BRUNSWICK HEADS BOAT HARBOUR
MASTERPLAN
REPORT No. 3
MARINA LAYOUT OPTIONS AND DESIGN

Brunswick Heads Boat Harbour, Brunswick Heads

for:

NSW Industry
Department of Industry – Lands

December 2015
### Document Control Sheet

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<tr>
<td>Job Captain:</td>
<td>Bill Payne</td>
</tr>
<tr>
<td>Author:</td>
<td>Bill Payne</td>
</tr>
<tr>
<td>Client:</td>
<td>NSW Industry Department of Primary Industries – Crown Land</td>
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Marina Layout Investigations Report
Brunswick Heads Boat Harbour Masterplan
1 Introduction

This report relates to Marina Layout Options in the Brunswick Heads Boat Harbour Masterplan Project. The report forms part of the response to the Masterplan brief from the NSW Industry Department of Primary Industries – Crown Lands (DPI) to Ardill Payne and Partners (APP) to investigate a range of land and marine based issues for preparation of a Masterplan.

In detail the following deliverables are required for the investigation and evaluation of the Marina Layout.

1a) Assessment of demand for moorings
1b) Assessment of constraints and opportunities
1c) Establish design parameters
1d) Consult user group/s on site and prepare a record of meeting and or conversation
1e) Evaluate PWD marina layout
1f) Prepare sketches with annotations to illustrate a proposed concept including stages
1g) Prepare a draft report
1h) Prepare a final report

For the purposes of this report the Boat Harbour layout is concerned with recreational scale multihull and displacement craft similar to those already moored in the Marina. Typically this extends to 13m multihull yachts and similar length displacement hulls to 15 tonnes displaced weight.

This report is focused on the maritime component of a Marina Layout as described in Item 1.1.5 in the Introduction in the Masterplan Scope, Vision and Planning Objectives document (MSZPO). Other site issues identified in Section 1.1 of the Introduction in the MSZPO document, such as small boat launch and retrieval, large boat launch and retrieval and land based uses, are included herein by reference. Any other matters outlined in Section 1.1 of the Introduction in the MSZPO document are discussed in detailed reports by APP under separate cover.
2 Site Details: Current Situation

The site’s location and cadastral features are identified in Figures 1 and 2. The site constraints and opportunities are identified in Figure 3 and discussed below.

Figure 1 Site Location

The current Facility for large boat storage consists of approximately 35 mooring berths around the perimeter of the Boat Harbour and are in varying states of repair. The berths are leased under two separate Leases one by the Fisherman’s Co-operative and the other by the Brunswick Heads Cruising Yacht Club.

The location and leasehold arrangements for the Boat Harbour are provided on Figure 2, with the Fisherman’s Co-operative area labelled as 2, and the BHCYC area labelled as 4.

The BHCYC berths are partly affected by accretion at the northern end of the lease with boats sitting on the drying river bed at very low tides. See Figure 3.

The berths are bow-in berths with a variety of catwalks and jetties used for access to the boats. The Fishermen’s Co-Op berths have aft mooring piles while the BHCYC berths do not. The Fishermen’s Co-op lease also has a substantial boardwalk along its southern boundary. See Figure 3.

All piles, catwalks and boardwalks are in a variety of service states but none are in a critical state of disrepair.
2.1 Current Boat Harbour Capacity

The Marina has little spare capacity. The boats moored there consist of:

- Semi-permanent cruising yachts on the BHCYC berths.
- Commercial fishing and charter boats on the western end of the Fishermen’s Co-Op lease
- Recreational and Commercial boats on the southern Co-Op lease.

The lack of spare capacity would usually indicate there is potential and commercial value in expanding the mooring capacity of the marina. However, the Brunswick River is shallow with a poor bar crossing at its mouth. This is a mitigating factor against the assumption that an increase in mooring facilities will be met by increased demand. This is discussed in the next section.
Figure 2
Cadastral Land Holdings & Summary

1  Crown Land managed by Byron Shire Council
1a  Crown Land managed by DPI - Lands
2  Fishing Co-op Freehold Land
   Includes:
   - 24 Berths
   - Slipway / Hardstand
   - Fuel Shed
   - Storage Sheds
3  Fishing Co-op License
4  Brunswick Heads Cruising Yacht Club License
5  Marine Rescue License

Figure 2 Cadastral Land Holdings and Summary
Figure 3 Constraints & Opportunities

1. **Access Points**
   - Two existing vehicular entrances from the Old Pacific Highway to the Harbour Precinct.

2. **Constricted access to Beach Ramp**
   - Single Lane width access with small turning circle at the end.

3. **Small Beach Ramp**
   - Access for canoes and kayaks to the river.

4. **Decommissioned Slipway**
   - Decommissioned slipway suitable grade & width for new Ramp. Contamination issues are reported in Marina sediments around the slipway.

5a. **SEPP 14 Vegetation**
   - Existing vegetation to be protected and retained.

5b. **Isolated Vegetation Communities**
   - Existing vegetation to be assessed.

6. **Existing Boat Ramp**
   - Existing Boat Ramp access to the river.

7. **Existing Marine Rescue Slipway**
   - Existing Slipway access to river for Emergency Services.

8. **New Boat Ramp Pontoon**
   - New Boat Ramp Pontoon located between existing boat ramp and Emergency Services Slipway.

9. **Water Depth**
   - Water depth in Marina is generally adequate for shallow draft boats. Water depth in river, especially at bar crossing is a major constraint. Periodic dredging occurs subject to dredging availability.

10. **River Currents**
    - Adverse currents from tidal effects in river cause difficulties for Launch and Retrieval for boat users.

11. **Parking & Amenities**
    - Inadequate parking & amenities for existing Ramp.
3 Demand

The larger boats moored in the Boat Harbour rarely move, with the charter boats providing the most frequent passages in and out of the river mouth. The two largest factors in the low turnover of large boats and low visitor numbers and hence low demand is the lack of spare mooring facilities and the very shallow river and harbour depths available. Jones Laing Laselle (JLL) undertook a commercial and operational review of development options and raised this constraint therein. See below.

3.1 Current Situation

There are currently 29 boats moored permanently in the Boat Harbour comprising of 15 yachts ranging from 7 to 18 metres and 14 motorised craft ranging from 7 to 13 metres and 3 to 32 tonne.

It is understood that about 14 vessels have not moved from their moorings for many years. Active vessels are maintained in the following ways –

- Yachts – about 15 yachts are active and well maintained and travel to Southport, Tweed Heads and Ballina to be lifted from the water for hull cleaning and maintenance
- Charter vessels - 4
- Working trawlers - 1
- Fishing Boats - 2

3.2 Boat Registrations

As part of their commercial evaluation JLL undertook a study of underlying boat usage based on boat registrations in the area. The study sourced registrations from RMS records. Table 1 below is a summary of these registrations and is extracted from the JLL report.

<table>
<thead>
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<th>Boat Length</th>
<th>New Boat Registrations within Catchment by size &amp; year</th>
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<td></td>
<td>2010</td>
</tr>
<tr>
<td>Up to 3.0m</td>
<td></td>
</tr>
<tr>
<td>3.01-4.0m</td>
<td>224</td>
</tr>
<tr>
<td>4.01-4.5m</td>
<td>179</td>
</tr>
<tr>
<td>5.01-6.0m</td>
<td>86</td>
</tr>
<tr>
<td>6.01-8.0m</td>
<td>33</td>
</tr>
<tr>
<td>8.01-10.0m</td>
<td>5</td>
</tr>
<tr>
<td>10.01-12.0m</td>
<td>8</td>
</tr>
<tr>
<td>12.01-15.0m</td>
<td>12</td>
</tr>
<tr>
<td>15.01-18.0m</td>
<td>5</td>
</tr>
<tr>
<td>18.01-20.0m</td>
<td>1</td>
</tr>
<tr>
<td>20.01-25.0m</td>
<td>0</td>
</tr>
<tr>
<td>Over 25.0m</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>567</td>
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</table>

Within the catchment, very few new registrations have been recorded for new vessels that would most likely require a berth (vessels over 10m). This is largely a supply-led issue with a lack of available marina berths in the immediate area, as well as the boating conditions themselves, with limited protected boating locations being a factor in limited vessel demand.

Table 1 Local Boat Registration Trends

From Table 1 it can be seen there is a consistently low level of large new boat registrations in the area. Statistics for 2015 are obviously incomplete.
3.3 Effects on demand from River Entrance

JLL also advise in their study that the demand for large berths and hence launch and retrieval systems is limited by the poor seaway access at the mouth of the Brunswick River. DPI commissioned a dredging campaign in October 2015 to re-establish a navigable river entrance and periodic dredging will be commissioned by DPI pending budget allocation and condition of the sand bar. In any event the ingress of sand will occur with successive storm events and will always constrain the size of vessels likely to use the Boatharbour.

This is a major constraint to attracting new boats to the Marina. The JLL commercial evaluation cites this as a major unknown / variable in evaluating a major expansion in capacity.

The main voices amongst Stakeholders for determination of over water Marina facilities come from the Brunswick Heads Cruising Yacht Club (BHCYC), Fisherman’s Co Operative and Crown lands.

3.4 Brunswick Heads Cruising Yacht Club

BHCYC provided a proposed site layout for the Marina which was captured in Stakeholder Worksheet 2. BHYC also advised it required at least 20 wet berths and may have demand for in excess of 30 berths. Currently the BHCYC has room in its license area for approximately 15 berths.

3.5 Fisherman’s Co Operative

The Fisherman’s Co Operative manage approximately 20 berths. These are in part the facilities provided for the original fishing fleet. Only one trawler now uses the mooring pens. The Co Op did not have any advice on increased demand.

3.6 Crown lands

Crown Lands requires as part of this brief a review of the original PWD Marina Design for the site (see Figure 4). It does not have a position on the amount of over water Marina facilities required and relies on this report to capture Stakeholders’ inputs and a commercial use evaluation to determine demand.

3.7 Other

The commercial boats using the Marina pen berths include river based and ocean going charter boats. These berths are part of those managed by the Fisherman’s Co Operative. The commercial charter operators’ advice concerning demand for charters is as per the following:

- Byron Bay Eco Cruises and Kayaks – 8.5m long x 2.6m wide custom river cruiser. The operator has advised that business is steady and they intend to continue the operation into the future.
- Blue Bay Whale Watching Byron Bay – 8.5m length Cougar Catamaran. The operator has advised that business is excellent and they have expanded into dive trips, fishing charters and undertake commercial fishing at certain times of the year.
4 Summary of Constraints and Opportunities (Refer to Figure 3)

4.1 Constraints

Water Based Constraints
Major water based constraints for over water marina berths are as follows:

- The depth of water is shallow in both the river and Boat Harbour. This coupled with the poor long term standard of the bar crossing constrains the demand from visiting boats for marina berths
- Currently the Boat Harbour cannot store a large number of boats. This limits the number of available berths which in turn limits the return on investment for Capital Expenditure and desirability of upgrades and expansion.

Land Based Constraints
Major land based constraints for over water marina berths are as follows:

- There are no major on shore limitations for supporting marina berths

4.2 Opportunities

- The central waterway areas are unused with better depth than edges to expand capacity
- The Boat Harbour has excellent all weather protection
- There are very limited wet berth marina alternatives in the area. Ballina has some commercial facilities in Smith Drive and private berths exist in the Ballina Quays Estate.
- If the Council and Crown Land site is combined ample room around all of the site is available to provide formalised, landscaped parking and amenities to meet demand.
- The Boat Harbour Precinct is on sandy level terrain with little environmental constraints and is close to main roads and town facilities. Expansion of facilities therefore would not be constrained by buildability issues.
5 Design Standards & Parameters

The reference documents for Marina Design are:

- Australian Standard AS 3962 Marina Design Guidelines
- Australian Standard AS 4100 Steel Structures
- Australian Standard AS 3600 Concrete Structures
- Australian Standard AS 1170 Structural Design Actions
- Environmental Protection Legislation

AS 3962 is the Principle Design Standard for floating Marinas. It provides commentary on provisions of design considerations, and dimensional, loading and stability requirements. The other standards referred to above should be considered the technical reference documents for any Marina development. Associated documents relating to corrosion protection, BCA requirements and relevant Safety Codes need also be used in design and operational assessment.

5.1 On Shore Facilities

AS 3962 also directs designers to on shore requirements such as parking, ablution and social facilities, fuel and pump out facilities, firefighting and storage. All Stakeholders raised these issues in Stakeholder Workshops. Provision for these should be highlighted in concept and detailed design.

5.2 Layouts and Water Impact Effects

The layouts provided in the Stakeholder Worksheets are based on AS 3962 and Stakeholder inputs. Many Marinas have geometrical arrangements which depart from AS 3962, particularly in relation to fairway widths and berthing design. APP’s view is that the fairway widths for catamaran berths should be twice the berth length rather than 1.7 times as recommended in the code.

Marina layouts should be cognisant of accommodating various types of boats and water uses, river flows, prevailing winds, waves, floods and tidal effects. The Brunswick Heads Boat Harbour is an off line Harbour and well protected from strong winds, river flows and floods. These issues are therefore not considered significant design issues for the Marina. Tidal effects are moderate and standard for east coast Australia with a maximum tidal range of approximately 2 metres and an average range of 1.3m.

5.3 Berth Pen Orientation and Wind Effects

Mooring large boats will therefore be mainly effected by wind direction. It is always easier to moor a boat with the wind blowing fore or aft of the vessel. As the prevailing winds in the area are Northerly or South Easterly a marina orientated with its major access walkway running east-west providing north-south mooring pens would provide the easiest berthing.

5.4 Other Boat Harbour Users

Almost all Stakeholders identified the value in providing a launch facility for non-powered craft in the Boat Harbour. Many identified the desirability of a smooth water launch and retrieval facility for small powered craft. These issues are discussed in Report No. 1; Small Boat Launch and Retrieval Investigations.
How the Marina is orientated, what fairways are provided etc. have to be considered so as to allow safe access and operation for these other craft and their owners.

5.5 Environmental Considerations

Large and Small Marinas have the capacity to impact locally on water quality principally by discharge of grey and black water. This is particularly the case where there is a low flushing characteristic for water through the Marina. Brunswick Heads Boat Harbour has low flushing characteristics and strict controls on boat discharges should be made for any marina, present or future, in the Boat Harbour.

The impact of boat traffic on the health of the river was raised at the first Stakeholder Workshop. A study of such a complex relationship goes beyond the scope of this report. As an insight into man made impacts on marine and riverine life in the coastal belt APP provides the following comment. APP was a Stakeholder representative in Ballina Shire Council’s Community consultation on Integrated Water Strategies for Ballina Shire. As part of the study Southern Cross University undertook a sensitivity study of environmental effects on marine life around the Ballina Ocean Outfall at Lennox Head. The University advised that, after 10 years monitoring, the major impact on changes to marine life occurred from “pollutants” from the Richmond River when it was in flood flow. Any other variation was too small by comparison to measure. It is therefore more likely that a flood in the Brunswick River, or a heavy rainfall event, would similarly overwhelm the relatively minor effect of water borne pollutants (principally hydrocarbon discharge from engines) provided by powered craft.
6 Stakeholder Inputs

6.1 Stakeholder Workshops and One-on-One Meetings Input Methodology

A major part of the Masterplan process has been to interview Stakeholders at a preliminary workshop to capture their ideas and observations about the shortcomings of existing facilities and requirements for future facilities. From this information ideas were captured on the Stakeholder Worksheets and subsequent one on one interviews were held to confirm what had been presented. Stakeholders ranged from the Public to Private domain, industry, community and services sectors.

The Masterplan is then developed by distilling these ideas into Strategic Objectives and Design Principles. Constraints, Opportunities, Design requirements and feasibility are used to filter Objectives in an Options appraisal. From these options single or preferred options are developed for subsequent review in a further Stakeholder Workshop

To date one Stakeholder Workshop and a series of one-on-one meetings have been undertaken. A further Stakeholder Workshop will be held to discuss the outcomes of this report.

A record of the First Stakeholder Workshop is provided in Appendix 1.

6.2 Feedback from Stakeholder Workshop One

Stakeholder inputs concerning marine based development were summarised on Stakeholder Worksheets 1-3. Copies are provided in Appendix 2. In summary the Stakeholders Workshops produced the following proposals for the Boat Harbour Layout.

a) BHCYC proposed an east-west floating marina with their current pen berth lease given up for other purposes. Refer to small boat launch and retrieval report.

b) Crown lands engineers proposed a similar configuration

c) APP devised a north-south marina layout to accommodate the desire for a still water boat ramp at the existing disused slipway and to provide a greater degree of safety to non-powered craft if their launch facility was located in the eastern portion of the Boat Harbour.

6.3 Feedback from One-on-One Meetings.

The Stakeholder Worksheets were used as discussion points in subsequent one-on-one meetings with Stakeholders to confirm that Stakeholder opinions had been captured in the options. Records of interviews are provided in Appendix 3.

The options for Marina layout were captured in the Stakeholder Worksheets and consultation identified some polarised views in relation to the preferred orientation and overall configuration.

Most Stakeholders advised that their views had been captured by the Stakeholder Worksheets. The BHCYC considered that their views had not been captured. However, this was principally in relation to the provision of dedicated on shore facilities for BHCYC such as secured car parking, maintenance facilities and clubhouse amenities. Except for the on shore maintenance facilities and exclusivity required for dedicated land use the requests from BHCYC are captured in the Stakeholder Worksheets.
A summary of the One on One meetings is provided overleaf in Table 2. This summary only refers to the Boat Harbour Layout. Comments made by the stakeholders to other issues pertaining to the Masterplan are not included in this Table.
## Marina Layout Feedback

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<td>Boat Ramp loading pontoons – lift out</td>
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<td>Sick bay, floating pontoon near slipway</td>
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<td>Hardstand emergency haul out, carpark, crane pad</td>
<td></td>
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<td>Required. Not happy that no maintenance facility provided</td>
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<td>Club Facilities</td>
<td>yes</td>
<td></td>
<td>Required. Not happy that club facilities not provided</td>
<td></td>
<td></td>
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<tr>
<td>Helicopter landing point</td>
<td></td>
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<td>yes</td>
<td></td>
<td>yes</td>
<td></td>
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<td>Disabled vessel onto pier</td>
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<td></td>
<td></td>
<td>Covered above</td>
<td></td>
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<td>Too many moorings – boats don’t leave the river</td>
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<td>Too many big boat berths provided</td>
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<td>Paddle craft area</td>
<td>yes</td>
<td></td>
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<td></td>
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<td>Important to provide sage paddle craft launch</td>
<td>Noted</td>
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<td>C is Community representatives 1</td>
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<td>D is Brunswick Heads Cruising Yacht Club Association</td>
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<tr>
<td>F is Community Representative 2</td>
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### Table 2  Summary of One on One Meetings
7 Review of PWD Layout

A copy of the PWD Marina Layout is provided as Figure 4.

The PWD arrangement is described as The Draft Development Plan. It is undated but must have been prepared some time ago as much of the layout appears to be controlled by accommodating the Trawler Fleet manoeuvring room over water and maintenance facilities on land.

As such it includes substantial land and water way area allocations to maintain fishing fleet boats and equipment on land and clearance through the marina for trawler access to the existing unloading wharf. These proposals now run contrary to the Masterplan Guideline for optimising and prioritising land uses for the range of Stakeholders now involved.

The trawler fleet based design parameters create an inefficient marina layout with discontinuous berthing pens and a combination of North South and East West configurations. It allows for continued operation of the slipway but proposes fixed mooring pens on the eastern sector where paddle craft launch and retrieval is now being considered. As such it would prohibit this water use.

The PWD layout is considered to be now out of date as the design requirements upon which it is based no longer exist (i.e., a trawler fleet). As such it should not be included in any options evaluations.
8 Options and Staging

The Floating Marina arrangements discussed below provide a similar maximum number of floating mooring berths being between 66 and 68 berths depending on size of vessel to be accommodated. The documentation shown on the Stakeholder Worksheets represents a maximum berth arrangement. It was not proposed that the number of berths would be increased to the extent shown. Rather the intention was to look at the outcomes of different arrangements and their impacts on other parts of the Boat Harbour precinct.

The next stage of the Brief is Options evaluation. The Options included as Figures 5, 6 and 7 summarise the current status of investigations. The Options were prepared after the one on one meetings and a design development process involving Stakeholder inputs, a review of Constraints and Opportunities, incorporation of Design guidelines and evaluation under Masterplan Guidelines.

A discussion of Options follows. Following that Table 3 compares the strengths and weaknesses of the variables of the Options. There are other considerations in developing infrastructure for the marina as listed below. These are requirements, not Options, and are included herein to ensure provisions are made in detailed design.

- Adequate fire provisions
- Sewerage and toilet facilities
- Waste disposal
- Security
- Parking
- Environmental Controls

As for other aspects of the site it is important that the issues surrounding the preferred floating Marina layout are reviewed in the context of other aspects of the site uses; trailer boat launches, paddle craft, land based uses, parking and foreshore access.

Examples of marina layouts which might be useful in evaluating the preferred Brunswick option were provided in the original Stakeholder Workshop. Two relatively new but different styles of marinas of similar size are reproduced below for reference.
Port Stephens Marina

Yamba Marina
Figure 5
Marina Layout
Option 1
North South Layout
General Arrangement

Required Carpark Numbers

<table>
<thead>
<tr>
<th>Marina Stage</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>14</td>
</tr>
<tr>
<td>Stage 2</td>
<td>21</td>
</tr>
<tr>
<td>Stage 3</td>
<td>23</td>
</tr>
</tbody>
</table>

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Page 20
### Proposed Eatery

- **Proposed 2 Storey Commercial Area**
  - Proposed Carpark (22)

### Existing Jetty

- Proposed Boulevard
- Proposed Access Road

### Proposed Access Road

- Existing Emergency/Surf Club

### Required Carpark Numbers

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cat</th>
<th>Mono</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>1 x Cat</td>
<td>14 x Mono</td>
</tr>
<tr>
<td>Stage 2</td>
<td>2 x Cat</td>
<td>2 x Mono</td>
</tr>
<tr>
<td>Stage 3</td>
<td>11 metre Boat</td>
<td>10 x Cat</td>
</tr>
</tbody>
</table>

### Marina Layout Option 2

**North South Layout**

**General Arrangement**

- **Stage 1**
  - 11 metre Boat
  - 5 x Cat
  - 12 x Mono

- **Stage 2**
  - 14 metre Boat
  - 10 x Cat
  - 14 x Mono

- **Stage 3**
  - 11 metre Boat
  - 6 x Cat
  - 18 x Mono

### Marina Land Based Uses Report

- Brunswick Heads Boat Harbour Masterplan

#### Figure 6 Option 2 North South Layout

- Marina Layout Option 2
- North South Layout General Arrangement

- Required Carpark Numbers
- Marina Stage 1: 12
- Marina Stage 2: 18
- Marina Stage 3: 22

- Proposed Access Road
- Proposed Big Boat Lift Site
- Boat Ramp/Boat Sick Bay Pontoon

- Existing Vegetation to Remain

- Figure 6 Marina Layout Option 2 North South Layout

- Ardill Payne & Partners
Figure 7
Marina Layout
Option 3
East West Layout
General Arrangement

Required Carpark Numbers

Marina Stage 1 - 16
Marina Stage 2 - 22

Stage 1
11 metre Boat
14 x Cat
20 x Mono

Stage 2
14 metre Boat
9 x Cat
22 x Mono

Proposed 2 Storey Commercial Area
Proposed Car & Trailer Parking (64)
Proposed Jetty/Boat Sick Bay
Proposed Big Boat Lift Slab

Figure 7 Option 3 North South Layout

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8.1 Marina Configuration

For the Marina examples above there is no consistent design system. JLL’s benchmarking study found the same situation. Neither of the above designs take into account the prevailing winds in regard to berthing alignment. Rather the layout is determined by geometry relative to other facilities and clearance for fairways.

Other matters noted are:

- Single and double sided pontoons are used.
- No joint water users are accommodated except for Travel lift in Yamba. Fairway provided to same.
- Varying on shore land uses have been included.

East West Marina Configuration

The East West Marina arrangement is summarised on Option 3 Figure 7. It is a logical berthing alignment to minimise the impact of the prevailing (NE) winds during berthing events and is similar to that proposed by the BHCYC. It has the advantage of maintaining the existing boardwalk for casual or informal mooring. However the boardwalk provides limited opportunities for passengers to alight. A floating pontoon would provide better amenity for this.

The east west configuration is located in the deeper portions of the Boat Harbour.

As with all aspects of the Masterplan the floating marina berths impact on other users has to be taken into consideration. As discussed in the small boat launch and retrieval paper, the east west alignment compromises the safety of the paddle craft launch area and requires the still water ramp solution to be sited in a less advantageous location than the north south orientation.

Alternatively, fewer mooring pens could be provided and the recovered space provided for the preferred location for the still water small boat launch and retrieval ramp.

North South Marina Configuration

The North South Floating Marina arrangement is summarised as Options 1 and 2 as Figures 5 and 6. It is located in the deeper portions of the Boat Harbour. The north south arrangement is driven principally to maximise berthing pens, provide a boat ramp in still water close to the existing boat ramp and maximise clearance to the paddle craft area.

Options 1 and 2 are likely to be more expensive than Option 3 if the existing boardwalk is removed. It provides one sided pontoon access for larger commercial charter boats. Temporary moorings would be around the paddle craft area which is not highly desirable.

A summary of the pros and cons of each arrangement is provided in Table 3 below.
### Table 3 Evaluation of Marina options

<table>
<thead>
<tr>
<th></th>
<th>Option 1: North-South</th>
<th>Option 2: North-South</th>
<th>Option 3: East-West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berths provided</td>
<td>65</td>
<td>66</td>
<td>63</td>
</tr>
<tr>
<td>Ease of mooring</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Very good</td>
</tr>
<tr>
<td>Conflict with other users</td>
<td>Good</td>
<td>Very good</td>
<td>Very poor. Excludes still water ramp</td>
</tr>
<tr>
<td>Commercial Access Pens</td>
<td>Good</td>
<td>Very good</td>
<td>Low</td>
</tr>
<tr>
<td>Day moorings</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Manoeuvrability</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Number of New Pens in Stage 1</td>
<td>24</td>
<td>18</td>
<td>34</td>
</tr>
</tbody>
</table>

### 8.2 Staging and Demand

Demand for additional wet berths beyond the current nominal amount of 35 is unknown. Advice from JLL indicates the demand for wet berths may be low due to the constraints discussed above. Furthermore, even if the number of wet berths was maximised to the amounts shown on Stakeholder Worksheets 1 and 2, JLL considers there may be still insufficient numbers to make the marina commercially viable without some form of land based commercial added value.

Staging of a new floating Marina is therefore considered prudent and consistent with development of other Marinas. There appears to be consensus to evacuate the eastern mooring pens to paddle craft and simultaneously remove BHCYC from the very shallow waters around some parts of their lease. It would therefore seem logical to provide a first stage marina capacity of around 20 berths in either a north-south or east west configuration to reflect the demand advised by BHCYC.

Subsequent stages up to 60 berths might be then considered on as needs basis.
8.3 Other Issues

Car parking

The Marina code recommends that between 0.3 and 0.6 car parks be provided per wet berth. The code recommends allowances be made for joint uses of car parks between ancillary uses. Due to the low turnover of boats and hence the fewer numbers of cars arriving and leaving for passengers it is considered the lower end of the range is most applicable. Hence for the current 35 wet berths approximately 10 car parks would comply with the code requirements. For the maximum 68 berths layout approximately 23 car parks would be required.

A summary of Options and car parking is provided below in Tables 4, 5 and 6.

<table>
<thead>
<tr>
<th>Commentary</th>
<th>Net Berths</th>
<th>Car Park rate</th>
<th>Car Parks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>35</td>
<td>35</td>
<td>.33</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Will involve loss of approx. 16 berths and construction of 24 new pens</td>
<td>43</td>
<td>.33</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Will involve removal of approx. 6 berths along existing boardwalk &amp; construction of 28 pens.</td>
<td>65</td>
<td>.33</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Will involve removal of remaining 13 berths &amp; construction of 16 pens.</td>
<td>68</td>
<td>.33</td>
</tr>
</tbody>
</table>

**Table 4 Option 1: North South Arrangement. Single Dock on West.**

<table>
<thead>
<tr>
<th>Commentary</th>
<th>Net Berths OPTION 2</th>
<th>Car Park rate</th>
<th>Car Parks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>35</td>
<td>35</td>
<td>.33</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Will involve loss of approx. 16 berths and construction of 18 new pens</td>
<td>37</td>
<td>.33</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Will involve removal of approx. 6 berths along existing boardwalk &amp; construction of 24 pens.</td>
<td>55</td>
<td>.33</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Will involve removal of remaining 13 berths &amp; construction of 24 pens.</td>
<td>66</td>
<td>.33</td>
</tr>
</tbody>
</table>

**Table 5 Option 2: North South Arrangement. Single Dock on East.**
## Commentary

<table>
<thead>
<tr>
<th></th>
<th>Net Berths</th>
<th>Car Park rate</th>
<th>Car Parks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong></td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td><strong>Stage 1</strong></td>
<td>49</td>
<td>.33</td>
<td>16</td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td>67</td>
<td>.33</td>
<td>22</td>
</tr>
</tbody>
</table>

### Table 6 Option3: East West Arrangement. Informal berthing on existing boardwalk.

### Sewage, Waste, Public Facilities and Security

The Masterplan may need to investigate to what extent services will be upgraded to cater for the Floating marina. However, final decisions would generally be left until detailed development applications are lodged.

Fire upgrades would be required as a matter of compliance with Code and firefighting regulations with any subsequent application for development. Similarly public toilets, Waste Disposal, BBQ facilities and miscellaneous recreational items will be dictated by extents of development. The provision of pump out facilities for boat based black water is a policy decision for Council and Crown Lands and may be a condition of license or development consent.

Security provisions include selective parking, access to berths and CCTV which is usually dictated by the type of facilities provided by the Marina operator and would normally be left to that Stakeholder.


9 Scope of Engagement

This report has been prepared by Ardill Payne & Partners (APP) at the request of The Department of Trade and Investment, Regional Infrastructure and Services, Lands and Natural Resources Division for the purpose of investigations for expansion opportunities for small boat launch and retrieval at Brunswick Heads Boat Harbour and is not to be used for any other purpose or by any other person or corporation.

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