



# CURL CURL LAGOON COMMITTEE

## Dredging Studies

Information Bulletin No. 1

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### Introduction

by Ken Higgs

This is our first Informative Bulletin, and it concentrates on the dredging proposal and past and present studies. We are hoping to produce these more detailed Bulletins to accompany the newsletter whenever necessary. The next one is expected to concentrate on water quality and other aspects. We are relying on YOU to contribute articles to make these Bulletins and the Newsletter, a success.

"My dream is to get it clean"  
K-J. Woods,  
Fresh Water Video

### Previous Studies

a short summary by Ken Higgs

Over the last 15 years there have been a number of studies of Curl Curl Lagoon (Called Harbord Lagoon until c1980), and these have been summarized in the following reports.

**Environmental Investigation of Narrabeen, Dee Why and Harbord Lagoon**, by State Pollution Control Commission, February 1978. This is a general study of the three lagoons which reviews activities and developments that affect their environment. Information on Harbord Lagoon is limited, but includes a short description of the lagoon and catchment and a summary of its history from the 1950's to the 1970's.

**Harbord Lagoon, A preliminary Investigation of Proposed Rehabilitation Measures**, by UNSW Water Research Laboratory, Technical Report No. 76/3, February 1976. This was a preliminary study to examine options such as dredging and the construction of a weir to maintain a water level high enough to cover the mud flats without increasing the flood risk. It recommended the dredging option be investigated further and a small scale trial dredging be carried out to determine the feasibility. The report also includes a

contour map of the lagoon area, details of subsurface rock levels near the lagoon entrance, a preliminary analysis of floods and descriptions and size gradings of core samples taken from the bed of the lagoon.

**Harbord Lagoon, Effects of Dredging on Water Quality**, by UNSW Water Research Laboratory, Technical Report No. 78/5, May 1978. This report presented the results of a water quality monitoring study carried out during trial dredging of the Lagoon in February 1978. It concluded that dredging increased turbidity and nutrient concentrations and reduced the dissolved oxygen level, but that the likely long term benefits would outweigh these short term problems. The report also includes descriptions and size gradings for additional core samples taken from the bed of the lagoon.

**Curl Curl Lagoon, Methods of Improving Water Quality**, by UNSW Water Research Laboratory, Technical Report No. 81/5, May 1981. This report presented the results of further studies into the feasibility of dredging the lagoon and also installing a pumped sea-water flushing system to improve water quality. It recommended dredging approximately 2m of material from the bed. It was suggested that the only practical and cost effective method of disposal of the dredge material was to pump it into the ocean east of North Curl Curl pool. The proposal was not adopted due to the high cost and public opposition to the proposed disposal method. The report also contains the results of a number of subsidiary studies including a species list, analysis of leachate in water samples from 19 boreholes, heavy metal content of lagoon mud and a trial dumping of lagoon mud into the ocean.

While all of these reports are somewhat out of date, they do contain valuable data and discussion on technical aspects of the lagoon, such as the dredging proposal. All members who are interested in the well being of the lagoon should treat them as essential background reading.

"If no action is taken, the lagoon could become a dead body of water",  
WRL Technical Report No. 81/5,  
May 1981

## The 1981 Dredging Proposal

a short summary by Ken Higgs

The 1981 report by the UNSW Water Research Laboratory, recommended dredging the lagoon to improve its visual appeal and as a first stage to improving the water quality. It was pointed out that dredging alone was unlikely to result in satisfactory water quality, since pollutants from storm-water drains and leachate from the landfill areas could still enter the lagoon. However, it was anticipated that it would result in worthwhile improvement.

The present bed level of the lagoon is generally about RL 1m AHD (approximately high tide level). The report recommended dredging the lagoon bed to RL -1m AHD (approximately low tide level) which would leave a reasonably sandy bed. It was estimated that 30% of the dredged material would be black silt and mud and 70% sand and clay. The area of the lagoon is approximately 60,000 square metres so dredging 2m from the entire area would involve removing 120,000 cubic metres, consisting of about 36,000 cubic metres of black mud and 84,000 cubic metres of sand and clay. An alternative scheme was to dredge only 90,000 cubic metres and leave a 200m by 20m island with a crest at RL 2m AHD.

The report estimated that the lagoon would continue to silt up at a rate of about 4mm per year. At this rate, maintenance dredging would not be required for a considerable time.

The dredging of the lagoon is not technically difficult, but disposal of the material does present problems. The 1981 report recommended pumping it into the sea. It was shown that the fine mud and silt would rapidly disappear offshore and any sand content would assist in protecting the beaches from erosion during storms. However, there was widespread opposition to this method of disposal.

In 1981 WSC costed the dredging and ocean disposal at \$6 per cubic metre, giving a total cost of \$720,000 for the full dredging, or \$540,000 for dredging with the island. WSC indicated that it did not have sufficient funds to support such an expensive project. Enquires made by CCLC at the time located a number of dredge contractors who were prepared to undertake the project for significantly less than \$6 per cubic metre, but WSC staff expressed no interest in following these up, since there would still be insufficient funds even at the lower price.

The Curl Curl Lagoon Committee supported the dredging proposal but was opposed to leaving an island and to ocean disposal. At that time all alternative disposal methods that were suggested were expected to cost more than ocean disposal, so since sufficient funds were unlikely to become available, the proposal was dropped.

"It is possible the stage may be reached in the near future where all life in and on the lagoon will die out", WRL Technical Report No. 81/5, May 1981

## The Argument for Dredging the Lagoon

by Des Dunstan

Prior to development within the Curl Curl Lagoon catchment area, the bed of the lagoon comprised clean white sand. Siltation accompanying urban development and runoff has now covered the lagoon bed with a layer of black organic mud approximately 0.5 metres thick. The bed is now at an elevated level approximately 1 metre above mean sea level. Consequently, when the sand bar at the mouth is breached following heavy rain, the lagoon drains out exposing mud flats, debris and rubbish. Apart from being visually unattractive, the mud releases offensive hydrogen sulphide (rotten egg gas).

The WRL advised that to improve the water quality and restore permanent water, it would be necessary to remove the upper layer of silt and underlying sand to a depth of 2 metres. The likely benefits would be the re-establishment of a "more balanced bottom flora in the lagoon and hence a better variety of fish life" (WRL Technical Report 78/5, May 1978).

Curl Curl Lagoon is a focal point of the area, but this irreplaceable regional asset will be lost unless rehabilitated by dredging. In its present condition, when drained, it represents, possibly the biggest eyesore in the shire. Examples of successful dredging can be seen by inspecting Horse Shoe Cove, Crystal Bay or Crescent Bay in Pittwater. These were practically dry at low tide but improvements to both the aquatic environment and adjacent property values have resulted from controlled dredging.

Whilst other waterway areas within the shire require dredging, the need is greatest at Curl Curl Lagoon. Aesthetically the lagoon, when empty, is visually unattractive and the water quality is unacceptable. The anaerobic black mud must be removed and permanent water provided by dredging within the lagoon and channel.

"The creek goes fluorescent-green, blue and purple",  
Louise Jones  
Fresh Water Video

## A Current Dredging Proposal

by Des Dunstan

In view of the high cost and possible objections to ocean disposal, an alternative and less expensive dredge disposal proposal is submitted. This involves pumping the bed material to settlement ponds constructed on the grassed sand-dune area on the ocean side of Griffin Road and the southern side of the entrance channel. This area appears to have been filled with garbage, but it now seems to be inert and should not constitute a problem for disposal of dredge material.

For dredge flotation purposes, the entrance would need to be closed prior to the approximately 6 month dredging period. The bed material would be pumped to the disposal site. A number of settlement ponds would be constructed and filled progressively. They would be covered with sand as soon as possible to reduce risks.

This proposal has been discussed with a local dredging contractor who costed the setting up and dismantling of the dredge and pipelines, construction of settlement ponds, dredging and back-filling, at \$400,000. It has also been discussed with council and is expected to be examined in more detail in the near future.

"Its not clean, not by a long shot",  
Daniel DeVries,  
Fresh Water Video

### Other Dredging and Disposal Options

comments for discussion, by Ken Higgs.

The 1981 dredging proposal and the "Dunstan" proposal are not the only options that should be considered. The CCLC and council must examine these proposals and all alternatives in order to find practical and cost effective solutions. It must also decide what benefits it expects from the dredging. For example, it would be possible to remove less than 120,000 cubic metres, so as to reduce the cost and simplify the disposal problem. Benefits would be reduced, but perhaps any improvement is better than none. Removal of as little as 20,000 cubic metres of material would improve the appearance of the lagoon and ensure a more permanent water cover, but 60,000 cubic metres would also remove most of the undesirable black mud.

In 1981 the CCLC was opposed to the construction of an island in the centre of the lagoon. Perhaps this should be reconsidered since it significantly reduces the cost and the disposal problem and leaves a sanctuary for birds.

Costing of any dredging and disposal proposal is very dependent on the nature of the bed material. The black mud is smelly, very fine, and contains pollutants and rotting organic matter. It is difficult and expensive to transport and dispose of since it can cause environmental impacts at the disposal site. The sand and clay below it is cleaner, and is also easier to handle and transport. It could probably be used as a fill material so is not so difficult to dispose of. However, since the mud is in a layer about 0.5m thick, it is difficult to remove without spoiling the cleaner material below. It may be possible to recover a higher percentage of useful material by dredging a deep trench and later pushing the black mud into it, but this leaves the lagoon in a less desirable state.

The dredging itself is not the big problem. The problem is to find an acceptable disposal site and a cost effective way of moving the dredge material to it. However, the dredging method does affect the proportion of usable fill that can be recovered.

One suggestion is that some of the dredge material could be disposed of in the area behind the North Curl Curl sand dunes. This is not the ideal solution but may turn out to be the only affordable option. There is unlikely to be sufficient room to dump 120,000 cubic metres there, but it could be used as a rehandling area where the dredge material could drain and dry out. The usable material could then be trucked away and the remainder buried.

"The creek was really trashed. We thought, *this can't go into Curl Curl Lagoon*",  
Louise Jones,  
Fresh Water Video

### The Present Curl Curl Rehabilitation Study

by Heather Nelson (WSC)

A rehabilitation study for Curl Curl Lagoon is currently underway, jointly funded by Warringah Shire Council and the State Public Works Department, under the Estuary Restoration Works Program. The program is aimed at assisting Councils to carry out studies and works primarily within the tidal limit of lagoons and estuaries. The cost of the study, which is due for completion in early 1992, is \$63,500.

Council provided funds in the 1991 estimates for the study, however, it could not proceed until the grant funding was made available in May. After notification of the grant, a brief was prepared and forwarded to four selected consultants.

The objectives of the study as noted in the brief are to:-

1. Improve lagoon water quality and habitat to promote a suitable environment for water birds, fish and crustaceans, and hence create an attractive area for passive recreation, including recreational fishing.
2. Reduce the input of pollutants to the lagoon by mitigating, controlling and/or treating pollutants before stormwaters are discharged into the lagoon.

The four consultants proposals were assessed on aspects including technical detail, planning considerations and community involvement. On the 20th August, Council resolved to commission Patterson Britton, in association with Land Systems EBC and Dames & Moore to undertake the study.

Since that time discussions have been held by Council between the consultancy team, Curl Curl Lagoon Committee and Freshwater High School. Both the Committee and High School have provided valuable historical, general and ecological information on Greendale Creek and the Lagoon, as well as an insight into community concerns.

Site investigations for the study have also commenced and include; ground water and sediment sampling, and geotechnical investigations. These site investigations are primarily aimed at collecting information for analysis to determine the relative contribution of leachate to pollution of the lagoon, compared to inputs from stormwater. Until this is determined, options for rehabilitation of the Lagoon cannot be assessed.

Options, or combinations of options to be considered include; stormwater pollution mitigation devices such as gross pollutant traps, stormwater treatment ponds and wetlands; dredging the Lagoon bed; and possible containment of leachate material from previous fill sites surrounding the Lagoon.

Rehabilitation options will be assessed with regard to aspects including; visual characteristics, areas requiring protection, ecologically sensitive areas, site servicing problems, micro-climate problems, leachate areas, land ownership and zoning.

Options will be discussed with the Curl Curl Lagoon Committee and the groups which utilise the lagoon surrounds. From these discussions, a preferred option will be determined for further investigation.

The study will culminate in the preparation of final documentation to development application stage. This will enable concept plans to be displayed to the wider public for comment.

The study will also include cost estimates which will enable Council to prepare detailed submissions for further grant funding to implement rehabilitation

works.

"There used to be abundant wildlife.  
Now you are lucky  
to see an eel alive.",  
Lee Hitchenson,  
Fresh Water Video

## Meeting with the Consultants

Summary by Thelma Hobday

At 2:30pm on Thursday 5th September, at North Curl Surf Club, members of the CCLC met staff from WSC, PWD, Patterson & Britton, Dames & Moore and Land Systems. The meeting progressed in a very positive manner with a number of speakers, including CCLC chairman Des Dunstan putting forward his dredging proposal (see earlier article).

The group gave our committee a long and thorough hearing with all points given consideration. The knowledge of Des Dunstan, a marine biologist who worked for many years for the Department of Fisheries, greatly assisted the meeting. Alan Newton, who has extensive knowledge of the lagoon and its history, and Ken Higgs from the UNSW Water Research Laboratory, who gave information on past reports, were also very helpful.

All questions put forward by CCLC members were put to the group and discussed. Answers are available for those who are interested.

Following the meeting the group walked around the lagoon and inspected the area suggested for dredge disposal. The group were advised that test holes would be dug to assess the underlying material and groundwater pollution levels.

From a personal point of view I must say that it is wonderful to see some action taking place after so many years of waiting. There is of course a long road ahead but let us hope that something positive will eventuate.

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Edited by Ken Higgs