- 2(a) Residential
- 4 Industrial
- 5 Special Uses
- 6(a) Open Space Recreation.

The proposed rezoning of the site is expected to integrate the new land use zonings for the Precinct into a mixed marina and ancillary development precinct, most likely with a tourist and marina facilities focus. Ancillary development such as dry storage, commercial and retail developments, maintenance facilities and tourist accommodation are vital to support such a development (both in terms of financial feasibility and marketability). The Precinct has considerable scope for development of a marina and supporting facilities, although any impacts on surrounding residential land uses would need to be managed as part of the design process.

Of particular significance is the opportunity that the linear Precinct has with two street frontages, which provide the maritime assessment with a high level of flexibility of marina configuration to respond to the site constraints.

Existing land uses on the site include:

- the former Manning Valley Dairy Cooperative with occupied and unoccupied buildings
- including a disused rail spur and associated infrastructure
- residential development
- agricultural land with minor remnant structures (previous piggery)
- a car dealership on the site of a former service station (the 'Big Oyster')
- a creek and drainage channel
- scattered vegetation, generally along the creek and the Manning River
- disused wharfs on the Manning River
- minor areas of vacant Crown Land
- Fisherman's Cooperative
- fuel depot.

Figure 2 Site and surrounds

3.0 Market assessment

3.1 Introduction

The primary objective of the market assessment is to investigate the demand for marina facilities in Taree and to identify factors that would influence suitability of the subject site for a marina. The demand projections arising from this analysis will be used as the basis for rezoning the site and for formulating development concepts by the project architects.

The study methodology is described in **Figure 1**.

3.2 Qualitative assessment

With no established marina in Taree or in the immediate vicinity, it is difficult to establish existing local influences on the demand for marina berths. Accordingly, the market analysis incorporates a qualitative review of similar facilities elsewhere and provides a description of the likely influences on demand for marina facilities at Pitt Street. This section describes a qualitative analysis of potential marina berth demand and provides the basis for establishing the types of facilities that would be necessary as part of a marina in the Manning River.

Information sources used to inform this qualitative assessment include:

- local groups who are involved in maritime activities
- operators of similar marinas elsewhere in Australia
- information gathered from internet searches of similar marinas around the world (UK and USA).

All communications are documented in **Appendix B** of this report.

3.2.1 Consultation with local groups

The groups consulted as part of this investigation were (see **Section 3.2.4** below for case study contacts also):

- Manning River Sailing Club (Juniors)
- Manning River Rowing Club (letter received)
- Taree Fisherman's Co-operative Society Ltd
- Manning River Marine
- Manning Valley River Cruises
- Taree Aquatic Club (Sailo's)
- Harrington Marina (New Vision Real Estate)
- Markham Marine
- Crowdy Bay Charters
- Department of Lands (Taree and Newcastle offices)
- Marina Industries Association of Australia
- Manning Valley/Taree Chamber of Commerce, Industry and Tourism
- Stebercraft Pty Ltd
- NSW Maritime
- Marina developer (Ariadne Australia Pty Ltd).

The key issues raised as part of the consultation are described below.

- River constraints on vessel types that use the River and may utilise a marina include:
  - low clearance for bridges and power lines limit size of yachts
  - future 'no-wash zones' limit the size and speed of large vessels
  - distance from coast is a deterrent to vessels travelling in to Pitt Street Waterfront from the coast (particularly for yachts that travel slower than motorised vessels and require room for tacking when going into the wind)
  - the navigability of sand bars at Old Bar and Harrington that sees only 1 to 2 vessels pass over the bars per month is a key are deterrent to travel between the coast and the river, consequently, the market does not include vessels travelling up and down NSW coast.
- Existing boat ramp – The existing boat ramp is busy on weekends and is used by adjacent rowing and sailing clubs.
- Events – The Manning River Rowing Club holds carnivals in river and the Sailing Club hold annual sailing regatta. There is also an annual power boat racing event.
- Slipways – The only existing slipway is adjacent to the Taree Aquatic Club, which is in high demand. Stebercraft currently launches boats into river by crane and then sail vessels out to open water over Manning River bar. There appears to be a reasonable demand for slipway facilities.
- Facilities – River currently lacks slipway combined with maintenance facility for larger boats and refuelling facility. An existing pump out facility is adjacent to Aquatic Club in Taree. Further, anecdotal evidence provided by Council suggest that larger vessel owners often have waterfront properties and may utilise fuel, sullage and maintenance facilities (pers comm. GTCC, 2008).
- Manning River Bar – The bar is difficult to navigate and is unreliable (weather-dependent). Boat owners contacted indicate the bar is virtually a no go area. Retailers contacted suggested that as long as bar remains constraint, very little chance of larger boats using Manning River (like Coffs Harbour, Port Macquarie and Ballina). Crossing the bar is not typically attempted by people who are unfamiliar with bar.
- Users – The main river users are weekend recreational fishermen and picnic/day-trippers up and down the river. There is scope for expanding the local boating industry using river. Houseboats may be a potential market for berths at the marina. However, careful management of houseboats is required to ensure amenity is maintained. A marina at Pitt Street may be used by day trippers to and from Harrington.
- River visitors – NSW Maritime boat registration and random licensing checks revealed approximately 60% of river users during the months from October to April are visitors, primarily from Hunter/Newcastle area, although visitors from North and Western Sydney on the rise as well as some from Queensland.
- Fishing – The use of punts is prevalent in river for fishing. There is no commercial fishing in river on weekends. The Fisherman's Cooperative has dedicated wharf for unloading fish direct into the Coop's building. Semi-trailer access is constrained to Coop building.
- Vessel mix – The local marine retailer sells approximately 60 vessels per year, mainly 18 ft - 20 ft runabouts. An important market for vessel sales is seniors. The recent slump in house prices have meant sales in last two years have decreased. It is estimated that there are six to seven larger motor cruisers (up to 40 ft in length) on river, which are primarily owned by wealthy locals and almost all having existing private mooring on the river. Approximate licence numbers for Taree comprise:
  - 3,000 recreational boats less than 5 m length
  - 800 recreational boats greater than 5 m length
  - 18 commercial boats greater than 5 m length registered in Manning area
  - a total of approximately 5,900 current boat licence holders in the Greater Taree area (see licence analysis for accurate numbers of licences).
- Tours – Current river tour customers are generally seniors and other groups, who mostly live within two to three hours drive from Taree. River tours could attract larger vessel for river touring

if a marina is established. There is approximately 150 km of navigable river to tour. Accommodation is required in Taree to cater for larger tour groups and to increase catchment area to include overnight visitors.

- Moorings – There is demand for daytripper moorings to enable visitors to tie up and visit cafes and for shopping in Taree.
- Crowdy Head – The lack of existing facilities on the River means lack of tourist opportunities. Crowdy Head harbour attracts boating visitors from Newcastle and Hunter Valley.
- Marinas on Mid North Coast – Expansions to Port Macquarie and North Haven marinas. There is demand for more marinas, generally, on the Mid North Coast.
- Boat builders – Current sales are to customers from out of the Greater Taree region. The Manning River bar is a significant constraint to vessel delivery, as it is heavily tide and weather dependent. There is demand for casual moorings for customers who wish to leave vessel in river for short periods during collection.

Generally, the groups consulted indicated that there is likely to be demand for a marina in this location. Comments such as '*people might be pleasantly surprised at the usage of* [a marina]' were common amongst the people consulted. Overall, anecdotal evidence suggests that a marina at Pitt Street would experience a reasonable level of demand, with potential to generate more demand in the future if the visitor experience is enhanced. However, this is tempered by the distance from open water and the existence of the Manning River bar, which restricts ocean access for large periods of the year. This is reinforced by comments of the Marina Operations Manager for the developer of Port Macquarie Marina (Ariadne Australia Ltd), who suggested that a commercial marina in this location would not be feasible.

The severely restricted ocean access places a constraint on the potential occupancy for the Pitt Street Marina. This is reflected in the modelling of potential vessels provided in **Section 3.4** of this report. In particular, the restrictions the bar places on the types of vessels that can cross the bar is reflected in the vessel matrix (see **Table 11**), which provides the basis for forecasting demand for vessels. Aside from the marina at Harrington, none of the stakeholders that were consulted were aware of any marinas in Australia that do not have access to open water.

3.2.2 Local marinas and facilities

This section provides an assessment of current maritime activities and facilities located in the area including Chatham, Taree and the surrounding section of the Manning River.

Greater Taree contains two existing marinas, at Harrington and Crowdy Head, that would influence the demand for marina berths at the Pitt Street Marina. These marinas represent a combined capacity of approximately 50 vessels. Harrington is located inside the bar and consists of 24 moorings (plus café), whereas Crowdy Head Marina is an ocean port and contains more than 22 moorings (refuelling and supplies). Facilities provided in marina catchment are described in **Table 1**. The Harrington and Crowdy Head marina facilities are described in more detail in the following sections.

Table 1 Local facilities

Facilities	Crowdy Head Marina	Harrington
Wet berths	22 - 30	24 (+20 berths planned in future)
Dry berths	No	No
Maximum length	NA	16m (approx)
Pricing per week (based on 10m boat)	unknown	$35-40
Fuel	Diesel (perm.)	No
Sullage pump out	Yes	Yes
Shiplift / Slipway and maintenance	Yes	No
Retail (onsite)	Takeaway Outlets Chandlery	Café / restaurant Accommodation shops

Harrington Marina

Harrington Marina comprises a recently completed jetty with 24 moorings, associated with a residential estate development. These berths are casually rented and between 6 – 10 of these berths are currently occupied. The rental for berths is $35 – 40 pw.

Types of vessels currently moored range from 18 ft up to 52 ft and include:

- 25 ft (7.6 m) sailing vessel
- 52 ft (15.8 m) house boat
- inboard boats
- cruisers.

Some of the current demand for marina berths is from residents of Taree.

There are minimal facilities provided by way of maintenance and amenities for visiting vessels in comparison to the Pitt Street site. The marina provides water and power as well as sullage pump out for vessels. Commercial activities, including a restaurant, Irish Tavern, shops and new tourist accommodation (5-Star) are provided within the estate development. A new marina will soon be established with 20 berths attached to title for townhouses in new residential development within the estate.

Figure 3 Harrington Marina

Source: Google Earth Pro, 2007

Crowdy Head Marina

Crowdy Head Marina is a small fishing port that provides mooring for 22 vessels on the main jetty, although often up to 30 vessels are moored in the marina (NSW Maritime, pers comm.). A second jetty is located in the harbour, which provides temporary mooring and is used by the Fishing Cooperative. The harbour is safe in all weather, being one of safest harbour accesses on the eastern seaboard, and primarily serves a commercial fishing vessel fleet. The harbour has direct ocean access, but does not provide tourist/visitor amenities.

Land available for tourist, commercial or residential development around the harbour is limited by the Crowdy Bay National Park and topographical constraints. The tourist potential of the marina is limited through the lack of facilities and lack of supporting development such as restaurants and cafes. However, fuel and provisions are available from the Fishing Cooperative. The harbour attracts vessels travelling along the coast for refuelling. A slipway is also provided in the harbour.

Figure 4 Crowdy Head Boat Harbour aerial

Source: GTCC, 2007

Figure 5 Crowdy Head Slipway

Source: http://www.harringtoncrowdy.com/CrowdyHeadFishingVillageAtCrowdyBay.html

Manning River private jetties and swing moorings

A survey of the private jetties located along the Manning River between the coast and the proximity of Mount George was undertaken using aerial photography. The extent of the survey is shown in **Figure 6** and the findings described in **Table 2**.

Table 2 Manning River private jetties

Mooring	Number
Private jetties	83
Private jetties with vessel	11
Swing moorings	18

NSW Maritime (Brett Ryan, pers comm., 22 September 2008) advised that:

- vessel sizes at private jetties are generally between 7 m and 13 m / 14 m, of which there are about 12 or so on the river moored at private jetties at present
- approximately 3 of these vessels are transient in nature, with large portions of time being spent moored at Wallace Lake and Forster
- most vessels under 7 m in length are trailerable and not generally stored on river
- a significant proportion of private jetties do not have vessels moored
- a number of the private jetties on Manning River are fishing platforms
- often the private jetties are not structural sound to cater for larger vessels.

Data provided by Department of Lands (R Birse, pers comm., 30 September 2008) states that authorised Domestic Waterfront Structure (DWFS) on the Manning River are as follows.

- a total of 59 DWFS held under licence
- three of the DWFS held under licence have attached berthing (wet) areas, which are 6 m x 24 m, 5 m x 15 m and 4 m x 7 m
- a total of 22 DWFS are held under permissive occupancy (PO)[2]
- no data is held regarding the size of vessels berthed on DWFS in Manning River.

The input by NSW Maritime and Department of Lands reinforce the indicative results arising from the survey of aerial photography, which are incorporated into the estimate of marina demand (see **Section 3.4** of this report).

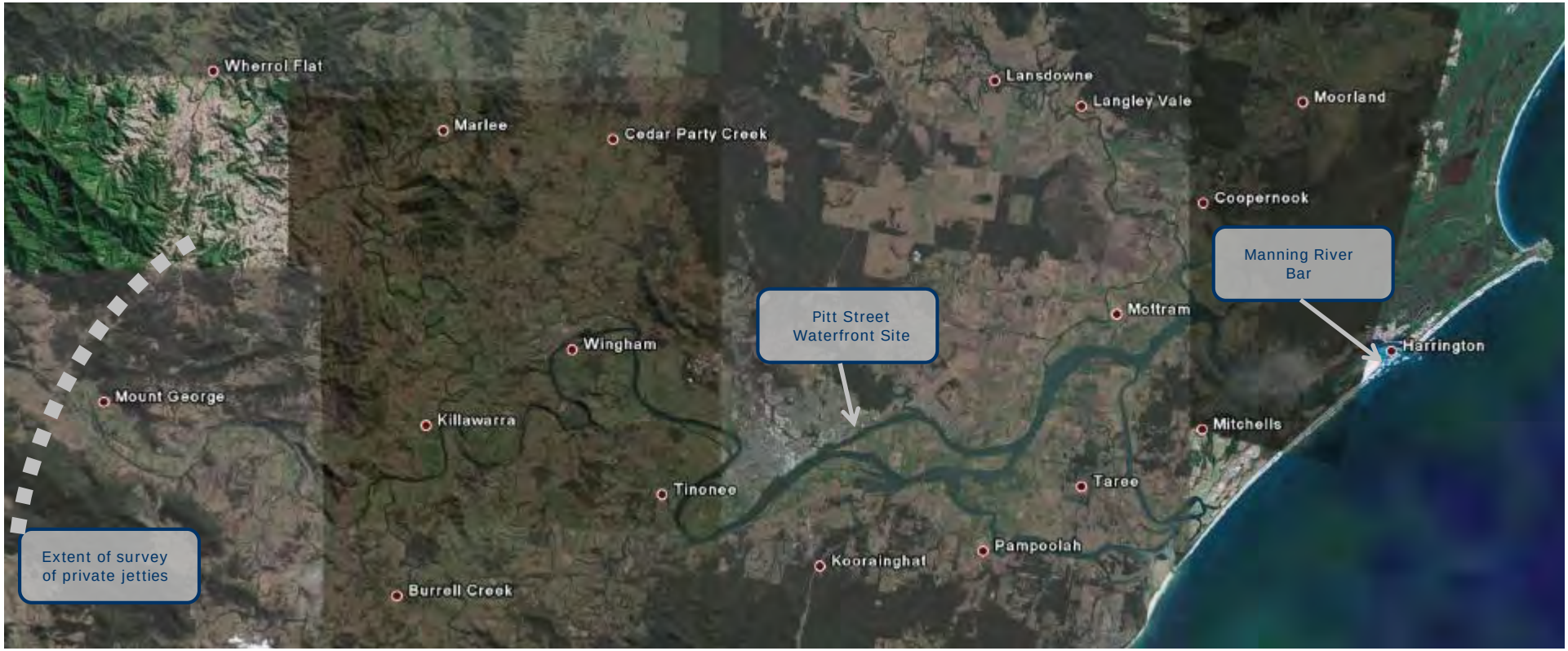
Swing moorings can affect safety by creating additional navigational hazards. The presence of strong currents and the risk of large river floods increase the possibility of boats coming loose from their moorings. As such, the prevailing river conditions are not ideal for swing moorings in the long term, particularly for large vessels, within the river.

Swing moorings can also have adverse impacts on the environment. The establishment of swing moorings may destroy native seagrass beds, which provide a highly productive fish nursery and feeding habitat. Expansion of swing moorings will also increase the difficulty of managing pollution from vessels. The adverse effects of boating can be better managed by establishing environmentally acceptable facilities (i.e. refuelling facilities, sewerage pump-out facilities, maintenance) in a contained area such as a marina.

The establishment of additional swing moorings is preferred solution to satisfying berthing demand for safety, environmental, access and vessel traffic management reasons.

[2] *"A permissive occupancy is a form of tenure held over Crown land authorising an occupation or use. Permissive occupancies were granted under previous legislation and are no longer issued, having been replaced by licences. A permissive occupancy cannot be transferred, but can be replaced by a new licence upon termination."* Source: http://www.lands.nsw.gov.au

Figure 6 Taree region



Source: Google Earth Pro, 2007

Boat ramps

Existing boat ramp facilities

With no existing marina in Taree, the majority of existing vessels that use the Manning River are trailered and launched at the Taree CBD boat ramp (see **Section 3.4.2** for vessel licence data demonstrating this).

The Manning River has a relatively large number of boat ramps providing access to the waterway. However, facilities are generally constrained by limited access/ manoeuvring space for trailers, dedicated car and trailer parking, ramp gradient and water depth at low water. The *Manning River Recreational Waters Development Strategy* (the Recreational Waters Strategy), prepared in 1990, recommends dredging at a number of sites along the river, including the area adjacent to the northern bank between the rowing and sailing clubs in Taree. However, it is likely that this area will continue to shoal and regular maintenance dredging will be required (Greater Taree City Council, 1990).

Discussion with Stakeholders indicated that both Regional Boat ramps (RBR) and Local Boat ramps (LBR) are needed in the Manning River. RBR's provide for an important access point for a large number of local and regional users. LBR's are required to provide convenient access for local communities. In relation to boat ramp facilities within the Taree CBD area it is believed that *"sufficient boat launching facilities exist in the area, however some tend to be user specific and all have identifiable problems"* (Greater Taree City Council, 1990, p.36). Enhanced facilities would improve the running of the Aquatic Festival.

Those facilities located in proximity to population centres such as Taree CBD receive high usage (Greater Taree City Council, 1990) and are extensively used during the peak holiday season and the nine day Aquatic Festival which culminates on the Australia Day Long Weekend. Council is in the process of examining the upgrade of boat facilities at several locations. Parking and access are major problems during these peak periods.

An existing two lane boat ramp is located on Endeavour Place in Taree CBD (see **Figure 7**). The boat ramp has 20 double car parks for car and trailer (which can be used as 40 single spaces) and 20 single car spaces in an at grade car parking area, as well as a small pontoon and fish cleaning facilities. The boat ramp is situated adjacent to the Sailing Club (juniors) and the Rowing Club buildings. These two clubs use the boat ramp, pontoon and a grasses verge for launching boats.

Anecdotal evidence suggests that the boat ramp provides adequate car parking for the majority of the year with the exception of peak periods in which demand far outstrips the supply of parking spaces. Peak periods are primarily during the summer months, particularly over the Christmas period long weekends and when events such as fishing competitions are held. It is believed that the ramps located in closer proximity to the coast receive higher levels of patronage on a year round basis due to there closer proximity to prime estuary fishing locations.

The upgrading of the Endeavour Place boat ramp adjacent to the sailing club to allow larger vessels to berth while providing more convenient access for other vessels is listed as high priority under the Recreational Waters Strategy (Greater Taree City Council, 1990). This boat ramp is believed to receive high levels of usage leading to congestion, particularly during the peak season. Improvements at other boat ramps along the river are generally focused on allowing larger vessels to use the facilities.

Figure 7 Endeavour Place boat ramp

Source: Google Earth Pro, 2007

Additional boat ramp facilities are provided in the Taree CBD adjacent to the Council buildings in Pulteney Street and a public wharf is provided adjacent to the Sailo's Club in Macquarie Street, as shown in **Figure 8**).

The existing T wharf is considered too small to cater for river users visiting the CBD (Greater Taree City Council, 1990) and has been approved by Council for demolition within the next two years. The two single lane boat ramps are unused due to their location close to shops, lack of available parking and their steep gradient. There is an existing sullage pump out facility adjacent to the Sailing Club. It is recommended that an additional sullage facility be located at the Pitt Street Waterfront site.

New boat ramp facilities

The Recreational Waters Strategy states that ocean access is constrained by the entrance sand bars, which limit River usage to primarily trailered craft. Consequently the Recreational Waters Strategy states it is important to provide comprehensive boat ramp facilities (Greater Taree City Council, 1990, p.43). The Recreational Waters Strategy proposes a number of new RBR sites, including a site to the east of the Taree CBD, within the sheltered waterway created by the lee of Shallow Island adjacent to the Manning River Sailing Club. This site is preferred to ramp improvements adjacent to the rowing club as this could create conflict between boat users and rowers. The proposed ramp was proposed to consist of three lanes, with 20 car parking spaces. Further reclamation of the inlet is recommended to create room for a larger manoeuvring area and 90 space car park, in addition to ancillary services such as wash down facilities.

The Recreational Waters Strategy states that the demand for larger short and long term berths is limited due to the lack of ocean access. However, the Recreational Waters Strategy states that there

is a latent demand and that once facilities are provided people will trade-in trailerable craft for larger vessels to use the berthing options (Greater Taree City Council, 1990). It is recommended that berths are provided in proximity to the Taree CBD with Council administering the operation, while in the longer term a commercial operation could be located in a basin off the main river.

Figure 8 CBD boating facilities

Source: Google Earth Pro, 2007

It has been noted by Council that since the construction of additional infrastructure usage of the waterways has increased. It is likely that usage has increased due to the increased waterway accessibility. The improved access allows a wider range of people particularly those who are elderly and less mobile who make up a large proportion of the demographic to use facilities such as the pontoon to access water craft, where previously this might not have been possible.

3.2.3 Regional marina facilities

Presently, there is a reasonable level of regional supply to cater for demand for marina berths along the Mid North Coast region. Other marinas located on the Mid North Coast include:

- North Haven
- Forster-Tuncurry
- Port Macquarie – currently undergoing expansion.

The following sections provide a brief overview of these marinas, which located just outside the Greater Taree study area but have the potential to influence demand for marina berths at Pitt Street. These marinas also provide a useful comparison for the Pitt Street Marina in terms of facilities provided, physical constraints and moorings.

North Haven

Although North Haven is outside the survey area, it provides reasonable comparison to the Pitt Street situation.

North Haven contains three small marinas, which are the Dunbogan Boatshed & Marina, Laurieton Unite Servicemen's Club and a marina in Laurieton. The Camden Haven River has a fully trained river entrance and large number of moorings lining the river banks. Pump out facilities are available and a range of facilities are provided at the various small wharves/ marinas.

With excellent ocean access, good fishing, nearby beaches, local cafes and a resident population, North Haven provides good opportunities for boating.

Key facilities provided include:

- hire boats
- approximately 45-50 deep water moorings (from aerial photography), excluding swing moorings and private jetties
- general amenities, including internet
- chandlery and tackle
- mobile maintenance services provided.

Figure 9 North Haven

Source: Google Earth Pro, 2007

Forster-Tuncurry

Forster Tuncurry, also known as Cape Hawke Harbour, provides a significant number of moorings and a range of facilities. The area is extremely popular for boating with a range of visitor facilities, including accommodation, tours, fishing and maintenance facilities. Numerous boating facilities exist in the Forster Boat Harbour and at Tuncurry. It is understood from anecdotal sources that owners of larger boats who live in Taree often moor vessels at Forster, which is only a 30 minute drive from Taree.

Deep water and a fully trained river mouth allow large vessels to moor in close proximity to central Forster and Tuncurry areas (see **Figure 10**). A large number of moorings are located along the river banks, with some smaller marinas scattered along the Forster side.

Along the east bank of the river, Forster contains four small marinas, including:

- Forster Beach Caravan Park and Marina
- Paradise Marina
- Forster Marina (currently for sale) – containing hard deck and boatsheds as well as 25 marina berths/bays up to 7.5 m in length.
- Tikki Boatshed and Marina.

As can be seen from **Figure 10** the marinas located in Forster comprise a network of small regional marinas with approximately 20-30 berths each. Each marina contains a range of associated tackle, chandlery, servicing and accommodation.

Figure 10 Forster-Tuncurry moorings

Source: Google Earth Pro, 2007

Port Macquarie Marina

Existing facilities

The Port Macquarie Marina is shown in **Figure 11**, with photographs of the current facilities provided in **Figure 12** to **Figure 17** inclusive. The Port Macquarie Marina currently has a maximum capacity of 67 berths, which comprises:

- 49 wet berths within the existing marina basin (see **Figure 14**)
- eight swing moorings in the Hastings River Estuary
- one 'H' mooring that has the capacity for a further 10-12 vessels, which is situated within the Hastings River Estuary (see **Figure 15**).

Figure 11 Port Macquarie Marina

Source: Google Earth Pro, 2007

Marina related activities provided at Port Macquarie include:

- a refuelling platform
- workshop building
- marina management office
- hardstand area that doubles as a maintenance area for larger vessels
- dry storage facility
- boat sales yard with associated boat mechanical workshop
- slipway (with straddle lift) within the secure maintenance compound
- existing maintenance includes heavy marine industrial activities, such as antifouling, hull repair and replacement and general vessel refit and maintenance
- 66 on site car parking spaces provided on the marina site.

Business activities on site include:

- restaurant
- hairdresser
- bicycle store
- laundromat
- beautician
- fishing bait and tackle shop
- financial services
- marine engineering and services
- marine electrical and fibreglass services
- boat hire (occupying six marina berths and floating office).

Figure 12 View of existing marina basin

Source: Maunsell, 2007

Figure 13 Retail shops in Port Marina complex

Source: Maunsell, 2007

Figure 14 Existing marina basin

Source: Maunsell, 2007

Figure 15 Marina basin view to Hastings River

Source: Maunsell, 2007

Figure 16 Existing marina dry storage compound

Source: Department of Lands, 2006

Figure 17 View of existing refuelling station

Source: Maunsell, 2007

Proposed redevelopment

Port Macquarie is undergoing a redevelopment by its current owner, Ariadne Australia. It is understood that the central aims for the redevelopment of Port Macquarie Marina are to:

- establish a commercially viable marina complex through better utilisation of the land for tourism, hospitality, entertainment, accommodation/residential, light marine industrial, recreation and related purposes
- provide regional community benefits through improving pedestrian and visual links to and along the waterfront and associated areas of open space
- support the demand for retail, accommodation and hospitality in the area by increasing opportunities, attractions and services for residents and tourists
- enhance efficiency of marina operations and the land-water interface through improvements in boat moorings and boating facilities in the Hastings River adjacent to the CBD and to open up sections of the water body for active water based recreation
- meet future demand by increasing long term marina capacity
- protect and enhance the existing social and environmental values of the site and surrounding areas
- preserve significant ecological areas.

The proposed redevelopment includes:

- new wet berths and new fuel facility
- a waterfront pedestrian boulevard walkway that links to the CBD and to the marina
- mixed use buildings fronting the inner harbour berthing area consisting of retail, hospitality, commercial, light marine industrial and tourist accommodation land uses
- car parking.

See **Section 3.4.3** of this report for further discussion of the proposed redevelopment

3.2.4 Marina case studies

Introduction

Case studies of similar marinas are reviewed to enable comparison of the Pitt Street Waterfront situation with similar locations elsewhere in Australia and other similar economies (United States of America and United Kingdom). The comparative analysis identifies relevant synergies with similar marinas.

The Pitt Street Marina situation is relatively unique in that it is on a river and does not have direct ocean access. There appears to be very few river marinas that do not have either ocean or lake access.

The marinas that were reviewed and descriptions of the key findings are described below.

Berowra Marina (NSW)

Berowra Waters is a small river settlement located on the Berowra Creek, a tributary of the Hawkesbury River, 45 km north of Sydney. The Marina's location allows vessels to travel to Sydney Harbour from the Marina in approximately two hours and north to Gosford in less time. The marina operator estimates that approximately 40 to 50 percent of vessels located at the Marina travel to and from the ocean.

The Berowra Waters Marina has 72 berths on the western side of the river, 29 berths on the eastern side and 20 commuter berths. The marina can currently accommodate vessels up to 21 m in length. However, an application is currently being made to extend this to 29 m.
The Marina's depth of approximately 8.5 m and the greater depth of the surrounding waterways ensure that vessels draughts are not constrained.

A 'no wash' zone operates at various locations along the waterway in response to residents with property abutting the water. The zone prevents private commuter vessels moored at these properties from being inundated. It is not believed that the 'no wash' zone deters boat users from the Marina. The Marina currently has 100 percent occupancy and a waiting list in place.

Other facilities associated with the Marina include:

- a range of water crafts for hire including cruisers with catering facilities for group bookings, tennis, and single and double kayaks that can all be used for a range of activities including site seeing and fishing
- fuel and general store.

Table 3 Berowra Marina summary

Facilities	Berowra Marina
Berths	121
Maximum length	25 m
Pricing per week (based on 10m boat)	$55 – 115 (location dependent)
Fuel	Diesel, Unleaded, Premium
Sewerage pump out	No
Retail (onsite)	Small Store

River Glen Marina (SA)

The marina is situated 101 km from the mouth of the Murray River and approximately 50 km from Lake Alexandrina. In the marina, permanent berths account for approximately 90% of the boats stored in the marina. Currently stores 90 private vessels and 16 hire boats (house boats).

River Glen Marina is shown in **Figure 18**.

Marina facilities provided include:

- security fence around marina
- toilet shower block
- kiosk
- licensed premises for sale of alcohol
- laundry service
- rubbish collection.

The marina is a large distance from mouth of the Murray River, therefore the vessels that use the marina are not ocean going. Virtually all of the vessels are river vessels, including houseboats and some runabouts (smaller speed boats). Often the houseboats also have 'tinnies' or jet skis that owners use up and down the river.

A slipway business operated near the marina, but has recently ceased operation. A public boat ramp exists on site, but is not connected to marina. Slipways are located along the river, but generally near towns. There are no maintenance facilities at the marina, as these are typically in the towns, near slipways. Slipways are not an essential part of the marina for the river.

Nearby maintenance businesses have mobile repairers that can service boats in the marina.
The Marina has pump out and fresh water at each berth and a central refuelling and pump out facility.

Figure 18 River Glen Marina

Source: Google Earth Pro, 2007

The Marina is one of the deeper marinas along the river and so is less sensitive to low water levels.

Other marinas in the area include Long Island Marina and Kia Marina (Mannum), but these are not as deep as River Glen and are experiencing a drop in patronage due to low water levels in river. The Kia Marina have been keeping vessels on shore (dry storage), but EPA have ordered them to put the vessels into the water as the marina does not have a licence for dry storage. Vessels are scraping the river bottom.

Aside from fishing and relaxation, visitors to the marina have opportunity to travel to diverse destinations along the river, including:

- events (Murray Bridge Pedal Prix, water skiing festival), for which visitors hire house boats to stay on and as spectator or participant.
- favourite spots
- backwaters (attraction of bush and birdlife)
- holiday settlements along the river
- historic towns
- museums.

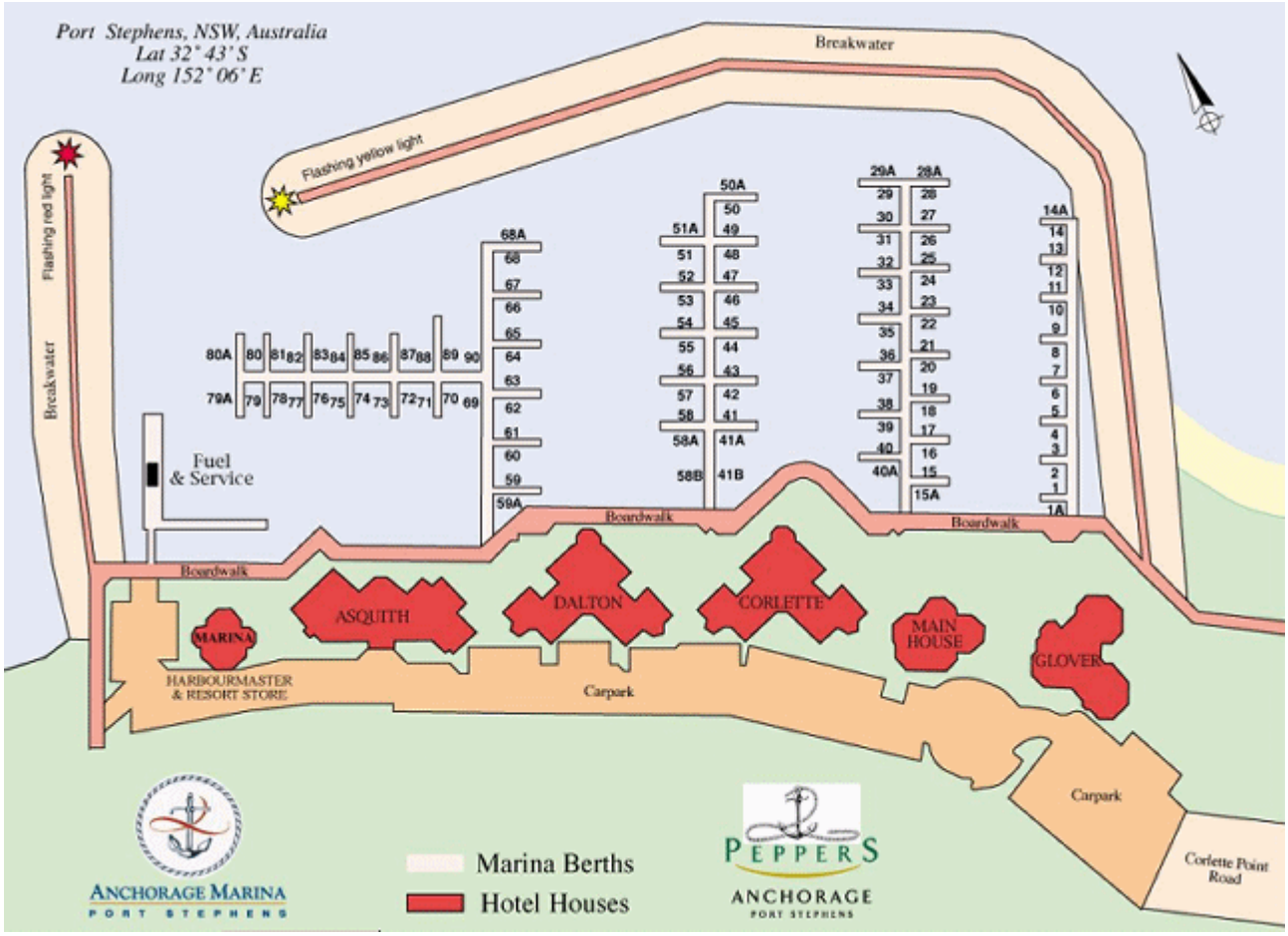
Physical constraints include:

- mouth of the Murray River is silted up, which restricts the vessels that have ocean access
- low water levels in the river due to drought has reduced demand for boating, but the marina is still highly occupied (90%) and the hire house boats are used regularly (approximately 50% occupied)
- South Australia Environmental Protection Authority (EPA) has strict controls over marinas, including no living on vessels, which cause difficulties for management of marinas.

Anchorage Marina, Port Stephens (NSW)

The Anchorage Marina provides a 90-berth marina around an artificial harbour, serving boats up to 20 m in length (see **Figure 19**). A Peppers Resort tourist accommodation is located adjoining the marina, creating a tourist precinct focussed on the marina basin (see **Figure 20**).

Figure 19 Layout of Anchorage Marina, Port Stephens



Source: http://www.anchoragemarina.com.au

Facilities provided include:

- secure mooring and access keys
- wireless portable broadband internet/email services
- car park – one vehicle per vessel
- fuel and pump-out services – 7 day fuel service from 8.00am to 5.00pm (diesel, unleaded fuels, marine oils and additives, LP gas and pump-out facility)
- laundry, dry cleaning
- restrooms and showers
- Anchorage Marina does not offer haul-out or hard-stand facilities, mobile repairs and maintenance service contactors can attend to vessel needs
- rubbish removal
- secretarial – mail, facsimile and telephone messages
- marina luggage trolleys
- public access is provided to marina, foreshore and restaurant.

Figure 20 View of Anchorage Marina tourist accommodation

Source: http://www.anchoragemarina.com.au

Batemans Bay Marina

Existing situation

Batemans Bay Marina is within a small boat harbour, protected by a rock training wall, with direct access into the Clyde River. The Clyde River has a sand bar that restricts access for larger vessels.

Batemans Bay Marina is currently undergoing a redevelopment that is expected to approximately double the number of marina berths and will add marina related floor space (e.g. chandlery), commercial, retail, tourist accommodation and car parking to the land area. Also the proposed redevelopment will significantly enhance the maintenance area through establishing a travel lift, hard stand, dry storage and maintenance shed. This analysis focuses on the current marina layout, but the findings of this analysis include consideration of the proposed expansion.

The current layout of the Marina is designed to accommodate boats up to 12 metres in length. However, limited capacity exists at the Marina for boats in excess of 10 metres in length. Only nine berths (berths 28 to 36) are designated for boats longer than 11 metres and 18 berths (berths 125 to 133 in addition to berths 28 to 36) are designated for boats between 10 metres and 11 metres in length.

In addition to the 126 berths, facilities available at Batemans Bay Marina include a slipway and hardstand area for maintenance and repairs to vessels. An administration building and amenities block is located on the western side of the hardstand area on the western side of the boat harbour. Amenities are owned by the Department of Lands and managed by the Marina Co-op. A chandlery operates from a shipping container located on the hardstand adjacent to the slipway. An aerial layout of the Marina is provided in **Figure 21**.

Figure 21 Batemans Bay Marina aerial layout

In comparison to similar sized coastal NSW marinas, the Batemans Bay Marina is limited in the range of facilities provided. In particular, the Marina lacks permanent refuelling facilities, sewerage pump-out facilities and has limited car parking. The Marina is also limited in the provision of land-based facilities such as administrative space, in particular for government and community organisations, and retail space.

As a comparison to the Pitt Street situation, the limited range of facilities provided at Batemans Bay is illustrated by a brief comparison of facilities between Batemans Bay Marina and three selected NSW marinas shown in **Table 4**. All of these marinas currently have ocean access, with Batemans Bay Marina offering the closest comparison to the Pitt Street situation, with restricted access as a result of a river mouth bar.

Table 4 Summary of Batemans Bay Marina facilities

Facilities	Batemans Bay
Wet berths	126
Dry berths	No
Maximum length	15 m
Pricing per week (based on 10m boat)	$45
Fuel	Diesel (temp.)
Sewerage pump out	No
Shipyard hardstand area	2,000 m^2
Maximum haulout	20 t
Retail (onsite)	Small Chandlery
Car parking spaces	25

Source: Ship2Shore, Macquarie Leisure Trust 2003 Annual Report.

The existing mix of vessel by use is shown in **Table 5**.

Table 5 Marina berth usage by purpose

Usage	Total
Recreational	106
Commercial	2
Fishing	3
Community	1
Unknown	14
Total	126

Source: Based on data provided by the Department of Lands, October 2004.

Batemans Bay Marina, with restricted access due to the Clyde River bar, has some similarities to the Pitt Street Marina. It is likely that Pitt Street Marina can expect to attract a similar mix of vessels, with the majority being predominantly recreational vessels.

Proposed redevelopment

The following information is sourced from the *Batemans Bay Marina Redevelopment Preliminary Environmental Assessment* report, prepared by Maunsell for the Department of Lands, 2007, which was exhibited on the Department of Planning website.

The proposed mix of vessels at Batemans Bay Marina is shown in **Table 6**.

Table 6 Concept design minimum berth mix

Vessel Length	No. of Berths	Berth Mix
10 m	99	36%
12 m	79	29%
14 m	50	19%
16 m	35	13%
18 m	7	3%
Total	**270**	

Proposed ancillary development at Batemans Bay Marina consists of:

- dry storage of 60 vessels (up to 8 m in length)
- maintenance shed
- a 40 tonne travel lift with capacity for vessels ranging in length from 8 m to 18 m.
- boat hard standing area – a hardstand area of approximately 2,600 m^2, which can be used as permanent yacht storage or as temporary storage for boat maintenance, with wash down slab
- refuelling and sullage pump out jetty
- commercial floor space of 3,000 m^2
- active retail/cafes/waterfront uses of 1,500 m^2
- tourist facility (as yet not designed, but likely to include accommodation).

The types of land uses proposed within the commercial buildings comprise chandlery, marine sales and retail, sail making, food (seafood) retailing, cafes and restaurants, clubs (sailing club, marine related sports clubs), small maritime business offices, government offices, charter boats, dive boats, cruise offices, tourism-related commercial businesses.

The redevelopment of Batemans Bay Marina provides a reasonable example of the type of mixed use development that would be appropriate for the Pitt Street situation. As with Pitt Street, Batemans Bay Marina is separated from the CBD by approximately 2 km and is a river marina with vessel types restricted by a bar at the river mouth. The focus at Batemans Bay is for a mixed use development that complements the existing CBD businesses and promotes tourism and access to water based activities.

Newcastle Cruising Yacht Club

As part of preparing this analysis, a discussion was held with George Keegan, Club Captain of the Newcastle Cruising Yacht Club (see **Figure 22**), who was the key person in developing the existing marina. The marina is situated on Hannell Street, near the Cowper Street Bridge in the Port of Newcastle, at the northern end of the Honeysuckle waterfront development area.

The marina was established in 2001 as a Greenfield marina, at a time when there were no recreational boating facilities in the Port. The key driver for the Newcastle Cruising Yacht Club and the marina was the opportunity for Newcastle to be a training venue for the America's Cup in New Zealand.

Extract from the NCYC Website:

> *The marina and administration facilities are located within the commercial centre that offers bathrooms and laundrette services, ships chandlery, tackle store, a beauty therapy salon, seafood cafe, yacht brokerage and a real estate agent.*
>
> *The N.C.Y.C shipyard is operated by 'NOAKES boatyard. Their services include diesel and unleaded petrol supply, pump out services, a concrete hard stand and a spray paint shop that can accommodate vessels up to 18m long and 70 tonnes. There is also a 40 tonne travel lift that can handle 24m lengths. Endeavour Marine provides comprehensive motor and engine service from a marina pontoon.*

The first stage of marina development included:

- 80-100 marina berths
- 40 tonne travel lift and maintenance yard
- chandlery and cafe
- shops and offices.

Subsequent stages include additional marina berths, up to the current planned capacity of 180 marina berths (currently 150 berths), and a licensed club. The planned expansion will be completed in time for the Sydney to Newcastle Yacht Race scheduled in March 2008.

During discussions Mr Keegan provided comments regarding the potential for a marina at Taree, which are summarised below (It is noted that these comments are anecdotal and have been considered appropriately in this analysis).

- The bar across the Manning River is a serious concern. The NCYC gains a large amount of marina occupancy from vessels that cruise along the NSW coast. For example, the NCYC marina experiences high demand for berths during periods of bad weather, when vessels come into the marina to escape bad weather in the ocean.
- The fundamentals for establishing a marina is to include support services (chandlery, café etc) and maintenance facilities in a centralised complex, preferably associated with a boat ramp and travel lift.
- The marina needs to be a destination, with sufficient support facilities to attract visitors. It was suggested that a marina can generate induced demand through appropriate ancillary services.
- Lake Macquarie also has similar access issues as the Manning River, with entrance silting up often and causing some boats to scrap the bottom. The height and limited openings of the Swansea Road bridge is also a restriction on ocean access from the Lake.
- A marina on the Manning River in the location proposed is likely to be feasible, even considering the restrictions on access to the ocean.
- Events are important to encourage use of marina. Taree has a number of local events based around the river that could be built upon to enhance attractiveness of a marina.

- Crossing the Manning River bar in a sailing vessel with a 6 ft (1.8 m) draught is possible in calm water.
- Marina needs to be supervised by brokerage and high security is important to protect vessels and surrounding facilities.
- Taree may not generate sufficient demand to warrant expenditure on a travel lift. Travel lifts are in the order of $500,000. A slipway may be a possible solution for maintenance facilities.
- Dry storage not likely to be in high demand in Taree because most residential properties are large, which mean people can trailer vessels and store on private property[3].
- A club associated with the marina would generate demand for marina berths through membership and from hosting events.

Figure 22 Newcastle Cruising Yacht Club

Source: Google Earth Pro, 2007

[3] Note that Council has stated that *"this is an unsubstantiated comment. The majority of residential lots in Taree are smaller than ¼ acre in size and are not considered large"* (Pers comm. Robert Baker, GTCC, 3/4/08).

Mulgrave River Marina

Mulgrave River Marina is 45 km south of Cairns and 2 km up the Mulgrave River from open water. The marina is a dry storage marina only, due to the propensity of the Mulgrave River to flood. A boat ramp system is used to store boats on land within a compound. Approximately 30 vessels are stored on site and up to 70 cars and trailers are stored in the peak season.

The Mulgrave River is bound by rainforest and picturesque countryside. The River has direct ocean access and is within the Great Barrier Reef, resulting in calm ocean waters for fishing, cruising, diving, swimming and skiing. The marina serves a small village at the river mouth that is only accessible by water. Mulgrave Marina is representative of a very small regional marina that provides essential services to the local community, but is primarily based on trailered vessels rather than large cruisers. This demonstrates the potential for a regional marina to rely on trailered vessels through providing dry storage, which may be an option to be considered for the Pitt Street Waterfront.

3.2.5 Preliminary qualitative marina model (summary and findings)

The case study analysis provides qualitative data with which a preliminary model for the Pitt Street Waterfront marina is formulated. This preliminary model will be tested using vessel registration and other socio-economic data as described in subsequent sections of this report, to formulate a concept design for the proposed marina.

In terms of marina demand, as there is no existing marina located on or near the site, it is difficult to clearly define the catchment for the proposed marina. However, it is expected that the majority of demand for marina berths at Pitt Street would be sourced from the Greater Taree area, with potential visitor demand from locations as distant as such as Newcastle and Port Macquarie.

A range of river marinas were searched using the internet, which revealed the majority of marinas throughout United States and Australia promote the idea of ocean access as a benefit to those mooring within the marina. Overall, marinas within Australia and, in particular the NSW example, generally have ocean access as well as a vibrant tourism market. For example, Port Stephens contains a number of marinas but has a large existing tourism market, due in part to its proximity to Newcastle and Sydney, and boating is supported by excellent ocean access. The Taree situation differs to most existing marinas surveyed as it does not provide ocean access (due to distance and the river bars) and generally a less mature tourism market. However, studying these marinas provide background to the potential for attracting vessels to Taree and generic examples of viable marina elements, such as potential supporting tourist or maritime infrastructure.

All of the river marinas searched in Australia, US and UK are all located on a river that has an existing tourist product, including canals, fishing and nature parks. These marinas also have in common a series of marinas on the same river that support each other to promote boating on waterways.

Based on the case studies and the limited ocean access, it is likely that the demand for marina berths will be for predominantly river based vessels. The Pitt Street marina would have less ocean-going vessels, such as yachts and large motor cruisers. This would indicate that vessels that are likely to moor in the marina would be similar to other river based marinas surrounding Australia. Vessels that are moored at similar marinas along the Murray River include houseboats, runabouts and some larger cruisers.

River marinas are also supported through a range of ancillary attractions, such as eco-tours, Parks and gardens, national parks, heritage locations, scenic areas and fishing. These marinas are likely to be supported by a tourism strategy from the local authority or marine authority. It is important that public access be maintained to the marina to allow the public to utilise marina and associated facilities. This includes the public being able to moor vessels temporarily and patronise surrounding restaurants, tourist accommodation and retail experiences. Increased utilisation of public domain areas around a marina also assists with security through casual surveillance.

A critical mass of river facilities for boating would generate additional demand for marina berths, which may induce further demand through improved boating convenience and increased attraction for visitors.

In this regard it is recommended that, where practical, the local boating clubs be located in the Marina. Potential relocation of Sailing Club, Rowing club, Fishing club and Fisherman's Cooperative is supported to provide a community focus and ownership of the new marina facilities. Further co-location is important to support the desire to create a marina precinct with associated facilities in one location. It is noted that anecdotal evidence suggests the Rowing Club may not currently support moving existing facilities and that the sailing club (Sailo's) are currently considering extension and upgrade of their existing facility.

The infrastructure required for a marina that provides dry storage or a maintenance area includes either a slipway or a travel lift for larger vessels, or a forklift for smaller vessels up to approximately 8 m in length. The type of lifting device would depend on the requirements of the marina operator and the commercial viability of installing a large travel lift. Council have indicated that including a 50 tonne travel lift is the preferred approach and this is reflected in the concept plan shown in this report. Should a travel lift not be deemed necessary by the operator / developer, a crane can be used intermittently on the hardstand area to move larger vessels into and out of the water (i.e. for Stebercraft vessels).

It is noted however, that should a travel lift be deemed necessary, a larger travel lift may be only marginally more costly than a smaller size travel lift. The size of travel lift depends on the expected size of vessel to be catered for in the maintenance facilities and the frequency of moving vessels into and out of the water. For the purposes of this report, there is insufficient detail regarding the frequency of movements or the size of vessels that would use the maintenance facilities to allow a size of travel lift to be determined.

A hardstand dry berth storage would also allow yachts to leave masts up rather than take down for trailering.

Figure 23 50 tonne travel lift and rails – Marmong Marina, Lake Macquarie

Source: Maunsell, 2007

The likely marina facilities as identified from the survey of similar marinas throughout NSW, Australia and overseas, provides an indication of the size of the marina, types of vessels and the associated facilities that could locate at the marina. These marina elements are considered as part of formulating the concept design for the site and are described below:

- approximately 100 marina berths
- staged development is an important consideration, while allowing space for expansion in the longer term (when demand dictates)
- berths to provide for houseboats, larger river cruising vessels and commercial tour operators
- depth of marina should account for low water levels – this is to be further investigated as part of detailed design
- refuelling (anecdotal evidence of high demand in Manning River for refuelling facilities) and sullage pump out
- community facilities co-located (clubs and the like)
- accessible parking: requirements under AS *3962-2001 Guidelines for design of marinas*
- chandlery, bait and tackle shop
- café and/or restaurant
- shop – grocery items and the like
- amenities – toilets, showers, rubbish collection, internet, fax and like facilities
- maintenance facility, hardstand and travel lift (travel lift could provide for houseboats/Stebercraft vessels if possible, otherwise crane can be used)
- boat ramp preferable to be located on site within a marina complex, which needs associated car and trailer parking
- associated residential, commercial offices and retail development is important
- proximity to existing centres is important (e.g. Taree CBD and other historic towns)
- tour operator facilities
- tourist accommodation.

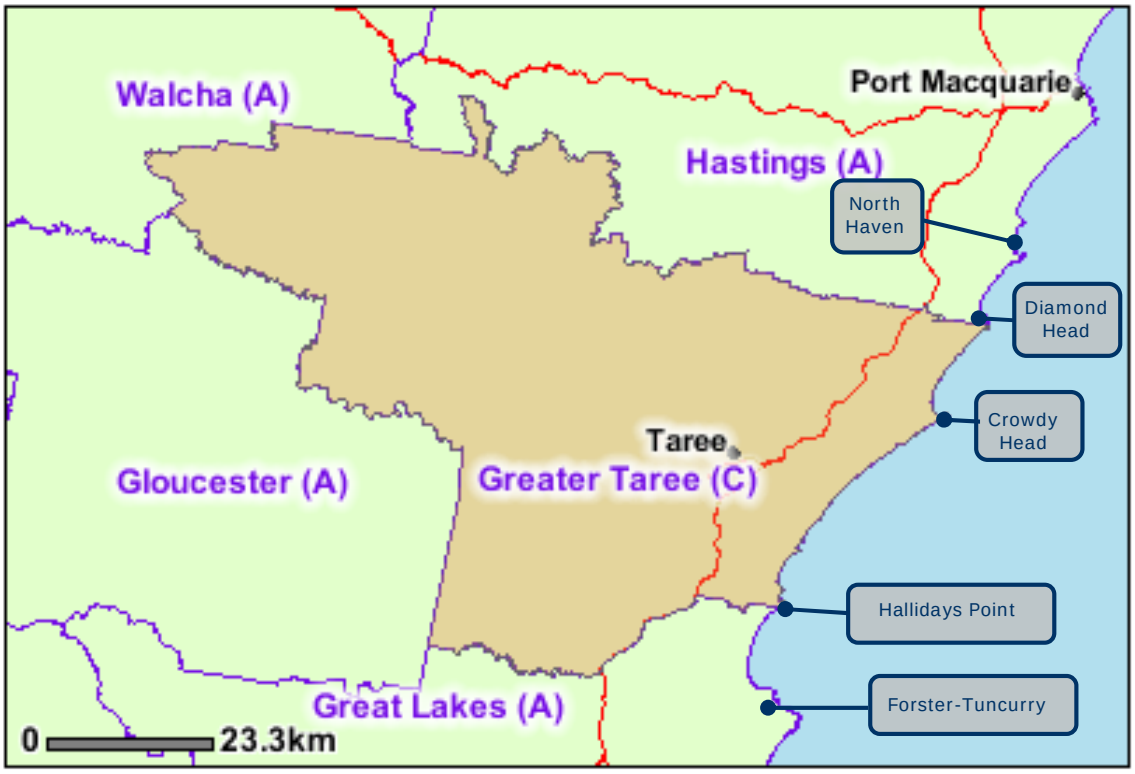
In subsequent sections, this Maritime Assessment tests the preliminary qualitative marina model as far as practical utilising vessel registration data and other relevant information.

Tourism, diversity of experiences and visitor attraction is vital to a successful Marina at Pitt Street. From the qualitative analysis, a Manning River Tourism Strategy and Implementation Plan would further encourage visitor use of marina and long term viability of a marina complex at Pitt Street. The Manning Valley contains range of visitor experiences, including beaches, ocean fishing from Crowdy Head as well as easy (land based) access to Port Macquarie and Forster-Tuncurry.

3.3 Socio-economic growth drivers

SGS Economics and Planning (SGS) have undertaken an analysis of socio-economic drivers as part of their *Socio-Economic Assessment* report. For consistency across reports, the SGS analysis has been used to inform this section. This section provides a summary of the key information affecting the marina market based on information provided by SGS.

Figure 24 Greater Taree LGA area



Source: Australian Bureau of Statistics

The analysis covers the Greater Taree LGA area as defined by the Australian Bureau of Statistics (ABS). **Figure 24** describes the Greater Taree areas as covered under ABS definition. The catchment area extends from Diamond Head in the north to Hallidays Point in the south.

3.3.1 Population

In 2006, Greater Taree had a total population of 45,144 persons. Population growth in Greater Taree between 1996 and 2006 was 2,804 persons (representing a total population change of 6.6%). This was slightly lower than the Mid North Coast average over the same period (a total population change of 8.6%). **Table 7** shows the population changes for Greater Taree, Mid North Coast and NSW overall.

Table 7 Population

	Greater Taree	Mid North Coast	NSW
2006 Population	45,144	284,674	6,549,177
1996 – 2001 Population % Change	1.2%	4.6%	5.3%
1996 – 2006 Population % Change	6.6%	8.6%	9.2%

Source: SGS Socio-Economic Assessment report

Projections for population to 2031 have been taken from the GTCC Local Growth Management Strategy. **Table 8** summarises the population projections to 2031.

Table 8 Population projections

Year	2007	2011	2016	2021	2026	2031
Projected Population	45,267	47,291	49,613	52,138	54,893	57,907

Source: GTCC Local Growth Management Strategy

These projections forecast a 28% increase in population over the next 24 years, with an average annual compounding rate of 1% per annum between 2007 and 2031. This high population growth will provide a larger market for boat ownership and consequently, a larger market for marina berths.

3.3.2 Resident population

Current thinking is for the Marina to be developed in conjunction with surrounding commercial, community and residential land uses. Concepts developed for the Pitt Street Waterfront provide a reasonable indication of the quantum of new residents that could be expected to reside on the site. It can be reasonably assumed that a higher than average proportion of residents in this development may own or use boats that are stored in the Marina. Indeed, the Marina may become intrinsically linked to the sale of dwellings, either through marketing (i.e. 'buy here and you can store your boat two minutes walk from your home') or through tenure (i.e. moorings may be sold with some dwellings, most likely being higher value dwellings).

3.3.3 Age distribution

The median age of the population in Greater Taree was 43 years, similarly the Mid North Coast has a median age of 43 years. In 2006, the median age in NSW was younger at 37 years. The median age of the Greater Taree population is increasing rapidly. In 1996 the median age of the population was 37 years and in 2001 the median age was 40 years.

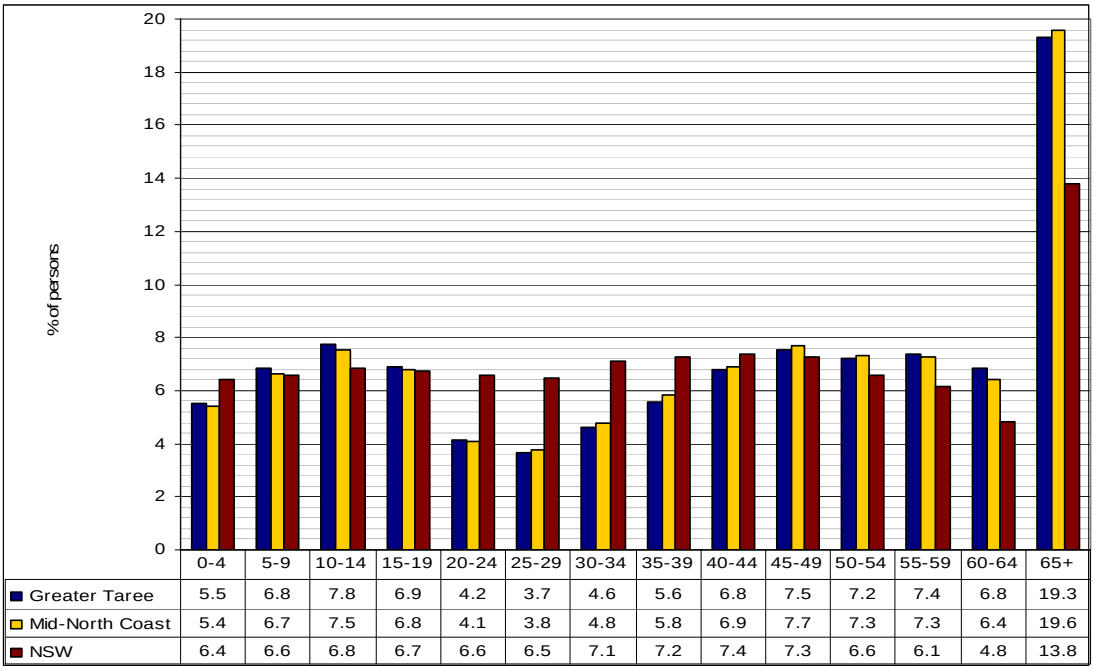
Table 9 illustrates the age profile for Greater Taree compared to the Mid-North Coast and NSW in 2006. Greater Taree, along with the Mid-North Coast, is characterised by an ageing population. A low proportion of working aged adults currently reside in Taree, particularly those aged 19-39 years. A higher proportion of people aged over 50 years, live in Taree and on the Mid-North Coast compared to NSW.

Little publicly available data is available to determine accurately the average age of marina berth holders or boat owners.

Data on recreational boating in Tasmania[4] provides an indication that the average age of a boat owner is over 45, with almost half of all boat owners over the age of 51. The dataset also showed that whilst boat utilisation did decline with age, boat usage declined by only one boat trip per year between the 35-50 years age group and the over 61 years age group. As such, it is likely that demand for marina berths is likely to come from people aged over 45 years. The high proportion of people aged over 50 in Greater Taree, and the average age increasing over time, suggests demand for marina berths is could increase with time.

[4] Marine and Safety Tasmania (2002)

Table 9 Age distribution of Taree LGA



	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
Greater Taree	5.5	6.8	7.8	6.9	4.2	3.7	4.6	5.6	6.8	7.5	7.2	7.4	6.8	19.3
Mid-North Coast	5.4	6.7	7.5	6.8	4.1	3.8	4.8	5.8	6.9	7.7	7.3	7.3	6.4	19.6
NSW	6.4	6.6	6.8	6.7	6.6	6.5	7.1	7.2	7.4	7.3	6.6	6.1	4.8	13.8

Source: ABS 2006

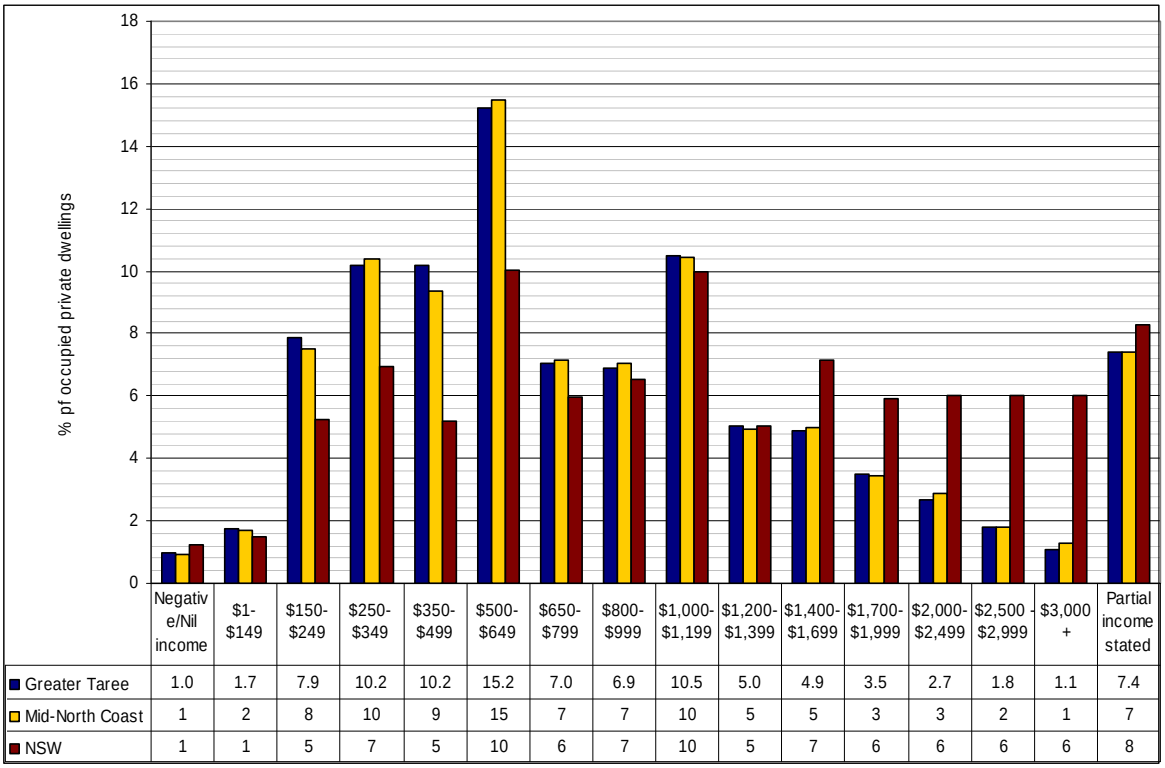
3.3.4 Income and wealth

Ownership of vessels and use of marinas are considered a luxury good, and their usage increases with income and wealth. It is important to consider the income profile of the area when assessing market demand. Greater Taree LGA is currently characterised by a high proportion of low income households and a low proportion of high income households. As shown in **Table 10** this is similar to the Mid-North Coast. The average household income in Greater Taree was $635 a week.

The number of higher income households in Greater Taree has grown over the past five years. From 2001 to 2006 the proportion of people who earned over $2,000 increased from 2.5% to 5.5%. This trend is consistent with the Mid North Coast with the proportion of people increasing also by 3%. However, NSW experienced a much higher increase of 8.1%.

There was a decline in the proportion of lower income households over the same period. There was a 12.2% decrease in lower income households (those who earned less than $500) in Greater Taree from 43.12% to 30.93%. Similarly the Mid North Coast and NSW also experienced decreases of 14 and 8% respectively. Whilst income is growing in the area, it remains below the NSW average. This may affect the type of vessels people will purchase and whether they will use a marina and should be considered when designing the marina and setting prices.

Table 10 Income distribution of Taree LGA



	Negative/Nil income	$1-$149	$150-$249	$250-$349	$350-$499	$500-$649	$650-$799	$800-$999	$1,000-$1,199	$1,200-$1,399	$1,400-$1,699	$1,700-$1,999	$2,000-$2,499	$2,500 -$2,999	$3,000 +	Partial income stated
Greater Taree	1.0	1.7	7.9	10.2	10.2	15.2	7.0	6.9	10.5	5.0	4.9	3.5	2.7	1.8	1.1	7.4
Mid-North Coast	1	2	8	10	9	15	7	7	10	5	5	3	3	2	1	7
NSW	1	1	5	7	5	10	6	7	10	5	7	6	6	6	6	8

Source: ABS 2006

Marina-related facilities

As part of the Socio-economic study, SGS investigated case studies of marinas with surrounding missed use development in order to conclude general requirements for marina-related facilities. The facilities or opportunities SGS recommend are described as follows.

- *"Address servicing requirements specific to the needs of marina-related visitors, including re-fuelling and sullage pump out services, public facilities (bathrooms and laundries) and public boat ramps."*
- *"Provide a limited amount of light marina-related industrial development. It is important that only light marine oriented industrial uses are located at the Marina. Any heavy industrial uses should be located off site. When locating marine maintenance services, conflict with residential and other public uses should be avoided."*
- *"Provide opportunities for marine-related services and retail to be located within shop-front development. There are a number of services and retail offering which should be provided in the Marina complex. These include boat mechanic and electrician, ship chandlery and tackle shop and boat brokers."*
- *"Provide flexible carparking arrangements if possible (carparking arrangements will vary according to whether a boat ramp is located at the site or not). If a boat ramp is located at the site, then a larger proportion of the site will need to be dedicated to open carparking for cars and trailers. If a boat ramp is not located at the site, there is more flexibility in car parking arrangements in terms of size, style and location."*
- *"Cater for demand in areas where a strong houseboat industry exists. Successful Marinas such as Hindmarsh in SA and other Marinas on the Murray River and Myall Lakes often coexist with a strong houseboat industry as this provides demand for mooring and berths and attracts visitors. In association with any marina development, there should be an effort to identify whether demand for houseboating along the Manning exists and whether this could be based out of Taree.'*

Source: SGS Economics and Planning, 2008

This analysis by SGS serves to reinforce the analysis carried out by Maunsell as part of this Maritime Assessment, in particular the need for a mix of facilities and the focus on tourism drivers to generate marina demand.

3.3.5 Summary

The Taree LGA population is growing and ageing, which would indicate a high probability of an increase in the number of vessel registrations over the next 20 years. This is tempered by the low income profile for the Taree area, which, combined with large inexpensive blocks of land, indicates a potentially high propensity to trailer vessels instead of mooring vessels at a marina on the Manning River. With an aging population who may have impaired mobility, the physical requirements for vessel owners to trailer vessels in and out of the water may result in demand for more convenient dry storage of vessels within a marina.

This indicates that if the marina is to be a viable alternative to trailering vessels, mooring rates will need to be competitively priced and convenient access and operation of dry storage is necessary.

3.4 Marina berth projections

3.4.1 Methodology overview

A projection framework based on collective vessel registration trends, using licence data obtained from NSW Maritime, was developed to assist in preparing projections for required marina space at Pitt Street Waterfront Precinct on a five yearly basis to 2031. The projection framework is a basic yet robust model to provide a strategic view on the potential current and future demand for marina space. The projection framework has four basic steps, which are:

- consideration of constraints on vessel types and likely demand for marina berths (dry and wet berths)
- determination of current aggregate potential demand
- determination of likely future aggregate demand growth
- projection of berthing requirement on a five yearly basis to 2031.

Two growth scenarios were developed in order to provide a robust forecast of vessel registrations as the basis for assessing demand for moorings at Pitt Street, which are:

- **standard case:** assumes the continuation of current underlying trends in population, income and wealth and vehicle registrations
- **optimistic case:** takes into account expected increases in the population growth rate.

There are two components within each case: the base component provides an indication of the current potential market and the growth component provides an indication of future demand. **Figure 25** provides an overview of the projection framework and **Figure 26** provides an overview of the relationship between the base and growth components with potential demand projections.

Figure 25 Overview of projection model for potential demand at Pitt Street Waterfront Precinct

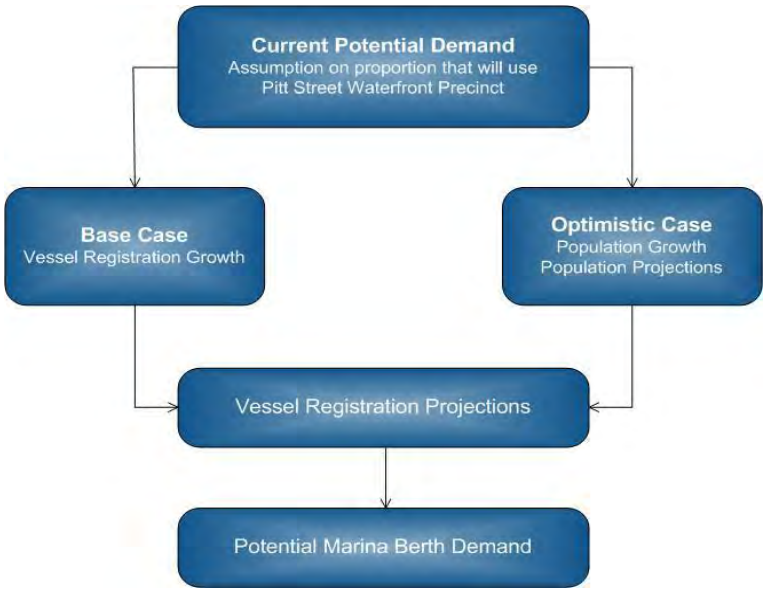
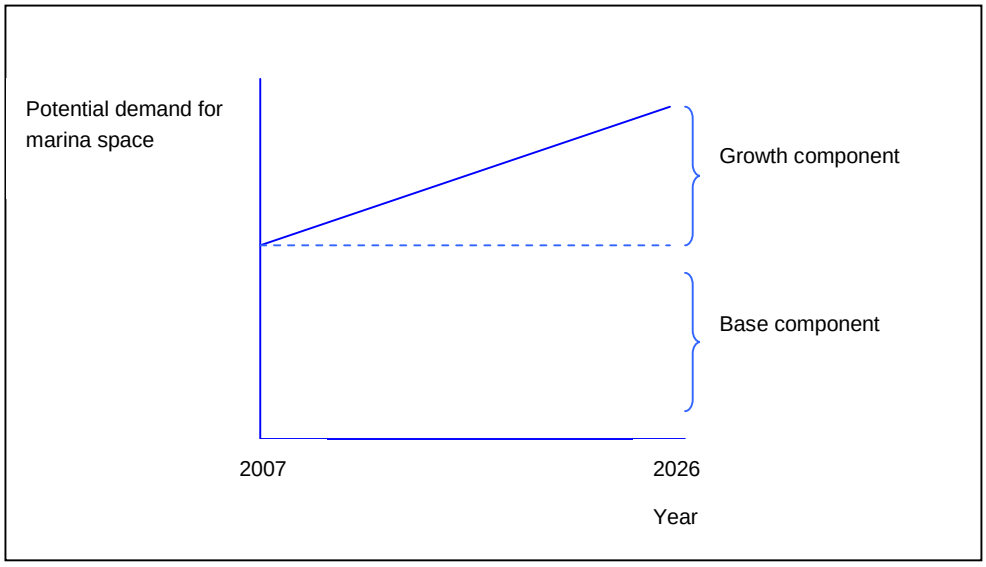


Figure 26 Relationship between base and growth components and berth projections



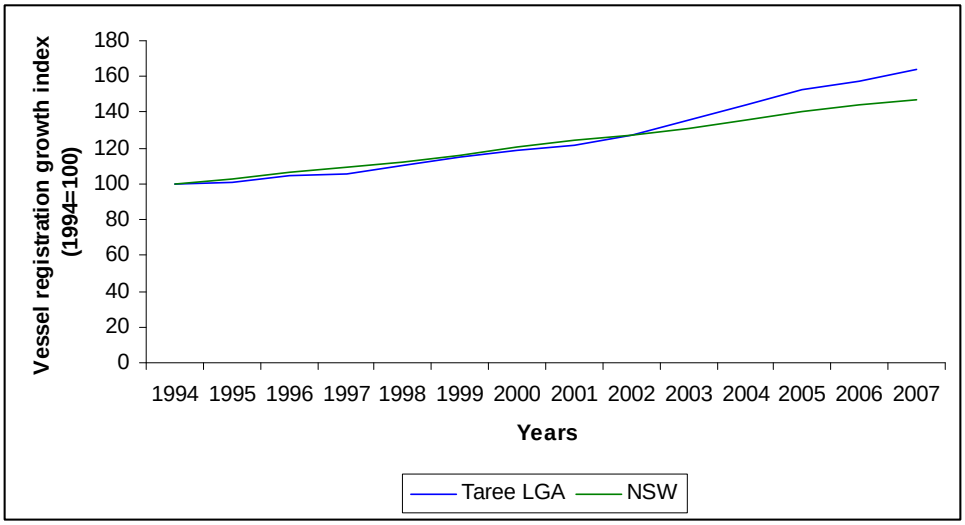
3.4.2 Vessel registration trends

Over the last decade, strong growth in vessel registrations has been experienced in NSW. From vessel registrations data obtained from the NSW Maritime Authority (formerly Waterways), registrations in NSW are approaching the 220,000 mark, with growth in vessel registrations in NSW growing at an average annual compounding rate of 3.0% per annum between 1994 and 2007.

To assist this study, data was sought from the NSW Maritime Authority to assess vessel registration growth trends within the Taree LGA area. As at October 2007, Taree LGA was found to be home to 3,823 vessels (of all sizes). Over the period 1994 to 2007, the number of vessel registrations in Taree LGA has increased by 64% compared with an increase of 47% for the whole of the NSW region, at an average annual compounding rate of 3.8% per annum. **Figure 27** shows the growth patterns for Taree

LGA and NSW. Up until 2002 Taree had similar growth to NSW, but in the last five years it has been growing at a faster rate.

Figure 27 Vessel registrations growth index for Taree LGA and NSW

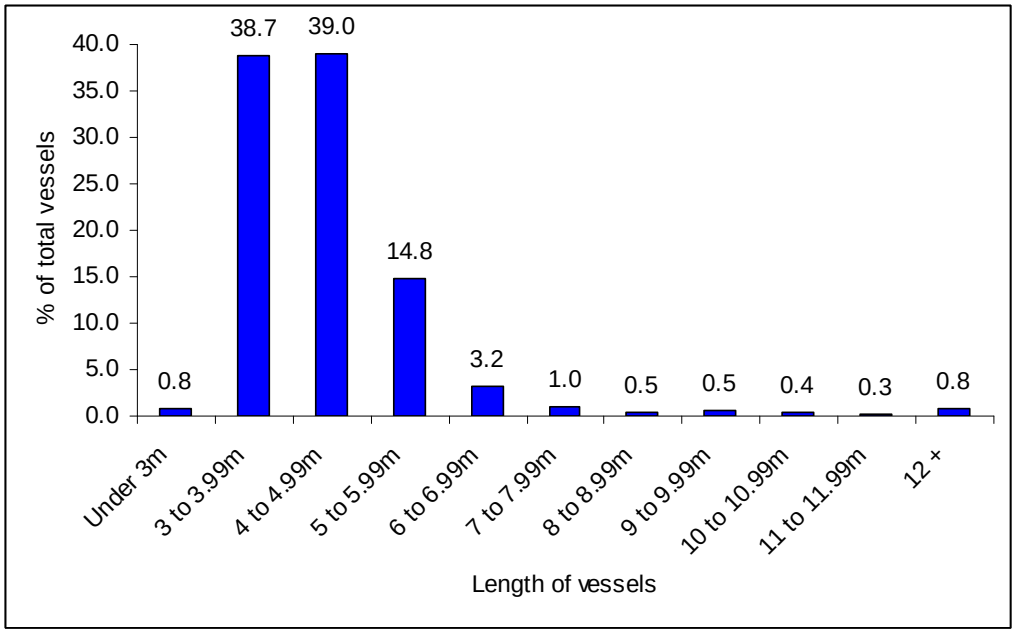


Taree's deviation from the NSW average in boat ownership since 2002 is likely to be a reflection of Council's increased spending and provision of facilities in line with the NSW Infrastructure Program (Greater Taree City Council, 2008). This indicates that ongoing provision of infrastructure, such as the proposed marina facilities, could have a similar effect of increasing boat ownership into the future.

Of the total vessels in 2007, 71% are open runabouts, 14% are punts and 9% are Cuddy-Cabin runabouts. Whilst punts have become more popular in recent years there has not been much change in types of vessels since 1994.

Figure 28 shows the boat length distribution for all vessels registered in Taree LGA in 2007. The majority of the vessels are under 6 m (93%), with 15% between 5 m and 6 m, 39% between 4 m and 3 m and 39% between 3 m and 4 m. There has been some small fluctuation in size over the years, but generally the proportions have stayed broadly the same.

Figure 28 Vessel length distribution for Taree LGA



The analysis of current vessel registrations in Greater Taree suggests the potential market for a marina is between 3 m to 7 m. Of this size, it is expected that owners of smaller vessels up to 5 m in length are less likely to utilise a marina berth. Of this range of vessels, those vessels that are stored in a marina of a length between 5 m and 7 m are be more likely to utilise dry berths than a wet berth. This is reflected in the likely vessel demand matrix provided in **Table 11**. **Section 3.4.3** provides a detailed discussion of the likely issues affecting demand for marina berths based on vessel registration and physical constraints.

It is noted that larger trailerable vessels are more difficult to store in house yards than smaller vessels and dry storage at the marina may be a more attractive option for owners.

3.4.3 Issues affecting demand for marina berths

Manning River constraints

Environmental management constraints

The *Manning River Estuary Management Plan 2008* (EMP) provides guidance on the future opportunities and constraints associated with the use of the Pitt Street precinct for a marina. The EMP presents a number of key issues, of which the relevant issues for Pitt Street Marina are:

- riverbank erosion
- water way access
- entrance condition issues
- lack of major launching facilities on the river
- waterway conflicts.

The EMP states that waves generated by larger boats and power boats in particular are commonly considered to have an impact on the rate of erosion of natural river banks. In addition to these, wake-boarding and water skiing activities have been shown to exacerbate bank erosion (EMP, 2008). The EMP states that wave height and power of the boat wake is responsible for increased bank erosion. Additionally power boats conflict with oyster farmers and people involved in passive recreation. Although the EMP does not specifically recommend the implementation of a 'no wash' zone to

alleviate this problem, it is believed that a 'no wash' zone could be the appropriate response in this case.

There is the potential for boat owners to be deterred from using the Pitt Street site given this constraint. However, conversely a reduced wash may encourage other boat owners engaged in fishing or more sedate forms of water related activities to use the River and in turn utilise a marina. The main entrance to the Manning River at Harrington is permanently open and has an artificial breakwall on the northern bank. Farquhar Inlet, to the north of Old Bar, is untrained and has a history of periodic closure. Farquhar Inlet has been blocked for some time by the back beach berm at Old Bar Beach (EMP, 2008). The EMP investigation recommends that major works are required to improve estuary flushing times and entrance navigability. However, it also recognises that these works would require further justification on environmental grounds. The Royal Volunteer Coastal Patrol (RVCP) monitors traffic over the bars at Harrington and Old Bar (Farquhar Inlet). The routes over the bars are considered to be dangerous and movement through these areas is not recommended. The Royal Volunteer Coastal Patrol estimates that only one to two boats traverse the bars at each location per month (RVCP, pers comm., 21 May 2008). The Manning River bar severely restricts the type, number and frequency of vessels that can enter/exit the Manning River. The bar therefore significantly reduces the type and number of ocean-going vessels that would utilise a marina on the Manning River.

The EMP action item 19 states that additional boating facilities should be constructed at Taree in accordance with the recommendations made in the Greater Taree Draft Conservation and Development Strategy. In order to develop these facilities a program of actions are required including the development of scoping plans to be assessed against the environmental and social impacts of the potential upgrade. Subject to the outcome of these studies, detailed design and construction would take place. However, it is noted that Figure 14 in the EMP (Estuary Management Strategy Zone 3) highlights the Taree foreshore for jetty/wharf areas and passive boating. However, the Chatham foreshore adjacent to the Pitt Street site does not have an allocated use. It is likely that the Pitt Street site was not noted by the EMP due to it still being under its previous use as a dairy at the time of the EMP's inception (Greater Taree City Council, pers comm., 20 May 2008). Consequently, it would not have been considered as a site for potential marina facilities.

The EMP suggests that the navigation channel at the rowing course adjacent to Shallow Island should be dredged to increase the amenity of the rowing course and general navigation along the Manning River.

Action item 23 requires the protection and preservation of sites of indigenous and non-indigenous heritage through the development of management plans for affected sites. It is noted that two DCP cultural heritage sites are located within the Pitt Street Marina precinct. The sites are both located abutting the river, one is at the southwest extremity of the land and the other site is in the centre of the land.

The EMP identifies priority one, two and three actions. Priority one actions are those in which implementation should proceed immediately to address major issues, with the action achieved within three years. Priority two actions are those in which implementation should proceed at some time during the next five years to address issues that have proved to be a consistent problem, but which can be *"lived with"* over the short term in the interests of achieving the right result (EMP, 2008, p.85).

Priority one actions included the incorporation of a 40 m wide un-developed 'Environmental Conservation' Zone adjacent to waterways within the revised *Greater Taree Local Environmental Plan 2008* (LEP 2008) and the finalisation of a comprehensive land use plan (*Greater Taree Conservation and Development Strategy*) to identify areas of future urban development and high conservation value (EMP 2008). The implementation of these strategies has the potential to place constraints on the future development of the marina.

The construction of additional boating facilities at Taree as per recommendations contained in the *Greater Taree Draft Conservation and Development Strategy* is considered a Priority two action.

General physical constraints

The key constraints on vessel types utilising the Manning River and the Pitt Street marina are described as follows. Refer also to 'height clearance' section below.

- Distance from coast – Pitt Street Waterfront is approximately 32 km from the Manning River entrance, which would take in excess of two hours for a yacht to cover with a tail wind (Greater Taree City Council, telephone conversation 20 May 2008). The distance means that non-power boats and smaller vessels are unlikely to make the journey from the coast. In light of this, the market for vessels at Pitt Street is likely to be focussed on local boat owners rather than relying on demand from vessels that travel along the NSW Coast. This is reinforced by the low demand levels currently experienced at Harrington Marina (Greater Taree City Council, pers comm., April 2008). Note that the distance to the coast is both a constraint (fuel, physical constraints) and an opportunity. The distance from the coast and the length of navigable river (for some vessels) provides a large area for exploring (see **Section 3.2.5** of this report for discussion regarding the Manning River tourist opportunities).
- No wash zones limit the speed and relative size of motor vessels – Council has indicated that *"based on outcomes of the draft 'Estuary Management Plan' the presence of no-wash zones along the Manning River will likely continue to increase in the future providing further discouragement to larger boat owners to navigate as far up the river as the Precinct"* (Greater Taree City Council, April 2008). This indicates a longer term reduction of the ability for larger vessels to travel along the Manning River, thereby reducing the likely demand for marina berths from larger vessels. However, the implementation of a 'no wash' zone is likely to encourage more passive forms of river activity including fishing and unpowered vessels.
- Navigability of route to the coast – The channel is approximately 4 - 5 m in depth from the Pitt Street Waterfront to the coast. However, the width of the channel, particularly around the river islands would make it very difficult for boats under-sail to negotiate the river into the wind as there is not sufficient room to allow vessels to tack (Greater Taree City Council, telephone conversation 20 May 2008).
- Manning River Bar – In relation to the draught of vessels able to cross the bar, the analysis assumes that, as the tidal range is approximately 2 m in spring tides, vessels with draught of approximately 2 m can cross the bar, weather permitting. AS 3962-2001 states that the typical vessel draught for yachts of 12 m in length is 2 m. Accordingly, sailing vessels (single hull) that are larger than 12 m in length have been discounted. Conversely, multi-hull sailing vessels, which typically have shallower draughts (being 1.2 m under AS 3962-2001) have better capabilities to cross the bar. It is noted that Old Bar may be considered as a site for a southern break wall, however any breakwater and dredging is not likely to occur in the short term and has not been included in this analysis. Long term future planning of the marina should not preclude the potential that at some stage, larger vessels may be able to navigate into the Manning River. Accordingly, the marina concept provides some area for expansion through induced demand or a freeing up of the river entrance.
- Implementation of an Environmental Conservation Zone (ECZ) adjacent to waterways within the Greater Taree Local Government Area as per the EMP has the potential to constrain development adjacent to the Manning River. The ECZ has the potential to conflict with the proposed Marina precinct development.

Larger wet berths are not expected to be as popular given the proportionately lower number of larger vessels that are adversely affected by physical constraints described above.

These constraints are reflected in the analysis contained in **Table 11**.

Height clearance

There are potential height clearance issues at a number of points along the river, both upstream and downstream of the Pitt Street Waterfront site. Obstacles include the Pacific Highway bridges crossing both the North and South Passages, restricting access for boats with masts in excess of 9 m. Additionally, power lines of a similar height cross the river further restricting access (Greater Taree City Council, telephone conversation 20 May 2008). The key vessel types that are affected by these height constraints are as follows.

- Cat Power Vessels – Cat Power boats are Catamaran (dual hull) motorised power boats. They should be classified in the same way as 'Motor Cruiser' vessels.

- Cat-Sail Vessels – Cat-Sail vessels are Catamaran (dual hull) sail boats. Vessels longer than 5 m generally have a mast length greater than 8 m meaning they may exceed the allowable vessel height. The table below summarises a number of Hobie Cat-Sail Vessels.

Model	Length (m)	Mast height (m)
Hobie Tiger	5.51	9.00
Hobie Getaway	5.05	7.60
Hobie Bravo	3.66	5.79
Hobie Wave	3.99	6.01
Hobie 16	5.05	8.07

*source http://www.hobiecat.com.au/sailing/specfeat.html

- Sail Vessel (Yacht) and Tri-Sail Vessels – Sail Vessels are generally too large to be considered for the site due to the height restrictions. The smallest Beneteau yacht on the market is the "First 21.7" which has a length of 6.4 m and a mast height of 10.4 m. Smaller recreational sail vessels such as Lasers would be able to be used in the area and could be stored on hardstand.

Propensity of vessels to use marina berths in Manning River

Of primary interest to this assessment are the types of vessels that are most likely to use a marina on the Manning River. Refer also to **Sections 3.2.1** and **3.2.2** of this report for discussion regarding the unique physical characteristics of the Manning River that influence the type of vessels that can cross the Manning River bar.

For the purposes of this analysis **Table 11** describes the types of vessels that would be expected to utilise either a dry or a wet berth at a new marina in the Manning River based on the physical constraints only. This is not based on the likelihood of vessel owners 'choosing' to berth a vessel in a marina[5]. This matrix forms the basis for modelling (forecasting) vessel demand based on trends in vessel registration. The matrix provides a description of the propensity of vessels to use the marina at Pitt Street.

Assumptions and categorisations used to describe the propensity of vessels to locate at Pitt Street are described in the notes to the table, which are provided in **Table 12**. The classifications of vessels are based on the NSW Maritime Vessel Registration database.

[5] To estimate the likelihood of a boat owner choosing to berth a vessel in a marina on the Manning River, a survey of existing and potential boat owners would be necessary.

Of relevance to this analysis is the following statement from Council:

> *"Council suggests that the majority of larger vessel owners (i.e. those requiring wet berths) already own waterfront property with private jetties such that demand for wet berths may not be so high resulting in hardstand dry storage being the modal form of boat storage. For this reason, most demand for wet berths is likely to come from transient holiday makers. Based on the current low occupation of wet berth moorings at Harrington Waters, the demand for wet berths at Pitt Street should not be expected to be too high."* (Greater Taree City Council, April 2008)

The analysis has subtracted the number of existing vessels that are stored on private jetties (based on aerial photography survey) from the total licences used to derive the Base Component of the projected vessel demand (refer **Section 3.4.4** of this report).

Other vessels that are licensed by NSW Maritime, such as Inflatable, Pontoons, Personal Watercraft, Hovercraft and Hydroplane were not considered in this analysis.

Table 11 Likely demand for marina berths (dry and wet)

Vessel Type	Vessel length and likely demand for Marina berth				Remarks (assumptions for ratings)
	Up to 4.99m	5 to 5.99m	6 to 6.99m	7m +	
Barge	Temporary	Temporary	Temporary	Temporary	The marina should have a focus on recreational vessels and vision for precinct as a retail and high amenity urban environment. However, there will be greater need for barges with increased boating. Barges may not necessarily need berths but may need to work there or to access fuel. Houseboats and barges may utilise similar mooring facilities. Barges are likely only to be located at the Marina temporarily, for which a temporary mooring jetty is provided in the concept.
Centre Console	Unlikely	Possible	Possible	Likely	The *Manning River Estuary Management Plan 2008* suggests that water skiing is a significant contributor to bank erosion and impacts on private moorings. No wash zones act as disincentive to use of larger cat-power, cuddy cabin runabout, motor cruisers, open runabouts and planning vessels on the river. The EMP is likely to extend the no-wash zones, which will act as a deterrent to owners of larger vessels of this nature, which would travel at faster speeds and generate wash, from using the river. It is noted that centre consol vessels are used for fishing and may be less affected by the no wash zones in the river and larger such vessels are rated more likely than other powered vessels. Vessels less than 5 m in length are more likely to be trailered than stored in a marina.
Cat-Power	Unlikely	Possible	Possible	Possible	
Cuddy Cabin Runabout	Unlikely	Possible	Possible	Possible	
Motor Cruiser	Unlikely	Possible	Possible	Possible	
Open Runabout	Unlikely	Possible	Possible	Possible	
Planing	Unlikely	Possible	Possible	Possible	
Sailing Ship	NA	NA	NA	NA	Sailing ships have been discounted as these vessels typically have masts that would be constrained by bridges and power lines over the river. Further, sailing ships are not likely to use Pitt Street Marina due to Manning River bar. In addition, there are not likely to be sailing ships less that 6 m in length.
Cat-Sail	Possible	Unlikely	NA	NA	Larger cat-sail vessels, sail vessels (yachts) and tri-sail vessels have been discounted as these vessels typically have masts that would be constrained by bridges and power lines over the river (refer to **Section 3.4.3** regarding vessel height constraints). Further, sailing vessels are not likely to use Pitt Street Marina due to distance from coast and Manning River bar. Smaller such vessels may be trailered or stored in a dry berth.
Sail Vessel (Yacht)	Possible	Unlikely	NA	NA	
Tri-Sail	Possible	Unlikely	NA	NA	
Dredge	Temporary	Temporary	Temporary	Temporary	Dredges are not desirable due to focus on recreational vessels and vision for precinct as a retail and high amenity urban environment. As with barges, dredges that may wish to moor temporarily at the marina can do so under the concept at the temporary berthing jetty.
Fishing Vessel	Unlikely	Unlikely	Unlikely	Unlikely	Larger fishing vessels are unlikely to access this portion of river due to Manning River bar. Smaller fishing vessels are likely to be trailered.
Houseboat	NA	NA	Likely	Likely	Houseboats are not likely to be of a length less than 6 m.
Punt	Unlikely	Unlikely	Unlikely	Unlikely	Punts are used for fishing along the Manning River. Some may locate in the marina, but are more likely to be trailered or stored in a dry berth.
Unknown	NA	NA	NA	NA	The unknown category of vessels from the NSW Maritime licence database is undefined and is discounted for this analysis. The NSW Maritime 'Application for Vessel Registration' does not contain a field for 'unknown' under the 'vessel type' section of the form. This category accounts for approximately 0.5% of the vessels in the Greater Taree area, so does not significantly impact on the outcome of the analysis.
Row Boat	NA	NA	NA	NA	Row boats would be stored in sheds or on trailers and would not locate in a marina.

Table 12 Key to Table 11

Key			
Demand	**Description**	**Treatment in model**	**Explanation**
Temporary	Vessels of this nature are not desired at the Pitt Street Marina	Modelling based on **0%** of these vessels using Pitt Street Marina	These vessels would not be appropriate at the marina due to the focus on high amenity urban design and on recreational boating. However, there may be demand for such vessels on a temporary basis. Accordingly, some vessel types will be catered for on a temporary facility shown in the concept design.
NA	Vessels of this type are not likely to fall within this size range or are severely affected by river constraints	Modelling based on **0%** of these vessels using Pitt Street Marina.	Such vessels would not typically exist at the lengths described in the table or are severely constrained by physical river constraints, including power lines, bridges and/or river depths.
Unlikely	These vessels are not likely to be interested in a marina berth, based on size, but a few may use a marina.	Modelling based on **5%** of these vessels using Pitt Street Marina	Whilst the majority of vessels classified as unlikely will not use a marina as they can use a trailer, there will be some unique cases where the owner will prefer to use a marina.
Possible	These vessels may be interested in a marina berth.	Modelling based on **25%** of these vessels using Pitt Street Marina.	The majority of vessels classified as possible are 6 – 7 m. Some of the vessels towards the top end of this range will likely use a marina, whilst others towards the bottom end will not. It has been assumed that on average half those in this range will use a marina. In addition, existence of typically large blocks of relatively inexpensive land in Taree coupled with the low income profile seen in **Section 3.3.4** of this report, mean there is likely to be a high propensity to trailer vessels where possible. As such, it has been assumed that of the 50% in this category that may use a marina due to size, only half will do so. Overall this gives a proportion of 25% of vessels in this category.
Likely	These vessels would likely be interested in a marina berth as these vessels are generally not able to be launched using a trailer.	Modelling based on **100%** of these vessels using Pitt Street Marina.	The size of these vessels indicates they would always seek to locate at a marina or fixed mooring. These vessels could typically cross the Manning River bar, weather permitting.

Propensity of vessels to use dry or wet berths

Due to the large number of trailerable vessels that are registered in the Greater Taree area, there is likely to be a demand for dry berths to park these smaller vessels. The options for providing dry storage at the Taree Waterfront site include:

- Dry 'Stack' Building – Typically, vessels up to 8 m in length can be stored in a dry stack building (**Figure 29** provides and example of a dry stack building).
- Hardstand – parking of vessels of a range of lengths on a hardstand, either with or without a shelter **Figure 30** provides and example of a hardstand storage area).

Typically, a contemporary dry stack building requires around 200 berths for the building to be commercially viable. In the case of Taree this is not likely to occur in the short term. A hardstand area can be used initially and converted to a dry stack building should demand be of sufficient size in the future to warrant further investment by the marina operator. This has been built into the concept design provided in **Section 5.3** of this report.

Figure 29 Dry Stack – St Kilda Marina (Vic)

Source: http://stkildaboatsales.com.au/st-kilda-marina (2008)

Figure 30 Maintenance and storage yard – Marmong Marina, Lake Macquarie

Source: Maunsell, 2007

Due to the lack of comparable examples to the Pitt Street Marina situation it is difficult to establish an accurate appreciation of the demand for dry as opposed to wet berths. An examination of marinas that contain both wet berths and dry berths located in either a dry stack or on hard stand demonstrates that the demand for particular facilities is related to a number of factors. Factors that influence the propensity for owners to utilise dry berths include the following.

- Boat size – larger boats are less manoeuvrable and therefore harder to take out the water. Additionally many of the larger boats have facilities on board to enable owners to use the boats while moored, as opposed to smaller boats which do not have the onboard facilities that make it comfortable to spend time on the boat while stationery (St Kilda Club, 2008). Consequently, it is likely that a hard stand area should be equipped to cater for smaller boats of between approximately 4.5 m and 8 m based on discussion with Marina operators at St Kilda Marina and d'Albora Marina, Akuna Bay (pers comm., 2008).
- Frequency of usage – boat owners who use their vessels more frequently are likely to accept the higher costs associated with a wet berth and keep boats on the water due to the added convenience (St Kilda Marina, 2008).
- Capacity of owner – some older, less mobile, boat owners may prefer to locate their vessels in dry storage to avoid the need to use trailers and boat ramps.
- Transport and storage options – boat owners who live in close proximity to the marina and have their own land on which to store boats are less likely to require marina storage. Larger trailerable vessels are more difficult to store in house yards than smaller vessels and dry storage at the marina may be a more attractive option for owners. However, residential properties in Taree tend to be of a sufficient size and configuration to enable the parking of smaller trailerable vessels on site. Further, waterfront properties on the Manning River often have jetties, which offer good mooring ability and would reduce propensity for those owners to use a marina berth. To encourage owners to use dry storage, incentives for use will be required, including measures such as lower rates than wet berths and support services. In this regard, benefits of dry storage that can be marketed include:
  - greater flexibility and range of storage options
  - savings on repair and maintenance requirements as boats are stored out of water and away from direct sunlight
  - elimination of anti-foul requirements
  - savings on boat trailer costs, storage needs, towing and associated trailer parking
  - reduced fuel consumption and decreased traffic congestion as a result of the above
  - potential for high level step-on / step-off boating service provided by the operator
  - lower insurance premiums as a result of increased storage security.

The following table provides examples of Australian marinas that contain both wet and dry berths. The proportion of wet to dry berths is variable and dependent upon local conditions, including access to ocean and maintenance facilities provided. It is noted that dry stacks are very limited within NSW due to a number of reasons, including land values and the difficulty of obtaining development approvals in sensitive waterside locations (pers comm. Soldier Point Marina & d'Albora Marina, 2008).

Hard stand is generally provided at marinas surveyed, but its use is predominantly for maintenance works or temporary storage, with few examples of permanent storage facilities offered on hard stand.

Table 13 provides a breakdown of marinas that provide both wet and dry berths.

Table 13 Marina wet/dry Berth ratio

Marina	Wet berths	Dry berths/hard stand storage	Wet to dry berth ratio
Batemans Bay (NSW) – large dry stack building *(new development scenario)**	240	250	1:1.1
Marmong Marina (NSW) – sheltered hardstand storage yard *(under proposed development scenario)**	245	110	2.3:1
Akuna Bay (NSW) – dry stack building	200	180(boats up to 7.3m long)	1.1:1
St Kilda (Vic) – combined dry stack building and hardstand	500	400 (200 stack/ 200 hard stand 4.5-9m long)	1.25:1

Source:
** Department of Planning website – Register of Major Projects (www.planning.nsw.gov.au/asp/register.asp)*
*** Pers comm. 2008.*

It is noted that Mulgrave Marina (Queensland) provides 100% dry berths as the site is constrained by flooding and wet berths are not possible. This analysis demonstrates that the ratio of dry to wet storage is tailored to the constraints and the nature of likely demand for berths overall.

In terms of occupancy, **Table 14** provides an overview of the occupancy rates for dry storage facilities around Australia. This demonstrates that where good facilities are provided, generally the occupancy rate is high. This generally supports the concept of providing dry boat storage facility to cater for the high number of smaller vessels that characterises the potential market for a marina on the Pitt Street Waterfront Precinct.

A *Survey Of Existing Australian Dry Boat Stores Incorporating Vessel Launch Demand Profiles, Layover Berths To Boats Stored, Storage Slot Occupancy Levels* (the Dry Boat Stores Report) was prepared by Australian Marina Management Pty Limited (2005), which provides a breakdown of the occupancy rates for dry storage facilities in Australia. A summary of the occupancy rates is provided in **Table 14**.

Table 14 Occupancy of dry storage facilities

State	Facility	Total Spaces	Annual Occupancy	Spaces Used
QLD	Gold Coast City Marina	250	96.00%	240
	Horizon Shores Marina	360	85.00%	306
	Runaway Bay Marina	160	98.12%	157
	East Coast Marina	120	98.33%	118
	Spinnaker Sound Marina	66	98.48%	65
	Total - Queensland Facilities	956	92.67%	886
VIC	Pier 35 Marina	300	92.00%	276
	Patterson Lakes Marina	275	88.00%	242
	St Kilda Marina	110	94.54%	104
	Total - Victorian Facilities	685	90.80%	622
NSW	d'Albora Marina Akuna Bay	165	87.27%	144
	Total – NSW Facility	165	87.27%	144
National Totals - Australia		1,806	91.47%	1,652

Source: Australian Marina Management Pty Limited, 2005

The Dry Boat Stores Report states the following in relation to these figures.

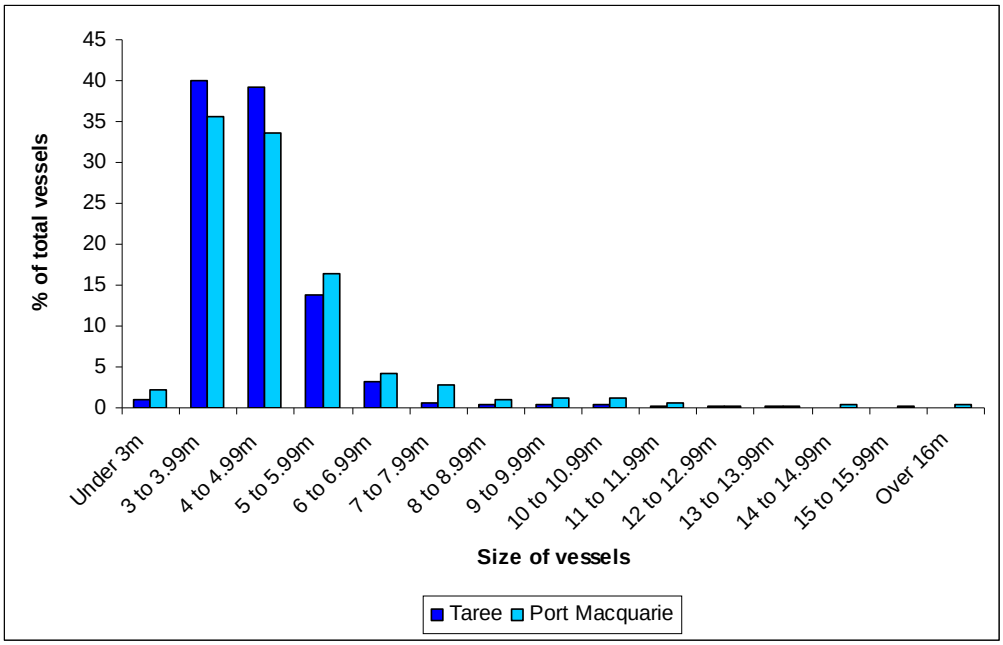
> *"The average occupancy rate in Queensland is slightly higher than in Victoria. The location of some of the older and smaller Queensland facilities however is convenient to open waters and results in higher than average occupancy.*
>
> *Water access to the Patterson Lakes facility in Victoria is restricted to some degree by a road bridge resulting in the facility having a slightly lower than average occupancy.*
>
> *The Akuna Bay facility in NSW is an older partially open facility. It is also in a relatively remote location. These factors result in a slightly lower than average occupancy."* (Australian Marina Management Pty Limited, 2005)

The above examples are not readily comparable to the Taree situation due to a combination of the following:

- Taree is the only marina location that is located on a river with virtually no ocean/lake access (due to bar)
- Taree is located large distance from the coast
- Manning River is constrained by a number of height restrictions (see above for discussion regarding the range of river constraints)
- other locations are generally near larger urban centres.

Although providing direct ocean access, Port Macquarie provides a reasonable comparison for Pitt Street Marina as it is considered to be of a similar socio-economic demographic and is located in close proximity to Taree. In this regard a comparison of the NSW Maritime vessel registration data between Taree and Port Macquarie was carried out, which is provided in **Figure 31**. This shows that the profile of vessel size for Taree is comparable to the Port Macquarie situation, but with Port Macquarie having slightly higher proportion of larger vessels. Most likely, this is a function of the direct ocean access available from Port Macquarie.

Figure 31 Vessel registrations for Taree and Port Macquarie



In addition, the Port Macquarie Marina is currently undergoing a redevelopment and provides a good indication of the market potential for marinas in the Mid North Coast of NSW. A review of the Port Macquarie Marina configuration was conducted in order to inform the analysis of potential dry and wet berthing on the Manning River. The analysis provided considers both the existing and future scenarios at Port Macquarie. The following information was obtained from the Port Macquarie Marina and Recreation Precinct website (www.portmacquariemarina.com.au).

As discussed in **Section 3.2.3** of this report, existing wet berths at Port Macquarie Marina are made up of:

- 49 wet berths within the existing marina basin
- eight swing moorings in the Hastings River Estuary
- one 'H' mooring that has the capacity for a further 10 – 12 craft, which is situated within the Hastings River Estuary at the edge of the examination licence area.
- total of up to 69 berths (including swing moorings).

The Port Macquarie Marina wet berth configuration allows for vessels up to 12 m in length. Due to severely restricted fairway and berth dimensions and the dilapidated state of existing pontoons, there is no set layout or berthing size mix for the marina. Most of the vessels currently in the marina are between 6 – 8 m in length.

The Port Macquarie Marina dry storage facility has recently been closed as it was deemed unsafe and demand for berthing was insufficient to sustain its operation. Prior to closing, the dry stack building catered for approximately 22 vessels (see **Figure 32** and **Figure 33**). The existing hardstand contains approximately 16 vessels (counted using Google aerial image) that are undergoing maintenance or being stored temporarily.

This equates to a total of 38 dry storage berths at Port Macquarie Marina, notwithstanding that 22 of these dry berths are now decommissioned as these will reinstated as part of the redevelopment project (see below).

Figure 32 Port Macquarie dry storage facility – south side

Source: Maunsell, 2007

Figure 33 Port Macquarie dry storage facility – north side

Source: Maunsell, 2007

Under the proposed redeveloped Marina and Public Recreation Precinct, the berth configuration comprises:

- 149 wet berths
- 240 dry berths in boat dry stack (Source: www.portmacquariemarina.com.au).

It is appropriate to use the future scenario to inform the Taree marina analysis because this is a scenario that the current investors have committed funds and is assumed to be based on future market potential.

To summarise, the ratios of wet to dry berths for the existing and future developed scenario are shown in **Table 15**.

Table 15 Ratio of wet to dry berths – Port Macquarie

Berth type	Development Scenario	
	Past (%)	Future (%)
Wet	64	38
Dry	36	62

As the Port Macquarie market is made up of slightly more larger vessels than Taree (see **Figure 31)**, the final figures using the ratio of dry to wet berths from Port Macquarie is conservative and may be weighted more towards wet berths than dry storage. This means that as Taree has a slightly higher proportion of smaller vessels, Port Macquarie situation indicates that the market in Taree is likely to be focussed towards dry berths.

The future ratio of wet to dry berths in **Table 15** is used in this market analysis to calculate the proportion of wet and dry marina berths at the Pitt Street Waterfront.

3.4.4 Projection base component

The 'base component' of the projections establishes the proportion of the *current* vessel market that will use the Pitt Street Waterfront Precinct. This is difficult to ascertain for a number of reasons:

- there are currently no marina facilities at the site so there are no indicators of demand (current users, waiting lists)
- it will be a river only marina, so there are not many other marinas with which to make suitable comparison.

To provide a reasonable estimate of project demand, this analysis is based on the following steps:

1) analysis of collected data on vessel registrations in the Taree LGA area for the period 1996-2007
2) classified this data into those that may use a marina based on size and type of vessel and calculated the proportion of those with suitable vessels that may use the Pitt Street Marina.

Each of these steps is discussed in more detail below.

Step one: Collected data on vessel registrations in the Taree LGA area for the period 1996-2007

The vessel registration data is available by postcodes. The postcodes were grouped to make an area that is comparable with the Taree LGA area and that will be consistent with the socio demographic data and the population projections (see **Figure 24**). This data indicates a total of 3,823 vessels in 2007.

There will be some leakage into and out of the area, which means vessels registered in the Taree area may use marinas in other areas and other vessels registered outside the region may use marinas in the Taree region. For the purpose of this analysis it has been assumed that the proportion that leave and enter will be the same and the overall effect is neutral.

Step two: Classified this data into those that may use a marina based on size and type of vessel and calculated the proportion of those with suitable vessels that may use a marina

Vessel demand spread

When the type, number and sizes of vessels that are registered in the Greater Taree area is assessed against the matrix of vessels provided in **Table 11**, the results show that a total of 8.6% of total vessels registered in Taree LGA, which equates to a total of 330 vessels that are of the appropriate type and size to use a marina in the Manning River.

Figure 34 shows the vessel size distribution for the 330 vessels that are calculated to be most likely to use a Manning River marina. Of the 330 vessels, 45% are under 5 m, 41% are between 5 m and 6 m and 8% are between 7 m and 8 m. Only 6% of the 330 vessels are over 7 m.

Figure 34 Vessel size distribution for Pitt Street

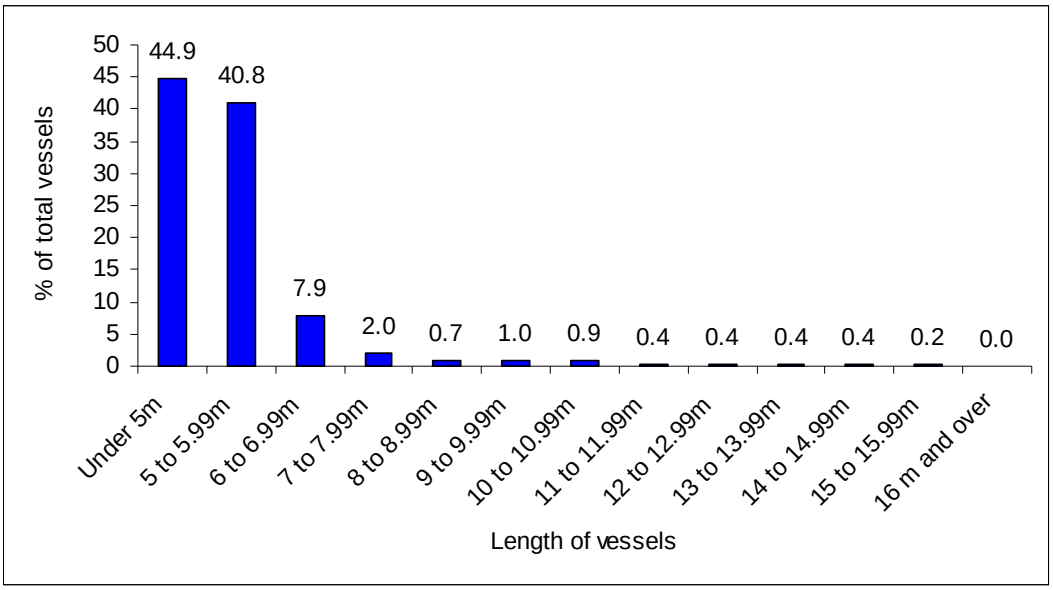


Table 16 shows the proportion of total vessels (330) for each type of vessel that are most likely to use a marina.

Table 16 Type of vessels that may use a marina

Type of vessel	Proportion of vessels
Open runabout	65%
Cuddy-Cabin runabouts	19%
Punt	8%
Motor cruiser	5%
Houseboats	2%
Cat-Power	1%

This analysis of vessel registrations (as at October 2007) is used as the basis for calculating the projected marina demand at the Pitt Street Marina, using the two identified growth scenarios (base and optimistic), which are described in the following sections.

Potential vessel demand

In terms of potential vessel demand **Table 11** splits vessel registrations into the types of vessels that would utilise a marina on the Manning River. Using these classifications, it is possible to calculate the number of vessels that may use a marina berth (based on size and types of vessels). The proportions and numbers are set out in **Table 17**. As discussed in **Section 3.4.2** only 25% of vessels classified as 'possible' and 5% of those classified as 'unlikely' have been used.

Table 17 Likely demand for marina berths from vessels registered in Taree LGA

Likelihood of using a marina	%	Number of Vessels (2007)	Number of vessels that are the right size and type to use a marina (2007)
Likely	0.2 %	6	6
Possible	18.2 %	695	174
Unlikely	78.5 %	3000	150
Not applicable	3.2 %	122	0
Total	**100%**	**3,823**	**330**

Assessment of the likely demand in accordance with **Table 17** gives a total number of 330 vessels that are of the appropriate type and size to use the proposed Pitt Street marina. There are a number of factors that will affect whether the owners of these vessels will use a marina and whether that marina will be the proposed Pitt Street Marina, including:

- price
- competition
- security
- services (quality of mooring, site maintenance, quality and range of facilities).

There is a lack of published research into what proportion of people with vessels use marinas in Australia, and particularly for inland marinas. A UK study of inland marinas shows that the proportion of boats requiring inland long term moorings in the UK is currently 55% but could go up to 66% once induced demand is included[6]. Although the UK is a different market there are many similarities that make this result usable in the absence of data specifically on the Australian market.

Along the navigable part of the Manning River there are 83 private jetties, with only 11 of these in use, and 18 swing moorings. This is just a snapshot but provides a guide as to where people keep their boats. Only 29 of the 330 registered vessels big enough to require a marina have somewhere to store their vessel which suggests there may be demand from up to 93% of the 330 vessels most likely to use a marina in the Manning River.

In order to be conservative the 55% figure, established in the UK study, was used. This indicates 182 vessels registered in the Taree LGA that are likely to use a marina on the river upstream of the Manning River sand bar.

The provision of a new Marina may attract further demand (either through existing vessels switching from their existing sites or through new vessel purchases), attracted by the increased probability of attaining a berth. As the proposed Manning River marina is a unique situation, it is very difficult to ascertain the induced demand. The current model assumes a proportion of the current vessel owners will switch to the new marina, but does not take account of people who purchase new vessels due to the marina being available.

[6] Inland Marina Investment Guide, British Waterways, 2006

The UK study used above to give a guide on the proportion of vessel owners that use a marina suggests the proportion could rise from 55% to 66% once induced demand is accounted for. Sensitivity testing has been undertaken using proportions of 45% and 66%. The 66% sensitivity provides an indication of the number of vessels if induced demand is included. As there is uncertainty over this number it is suggested a cautious approach is taken and 55% is used with the sensitivity percentages as a range.

As described in **Section 3.2.2**, there are two main competing marinas in the region. Crowdy Head provides space for up to 30 moorings and Harrington currently provides space for 24 moorings with 20 more planned in the near future. There are currently 74 moorings available, which results in potential demand for an additional 108 moorings at present (i.e. 182 vessel registrations of a type likely to use a marina minus 74 moorings at Harrington and Crowdy Head), assuming a new marina is competitively priced and offers suitable facilities. This would represent 59% of the potential local market.

In addition, the Pitt Street Marina may be able to attract a higher share of the market. Harrington is expected to be utilised by the residents of the associated residential estate and the marina is currently remote from other services and facilities. Pitt Street is adjacent to the Taree CBD and as long as it provides a concentration of ancillary facilities that the other marinas do not have, it has the potential to attract a larger share of the market.

3.4.5 Projection growth component

To calculate the growth components, regression modelling (i.e. analysing past data trends) was undertaken over an 11 year period to increase the robustness of the projections. Aggregate vessel information was used for the Taree Local Government Area, to allow the model to encapsulate the possibility that smaller boat owners may switch to larger boats if marina space became available.

The regression analysis is based on the two growth scenarios, 'standard case' and 'optimistic case', as described below.

Standard case

The standard case growth scenario is a continuation of the established upward trend in vessel registrations over the past ten years. It should be noted that the standard case implies the continuation of growth in factors such as population, income and wealth.

Using econometric analysis, a relationship between vessel registrations and time was constructed and the following relationship was estimated:

Equation 1 Standard case regression

Number of vehicle registrations = 2026.4 + 118.71 (Years – 1994)

The relationship expressed in **Equation 1** is based on data between 1994 and 2007. From this relationship, vessel registrations were predicted. A high R^2 value[7] of 0.95 was achieved. The high R^2 value suggests a high level of fit between vessel registrations and time[8]. The year parameter of 118.71 in **Equation 1** implies that each additional year brings about an additional 118.71 vessel registrations.

Vessel registrations were projected using the relationship established in **Equation 1**. In turn, the growth in projected vessel registrations has been used to calculate the potential demand for marina berths at Pitt Street and construct a 'growth index' by which the current level of demand for marina

[7] The R^2 value is a measure of the goodness of fit and is used to assess how well the regressed equation fits the dataset. A figure of 1 is a perfect fit and 0 is no fit.

[8] High levels of fit can be achieved if any two variables increase over time, even under situations where these variables are unrelated.

berths will be increased. **Table 18** shows the growth index under the standard case. It also shows the results of the sensitivity analysis indicating how the number of berths demanded varies if the proportion of people that use a marina changes.

Table 18 Projected growth index under standard case

Year	2007	2011	2016	2021	2026	2031
Projected vessel registrations	3,823	4,044	4,638	5,232	5,825	6,419
Potential market for Pitt St	**108**	**113**	**130**	**146**	**163**	**180**
Growth index	100	106	121	137	152	168
Sensitivity analysis						
Sensitivity – proportion that use a marina 45%	88	93	106	120	133	147
Sensitivity – proportion that use a marina 66%	128	136	156	176	196	216

The analysis suggests that at the moment there is potential demand for around 110 berths. The projections show continued growth. Over the medium to long run there could be potential demand for around 150-180 berths.

Optimistic case

Under the optimistic case, an econometric analysis of the long run relationship between population and aggregate vessel registrations was performed. The population projections for the Taree LGA area were then used to forecast future vessel registrations. Future vessel registrations forecasts were in turn used to develop a growth index for the standard case. The population projection figures for Taree LGA were based on projections from the Greater Taree City Council[9].

This method allows for the trends in population growth to be incorporated into the projections. Taree City council expect a 30% increase in population between 2006 and 2031.

The following relationship was estimated between vessel registrations and population:

Equation 2 Optimistic case regression

Number of vessel registrations = -16146 + 0.4405 Population

The relationship expressed in **Equation 2** is based on data between 1996 and 2007. The regression produced a high R^2 value of 0.98. The high R^2 value suggests a high level of fit between vessel registrations and population[10]. The population parameter estimate of 0.4405 is quite high, but likely reflects the high number of the population in Taree that have registered vessels. In 2006 8% of the resident population in Taree has a registered vessel, compared with 3.3% of the NSW population. This is not surprising as Taree is on the coast and has a high proportion of people aged over 50 years (the key demographic market for vessel ownership), at 41% compared with 31% for NSW as a whole.

Again, a growth index has been developed from projected vessel registration growth rates. These projections were developed from **Equation 2** are shown in **Table 19**.

[9] Greater Taree City Council Local Growth Management Strategy

[10] High levels of fit can be achieved if any two variables increase over time, even under situations where these variables are unrelated.

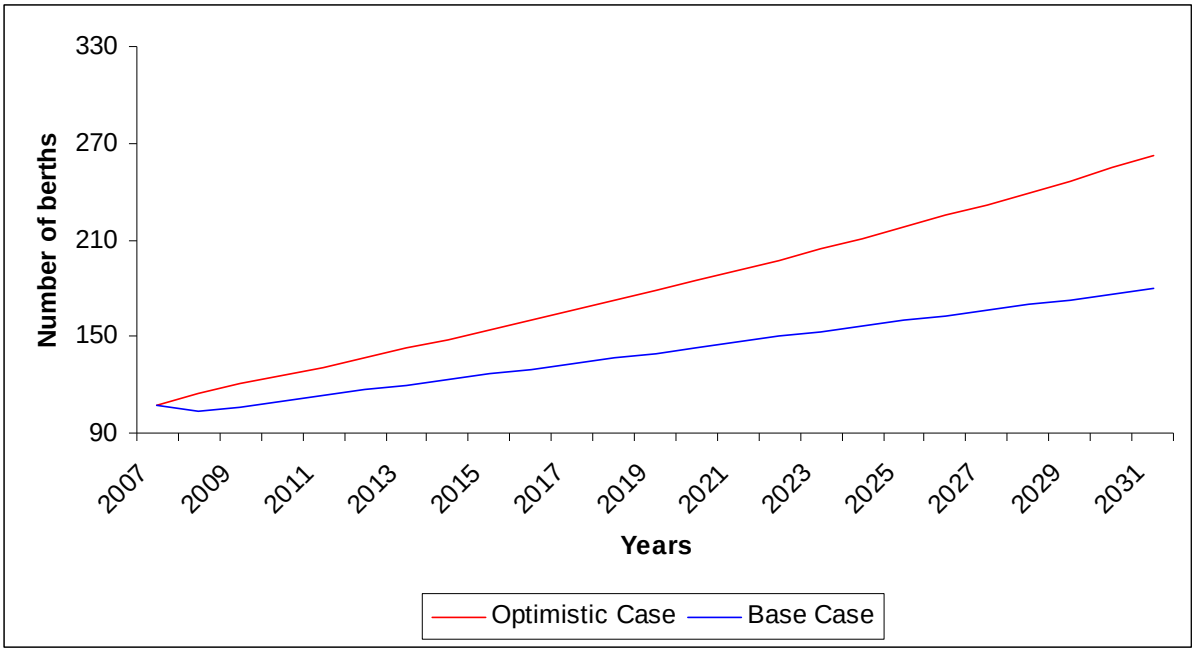
Table 19 Projected growth index under optimistic case

Year	2007	2011	2016	2021	2026	2031
Projected Population	45,267	47,291	49,613	52,138	54,893	57,907
Projected vessel registrations	3,823	4,685	5,709	6,820	8,034	9,362
Potential market for Pitt St	**108**	**131**	**160**	**191**	**225**	**262**
Growth index	100	123	149	178	210	245
Sensitivity analysis						
Sensitivity – proportion that use a marina 45%	88	107	131	156	184	214
Sensitivity – proportion that use a marina 66%	128	157	192	229	270	314

Currently, there is potential demand for around 110 berths. The optimistic case suggests by the time this development is complete (2-3 years) potential demand could be around 130 berths. The projections show substantial growth, accounting for the expected increase in population over the next 20 years in Taree LGA. Over the medium to long term (10-15 years) there could be potential demand for 190 - 260 berths.

Figure 35 shows the comparison between the two different forecasts. They diverge due to the population growth projections, which affect vessel registrations under the optimistic case.

Figure 35 Potential demand for marina berths under standard and optimistic growth scenarios



As a check on these numbers, the proportion of vessel owners in Port Macquarie that use the marina was calculated. In 2007 there were 2154 vessels registered in the Port Macquarie area. The Port Macquarie marina has a total of 107 berths (69 wet berths and 38 dry storage – see section 3.4.3), representing 5% of total vessels registered in Port Macquarie[11]. If you assume the same proportion for Taree this would suggest there should be 190 marina berths at Greater Taree. Given there are

[11] Not all of the berths at Port Macquarie will come from vessels registered in Port Macquarie. This is not an accurate calculation but sufficient to provide a quick sense check on the numbers at Taree.

limitations at Taree, as discussed in **Section 3.4.3** of this report, it is expected that there would be less berths than at Port Macquarie. This suggests the total berth numbers are a reasonable approximation.

As discussed in **Section 3.4.3** of this report, the best reflection of current propensity of vessels to use dry or wet berths is reflected in the redevelopment plans for Port Macquarie where there will be 38% wet berths and 62% dry berths. **Table 20** and **Table 21** describe the projections for wet and dry berths under the base case and the optimistic scenario.

Table 20 Projected wet and dry berths under the base case

Year	2007	2011	2016	2021	2026	2031
Potential market for Pitt St	108	113	130	146	163	180
Wet berths (38%)	41	43	49	55	62	68
Dry berths (62%)	67	70	81	91	101	112

Table 21 Projected wet and dry berths under the optimistic case

Year	2007	2011	2016	2021	2026	2031
Potential market for Pitt St	108	131	160	191	225	262
Wet berths (38%)	41	50	61	73	86	100
Dry berths (62%)	67	81	99	118	139	162

3.4.6 Caveats

As is the case with all projections, some consideration needs to be given to factors that may affect their validity. The modelling provided in this report is prepared based on the following caveats.

- **Future population growth:** Projections have been predominantly based on population projections prepared by Taree City Council. Significant differences in population growth rates in the future from those projected will have a significant effect on marina berth projections.
- **Vessel registration growth:** There are a variety of factors that affect vessel registration that may change the trend over the past ten years.
- **Proportion that will use a marina:** In the absence of a current facility it is very difficult to estimate the proportion of vessel owners that will use the marina. A number of assumptions have been made to enable this. Firstly, it has been assumed that 55% of those with vessels of the right size will use a marina. Then it has been assumed Pitt Street Marina will be able to enter the appropriate market and compete with the existing marinas and increase its market share over time. With the right facilities the marina should be able to compete with local competition. However, there is uncertainty around the proportion that will use a marina. Sensitivity analysis has been undertaken which suggests the market remains reasonable at 45%, however it is suggested that there is further refinement of these proportions. A survey of vessel owners would provide more certainty on marina use.
- **Propensity to use wet or dry berthing:** The propensity for utilising wet or dry berths is based on a proposed development situation and reasonable analysis of similar configurations of uses elsewhere. It is considered this is a reasonable approach for the purposes of concept design and rezoning, however, the final number of wet/dry berths would be made by a marina operator. It is assumed that the Port Macquarie situation, upon which the ratio is based, is a viable commercial operation.
- **Extent of induced demand:** The provision of a new Marina may attract further demand (either through existing vessels switching from their existing sites or through new vessel purchases), attracted by the increased probability of attaining a berth. The higher sensitivity using a 65% proportion for vessel owners that use marinas gives an indication of the level of induced demand

that could be anticipated. This is based on the UK study[12] which estimated induced demand to be in the order of 66% (see **Section 3.4.4** of this report). In order to increase certainty on this number it is suggested a survey is undertaken of non-vessel owners to ascertain what proportion of non-vessel owners may purchase a new vessel because of the presence of the marina.

- **Pricing:** It has been assumed that the Marina will be competitively priced and have sufficient facilities to compete with the existing marinas. Decisions on pricing will affect demand and further analysis should be done on competitor prices to ensure the pricing structure allows the marina to compete.

3.4.7 Summary

A summary of the analysis of potential demand for marina berths is provided in **Table 22**.

Table 22 Summary of potential vessel demand

Potential market modelling calculations	Results	
Base Component (2007)		
Potential market – vessels of right type and size to use a marina in the Manning River as determined by vessel matrix (Table 11)	330	
Number of vessels likely to use a marina – equates to 55% of potential market.	182	
Current supply of marina berths – Harrington Marina and Crowdy Head	74	
Potential unmet demand for marina berths in the Manning River	108	
Growth Component (2007 - 2031)		
Growth scenario	**Year 2021**	**Year 2031**
Standard Case – Projections of growth in potential vessel demand is calculated based on past trends of vessel registration growth assumed to continue at the same rate over time (see **Table 18** for projections)	146 (56 wet berths, 90 dry berths)	180 (68 wet berths, 112 dry berths)
Optimistic Case – Projections of growth in potential vessel demand is calculated based on projected population growth rates over time (see **Table 19** for projections)	191 (73 wet berths, 118 dry berths)	262 (100 wet berths, 162 dry berths)

Note: The above figures are estimates to provide and indication of the potential market.

The market assessment carried out suggests there is potential demand for 110 berths in 2007. The projections suggest increasing potential demand for marina berths at Pitt Street in the future. Over the medium term (2021) there is likely to be demand for between 150 – 190 berths. Over the long term (2031) there is likely to be potential demand for between 180 – 260 berths.

An indication of induced demand can be provided based on the findings of the *Inland Marina Investment Guide* (2006), prepared by British Waterways, which suggests that the proportion of boats requiring inland long term moorings in the UK is currently 55% but could go up to 66% once induced demand is included. A sensitivity test provided in this report that indicates with this level of induced demand, the projections in the medium term (2021) could be 176 (standard case) – 230 (optimistic case) vessels. However, potential for induced demand to significantly increase potential demand for moorings at Pitt Street should be treated as a potential upper limit of demand rather than the likely scenario.

[12] Inland Marina Investment Guide, British Waterways, 2006

The potential demand projections provided in this assessment rely on the marina offering a concentration of ancillary facilities (such as boat ramp, dry storage, commercial and retail developments, maintenance facilities and/or tourist accommodation). The projections also take into account recommendations of the qualitative analysis to prepare a Tourism Strategy and Implementation Plan for the Manning River to facilitate a network of visitor and boating activities along the river in support of the Pitt Street Marina.

The analysis undertaken is dependent on a number of assumptions. The most crucial is the proportion of vessel owners that will use a marina, which is taken to be 55% based on UK evidence for similar facilities. For more certainty, it is suggested further information is gathered to refine this figure through a survey of local vessel owners.

4.0 Maritime engineering assessment

4.1 Introduction

Site conditions have been assessed to determine the constructability and workability of a marina development at this location in respect of:

- required civil/maritime construction elements with reference to the site environmental actions (wind, waves and currents) for establishing a marina on the subject site
- required dredging or reclamation operations with reference to the likely site soil conditions
- the effects of a marina development on the flow of the Manning River and associated marine and coastal processes (siltation, flushing and currents) and any constraints that this might place on a marina development
- the effects of flood water heights and current velocities on the proposed maritime infrastructure and any constraints that this might place on a marina development
- the potential for accommodating larger vessels and potential future marina expansion.

Matters addressed included:

- soil stability and geomorphology (potential for excavation/dredging)
- wind and wave climate
- river conditions (normal river levels and velocities, and flood levels and velocities)
- water depths and river bed conditions within/adjacent to the precinct
- navigation issues
- ecology and design responses
- contamination.

4.2 Soil stability and geomorphology

4.2.1 Geomorphology

Ocean entrance

The Manning River is described by the Department of Natural Resources (now Department of Environment and Climate Change) as a complex estuarine system that includes a number of tributary creeks, branch channels and two ocean entrances, the main entrance being at Harrington (see **Figure 37**) with the secondary entrance, Farquhar Inlet, being located 12 km to the south at Old Bar (see **Figure 36**). The entrance at Farquhar Inlet has, at times, been entirely closed by littoral drift.

The site is located some 15 km (river miles) from the Farquhar Inlet and some 23 km (river miles) from the Harrington Inlet. These distances, coupled with the poor navigability of the ocean inlets, precludes Taree becoming a popular destination for passing ocean-going pleasure craft, particularly yachts.

Figure 36 The Manning River ocean inlet at Old Bar

Figure 37 The Manning River ocean inlet at Harrington

(Photographs by courtesy of NSW Government, Department of Natural Resources).

Geomorphology

The site stratigraphy has been investigated by several shallow boreholes and hand auger holes (Coffey, 2007). Two boreholes at the southern end of the site near the fuel depot encountered a profile of imported fill overlying high plasticity alluvial clays. These were underlain at depths of 3 m and 4.1 m in BH1 and BH2 respectively by residual clay soils, also of high plasticity. Groundwater was encountered 4.5 m below ground level in each location (GL at around 3.7 m AHD) which would be close to the level of the adjacent river. Weathered rock was encountered at approximately 5.5 m depth (around RL −1.8 m AHD).

Five hand auger holes were undertaken along the river bank at the north-eastern low-lying part of the site to depths of 3 m to 3.5 m (Greater Taree City Council, 2008c). Generally, the stratigraphy comprised some 2 m of clayey silt overlying silty sand. At the most north-eastern end of the site, adjacent to the river bank in front of 'The Big Oyster', one hand auger hole indicated bedrock at around −1.8 m AHD.

Riverbed sediments at the site of the Regional Boat Ramp, Endeavour Place, which is nearby to the Pitt Street site, have been sampled and were found to comprise sandy, slightly cohesive muddy silt to depths of 3.9 m. The silts in the region have been tested and found to be potential acid sulphate soil (Greater Taree City Council, 1993).

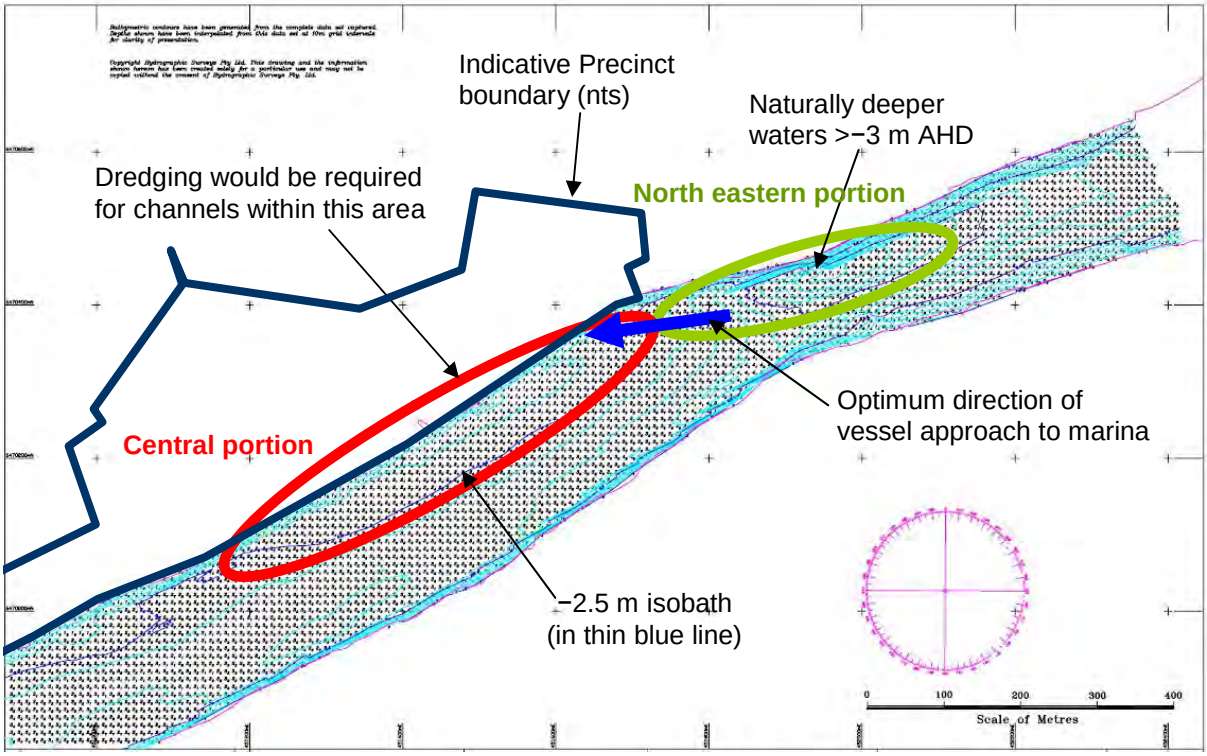
4.2.2 Water depths

General considerations

To determine appropriate channel depths, vessel draughts need to be increased to allow for squat, siltation and under-keel clearance. For these allowances at the proposed Taree facility, we recommend an additional 0.5 m for small vessels and 1 m for the larger vessels that could be expected at the site. Because Mean Low Waters Springs is approximately −0.2 m AHD, a dredged level of −3 m AHD for channels and moorings would cater for most vessels wanting to use a marina facility at Taree.

Large power boats to 25 m long have draughts of up to 1.8 m. Smaller power boats to 15 m have draughts of up to 1.2 m and those up to 8 m have draughts up to 0.9 m (AS 3962-2001). Keel boats to 25 m draw up to 3 m, 15 m keel boats draw up to 2.5 m and those to 8 m draw up to 1.5 m (AS 3962-2001).

Figure 38 Hydrographic Survey of the North Passage adjacent to the site



*Source: Hydrological Surveys, 2007 (see **Appendix C** for full image)*

At the site, the North Passage is some 200 m wide. Hydrographic survey undertaken for this project (shown in **Figure 38** and provided in **Appendix C**) indicates that the river, typically, shoals gently from the north-western bank of the North Passage to a level of between −3 m to −4 m (AHD) at the thalweg, which is offset so as to be much closer to the site's central river bank than the northern bank. However, immediately adjacent to the north-eastern end of the site the river deepens in a north-easterly direction to around −7 m (AHD). This deep area appears to reflect the meandering thalweg of the river channel, which has a tendency to hug bedrock outcrops. This naturally deeper area is considered stable for that reason. Further downstream from the site, the river has depths of approximately −3 m or greater.

The construction of a dredged marina basin on the site would require dredging of the existing river bed to form an entrance channel. On the basis of the hydrographic survey data, construction of a marina basin and entrance channel to −3 m AHD in the central portion of the site would entail dredging of material extending up to 130 m into the river channel from the river bank. As an alternative, the approach channel could be parallel to the shoreline. If catering only for power boats up to 15 m in length, the dredged channel and marina could be as shallow as −2.5 m AHD. Regardless of the solution, a marina in the central portion of the site would necessitate considerable dredging, which would be susceptible to sedimentation and, hence, maintenance dredging following flood events. A marina located at the north-eastern end of the site could take advantage of the proximity of the deep thalweg located there, which would reduce dredging requirements.

Dredging within the river channel may be subject to infilling (siltation), especially during times of river flooding. However, estimates of sediment transport capacity can only be made with flood velocities and sediment data, which were not available for preparing this assessment. Tidal currents are most likely too weak to transport large quantities of sediment to a dredged channel within the river bed. Sand and gravel beds of the Manning River at the site are mobilized during floods (RDM, 1993) is likely to result in sedimentation of any dredged navigation channel. The degree of maintenance dredging that may be required would depend on the location of the marina and the design of the navigation channel. A navigation access channel cut across the river from the deeper thalweg

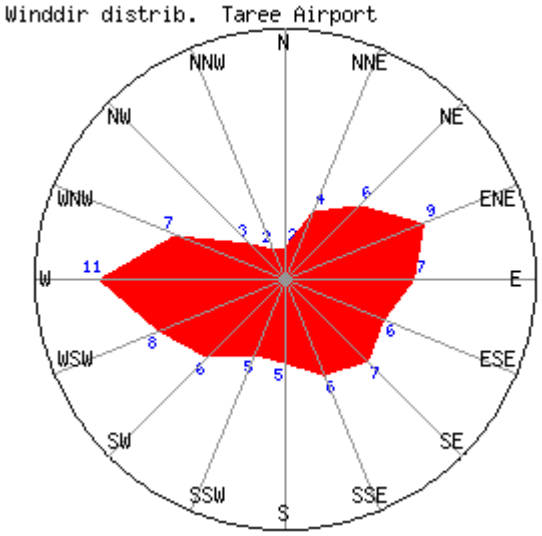
channel on the south-eastern side of the North Arm would be susceptible to filling in during a flood event. However, a channel cut from the naturally-deeper thalweg of the river located on the northern side of the North Arm channel would be less susceptible to sedimentation, particularly if it was situated in the lee of a breakwater designed to protect the marina berths from flood debris.

The water depths in the northern portion of the site (shown in **Figure 38**), adjacent to 'The Big Oyster', are generally deeper than the central portion and navigable access to a marina in this location is more readily achieved. A marina in the northern portion of the site could access sufficient water depth without significant capital dredging or maintenance dredging.

4.2.3 Wind

Based on data presented by Windfinder.com, daily observations from 7am to 7pm (local time) at Taree Airport, taken between March 2004 & September 2007, show that average wind speeds of around 10 knots are experienced (Figure 5.2). These winds are mainly from the west during May to August and from the east-northeast from December to February.

Figure 39 Average wind speeds and directions at Taree Airport



Source: www.windfinder.com

Extreme wind speeds, which can be used to calculate design wave conditions for the design and serviceability of maritime marina structures, are given in AS/NZS 1170.2:2002. For a 50 year design life and an encounter probability of < 1%, AS/NZS 1170.2:2002 gives a regional 3 s gust speed of 50 m/s, which is equivalent to an hourly mean wind speed, as used for wave calculations, of 33 m/s.

For determining the appropriate wave conditions for the serviceability of moorings and berths at a marina, wave climates are derived for lesser conditions than those used for structural design. For this case, guidance is taken from AS 3962 *Guidelines for design of marinas*, wherein the wave conditions criteria are provided for wave events exceeded once in 50 years and once a year. To compute these conditions for the project site, 3 s regional gust wind speeds of 39 m/s for 50 year and 26 m/s for one year have been derived from AS/NZS 1170.2:2002. These gust speeds convert to hourly mean wind speeds of 26 m/s and 17 m/s (respectively).

4.3 River conditions

4.3.1 Waves

Structural design considerations

Extreme onshore waves will be generated by the wind across restricted narrow river fetches. The north-easterly fetch is some 2,000 m, the south-easterly (across river) fetch is some 200 m whereas the south-westerly fetch is some 3,000 m. Extreme waves for design have been calculated for an encounter probability of <1% and are presented in **Table 23**.

Table 23 Extreme wind-wave conditions for structural design

Direction	North-east	South-east	South
Fetch length (m)	2,000	200	3,000
***Significant* wave height H_{mo} (m)**	0.9	0.3	1.1
Peak wave period T_p (s)	3.1	1.7	3.4

Table 23 describes an extreme wave condition to be adopted for the structural design of the marina facilities, as stated in the report. It does not represent the typical or even more severe boating conditions experienced at the site, which are described in **Table 24** and **Table 25**. Design waves for structural design need to be more severe than those that determine operational conditions. For boat operating conditions, wind-wave conditions exceeded once a year were calculated from standard procedures using AS/NZS 1170.2:2002 and the Shore Protection Manual and gave a wave height of 0.4 m to 0.5 m (40 cm to 50 cm).

Additional to these extreme wind-generated waves will be boat wash. Boat wash has a transitory nature and wave heights decay with distance from the vessel track. For structural design, we recommend a maximum wave height of 0.8 m with a wave period of 3.6 s, as may be generated by larger motor cruisers (>15 m; Mercer *et al*., 1982).

Serviceability considerations

The wind-wave conditions for serviceability of moorings and berthing are given in **Table 24** and **Table 25**.

Table 24 Wind-wave conditions exceeded once in 50 years

Direction	Northeast	Southeast	South
Fetch length (m)	2,000	200	3,000
***Significant* wave height H_{mo} (m)**	0.7	0.2	0.8
Peak wave period T_p (s)	2.7	1.5	3.0

Table 25 Wind-wave conditions exceeded once a year

Direction	Northeast	Southeast	South
Fetch length (m)	2,000	200	3,000
***Significant* wave height H_{mo} (m)**	0.4	0.1	0.5
Peak wave period T_p (s)	2.1	1.2	2.3

For vessels moored parallel to the existing river bank, these calculated wave climates correspond to "moderate" conditions for berths. Good to excellent conditions could be achieved only through the provision of breakwaters, which could comprise floating pontoon structures, or by providing a marina harbour excavated within the river bank.

For boat wash from small power boats, for serviceability we recommend designing for wave heights up to around 0.4 m with periods 2 s (NAVFAC, 1968).

4.3.2 Currents

Tidal currents

Tidal currents have been measured downstream of the site in the North Passage (i.e. in the same river reach), near the confluence with the Dawson River, by the Manly Hydraulics Laboratory (MHL) for a large ocean spring tidal range of around 1.5 m on 3 November 1998 (NSW Department of Commerce, MHL Report No. 1200). The peak discharge was measured at some 150 m^3/s on both the flood and ebb tides, which was around half of that measured in the south passage.

The channel there is some 170 m wide and the thalweg reaches a level of −6.7 m AHD. At maximum discharge, therefore, the channel cross-sectional area was around 600 m^2, which gives an average flow velocity of around 0.25 m/s. The tidal velocities near the banks would be less than the average velocities, and would peak at around 0.2 m/s on the higher spring tides. These speeds are low and would not present any significant constraint to a marina development along the river.

Floods

Flood velocities have been modelled in the Manning River Flood Study. At time of writing, Council has not been able to provide a copy of the flood study, which would have the relevant flood velocities.

4.3.3 Water levels

Tides

The mean spring tidal range at Taree is approximately 0.75 m, which is some 60% of that at the ocean entrance. Modelling undertaken for the Manning River estuary management study has indicated that high water spring tides reach levels of around 0.6 m AHD at Taree and low waters around −0.2 m AHD. This compares with ocean levels of around 0.7 AHD and −0.6 AHD (respectively). It is noted that high waters approach those levels in the ocean whereas low waters remain elevated relative to ocean levels. Mean sea level at the site would be around 0.2 m AHD.

Floods

Flood levels have been defined on Flood Contour Maps for 1%, 2% and 5% Annual Exceedance Probabilities (AEP) prepared for GTCC by WBM Oceanics Australia. The flood levels at the site have been derived from the flood contour maps provided by GTCC and are given in **Table 26**.

Table 26 Annual Exceedance Probabilities for various flood levels

Annual Exceedance Probability	Flood Level
1%	5.2 m AHD
2%	4.9 m AHD
5%	4.2 m AHD

It is noted that much of the site is flood prone. Images of the flooding that occurred in 1978 are provided in **Appendix F** to this report. This flood was a 1 in 80 year flood event and indicates that vast areas of the overall development site are subject to flooding even at recurrence intervals below the 100 year design event.

The concept designs presented to date all show development within the flood plain to a greater or lesser extent. Any filling to be carried out would need to be compensated for by excavation elsewhere on the site to unsure that there was no net change to flood plain storage on the site. Excavations below the water table, which generally lies at or above 0.4 m AHD, would not contribute to flood plain storage. This issue would present a significant constraint to the developable land area within the site.

To obviate loss of flood storage on the site, retail and workshop areas for the proposed marina development would be located on high ground above the 100 year flood level while the development associated with the wet berths, boat ramp and the like, can be located within the 100 year flood level.

Climate change

In the longer term, there may be global changes resulting from a postulated warming of the earth due to the accumulation in the atmosphere of certain gases, in particular carbon dioxide, resulting from the burning of fossil fuels (the *Greenhouse Effect*). The current consensus of scientific opinion is that such changes could result in global warming, leading to changes in climate.

Global warming may produce a worldwide sea level rise caused by the thermal expansion of the ocean waters and the melting of some ice caps. According to the UNEP Intergovernmental Panel on Climate Change (IPCC), global mean sea level is projected to rise by 0.1 m to 0.8 m by 2100. Best estimates postulate sea level rises by around 0.15 m by 2050 and 0.34 m by 2100 (IPCC, 2007). Taking account of the existing (secular) measured rate of sea level rise for the Australian eastern seaboard of 0.00086 m/year (Mitchell *et al*., 2000), the projections of future sea level rise are 0.2 m for the year 2055 and 0.4 m for 2100.

While in respect of flood processes, the ocean tail water levels are likely to increase, these are unlikely to affect flood levels at the site. Further, the Flood Plain Development Manual makes provision for *Greenhouse* effects in the freeboard provided for residential developments.

Marine ecological habitats

The site is fringed by various marine ecological habitats. The banks of the river and the adjacent tidal creek, which runs through the north-eastern part of the site, are fringed with mangroves. The River bank has fringing seagrass meadows in patches. These have not been mapped by NSW Fisheries of the Department of Primary Industries (email communication, Kerry Gillfeather, 5/11/07) but some observations have been made on the hydrographic Survey Charts by the consultant surveyor (Hydrographic Surveys 2007 – Appendix E). Seagrasses appear at the southern end of the site and along the southern bank of the North Passage.

The low-lying area on the site adjacent to the southern bank of the creek is likely to comprise some salt marsh habitat, but these have not been mapped (Kerry Gillfeather 5/11/07).

Potential marine ecological habitats that may be impacted upon by development of the site include mangrove, seagrass and salt marsh habitats. Seagrasses were observed in patches as noted on the hydrographic survey drawings (Appendix E). The locations of these seagrasses are not likely to pose a significant constraint on the location of a marina in the Pitt Street Waterfront site. These observations do not constitute a marine ecological assessment. It is recommended that a detailed marine ecological assessment be carried out as part of subsequent design stages.

4.4 Contamination

Soil sampling and testing (Coffey 2007) showed that the low-lying north-eastern portion of the site, adjacent to the River, is underlain by potential acid sulphate soils. It is most likely that none of this material, if excavated, could be used for fill on the site unless it was treated, which is likely to be expensive.

Careful analysis of the water table would need to be undertaken to ensure that excavations would not induce changes to the water table levels remaining in the soil adjacent to the excavations, thereby inducing acidic seepage into the marina and adjacent waterway. This potential problem may require a barrier edge, such as sheet piling, to any such marina basin to minimise ground water fluctuations adjacent to the excavation.

4.5 Concept evaluation

This sections provides a brief commentary regarding the mooring arrangements proposed as part of four short-listed concept master plans, in light of the maritime constraints and in terms of the numbers of berths provided.

4.5.1 Concept design evaluation

Hyder master plan

The Hyder master plan (**Figure 40**) proposal would provide for an ample number of berths to cater for the projections made in this review. The large mooring basin/harbour provides ample protection from waves and flood debris. Additional shore-parallel moorings along the river bank are aligned appropriately and are unlikely to be impacted upon adversely by flood debris. However, given the shallow water depths along this shore, these berths could cater only for the smaller shallow-draught vessels.

Figure 40 Hyder Consulting's *Manning Valley Experience Master Plan*

The small entrance provided to the proposed marina mooring basin is not recommended because of the restriction it places on flushing of the marina waters. With this design, there is a high likelihood that very poor water quality would develop within the marina. PIANC Report No. 98-2008 entitled

Protecting Water Quality in Marinas provides expert guidance and state of the art information and recommendations on good practice for marina design in respect of water quality. In respect of the physics of basin circulation, the maximum basin aspect ratio (L/B) recommended is 4. However, PIANC advises that once the aspect ratio exceeds 2 the tidal flushing efficiency declines rapidly as multiple circulation gyres are likely to form inside the basin with the inner gyres unable to exchange water through the entrance.
The aspect ratio of the marina in **Figure 40** is larger than 4 and is not recommended. An open entrance with a pontoon edge and skirt breakwater, if required, could address the water quality issue.

The large excavation proposed is likely to be able to compensate for any loss of flood storage that may result from site filling with this concept design. However, the large excavation proposed would involve the removal and treatment of a large quantity of potential acid sulphate soil (PASS), which is likely to be difficult to manage environmentally and which may be expensive to effect. Further, however, the large excavation proposed also may induce the production of acid groundwater seepage by lowering and draining the water table adjacent to the marina basin. A barrier edge treatment (sheet piling) may obviate this potential adverse impact.

Unless vessels using a marina at this site are limited to the smaller power vessels, a marina at this site is likely to require a dredged access channel across the shallow river bed to the river thalweg along the southern bank of the North Passage or parallel to the shore to deeper water. Such an access channel may be prone to siltation and require dredging following floods.

The proposal could be designed to have a minimal effect on the marine ecology in that much of the existing mangroves and seagrass habitats could be maintained. However, the proposed marina excavation may have the potential to damage potential salt marsh habitat.

HBO +EMBT master plan

This HBO +EMBT master plan (**Figure 41**) proposal provides for an ample number of berths to cater for the projections made in this review. However, given the shallow bathymetry along the northern bank of the North Passage, moored vessels using the Berths as shown would be restricted to smaller power boats. The moorings shown would be exposed to a moderate wave climate. The small set of berths at the far north-eastern end of the site are aligned shore-normal, which has the potential for adverse beam seas during periods of strong north-easterlies or south-westerlies. Such an alignment is not recommended. At the south-western end of the site there are several berths shown angled to the shore. Such an orientation is sub-optimal in respect of providing the maximum number of berths and is not recommended. The outer moorings would be susceptible to debris impact during floods. Also, they would appear to interfere with the existing rowing course.

The proposal generally accommodates the site constraints for development in the flood plain and excavation in PASS. It enhances the marine ecology of the site by rejuvenating the relict tidal watercourse/salt marsh habitat and enhancing the mangrove habitat. The proposal would have no issues with poor water quality and would have minimal impact on the sparse fringing seagrass.

Figure 41 HBO +EMBT *Illustrative Master Plan*

LAB master plan

The LAB master plan (**Figure 42**) would not appear to provide for the number of berths required to cater for the projections made in this review. However, the site of the marina is well chosen as it lies adjacent to deepwater access to the river and dredging requirements are likely to be minimal. Further, the marina would be unlikely to have any adverse water quality issues. It is noted that the vessel layout shown is sub-optimal.

Large flood-prone areas are shown to be developed but there would not appear to be sufficient compensation made on site for the flood plain storage that would be lost. The area set aside for the marina has been styled in such a way as to obviate any issues relating to poor water quality.

It would appear that this master plan proposal could be designed in such a way as to preserve mangrove, salt marsh and seagrass habitat.

Figure 42 LAB *Master Plan*

Suters master plan

Suters' master plan (**Figure 43**) would appear to provide for the number of berths required to cater for the projections made in this review. The small marina layout as proposed would not present any poor water quality issues and its excavation would have minimal PASS issues. However, the excavation for the marina may encounter rock, as BH 16 has indicated rock within 3 m of the surface, being at around RL −1.4 m AHD. Further drilling in this area is warranted. The site is well chosen lying near to the deepwater river access and minimal dredging would be anticipated with this scheme.

The proposed filling of the flood plain would not appear to have been compensated for by the provision of additional flood storage on the site. Existing mangrove and seagrass habitat would appear to be maintained. However, potential salt marsh habitat appears to have been filled.

Figure 43 Suters *Master Plan*

5.0 Marina concept

This section outlines a concept plan that addresses the findings of this maritime assessment and provides certainty regarding the suitability of a marina to be located on the subject site. It is recommended that the proposed concept be subject to more detailed analysis as well as consultation with key stakeholders and the wider community to progress the design development.

5.1 Summary and gap analysis

This section provides a summary of the site considerations described in the preceding maritime engineering assessment and commentary on the proposed concept master plans for the purpose of formulating a concept plan.

5.1.1 Opportunities for marina development

The primary maritime/hydrological constraints that may limit the development of a marina on the site are:

- the site is prone to flooding
- adjacent river depths are shallow, restricting navigation for anything but small power boats, which means river dredging is likely to be required
- berths in the river would be exposed to moderate wave conditions
- marina excavation would be in potential acid sulphate soils.

Marine ecological issues have not been addressed.

Flooding

Much of the undeveloped area of the site lies below the 0.1% AEP flood level, which means development on the site would necessitate significant filling to raise floor levels to approximately 5.7 m AHD. Compensation for the loss of flood storage would be needed for any site filling and a suitable source of fill material has yet to be identified (see below).

Waves

Long river fetches prevail along predominant wind directions, which provides for ‘moderate’ mooring conditions only within the river channel. To provide better than ‘moderate’ conditions, being either ‘excellent’ or ‘good’ mooring conditions, moorings would need protection by excavation into the embankment of the North Passage or by creation of a breakwater.

Marina excavation

Filling of the site would require excavation to compensate for loss of flood plain storage. Sediments available on site for excavation comprise Potential Acid Sulphate Soils (PASS). The disposal or treatment of PASS is likely to be expensive and could present as an ecological risk for the project.

Navigation

Water depths adjacent to much of the site present significant constraints for a marina development. For small vessels up to 8 m length, power boats would need channels dredged to −2.0 m AHD and keel boats would need channels dredged to −2.6 m AHD. Larger vessels would need bottom levels to −3.0 m AHD or greater.

Generally, along the shores of the site where a reasonable size marina could be excavated, the river bed shoals gently from 0 m AHD and reaches the −2.5 m AHD isobath some 80 m out from the bank.

Hence, considerable dredging within the river bed would be required for the development of a marina that could accommodate anything but the smallest vessels. There is potential for maintenance dredging requirements should infilling occur with flooding events. Careful siting of the marina can minimize dredging requirements.

5.1.2 Information gaps

Material availability for civil works

If significant quantities of fill are required, suitable sources would need to be identified for detailed feasibility assessment.

Marine ecology

No marine ecology survey data with respect to seagrass, salt marsh and mangrove habitats is available for the feasibility study. However, an indication of the seagrass present in the Manning River has been provided by Hydrological Surveys (see Appendix C of this report). This seagrass information provides an indication only as it has not been provided by a suitably qualified marine ecologist.

Further, the Division of Fisheries in the Department of Primary Industries has advised that its' mapping is not of the requisite detail for this project. The project has the potential to impact on marine ecology and surveys would be required as part of more detailed feasibility assessment.

Geotechnical data

Subsurface stratigraphy needs to be determined for any proposed marina excavation area and for any proposed entrance channel dredging. Drilling to −3.0 m AHD would be required for further feasibility assessments of potential sites onshore and for dredging contracts over the river bed areas to be dredged.

Siltation

River bed sediment sampling and grain size analyses would be required for sediment transport/channel infilling assessments. The flood study report would be required for the assessment of flow velocities.

5.2 Marina concept outline

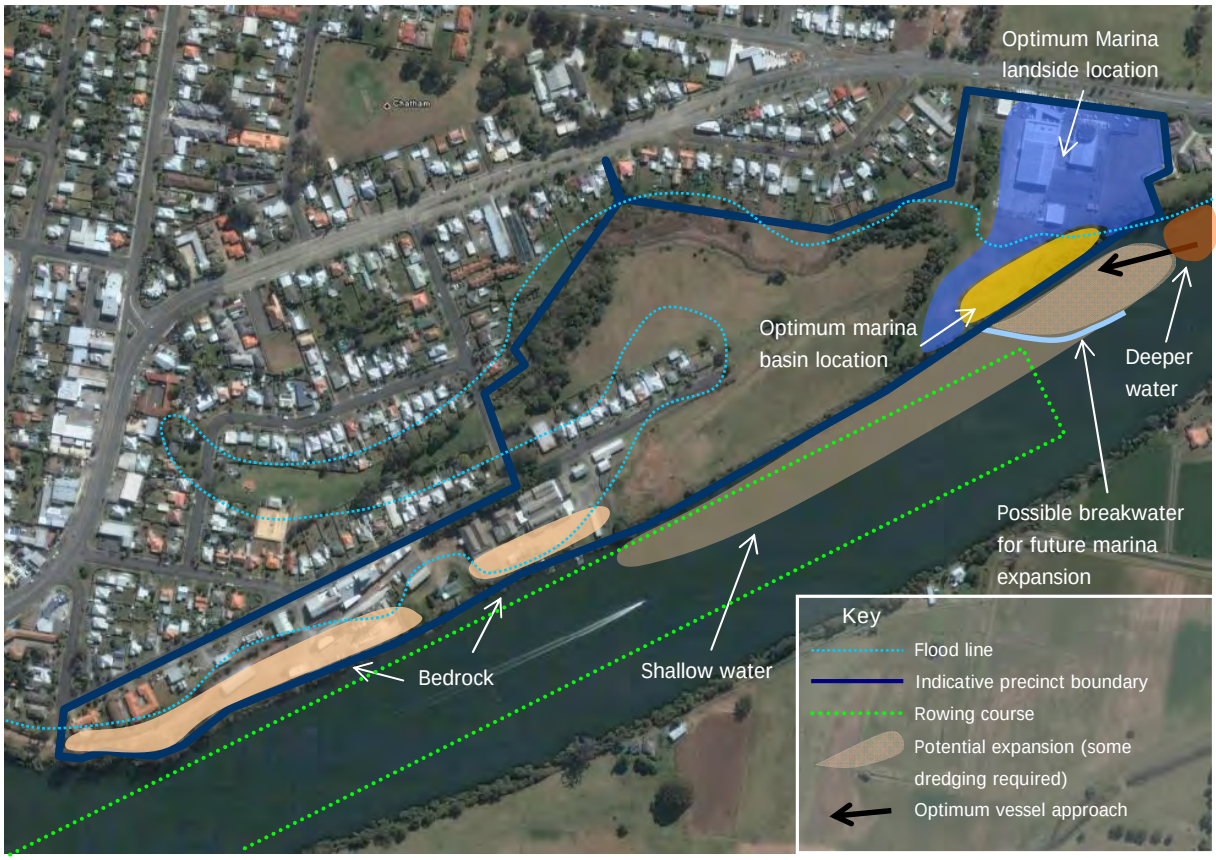
The site does not contain a natural basin that could provide suitable mooring for a marina. Further, the Manning River conditions do not provide appropriate conditions for mooring the number of vessels that are suggested in the demand analysis (see **Section 3.4.7** of this report), without appropriate protection from river wind waves and flood debris.

The optimum solution to providing suitable marina berths would be to excavate a marina basin that provides suitable protection for vessels at an appropriate depth. This marina basin could also incorporate a breakwater in the River to provide additional moorings if required.

As shown in **Figure 38**, deep water exists naturally in the Manning River at the north-eastern end of the site (near the 'The Big Oyster') adjacent to an underlying bedrock ridge, which has potential for an artificial marina basin. In this location the river embankment is naturally indented, providing some natural sheltering for moorings. Dredging for the entrance channel would be minimised at this location. It is recommended that a geotechnical survey be carried out in this area to confirm presence of rock and the extent to which a marina basin can be excavated. If further excavation here is feasible, an artificial marina site could be developed in this location. However, creating a marina basin capable of mooring more than approximately 20 vessels would necessitate significant excavation.

Based on the current level of site knowledge, the optimum marina location in light of the key site constraints is shown in **Figure 44**, along with indication of the potential for expansion of the marina into the Manning River. It is noted that the breakwater shown in the concept below is only necessary should the marina warrant an expansion in the number of wet berths in the future. This is shown on the concept to demonstrate the ability for the marina to expand, while avoiding the rowing course, in light of potential induced demand or works to the entrance that provide more convenient ocean access (see Appendix E for rowing course location). This plan has been integrated into the architectural master plan prepared by Suters Architects.

Figure 44 Preliminary marina concept plan



Source: Google Earth Pro, 2007 *Not to scale*

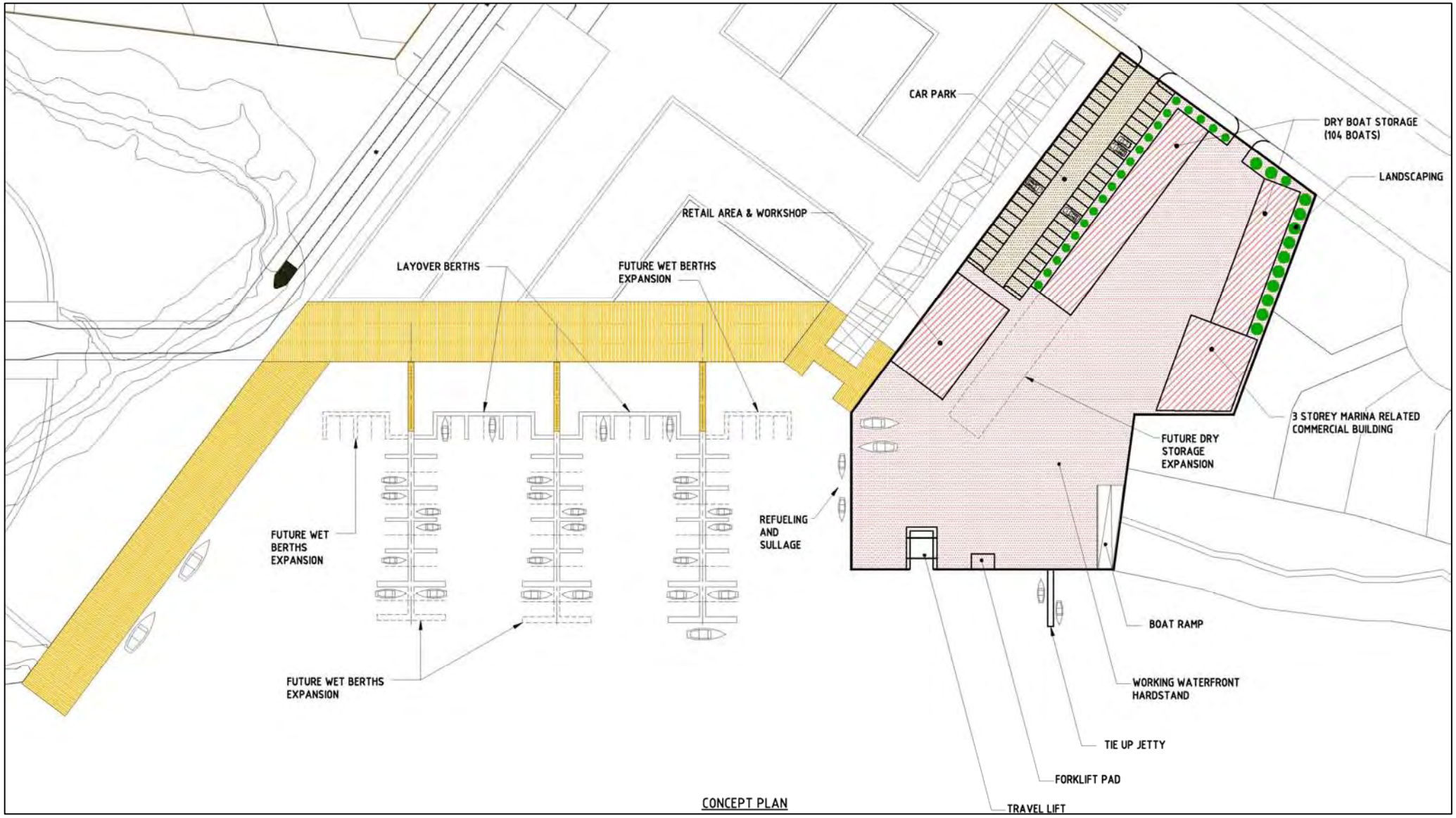
5.3 Concept plan

5.3.1 Proposed concept plan

Based on the most recent architectural master plan concept for the Pitt Street Waterfront Precinct (**Figure 45**) prepared by Suters Architects, a concept layout for the Pitt Street Marina based on the analysis provided in this report has been prepared. This is presented in **Figure 46** (full version of the concept plan drawing is provided in **Appendix G**).

Figure 45 Suters Master Plan (as at June 2008)

Figure 46 Proposed Pitt Street Marina Concept



A general description of the concept design is provided in the following sections.

Wet berths

The initial concept design provides 64 wet berths, of which:

- six can be used for boats of lengths up to 10 m
- ten can be used for 8 m boats
- 48 can be used for boats of lengths 7 m or less.

The concept has been designed so the jetties are perpendicular to the shore and as a result are flexible to suit a future developers needs in terms of size and number of vessels.

Possible wet berth expansion locations have been included that would add an additional 16 wet berths to the marina bringing the total number of wet berths to 80.

In addition to these permanent wet berths, 12 layover wet berths are provided for temporary mooring of dry berthed boats from the adjacent dry boat storage. These berths may be used for semi-permanent wet berthing if required.

Dry boat storage

The mix of hardstand (maintenance and storage) and dry stack berths in the initial concept is designed to maximise flexibility to meet the needs of a potential operator. However, it demonstrates that a practical solution can be found to accommodating dry storage and maintenance on the subject site.

In the ultimate configuration, the concept design comprises two dry storage buildings structures that are 10 m in depth. This provides high level of flexibility to cater for a range of vessel sizes that may wish to be stored in sheltered accommodation. The ultimate configuration of the storage racks would be dependent on the commercial operator and the experienced demand.

For the purposes of this analysis, the length of building shown would accommodate 104 vessels, made up of:

- 80 vessels of 6 m in length or less in the western structure adjacent to the car park over four levels
- 24 vessels of 7 m in length in the eastern structure over two levels.

Further, the eastern structure has potential to be increased in the levels, increasing the number of dry storage spaces by approximately 12 per level. However, expansion in this location would depend on preserving reasonable amenity of the adjoining residential properties.

An extension area is shown to the dry boat storage structure that would allow an additional four levels of approximately 12 boats (48 berths) bringing the total number of dry berths in the western structure to approximately 128. In the interim, this extension area would be utilised for hardstand storage of vessels, such as the temporary storage or maintenance of Stebercraft vessels where necessary. The number of vessels stored in this area would depend on the size of those vessels.

In addition, the concept provides for up to four larger vessels to be stored on hardstand outside the dry storage building footprint generally in the location of the fuel wharf and travel lift.

As part of a staging strategy for the marina, there may be potential for the dry stack building footprints to be used for hardstand storage of vessels prior to construction of the dry storage buildings. The space occupied by the dry storage buildings could accommodate approximately 32 vessels (equivalent to one level of the dry storage at the sizes referred to above) stored on a hardstand, not including the hardstand storage spaces described above.

Car park

A 50 vehicle car park is included in the layout. It is envisioned that this would be for the private use of marina staff and patrons.

If the long term berthing expansions are realised or the car park is intended for use by the general public then this design may need to be modified to provide additional parking spaces.

Retail and commercial building

Two commercial / administration buildings are shown in **Figure 46**. The building labelled 'retail area and workshop' would house a number of marina related retail shops and a workshop. Showers and toilets would also be provided in this building.

The other building labelled '3 storey marina related commercial' would house the marina administration offices.

Retail and administration buildings would be required to located above the 1 in 100 year flood line, which is generally indicated in **Figure 44**.

Hardstand area

Based on an analysis of physical constraints and the review of the preferred master plan concept, the optimum location for the hardstand area is on the site currently occupied by the car dealership. The hardstand area shown on the layout would accommodate a number of marina related activities including: boat launching via the boat ramp, temporary dry storage of boats for repair and maintenance, a travelift and forklift pad. Two forklifts would be provided as part of the marina

A small tie up jetty is also included for temporary berthing of dry stored boats or for boats launched at the boat ramp. This jetty would also be used for small tenders associated with the marina.

Detailed design of the hardstand area would need to include drainage and pollution control measures and solid waste collection and removal. The long term berthing projections would also need to be considered to ensure adequate space is available for the hardstand activities described above.

Refuelling and sullage removal

Refuelling and sullage removal is proved on the western side of the hardstand area. During detailed design, sullage removal, fuel storage tanks and reticulation systems for petrol, diesel and LPG would need to be considered.

Landscaping

The large dry boats storage structures have been set back 3m from the site boundary where possible. This space would be landscaped to diminish the visual impact of these structures on the surrounding area.

5.3.2 Costs

Based on our investigations a generic ruling does not generally exist for the annual operational costs associated with dry and wet berths in a contemporary marina. The operational costs can vary considerably depending on variables such as rent, land tax, marina system used, maintenance dredging etc. Consequently, to arrive at an approximate figure research has been undertaken to identify existing marina operational costs. Due to the operational sensitivity associated with divulging financial information specific case studies have not been cited.

The operational cost estimate is based on costs associated with marina operations as a proportion of their capacity relating to wet and dry berths. Based upon this calculation it is believed that the Pitt Street Marina will incur operational costs of approximately $320,000 per annum.

Indicative estimate of costs associated with the proposed concept is provided at **Table 27**. This costing is based on Rawlinson's 2006 data increased by ten percent for 2008.

Table 27 Costing estimate based upon Rawlinson's 2006 (data amended for 2008)

Facility	Description	Cost Per Unit	Amount	Total Cost	Rawlinson's Reference
Wet Berths -	Pre cast concrete	$18,200.00 per berth	76	$1,383,200.00	11.9.2.1.2
	Services	$3,500	76	$266,000.00	11.9.2.1.3
	Total			**$1,649,200.00**	
Dry Berths -	Large Structure	$11,000.00 per pen	24	$264,000.00	11.9.3
	Small Structure	$11,000.00 per pen	24	$880,000.00	11.9.3
	Total			**$1,144,000.00**	
Hardstand -	Concrete Pavement	$215.00 per m^3	2610	$561,150.00	p.228
	Drainage, Bunded area and septic	Per item		$150,000.00	
	Total			**$711,150.00**	
Retail Building -	suburban neighbourhood shops - 2 storey	$620.00 per m^2	300	$186,000.00	14.1.1.2
	fit out	$172.00 per m^2	300	$51,600.00	14.1.1.3
	Total			**$237,600.00**	
Marina Building -	3 storey fully serviced	$1,600.00 per m^2	1242	$1,987,200.00	9.1.2.5
	standard fit out	$430.00 per m^2	1242	$534,060.00	9.1.5.1
	work stations	$125.00 per m^2	40	$5,000.00	9.1.5.1.2
	furniture	$100.00 per m^2	1242	$124,200.00	9.1.5.3.2
	Total			**$2,650,460.00**	
Car park -	Open parking area	$2,400.00 per car	50	$120,000.00	10.2
	Total			**$120,000.00**	
Landscaping -	around buildings	$38.50 per m^2	330	$12,705.00	11.13.1
	Total			**$12,705.00**	
Dredging -	sand or silt	$50,000.00 base	1	$50,000.00	p.642
		$4.60 m^3	15450	$71,070.00	p.642
	Total			**$121,070.00**	
Excavation -	clay	$40.00 m^3	72700	$2,908,000.00	p. 642
	disposal (assumed uncontaminated	$32.00 tonne	116320	$3,722,240.00	p. 642/207

Facility	Description	Cost Per Unit	Amount	Total Cost	Rawlinson's Reference
	clean fill with disposal site 20km away)*				
	Total			**$6,630,240.00**	
Workshop Building -	maintenance workshop	$925.00 per m^2	250	$231,250.00	8.3.3
	Total			**$231,250.00**	
Toilets	public toilets	$1,800.00 per m^2	50	$90,000.00	1.2.9
	Total			$90,000.00	
Miscellaneous	travel lift	item		$200,000.00	
	floating tie up wharf	$2,500.00 per metre	15	$37,500.00	11.9.4.3
	fuel tanks	item		$200,000.00	
	sullage removal	item		$100,000.00	
	2 x forklift	item		$100,000.00	
	Total			**$637,500.00**	
Walkway -	timber deck 100x25 treated pine	$58.00 per m^2	4165	$241,570.00	p.326
	timber piles on 3x3 m grid	$10,000.00 per item	207	$2,066,666.67	
	Total			**$2,308,236.67**	
Summed Total	Note: Costs are based on Rawlinson's 2006, increased by 10% for 2008 costs.		10%	$18,197,752.83	
	Increased by 7% for Taree		7%	$19,471,595.53	
	Contingency Sum		20%	$23,365,914.64	
	Engineering Design & Project Mgt		8%	$25,235,187.81	
Total				**$25,236,000.00**	

**Note: Earthworks costs assume disposal of all materials at $32 / tonne up to 20km distance. Project cost saving are possible if a suitable site for disposal can be found closer to the marina site.*

5.4 Planning and legislative requirements

5.4.1 Approval process

State Environmental Planning Policy (Major Projects) 2005

State Environmental Planning Policy (Major Projects) 2005 (SEPP Major Projects) was gazetted on 25 May 2005 and duly amended on 1 August 2005. It replaces all previous provisions related to former State significant development in planning instruments, directions and declarations.

The proposed marina[13], being developed as part of the Pitt Street Waterfront Redevelopment, falls within the definition of a 'Major Project', under Schedule 1, Section 14 (Marina facilities) of *State Environmental Planning Policy (Major Projects) 2005* (SEPP Major Projects). The definition of marina facilities within Section 14(1) includes:

'(1) Development for the purpose of marinas or other related land or water shoreline facilities that moor, berth or store vessels (excluding dinghies and other small craft) at fixed or floating berths, at freestanding moorings, alongside jetties or pontoons, within dry storage stacks or on cradles in hardstand areas and that:
(a) …
(b) moor, berth or store more than 80 vessels in other waters, or
(c) are located in environmentally sensitive areas of State significance, but excluding any development that, in the opinion of the Minister, is only of local environmental planning significance.

The proposed marina is likely to comprise more than 100 berths and would therefore be a Major Project within the meaning of SEPP Major Projects. Section 6(1) states that development described in Schedule 1 of the SEPP is declared to be a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) applies.

It is understood that an application has been made by Greater Taree City Council to the Minister for Planning, who has declared the overall Pitt Street Waterfront Master Plan to be a project to which Part 3A of the EP&A Act applies (i.e. a 'Major Project').

Environmental Planning and Assessment Act 1979

The EP&A Act and the *Environmental Planning and Assessment Regulation 2000* provide the framework for the assessment and approval of proposed developments in NSW.

Part 3A of the EP&A Act consolidates the assessment and approvals process for all major projects requiring approval of the Minister for Planning, which were previously dealt with under Parts 4 and 5 of the Act. Part 3A applies to State government infrastructure projects, developments previously classified as State significant and any other projects, plans or programs declared by the Minister. It provides a separate streamlined and integrated development assessment and approvals regime for projects of significance to the State.

Clause 75B(1) of the EP&A Act states that *"This part applies to the carrying out of development that is declared under this section to be a project to which this part applies… by a State environmental planning policy"*.

According to Clause 75D, the Minister is the approval authority for Part 3A projects:

"(1) A person is not to carry out development that is a project to which this Part applies unless the Minister has approved of the carrying out of the project under this Part.
(2) The person is to comply with any conditions to which such an approval is subject."

[13] This planning review relates solely to the proposed marina concept and does not consider any other parts of the overall Pitt Street Waterfront master plan.

A Clause 6 Declaration was issued by the Minister for Planning (dated 13 May 2008, supplied by GTCC) confirming the Pitt Street Waterfront Master Plan is a Major Project to which Part 3A of the Act applies. Further, the Minister approved the submission of a Concept Plan application under Section 75M of the EP&A Act.

Under Section 75P(1) of the EP&A Act, when giving an approval for the concept plan for a project, the Minister may make any of the following determinations:

- that further environmental assessment requirements for approval to carry out the project or any particular stage of the project is required under Part 3A (i.e. Project Approval is required under Part 3A of the Act)
- that approval to carry out the project or any particular stage of the project is to be subject to either Part 4 or Part 5 of the Act
- the Minister may determine that no further environmental assessment is required for the project or any particular stage of the project.

In the case of the proposed marina, should the Minister approve the Pitt Street Waterfront Master Plan Concept Plan application under Part 3A, she may determine that the marina component is subject to approval under Part 4 or that a subsequent Project Application is required under Part 3A.

5.4.2 Commonwealth legislation

Environmental Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) governs the Commonwealth Environmental Assessment process and provides protection for matters of National Environmental Significance (NES).

Matters of NES are:

- World Heritage properties
- National Heritage places
- wetlands of international importance
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- nuclear actions (including uranium mines).

The EPBC Act defines proposals that are likely to have an impact on a matter of NES as a 'controlled action'. Proposals that are, or may be, a controlled action are required to be referred to the Commonwealth Minister for the Environment, Water, Heritage and the Arts for a determination as to whether or not the action is a controlled action.

Should it be determined that approval under the EPBC Act is required, environmental assessment (under accredited state process) will be undertaken and a decision on approval (with conditions) may be granted. The EPBC Act is separate from other approvals (such as those under the TSC Act) and does not remove the requirement for such other approvals.

A search was carried out of the matters of NES within the local area, upon the request of Council to verify the search conducted by Ecotone Ecological Consultants (Pitt Street *Ecological Constraints Assessment*, 2008) was carried out by Maunsell on 29 September 2008. The buffer used was any matters within 10km of the subject site. The results of this search are provided in **Appendix H**.

The results of the latest EPBC Act search provided the following results:

- The search found the following Matters of NES in the study area, which provided the following results.
  - World Heritage Properties: None
  - National Heritage Places: None
  - Wetlands of International Significance (Ramsar Sites): 1
  - Commonwealth Marine Areas: None
  - Threatened Ecological Communities: None
  - Threatened Species: 13
  - Migratory Species: 15
- Other matters protected by the EPBC Act include:
  - Commonwealth Lands: 5
  - Commonwealth Heritage Places: None
  - Places on the RNE: 2
  - Listed Marine Species: 13
  - Whales and Other Cetaceans: None
  - Critical Habitats: None
  - Commonwealth Reserves: None
- Additional items listed include:
  - State and Territory Reserves: 4
  - Other Commonwealth Reserves: None
  - Regional Forest Agreements: 1

Additional species found in the latest search that were not explicitly referenced in the Ecotone report include:

- Hastings River Mouse: Endangered – Species or species habitat likely to occur within area
- Grey-headed Flying-fox: Vulnerable – Roosting known to occur within area
- Fork-tailed Swift: Migratory – Species or species habitat may occur within area

To establish whether these species are impacted upon by the proposed marina, a survey by a suitably qualified ecologist is necessary.

These results are generally commensurate with the Ecological Assessment carried out by Ecotone and as such, the Ecological Assessment provides a sound basis for identifying potential constraints under the EPBC Act for the construction of a marina. All matters of relevance would need to be assessed in detail as part of an application for approval under Part 3A of the EP&A Act.

5.4.3 NSW State legislation

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) relates to pollution management and waste disposal in NSW. The objectives of the POEO Act are:

- to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development
- to provide increased opportunities for public involvement and participation in environment protection
- to ensure that the community has access to relevant and meaningful information about pollution
- to reduce risks to human health and prevent the degradation of the environment.

The POEO Act establishes licensing requirements for certain activities, which are listed in Schedule 1 to the Act. 'Marinas and boat repair facilities' are listed within Schedule 1 and would therefore require an Environment Protection Licence from the Department of Environment and Climate Change to operate the facility.

Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) provides for the conservation of threatened species, populations and ecological communities of animals and plants.

Section 91 of the TSC Act requires that a license be obtained should a development result in one or more of the following:

- harm to any animal that is of, or is part of, a threatened species, population or ecological community
- the picking of any plant that is of, or is part of, a threatened species, population or ecological community
- damage to critical habitat
- damage to habitat of a threatened species, population or ecological community.

The *Ecological Constraints Assessment* report prepared by Ecotone Consultants (Ecotone Consultants, 2007) found that it is unlikely that the preparation of a species impact statement for Endangered Ecological Communities (EECs) and terrestrial fauna will be required. However, this will need to be determined by the preparation of 7-part tests as part of the application for approval under Part 3A of the EP&A Act. Several key threatening processes may require consideration or assessment pursuant to the TSC Act.

Fisheries Management Act 1994

The objectives of the *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. In particular, the objects of this Act include:

- to conserve fish stocks and key fish habitats
- to conserve threatened species, populations and ecological communities of fish and marine vegetation
- to promote ecologically sustainable development
- including the conservation of biological diversity.

The proponent of the marina will be required to consult with the Department of Primary Industries (Fisheries) in regards to details of any dredging and dredge spoil management.

The *Ecological Constraints Assessment* report (Ecotone Consultants, 2007) concluded, in relation to the Pitt Street Waterfront Master Plan proposal, that *"the potential removal of mangroves and riparian habitat, changes to the water depth through dredging and the construction of wharfs, jetties and boat moorings is likely to require a full assessment under the Fisheries Management Act and the results of this survey may trigger the need for the preparation of a Species Impact Statement"*.

A permit to remove seagrass, mangroves and macroalgal habitat may be required under Part 7 of the FM Act.

Other applicable statutory approvals

The following Acts may be applicable to the project:

- *Contaminated Land Management Act 1997*
- *OHS Amendment (Dangerous Goods) Act 2003* and *OHS Amendment (Dangerous Goods) Regulation 2005*
- *Maritime Transport and Offshore Facilities Security Act 2003*
- *Noxious Weeds Act 1993*
- *Rail Safety Act 2002*
- *Road and Rail Transport (Dangerous Goods) Act 1997*
- *Roads Act 1993*
- *Water Act 1912*
- *Maritime Services Act 1935.*

5.4.4 Greater Taree Local Environmental Plan 1995

The *Greater Taree Local Environmental Plan* (LEP 1995) applies to all land within the City with the exception of land marked as 'Deferred'. Council is currently preparing a new Principal Local Environmental Plan (LEP), which will replace LEP 1995.

Under LEP 1995, the site of the Pitt Street Marina is subject to a mix of zones including:

- 1(a) Rural General
- 1(b1) Rural Valley Agriculture
- 2(a) Residential
- 4 Industrial
- 5 Special Uses
- 6(a) Open Space Recreation.

The current study forms part of a rezoning for the Pitt Street Waterfront site. The new Principal LEP will adopt the Standard LEP Template, under which the appropriate zones for the marina would be a combination of the following.

- W2 Recreational Waterways – for waterway and land areas of the marina complex, (note: retail and associated uses would need to be included as part of this zone if not included in definition of 'marina').
- B4 Mixed Use – would be appropriate should retail and hospitality activities be proposed on site (note that marinas would need to be included as permissible activities in this zone).
- IN4 Working Waterfront – for landside areas that are to be used for the marina maintenance and associated activities (note: is not likely to facilitate use of the site for retail or hospitality).

The preferred land use zone is B4 - Mixed Use, assuming marina is listed as being permissible with consent. This zone would provide the flexibility to establish a mixed use marina that includes the range of uses typical of modern marinas.

5.5 Site development marketing and tenure

Marketing options

Council could consider a number of options to achieve the required outcomes from the site, which are:

- Council acquires the land from the current owner and develops / tenders the marina development.
- Council provides incentive for private landowner to develop the marina, which could include higher zoning and development yields on adjoined land areas to off set costs and investment risks associated with marina construction.
- Council acts as development partner with the land owner, providing funding to the development, as a joint venture partner.

Development of a marina on the subject site is a highly speculative investment, with significant investment risk. For the marina to proceed, the developer will want to achieve a sufficient commercial return from adjoining land development to fund the marina construction.

This feasibility analysis shows that there is potential demand for a marina on the site, based on an analysis of site constraints, licensing data and the likely vessel types that would typically use a marina, which is commensurate with the purpose of the report to support a rezoning assessment. It is noted the established demand is not based on a detailed market survey, with which more certainty regarding demand could be achieved.

The Master Plan (see **Figure 45**) shows three to four storey commercial, retail and residential development potential on the landownership within which the marina is located. Assuming this level of development is commercially viable, this may offset the risk associated with the marina construction and operation costs. It is noted that the commercial return from the marina would be generated predominantly from commercial development of adjoining land rather than the marina operations. Marinas alone are only profitable where they can generate income from activities such as berth rental, dry boat storage, boat repair and maintenance and ancillary retail like chandlery, restaurant and marine related office rentals. The proposed marina is unlikely to be of a scale where it can generate sufficient income from these types of activities. It is noted that the qualitative analysis (**Section 3.2.5** of this report) generally indicates that approximately 100 wet berths would be viable in the market.

The Department of Lands is currently undertaking commercial tendering processes for marina locations along the NSW coast, where the existing facilities are lacking and being released for private redevelopment. This is currently being carried out for Batemans Bay Marina, Port Macquarie Marina, Wollongong Harbour, Ulladulla Harbour, Nelson Bay Foreshore (excluding marina) and Tweed Heads. Through the tendering process, the Department retains a controlling interest in the redevelopment designs and facilities provided at these sites. This tender shortlist process is optimal in providing the market an opportunity to consider long term viability of marina components. Council can judge tender submissions based on stated objectives, whilst requiring respondents to demonstrate long term commercial viability through business case submissions.

A method for Council guiding development on the site, albeit with less certainty than being a development partner, involves development of a master plan and precinct plan that require minimum provision of facilities. Those minimum provisions would be based on this analysis. Also, covenants on title could be used, but which are fairly blunt instruments that can cause financing difficulties, particularly in documentation. Covenants have however worked effectively in other situations.

Essential for long term viability of the marina facility is the promotion of tourism, diversity of river experiences and Taree's visitor attraction. From the qualitative analysis, a Manning River Tourism Strategy and Implementation Plan would further encourage visitor use of marina and long term viability of a marina complex at Pitt Street.

6.0 Conclusion

This section provides an overview of the findings and recommendations with respect to the nature of a marina within the Pitt Street Waterfront Precinct. This report was prepared to support the consideration of rezoning the subject site for the purposes of a marina within a wider redevelopment that is the subject of a wider master plan, namely the Pitt Street Waterfront Master Plan. This report does not constitute a commercial or financial feasibility for a marina on the site. Methodologies, assumptions and limitations of this study are clearly documented within the body of this report.

6.1 Preliminary qualitative model for marina

With no established marina in Taree or in the immediate vicinity, it is difficult to establish existing local influences on the demand for marina berths. Accordingly, the market analysis incorporates a qualitative review of similar facilities elsewhere and provides a description of the likely influences on demand for marina facilities at Pitt Street.

Overall, anecdotal evidence suggests that a marina at Pitt Street would experience a reasonable level of demand, with potential to generate more demand in the future if the visitor experience is enhanced. However, this is tempered by a range of constraints, including:

- distance from coast, which is a deterrent for non-powered and smaller vessels to access the ocean
- existence of the Manning River bar, which restricts ocean access for large periods of the year
- no wash zones limit the speed and relative size of motor vessels
- navigability of route to the coast makes it difficult for boats under-sail to negotiate the river into the wind
- obstacles over the River constraining height clearance for vessels, including the Pacific Highway bridges crossing both the north and south passages and power lines, which are of similar height.

A case study analysis provides qualitative data with which a preliminary model for the Pitt Street Waterfront marina is formulated (see **Section 3.2.5** of this report). This preliminary model was tested using vessel registration and other socio-economic data, to formulate a concept design for the proposed marina.

The primary finding of the case study-based qualitative analysis is that the majority of marinas either promote convenient ocean access or are part of a network of river based marinas (which also typically have some degree of ocean access). Based on the case studies and the limited ocean access (due to the site's distance from the coast and the Manning River Bar constraints) it is likely that the demand for marina berths will be for predominantly river based vessels. The Pitt Street Waterfront marina would have less ocean-going vessels, such as yachts and large motor cruisers. This would indicate that vessels that are likely to moor in the marina would be similar to other river based marinas surrounding Australia. Vessels that are moored at similar marinas along the Murray River include houseboats, runabouts and some larger cruisers.

River marinas are also supported through a range of ancillary attractions, such as eco-tours, Parks and gardens, national parks, heritage locations, scenic areas and fishing. A critical mass of river facilities for boating would generate additional demand for marina berths, which may induce further demand through improved boating convenience and increased attraction for visitors. As the Pitt Street Marina would be targeted towards river cruising and river fishing boating activities, to maximise the visitation, and therefore the demand for marina berths, the establishment of the marina at Pitt Street should be accompanied by a Manning River Tourist Strategy and Implementation Plan. Facilities for tourists could be established at strategic locations along the Manning River, such as picnic spots,

heritage places, museums, fishing spots, scenic view points, accommodation and other areas of interest.

6.2 Quantitative analysis

6.2.1 Socio-economic findings

The Taree LGA population is growing and ageing, which would indicate a high probability of an increase in the number of vessel registrations over the next 20 years. This is tempered by the low income profile for the Taree area, that combined with typically large inexpensive blocks of land in the Taree area indicates a potentially high propensity to trailer vessels instead of mooring vessels at a marina on the Manning River. This indicates that if the marina is to be a viable alternative to trailering vessels, mooring rates will need to be competitively priced.

6.2.2 Potential marina demand

A summary of the analysis of potential demand for marina berths at Pitt Street Waterfront Precinct is provided in **Table 28**.

Table 28 Summary of potential vessel demand

Potential market modelling calculations	Results	
Base Component (2007)		
Potential market – vessels of right type and size to use a marina in the Manning River as determined by vessel matrix (Table 11)	330	
Number of vessels likely to use a marina – equates to 55% of potential market.	182	
Current supply of marina berths – Harrington Marina and Crowdy Head	74	
Potential unmet demand for marina berths in the Manning River	108	
Growth Component (2007 - 2031)		
Growth scenario	**Year 2021**	**Year 2031**
Standard Case – Projections of growth in potential vessel demand is calculated based on past trends of vessel registration growth assumed to continue at the same rate over time (see **Table 18** for projections)	146 (56 wet berths, 90 dry berths)	180 (68 wet berths, 112 dry berths)
Optimistic Case – Projections of growth in potential vessel demand is calculated based on projected population growth rates over time (see **Table 19** for projections)	191 (73 wet berths, 118 dry berths)	262 (100 wet berths, 162 dry berths)

Note: The above figures are estimates to provide an indication of the potential market.

The market assessment carried out suggests there is potential demand for 110 berths in 2007, based on vessel licensing data. The projections suggest increasing potential demand for marina berths at Pitt Street in the future. Based on the potential demand for marina berths in 2007, over the medium term (2021) there is likely to be demand for between 150 – 190 berths and over the long term (2031) there is likely to be potential demand for between 180 – 260 berths.

An indication of induced demand can be provided based on the findings of the *Inland Marina Investment Guide* (2006), prepared by British Waterways, which suggests that the proportion of boats requiring inland long term moorings in the UK is currently 55% but could go up to 66% once induced demand is included. The sensitivity test provided in this report indicates with this level of induced demand the projections in the medium term (2021) could be 176 (standard case) – 230 (optimistic

case) vessels. However, potential for induced demand to significantly increase potential demand for moorings at Pitt Street should be treated as a potential upper limit of demand rather than the likely scenario.

The potential demand projections provided in this assessment rely on the marina offering a concentration of ancillary facilities (such as boat ramp, dry storage, commercial and retail developments, maintenance facilities and/or tourist accommodation). The projections also take into account recommendations of the qualitative analysis to prepare a Tourism Strategy and Implementation Plan for the Manning River to facilitate a network of visitor and boating activities along the river in support of the Pitt Street Marina.

The analysis undertaken is dependent on a number of assumptions. The most crucial is the proportion of vessel owners that will use a marina, which is taken to be 55% based on UK evidence for similar facilities. For more certainty, it is suggested further information is gathered to refine this figure through a survey of local vessel owners.

6.3 Preliminary concept design for Pitt Street Marina

6.3.1 Site analysis

The best opportunity for a marina appears to lie at the north-eastern end of the site. The Manning River water depths are greatest in this location and it is anticipated that suitable berths could be developed close to the naturally deeper stretches of the river.

Berths in the river channel would not experience good mooring conditions. Good or excellent mooring conditions could be developed by excavation of part of the shore to provide protection from the waves that can be generated along the long river fetches approaching the site.

A deeply-incised excavated harbour with a narrow entrance is not recommended for the reason of obviating the poor water quality that is likely to develop such a facility in the absence of any strong hydraulic energy gradients that, otherwise, could be tapped to enhance water turnover/harbour flushing (The Anchorage, Port Stephens). An incised mooring basin would present a wide opening to the river, although floating mooring pontoons with sub-aqueous wave-protection skirts could enclose such a basin while providing still for adequate water circulation.

Should the north-eastern most area of the site be explored for further marina development opportunities, more detailed geotechnical information would be required to assess the excavation potential for this site. The numbers and types of vessels for design would need to be confirmed and preliminary marine ecological surveys and assessments carried out. In this regard a key challenge for development of a marina at Pitt Street would be the capability of the site to provide an adequate number of berths to meet expectations.

6.3.2 Concept design

Based on the most recent architectural master plan concept for the Pitt Street Waterfront Precinct (**Figure 45**) prepared by Suters Architects and based on the analysis provided in this report, a concept layout for the Pitt Street Marina has been prepared. This is presented in **Figure 46** (full version of the concept plan drawing is provided in **Appendix G**). The concept design provides a medium term development concept that addresses site constraints. Due to the inherent difficulty in accurately estimating vessel demand and feasibility of a marina on the site, the design has potential for staging and long term expansion to respond to actual demand experienced.

Key features of the concept design are:

- wet berths;
  - 64 wet berths (expansion potential for additional 16 wet berths)
  - 12 layover wet berths are provided for temporary mooring of dry berthed boats from the adjacent dry boat storage
- the two wet berths at the end of each marina arm and layover berths along the marina basin edges could be used to accommodate larger vessels, such as:
  - houseboats, larger river cruising vessels and commercial tour operators
  - single hull yachts up to 12 m
  - other vessels up to 1.8 m / 2.0 m draught (approximately 30 m length).
- flexible arrangement of dry boat storage, comprising;
  - 104 dry berths in two structures over four and two levels respectively (a mix of vessel sizes up to 7 m in length)
  - potential building expansion for additional 48 dry storage spaces, which would be used for hardstand storage of larger vessels in the interim
  - four dry berths on hardstand outside the dry storage structures footprints for larger vessels
  - potential first stage (prior to construction of dry storage buildings) hard stand storage space for 32 vessels (equivalent to one level of the two dry storage structures), excluding hardstand outside dry storage building footprint.
- car parking for 50 vehicles
- two marina related commercial buildings for marina related retail/offices, workshop, amenities, marina administration offices, chandlery, café and/or restaurant, tour operator facilities, as well as space for co-location of clubs and Fisherman's Coop.
- hardstand area, including provision for:
  - temporary dry storage of boat for repair and light maintenance/repairs
  - travel lift[14]
  - forklift pad and boat ramp
  - tie up jetty
  - refuelling and sullage pump out
- potential future flood protection breakwater (for future marina extension).

The findings of this study provide sufficient basis, in light of the information presented herein, for demonstrating the suitability of the site as part of the rezoning process. This model should be read in conjunction with the entire Maritime Assessment and Concept Design discussion with this report, including caveats and assumptions made as part of forecasting potential demand. It is noted that this assessment does not consider non-maritime related matters such as urban design, traffic and other matters that are being addressed by others as part of the site rezoning process. Further, it is recommended that this preliminary maritime concept for Pitt Street Marina be subject to commercial and financial feasibility analyses as part of the ongoing design and development process.

It is noted that the commercial return from the marina would be generated predominantly from commercial development of land rather than the marina operations. Marinas alone are only profitable where they can generate income from activities such as berth rental, dry boat storage, boat repair and maintenance and ancillary retail like chandlery, restaurant and marine related office rentals. Although no commercial feasibility has been carried out, it appears that the proposed marina is unlikely to be of a scale where it can generate sufficient income from these types of activities alone and as a result may require incentives for vessel owners to utilise the berths and incentives for a developer to establish and operate the marina.

[14] Note: The requirement for lift and size is dependent on commercial feasibility. Council preference is for a 50 tonne travel lift to be included on site. Appropriate space in the concept design has been provided.

References

AS 3962−1991 Guidelines for design of marinas, Standards Association of Australia.

Australian Marina Management Pty Limited, *2005, Survey Of Existing Australian Dry Boat Stores Incorporating Vessel Launch Demand Profiles, Layover Berths To Boats Stored, Storage Slot Occupancy Levels*, 30 April 2005, prepared for Rozelle Bay Pty Limited.

Coffey, 2007, *Greater Taree City Council Rezoning of Pitt St Waterfront Chatham*, Report No GEOTTUNC01736AA−AC prepared for Sinclair Knight Merz, September, 2007.

Coffey, 2008, *Greater Taree City Council Pitt Street Waterfront Precinct Geotechnical Assessment Final Report*, Report No GEOTTUNC01736AB-AD prepared for Sinclair Knight Merz by Coffey Geotechnics Pty Ltd, 16 June 2008.

Ecotone Consultants, 2007, *Ecological Constraints Assessment The Pitt Street Waterfront Precinct at Chatham (Taree)*, Ecotone Ecological Consultants Pty Ltd, 30 November 2007,

ENSR, 2008, *Aboriginal and Historic Heritage Assessment - Pitt Street Waterfront Development, Chatham*, *Taree*, prepared for Sinclair Knight Mertz by ENSR Australia Pty Ltd, 10 March 2008

Greater Taree City Council, 1990, *Manning River Recreational Waters Development Strategy*, prepared by Hassell Planning Consultants for Greater Taree City Council.

Greater Taree City Council, 1993, *Geotechnical Investigation - Regional Boat Ramp, Endeavour Place*, prepared by Resource Design and Management Pty Ltd for Greater Taree City Council.

Greater Taree City Council, 2008a, *Manning River Estuary Management Plan (Exhibition Draft)*, prepared by Patterson Britton & Partners Pty Ltd in association with Worley Parsons for Greater Taree City Council.

Greater Taree City Council, 2008b, *Manning River Estuary Management Study (Exhibition Draft)*, prepared by Patterson Britton & Partners Pty Ltd in association with Worley Parsons for Greater Taree City Council.

Mercer, A.G., M. Isaacson & M.W. Mulchay, 1982, *Design wave climate in small craft harbours*, 18th I.C.C.E., Capetown, 1982.

Mitchell, W., Chittleborough, J., Ronai, B. and Lennon, G., 2001, *Sea Level Rise in Australia and the Pacific*, in Proceedings of the Pacific Islands Conference on Climate Change, Climate Variability and Sea Level Rise, Linking Science and Policy, eds. M. Grzechnik and J. Chittleborough, Flinders Press, South Australia.

NAVFAC (1968). *Design Manual – Harbour and Coastal Facilities NAVFAC DM-26*, US Dept. Navy, Naval Facilities Engg. Command, Wash. DC, July, 1968.

IPCC (2007). *Climate Change 2007: The Physical Science Basis. Summary for Policymakers*, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Switzerland.

PIANC (2008), *Protecting water quality in marinas,* Report No. 98 − 2008.

SGS Economics and Planning, 2008, *Preliminary Economic and Social Assessment – Pitt Street Waterfront Precinct Rezoning* (Final Report), prepared for Sinclair Knight Merz for Greater Taree City Council, March 2008

WBM (2001). *Manning River Estuary Management Study – Numerical Modelling*, Final report R.B12129.002.01 prepared for Greater Taree City Council by WBM Oceanics Australia, March, 2001.

Appendix A Department of Primary Industries Site Assessments

NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Site assessment survey for marine aquaculture facilities on the NSW coastline

Readers' Note

This document is part of a larger publication. The remaining parts and full version of the publication can be found at:

http://www.dpi.nsw.gov.au/fisheries/aquaculture/publications/industry-development/site-assessment-survey-for-marine-aquaculture-facilities

Updated versions of this document can also be found at the above web address.

6.12 GREATER TAREE CITY COUNCIL

Location:
Mid North Coast

Population:
44297

Northern Coastal Boundary:
6 kilometres north of Crowdy Head on Kylies Beach

Southern Coastal Boundary:
Diamond Reef, northern end of Nine Mile Beach

Coastline:
45 kilometres of predominantly long, exposed sand beaches having easterly to south-easterly aspect; numerous rock headlands; 1 estuary with training walls; no major embayment

Coastal Settlements:
Crowdy Head, Harrington, Manning Point, Old Bar, Wallabi Point, Diamond Beach, Red Head and Hallidays Point

Coastal Estuaries:
Manning River and Khappinghat Creek

6.12.1 CROWDY HEAD

Site Ranking: **

GPS Position: South 31° 50.594' East 152° 44.597'

General Description:

Crowdy Head is a prominent rocky headland six kilometres north of the Manning River estuary within the Greater Taree City Council (GTCC) area on the north coast. The associated community of Crowdy Bay is very small, comprising of around 80 residents, a small school and a harbour servicing a small commercial fishing industry. Crowdy Bay National Park dominates the coastline north of Crowdy Head to Diamond Head and south to Harrington. Although Crowdy Head has limited options for tourist accommodation the area is a popular destination, with Port Macquarie, Forster and Taree all within a one-hour drive.

Site Assessment

Table 38. Ranking of Primary Criteria for Crowdy Head.

Primary Criteria	Ranking	Comments
Secure access to high quality oceanic water	Excellent	Harbour break walls; boulder beach
Land-base < 1km of intake point	Good	Zoning and aesthetic impact issues

Table 39. Ranking of Secondary Criteria for Crowdy Head.

Secondary Criteria	Ranking	Comments
Access to mains power	Good	3 phase lines <500m from both land-bases
Access to mains freshwater supply	Good	<500m from both potential land-bases
Access to telecommunications	Good	<500m from both potential land-bases
Access to suppliers, trade services	Good	Harrington 6km; Taree 35km
All weather (sealed) road access	Good	<500m from both potential sites then gravel
Potential water quality pollutants	Good	Manning River >5km; harbour activities
Protection from prevailing swells	Excellent	Existing harbour with northerly aspect
Pumping head	Excellent	<10m
Size of land portion(s)	Good	2-5 ha, limited to hatchery development
Land status	Good	Both potential sites cleared, degraded
Land zoning	Good-Poor	6A(open space); 7F2(coastal protection)
Land topography	Excellent	Both potential sites flat to gently sloped
Aesthetics	Poor	Overlooking residential

Site Discussion

The existing rock-walls and wharves associated with the harbour on the northern side of the headland would provide a number of suitable anchorage points for an intake pipe. The northerly aspect of the outer harbour walls would protect any intake anchored on the seaward side from southerly to easterly prevailing swells and minimise issues of longshore sand drift. Anchorage within the harbour walls would provide more protection, but activities within the harbour may compromise water quality.

Alternatively, the boulder beach to the west of the harbour (see overleaf) could provide reasonable anchorage and protection of a well-type intake, buried below the boulders.

Rocks on the southern side of the headland near the quarry (see overleaf) would provide suitable anchorage as well, but the aspect is unfavourable and the intake would be exposed to prevailing swells and sand drift from the south.

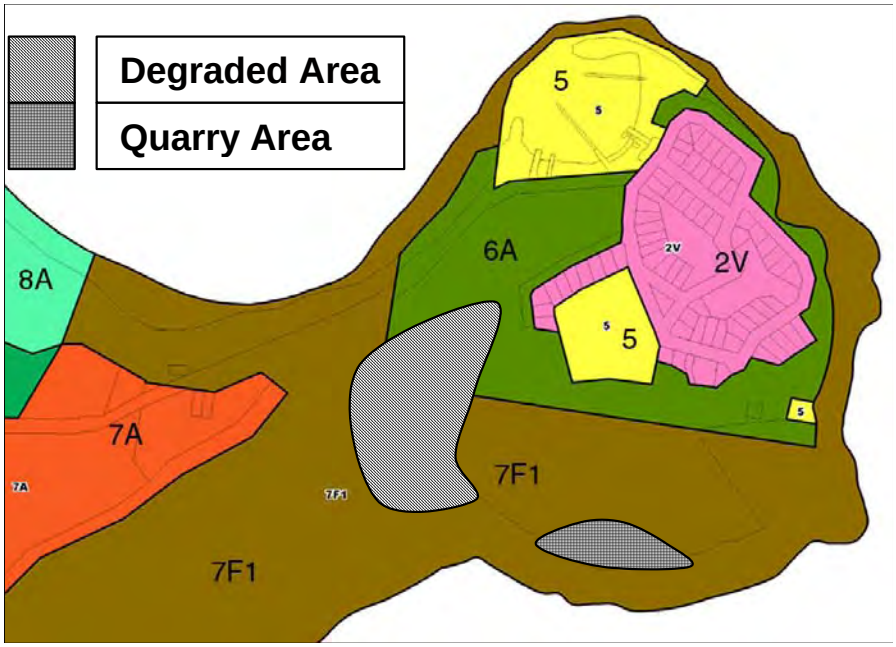
Crowdy Head looking south towards Harrington Inlet Source: GTCC 2001©

Although space at Crowdy Head is limited, due to the surrounding Crowdy Bay National Park, there are some potential land-bases within 1 kilometre of the specified anchoring points. A tract of degraded land with an approximate area of five (5) hectares lies to the south west of the residential zone (see LEP Zoning map) and an adjacent car and boat-trailer parking area. The area is a mixture of 6A (Open Space) and 7F1 (Environmental Protection Coastal Lands) zoning under which conditional consent for development can be given by the Council for 6A or the Director of Planning for 7F2, according to the scale, nature and how appropriate the development will be. Alternatively zoning can be amended to make the activity more allowable.

Crowdy Head Harbour Photo: D Glendenning

Crowdy Head quarry, looking east Photo: P Read

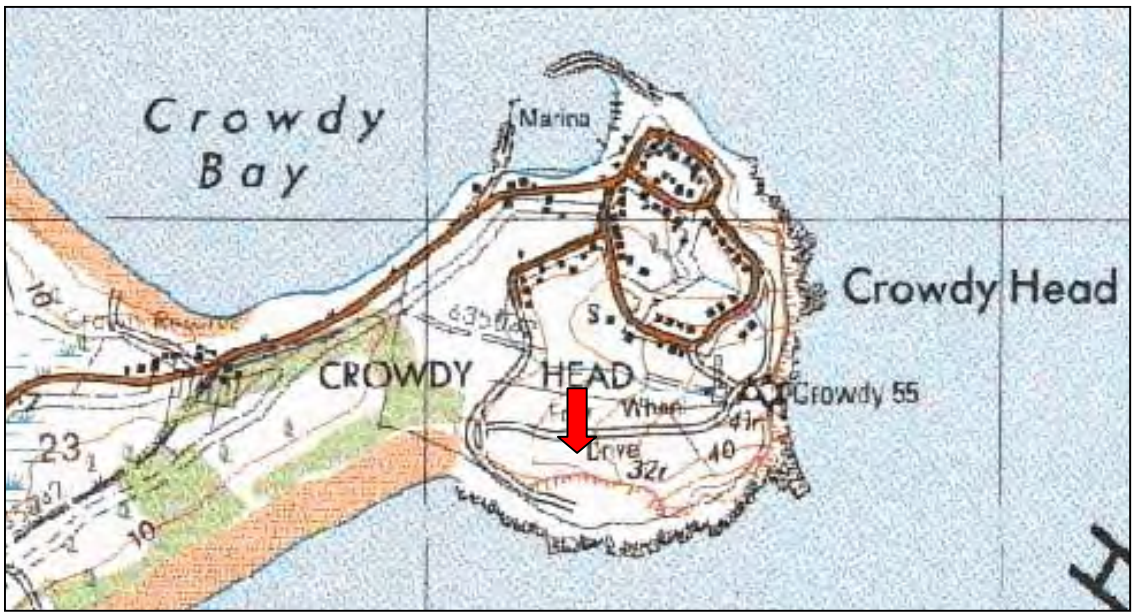
The degraded area is directly adjacent to the harbour and surrounding infrastructure, and aquaculture development would be consistent with the existing fisheries-based community. However, development of this land parcel would have potential visual aesthetic impact on a small number of overlooking houses (see below), some within 200 metres with line of sight. Development of this portion would therefore require a minimum of Level 2 Assessment under the Project Profile Analysis of the SAS (Appendix C)



LEP zoning map, showing proposed land areas Source: Adapted from GTCC LEP (1995)

A second option for a small land-base exists on the southern side of the headland in the quarry. The quarry contours and access roads can be clearly seen on topographic maps (see below). Although the site is small, approximately 2 hectares, the absence of overlooking houses would reduce any potential visual impact. However neighbouring land is still residential, with houses approximately 200 metres north of the quarry cliff.

The quarry site is very degraded and despite being zoned 7F1 (Environmental Protection Coastal Lands) any development would improve the areas aesthetics. Access to at least a portion of the quarry wall may be required periodically to maintain the harbour break-wall.



Topographic Map of Crowdy Head, showing quarry contours and access. Source: TopoView© 2000

Land portion with overlooking residential properties Photo: D Glendenning

The provision of services to Crowdy Head is good, excepting sewerage that is treated on-site (septic tank or similar). Three-phase power, sealed road access, mains freshwater supply and telecommunications are all provided to the settlement. An extension of services for less than 500 metres and the upgrading of road access are required for both identified areas. Both areas are either cleared or partially cleared.

Development of either of the identified sites is limited to tank-based, hatchery-only development due to the small size of the land portions. Proximity to residential areas means that development of either site will require a minimum of Level 2 Assessment under the Project Profile Analysis of the SAS.

6.12.2 HARRINGTON

Site Ranking: *

GPS Position: South 31° 52.00' East 152° 42.08'

General Description:

Harrington is a small town of 1450 residents on the northern side of the Manning River estuary, within the Greater Taree City Council (GTCC) area on the north coast. Crowdy Bay National Park dominates the coastline north of Harrington to Diamond Head. The area is subject to moderate to high recreational usage, with Port Macquarie, Forster and Taree all within a one-hour drive.

Site Assessment

Table 40. Ranking of Primary Criteria for Harrington.

Primary Criteria	Ranking	Comments
Secure access to oceanic water	Poor	Northern break wall; potential water quality issues; estuarine influences
Land-base < 1km of intake point	Good	Zoning and aesthetic impact issues

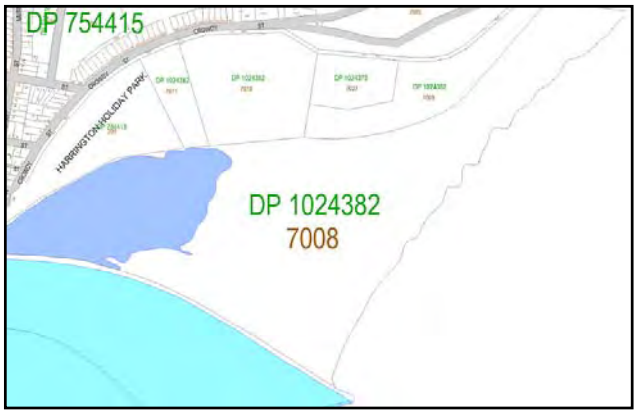
Table 41. Ranking of Secondary Criteria for Harrington.

Secondary Criteria	Ranking	Comments
Access to mains power	Good	<500m from potential land-base
Access to mains freshwater supply	Good	<500m from potential land-base
Access to telecommunications	Good	<500m from potential land-base
Access to suppliers, trade services	Good	Harrington (immediate); Taree 30km
All weather (sealed) road access	Excellent	Adjacent to site
Potential water quality pollutants	Poor	Manning River discharge immediate
Protection from prevailing swells	Poor	Break wall exposed to prevailing swells
Pumping head	Excellent	<10m
Size of land portion(s)	Excellent	>40 ha, hatchery and/or grow-out
Land status	Good	Undeveloped vegetated with degraded portions
Land zoning	Good	Environmental Protection Coastal Lands Acquisition (7F1); Environmental Protection Habitat (7A)
Land topography	Excellent	Potential sites flat to gently sloped

Site Discussion

The existing rock break wall on the northern side of the Manning River would provide a number of suitable anchorage points for an intake pipe. The break wall runs approximately south-east. This means that both the southern (estuarine) side and the northern (oceanic) side of the break wall are exposed to prevailing swells from the south to south-east. The oceanic side would also be exposed to swells from the north. Water quality on both sides of the break wall is likely to be affected by estuarine discharge. Sewerage effluent for Harrington is discharged to groundwater. Further investigation of water quality variation between the two sides in different conditions (flood, high seas, tides etc) is required in order to evaluate a preferable side for anchorage.

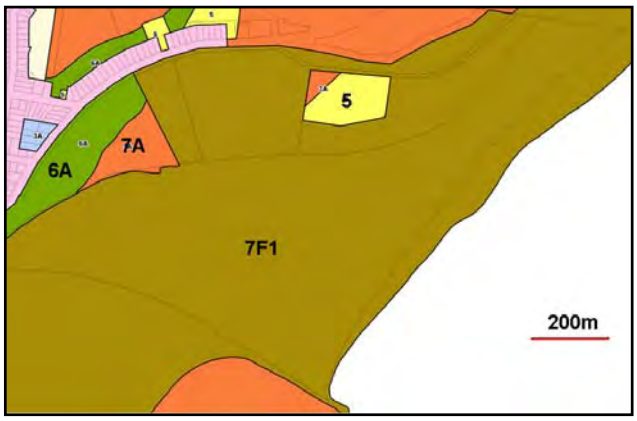
Harrington and the Manning River estuary Source: DLWC 1998©



LEP Zoning Map of Harrington, north of northern break wall
Source: GTCC LEP Maps (2003)

Suitable land portions are available within 1 kilometre of the break wall. The area is mainly a mixture of Environmental Protection Habitat (7A) and Environmental Protection Coastal Lands Acquisition (7F1) zoning. Both zones prohibit aquaculture development under the Greater Taree LEP (1995), however zoning is not considered to be a hard constraint to development for this report.

The largest portion (DP 1024382 Lot 7008) available comprises more than 40 hectares of suitable Environmental Protection Coastal Lands Acquisition



Zoning Map of Harrington, North of Breakwall
Source GTCC LEP Maps (2003)

(7F1) land directly adjacent to the break wall. The western portion of the block is dominated by a shallow lagoon (not included in block size) and shares a common boundary with Harrington Holiday Park.

Development of a large portion of the identified site could include an integrated hatchery and grow-out development. However inclusion of wide buffer zones to adjacent land-use and the lagoon would reduce the available land area considerably so that development is restricted to either a hatchery (tanks or ponds) or a grow-out (tanks only) facility.

Development of other smaller 7F1 portions adjacent to the north, between the holiday park and a cemetery (zoned 5A), is also restricted to hatchery only or grow-out only facilities.

The proximity of the identified site to residential areas (<400m) and the potential for visual impact from prominent sites means that development of the site will require a minimum of Level 2 Assessment under the Project Profile Analysis of the SAS (Appendix C).

Estuarine sites

Estuarine Aquaculture maps included in the North Coast Sustainable Aquaculture Strategy identify areas within the estuary that are regarded as suitable under Tier 1 Assessment Criteria of the Strategy (Appendix C). Operationally these areas may be suitable for the culture of the more euryhaline species, particularly for the grow-out phase of production.

No additional estuarine sites were catalogued during ground-truthing for this Council area.

6.12.3 CATALOGUE OF REMAINING COASTLINE

Table 42. Greater Taree City Council – justification of sites having no current potential.

Site	Justification
Wallabi Point	No land-base; developed, residential; undeveloped, cultural significance (Saltwater Reserve); exposed anchorage
Red Head/Black Head/ Hallidays Point	No land-base; developed, residential; undeveloped (Darawank Nature Reserve); inappropriate slope; elevated pumping

Appendix B Consultation minutes

Appendix B Consultation minutes

Stakeholder Consultation

Comments from stakeholders contacted as part of preparing this Maritime Assessment are provided in the following sections.

Manning River Sailing Club (Juniors)

Date: 09/10/07
Name: Linda
Contact: Mob. 0421 720 984
Type: Sporting/Social Club

Key Points:

- Junior sailing club memberships are in decline, have recently lost a number of members. The club currently hires out the hall for functions as an alternate source of income.
- The existing boat ramp located adjacent to rowing club is busy on weekends.
- The rowing club holds large carnivals twice yearly involving both high schools and senior rowers. The existing boat ramp and car park become overloaded at these times.
- There is an alternative single lane boat ramp near council chambers, however this ramp is steep and consequently not heavily used. The same applies to the existing boat ramp at Shannahan.
- There are a couple of larger motor cruisers owned by locals. Suggest talking to Stebercraft.
- The only slipway is adjacent to the Taree Aquatic Club. An additional slipway would be desirable.
- Taree hosts annual sailing regatta.
- The bar at the river entrance at Harrington is difficult to navigate.
- Stebercraft launch boats directly into river using crane over river bank and sails out through the bar.
- Majority of river use by recreational boaters who travel to from Harrington and Old Bar for picnics/barbeques (day trip).

Taree Fisherman's Co-operative Society Ltd

Date: 09/10/07
Name: Wayne
Contact: Ph. (02) 6552 1323
Type: Commercial Fishing - Cooperative

Key Points:

- Memberships currently total around 17 fishermen/boats. Members are predominantly local, but include one vessel from Crowdy Head and some from Forster. Locals are primarily from Taree, Cundletown and as far as Bohnock.
- The largest member vessel is a 56ft trawler based Crowdy Head. This size is no longer able to cross the bar at Harrington. The member vessels based at Forster are all trawlers.
- Local members all use punts launched from local boat ramps.
- Restrictions in place currently prohibit commercial fishing on weekends and public holidays. Commercial fishermen are allowed to fish crabs on these days but are not allowed to have nets aboard at the time.
- The co-op has a dedicated wharf for offloading fish from the river.
- Semi trailer access off street is required for deliveries to Sydney, current access is tight but manageable.

- Desirable features for any new development are the retention of a dedicated commercial fishermen's wharf and improved semi trailer access off street.
- There is currently no major clash between recreational users of the boat ramp and local fishermen due to restrictions on commercial fishing on weekends and times of usage during the week (commercial fisherman primarily pre-dawn and post-dusk).

Manning River Marine

Date: 09/10/07
Name: Not recorded
Contact: Ph. (02) 6552 2333
Type: Boating Industry - Retailer

Key Points:
- Business sells new and used small craft up to 18-20ft (runabouts).
- Average sales of approximately 60 new units per annum.
- Customer base Taree and surrounds.
- Existing major boat ramp facilities on the Manning include the following:
  - Three lane boat ramp at Taree Estate
  - Cundletown boat ramp
  - Gravel single lane boat ramp at Old Gravelworks.
- River usage predominantly weekend recreational fishermen and picnic/day-trippers up and down the river.
- Mainstay of business is retirees. Business has been slow in the last two years, due primarily to housing boom peak two years ago and subsequent slump in values.
- There are currently 6-7 larger motor cruisers up to 40ft on river primarily owned by wealthy locals and almost all moored at existing private moorings on the river.
- The entrance to the river at Harrington places significant constraint on boating activity on the Manning. The bar is effectively out of bounds.
- Unless 27/7 access is available over the bar there will never be the demand for larger vessel facilities in the Manning experienced at Hastings, Coffs, Ballina and Port Macquarie.

Manning Valley River Cruises

Date: 09/10/07
Name: Darren
Contact: Ph. (02) 6553 2683 Mob. 0428 532 683
Type: Tourism Industry Operator

Key Points:
- Business operates river cruises on the Manning using single 40' vessel (24" beam).
- Customer base mainly seniors and bus groups from Newcastle or elsewhere typically within 2-3hrs of Taree.
- Business is currently based out of Croki using old existing wharf, but would relocate to new marina or location closer to Taree if appropriate facilities were available. Business would upgrade to a 100' boat given a larger facility to base operations.
- The river currently lacks slipway/maintenance facilities for larger boats and an on-river diesel refuelling facility. The existing slipway adjacent to the Aquatic Club may cease operation in near future.
- Business has no shortage of customers or routes for Manning river cruises. There is over 150km of river to cover.

- Foresees market for package deals including accommodation for groups 50-70 people, but Taree cannot cater for groups of this size. The nearest hotel/motel capable is in Wingham.
- Smaller operators in Harrington are currently finding business slow and some have put businesses on the market.
- River use is predominantly commercial fishermen and oyster farmers.
- There are 15-20 larger motor boats owned and operated locally. Suggests contacting local private large motor cruiser owners Lachlan Higgens, Laurie Gates or Vic Currie regarding existing facilities for larger vessels. Most larger vessel owners have existing private moorings on river.
- Taree has a reasonable, if small, local boating industry but there is definitely room for expansion.

Taree Aquatic Club (Sailo's)

Date: 09/10/07
Name: Richard
Contact: Ph. (02) 6552 1435
Type: Sporting/Social Club

Key Points

- Club is predominantly a social club with around 5000 members. Includes sailing club among its membership. Club is licensed to hold 250 people which is too small for the current number of members. The club recently completed a major refurbishment.
- The sailing club holds events every weekend 6 months of the year plus an annual regatta. The sailing club fleet totals around 20 small craft. Last Manning River Marathon sailing race attracted 75 entrants.
- The Manning hosts power boat racing events 4-5 times a year plus a regatta at Easter. Theses events bring a lot of people to town. The World Championships were held in Taree two years ago.
- The Junior Sailing club totals less than 20 vessels. The Junior sailing club is separate from the Aquatic Club and resists efforts to combine.
- The Rowing club holds regattas 3-4 times a year which attract a good crowd.
- There is likely to be demand for a small to medium size marina similar to that just completed at Harrington (15-20 berths). The main problem is that currently day trippers from Harrington or elsewhere cannot tie up their vessels and come into town to shop or eat. A new development would require casual moorings.
- Notes that Harrington is subject to the same bar restrictions as Taree. However some locals do make themselves available to pilot vessels over the bar. Overall, the bar is not that much of a problem, although it should not be attempted by first timers unaccompanied.

Markham Marine

Date: 09/10/07
Name: Not Recorded
Contact: Ph. (02) 6581 1034
Type: Boating Industry – Manufacturer/Retailer

Key Points:

- Business is fibreglass hull boat manufacturer up to 9.5m length, producing around 60 vessels p.a. and exporting primarily to WA and QLD. Very few local sales, unable to provide any real input for this study.

Crowdy Bay Charters

Date: 09/10/07
Name: Roger
Contact: Ph. (02) 6552 2022
Type: Tourism Industry Operator

Key Points:

- Business operates offshore fishing charters and whale watching cruises out of Crowdy Head using single 7.5m LOA vessel (eight person capacity).
- Crowdy Harbour has two wharves. Usage is predominantly by commercial fishermen. Capacity around 30 vessels, only three to four private permanent moorings.
- Drawback for tourism in Crowdy Head is the lack of transport out of the harbour for tourists arriving in boats.
- Crowdy Head has a very good four lane boat ramp. The facility was upgraded two years ago.
- Customer base primarily local fishing charters, but some tourists from Cessnock/Hunter region. Not very many tourists from Sydney. Business is a part time occupation only, works “real” job full time.
- Uses trailerable boat, launched at Crowdy boat ramp, does not have permanent mooring. Preferable for small craft as maintenance is easier and not required as often.
- Has little need to cross the bar and will not generally attempt as it is too unreliable.
- There is another boat ramp at Harrington.
- Suggests researching Harrington Waters housing development which includes small marina development.

Department of Lands

Date: 10/10/07
Name: Gary Dobinson
Contact: Ph. (02) 6591 3500
Type: Government Authority

Key Points:

- Works in Crown Lands Department (Commercial), dealing primarily with leases on crown land.
- Planned extension to Port Macquarie Marina is currently being assessed plus planned development of overflow marina at Camden Haven (North Haven). Market for marinas and mooring facilities along mid north coast is strong.
- Department of Lands previous studies possibly include assessment of proposed development in Brown’s Creek area (20 years ago) consisting of EOI for long term lease.
- Suggests talking to Ian McAndrew of Marina Industries Association of Australia (02) 9739 6712 who identified the need for expansion of Port Macquarie Marina + North Haven development.
- Suggests talking to Bob Birse (02) 6591 3504 from Department of Lands – Crown Lands (Land Management) in relation to existing waterway planning studies or the like.

Date: 10/10/07
Name: Bob Birse
Contact: Ph. (02) 6591 3500
Type: Government Authority

Key Points:

- Department carries out “broad brush” land management assessments on development proposals/applications. Includes planning, social and ecological considerations and is typically carried out pre EIS/REF stage so as to grant land owners consent.
- Previous land management assessment carried out for Croki Bypass Bridge. Bob will forward copy early next week. Also one for Manning Point development but this not yet issued.
- Very little demand for development of waterside structures in Manning.
- Department has information relating to number and location of waterside structures on crown land. Bob will forward data for Taree to Harrington early next week.
- Council operates a sewerage pump out facility adjacent to Taree Aquatic Club. Council should hold usage information relating to this facility.

Date: 30/09/08
Name: Bob Birse

Office records show the following authorised Domestic Waterfront Structures (DWFS) on the Manning River:

- Total number DWFS held under licence - 59
- Only 3 of these have attached berthing (wet) areas – 6x24m, 5x15m and 4x7m
- Total number DWFS held under permissive occupancy (PO) – 22
- No data held with regard to vessel sizes moored at DWFS in Manning River

Marina Industries Association of Australia

Date: 10/10/07 and 01/11/07
Name: Ian McAndrew
Contact: Ph. (02) 9739 6712 Mob. 0418 494 039
Type: Marina Industry – Industry Association

Key Points:

- Marina market expanding along the NSW Coast, Coffs Harbour, Port Macquarie full, need for additional expansion at Port Macquarie and development at Camden Haven (North Haven).
- General lack of boat storage is limiting boat sales as people will not buy unless they have somewhere to store it.
- Stebercraft have major problem with bar, sometimes having to transport boats by road at greatly increased expense.
- Marinas along NSW experiencing strong demand for berths. Plans for expansion at Port Macquarie and new facility at North Haven.
- Access to ocean is critical. Access across bar at Harrington is unreliable and would potentially restrict demand for berths in Taree area. Believes full time all weather access is critical to viability of marina development on Manning.
- Without reliable access to ocean marina would be limited to small scale development possibly catering to houseboats/tour operators. New development would need to concentrate/focus boating activities on Manning to be successful.

Stebercraft Pty Ltd

Date: 10/10/07
Name: Alan Steber
Contact: Ph. (02) 6552 2577
Type: Boating Industry – Manufacturer/Retailer

Key Points:

- Business manufactures fibreglass hull boats between 22' to 52' at around 12 p.a. Very few local sales, predominantly private customers from major capitals and international, plus government contracts for water police, customs and defence. Does not manufacture runabouts.
- Mobile crane used to launch vessels at river bank. Boats leave factory 99% complete but can be completed on the water within two days typically, up to one week if sea trials are required.
- Final fit out and trials performed at Stebercraft private waterside residence and jetty on river. Handover or inspection by customers also handled at same private facility (VIP type facility).
- Boats leaving the river are piloted over the bar. This is not a major problem at present but is heavily tide and weather dependent. It can sometimes cause delays.
- Current operations are not reliant on existing public marine facilities at Taree.
- Definitely demand for permanent and casual moorings in area. Casual moorings required to service customers who take delivery of boats but wish to remain in area or leave boat moored for short periods of time.
- Identifies a need for riverside refuelling facility. Current alternative is to hire tanker and fill directly, with far greater risk of spills.
- Sees potential for berths for customers seeking refit of existing vessels, typical refit might take 1 week to three months.
- Identifies demand for slipway facilities, the nearest existing facilities are at Forster, Crowdy Head and Taree. The existing Taree slipway is old and run-down and currently for emergency use only.
- There are 15-20 larger size locally based vessels including a small number of houseboats.

NSW Maritime

Date: 17/10/07
Name: Brett Ryan
Contact: Ph. (02) 6552 2577
Type: Government Authority

Key Points:

- NSW Maritime regulates boating activities within the Manning based out of office in Forster.
- Currently 3000 recreational boats < 5 m, 700 recreational boats > 5 m, 18 commercial boats > 5 m registered in Manning area.
- 5900 current boat licence holders in the area.
- MSW Maritime boat registration and licensing random checks revealed approximately 60 % of river users from the months October to April were visitors, primarily from Hunter/Newcastle area, although visitors from North and Western Sydney on the rise as well as some from Queensland.
- Lack of diesel re-fuelling facilities on river limits attraction for larger vessels.
- Bar is difficult to cross although depends on experience of vessel master. Not typically attempted by people unfamiliar with area.
- Noted that this was not really an impediment to the current usage of the river which comprised day trippers in smaller trailer boats.
- Existing facilities at Crowdy Head are primarily for commercial fishermen and not generally geared for tourists, e.g. lack of showers and public amenities, although boat ramp is good. Existing facilities at Forster better.
- Generally positive about potential for small scale marina development on Manning, thought that people might be pleasantly surprised at the usage of such a facility.
- Necessary to provide public amenities and re-fuelling facilities as part of the development to cater for the visitors.

Date: 22/09/08
Name: Brett Ryan

- Private jetties:
  - Vessel sizes at private jetties are between 7 m and 13/14 m. Of which there are about 12 or so on the river moored at private jetties at present.
  - Approximately 3 of these vessels are transient in nature, with mooring being split between Wallace Lake / Forster and Manning River.
  - Most of the vessels under 7 m in length are trailerable and not generally stored on river.
  - A significant proportion of jetties do not have vessels moored.
  - A lot of the private jetties on Manning River are fishing platforms. Often the private jetties are not structural sound to cater for larger vessels.
  - Department of Lands may have information on the number of wet lease areas, which some private jetty owners have taken up with the Department.

Harrington Marina

Date: 01/11/07 and 05/11/07
Name: Geoff Holsworth (New Vision Realty)
Contact: Ph. (02) 6556 0188
Type: New Vision Realty (Real Estate Agent)

Key Points:

- Business is managing sales of land packages at Harrington Waters Estate development – Harrington.
- Current 24 berth capacity at estate marina which can accommodate vessels up to 50 ft. At present around 6 – 10 boats moored typically around 35 ft. Majority belong to estate land owners in but some from Harrington and a couple from Taree.
- Existing 24 berths are casually rented.
- Types of vessels currently moored range from 18 ft up to 52 ft and include
  - 25 ft sailing vessel
  - 52 ft house boat
  - Inboard boats
  - Cruisers.
- Rental for berths is $35-40 pw.
- Office and marina constructed 6-7 years ago.
- Future marina development planned but will be tied to future land releases.
- New marina will be established with 20 berths attached to title for townhouses in new residential development.
- Facilities provided include water and power, sullage pump out.
- Land uses include: shops, restaurant, Irish Tavern (just opened) with small marina associated and a 17 unit (5 Star) accommodation lodge.

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Appendix C Hydrological survey

Bathymetric contours have been generated from the complete data set captured. Depths shown have been interpolated from this data set at 10m grid intervals for clarity of presentation.

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6469600mN
6469400mN
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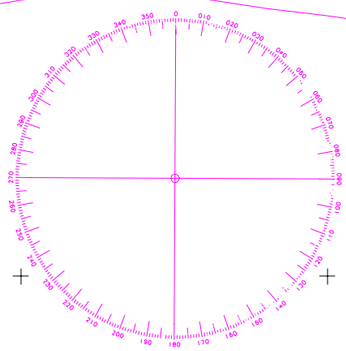
Taree

Manning River



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Scale of Metres

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2.	SOUNDINGS IN METRES & DECIMETRES REDUCED TO BELOW AUSTRALIAN HEIGHT DATUM (AHD). TIDAL DATA: OBSERVED TIDE POLE & RTKDGPS DATA.		
3.	CONTOURS AT 0.5m INTERVALS RELATIVE TO DATUM .		
4.			
5.			

BATHYMETRY & RIVERBED CONTOURS

MANNING RIVER – TAREE

HYDROGRAPHIC SURVEYS PTY. LTD. ABN 21-114-568-759

21 LYNWOOD ST., BLAKEHURST, NSW, 2221. PH:61-2-95467536 FX:61-2-95464768 Mob:0412113921

11/39 DUKE ST., STUART PARK, NT. 0820. PH:61-8-89422611 FX:61-8-89423611

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SURVEYOR	GWH	SPHEROID	WORLD GEODETIC SYSTEM 1984.
DRAWN	GWH	DATUM	GDA94 – MGA94
HOR SCALE	1: 2000	GRID	METRES
VERT SCALE	.	ZONE	56. (CM 153°)
VERT DATUM	AUSTRALIAN HEIGHT DATUM (AHD)	2nd GRID	.

NEW SOUTH WALES

MANNING RIVER

PITT STREET MARITIME ASSESSMENT

RIVER SURVEY

FOR

MAUNSELL AUSTRALIA PTY LTD

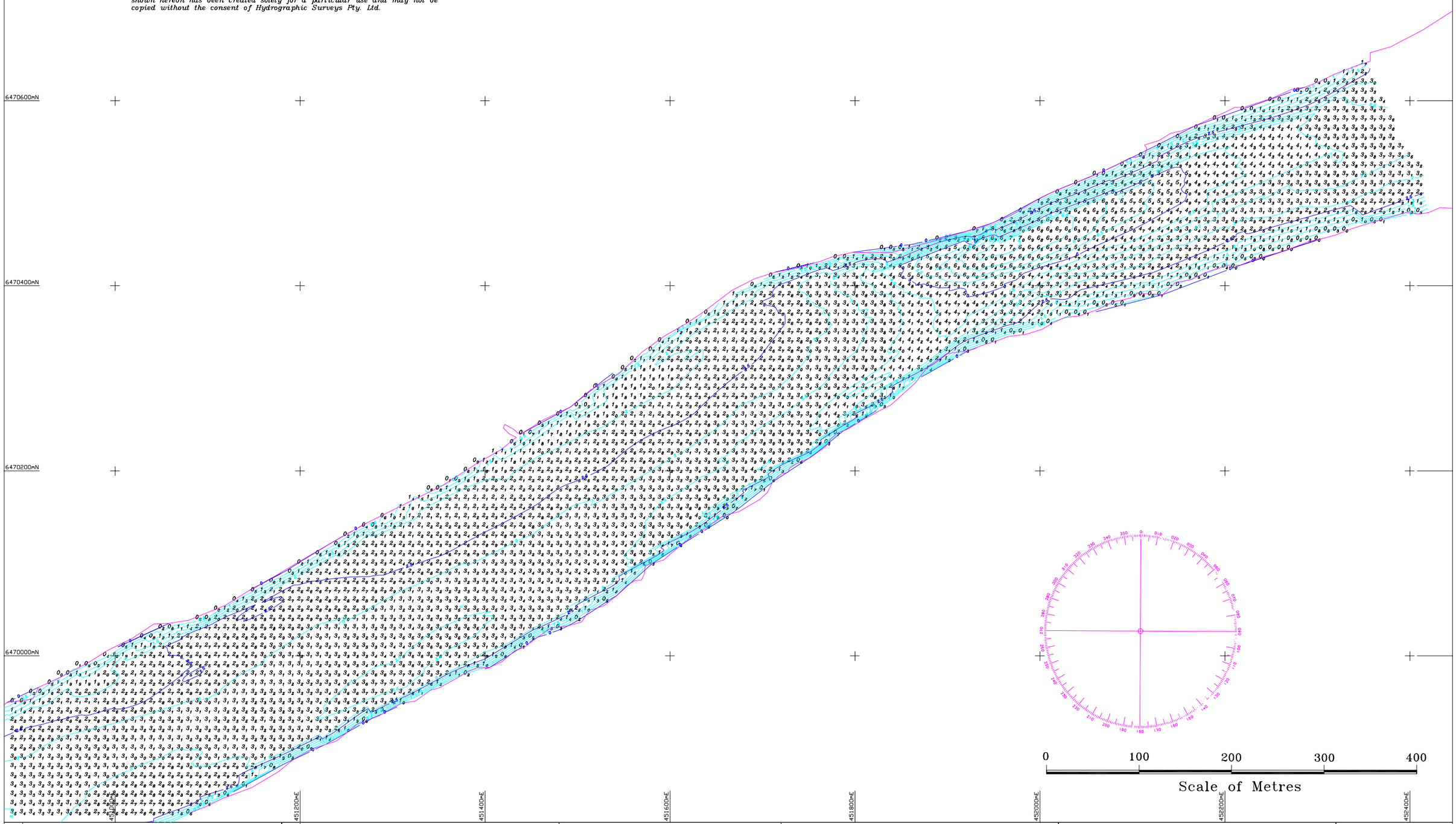
DRAWING NO:

H801–001

SHEET 1 of 1.

REVISION NO:

CONTRACT NO:



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Scale of Metres

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3.	CONTOURS AT 0.5m INTERVALS RELATIVE TO DATUM .		
4.			
5.			

BATHYMETRY & RIVERBED CONTOURS

MANNING RIVER - TAREE

HYDROGRAPHIC SURVEYS PTY. LTD. ABN 21-114-568-759

21 LYNWOOD ST., BLAKEHURST, NSW, 2221. PH:61-2-95467536 FX:61-2-95464768 Mob:0412113921

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DRAWN	GWH	DATUM	GDA94 - MGA94
HOR SCALE	1:2000	GRID	METRES
VERT SCALE	.	ZONE	56. (CM 153°)
VERT DATUM	AUSTRALIAN HEIGHT DATUM (AHD)	2nd GRID	.

NEW SOUTH WALES

MANNING RIVER

PITT STREET MARITIME ASSESSMENT

RIVER SURVEY

FOR

MAUNSELL AUSTRALIA PTY LTD

DRAWING NO:

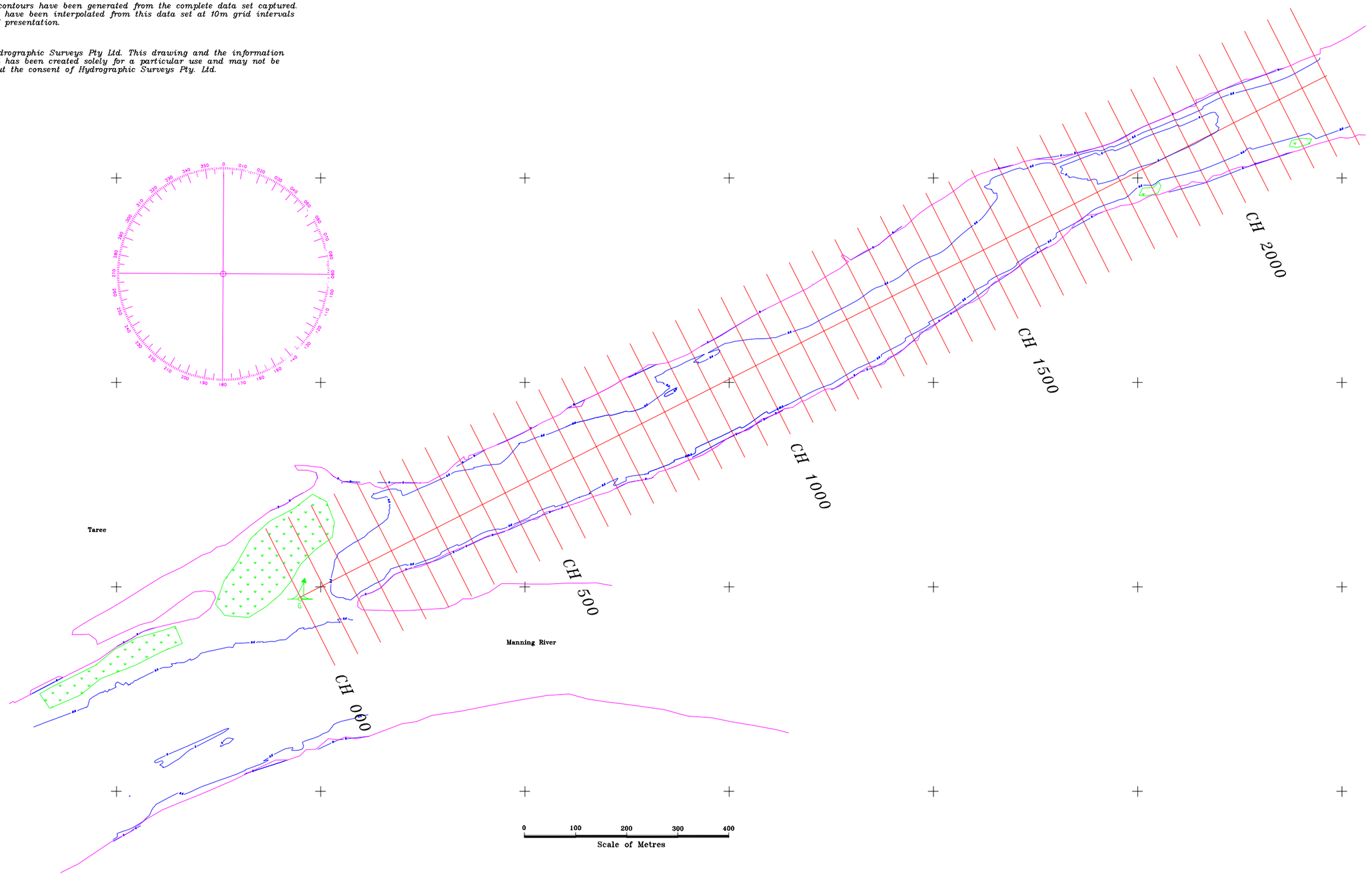
H801-002

SHEET 1 of 1.

REVISION NO:

CONTRACT NO:

Bathymetric contours have been generated from the complete data set captured. Depths shown have been interpolated from this data set at 10m grid intervals for clarity of presentation.



1.	NAVIGATION SYSTEM: TRIMBLE RTK/DIFFERENTIAL GPS ORIGIN: PM 79477 (450506.199mE 6469859.221mN 8.289m AHD.		
2.	SOUNDINGS IN METRES & DECIMETRES REDUCED TO BELOW AUSTRALIAN HEIGHT DATUM (AHD). TIDAL DATA: OBSERVED TIDE POLE & RTKDGPS DATA.		
3.	CONTOURS AT 0.5m INTERVALS RELATIVE TO DATUM .		
4.			
5.			

SEAGRASS LOCATIONS & CROSS SECTIONS

MANNING RIVER - TAREE

HYDROGRAPHIC SURVEYS PTY. LTD. ABN 21-114-568-759

21 LYNWOOD ST., BLAKEHURST, NSW, 2221. PH:61-2-95467536 FX:61-2-95464768 Mob:0412113921

11/30 DUKE ST., STUART PARK, NT, 0820. PH:61-8-89422611 FX:61-8-89423611

DATE	24th OCTOBER, 2007.	PROJECTION	UNIVERSAL TRANSVERSE MERCATOR
SURVEYOR	GWH	SPHEROID	WORLD GEODETIC SYSTEM 1984.
DRAWN	GWH	DATUM	GDA94 - MGA94
HOR SCALE	1: 4000	GRID	METRES
VERT SCALE	.	ZONE	56. (CM 153%d)
VERT DATUM	AUSTRALIAN HEIGHT DATUM (AHD)	2nd GRID	.

NEW SOUTH WALES

MANNING RIVER

PITT STREET MARITIME ASSESSMENT

RIVER SURVEY

FOR

MAUNSELL AUSTRALIA PTY LTD

DRAWING NO:

H801-003

SHEET 1 of 1.

REVISION NO:

CONTRACT NO: