Issues and Options Paper

Following are the main issues identified for Wagonga Inlet and some suggested management options. These were identified from a community questionnaire, discussions with members of the Estuary Management Committee, through the Estuary Processes Study and other documents relating to Wagonga Inlet. More information can be found in the following reports:

- *Wagonga Inlet Estuary Processes Study* (2000), Manly Hydraulics Laboratory
- *Investigations of Narooma Bar Improvements (2000),* Manly Hydraulics Laboratory
- *Wagonga Inlet Estuary Management Study Questionnaire Results (2000)*, Nelson Consulting
- *Wagonga Inlet Flooding Investigation (1999)*, Gary Blumberg and Associates, and
- Narooma Foreshore and Townscape Masterplan (1998), Conybeare and Partners.

Once we have received your feedback, preferred management options will be considered in more detail for inclusion in the Estuary Management Plan. A submission form is included at the end of this Paper.

1 Entrance Bar

The entrance bar is subject to natural changes in the littoral (along shore) drift regime associated with annual variability in the prevailing weather conditions. While it appears that the annual net littoral drift is very small, individual events can cause substantial transport of marine sediments.

Although entrance works resulted in the deepening of the entrance channel between the breakwaters and movement of the bar offshore, water depths over the bar are still relatively shallow. Under certain weather conditions navigation becomes hazardous, particularly when the south-east channel is shoaled.

Examination of accident records shows common factors, which include:

- that most accidents occur on an ebb (outgoing) tide and with an estimated swell wave height of 1.8 m or higher; and
- the vast majority of boats involved are recreational, not commercial vessels.

Suggested options to improve navigation include modification of the entrance channel breakwaters and training walls (eg extending the northern breakwater, removing the southern breakwater), dredging and improved hazard warning and management.

A preliminary review of these options found that, while very expensive, modifications to the entrance structures may achieve navigation improvements in the short-term (depending on sediment transport). However, the bar would return to a similar configuration as exists now in a relatively short space of time.

Although insufficient data is available to quantify sediment movement patterns and rates, dredging may improve bar conditions when the south-east channel becomes blocked for extended periods (as occurred in 1997).

Options to educate boaters and improve dissemination of information include compilation of data and analysis of tides, swell and weather to predict when the bar would become hazardous (this would involve the development of a computerised system); and dissemination of information by:

- broadcasts on boat radio frequencies and local radio; and
- digital display boards (similar to those used on freeways) at the boat launching ramp at Apex Park and in the entrance channel closer to the bar itself.

2 Shoaling

The main area of concern is the channel upstream of the Princes Highway Bridge, where shoaling restricts boat access into Forsters Bay and hence reduces utilisation of boating facilities available in the bay, eg marina, moorings and slipway.

Comparison of shoal locations, using digitised aerial photographs (1964 to 1997) and survey transects, indicates the following.

- The location of the shoals at Mill Bay have hardly changed, however, since 1971 there is some evidence of shoaling and a decrease in water depth on the northern side of the bay.
- Although the sewer crossing between Mill Bay and the bridge has had some minor local effects, impacts on overall sediment movement within the entrance channel are negligible.
- Upstream of the bridge there has been some shoaling of the channel.
- Although narrowing of the entrance to Forsters Bay at Shell Point has been raised by the community, the flood tide delta (see Figure 1) appears to be virtually unchanged, except near the eastern shoreline of the bay where there appears to have been some accumulation of sand.
- The sand flat near the NSW Fisheries building at Forsters Bay has expanded over the past 30 years, with some suggestion that the rate of expansion has increased in recent years.

Some of these changes can be confirmed, eg encroachment of the sand flat at the NSW Fisheries building such that the slipway is no longer serviceable. Removal of rocks and infrastructure from old oyster leases on the sand flats may have resulted in the release of some sediment that is continually being worked by the prevailing winds and currents.

However, more detailed monitoring would be required to quantify sediment movements in the channel and to assess the feasibility of dredging, together with environmental impacts and cost-benefits. A preliminary analysis of dredging the shallow points (see Figure 2) in the channel off Peters Point and closer to the bridge off Lavender Point was undertaken. This indicated that if 50,000 m^3 of material was removed, assuming an average transport rate of 30 m^3 per tide, it would take roughly two to five years for the channel to infill. Dredging could also potentially affect oyster leases adjacent to the western end of the channel.

It has also been suggested that the southern training wall be raised to stop erosion of the sand area it encloses and hence drift of sand into the entrance channel. From investigations, it appears that sand is redistributed over the sand area, rather than being eroded and deposited in the entrance channel. In addition, flow of water over the wall

represents only a small fraction of the tidal prism (ie volume of water moving into and out of Wagonga Inlet), therefore no benefits would be gained through raising the wall.

Options to address shoaling on the northern shore of Mill Bay include extension of wharves and jetties and selective dredging to maintain access to moorings.

3 Erosion and Sedimentation

Some erosion is apparent in the downstream reaches of Billa Bilba, Burrimbidgee and Punkally creeks, however, the cause of this is unclear.

In general, sedimentation of Wagonga Inlet is proceeding at a very low rate because of the relatively large area of the estuary and relatively small inflows. The major sediment sources are:

- from the catchment (fluvial sediments) which result in an increase in the deltas at the mouths of the creeks; and
- marine sediments which are deposited on the flood tide delta, resulting in a slow increase in the area of the delta on a geological time scale.

The rates of infilling of the whole estuary are particularly small and estimated to be less than 1 mm/year. This rate is typical of NSW estuaries. Analysis of aerial photography (1957, 1967 and 1994) indicates that rates of sediment delivery to the Punkally Creek delta are not exceptional when compared with similar data for relatively undisturbed South Coast estuaries. However, localised sedimentation in the upper reaches around Wagonga and Punkally Creek has been identified. Infrastructure associated with oyster leases near the major creeks may have resulted in increased accumulations and channel realignment in these areas.

4 Water Quality

Water quality within Wagonga Inlet is linked to a number of factors, in particular the rate at which water inflow from the catchment is exchanged with oceanic waters through the entrance. The rate at which this occurs is termed flushing and has a significant effect on the concentration of contaminants in the waterway.

Based on the limited data available, water quality in the estuary is generally good. However, there are some indications of localised nutrient enrichment in the form of epiphytic growth on seagrasses (ie increase in density of algae attached to seagrasses) and an indication that high chlorophyll-a concentrations may occur (chlorophyll-a is a measure of the abundance of phytoplankton, which are minute aquatic plants). It is not clear if this is typical of the natural system or if it has been accelerated in recent times.

Protection of the health of shellfish consumers and recreational swimmers is an important management issue for Wagonga Inlet. The limited available data on bacteria (consisting of thermotolerant coliform counts) is inadequate for assessing whether human pathogens are present in significant densities within the estuary.

Potential sources of pollutants include urban stormwater, sewer overflows, septic tank seepage and on-site sewage treatment, rural runoff and waste from boats and boat maintenance.

Community feedback indicated that Forsters Bay was the most affected by stormwater pollution. Localised stormwater inputs to Forsters Bay may contribute to excess nutrients. To identify and quantify nutrient inputs (together with other pollutant loads) it

would be necessary to undertake monitoring near onshore facilities and in the deeper water of the bay.

Options to reduce stormwater pollution include:

- installation of small wetlands/vegetated buffers to strip nutrients;
- installation of litter traps on stormwater drains; and
- education regarding the responsible use of fertilisers, erosion control etc.

A Stormwater Management Plan is currently being prepared by Council which includes the Forsters Bay area.

Blockages from tree roots, or electrical failures, have been the main causes of sewage overflows at Narooma. These overflows occur predominantly at manholes, but may also occur at sewer pumping stations (see Figure 2). Several strategies have been employed to minimise sewer overflows at Narooma, including pressure cleaning mains of tree roots, audits of pumping stations including pump drawdown tests, standby diesel pumps, and a radio telemetry warning system. These strategies have reduced discharge from sewer overflows to amounts that should not adversely affect the water quality of Wagonga Inlet in the long-term.

The town sewer currently extends just beyond the intersection of the Princes Highway and the Old Highway, approximately 1.5 km from the eastern edge of Ringlands Estate. The Estate was designed with larger lot sizes to facilitate the on-site treatment and disposal of effluent. Regular inspections of on-site disposal systems and monitoring will be necessary to ensure systems are working effectively. In the existing, serviced urban area all land near Wagonga Inlet has been developed. The Field Street area represents the only major serviced area with immediate development potential. Any expansion of the urban area, in the designated urban expansion zone to the south, would be dependent on the provision of services, including reticulated sewerage.

Disposal of galley waste and sewage from boats is catered for at Wagonga Inlet through provision of a privately owned boat pumpout at the Quarterdeck Marina. To increase awareness and use of this facility it could be included on boating and tourist maps, with the owner's agreement.

5 Flooding

Flooding was identified as an issue for the 'flat area' of Narooma (ie area adjoining the eastern foreshore of Forsters Bay). Based on an assessment of historical flooding, the area of most concern is the main drainage catchment from the oval and surrounding ridge line to the concrete-lined stormwater channel draining to Forsters Bay (adjacent to McMillan Road and Brice Street).

Flooding of the flat area is due to a combination of oceanic influences (eg tide levels, elevated ocean water levels due to coastal storms) and freshwater influences (ie intensity of rainfall in the catchment), rather than factors associated with the capacity or maintenance of the stormwater drainage system.

Options to reduce the impact of flooding in the flat area will be based on the flood levels determined by the Flood Study. These will focus on building and development controls and include a review of design floor levels for new developments or redevelopments.

6 Waterway Facilities

6.1 Boat mooring facilities

Tourism is important to Narooma, with the Eurobodalla Nature Coast Tourism Development Strategy listing Montague Island cruises as one of the five most appealing features of the Eurobodalla Coast. There are nine charter boats based at Narooma plus the Wagonga Princess which undertakes tours within the inlet.

As there is insufficient room at the Town Wharf, some operators moor at Fosters Bay or Mill Bay, which puts them at a disadvantage due to a lower customer profile and time and costs associated with travel between moorings and the Town Wharf. Extension of this wharf has been recommended in a number of reports. The following was put forward by the charter boat operators.

The wharf extension should be to the north-west and straddle the training wall and be of sufficient length to moor all of the large vessels currently on moorings, including the National Parks and Wildlife Service and Royal Volunteer Coastal Patrol vessels.

Contrary to this view, some community members suggested that Town Wharf should be available for public use, with charter vessels mooring elsewhere and using this facility as a pick-up and drop-off point.

The Department of Land and Water Conservation (DLWC) has indicated that any proposal to extend the Town Wharf should be subject to initial investigations to ensure that adequate water depth can be maintained without the need to undertake dredging.

In addition to charter boat accommodation, there are few mooring facilities east of the highway bridge for local and visiting vessels. The issuing of pole moorings to address this has been associated with displacement of sand along the foreshore due to propeller wash, and encroachment into navigation channels.

Suggested locations for development of a marina east of the bridge include the area in front of the public swimming pool (see Figure 1), Mill Bay and the old salmon trap, downstream of Mill Bay.

The Narooma Foreshore and Townscape Masterplan identified Mill Bay as a possible marina site, however, this was discounted due to size constraints, lack of water depth and potential impacts on sewer mains and seagrass beds. Similar issues were identified for the salmon trap.

6.2 Access and facilities for water-based recreational

The Waterways Working Group of the Estuary Management Committee investigated potential jetty sites around Wagonga Inlet and noted that private ownership of foreshore land, and in some cases proximity of oyster leases to the shore, precluded large areas of the shoreline from consideration. *In particular, access to the northern inlet shore is very constrained. Similarly, access to the upper reach (Punkally and Billa Bilba creeks) is so limited as to be beyond useful consideration for the present.* The Working Group identified other factors to be considered in jetty siting as including provision of vehicle access and landbased facilities (eg fish cleaning facilities, picnic tables, toilets).

From a review of 12 sites, five potential public jetty sites were identified and are shown on Figure 1. They are described below.

Ringlands Bay:

- site 1 - site of previous jetty with vehicle access restricted to the existing carpark at the picnic area; and
- site 2 - reconstruction of the existing jetty which is in a poor state of repair.

Ringlands Point to Hobbs Bay:

- site 3 - this site is useable but there are some minor land-based access difficulties;
- site 4 – Picnic Point is a good site but some negotiation with the oyster lessee(s) would be necessary; and
- site 5 – is on land owned by the Wagonga Local Aboriginal Land Council *but it is understood that a public jetty in this area would be welcome.*

The Narooma Foreshore and Townscape Masterplan contained a number of recommendations for improved foreshore facilities in and around Narooma. Those still to be implemented include completion of foreshore paths and the following.

Forsters Bay:

- low-key mangrove boardwalk and interpretive signage off Riverside Drive near the backpacker's accommodation; and
- south-west boat ramp – new jetty, fish cleaning table and formalising and sealing the carparking area.

Bar Rock area:

- widening and upgrading the existing wharf to allow for fishing and viewing, with a fish cleaning table to be installed to the south.

Further suggestions put forward by the community included:

- widening of the sailboat launching ramp near the NSW Fisheries building;
- improvements to the Town Wharf fish cleaning table and other fish cleaning facilities, including lighting and provision for disposal of fish offal; and
- provision of more barbecue and picnic facilities.

7 Mangroves and Seagrasses

Aerial photography (1957, 1967 and 1994) was used to compare the deltas at Billa Bilba and Punkally creeks. Limited mangrove development was noted in 1957, no mangroves were apparent in 1967 and there was extensive growth of mangroves in 1994. The absence of mangroves in 1967 is probably due to clearing or grazing, rather than changes in bed levels influencing the distribution of mangroves.

The distribution of seagrass beds recorded as part of the Estuary Processes Study was similar to previous studies, except:

- there appeared to be much less eelgrass on the sandflat to the west of Riverside Drive, thought due to shoaling which has raised the level of the sandflat, reducing the amount of suitable substratum for seagrass growth; and
- the seagrass beds on the sandflat behind the southern training wall appear to be smaller than in 1985 and 1980.

Clearing of mangroves and seagrass beds, and conversely the need for their protection were raised by the community. Mangroves contribute significantly to estuarine productivity as well as stabilising shorelines, while seagrasses are recognised for their importance as fish nurseries. Suggestions to protect foreshore vegetation and seagrass beds included:

- public education, so that their values would be appreciated; and
- providing for, and limiting foreshore activities to designated areas.

8 Other issues

Other issues related to the recognition and protection of cultural heritage sites and the need for improved management/control of power boating, dogs, oyster leases and recreational fishing. Although commercial fishing was raised as an issue by some respondents to the questionnaire, it should be noted that Wagonga Inlet is closed to professional fishing.

The bridge approach and access to Mill Bay were identified as needing improvement. The need to raise the bridge to allow larger vessels to access areas upstream was also indicated as an issue. These road and traffic issues will be noted in the Estuary Management Plan, however, considerations of options to address these is outside the scope of the Estuary Management Study.