

## Note / Memo

**Haskoning Australia PTY Ltd.  
Maritime & Aviation**

To: Paul Busmanis  
From: James Donald & Gary Blumberg  
Date: Monday, 17 October 2016  
Copy:  
Our reference: M&APA1326N005D02  
Classification: Open

**Subject: Keith Hall Boat Ramp Facility - Concept Design Memo**

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## 1. Background

The Ballina Shire Council is planning to upgrade seven (7) small craft facilities along the Richmond River and North Creek. The maritime infrastructure proposed at these sites comprise of boat ramps, associated carpark facilities and pontoons.

Proposed maritime works planned for the Keith Hall site involves the construction of a new boat ramp facility. There currently exists an informal ramp at the site which was created and is currently maintained and frequently used by the local boating community. The existing informal ramp at Keith Hall is currently the only ramp which provides local access to the Richmond River from the South Ballina, Keith Hall and Empire Vale areas. Council intends to formalise this existing arrangement in order to provide a safer and easier to use facility.

This memo provides a description of the proposed boat ramp and includes attached concept design plans to assist in the refinement and finalisation of a preferred concept design for the facility.

This memo should be read in conjunction with the Basis of Design (BoD) document "*M&APA1362R001D01 – Ballina Maritime Works BoD*" which sets out all key design parameters for the development. The BoD includes a review of all existing site information, environmental conditions, opportunities, constraints and relevant guidelines and standards used to inform the design process.

The concept design and layout of the facility has largely been developed in consideration of the NSW Boat Ramp Facility Guidelines, (referred further simply as the "Guidelines") published by Roads and Maritime Services (RMS) in September 2015, which sets out the general guidance on the design of boat ramp infrastructure facilities for small recreational craft. It may not be required (or sometimes possible) to meet all the specific requirements of the Guidelines due to site or funding constraints. It is important to consider these Guidelines: have been developed over decades of boat ramp and maritime facilities usage; are consistent with the relevant Australian Standards; have recently been updated to reflect modern day usage and expectations of boat ramp users; and, have been prepared in consultation with key representatives from governmental, non-governmental and recreational user groups.

## 2. Proposed Concept Design

The newly constructed single lane ramp would extend from the existing shoreline out into the Richmond River, to a toe depth of -1.8 m AHD, in accordance with the Guidelines. The toe of the ramp would be protected with suitably sized rock to reduce the effects of river currents eroding and undermining the ramp foundations. The ramp deck would be constructed from both pre-cast and in-situ concrete slabs, finished with deep grooves moulded into the surface (25 mm deep and 25 mm wide, square-shouldered

grooves at an angles of 45 degrees to the ramp contours and at 100 mm centres) to provide a non-slip surface and promote self-cleansing of the boat ramp by allowing drainage of excess water and debris.

The proposed gradient of the ramp at 1V:7H is at the upper limit of the slope acceptable in the Guidelines (which is recommended to be between 1V:7H and 1V:9H). This gradient has been selected to minimise the amount of cut and shore protection works required in constructing the ramp. By way of comparison, this slope would be flatter than the slope of the existing informal ramp at the site (estimated to be a gradient of 1V:6H from recent surveys) however considerably steeper than the closest ramp at East Wardell, which has a slope estimated at 1V:9H (from recent surveys). Advice from local users is that the informal Keith Hall ramp is generally preferred over the East Wardell facility, as the steeper ramp results in less of the trailer and vehicle being immersed during launching and retrieval. The proposed ramp would be slightly recessed into the river bank and would provide improved refuge for vessels and trailers from river currents.

As per the Guidelines, the proposed ramp would be at least 4.5 metres wide to accommodate a maximum permissible trailer width of 2.5 metres with the allowance for 1 metre of manoeuvring space on each side. This would be similar in size to the existing single lane informal ramp at the site. Additionally, the ramp would be widened by 1.5 m (total width of 6 m) to facilitate the potential staged instalment of a floating on-ramp pontoon, should funding become available in the future.

Further funding may allow for the future installation of a boat holding structure, which would likely be best facilitated by the provision of an articulated on-ramp pontoon structure (similar to what is currently being proposed for Faulks Reserve). The later addition of an on-ramp pontoon would increase both the efficiency and usability of the facility. The articulated pontoon structure would move up and down with the tides to provide safe access for loading of passengers during launching and walking boats back to the ramp during retrieval. The pontoon would be best located on the starboard or vessel driver-side of the boat ramp in order to maximise solo operator ease when launching and retrieving vessels.

As part of the current design process, consideration has been made to the operational aspects of the facility, including: general traffic flow, parking arrangements and required manoeuvring areas. It is important these aspects still be considered as they govern the placement and orientation of the ramp, in the case the site is later formally developed.

In order to provide the required vehicle manoeuvring distance between the ramp crest and River Drive (minimum of 20 m, in accordance with the Guidelines), the ramp would need to be shifted slightly northward from its current location. Positioning of the ramp at this location is needed to complement the vehicle and trailer turning circles required when entering the facility from River Drive.

When reviewing the proposed concept design drawings for the carpark and manoeuvring areas, it is important to note that the site is considerably constrained by:

- The overall size of land available at the site, which is bordered by the Richmond River to the west and River Drive to the east;
- The overhead power lines which run along the western side of the River Drive road reserve;
- Solitary access to River Drive which is signed as 80km/h;
- Opposing T junction of River Drive and Keith Hall Lane; and,
- The open drainage channel which borders the east of the site along the River Drive road reserve.

As part of the design process a number of potential carpark and manoeuvring area arrangements were considered and discussed with the council. It has been determined that the ideal facility layout comprises of single one-way entries and exits. Justification for this arrangement includes:

- Reduced congestion within the carpark, manoeuvring area and entry/exit points;
- Ease of turning into the ramp manoeuvring area from the road; and,
- Provision of wider entry and exit ways between River Drive and the facility.

While entry and exit from the facility would be directionally limited, a 9 m manoeuvring distance in front of the trailer parks would allow users to manoeuvre both ways, directly between the trailer parks and the ramp without the need to exit the facility when retrieving their vessels, this would be the case if the facility was purely a one-way only arrangement. Investigations were also made into the potential inclusion of rigging/derigging bays into the design, however, the limited available space at the site rendered this not feasible.

The limited land at the site has meant only 9 trailer parks can be made available. This is a notable limitation of the proposed site, as this is well below the number recommended by the Guidelines of 20-30 for a rural single lane boat ramp facility. The absence of nearby council land suitable for an overflow car parking area means this facility would be limited by parking availability.

Currently, an open drainage channel runs alongside the River Drive road reserve and discharges directly into the Richmond River to the north of the site. Investigations suggest that the catchment area of this channel to be relatively minor. For a carpark to be formally developed at this site an appropriately sized culvert would need to be installed to convey flow from the existing open drainage channel underneath both the proposed carpark entry and exit access ways. The channel may also require minor works to direct flow to the current discharge point.

Considering the predicted low to moderate level of usage, it may be practical to leave the site unsealed at this point in time, reducing the impermeable area and limiting stormwater runoff from the facility. If it is later found that the development of a formalised ramp has resulted in increased usage and degradation of existing grassed surfaces, then either a gravel finish or asphaltic sealing maybe required to formalise the car parking and manoeuvring areas. In either scenario the portion of the park intended for trailers would remain grassed to limit the impervious areas of the facility.

It is recommended that additional ancillary facilities be included in the development, namely:

- lighting to allow for early morning, evening and night usage;
- log barriers to delineate areas of the car park and manoeuvring area from green space and nearby road; and,
- limited signage, including:
  - legally enforceable signage to advise users of the take in / take out waste policy;
  - signage indicating entry and exit only access ways as well as parking restrictions (no parking in manoeuvring areas and access ways); and,
  - warning signage to caution users to the presence of overhead power lines.

It is recommended that the council together with the relevant stakeholders consider the proposed facility concept design in order to finalise a preferred arrangement for detailed design and construction.

### **3. Concept Design Construction Cost Estimate**

A construction cost estimate has been prepared based on the concept design described above. The total construction cost is estimated to be:

- \$250,000 for the boat ramp; and,
- \$193,500 for the associated car park and ramp access facility.

Cost estimates for two additional development options have also been provided, which include:

- \$200,000 for the latter installation of an on ramp pontoon; and,
- \$24,500 for the asphaltic concrete finish of the car parking area.

A further detailed breakdown of this estimate has been attached to this memo. This estimate includes a contingency of 20% which is considered to be appropriate for the current level of design development.

It is important to note, this is a construction cost estimate and excludes the additional costs of approval documentation (including environmental assessment), design and tender documentation, tendering, site supervision and contract administration.

Table 1. Boat ramp preconstruction cost estimate.

<b>PRECONSTRUCTION COST KEITH HALL BOAT RAMP</b>		<b>Amount</b>
<b>1 MOBILISATION AND PRELIMINARIES</b>	<b>\$</b>	<b>48,500</b>
<b>2 SET OUT</b>	<b>\$</b>	<b>3,000</b>
<b>3 DEMOLITION AND EARTHWORKS</b>	<b>\$</b>	<b>3,190</b>
<b>4 CONCRETE WORKS</b>	<b>\$</b>	<b>131,200</b>
<b>5 ROCK PROTECTION</b>	<b>\$</b>	<b>5,700</b>
<b>6 AUXILARY ITEMS</b>	<b>\$</b>	<b>6,000</b>
<b>7 COMPLIANCE SURVEYS</b>	<b>\$</b>	<b>3,000</b>
<b>8 COMPLETION</b>	<b>\$</b>	<b>7,940</b>
	<b>Construction cost excluding contingency</b>	<b>\$ 208,530</b>
	<b>Contingency on construction cost</b>	<b>20% \$ 41,800</b>
	<b>ESTIMATED CONSTRUCTION COST</b>	<b>\$ 250,330</b>
<b>A ON-RAMP PONTOON (Option)</b>	<b>\$</b>	<b>200,000</b>

Note: Excludes costs for design development, environmental assessment, DA, tender preparation and advertising, advising on tenders, contract sign, supervision and administration.

Table 2. Carpark preconstruction cost estimate.

<b>PRECONSTRUCTION COST KEITH HALL CAR PARK</b>		<b>Amount</b>
<b>1 MOBILISATION AND PRELIMINARIES</b>	<b>\$</b>	<b>13,000</b>
<b>2 SET OUT</b>	<b>\$</b>	<b>1,000</b>
<b>3 DEMOLITION AND EARTHWORKS</b>	<b>\$</b>	<b>8,425</b>
<b>4 ROAD WORKS</b>	<b>\$</b>	<b>93,400</b>
<b>5 DRAINAGE</b>	<b>\$</b>	<b>13,800</b>
<b>6 AUXILARY ITEMS</b>	<b>\$</b>	<b>26,400</b>
<b>7 COMPLIANCE SURVEYS</b>	<b>\$</b>	<b>1,500</b>
<b>8 COMPLETION</b>	<b>\$</b>	<b>3,380</b>
	<b>Construction cost excluding contingency</b>	<b>\$ 160,905</b>
	<b>Contingency on construction cost 20%</b>	<b>\$ 32,200</b>
	<b>ESTIMATED CONSTRUCTION COST</b>	<b>\$ 193,105</b>
<b>A ASPHALTIC CONCRETE FINISH (Option)</b>	<b>\$</b>	<b>24,380</b>

Note: Excludes costs for design development, environmental assessment, DA, tender preparation and advertising, advising on tenders, contract sign, supervision and administration.

#### 4. Attachments

1. Keith Hall Boat Ramp, concept design drawing – Drawing No. PA1362/MA/6001.
2. Keith Hall Boat Ramp, concept design 3D visualisation.
3. Construction cost estimation schedule.





**Note / Memo**

**Haskoning Australia PTY Ltd.  
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To: Paul Busmanis  
From: James Donald & Gary Blumberg  
Date: Monday, 17 October 2016  
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Our reference: M&APA1326N007D02  
Classification: Open

**Subject: Fishery Creek Pontoon - Concept Design Memo**

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## **1. Background**

The Ballina Shire Council is planning to upgrade seven (7) small craft facilities along the Richmond River and North Creek. The maritime infrastructure proposed at these sites comprise of boat ramps, associated carpark facilities and pontoons.

Proposed maritime works planned for the Fishery Creek site includes the installation of a new pontoon and access ramp to increase the efficiency of the existing facility. Fishery Creek is the main recreational boat ramp facility in Ballina and sees significant usage during weekends and public holiday. It is intended that the addition of another pontoon would provide greater facility efficiencies for users launching and retrieving their vessels. This memo provides a description of the proposed floating pontoon concept design. This memo, including the attached concept design plans and 3D visualisation, has been provided to assist in the refinement and finalisation of a preferred concept design for the facility.

This memo should be read in conjunction with the Basis of Design (BoD) document "*M&APA1362R001D01 – Ballina Maritime Works BoD*" which sets out all key design parameters for the development. The BoD includes a review of all existing site information, environmental conditions, opportunities, constraints and relevant guidelines and standards used to inform the design process.

The concept design and layout of the pontoon has largely been developed in consideration of the NSW Boat Ramp Facility Guidelines, (referred further simply as the "Guidelines") published by Roads and Maritime Services (RMS) in September 2015, which sets out the general guidance on the design of boat ramp infrastructure facilities for small recreational craft. It may not be required (or sometimes possible) to meet all the specific requirements of the Guidelines due to site or funding constraints. It is important to consider these Guidelines: have been developed over decades of boat ramp and maritime facilities usage; are consistent with the relevant Australian Standards; have recently been updated to reflect modern day usage and expectations of boat ramp users; and, have been prepared in consultation with key representatives from governmental, non-governmental and recreational user groups.

## **2. Proposed Concept Design**

A new floating pontoon and access gangway has been proposed for Fishery Creek facility. The proposed pontoon would allow users the opportunity to transfer passengers and goods to and from their vessels, as well as temporarily moor their vessels during launching and retrieval activities. The proposed layout for this pontoon provides a near mirror image of the already existing pontoon located to the southern side of the boat ramp. It is proposed that a short gangway would link the new pontoon to the existing, allowing direct access to the ramp. A new gangway would also be installed linking the southern end of the new



pontoon to the shoreline. The access gangway would be approximately 10 m long and 1.5 m wide, which would allow for assisted disability access, in line with the Guidelines.

A small concrete abutment would also be installed along the bank to provide the necessary support for the pinning of the gangway to the shoreline. The proposed location of this abutment has been selected as it: provides the shortest available gangway span from the shore to the pontoon; results in limited vegetation pruning/ removal; minimises the disturbance of existing mangrove trees; and, directs foot traffic toward the carpark and existing fish cleaning facility. A concrete path has also been proposed to extend from the gangway entrance, towards the car park and fish cleaning table.

The proposed pontoon frontage would be positioned over variable depth contours, mainly the -1.5 to -2.0 m AHD depth contours. The majority of the pontoon frontage would be positioned over -2.0 m AHD depths, which would allow for access of vessels with drafts of up to 0.9 m, under 80% tides (includes an under keel clearance of 0.3 m). It is important to note that the Fishery Creek channel is relatively shallow and is subject to similar draft restrictions when accessing the channel and ramp from the Richmond River.

The dimensions of the proposed pontoon would provide an additional 13 m of berthing frontage to the existing facility pontoon arrangement. It is proposed that the new pontoon be furnished with rubber fenders, mooring cleats and pile cages. Solar beacons and reflectors are also to be installed on the pontoon, to assist in the visibility of the structure at night/ low light.

It is also recommended a sign targeting boat ramp and waterway etiquette be installed at the entry to the pontoon advising users of mooring time limits and the need for people fishing from the pontoon to give right of way to mooring vessels.

It is recommended that the council and stakeholders consider the proposed pontoon concept design in order to finalise a preferred arrangement for detailed design and installation.

### 3. Concept Design Construction Cost Estimate

A construction cost estimate has been prepared based on the concept design described above. The total construction cost of the works is estimated to be \$127,000 and is summarised in **Table 1**. A further detailed breakdown of this estimate has been attached to this memo. This estimate includes a contingency of 20% which is considered to be appropriate for the current level of design development.

It is important to note, this is a construction cost estimate and excludes the additional costs of approval documentation (including environmental assessment), design and tender documentation, tendering, site supervision and contract administration.

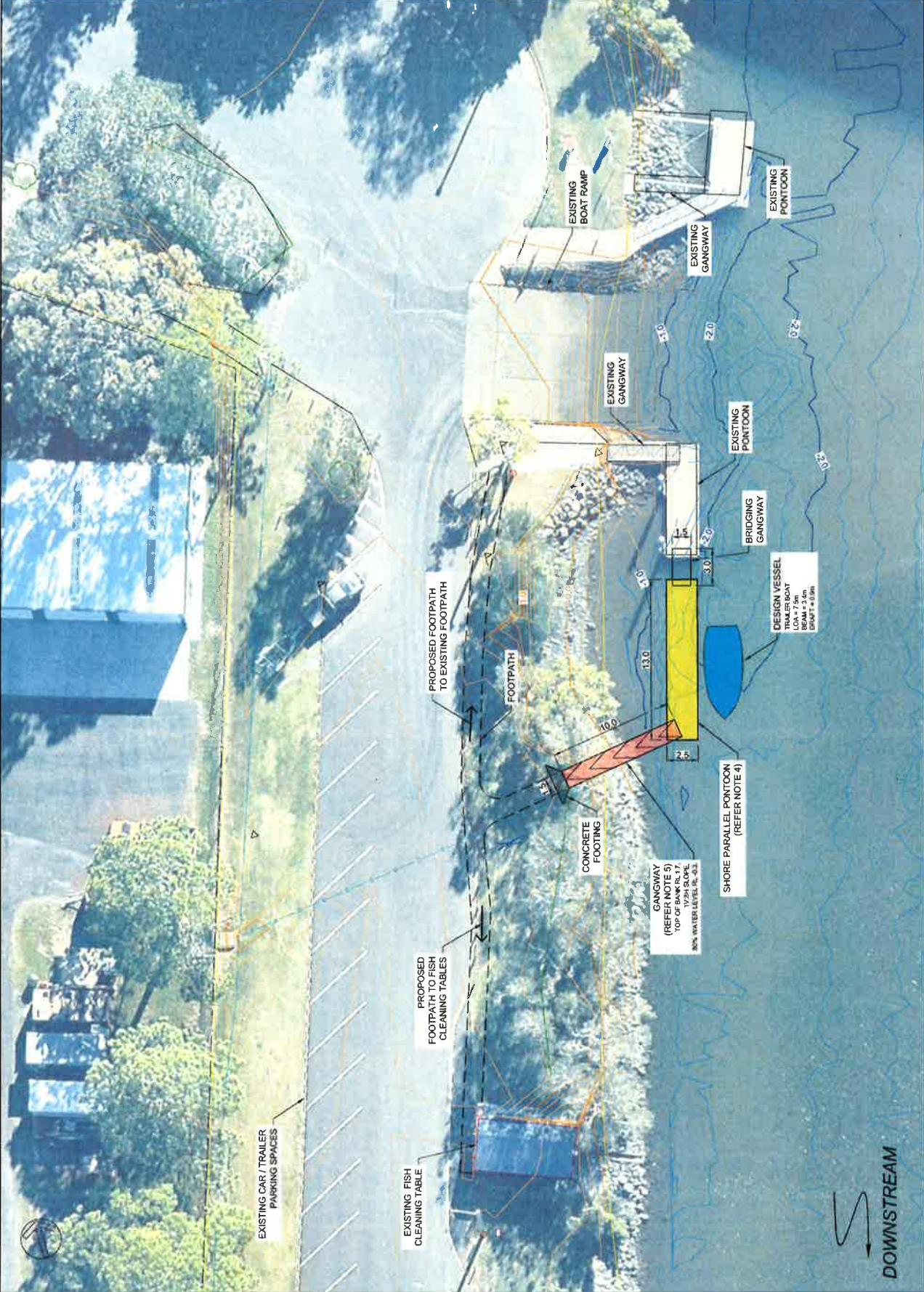
Table 1. Preconstruction cost estimate.

<b>PRECONSTRUCTION COST FISHERY CREEK PONTOON</b>		<b>Amount</b>
<b>1 MOBILISATION AND PRELIMINARIES</b>	<b>\$</b>	<b>19,500</b>
<b>2 SET OUT</b>	<b>\$</b>	<b>1,500</b>
<b>3 GANGWAY</b>	<b>\$</b>	<b>14,700</b>
<b>4 PILES</b>	<b>\$</b>	<b>25,000</b>
<b>5 PONTOON</b>	<b>\$</b>	<b>29,700</b>
<b>6 FOOTPATH</b>	<b>\$</b>	<b>4,500</b>
<b>7 AUXILARY ITEMS</b>	<b>\$</b>	<b>1,350</b>
<b>8 COMPLIANCE SURVEYS</b>	<b>\$</b>	<b>2,000</b>
<b>9 COMPLETION</b>	<b>\$</b>	<b>7,610</b>
<b>Construction cost excluding contingency</b>		<b>\$ 105,860</b>
<b>Contingency on construction cost</b>		<b>20% \$ 21,200</b>
<b>ESTIMATED CONSTRUCTION COST</b>		<b>\$ 127,100</b>

Note: Excludes costs for design development, environmental assessment, DA, tender preparation and advertising, advising on tenders, contract sign, supervision and administration.

#### 4. Attachments

1. Fishery Creek Pontoon, concept design drawing – Drawing No. PA1362/MA/4002.
2. Fishery Creek Pontoon, concept design 3D visualisation.
3. Construction cost estimation schedule.



1. AERIAL PHOTOGRAPH TAKEN FROM SIMMAPS DATED 12/05/2016
2. TOPOGRAPHIC SURVEY UNDERTAKEN BY BSC (2016)
3. BATHYMETRIC SURVEY UNDERTAKEN BY DPI LANDS (2016)
4. TO COMPLY WITH STANDARDS BED LEVEL UNDER PONTON AND AT OUTER BERTH TO BE NO HIGHER THAN RL -1.39 AND RL -2.19 RESPECTIVELY.
5. TO ACHIEVE ASSISTED DISABILITY ACCESS IN ACCORDANCE WITH THE BOAT RAMP GUIDELINES (RMS, 2016), GANGWAY LENGTH TO EXCEED 6m.

DATUMS AND TIDAL DATA	
Metres +1.8	
+1.6	+1.75M ARI
+1.4	+1.62M ARI
+1.2	
+1.0	+0.90 HRWSS
+0.8	
+0.6	+0.56 MRWSS
+0.4	+0.45 MRW
+0.2	+0.33 MRWN
A.H.D.	0.0 +0.02 MSL
	-0.2
E	-0.39 M.L.W.N
	-0.4
	-0.41 M.L.W
	-0.6
	-0.69 M.L.W.S
C.O.L.	-0.8
	-0.79 ISLW
	-1.0

ALL LEVELS AUSTRALIAN HEIGHT DATUM (A.H.D)

NO	DATE	DESCRIPTION	BY	CHK	APP
1	12/05/2016	ISSUED FOR CONCEPT			
2	12/05/2016	ISSUED FOR CONCEPT			
3	12/05/2016	ISSUED FOR CONCEPT			



PROJECT: BALLINA BOATRAMP UPGRADE

CLIENT: FISHERY CREEK OPTION 2 ASSISTED ACCESS PLAN

MAKING OUR AUSTRALIA BETTER STORY

Royal HaskoningDHV

DATE: 14/07/2018 JOB NO: PA1326

PROJECT: BALLINA BOATRAMP UPGRADE

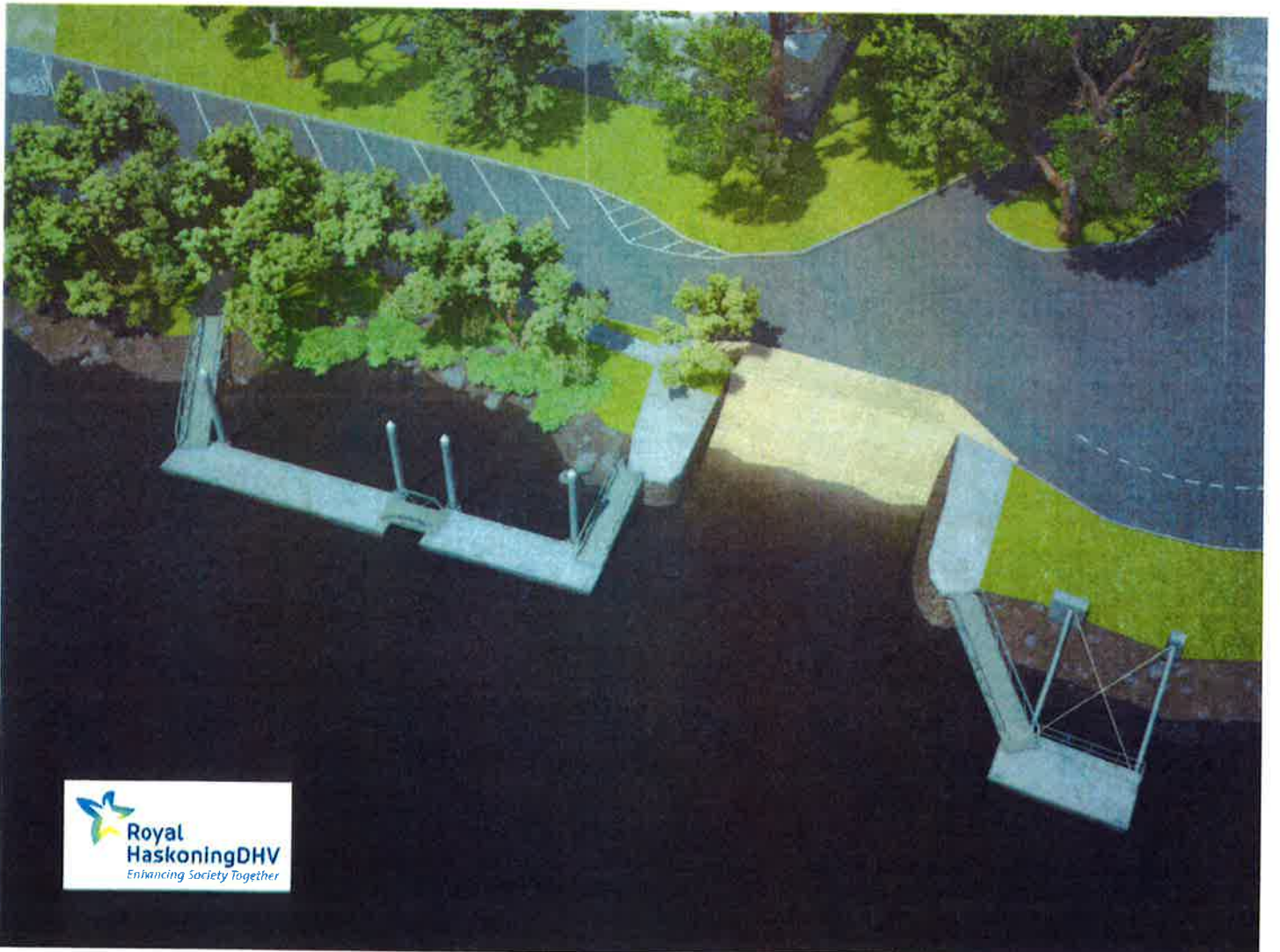
SCALE: AS SHOWN

DRAWN BY: PA1326-MA-CML MODEL-ALL

PA1326/MA/4002

REVISION: C

AUSTRALIAN HEIGHT DATUM  
NOT FOR CONSTRUCTION



## Note / Memo

**Haskoning Australia PTY Ltd.**  
**Maritime & Aviation**

To: Paul Busmanis  
From: James Donald & Gary Blumberg  
Date: Monday, 17 October 2016  
Copy:  
Our reference: M&APA1326N009D02  
Classification: Open

**Subject: East Wardell Pontoon - Concept Design Memo**

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### 1. Background

The Ballina Shire Council is planning to upgrade seven (7) small craft facilities along the Richmond River and North Creek. The maritime infrastructure proposed at these sites comprise of boat ramps, associated carpark facilities and pontoons.

Proposed maritime works planned for the East Wardell site includes the installation of a new pontoon and access ramp to increase the efficiency and usability of the existing single lane boat ramp. This memo provides a description of the proposed floating pontoon concept design. This memo, including the attached concept design plans and 3D visualisation, has been provided to assist in the refinement and finalisation of a preferred concept design for the facility.

This memo should be read in conjunction with the Basis of Design (BoD) document "*M&APA1362R001D01 – Ballina Maritime Works BoD*", which sets out all key design parameters for the development. The BoD includes a review of all existing site information, environmental conditions, opportunities, constraints and relevant guidelines and standards used to inform the design process.

The concept design and layout of the pontoon has largely been developed in consideration of the NSW Boat Ramp Facility Guidelines, (referred further simply as the "Guidelines") published by Roads and Maritime Services (RMS) in September 2015, which sets out the general guidance on the design of boat ramp infrastructure facilities for small recreational craft. It may not be required (or sometimes possible) to meet all the specific requirements of the Guidelines due to site or funding constraints. It is important to consider these Guidelines: have been developed over decades of boat ramp and maritime facilities usage; are consistent with the relevant Australian Standards; have recently been updated to reflect modern day usage and expectations of boat ramp users; and, have been prepared in consultation with key representatives from governmental, non-governmental and recreational user groups.

### 2. Proposed Concept Design

A new floating pontoon and access ramp has been proposed for East Wardell to increase usability and efficiency of the existing facility. The proposed pontoon would allow users the opportunity to transfer passengers and goods to and from their vessels, as well as temporarily moor their vessels during launching and retrieval activities.

The proposed pontoon would extend out to the -3 m AHD depth contour which would allow for all tidal access of vessels with drafts of up to 0.9 m (which includes an under keel clearance of 0.3 m) and a slightly lesser access for deeper draft vessels, which are generally less common at the facility. The

access gangway would be approximately 13 m long and 1.5 m wide, which would allow for assisted disability access (1V:8H slope) under all tidal conditions.

The dimensions of the proposed pontoon would be 9 m long and 3 m wide and would provide a total berthing frontage of approximately 20 m (at variable depths). For comparisons purpose, the dimension of the existing Wardell pontoon on the opposite side of the Richmond River is 12 m long and 2.5 m wide.

It is proposed that the new pontoon be furnished with rubber fenders, mooring cleats and pile cages, with piles secured through penetrations in the pontoon deck. Internally located piles would mean that berthing is possible on either side of the pontoon, recognising that the inside of the pontoon would be more draft limited but still considered suitable for many shallower draft vessels. Solar beacons and reflectors are also to be installed on the pontoon, to assist in the visibility of the structure at night/ low light.

The Richmond River is subject to significant flood events and as such it is proposed that the floating pontoon be anchored via flood resistant chain to prevent the pontoon detaching during extreme flood events.

The proposed gangway has been aligned as close as possible to the existing ramp, allowing unaccompanied users the opportunity to guide their vessel towards the ramp, via a guide rope when retrieving the vessels. A small concrete abutment would also need to be installed along the bank to provide the necessary support for pinning the gangway to the shoreline. A concrete path has also been proposed to extend from the gangway entrance, towards the car park and boat ramp, in order to provide linkage to these features.

Investigations were made into the possible installation of an on-ramp pontoon at this site, however, the width of the existing single lane ramp prohibited the installation of this type of pontoon without incurring significant construction costs. Likewise, positioning of the pontoon to the west of the existing ramp was also investigated, however, the existence of a large tree, storm water culvert and bridge piles did not make the positioning of the pontoon on the western side of the ramp feasible.

It should be anticipated that the installation of a pontoon at the East Wardell site may increase the usage and popularity of the facility. The guidelines recommended that rural boat ramp facilities comprising of a single lane ramp and pontoon, aim to provide 30-40 trailer parks and 6-8 car parks. Presently, the facility comprises of 8 trailer parks and no marked car parks. There may exist a need for the council to further develop the nearby grassed overflow parking area to accommodate any increased usage, following the installation of the pontoon.

It is also recommended a sign be installed at the entry to the pontoon advising users of mooring time limits and the need for people fishing from the pontoon to give right of way to mooring vessels.

It is recommended that the council and stakeholders consider the proposed pontoon concept design in order to finalise a preferred arrangement for detailed design and installation.

### **3. Concept Design Construction Cost Estimate**

A construction cost estimate has been prepared based on the concept design described above. The total construction cost of the works is estimated to be \$116,000 and is summarised in **Table 1**. A further detailed breakdown of this estimate has been attached to this memo. This estimate includes a contingency of 20% which is considered to be appropriate for the current level of design development.

It is important to note, this is a construction cost estimate and excludes the additional costs of approval documentation (including environmental assessment), design and tender documentation, tendering, site supervision and contract administration.

Table 1. Preconstruction Cost Estimate.

<b>PRECONSTRUCTION COST EAST WARDELL PONTOON</b>		<b>Amount</b>
<b>1 MOBILISATION AND PRELIMINARIES</b>	<b>\$</b>	<b>19,500</b>
<b>2 SET OUT</b>	<b>\$</b>	<b>1,500</b>
<b>3 GANGWAY</b>	<b>\$</b>	<b>14,700</b>
<b>4 PILES</b>	<b>\$</b>	<b>25,000</b>
<b>5 PONTOON</b>	<b>\$</b>	<b>24,300</b>
<b>6 FOOTPATH</b>	<b>\$</b>	<b>800</b>
<b>7 AUXILARY ITEMS</b>	<b>\$</b>	<b>1,350</b>
<b>8 COMPLIANCE SURVEYS</b>	<b>\$</b>	<b>2,000</b>
<b>9 COMPLETION</b>	<b>\$</b>	<b>7,665</b>
	<b>\$</b>	<b>96,815</b>
<b>Construction cost excluding contingency</b>	<b>\$</b>	<b>96,815</b>
<b>Contingency on construction cost</b>	<b>20% \$</b>	<b>19,400</b>
<b>ESTIMATED CONSTRUCTION COST</b>	<b>\$</b>	<b>116,200</b>

Note: Excludes costs for design development, environmental assessment, DA, tender preparation and advertising, advising on tenders, contract sign, supervision and administration.

#### 4. Attachments

1. East Wardell Pontoon, concept design drawing – Drawing No. PA1362/MA/7001.
2. East Wardell Pontoon, concept design 3D visualisation.
3. Construction cost estimation schedule.

1. AERIAL PHOTOGRAPH TAKEN FROM NEARMAP DATED 30/07/2014.
2. TOPOGRAPHIC SURVEY UNDERTAKEN BY BSC (2016).
3. BATHYMETRIC SURVEY UNDERTAKEN BY RHDRV (2016).
4. TO COMPLY WITH STANDARDS BED LEVEL UNDER PONTOON AND AT OUTER BERTH TO BE NO HIGHER THAN RL -1.27 AND RL -2.07 RESPECTIVELY.
5. TO ACHIEVE ASSISTED DISABILITY ACCESS IN ACCORDANCE WITH THE BOAT RAMP GUIDELINES (RMS, 2016), GANGWAY LENGTH TO EXCEED 8m.

DATUMS AND TIDAL DATA

Metres +2.6	
+2.4	+2.5 50% ARI
+2.2	
+2.0	+1.9 20% ARI
+1.8	
+1.6	
+1.4	
+1.2	
+1.0	
+0.8	+0.89 HHWSS
+0.6	+0.55 MHWS
+0.4	+0.35 MHW
+0.2	+0.36 MHWN
+0.0	+0.06 MSL
-0.2	-0.23 MLWN
-0.4	-0.33 MLWS
-0.6	-0.53 MLWS
-0.8	-0.67 SLW
-1.0	

ALL LEVELS AUSTRALIAN HEIGHT DATUM (A.H.D.)	
A.H.D.	0.0
E	0.926
C.D.	-1.0

REVISIONS		
NO.	DATE	DESCRIPTION
1		
2		
3		
4		
5		

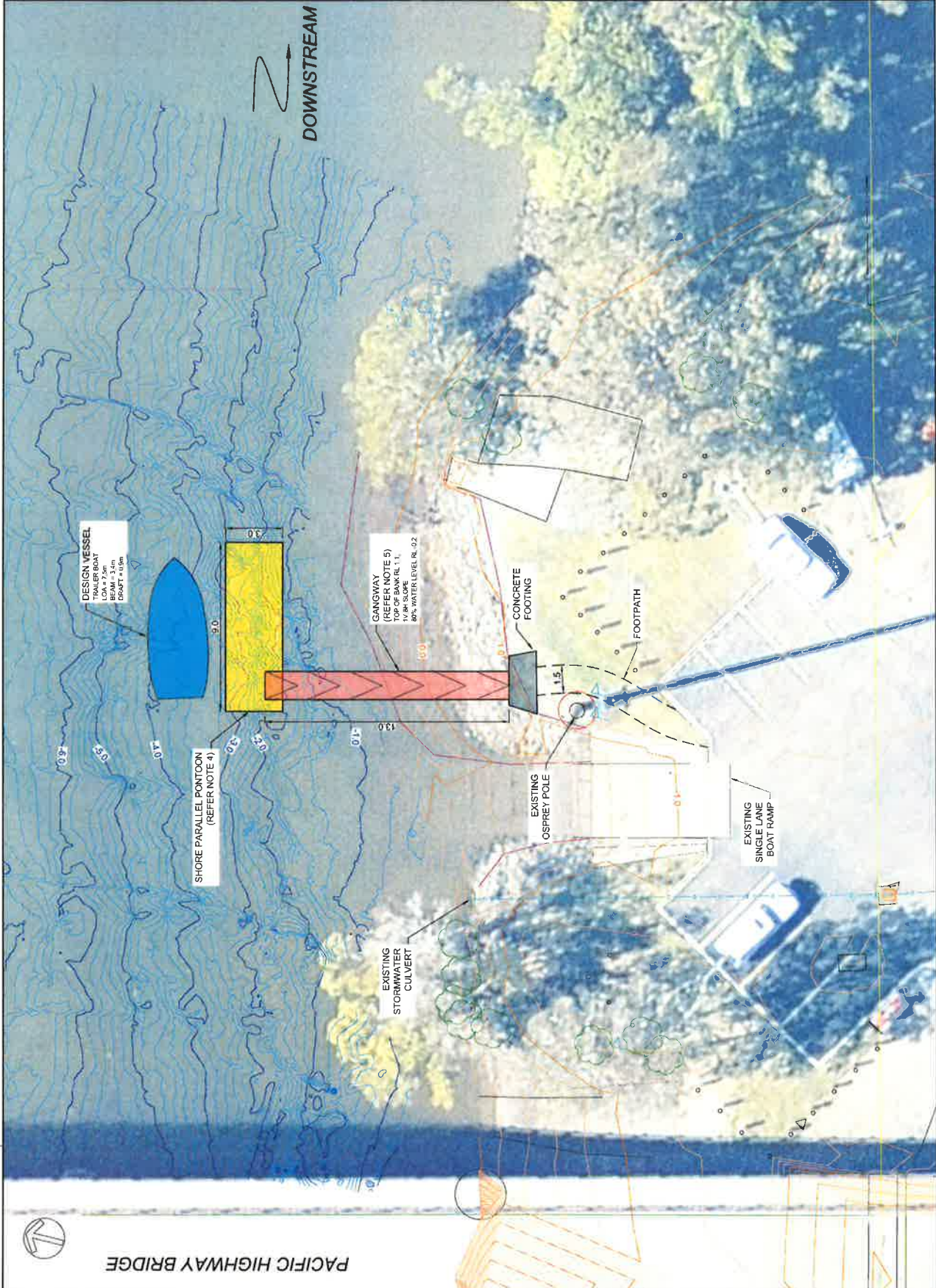


**BALLINA BOATRAMP UPGRADE**

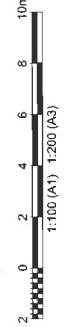
CONCEPT DESIGN  
EAST WARDELL  
PLAN

ROYAL HASKONINGDHV  
 CONSULTING ENGINEERS AND ARCHITECTS  
 100 RIVERVIEW DRIVE, SYDNEY NSW 1588  
 PHONE: +61 (0)2 9550 6200  
 FAX: +61 (0)2 9550 6201  
 EMAIL: info@haskoningdhv.com.au  
 WEBSITE: www.haskoningdhv.com.au

PROJECT NO: PA1326-MA-CIVIL MODEL-ALL  
 DATE: 14/07/2016  
 DRAWN BY: JAC SHORIN  
 CHECKED BY: JAC SHORIN  
 SCALE: 1:100 (A1) 1:200 (A3)  
 PROJECT: PA1326/MA/7001  
 SHEET NO: C



AUSTRALIAN HEIGHT DATUM  
NOT FOR CONSTRUCTION







**Royal  
HaskoningDHV**  
Enhancing Society Together

## Note / Memo

Haskoning Australia PTY Ltd.  
Maritime & Aviation

To: Paul Busmanis  
From: James Donald & Gary Blumberg  
Date: Monday, 17 October 2016  
Copy:  
Our reference: M&APA1326N006D02  
Classification: Open

**Subject: Faulks Reserve Proposed Pontoon - Concept Design Memo**

---

### 1. Background

The Ballina Shire Council is planning to upgrade seven (7) small craft facilities along the Richmond River and North Creek. The maritime infrastructure proposed at these sites comprise of boat ramps, associated carpark facilities and pontoons.

Proposed maritime works planned for the Faulks Reserve site includes the installation of a pontoon to increase the efficiency and usability of the existing dual lane boat ramp. This memo provides a description of two proposed pontoon concept designs. This memo, including the attached concept design plans and 3D visualisation, has been provided to assist in the refinement and finalisation of a preferred concept design for the facility.

This memo should be read in conjunction with the Basis of Design (BoD) document "*M&APA1362R001D01 – Ballina Maritime Works BoD*" which sets out all key design parameters for the development. The BoD includes a review of all existing site information, environmental conditions, opportunities, constraints and relevant guidelines and standards used to inform the design process.

The concept design and layout of the pontoons have largely been developed in consideration of the NSW Boat Ramp Facility Guidelines, (referred further simply as the "Guidelines") published by Roads and Maritime Services (RMS) in September 2015, which sets out the general guidance on the design of boat ramp infrastructure facilities for small recreational craft. It may not be required (or sometimes possible) to meet all the specific requirements of the Guidelines due to site or funding constraints. It is important to consider these Guidelines: have been developed over decades of boat ramp and maritime facilities usage; are consistent with the relevant Australian Standards; have recently been updated to reflect modern day usage and expectations of boat ramp users; and, have been prepared in consultation with key representatives from governmental, non-governmental and recreational user groups.

### 2. Proposed Concept Design

Two proposed pontoon options have been provided for consultation in finalising a preferred arrangement. These options include an on-ramp pontoon and traditional floating pontoon and gangway. Both proposed options are further discussed in the following sub-sections.

#### 2.1 On-ramp Pontoon (Option 1)

One option is the installation of a new on-ramp pontoon proposed for the existing Faulks Reserve small craft facility. The structure would be connected to a small concrete ramp by a hinge connection and would move up and down with the tides to provide safe access for the loading of passengers and goods.

The position of the pontoon along the ramp would also allow unaccompanied users the opportunity to guide their vessel towards the ramp, via a guide rope, when retrieving and launching their vessels. The pontoon would be located on the starboard or vessel driver-side of the boat ramp in order to maximise solo operator ease when launching and retrieving vessels.

The floating on-ramp pontoon would extend out to a depth of – 3 m AHD where it would terminate to a conventional floating pontoon positioned parallel to the shore line. This shore parallel pontoon component maximises pontoon frontage, while also limiting the distance the structure extends out into the river. The outer pontoon component has been designed to provide a usable berth length at the Design Low Water Level that is 1.5 times the length of the Design Vessel. This would allow for access of vessels with drafts of up to 0.9 m, under all tides (which includes an under keel clearance of 0.3 m).

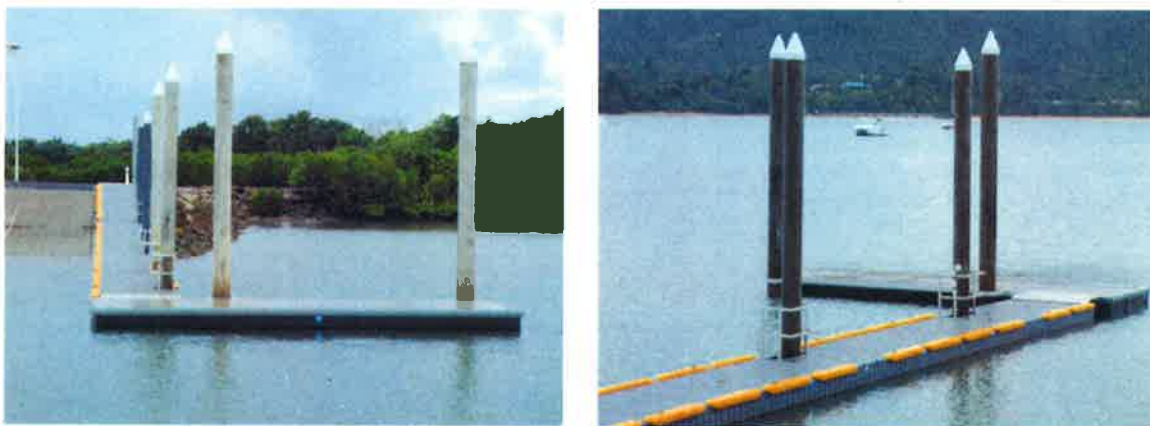


Figure 1. Example of floating on-ramp pontoon (source: Superior Jetties).

The pontoon would be designed to float level with a deck elevation of 350 mm to 450 mm above the water line. The pontoon would be a minimum 1.5 m wide, however this may be restricted to approximately 1.2 m at pile locations. The structure would comprise of a concrete ramp at the top of the existing boat ramp which would provide access from the car park/ manoeuvring area to the surface of the articulating structure. The floating pontoon components would be constructed from composite materials, including: HDPE compartments, concrete decking and stainless steel fixings.

Following installation of the on-ramp pontoon, the remaining width of the boat ramp would be 7.8 m, which is 0.2 m narrower than recommended by the Guidelines for dual lane boat ramps. The remaining width does however comply with the previous Guidelines, which recommended a minimum width of 7.4 m for dual lane ramps. While it is not possible to provide an adequately sized on-ramp pontoon and still provide a ramp width of 8 m, it is reasonable to assume the site could still be potentially operated as a dual ramp facility.

## 2.2 Floating Pontoon and Gangway (Option 2)

A new floating pontoon and gangway has also been proposed for East Wardell to increase usability and efficiency of the existing facility. The proposed pontoon would allow users the opportunity to transfer passengers and goods to and from their vessels, as well as temporarily moor their vessels during launching and retrieval activities. The installation of a traditional pontoon and gangway system has the advantage of not resulting in any reduction to the width of the existing boat ramp.

The proposed pontoon would extend out to the -3 m AHD depth contour which would allow for all tidal access of vessels with drafts of up to 0.9 m (which includes an under keel clearance of 0.3 m). The

access gangway would be approximately 10 m long and 1.5 m wide, which would allow for assisted disability access, in line with the Guidelines. In order to minimise the distance the pontoon and gangway protrudes out into the Richmond River, the gangway has been orientated in a downstream direction.

The dimensions of the proposed pontoon would be 9 m long and 3 m wide and would provide a total berthing frontage of approximately 20 m (at variable depths).

### 2.3 General

It is proposed that either pontoon system would be furnished with rubber fenders, mooring cleats and pile cages, with piles secured through penetrations in the pontoon deck. Solar beacons and reflectors are also to be installed on the pontoon, to assist in the visibility of the structure at night/ low light. It is also recommended that a sign targeting boat ramp and waterway etiquette be installed at the entry to the pontoon advising users of mooring time limits and the need for people fishing from the pontoon to give right of way to mooring vessels.

It should be anticipated that the installation of either pontoon option at the facility may increase the usage and popularity of the site. The Guidelines recommend that urban boat ramp facilities comprising of a single lane ramp and pontoon, should aim to provide 40 - 50 trailer parks. Presently, the facility comprises of 24 trailer parks. Therefore, there may exist a need for the council to further develop adjacent parkland areas to accommodate any increased usage following the installation of the pontoon. Similarly, there is potential to formalise on street parking along the southern edge of Riverside Drive to provide additional trailer parking capacity.

## 3. Summary of Options

The advantages and disadvantages of both proposed options have been summarised in **Table 1** below.

*Table 1. Key advantages and disadvantages of both proposed pontoon options.*

Option 1 – On-ramp Pontoon		Option 2 –Pontoon and Gangway	
Advantages	Disadvantages	Advantages	Disadvantages
Increased berthing frontage when compared to the proposed pontoon and gangway system.	Reduction in existing boat ramp width, potentially limiting the facility to one lane.	Lower cost when compared to the proposed on-ramp pontoon.	Difficult to utilise the pontoon and gangway system when launching and retrieving vessels, particularly for solo operators.
Increased efficiency when utilising the pontoon during launching and retrieval activities.	Higher cost when compared to the proposed pontoon and gangway system.	No reduction in existing boat ramp width.	Limited berthing frontage when compared to the proposed on-ramp pontoon.

It is recommended that the council and stakeholders consider both proposed pontoon concept designs in order to select a preferred arrangement for further detailed design and installation.

## 4. Concept Design Construction Cost Estimate

Construction cost estimates have been prepared based on the concept design options described above. The total construction cost for the on-ramp pontoon is estimated to be \$222,500 and is summarised in

**Table 2.** The total construction cost for the pontoon and gangway is estimated to be \$135,000 and is summarised in **Table 3**. A further detailed breakdown of both estimates have been attached to this memo. These estimates include a contingency of 20% which is considered to be appropriate for the current level of design development.

It is important to note, these are construction cost estimates and exclude the additional costs of approval documentation (including environmental assessment), design and tender documentation, tendering, site supervision and contract administration.

*Table 2. Preconstruction cost estimation – On-ramp Pontoon (Option 2).*

<b>PRECONSTRUCTION COST FAULKS RESERVE ON-RAMP PONTOON</b>		<b>Amount</b>
<b>1 MOBILISATION AND PRELIMINARIES</b>	<b>\$</b>	<b>20,500</b>
<b>2 SET OUT</b>	<b>\$</b>	<b>1,500</b>
<b>3 CONCRETE WORKS</b>	<b>\$</b>	<b>3,000</b>
<b>4 PILES</b>	<b>\$</b>	<b>68,800</b>
<b>5 PONTOON</b>	<b>\$</b>	<b>80,600</b>
<b>6 AUXILARY ITEMS</b>	<b>\$</b>	<b>1,350</b>
<b>7 COMPLIANCE SURVEYS</b>	<b>\$</b>	<b>2,000</b>
<b>8 COMPLETION</b>	<b>\$</b>	<b>7,610</b>
	<b>Construction cost excluding contingency</b>	<b>\$ 185,360</b>
	<b>Contingency on construction cost</b>	<b>20% \$ 37,100</b>
	<b>ESTIMATED CONSTRUCTION COST</b>	<b>\$ 222,500</b>

Note: Excludes costs for design development, environmental assessment, DA, tender preparation and advertising, advising on tenders, contract sign, supervision and administration.

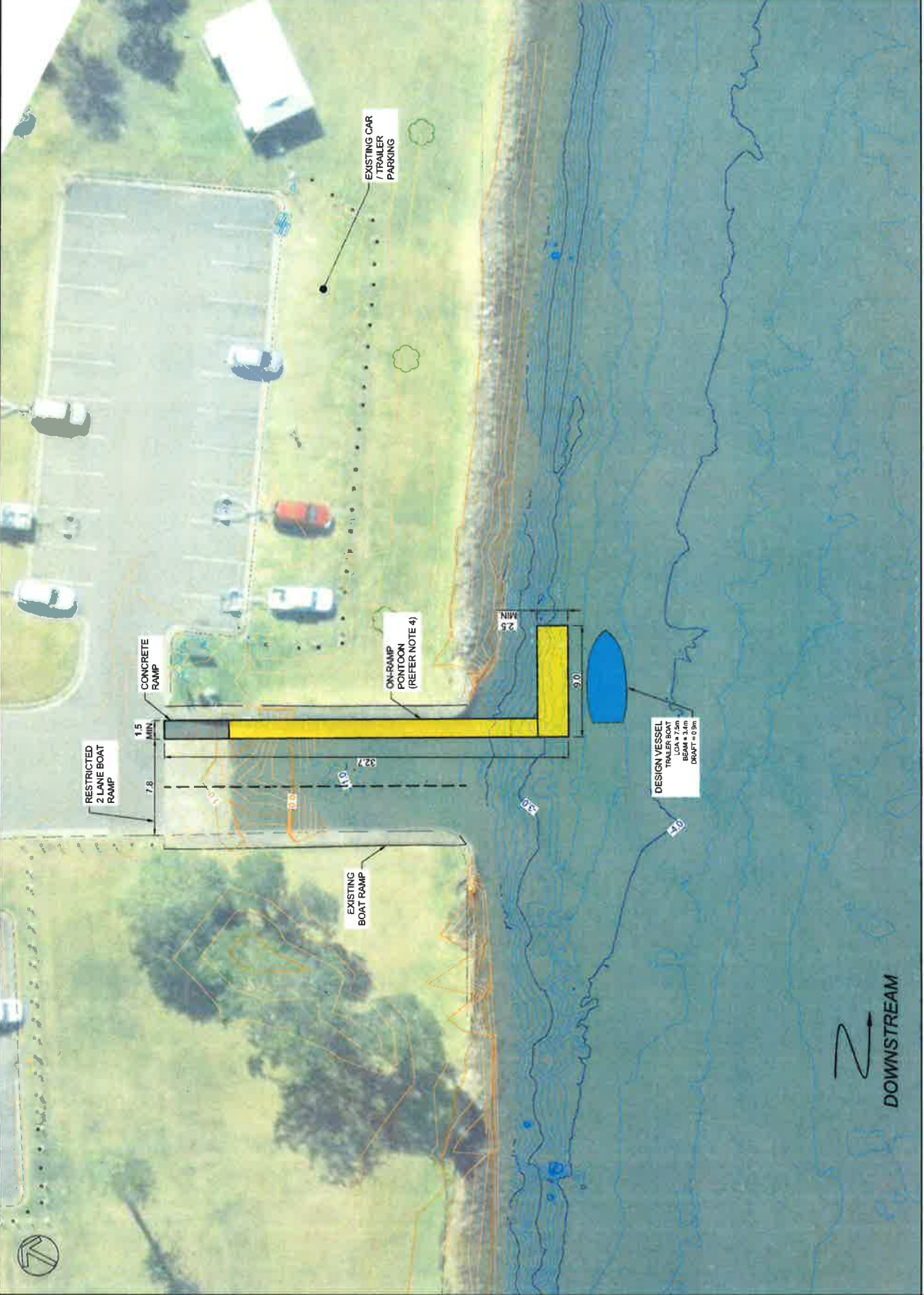
Table 3. Preconstruction cost estimation – Pontoon and Gangway (Option 2).

<b>PRECONSTRUCTION COST FAULKS RESERVE PONTOON AND GANGWAY</b>		<b>Amount</b>
<b>1 MOBILISATION AND PRELIMINARIES</b>	\$	<b>19,500</b>
<b>2 SET OUT</b>	\$	<b>1,500</b>
<b>3 GANGWAY</b>	\$	<b>14,700</b>
<b>4 PILES</b>	\$	<b>40,000</b>
<b>5 PONTOON</b>	\$	<b>24,300</b>
<b>6 FOOTPATH</b>	\$	<b>1,500</b>
<b>7 AUXILARY ITEMS</b>	\$	<b>1,350</b>
<b>8 COMPLIANCE SURVEYS</b>	\$	<b>2,000</b>
<b>9 COMPLETION</b>	\$	<b>7,665</b>
	<hr/>	
<b>Construction cost excluding contingency</b>	\$	<b>112,515</b>
<b>Contingency on construction cost</b>	20% \$	<b>22,600</b>
	<hr/>	
<b>ESTIMATED CONSTRUCTION COST</b>	\$	<b>135,100</b>

Note: Excludes costs for design development, environmental assessment, DA, tender preparation and advertising, advising on tenders, contract sign, supervision and administration.

## 5. Attachments

1. Faulks Reserve On-ramp Pontoon, concept design drawing – Drawing No. PA1362/MA/5001.
2. Faulks Reserve Pontoon and Gangway, concept design drawing – Drawing No. PA1362/MA/5002.
3. Faulks Reserve Pontoon, concept design 3D visualisation.
4. Construction cost estimation schedule.



1. AERIAL PHOTOGRAPH TAKEN FROM SIXMAPS DATED 29/08/2012.
2. TOPOGRAPHIC SURVEY UNDERTAKEN BY BSC (2016).
3. BATHYMETRIC SURVEY UNDERTAKEN BY RHDHV (2016).
4. TO COMPLY WITH STANDARDS BED LEVEL UNDER LAST 9m OF PONTOON TO BE NO HIGHER THAN RL -2.19.

DATUMS AND TIDAL DATA	
Metres +1.8	
+1.6	+1.6 2050yr ABL
+1.4	
+1.2	
+1.0	+0.93 HRWSS
+0.8	
+0.6	+0.56 MLWWS
+0.4	+0.45 MLHW
+0.2	+0.33 MLWN
A.H.D.	0.0 +0.02 MSL
-0.2	-0.39 MLWN
-0.4	-0.41 MLW
-0.6	-0.65 MLWS
-0.8	-0.79 ISLW
-1.0	

ALL LEVELS AUSTRALIAN HEIGHT DATUM (A.H.D)

NO	DATE	DESCRIPTION	BY	CHK
1	17/03/2016	ISSUED FOR CONCEPT		
2	27/07/2016	ISSUED FOR CONCEPT		
3	10/07/2016	ISSUED FOR CONCEPT		
4	10/07/2016	ISSUED FOR CONCEPT		

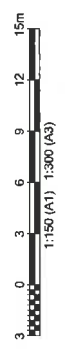


BALLINA BOATRAMP UPGRADE

CONCEPT DESIGN  
FAULK'S RESERVE  
OPTION 1  
BENT ON-RAMP PONTOON  
PLAN

DATE: 14/10/2016  
 DRAWING NO: PA1326/MA/5001  
 PROJECT NO: PA1326  
 MODEL: [C]  
 SCALE: AS SHOWN  
 PROJECT: PA1326/MA/5001  
 SHEET: C

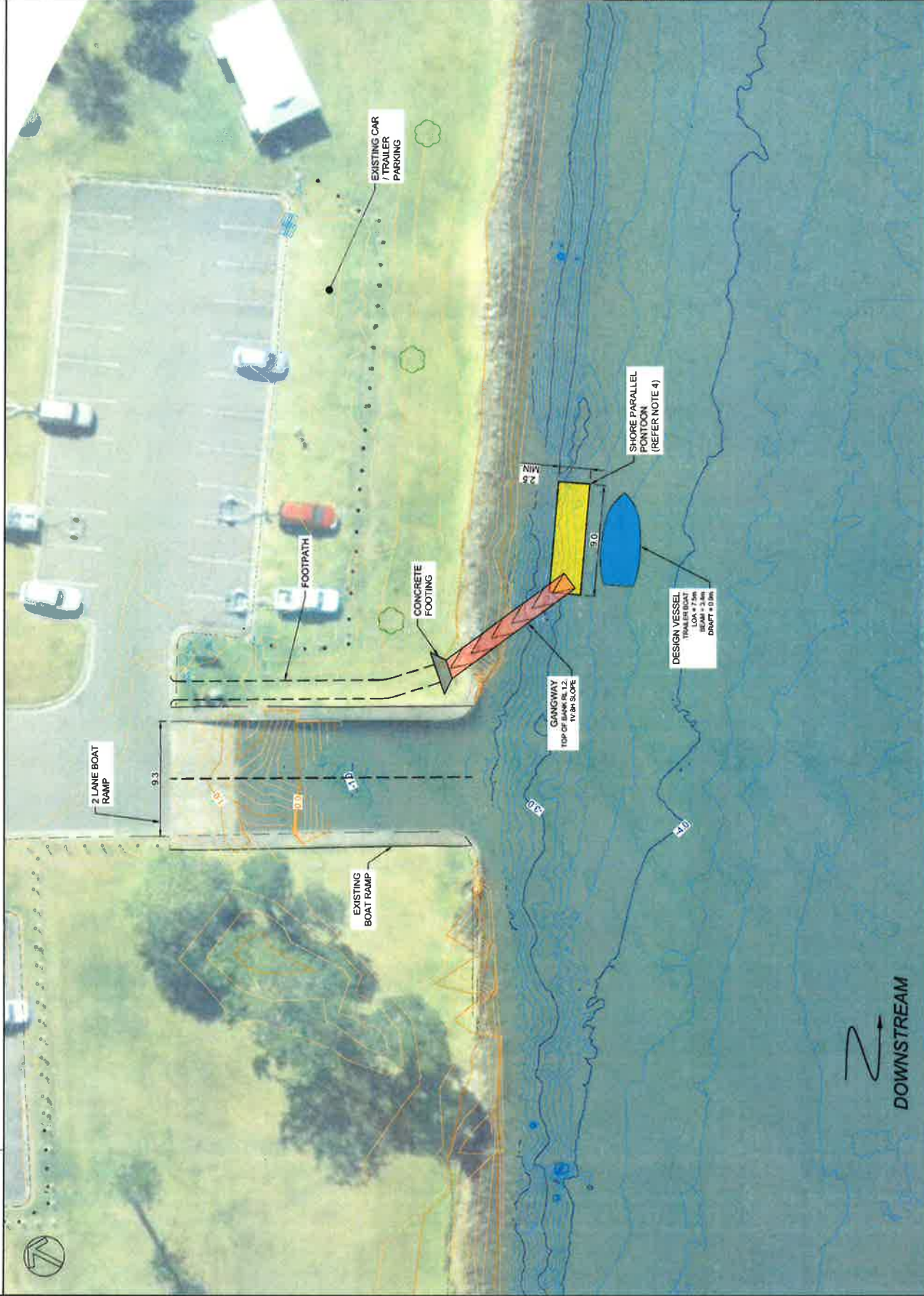
AUSTRALIAN HEIGHT DATUM  
NOT FOR CONSTRUCTION



DOWNSTREAM







1. AERIAL PHOTOGRAPH TAKEN FROM SIXMAPS DATED 29/08/2012
2. TOPOGRAPHIC SURVEY UNDERTAKEN BY BSC (2016)
3. BATHYMETRIC SURVEY UNDERTAKEN BY RHDHV (2016)
4. TO COMPLY WITH STANDARDS BED LEVEL UNDER PONTOON TO BE NO HIGHER THAN RL -2.19

DATUMS AND TIDAL DATA	
Metres +1.8	
+1.6	+1.6 20:50yr ARI
+1.4	
+1.2	
+1.0	+0.93 HHWS
+0.8	
+0.6	+0.56 MHWS
+0.4	+0.45 MHW
+0.2	+0.33 MHWN
A.H.D.	0.0 +0.02 MSL
-0.2	-0.39 M.LWN
-0.4	-0.41 M.LW
-0.6	-0.65 M.LWS
-0.8	-0.79 ISLW
-1.0	

ALL LEVELS AUSTRALIAN HEIGHT DATUM (A.H.D)

REVISIONS		
NO.	DATE	DESCRIPTION
1		
2		
3		
4		



**BALLINA BOATRAMP UPGRADE**

CLIENT: **CONCEPT DESIGN FAULK'S RESERVE OPTION 2 PONTOON AND GANGWAY PLAN**

MAJOR CLIENT: AUSTRALIAN CITY LTD

DRAWN BY: PA1326/MA-001 MODEL: C3

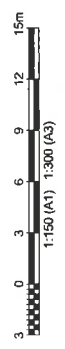
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DRAWING NO: PA1326/MA/5002

SHEET NO: C

**AUSTRALIAN HEIGHT DATUM**

**NOT FOR CONSTRUCTION**



## Note / Memo

**Haskoning Australia PTY Ltd.  
Maritime & Aviation**

To: Paul Busmanis  
From: James Donald & Gary Blumberg  
Date: Monday, 17 October 2016  
Copy:  
Our reference: M&APA1326N008D02  
Classification: Open

**Subject: Captain Cook Park Pontoon - Concept Design Memo**

---

### 1. Background

The Ballina Shire Council is planning to upgrade seven (7) small craft facilities along the Richmond River and North Creek. The maritime infrastructure proposed at these sites comprise of boat ramps, associated carpark facilities and pontoons.

Proposed maritime works planned for the Captain Cook Park site includes the installation of a new pontoon and access ramp. This pontoon is intended for short term boat mooring and passenger exchange. The proposed pontoon would provide additional access from the Richmond River to the nearby parkland and wider town centre area. It is expected that vessels of up to approximately 20 tonnes would utilise the facility. This memo provides a description of the proposed floating pontoon concept design. This memo, including the attached concept design plans and 3D visualisation, has been provided to assist in the refinement and finalisation of a preferred concept design for the facility.

This memo should be read in conjunction with the Basis of Design (BoD) document "*M&APA1362R001D01 – Ballina Maritime Works BoD*" which sets out all key design parameters for the development. The BoD includes a review of all existing site information, environmental conditions, opportunities, constraints and relevant guidelines and standards used to inform the design process.

### 2. Proposed Concept Design

A new floating pontoon and access ramp has been proposed for this site to provide additional access from the River to the adjacent parkland and greater town centre. The proposed pontoon would allow users the opportunity to transfer passengers and goods to and from their vessels, as well as temporarily moor their vessels.

The proposed pontoon would extend along the -5 m AHD depth contour which would allow for all tidal access of yachts with drafts of up to 3.7 m (includes an under keel clearance of 0.3 m). The access gangway would be approximately 14 m long and 1.5 m wide, which would allow for assisted disability access, in accordance with the Guidelines (**Attachment 1**). This is similar to public pontoons already existing in the Captain Cook Park area, which also have 1V:8H slopes for at least 80% of the tide. The opportunity does exist to provide all ability access (1V:14H slope for at least 80% of the tide), however, the gangway would need to be extended in length to 24 m (**Attachment 2**).

When considering the extension of gangway lengths, it is also important to consider the potential implications on project costs. Increasing the gangway span requires the structural elements of the gangway to be enlarged considerably in order accommodate the increases in bending moment forces

acting on the structure. For this reason small extensions in gangway lengths can result in considerable increases in construction/fabrication costs. For example, an estimated cost for a gangway 16 m in length could be in the order of \$46,000 while a gangway 22 m in length could be in the order of \$92,000.<sup>1</sup>

The dimensions of the proposed pontoon would provide a total berthing frontage of approximately 33 m (at variable depths). For comparison purposes, the dimension of the proposed pontoon is similar in size to the floating pontoon existing at the eastern end of Captain Cook Park. It is proposed that the new pontoon be furnished with rubber fenders, mooring cleats (suitable for 20 tonne vessels) and pile cages, with piles secured through penetrations in the pontoon deck. Internally located piles would mean that berthing is possible on either side of the pontoon, recognising that the inside of the pontoon would be more draft limited and slightly difficult to access.

The Richmond River is subject to significant flood events and as such it is proposed that the floating pontoon be anchored via flood resistant chain to prevent the pontoon detaching during extreme flood events.

The proposed gangway has also been aligned with the main boardwalk which borders the river side of the Ballina RSL. The gangway would be pinned to the existing boardwalk and provide direct access from the boardwalk to the waterline. An existing ladder which is currently located at the proposed gangway entrance would be relocated (location to be confirmed).

It is recommended a sign be installed at the entry to the pontoon advising users of mooring time limits and the need for people fishing from the pontoon to give right of way to mooring vessels. Solar beacons and reflectors are also to be installed on the pontoon to assist in the visibility of the structure at night/ low light.

It is recommended that the council and stakeholders consider the proposed pontoon concept design in order to finalise a preferred arrangement for detailed design and installation.

### **3. Concept Design Construction Cost Estimate**

A construction cost estimate has been prepared based on the concept design described above. The total construction cost of the works is estimated to be \$141,500 and is summarised in **Table 1**. A further detailed breakdown of this estimate has been attached to this memo. This estimate includes a contingency of 20% which is considered to be appropriate for the current level of design development.

It is important to note, this is a construction cost estimate and excludes the additional costs of approval documentation (including environmental assessment), design and tender documentation, tendering, site supervision and contract administration.

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<sup>1</sup> RHDHV (2014), Assistance with Valuation of NPWS Maritime Assets. Prepared by Royal HaskoningDHV for NSW National Parks and Wildlife Services.

Table 1. Preconstruction cost estimate.

<b>PRECONSTRUCTION COST CAPT. COOK PARK PONTOON</b>		<b>Amount</b>
<b>1 MOBILISATION AND PRELIMINARIES</b>	<b>\$</b>	<b>19,500</b>
<b>2 SET OUT</b>	<b>\$</b>	<b>1,500</b>
<b>3 GANGWAY</b>	<b>\$</b>	<b>12,600</b>
<b>4 PILES</b>	<b>\$</b>	<b>30,000</b>
<b>5 PONTOON</b>	<b>\$</b>	<b>40,500</b>
<b>6 AUXILARY ITEMS</b>	<b>\$</b>	<b>1,850</b>
<b>7 COMPLIANCE SURVEYS</b>	<b>\$</b>	<b>2,000</b>
<b>8 COMPLETION</b>	<b>\$</b>	<b>10,000</b>
<b>Construction cost excluding contingency</b>		<b>\$ 117,950</b>
<b>Contingency on construction cost</b>		<b>20% \$ 23,600</b>
<b>ESTIMATED CONSTRUCTION COST</b>		<b>\$ 141,550</b>

Note: Excludes costs for design development, environmental assessment, DA, tender preparation and advertising, advising on tenders, contract sign, supervision and administration.

#### 4. Attachments

1. Captain Cook Park Pontoon Assisted Access, concept design drawing – Drawing No. PA1362/MA/2002.
2. Captain Cook Park Pontoon All Ability Access, concept design drawing – Drawing No. PA1362/MA/2001.
3. Captain Cook Park Pontoon, concept design 3D visualisation.
4. Construction cost estimation schedule.

1. AERIAL PHOTOGRAPH TAKEN FROM SIXMAPS DATED 29/08/2012.
2. TOPOGRAPHIC SURVEY UNDERTAKEN BY BSC (2016).
3. BATHYMETRIC SURVEY UNDERTAKEN BY RHQHV (2016).
4. TO COMPLY WITH STANDARDS BEING LEVEL UNDER PONTOON AND AT OUTER BERTH TO BE NO HIGHER THAN RL -1.53 AND RL -4.33 RESPECTIVELY.
5. TO ACHIEVE ASSISTED DISABILITY ACCESS IN ACCORDANCE WITH THE BOATRAMP GUIDELINES (RMS, 2016). GANGWAY LENGTH TO EXCEED 8m.

DATUMS AND TIDAL DATA

Metres +1.8	+1.7.50M ARI
	+1.6.20M ARI
	+1.4
	+1.2
	+1.0
	+0.8
	+0.6
	+0.4
	+0.2
A.H.D.	0.0
	-0.2
	-0.4
	-0.6
	-0.8
	-1.0

ALL LEVELS AUSTRALIAN HEIGHT DATUM (A.H.D)

REV	DATE	DESCRIPTION	BY	CHK
1		ISSUED FOR CONCEPT		
2		ISSUED FOR PERMITS		
3		ISSUED FOR CONSTRUCTION		



**BALLINA BOATRAMP UPGRADE**

CONCEPT DESIGN  
CAPTAIN COOK PARK  
OPTION 2  
ASSISTED ACCESS  
PLAN

ROYAL HASKONINGDHV  
MARITIME AUSTRALIA PTY LTD

PROJECT NO: PA1326-MA-CHK MODEL-ALL  
SCALE: AS SHOWN

DATE: 14/02/2018  
JOB NO: PA1326

PROJECT: BALLINA BOATRAMP UPGRADE

DATE: 14/02/2018

PROJECT NO: PA1326-MA-CHK MODEL-ALL

SCALE: AS SHOWN

PROJECT: BALLINA BOATRAMP UPGRADE

DATE: 14/02/2018

PROJECT NO: PA1326-MA-CHK MODEL-ALL

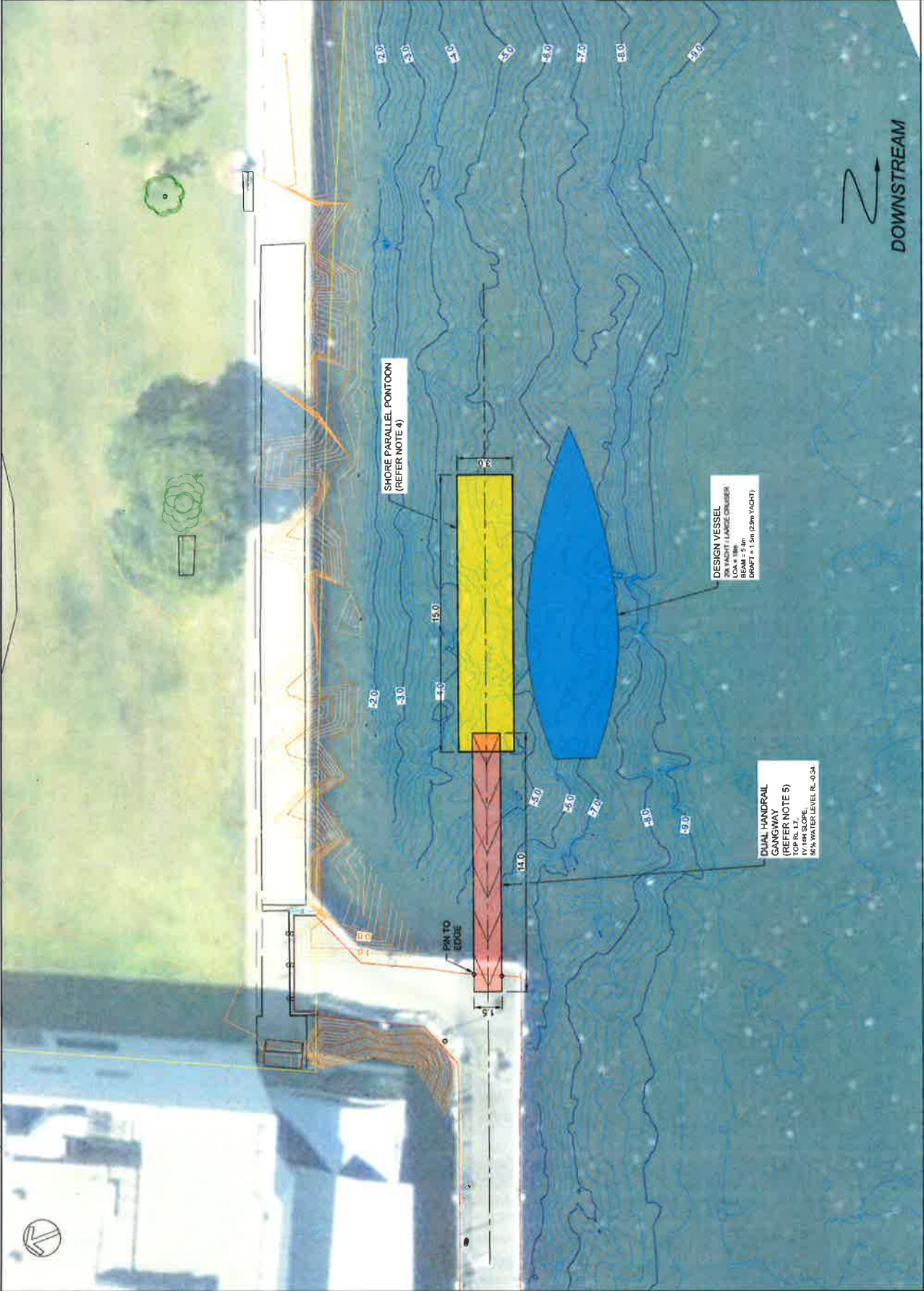
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PROJECT: BALLINA BOATRAMP UPGRADE

DATE: 14/02/2018

PROJECT NO: PA1326-MA-CHK MODEL-ALL

SCALE: AS SHOWN



AUSTRALIAN HEIGHT DATUM

NOT FOR CONSTRUCTION



1. AERIAL PHOTOGRAPH TAKEN FROM SIXMAPS DATED 29/08/2012.
2. TOPOGRAPHIC SURVEY UNDERTAKEN BY BSC (2016).
3. BATHYMETRIC SURVEY UNDERTAKEN BY RHDHV (2016).
4. TO COMPLY WITH STANDARDS BED LEVEL UNDER PONTOON AND AT OUTER BERTH TO BE NO HIGHER THAN RL -1.53 AND RL -4.33 RESPECTIVELY.
5. TO ACHIEVE ASSISTED DISABILITY ACCESS IN ACCORDANCE WITH THE BOAT RAMP GUIDELINES (RMS, 2016), GANGWAY LENGTH TO EXCEED 6m.

DATUMS AND TIDAL DATA

Metres +1.8
+1.7 5007 ARI
+1.6 2007 ARI
+1.4
+1.2
+1.0
+0.8
+0.6
+0.4
+0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0

A.H.D. 0.0  
 E 928.0  
 C.D. -1.0

ALL LEVELS AUSTRALIAN HEIGHT DATUM (A.H.D.)

NO.	DATE	ISSUANCE	BY	CHK	APP
1	14/01/2018	ISSUANCE			



**BALLINA BOATRAMP UPGRADE**

CONCEPT DESIGN  
 CAPTAIN COOK PARK  
 OPTION 1  
 ALL ABILITY ACCESS  
 PLAN

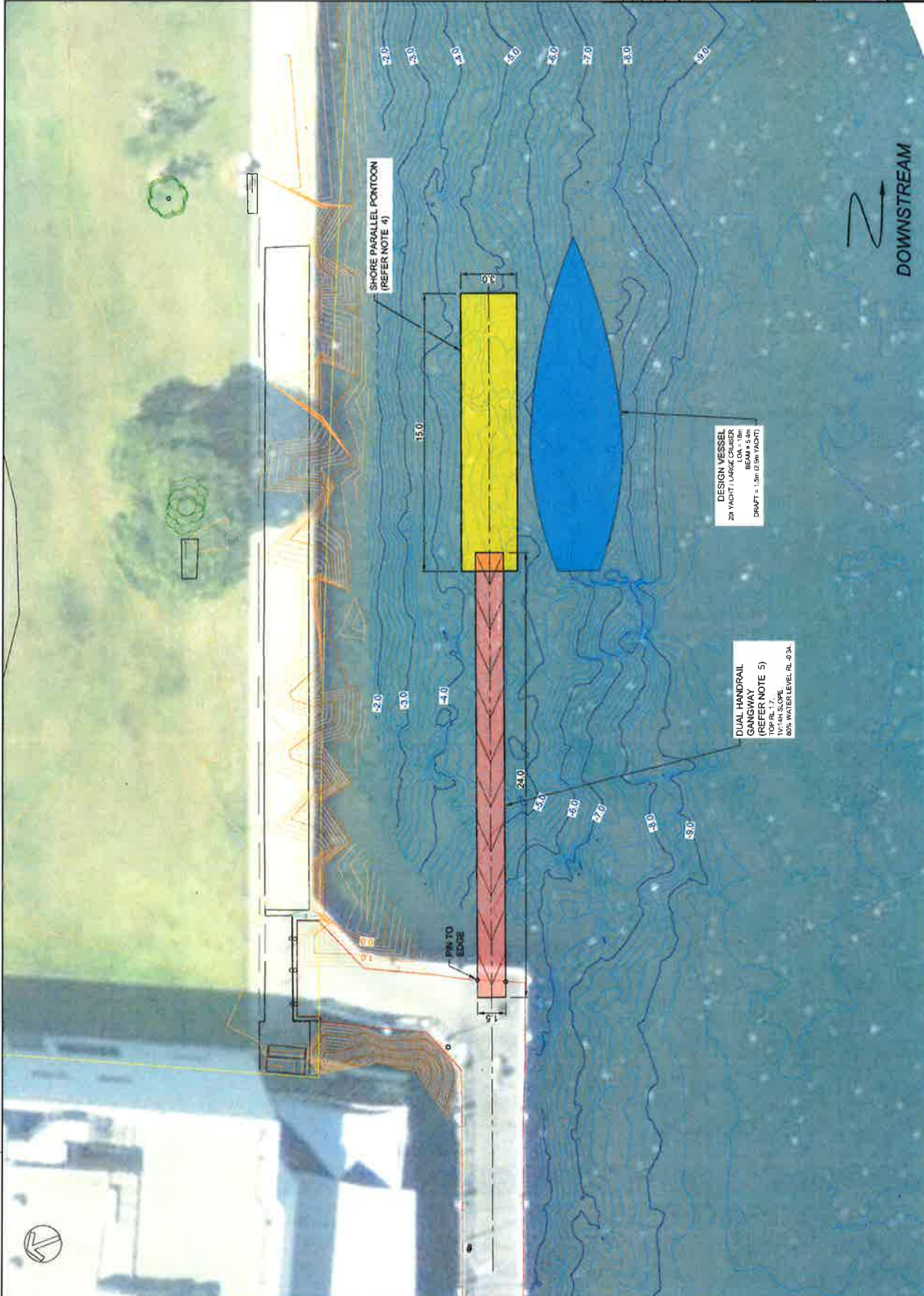
Royal HaskoningDHV  
 CONSULTING ENGINEERS

DATE: 14/01/2018  
 JOB NO: PA1326  
 DRAWING NO: PA1326-MA-001L  
 MODE: ALL

SCALE: AS SHOWN

PROJECT: BALLINA BOATRAMP UPGRADE

PA1326/MA/2001



AUSTRALIAN HEIGHT DATUM  
 NOT FOR CONSTRUCTION

