

Lake Conjola Entrance Management Plan

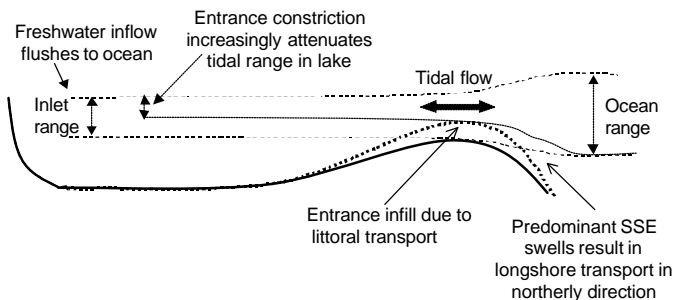
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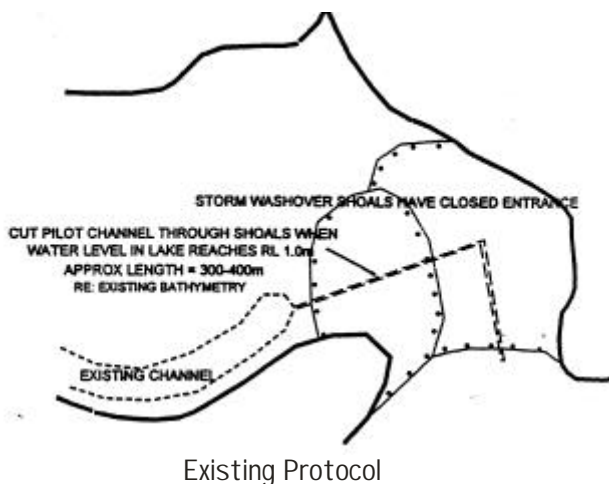
Shoalhaven City Council has commissioned Manly Hydraulics Laboratory (MHL) to develop an Entrance Management Plan for Lake Conjola.

Background

The entrance of Lake Conjola is generally open, although the entrance channel shifts in response to ocean conditions and floods. However, since 1937 the entrance has closed off completely eight times, and these closures have often lasted for several years. Over the last 62 years, the entrance has been closed for 9½ years, open for 38½ years and heavily shoaled for 14 years (cumulative durations). Typical estuarine processes are depicted in the following diagram.

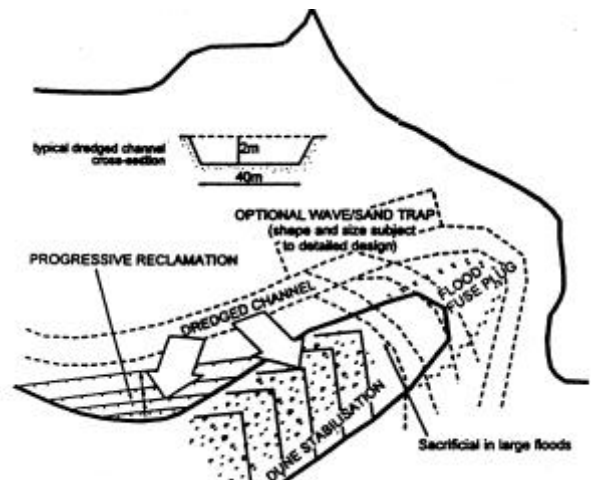


Shoalhaven City Council has a policy of reopening the closed lake to relieve flooding and water quality concerns by excavating a short pilot channel across the closure spit when water levels reach RL 1.0m AHD.



Existing Protocol

The Lake Conjola Entrance Study, undertaken in 1999, defined six options to maintain a sustainable open entrance. A *preferred option* of a 'Managed Entrance' was subsequently adopted by Council.



- Stabilise entrance spit to reduce storm washover
- Monitor entrance conditions
- Maintain fuse plug at northern tip of spit to suit flood flows (1.0-1.5 m AHD)
- When close to closure according to a new Entrance Management Policy, dredge new channel along path of historic flood cuts to substantial dimensions, i.e. 40m x 2m deep

Managed Entrance

A formal Entrance Management Plan is now required to enable effective implementation and ongoing operation of the new strategy. The Managed Entrance will include implementation, at the appropriate time, of works to maintain a viable lake entrance. The works are:

- Excavating a substantial channel approximately south to north across the inner sand flats, leading to the northern entrance throat.
- Building up of the entrance spit to a level (approx RL 7.0 m AHD) above wave run up in order to limit coastal storm washover effects.

Prior to implementation of the Management Plan interim works have been undertaken to avoid entrance closure, by dredging a small channel and raising the spit to a height of approximately 3.5 m AHD.

Who is preparing the Plan?

The Entrance Management Plan is being prepared by the NSW Department of Public Works and Services' **Manly Hydraulics Laboratory** (MHL). MHL has been a specialist problem solver in the area of water, coastal and environmental engineering for over 40 years, making use of physical models, mathematical models and field data collection. MHL has completed numerous estuary investigations, estuary management studies and management plans and has conducted sediment, hydrodynamic and water quality monitoring and modelling programmes on most of the major estuaries in NSW. MHL operates water level recorders at a large number of estuaries and Waverider buoys at seven sites along the NSW coast. MHL operates the rainfall and water level recorder at Lake Conjola which assists SES, Council and DLWC personnel to make management decisions related to reduction of flood hazard and water quality.

Sections dealing with biological issues, particularly aquatic ecology, will be prepared by The Ecology Lab (TEL). TEL is an Australian-owned and operated environmental consulting firm specialising in aquatic habitats and biota since 1985. In the last five years TEL has completed over 25 studies involving assessments of aquatic habitats and biota in relation to proposed engineering works.

What will be in the Plan?

The Plan will include:

- a comprehensive description of the physical processes determining the state of the entrance, particularly the influence of storm events
- the actions required and their timing to maintain a sustainable entrance
- definition of the flow criteria signalling imminent closure which will trigger initiation of the works
- specification of the monitoring data to be used to describe the processes affecting entrance behaviour
- a Review of Environmental Factors (REF) to allow the works to be approved and initiated without delay
- a decision support system which will evaluate the state of the entrance and trigger initiation of the works

- a commitment document to ensure sustained commitment to maintenance of an open entrance
- identification of the appropriate source of funding and documentation of the procedure for accessing funding for the works at the appropriate time and for funding the ongoing decision support system
- the conceptual configuration of the substantial channel from south to north across the inner sand flats and the configuration to build the entrance spit up to approximately RL 7.0m AHD
- the most effective methodology for dredging the channel and transportation and placement of sand to the spit taking into account the cost, environmental impacts and plant availability and mobilisation requirements of various methods
- a cost estimate for the works
- definition of the required contract documentation and the procedure for calling and assessing tenders - preparation of such documentation is not part of this project.

The Plan will take into account:

- environmental constraints, particularly migratory bird nestings
- beach access, recreational amenity and aesthetics
- future maintenance
- the *Caulerpa taxifolia* infestation
- the active erosion of vegetated high dunes in the south-east corner of the lake
- boating access to the launching ramp at Cunjurong Point.

The Review of Environmental Factors

The REF will define any environmental constraints to be accommodated in the Plan and expedite the environmental approval process. The REF will be designed to satisfy the requirements of the *Environmental Planning and Assessment Act 1997* and avoid the need for a full rigorous assessment each time it is proposed to carry out works. All relevant bodies will be identified and consulted with the aim of streamlining the process required at the time of initiating entrance works. This will include identifying bodies from which approvals or licences will be required and proposing standard conditions of approval where appropriate.

While some parts of the REF will remain applicable over a long period of time it is likely that some parts will require updating at the time dredging and related activities are undertaken to address the environmental conditions at the time. These parts will be flagged and a brief description of the work likely to be required will be included.

The decision support system

An important component of managing the entrance is a decision support system to analyse the information showing the degree of constriction of the entrance and to signal the onset of triggering conditions for initiation of the planned maintenance procedures.

The decision support system will take two forms:

- a written work plan document
- an information management system.

The work plan will outline the actions to be undertaken, under what conditions, and by whom. The information management system will comprise:

- monitoring of the condition of the entrance and environmental data required to identify the trigger conditions
- the input of the information to a 'predictive model' which will signal the onset, or otherwise, of triggering conditions and lead to initiation of entrance maintenance procedures.

The system will rely on environmental data from the MHL water level recorders in the Lake Conjola entrance and in Jervis Bay, data from the MHL Waverider buoys located off the NSW coast at Batemans Bay, Port Kembla and Sydney, the MHL rain gauge at Lake Conjola and analysis of the occurrence pattern of significant coastal storm events.

The system will carry out a running analysis over a suitable period of the Lake Conjola tidal range compared to the Jervis Bay tidal range (representing the ocean tidal range) to provide an estimate of entrance constriction. When the entrance has reached a condition where closure is becoming likely the probability of a critical ocean storm will be combined with the indicators of entrance state to determine when the threshold conditions to trigger actions in the management plan have been reached.

The commitment document

In contrast to most entrances, which are predominantly closed and require opening soon after heavy rainfall or a decline in water quality, the entrance to Lake Conjola is predominantly open. Closure can be anticipated well in advance with appropriate monitoring of key indicators.

An agreed set of procedures between Council, government agencies and the community will be prepared to ensure sustained commitment to the maintenance of an open entrance. A document will be prepared that summarises, in point form:

- the main benefits of maintaining an open entrance
- the main physical processes involved
- the implications for water quality and ecological processes
- the actions/strategy required, and by whom, to maintain the open entrance
- the areas of responsibility of Council and government agencies relevant to the Entrance Management Plan
- the required funding and funding sources to implement the Plan
- implication for the operation of the plan if various elements of the strategy are not implemented.

This document will be submitted to Council and relevant government agencies for their comment, revision and ultimate endorsement.

The document will be held by Council and will be made available to the general public and relevant government agencies. To ensure the Plan operation remains in the minds of stakeholders, Council will produce an annual report on the operation of the Plan, using a template provided with the document. This annual report would be submitted to stakeholders with a response form to be returned by stakeholders covering, inter alia, any non-conformance with the endorsed actions/strategy set out in the document.

Community Education

The proposed change in approach to entrance management is quite significant and community education will be an important part of the entrance plan.

Elements of the education package are:

- two newsletters
- presentation of the draft report at a public meeting
- a public 'Lake Conjola Entrance' website.

The second newsletter will outline the main findings of the study, listing the broad actions to be taken to maintain the entrance.

A public access web page containing general material for educational purposes is being set up. It will be updated after each meeting with the technical sub-committee.

Where are we at?

The project has started on several fronts and the first meeting with the Technical Sub-Committee has been held. The Plan, REF and development of the decision support system are underway and letters have been sent to government agencies seeking comments. The information website is accessible at:

<http://marlin.mhl.nsw.gov.au/www/lconj.html>

For more information

Contact Bob Cook at Manly Hydraulics Laboratory by email at rbcook@mhl.nsw.gov.au or have a look at the website.



Lake Conjola entrance area 1993
entrance open



Lake Conjola entrance area 1997
entrance closed