



LEGEND

Existing vegetation and individual trees

Key:

- Ac Acacia sp
- Cas Casuarina sp
- ER Elaeocarpus reticulatus
- Euc Eucalyptus sp
- Exo Exocarpus sp
- Lep Leptospermum sp
- Ma Mangrove
- Mel Melaleuca sp
- rif rainforest species
- Pitt Pittosporum sp

Existing contours (500mm contour interval - 1m contours in bold)

Proposed (sealed or stabilised) vehicle accessway.

Proposed stormwater detention area

Proposed foreshore rock revetment

Proposed boat launching pad

Proposed planting areas with existing vegetation as core

DESIGN NOTES – Casuarina Park:

Design Context:
The intention is to accommodate the needs of boating activities whilst maintaining the natural characteristic of the reserve; address the potential impacts of climate change on sea level rise; address stormwater management to improve the quality of stormwater entering the waterway; address foreshore erosion and instability; and accommodate other park uses (commemorative gardens and picnic area).

Existing water levels:
For the period July 2010 to June 2011 the following tide levels are predicted:

Tide:	Predicted level:	Equivalent to:	Onsite:
highest tide	2.02m	1.095m AHD*	Approx current top of bank
lowest tide	0.06m	- 0.865m AHD	Offshore - approx 60m**

* Australian height datum
** Not accurately surveyed

- Need to allow for wave action caused by wind. *Port Stephens Foreshore Mgt Plan 2009* recommends to allow for 900mm wave height. At high tide this translates to 1.995m AHD.
- Tide anomalies also occur, between minus 100mm and plus 200mm. The largest recorded in NSW was 590mm during an ocean storm in 1974.
- Evidence of inundation of the reserve (ie no grass growth and deposits of wrack) can be seen up to approx 1.6m AHD at the southern end of the foreshore.

Climate Change:
Possible scenarios for sea level rise due to climate change could include the following:

	For 2050 Estimated mm:	For 2050 Recommended allowance mm:	For 2100 Estimated mm:	For 2100 Recommended allowance mm:
Best case	60	100	180	200
Medium estimate	220	250	560	550
Worst case	380	400	940	900

Source: A Snapshot of Future Sea Levels: Photographing the King Tide by DECCW NSW dated 12 January 2009

- To plan for 2050 would give the highest tide within a range of 1.155 to 1.495m AHD plus a wave height of 900mm gives a final range of 2.055 to 2.395m AHD (inundating the reserve by 9 to 10m as measured from the current high water mark). This inundation would be contained within the lower area of the reserve and wouldn't impact on the reserve as significantly as predicted sea level rise would at Water Street, North Arm Cove.

Proposed Jetty (information sourced from *Design Guidelines for Wharves and Jetties*, a Department of Public Works, NSW, publication, report No. 88062 dated August 1990):

- This concept plan addresses the expressed community desire for Council to provide public boat facilities at this reserve to allow owners of small craft to access Port Stephens at both high and low tides. The intention is to provide a boat launching site along with a jetty which allows:

- boats to be launched and retrieved from the boat launching site on the shore at high tide;
- boats to be tied to the jetty at low tide for retrieval from the boat launching site at the next high tide (boats are not to be moored at the jetty permanently), and;
- boats to be launched by hand only (not by vehicle).

The plan illustrates the proposal in concept only. To further develop the proposal to provide a jetty at this location, detailed investigation and design should be undertaken by personnel experienced in maritime structures. Investigation of a number of factors should be undertaken including:

- hydrographical assessment (water depths);
- predicted water levels including impacts of climate change;
- currents, wave and wind climates;
- waterways restrictions on use (eg oyster leases etc);
- navigational issues (eg obstructions at low tide etc);
- foundation conditions (sloped soils etc), and;
- usage survey eg vessel types and access requirements.

Investigation of the above factors will influence the resulting design in terms of:

- Jetty shape - finger, L-head or T-Head;
- Deck area - minimum requirements include:
 - 2m walkway width for a public jetty with light pedestrian traffic - 2.5m wide for moderate traffic;
 - 1.2m width for gangways accessing floating structures.
- Floating pontoons are considered relatively inexpensive options for small craft access provided they are located in protected waters where currents are not strong.
- Handrails are essential particularly where decks are located over shallow water to assist in preventing users falling from the structure.

The jetty structure proposed in the concept plan includes a fixed structure / jetty from the shore with a gangway connecting to a floating pontoon at the head in the water. The estimated length is 60m plus. The extent of shallow water was estimated from Council's aerial photography and has not been accurately surveyed.

The *Port Stephens Foreshore Mgt Plan 2009* recommends a revetment crest height of 2.5m AHD in relation to foreshore armouring. This level could also be applied to the fixed jetty height at Casuarina Park as a minimum. Materials selection will determine the life of the structure (reinforced concrete 25 years plus, painted steel 10 to 20 years and timber 5 to 10 years - sourced from *Engineering Standards and Guidelines for Maritime Structures* by NSW Maritime dated March 2005). This level is more than adequate to ensure that the jetty will remain usable for the life span of any of these materials and for use until 2050 in the event of the worst case climate change scenario occurring. To accommodate the worst case scenario for 2100 the level should be set at 3m AHD which would extend the jetty by no more than 2 to 3m on his site.

Proposed boat launching accessway:

- Concrete ramp (nationally shown at 3m wide) or consider rock revetment contained within gabions with open weave rubber matting finish to allow for stable surface for pedestrian access with a porous finish laid at max slope 1V:6H. Not designed for vehicle traffic.
- To be built to accommodate current water levels and with capacity to be extended to accommodate projected worst case scenario levels as required (to the 2.5m contour). Future extension may require ground modelling at the land entry to the ramp for improved pedestrian access.

Proposed foreshore protection

- A small section of the foreshore is eroding in the area of the proposed jetty and boat launching accessway. This could be influenced by the lack of foreshore vegetation and offshore mangroves in the immediate vicinity, use as an informal boat launching site, the drainage from the adjacent stormwater outfall and the impacts of the rock groyne wall seaward of the eroded section. Further investigation is required to determine the influences on the erosion in this area in order to design the necessary mitigation works.
- The *Port Stephens Foreshore Mgt Plan 2009* recommends a loose porous rock revetment at a maximum gradient of 1V:2H to armour eroding foreshores.
- The Mgt Plan recommends a revetment crest height of 2.5m. As this level will require filling of the reserve to achieve that height it is recommended that Council provide armouring to the existing levels at the foreshore edge. As this treatment of loose rocks is flexible, the future armouring of the foreshore as sea levels rise can be considered within the context of addressing the whole foreshore of North Arm Cove.
- Detail engineering design is required to determine location, levels and construction techniques. Refer to Section 3 and Figures 3.1 to 3.4 in Report No. 3001144.013 by Umwelt dated July 2006 for details of recommended construction. A copy of this report is included in the Reference Document for the Foreshore Management Plan.

Proposed accessway / driveway and parking:

- Proposed to formalise (by sealing or stabilising) the vehicle access from Eastslope Way.
- A bay to the north of the existing accessway to be provided to allow reversing of vehicles towing small boat trailers in order to exit the reserve in a forward direction. The bay to be located to minimise the length of vehicle reversing required but to also maximise the area available for the picnic area and to minimise the trees to be removed.
- The access is to be provided to allow boats to be delivered to the site for permanent or temporary storage in the proposed boat racks. Boats can be carried from the proposed storage racks to the upgraded launch site.
- 90° angled parking is proposed on the road to accommodate boat trailers is not proposed. The parking area is to be formed by filling. A planted bank at slope 1:3 would extend into the reserve.
- The accessway is to be bollarded or fenced to prohibit vehicle entry to any other areas within the reserve.
- The accessway to be signposted at the entry from the road to limit use to one vehicle dropping off at any one time. Parking to be prohibited within the accessway / driveway. All parking to be on-road (Eastslope Way). To provide a two way roadway (6m wide) would necessitate the removal of several mature Eucalypts which seems unnecessary given the low level and type of expected use of the accessway.
- The accessway to be crowned to direct drainage to the adjacent grassed and planted areas and to avoid draining directly down the accessway to the foreshore and waterway.
- To accommodate disabled access to the jetty would require 50m of ramp @ 1:20 from the end of the accessway / driveway. The provision of such should be determined by the actual level of use and available funds.

Proposed stormwater management strategy:

- Proposed to provide a detention area at the existing outlet at Eastslope Way or sub surface detention cells to manage the stormwater and suspended pollutants.

- Proposed through ground modelling to divert stormwater flows from the accessway to the grassed and planted areas either side of the accessway.
- Stormwater engineering is required to assess the proposed strategy and to undertake detail design.
- Proposed to supplement and extend the planting on the foreshore and the bank behind to provide a planted buffer to further filter out stormwater pollutants before the drainage enters the waterway.

Proposed boat storage:

- Storage racks to be vertical due to space constraints on the lower level of the reserve. An area of 2m x 1m has been allowed on the plan per boat.
- Consider installation of a water outlet to assist with cleaning.

Existing vegetation:

- Some mature trees will require removal to implement the proposed design in the following locations:
 - To accommodate the boat launch accessway and jetty (2-3 Casuarinas)
 - To accommodate the reversing bay (1 Eucalypt and 3 Melaleuca)

Proposed plantings:

- As recommended in the *Port Stephens Foreshore Mgt Plan 2009* a buffer zone of vegetation is proposed adjacent to the foreshore to assist with foreshore stabilisation and filtering of stormwater before it enters the waterway. The planting to consist of indigenous trees, grasses and low shrubs. This foreshore planting to be fenced (in the manner of dune fencing) to halt boat storage under the trees.
- Extension of the existing screen planting along the side lot boundaries is proposed to screen the boating activities and other park activities from the neighbouring properties.
- Shrubby plantings are proposed to the fill bank to create the parking area for stabilisation of the bank and screening of the cars from the reserve.
- All proposed plantings are to be limited to native species indigenous to the area.

Existing Picnic Area:

- The existing area is to be retained as a picnic area. The area currently contains two table and bench units which should be sufficient to service the current needs of the community.
- The existing BBQ should be dismantled due to its derelict state (components such as the hot plate missing). A new unit to be provided within the picnic area. Consideration to be given to the fueling of the new unit. Wood fire BBQ's place local trees at risk. Gas or electric supply should be investigated within the context of existing reserve supply and ongoing maintenance requirements.

Existing Commemorative Garden:

- The gardens are to remain intact and continue their commemorative role.
- Plantings are to be limited to native species indigenous to the area.

Oyster leases:

- Existing accessways located through the oyster leases are not formal and are provided by the farmer.
- An unverified source indicates that the oyster lease offshore is current until 2017 and protected under the NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS).

- The strategy indicates that for an oyster lease to be classified as a priority oyster aquaculture area it should not be directly offshore from or within 50m either side of:
 - An area managed for public recreation
 - A public boat ramp or wharf
- The OISAS is due for revision next year according to its own triggers for review. It may be possible to request that the boundaries of the current lease be altered to accommodate the use of Casuarina Park as an area for public recreation and an area for public boat launching.

Aboriginal heritage:

- Heritage sites in the form of middens maybe present on the site. If discovered during construction works, works should halt immediately and the Local Aboriginal Land Council and NPWS contacted for direction.

Maintenance:

- Wrack should be left *in situ*. Removal of more than 20kg a day requires a permit from the Dept of Primary Industries. Wrack is important for fauna habitat and bank stabilisation.
- Use caution when using herbicides and pesticides near waterways. Use in accordance with EPA guidelines and manufacturer's directions.
- Maintain foreshore plantings intact for bank stabilisation. Recruit new trees to replace senescent plantings.

Date:	Amendments:
22.07.10	Printed for editing
26.07.10	Draft issue to client for review and feedback
10.08.10	Coloured and re-issued to client

Project:
**Proposed Foreshore Upgrade
Cove Gate Way (Casuarina
Park) East of Eastslope Way
North Arm Cove NSW**

Client:
Great Lakes Council

Sheet Title:
Landscape Concept Plan

Scale: Plan and Bar Scale @ 1:200 @ A1 sheet

Date: June 2010 (refer to amendments schedule)

Dwg no: 1002/2 sheet 1 of 1

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