

Lake Cathie

Frequently asked questions

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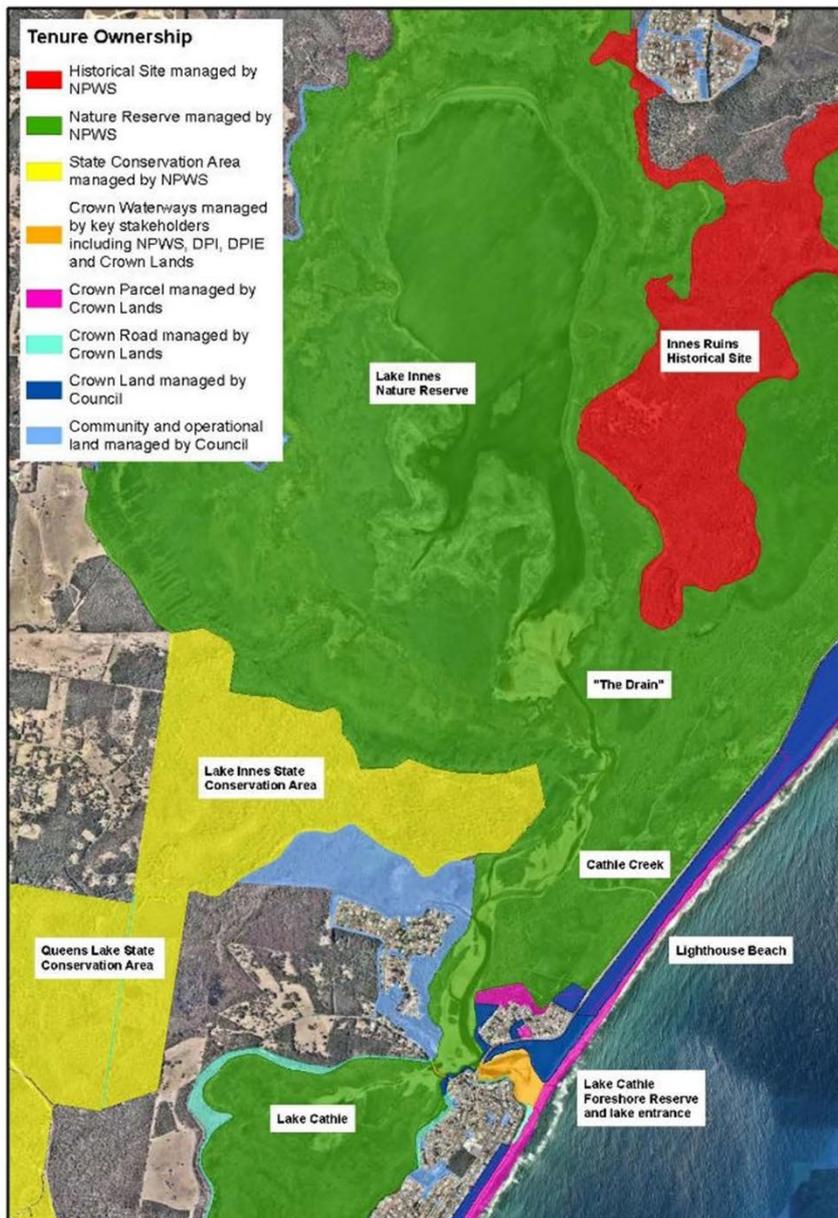
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Who is responsible for Lake Cathie?

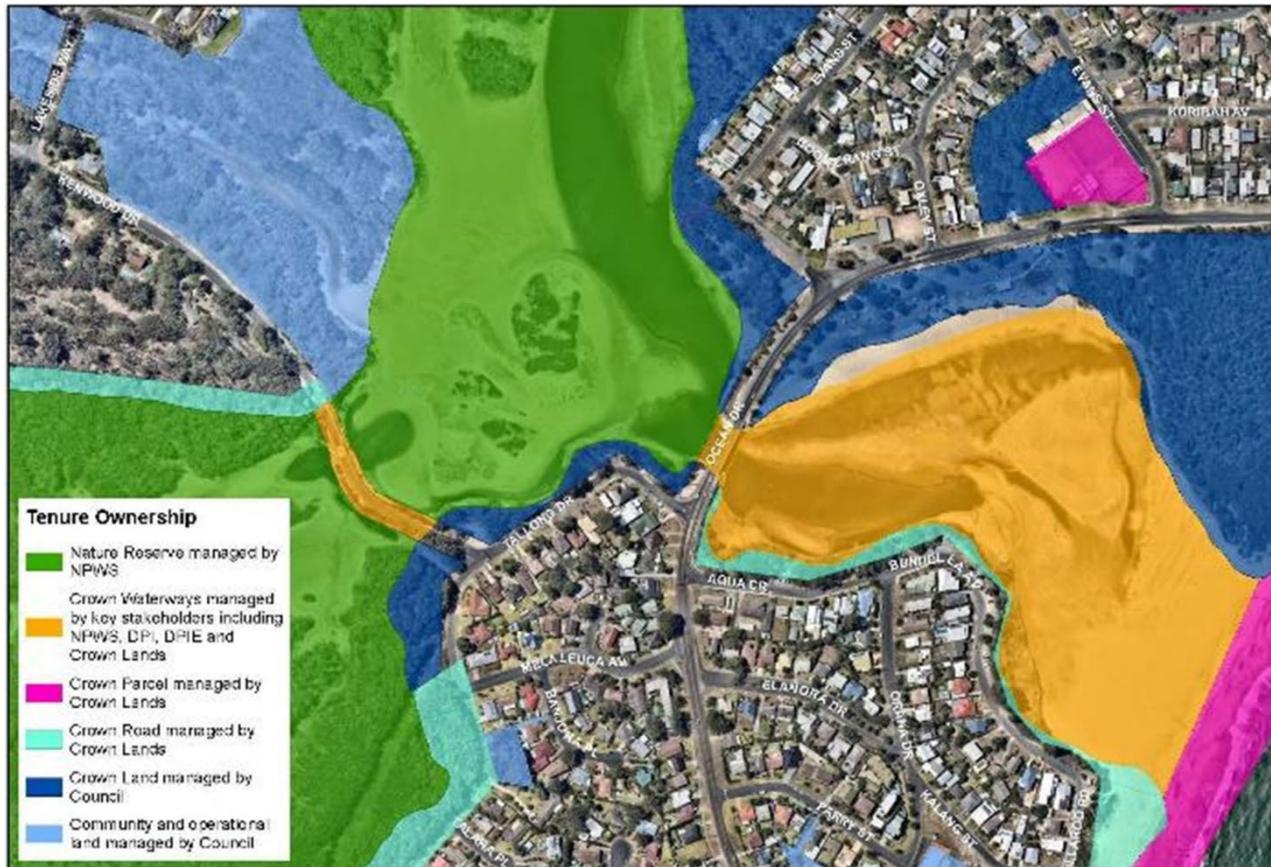
Council resolved on 20 May 2020 to write to the Minister for Water, Property and Housing the Honourable Melinda Pavey MP to confirm that Council's ongoing physical responsibilities for the management of the Crown owned Lake Cathie waterbody are strictly limited to the responsibilities of flood mitigation, stormwater drainage and community protection only.

Any actions outside of this scope (including public health issues and complaints about water quality, odour, colour, mosquitoes, fish kills, fish health, ecology of the waterway, salinity, acid sulphate soils, pollution, water safety and the like) will be directed to the NSW Department of Planning, Industry and Environment - Crown Lands as the owner of the waterbody.

This map provides a visual overview of the land tenure responsibilities for Lake Cathie, Lake Innes and surrounding lands.



The following map provides a detailed view of land tenure within the Lake Cathie Lagoon and respective responsibilities.



What is an REF?

A Review of Environmental Factors (REF) is an environmental assessment undertaken in accordance with Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). A REF is required when a public authority undertakes an activity or development that does not require development consent.

A REF examines the significance of likely environmental impacts of a proposal and the measures required to mitigate any adverse impacts to the environment.

A REF serves two purposes:

1. It documents whether an activity should be undertaken, taking into account matters affecting or likely to affect the environment.
2. It assists in determining whether the activity is likely to have a significant effect on the environment or significantly affect threatened species, populations or ecological communities or their habitats.

If the REF determines that a significant impact is likely, an Environmental Impact Statement (EIS) and/or Species Impact Statement (SIS) will need to be prepared before approval may be granted.

A REF precedes the granting of an approval (i.e. lease, licence, and easement) for an activity. An approval cannot be granted until the REF is determined.

Who can undertake an REF?

REFs are prepared by Public Authorities such as Councils when they want to undertake works. Alternatively, the proponent may engage a consultant, or consultants, to prepare a REF on their behalf.

The REF is determined by the public authority (Council) when the activity has been examined and it has been taken into account to the fullest extent possible all matters likely to affect the environment. If it does not have significant environmental impacts, it can proceed.

What is an EIS?

An Environmental Impact Statement (EIS) is another form of environmental assessment.

An EIS also examines the significance of likely environmental impacts of a proposal and the measures required to mitigate any adverse impacts to the environment.

Similar to a REF, an EIS is a higher-level assessment used to inform development consent decisions as it provides information on a project, including its environmental impacts and avoidance, mitigation and offset measures.

An EIS differs from a REF in that it can be prepared by a Council, developer, or anyone wishing to undertake works.

Generally, an EIS accompanies a Development Application (DA), which is then submitted, to Council for assessment. The EIS aims to enable decision makers to understand the environmental consequences of a proposed development.

The EIS must include sufficient information to ensure that all environmental, social and economic impacts associated with the proposal have been identified and assessed, and any adverse impacts are avoided, minimised, mitigated or as a last resort, offset.

The EIS generally involves a higher level of assessment than an REF and must include sufficient information to ensure that all environmental, social and economic impacts associated with the proposal have been identified and assessed, and any adverse impacts are avoided, minimised, mitigated or offset.

The EIS plays a critical role in the process of identifying, predicting, assessing, evaluating and mitigating the environmental, social, economic and other relevant effects of development proposals.

When is an EIS Triggered?

When it has been determined that an activity will likely have a significant effect on the environment. An EIS is likely to be required instead of a REF for a Council project in the following circumstances:

If there is likely to be a significant effect on the environment.

- If the activity affects a Coastal Wetland or an equivalent community, or littoral rainforest as outlined in SEPP Coastal Management (2018) by clearing of native vegetation, harm to marine vegetation, earthworks, construction of a levy, draining, filling, environmental protection works or any other proposed works;
- If the activity affects cultural heritage items and the works are likely to have a high or major impact on the fabric, setting or community values or are contentious in nature and will benefit from public exhibition and comment.

What is the ISEPP and what does it let us do?

The [State Environment Planning Policy \(Infrastructure\) 2007](#) assists the NSW Government, private infrastructure providers, local councils and the communities they support by simplifying the process for providing infrastructure. The State policy identifies activities and outlines the assessment pathways for public authorities.

If an activity is judged by the relevant public authority to 'significantly affect the environment', then an Environmental Impact Statement (EIS) and/or a Species Impact Statement (SIS) will need to be prepared and considered by the public authority.

What are the risks and environmental considerations?

The main reason for artificially opening Intermittently Closed and Open Lakes and Lagoons (ICOLL) entrance is to mitigate and reduce the impacts of flooding. When water levels rise in a closed ICOLL following rainfall this can lead to flooding of urban and rural development adjacent to the lake or lagoon foreshore.

Even when an ICOLL is closed it does not necessarily mean that it has poor water quality. Many closed ICOLLs maintain good water quality and remain suitable for swimming, water sports and fishing for long periods of time. Furthermore, artificially opening an ICOLL entrance will not always improve the water quality due to the limited tidal movement or 'flushing' in most ICOLLs.

In many instances opening the entrance is not the solution and consistent poor water quality is better addressed by improving the management of catchment inputs to ICOLLs.

It should be remembered that flooding and drying are natural components of the hydrological and ecological processes operating within ICOLLs. Coastal lakes and the life they support have evolved in response to these forces and to maintain a 'healthy' lake ideally it should be left to operate as close to natural as possible.

Risks of Opening the Lake

In the short term, there is a risk that opening the entrance will be detrimental to the health of the lake system, including the possible mobilisation of acid leachate, generated by the Acid Sulphate Soils within the lake system.

In the long term, whilst conducting the four studies agreed upon by stakeholders, Council will also continue the process of developing a Coastal Management Plan (CMP). The CMP will investigate all management options and provide the framework for the long-term management of the lake system.

Why can't we open the lake to the ocean?

This is possible (with environmental approvals), and involves significant excavation works involving bulldozers, excavators and trucks to shift the sand. It is likely that construction works would take weeks to open the lake to the ocean. The machinery would need to continually work to sustain an opening as the sand and tides would close the opening. Council needs approval to do this from all stakeholders and would need to seek funding for the works.

Won't the sea water just run out again on the run-out tide?

As the lakebed is equal to average sea level (0m AHD), opening the lake to the ocean will not fill the lake.

Tidal exchange may eventually occur; however, this will depend on the depth that the channel and how long the works are in place for. Without constant excavation works, the small swells and onshore winds will close the lake mouth before tidal exchanging will occur. Should the excavation works be undertaken over numerous weeks, then the works may result in some tidal exchange, including some water draining from the lake system on low tides.

If we open the lake won't it let more sand in?

Yes, as the works are intended to draw water into the system from the ocean, considerable amounts of sand will also be brought in by the waves and tides. Estuaries by nature, are always filling in, this is caused by infill from the sea with marine sand as well as sand from rivers and creeks and mud from the land.

Even large estuaries such as Lake Macquarie (Newcastle) that are permanently open have more sand brought in, than taken out.

If we open the lake will it close again?

Lake Cathie is an Intermittently Opening & Closing Lake or Lagoon (ICOLL) which is sometimes open to the ocean and sometime closed. The works proposed to open the lake will be to create a channel to 'pull' water into the lagoon. In doing this, more sand will be carried back into the entrance by waves and tides and a process called Longshore drift (it is this process that causes most of the sand on the east coast to move from south to north).

As such, the lake will close when earthworks cease and there will not be a proper opening until significant rainfall occurs.

Every time we open the lake to the ocean the water level drops. The lake system is fullest when it is closed to the ocean. While an opening will let water in, it will not be significant as the lake system is very shallow and hydraulic connectivity is low. Therefore, the system closes after we initiate an opening.

How much does it cost to open the lake?

Historically the entrance to the lake is artificially opened when the system is full. Under these conditions, the channel excavated to initiate the opening is on a small scale and the water pressure of the full lake does the rest.

The average cost of the last few openings has been around \$5000.

When conditions are dry however, it is vastly different. The proposed works include the excavation and removal of more than 100,000m³ of sand and due to insufficient water flow out of the lake, ongoing excavation would likely be required to keep the entrance open.

The required works would incur significantly higher than average costs compared to previous opening events.

Would a good rain flush the lake and reduce salinity?

Significant rainfall will be the most beneficial factor in the health and recovery of the lake system and will be the only thing that will bring the lake system back to a more normal state. Opening the lake to the ocean will draw saline water into the system and will likely increase the salinity. Over summer the high temperatures, long sunshine hours and windy conditions results in a high evaporation rate. As the seawater evaporates, it will leave salt behind and the system will become saltier, unless significant rainfall occurs to reduce the salinity levels.

What are Acid Sulphate Soils?

Acid Sulphate Soils are found within the lake system. With the present drought conditions these soils are drying out and oxidising. When they are re-hydrated the acid can move through the soil and enter the water column. Inputting small amounts of water will 'pump' the acid into the remaining lake water and will acidify it. Therefore, by opening the lake system to the ocean and introducing tidal water we may create conditions that will pump the acid and will result in acidic water. Significant heavy and prolonged rain is needed to dilute the acid.

Would a reclaimed water pipe help?

The volume of water that this system could provide is extremely small compared to the volume of water that the lake needs in order to fill it. Evaporation alone would mean that any water pumped in from the reclaimed pipe would not make a significant impact to the water levels.

Why don't we install a pipe to permanently connect the lake system and the ocean?

The lake system is an Intermittently Open and Closed Lake or Lagoon (ICOLL). ICOLL's are a natural feature of which there are over 70 ICOLLs located along the NSW coast alone. Naturally, these systems are sometimes open to the ocean but are mostly closed. Having a constant connection between the two would mean we are altering the natural state of the lake system.

Why don't we build breakwalls?

Construction of a breakwall (or breakwalls) as a means of achieving a permanent ocean opening is not supported by any level of government and therefore, will not be permitted at this time.

Previous studies have suggested that because gross sediment movement along the beach is very high, such breakwalls would need to be very long to prevent sand from infilling the estuary. This would cause severe beach erosion and have a major impact on the environmental values of the estuary, effectively changing the habitat from estuarine to fully marine.

Lake entrance works are very costly (millions of dollars) and can have many undesirable effects including permanently changing the ecology of the lake (including fish stocks and fish habitats), changing flood behaviour in the catchment, creating tidal currents and influences on sediment movement, and altering tidal flushing that may lead to poorer water quality and higher salinity in backwater areas.

An open entrance may improve water quality for recreational activities, however, safe wading areas for children may be reduced.

Why don't we close Lake Innes?

Lake Innes was originally a separate freshwater system, the largest in NSW. In 1933, a drain was excavated to connect Lake Innes to Cathie Creek. The drain subsequently widened and deepened under flood and tidal flows, causing Lake Innes to convert to an estuarine system. The introduction of saline water and tidal water variations has resulted in extensive changes to the biology of the lake, including the loss of most of the freshwater habitat. The lake is now an established estuarine system.

Limited hydrodynamic modelling of the Lake Innes/Lake Cathie system was carried out to determine the impact of closing the Lake Innes entrance berm on peak flows into Lake Cathie during flood events. It was found that closing the Lake Innes entrance would increase the peak flow rates into Lake Cathie. The reversion of Lake Innes to its former freshwater state would provide a secure permanent breeding habitat for many species of waterbird, both freshwater and salt-tolerant species, and would provide a drought refuge to those species restricted to freshwater. It will increase the available open freshwater on the mid north coast from 40 hectares to more than 700 hectares.

A freshwater lake will also result in a higher biomass of aquatic vegetation and a more complex lake margin. This in turn will lead to more species diversity, an increase in frog and turtle species and expand the food supply for microbats and birds.

Closing Lake Innes would involve stakeholders making critical choices between values such as:

- Restore a persistent freshwater habitat for ducks and swans but reduce local wader habitat and local saltmarsh habitat by a small amount.
- Maintain a small estuarine fishery that supports several local families and businesses or close the system to commercial fishing and potentially compensate these fishers in the regional fishery context. There may also be new opportunities for recreational fishing or ecotourism in a freshwater lake.
- Maintain higher water levels in the entrance lagoon, but risk nuisance flooding of low-lying areas.
- Support local businesses that depend on summer visitor trade or consider the broader regional business context of tourism and alternative ways to attract more visitors to Lake Cathie/Lake Innes when water levels are low.
- Invest Council and community resources into restoring the barrier between Lake Innes and Lake Cathie or use those funds to carry out more regular dredging of the lower estuary. It is important to note that both these options would be likely to enhance the reliability of community values in the lower estuary.

Why don't we dredge upstream of Ocean Drive Bridge?

Upstream of Ocean Drive Bridge is listed as Lake Innes Nature Reserve and is managed by National Parks and Wildlife Service (NPWS).

NPWS would have to approve dredging/sand extraction within the Nature Reserve. It is unlikely that such environmental approvals would be granted.

Why don't we dredge upstream of Kenwood Drive Bridge?

Upstream of Kenwood drive Bridge is listed as Lake Innes Nature Reserve and is managed by National Parks and Wildlife Service (NPWS).

NPWS would have to approve dredging/sand extraction within the Nature Reserve. It is unlikely that such environmental approvals would be granted.

Does Kenwood Dr Bridge affect water flow?

The community and recreational users of the Estuary consider the Ocean Drive Bridge and Kenwood Drive causeway to have negative impacts on sediment and tidal flow within the lower Estuary.

- **Kenwood Drive Bridge:**

Previous studies suggest that widening of Kenwood Drive to four times its current width would provide noticeable changes to water levels (increasing by up to 200mm) within Lake Cathie during spring tide conditions (entrance open).

The modelling also suggested that widening the Kenwood Drive culvert would increase flood levels within Lake Cathie, which could adversely affect residential properties (particularly along Kenwood Drive), and as such, compensatory works (e.g. flood gates) would need to be provided to minimise impacts.

Results of modelling show that widening the bridge opening would increase tidal discharge into and out of Lake Cathie and the range of water levels in the waterbody. Under proposed conditions, the modified hydrodynamic conditions would increase the extent of tidal inundation gradually altering the distribution of saltmarsh and other inter-tidal vegetation species within Lake Cathie as they adapt to new water level conditions. At other upstream localities, changes to tidal hydrodynamics are predicted to be much smaller relative to water level and flow conditions currently experienced.

- **Ocean Drive Bridge:**

The premise for increasing the size of the channel under the bridge is to increase the flow of water during breakout, producing deeper entrance channels, a larger entrance and consequently improving water quality and waterway usage. The basis for this process to occur hinges around the assumption that increasing the size of the channel under Ocean Drive Bridge would result in increased flows.

Hydrodynamic modelling of the entrance demonstrates that the channel is relatively deep and has a minor impact on flow dynamics during breakout. Numerical modelling indicates that the volume of water within the estuary (i.e. the water level prior to opening) has a far greater role on the size of the resulting entrance breakout channel.

Additional modelling undertaken in subsequent studies was found to support previous findings and concluded that the complete removal of the Ocean Drive Bridge would result in a marginal increase to peak flow volumes, indicating that the bridge has negligible impact on tidal flows.

Questions from Revive Lake Cathie

View the responses from Council regarding dredging, mosquito monitoring, Kenwood Drive Bridge, low water levels, acid sulphate soils, marine life and fresh water sources.

[Revive Lake Cathie Questions \(12 March 2020\)](#)