

# Appendix E

## Dredging Plan for The Entrance

The following description of Wyong Council's dredging operations at The Entrance has been prepared from Worley Parsons (2009) – not verbatim.

## Description of the Proposed Works

### Proposed Dredging Works

The dredging is generally to be undertaken as per previous dredging campaigns of The Entrance Channel and is predominantly designed to enhance the ebb tide flow (out flow) from the estuary. The dredge strategy was developed following trial dredging investigations in 1991 and has been refined following annual maintenance dredging that has been carried out in The Entrance Channel since 1993. The current strategy involves staged dredging by Council using a small (10/8) cutter suction dredger (CSD). The typical arrangement of the dredge footprint covers approximately 2.5km of channels and sumps within The Entrance System.

Dredging commences from the upstream end of the channels such that the ebb flows contribute to the dredging efforts. The channels are typically dredged to a width of 50m and to a level of 2.0m below water level except as noted below. Water level in the lake is approximately 0.06m above Australian Height Datum (AHD) in the vicinity of The Entrance which is roughly equivalent to mean sea level. The surveys indicate that much of the proposed dredge footprint will require dredging in the next few years.

Dredging is generally undertaken as follows:

- creation of a sediment trap (sump) across the main entrance parallel and adjacent to the eastern side of the road bridge. The low velocity environment created by the dredged sediment trap causes deposition of sands migrating with the flood tide, prolonging the timeframe required between maintenance dredging episodes and reducing the need to dredge channels upstream of the bridge. The sump adjacent to the bridge has previously been dredged to approximately 30m in width in the vicinity of Yellawa Island. However, it is proposed to exclude from the dredge footprint that portion of the sump immediately to the west of Yellawa Island to reduce any risk of foreshore erosion to Yellawa Island.
- dredging the main channel to the east of the road bridge on a yearly basis.
- dredging the ebb dominant northern channel (between the road bridge and the caravan park). This section of channel is dredged approximately every two years.
- dredging the ebb dominant northern channel from the caravan park, downstream through the middle of the flood tide shoal to the mouth of the estuary. This channel is dredged to a width of approximately 80m. The southern tip of the sand spit is also dredged. Dredging is undertaken yearly in these areas.
- Additional dredging is also undertaken on an 'as required' basis:
- dredging of Terilbah Channel, from the northern end of Terilbah Island, approximately parallel to Stewart St, downstream to the road bridge. Terilbah Channel has been dredged three times since dredging began in 1993 and was last dredged in 2008 – as at 2009.
- Occasional dredging of a sump, perpendicular to and south of the main channel, just to the west of the sand spit.

- Dredging of the main channel to the west of the road bridge to a width of approximately 80m. This area was significantly dredged in 1993 and was last dredged in 1995 – as at 2009. The area has progressively become shallower and is likely to require dredging in 2010 (as at 2009) to allow flushing of the ebb tide into The Entrance Channel.
- Dredging of a flood dominant southern channel (to 1.0 m below water level) along the southern foreshore of The Entrance Channel.

### Production Rates and Quantities

Council's dredge was built to specification based on dredging trials undertaken in March/April 1991. The trials indicated that effective maintenance of The Entrance Channel would require a dredge capable of removing 60,000m<sup>3</sup> of material over a 12 weeks period.

Dredge quantities are available from the 2004 campaign. These records indicate that 81,300m<sup>3</sup> (132,800t) of material was dredged from The Entrance Channel. Council's dredge crew have indicated that these records are typical of quantities dredged on a yearly basis over approximately a 3 to 4 months dredging campaign.

Dredging production rates of ≈105 m<sup>3</sup>/hr (170 t/hr) are generally achieved by the CSD. Slower rates are expected during dredging of the sump and in the vicinity of the ebb tide channel between the bridge and the caravan park due to the presence of old bridge supports and old Telecom cables within the channel. Similarly, dredging of the main channel downstream of the caravan park is often slowed due to the presence of fishermen and anchored boats within the channel.

### Proposed Beach Nourishment

Dredged sand is beneficially reused to nourish areas where, through visual inspection, it is determined that maximum environmental benefit to the dune system and beach amenity would result. Council aims to nourish beaches and foreshores to:

- renourish and protect dunes and foreshore areas and subsequently the ecosystems of these areas;
- protect the recreational value of the beaches as areas of public recreation; and
- Retain sand as mobile beach sand circulating within The Entrance sand system and prevent a net reduction of sand from the system over time. This is necessary to maintain the sand spit, The Entrance sand bar and flood tide shoals which are the natural control on lake levels and which provide natural protection of upstream areas from ocean storms.
- North Entrance Beach is nourished during each dredging campaign. The beach profile experiences erosion during significant storm events which can undermine the vegetated dunes.

Approximately 50,000m<sup>3</sup> of dredged sand is deposited on North Entrance Beach (as indicated by 2004 records). Placement to the south of a null point in the general vicinity of Hargraves St ensures that the sand is reworked back towards The Entrance Channel, thereby retaining sand within The Entrance sand system.

The estuary eastern beach is renourished on a regular basis. 'Recently', a small sand spur was also placed in the vicinity of the boundary of Karagi Foreshore Park and the Dunleith Caravan Park.

The (South) Entrance Beach is renourished on a less frequent basis. Nourishment has been undertaken approximately every five years (1994, 1999, and 2004). Approximately 30,000m<sup>3</sup> of dredged sand was placed on The Entrance Beach in 2004. Nourishment generally takes place only following representations from the Surf Club. Council consider that the area is too dynamic for sand to remain in place for any considerable length of time. The nourishment process is often slower than that of adjacent beaches as a result of regular disruption to the floating discharge pipeline during strong flood tides through the throat of The Entrance Channel or due to wave action across the rock platform to the north of The Entrance Beach.

Dredged sand is pumped from the CSD to the nourishment areas along a temporary submerged discharge pipeline. A permanent pipeline is also buried within the dune system and exits onto North Entrance Beach. The maximum pumping distance from the CSD to any nourishment area is 800m. No booster pump is used. Sand dredged from upstream of the road bridge is therefore limited to placement on the estuary eastern beach. Dredged sand from the sump and from the ebb tide channel between the bridge and the caravan park is deposited on the estuary eastern beach, whereas sand dredged further downstream, from the main channel and from the flood dominant southern channel is pumped to North Entrance Beach or occasionally, The (South) Entrance Beach.

To minimise localised erosion at the discharge location, the dredged sand is sprayed upwards to dissipate energy. This is undertaken from an elevated pipeline outlet onto the sub-aerial (above water) profile of the beach, below the edge of the erosion scarp where possible.

The throat is that section of the channel near the southern tip of the sand spit having minimum cross-section dimensions.