
Woolgoolga Lake Entrance Management Procedure

1 Purpose

The purpose of this document is to provide Council with criteria for initiating berm height management and a procedure for undertaking works to the entrance of Woolgoolga Lake Estuary to manage flooding of low lying infrastructure and private property in a way that allows the lake to function as naturally as possible.

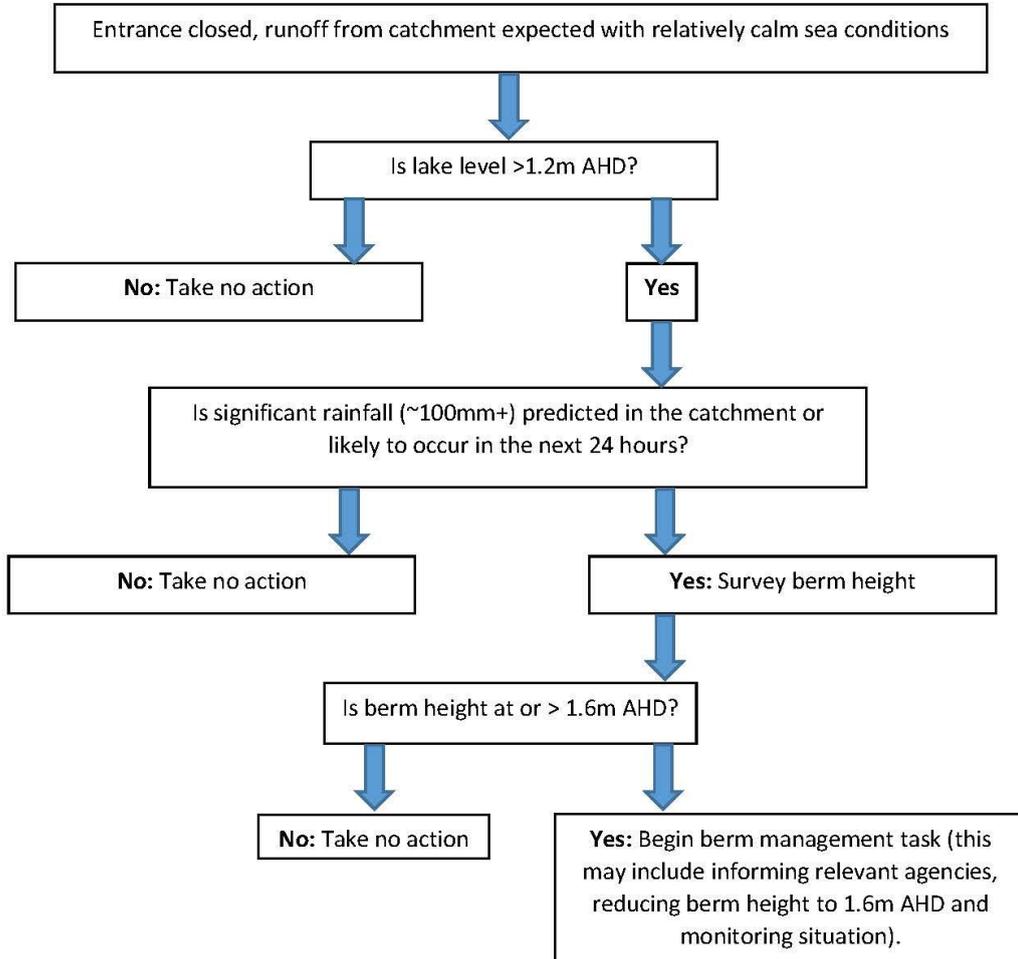
2 Scope

Council shall implement this procedure to manage inundation of critical low lying infrastructure around Woolgoolga Lake.

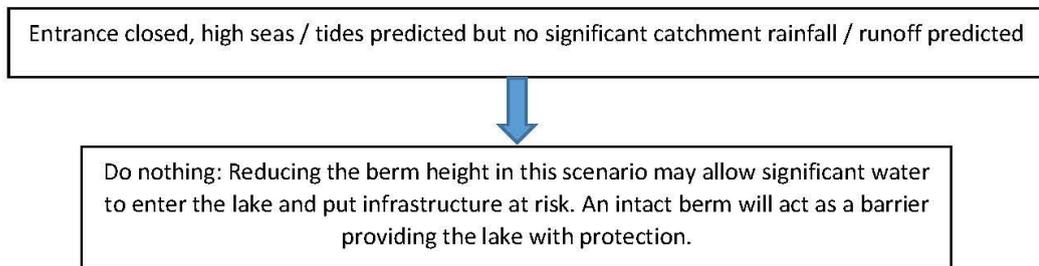
3 Procedure

The logic of the decision making process relates to avoiding flooding of low-lying infrastructure and the local sewerage system. Nuisance flooding of low-lying properties occurs at lake water levels of approximately 1.6m AHD. The decision making process is outlined in scenarios 1 - 4 below (further details in Appendix 1):

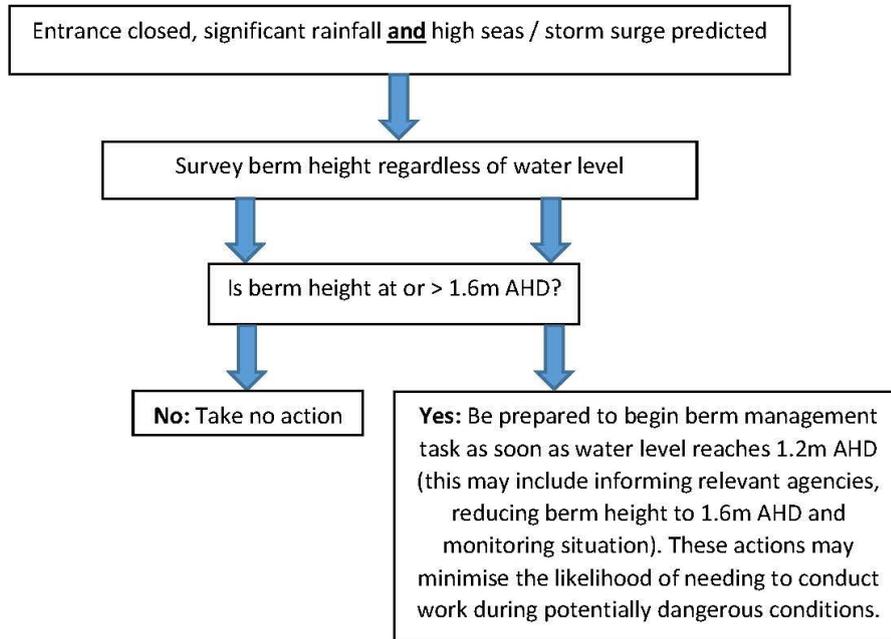
Scenario 1



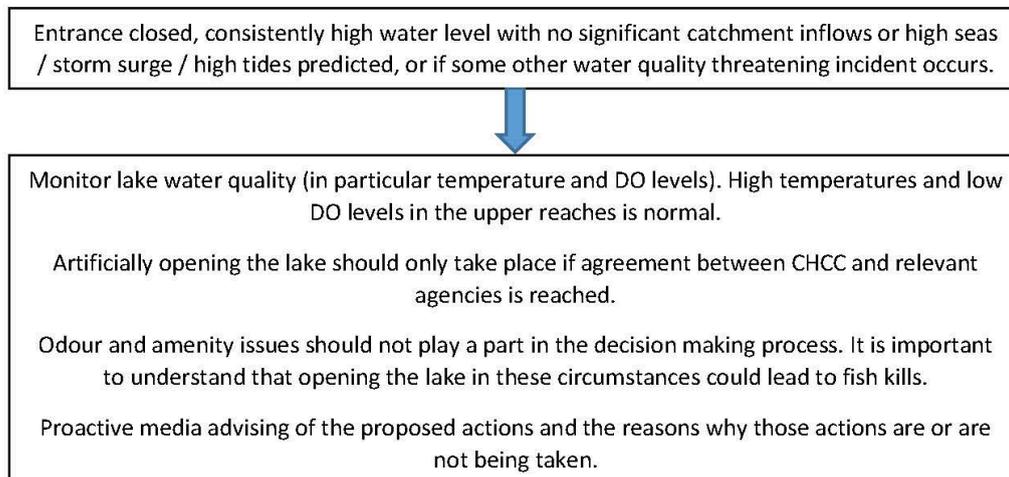
Scenario 2



Scenario 3



Scenario 4



4 Definitions

AHD: Australian Height Datum

ANZECC: Australian and New Zealand Environment and Conservation Council

CEMAC: Coffs Harbour City Council Coastal Estuary Management Advisory Committee

CHCC: Coffs Harbour City Council

CHLEP: Coffs Harbour Local Environmental Plan

CZMP: Coastal Zone Management Plan

ICOLL: Intermittently Closed and Open Lake and Lagoon

ISEPP: State Environmental Planning Policy (Infrastructure), 2007

LGA: Local Government Area

MHL: Manly Hydraulics Laboratory

PS: Pump Station

REF: Review of Environmental Factors

SEPP: State Environmental Planning Policy

5 Key Responsibilities

Councils designated officers responsible for the implementation of this Procedure are listed below:

- Senior Environmental Project Officer (Alternate – Environmental Project Officer)
- Coastal Works, Section Leader Roads and Open Spaces
- Coastal Works, Maintenance Coordinator

Councils officers responsible for Procedure review and development are listed below:

- Coast and Environment Officer
- Team Leader (Biodiversity, Coastal & Flooding)

6 References (laws, standards and other Council documents)

- Refer appendix 1

7 Details of Approval and revision

- **Approval date:** 14/05/2019
- **Responsible Section:** Local Planning
- **Superseded policies/procedures:**
- **Next review date:** 14/05/2021

Table of amendments

Amendment	Authoriser	Approval ref	Date

8 Appendix 1 – Additional procedure information

Entrance Management Procedure

Woolgoolga Lake Estuary

Updated May 2019 in line with Woolgoolga Coastal
Zone Management Plan



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1 Introduction

1.1 Reason for this Procedure

The entrance to the Woolgoolga Lake estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Many ICOLL's are manually or artificially opened to the ocean by authorities to 'drain' the estuary for a range of reasons, often to mitigate the impacts of flooding around the estuary foreshores. However, artificially opening ICOLL's can impact on estuary health. Therefore, a Procedure is required to outline to Council and the community if and when the Woolgoolga Lake estuary entrance berm should be managed, or other works undertaken.

1.2 The Purpose of this Procedure

The purpose of this document is to provide Council with criteria for initiating berm height management and a procedure for undertaking works to the entrance of Woolgoolga Lake Estuary to manage flooding of low lying infrastructure and private property in a way that allows the lake to function as naturally as possible.

1.3 Procedure Statement

The Woolgoolga Lake Entrance Management procedure aims to:

- minimise interference with the natural opening and closing regime for Woolgoolga Lake estuary;
- minimise flooding of properties from elevated water levels in the estuary;
- minimise flooding of the local sewerage system from elevated water levels in the estuary;
- provide a procedure to address extreme water quality issues in the estuary;
- detail trigger levels for undertaking works to the estuary entrance;
- detail procedures and responsibilities for undertaking works to the estuary entrance; and
- detail procedures for monitoring following works.
- detail consistent messages to the community from all relevant agencies

This Procedure will be implemented by Coffs Harbour City Council in consultation with the appropriate NSW Government agencies.

1.4 Entrance Management Principles

This Procedure advocates minimum entrance intervention, with preference for returning to a "natural as possible" breakout regime. The Woolgoolga Lake Estuary Coastal Zone Management Plan (CZMP) recommends formalising a policy for artificial management of the entrance that minimises the need for artificial opening in the long term. For this to be achieved, a number of measures will need to be considered, including:

- The Woolgoolga Lake Estuary CZMP recommends undertaking an audit and assessment of assets vulnerable to sea level rise impacts around Woolgoolga Lake, and relocating, replacing or modifying these assets to reduce risk.
- Investigate Voluntary House Raising as per the Woolgoolga Floodplain Risk Management Study and Plan
- Progressive and opportunistic raising, flood proofing or relocating low lying assets around the estuary
- Maintaining planning and development controls for the flood planning area as per the Coffs Harbour Local Environment Plan
- Triggers for opening should be reviewed and raised commensurate with sea level rise and in conjunction with the above works being undertaken



1.5 Area to Which this Procedure Applies

The area covered by this Procedure is shown Illustration 1.1. This Procedure applies to the catchment of the estuary which comprises the waterway, foreshores and land adjacent to the estuary up to the tidal limit of the tributary creeks and the extent of the drainage catchment directly contributing to the estuary waterways. The area relevant to this Procedure also includes the proposed access route along Woolgoolga Beach for excavator access to the estuary entrance.



Illustration 1.1: Area to Which Procedure Applies

1.6 Procedure Context

This Procedure has been prepared as part of the Coastal Zone Management Plan (CZMP) for Woolgoolga Lake estuary. CZMP's for estuaries are prepared in accordance with Part 4A of the Coastal Protection Act 1979 and the Guidelines for Preparing Coastal Zone Management Plans (DECCW, 2010). These guidelines require CZMP's for ICOLL's to include an Entrance Management Policy.

The Coastal Management Act (2016) has now replaced the Coastal Protection Act (1979). The State Environmental Planning Policy (SEPP) (Coastal Management) 2018 has consolidated and updated; SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection) all of which have now been repealed. However, as the CZMP for Woolgoolga Lake Estuary (and associated Entrance Management Policy) was prepared under the Coastal Protection Act (1979), this legislation will remain relevant until such time that a new Coastal Management Program is implemented for the Lake (requirement by December 2021).

A range of NSW legislation and policies are relevant to estuary management and the establishment of any Entrance Management Procedure and subsequent artificial opening/berm management works.

There may be a range of statutory approvals / licensing requirements that need to be sought in order to undertake entrance management activities. A range of approvals may be required due to potentially different land tenures, zonings and statutory provisions. These provisions may include Crown Lands licence under the Crown Lands Management Act 2016 and a permit from Department of Primary Industry - Fisheries under the Marine Estate Management Act 2014.

In addition, the Environmental Planning and Assessment Act 1979 established the framework for development control and assessment in NSW. Certain activities may require approval under this Act and associated State Environmental Planning Policies (SEPP) (e.g. SEPP (Infrastructure) 2007). Certain works or activities may either require development consent or be exempt from requiring consent. In the case where works or activities may be exempt from requiring consent, a Review of Environmental Factors (along with all other relevant approvals / licences) would be required under Part 5 of the EP&A Act before works / activities can be carried out. This is addressed more fully in Section 3 of this Procedure.

2 Background

2.1 Entrance Management Issues

The key issues for entrance management are:

- flooding of low-lying properties; and
- flooding of the local sewerage system.

Secondary issues relate to some community desire for artificial opening of the entrance to ‘flush’ the lake to improve water quality and reduce sedimentation in the lake. These secondary issues are discussed further in Section 2.1.4.

2.1.1 Water Levels

Manly Hydraulics Laboratory have maintained a water level gauge in Woolgoolga Lake since 2007 capturing more than eleven years of continuous data. Illustration 2.1 shows that water levels can vary significantly in the Lake and breakouts can occur over a relatively wide range. Generally, openings can be observed between 1.5m AHD – 1.7m AHD (Illustration 2.1) in line with Councils existing Entrance Management Policy to mitigate flooding of low lying assets around the Lake. The openings observed in this period are a combination of both natural and artificial breakouts.

Illustration 2.1 also shows that high water levels can occur irrespective of the entrance state. During a catchment flooding or storm surge inundation event (or a combination), high water levels can still occur regardless if the entrance is open or closed. Hence, there may be occasions where berm management / entrance opening works may be ineffective or counterproductive in regards to alleviating flooding. Planning for and managing these hazards are dealt with separately in both the Woolgoolga Floodplain Risk Management Study and Plan and the Coffs Harbour Coastal Zone Management Plan (specifically the Emergency Action Sub Plan).

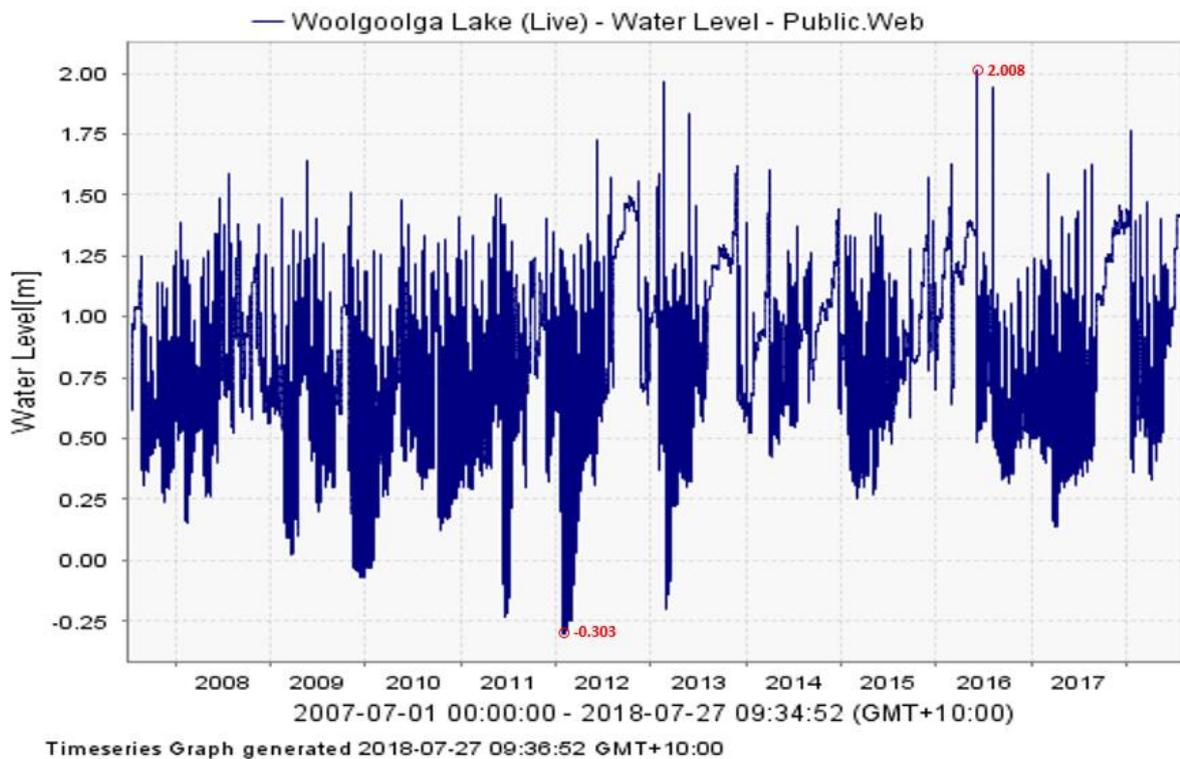


Illustration 2.1: Water level recordings for Woolgoolga Lake

2.1.2 Flood Levels

The highest recorded flood level in Woolgoolga Lake was reported as 2.1 m AHD in 1974 (Bewsher Consulting, 1989).

Flood levels for Woolgoolga Lake are dependent on input flows via stormwater runoff or creek flows, the flood storage capacity of the lake, outlet conditions and ocean water levels. A 2012 flood study for Woolgoolga Lake (BMT, WBM, 2012) estimated the following peak 1% Annual Exceedance Probability (AEP) event flood levels (i.e. 1 in 100-year event) based on a peak ocean level of 2.4 m AHD and a berm height of 1.5 m AHD:

- 2.6 m AHD for the lake entrance; and
- 2.7 m AHD at the upstream end of the lake.

The entrance berm geometry has the most significant impact on the modelled flood levels in Woolgoolga Lake and the surrounding floodplain. A catchment derived flood event occurring when the entrance is closed will provide a much higher flood level in the lake than a similar one occurring with an open entrance (BMT, WBM, 2012:81-83). The impact of adopting a 1.5m berm over a 1.0m berm is around a 0.4m increase in flood level within Woolgoolga Lake and a 0.3m increase at the Jarrett Creek confluence. The impact of adopting a 1.5m berm over an open entrance condition is around a 1.0m increase in flood level within Woolgoolga Lake and a 0.6m increase at the Jarrett Creek confluence (BMT, WBM, 2012:92).

The 2012 flood study for Woolgoolga Lake considered potential impacts of future climate change for the 1% AEP design event. The most significant impact for Woolgoolga Lake will be from the impact of the predicted increase in berm height, which is in line with the 0.4m and 0.9m sea level rise for the 2050 and 2100 planning horizons (BMT WBM, 2012:89).

Table 2.1: Flood Level Estimates – Woolgoolga Lake

	Flood Levels for the Lake Gauge at the Upstream End of the Lake (m AHD) ¹		
	Immediate ²	2050 ³	2100 ⁴
1% AEP design event	2.9	3.2	3.7

Source: Table 8-6 in BMT, WBM, 2012

2.1.3 Flooding of Properties

Contour information indicates the ground level of low-lying properties adjoining the estuary is generally in the range of 2.0 - 2.5 m AHD. Flooding events in 2011 and 2012 have highlighted at-risk properties in Sunset Caravan Park with ground levels in the range of 1.5 – 2.0 m AHD and some floor levels of permanent sites in the range of 2.13 – 2.23 m AHD. The flood study for Woolgoolga Lake (BMT WBM, 2012) indicates these properties would flood with a 5 year ARI flood event with an entrance berm height of 1.5 m AHD.

The Sunset Caravan Park has an approval to operate a caravan park/camping ground which specifies a number of requirements relating to the minimum floor level of unregistered and registrable moveable dwellings. The requirements specify that all floors must be a minimum of 0.5m above the 1% probability flood level and advise that the minimum floor level within the park is 3.6m AHD.

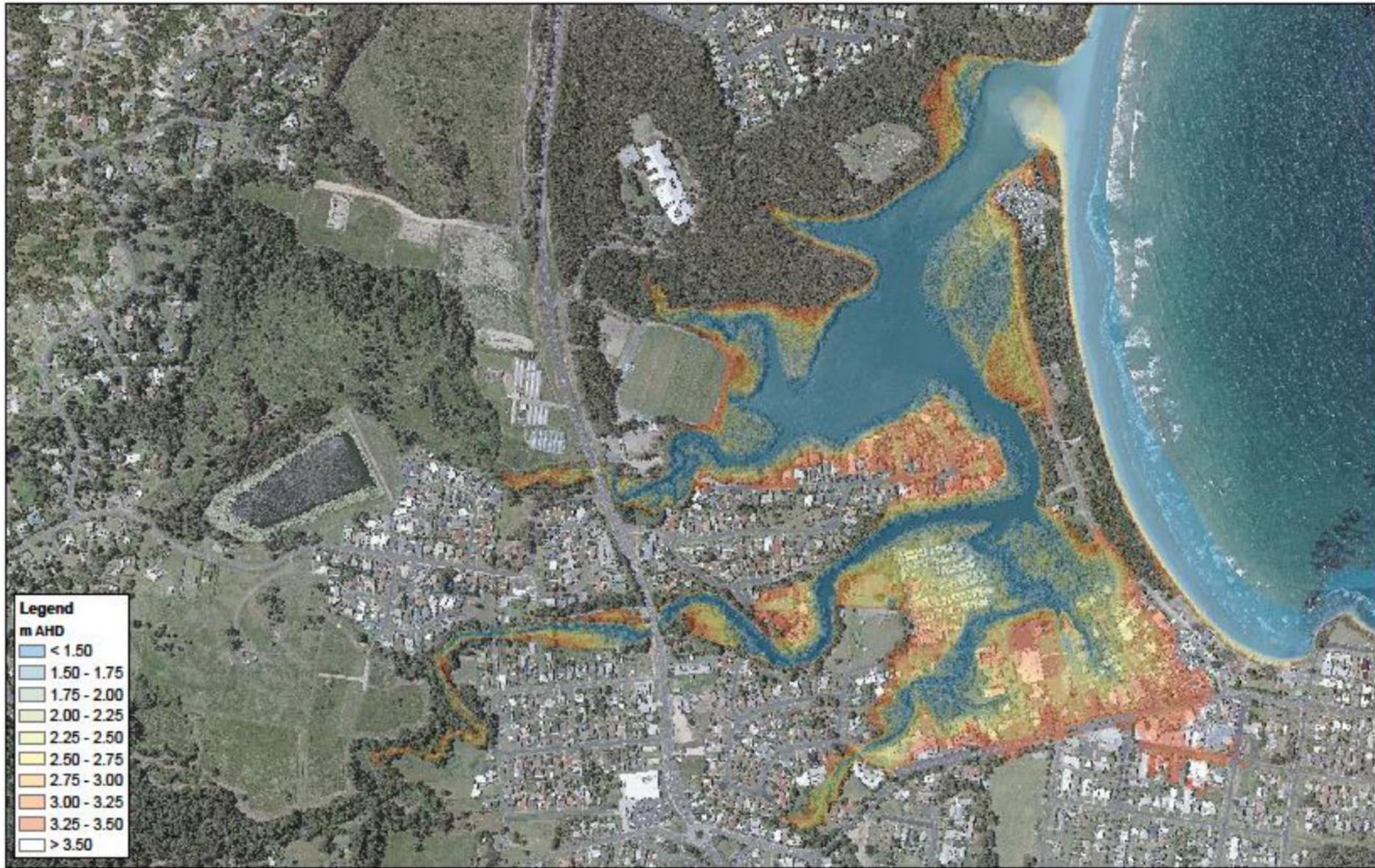
It is incumbent upon the Park owner/operator to ensure that new structures meet the minimum specified level at the time of installation. The Woolgoolga Lake Estuary Coastal Zone Management Plan highlights that some properties in the park have floor levels below 3.6m AHD, and that this would exacerbate flooding issues. The Sunset Caravan Park and relevant agencies will need to work together to address this issue. A recommendation from the Woolgoolga Floodplain Risk Management Study and Plan is to improve evacuation access to the Sunset Caravan Park. Council is currently undertaking further investigations, which looks at options that may improve access to the park in a flood.

There are also other at-risk properties throughout Woolgoolga which may include Pacific Street,

Wharf Street, Boundary Street and Haines Close that were affected by floods in 2011 and 2012. The Woolgoolga Floodplain Risk Management Study and Plan recommends investigations into flood proofing of commercial properties and voluntary house raising alternatives. The plan also identifies properties that require special attention during emergency response and evacuation of flood affected areas (refer section 7.2.3.3 of the plan).

The Woolgoolga Floodplain Risk Management Plan recommendations will be undertaken progressively to lower the flood impacts in conjunction with maintaining the operation of this procedure.

The flood level estimates in Table 2.1 indicate other properties are at risk of flooding in the present 1% AEP event. There will be an increased number of properties at risk of flooding as a result of sea level rise. Illustration 2.2 provides an indication of properties at risk of flooding at different water level elevations. The modelled flood hazards for the 1%AEP event from the 2012 flood study are shown in Illustration 2.3.



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Wooloolga Lake

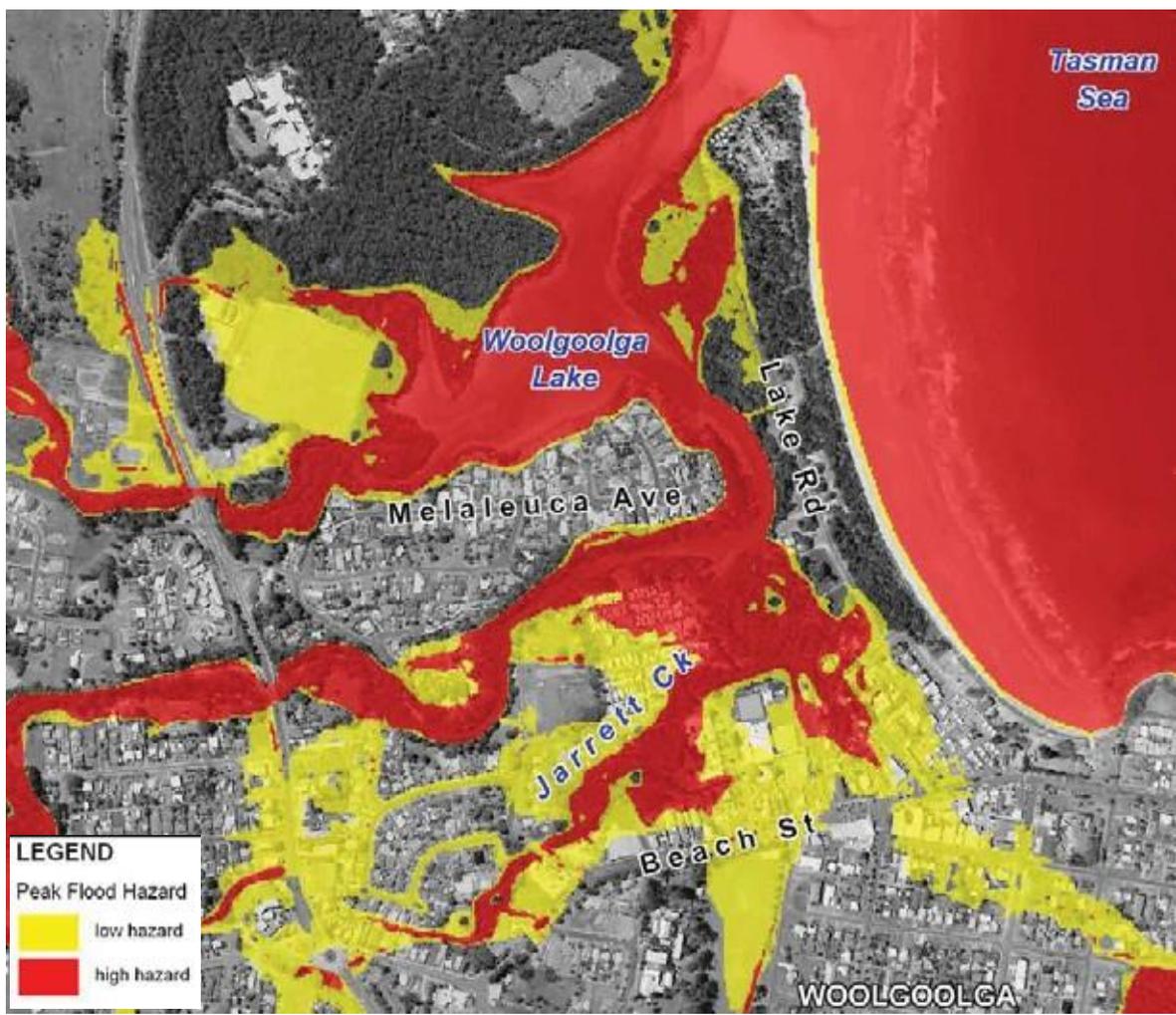
This map produced by GIS Section
Coffs Harbour City Council
User: jup911
Creation Date: 13/08/2018

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Projection: Transverse Mercator
Datum: GDA 1984



Illustration 2.2: Water elevation levels around Wooloolga Lake





Source: Figure A-12 in BMT, WBM, 2012

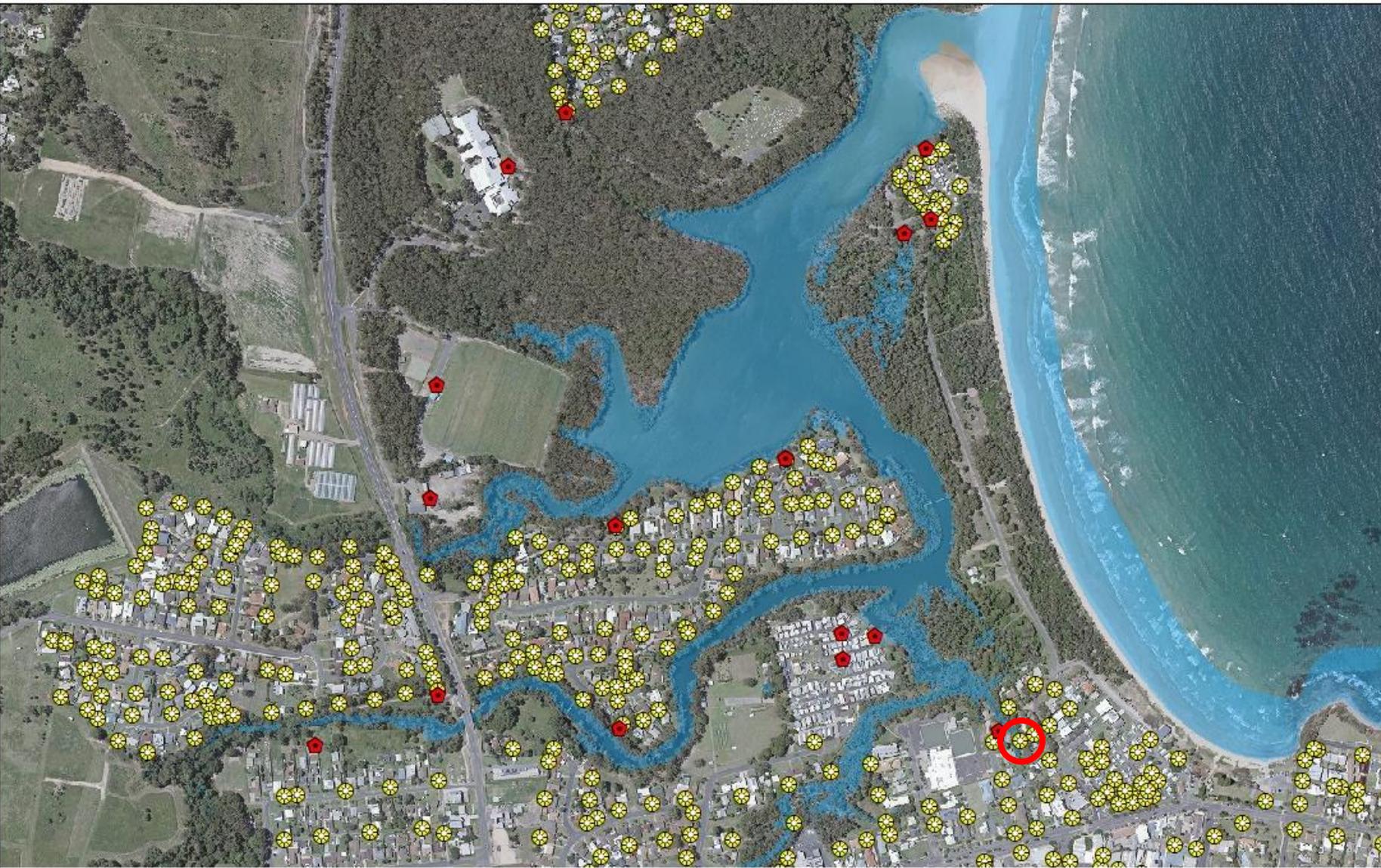
Illustration 2.3: Woolgoolga Flood Study – 1% AEP Modelled Peak Flood Hazards

2.1.4 Flooding of the Sewerage System

Council’s previous informal Policy of opening the lake entrance was based on preventing flooding of the adjoining sewerage system. Council’s Policy was to open the entrance when lake water levels reached an established flood mark of 1.8 m AHD. This is the level of the overflow pipe from Sewage Pump Station No.1 (PS 1) in Ganderton Street. At lake water levels greater than 1.8 m AHD, water will flood PS 1 causing water to enter the sewerage system causing excess pumping and potentially leading to sewage entering the lake system via Jarrett Creek. There is another low-lying sewage pump station (PS 16) on the southern foreshore of the lake, however this pump station is higher than PS 1 and does not currently dictate works to the entrance. Refer to Illustration 2.4 in regard to the location of these pump stations.

Council has recently installed a sealed bolt down gatic lid to seal sewer man hole B/01 (Illustration 2.4) to prevent the risk of flooding to PS 1 in a high water level event.

There are several other sewer man holes and pump stations located on low lying land around the estuary (shown in Illustration 2.4). This Procedure recommends that a detailed survey be undertaken of all of the low lying assets around the estuary foreshore in line with high priority action in the Woolgoolga Lake Estuary CZMP.



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Illustration 2.4: Location of Sewer Man Holes and Pump Stations around Wooloolga Lake (Sewer Man Hole B/01 circled in red)



2.1.5 Artificial Opening for Flushing the Estuary

A proportion of community participants in the consultation phase of the CZMP for Woolgoolga Lake estuary indicated a desire for an entrance opening Procedure for the purpose of:

- ‘flushing’ the lake to improve water quality; and
- reducing sediment in the lake.

2.1.5.1 Flushing to Improve Water Quality

Artificially opening estuary entrances is often carried out as a ‘quick fix’ to redress water quality problems stemming from other causes such as inadequate stormwater treatment from urban areas or inadequate erosion control measures in the catchment. Best practice for estuary management is based on addressing the source of the water quality issues rather than treating the symptoms by artificially opening entrances to ‘flush’ an estuary. The CZMP for Woolgoolga Lake Estuary includes strategies to address the source of current water quality issues.

Water quality data examined in the Estuary Processes Study for Woolgoolga Lake (GeoLINK et al., 2011) indicates the water quality of Woolgoolga Lake is generally in good condition with a high natural variance which is characteristic of ICOLLS. Therefore, there is no need for flushing of the estuary to improve water quality under ‘normal’ conditions. Nevertheless, there may be instances where artificial opening is justified to address extreme water quality issues in the waterway. This is addressed in Section 2.5.

2.1.5.2 Flushing to Reduce Sediment Levels

The major source of sedimentation in the estuary is from marine sands which are naturally pushed into the estuary through the entrance by tidal flows assisted by tidal and ocean currents and waves. Fluctuations in the amount of marine sediment in the estuary and consequent fluctuations in water depths are a natural trend. Secondary sediment sources include inputs from the broader catchment including from bank erosion and erosion associated with catchment land management practices.

The Estuary Processes Study for Woolgoolga Lake (GeoLINK et al., 2011) indicates artificial opening of the lake entrance will not have any significant impact on reducing sedimentation in the lake or removing the shoals of marine sand from the entrance. Data indicates that only very large flooding events (eg. the 1974 event), potentially in combination with large ocean swell events, will remove significant quantities of marine sand from the entrance. Artificial opening will only result in minor scouring near the entrance. The effect of this would be short-lived with relatively quick in-filling with marine derived sands. A Sustainability Assessment Report for Woolgoolga Lake (Dec 2006) similarly found that restricting opening of the entrance to above 1.8m AHD leads to a greater settling of sediments and an increase in sedimentation. Therefore, this Procedure does not recommend artificial opening of the entrance for the purpose of reducing sediment levels in the lake.

2.2 Water Level Monitoring

Water levels in the estuary are automatically monitored and recorded by Manly Hydraulics Laboratory (MHL) (“Woolgoolga Lake” station) and reported online. The water level recorder is located near the Melaleuca footbridge on Woolgoolga Creek, approximately 250 m upstream of the confluence of the creek and the lake as shown Illustration 1.1. The instrument records the water level every 15 minutes and is visible on the MHL website.

2.3 Natural Breakout Water Levels

Under natural conditions, ICOLL entrances open over a relatively wide range of water levels termed the ‘natural breakout range’.

An occasional artificial opening of the entrance within the natural breakout range is not likely to have

a significant environmental impact since it falls within the expected natural variation. However, over the longer term, numerous artificial openings especially at a comparatively low water level are likely to have a significant environmental impact since the natural frequency and duration of opening and closing to the ocean will be significantly altered.

Lake water level records for Woolgoolga Lake for the period of 1982 to 1988 indicate a natural breakout range of 1.2 to 1.8 m AHD. This was a period with varying rainfall years from very dry to very wet with some average years. Lake water level records for the period of 2007 to 2011 (a high rainfall period) indicate a similar 'natural breakout range' of 1.2 to 1.6 m AHD.

2.3.1 Rate of Water Level Rise During Flooding

The maximum rate of water level rise in the lake following a rainfall event has been estimated from an analysis of hourly water level records for the period of 2007 to 2011 (a high rainfall period). The analysis provided the following generalisations or indication of maximum rate of water level rise:

- 0.3 m rise in water level over 12 hours associated with approximately 120 mm of rainfall; and
- 0.6 m rise in water level over 24 hours associated with approximately 100 mm of rainfall; and
- 0.9 m rise in water level over 48 hours associated with approximately 100 mm of rainfall.

2.4 Trigger Water Levels

2.4.1 Trigger Levels

Based on the details in Sections 2.1.3 and 2.1.4, the desired water level in the lake to avoid flooding of properties and the sewerage system is 1.6 m AHD. This level is near the upper limit of the natural breakout range (1.2 – 1.8 m AHD). Having to artificially maintain the sand berm height at this level will be generally infrequent and will not have any significant impact on the natural opening and closing regime of Woolgoolga Lake. Hence it is unlikely to have a significant environmental impact on the estuary. Therefore, maintaining a sand berm level of 1.6 m AHD in anticipation of a high water level event is recommended as an intervention trigger.

The intervention levels may need to be adjusted in the future in response to:

- sea level rise;
- implementation of flood mitigation measures (including raising, flood proofing or relocation of low lying assets);
- augmentation of the sewerage system;
- or other factors.

2.4.2 Alert Trigger Level

In consideration of the rate of rise of water levels in the lake (Section 2.3.1) an alert trigger level of 1.20 m AHD is used to initially alert Council to monitor the potential for significant increases in water levels. This should provide between 12 and 24 hours of warning prior to the lake reaching a level of 1.6 m AHD in the event of significant rainfall.

It is noted that 2007 - 2011 water level data indicates that a level of 1.20 m AHD was reached on average 5 times a year when the entrance was closed.

The alert trigger water level may need to be adjusted in the future in response to sea level rise or other factors.

2.5 Other Triggers for Artificial Opening

Artificial opening may (in rare cases) be required to address extreme water quality issues where it may be desirable to provide some 'flushing of the lake. However, it is not considered practical to include triggers to address a broad range of potential water quality scenarios. A range of factors would need to be considered during a poor water quality event, such as:

- environmental and public health risks posed by the water quality issue;
- the extent to which artificial opening will mitigate the water quality issue; and
- consequent environmental and public health risks along the adjoining coastline following artificial opening of the lake.

This Procedure does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. It is recommended that any water quality event is assessed on an individual basis and any decision to open should be made by Councils assessing officers with advice / approval from the Office of Environment and Heritage (Water, Floodplain and Coast) and the Department of Primary Industries - Fisheries. The decision to open for water quality purposes would need to take into account:

- The Lake water level - opening at low water levels is generally not recommended as there is not enough of a hydraulic head differential between the Lake and the ocean meaning opening may not be effective / possible.
- The water quality – this Procedure recommends that opening for water quality purposes should not be undertaken unless poor water quality can be evidenced through monitoring data. Water quality monitoring should be undertaken in response to an incident and should include as a minimum; Dissolved oxygen, pH, temperature, salinity, Chlorophyll a, Nitrogen and Phosphorous (other contaminants will be dependent on the nature of the event). The Australian and New Zealand Environment and Conservation Council (ANZECC) guidelines should be used as a point of reference for water quality parameters.

As mentioned in section 2.1.5.1, the Woolgoolga Lake Coastal Zone Management Plan states that the water quality of Woolgoolga Lake is generally in good condition and that there is no need for artificial management of the estuary entrance to improve water quality under normal conditions. It recommends a number of appropriate catchment management actions to address water quality issues at their source rather than trying to respond with a 'quick fix' estuary opening. ICOLLs, more than any other estuary type, have a wide range of naturally occurring physical and chemical water quality conditions. Opening ICOLLs to improve water quality and estuary health is generally not recommended and could (despite best intentions) have undesired negative impacts on the estuary. Any decision to open for water quality purposes would need to be carefully considered amongst relevant Government agencies. Improved management of catchment and floodplain inputs into the ICOLL is a more sustainable way of managing ICOLL water quality.

If artificial opening is considered an appropriate option to address a water quality issues, then this Procedure should be referred to in undertaking the opening procedure.

2.6 Communication Messages

As described in section 3 the effective management of Woolgoolga Lake requires the cooperation of a number of government agencies. As such, it is important all agencies respond to enquiries in a consistent manner as described in Table 2.2.

Table 2.2: Joint Communication Messages – Woolgoolga lake Entrance Management

Messages to be considered for the broader community
Woolgoolga Lake is an Intermittently Closed and Opening Lake or Lagoon (ICOLL), meaning the entrance naturally alternates between being open or closed to the ocean.
Woolgoolga Lake is an important asset within the Solitary Islands Marine Park, delivering the community a suite of environmental, social and economic values. Healthy estuaries are critical nursery areas for many recreationally and commercially important fish species.
Woolgoolga Lake is managed in accordance with the Woolgoolga Lake Estuary Coastal Zone Management Plan.
Coffs Harbour City Council leads development and implementation of this Plan with the support of many other State Government agencies, including the Office of Environment and Heritage, Department of Primary Industries – Fisheries, and the Department of Industry - Crown Lands and Water.
Development and implementation of the Plan is overseen by the Coffs Harbour City Council Coastal Estuary Management Advisory Committee, which has representation from all key stakeholders and the community.



<p>The Plan is based on the best available science and identifies artificial management of the Lake entrance to balance flood mitigation with natural processes as a high priority issue.</p>
<p>Fluctuations in the amount of marine sediment and water depths in Woolgoolga Lake are a natural process. Historical aerial photography indicates that water depths in 1943 were similar to present conditions, and Lake depth has fluctuated since that time.</p>
<p>Artificial opening of the lake can significantly impact the health of the estuary and the life that depends on it.</p>
<p>Coffs Harbour City Council has prepared a Review of Environmental Factors (REF) for artificial management of the entrance to Woolgoolga Lake estuary that is based on the best available science and knowledge. The REF identifies a flood risk to dwellings at a water level of 2.0 AHD. It recommends artificially managing the lake entrance at a level of 1.6m AHD to provide a margin of safety. However, under some combinations of sea condition and catchment flooding, flood levels above 2.0 m AHD can occur regardless of whether the entrance is either open or closed.</p>
<p>The Woolgoolga Floodplain Risk Management Study and Plan recommends retaining the current trigger level of 1.6m AHD due to the minimal impact on property and infrastructure at that flood level, the detrimental effects on the estuary of lowering the trigger level and the relatively minimal reduction in Average Annual Damages.</p>
<p>The Woolgoolga Floodplain Risk Management Study and Plan recommends that this Entrance Management Procedure be reviewed periodically in response to changes in sea levels (A8.1.6)</p>
<p>Messages to be considered in response to specific complaints</p>
<p>The Woolgoolga Lake Estuary Coastal Zone Management Plan recommends formalising a policy for artificial management of the entrance that minimises the need for artificial opening in the long term.</p>
<p>The Plan recommends against either dredging of the Lake or artificial opening to reduce sediment levels. Regular artificial entrance opening can trigger increased marine sand ingress and shoaling within the lake.</p>
<p>The Plan states that the water quality of Woolgoolga Lake is generally in good condition and that there is no need for artificial management of the estuary to improve water quality under normal conditions. It recommends a number of appropriate catchment management actions to address water quality issues at their source rather than trying to respond with a 'quick fix'.</p> <p>ICOLLS, more than any other estuary type, have a wide range of naturally occurring physical and chemical water quality conditions. Improved management of catchment and floodplain inputs into the ICOLL is a more sustainable way of managing ICOLL water quality. Artificial openings of ICOLL entrances often do not improve water quality as much as hoped.</p>
<p>Evidence suggests that in some areas private works may have encroached beyond the lot boundaries onto adjacent Crown Land, which may be further exposing these assets to flood risk.</p>
<p>The Sunset Caravan park has an approval to operate a caravan park/camping ground which specifies a number of requirements relating to the minimum floor level of unregistered and registrable moveable dwellings. The requirements specify that all floors must be a minimum of 0.5m above the 1% probability flood level and advise that the minimum floor level within the park is 3.6m AHD.</p> <p>It is incumbent upon the Park owner/operator to ensure that new structures meet the minimum specified level at the time of installation. The Woolgoolga Lake Estuary Coastal Zone Management Plan highlights that some properties in the park have floor levels below 3.6m AHD, and that this would exacerbate flooding issues. The Sunset Caravan park and relevant agencies will need to work together to address this issue.</p>
<p>The Plan recommends undertaking an audit and assessment of assets vulnerable to sea level rise impacts around Woolgoolga Lake, and relocating, replacing or modifying these assets to reduce risk.</p>
<p>Regardless of the entrance management regime, Lake heights and flood risk for low lying properties will increase with the impacts of climate change. Increased sea levels, tide and storm surge alone will pose an increased risk even in the absence of rainfall events.</p>
<p>Opening ICOLLS at low water levels is generally not recommended as there is not enough hydraulic head differential between the lake and ocean which often leads to ineffective entrance openings. While a small rise in water level may not seem like a lot, over an entire water body it can equate to a significant water volume which can greatly improve the hydraulic scour on the entrance leading to longer lasting and more successful openings.</p>
<p>During a catchment flooding or storm surge inundation event (or a combination), high water levels can still occur regardless if the entrance is open or closed. Hence, there may be occasions where berm management / entrance opening works may be ineffective in regards to alleviating flooding. Planning for and managing these hazards are dealt with separately in both the Woolgoolga Floodplain Risk Management Study and Plan and the Coffs Harbour CZMP (specifically the Emergency Action Sub Plan).</p>

3 Approvals

3.1 Statutory Provisions

The area of Woolgoolga Lake and any proposed entrance management works would be located within the Coffs Harbour LGA. The actual water body of Woolgoolga Lake is zoned W2 Recreational Waterways under the Coffs Harbour Local Environmental Plan (CHLEP) 2013. Land immediately adjacent to and surrounding the defined water body of Woolgoolga Lake is either zoned as RE1 Public Recreation, E1 National Parks and Nature Reserves under the CHLEP 2013, with a small area zoned R2 Low Density Residential.

Specifically, for the purpose of flooding mitigation works, Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out on any land and precludes them from requiring development consent. Clause 50 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land.*
- (2) *A reference in this clause to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with flood mitigation work:*
 - (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *environmental management works.*

Although flood mitigation works would be permitted without consent on any land, the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council would be required to prepare a REF for proposed works to opening of Woolgoolga Lake. The REF would outline the nature and extent of the proposal, what would be the trigger and determining factors for proceeding with works and identify and address any potential environmental effects which may result from such works. Hence the REF would also include mitigation measures and safeguards for the protection of the environment during works to the sand berm. The REF would need to be consistent with the adopted CZMP and Entrance Management Procedure for Woolgoolga Lake.

In conjunction with preparation of the REF, Council would be required to seek relevant licences and or concurrence from state government agencies. These would include:

- Department of Primary Industries - Fisheries under the Marine Estate Management Act 2014.
- Department of Primary Industries - Fisheries under the Fisheries Management Act 1994

Council would also need to consult with and notify other agencies as appropriate including:

- Department of Industry Crown Lands under the Crown Lands Management Act 2016;
- NSW Office of Water under the Water Management Act 2000;
- Office of Environment and Heritage (Water, Floodplain and Coast)
- Office of Environment and Heritage (National Parks and Wildlife Service) under the National Parks and Wildlife Act 1974.

To assist implementation and to provide certainty, relevant permits should be requested for a period of 3 years. The REF and this Procedure should be reviewed simultaneously with both documents provided to relevant agencies for their consideration.

3.1.1 Local Government Act 1993

Under Division 2 (Section 35) of the Act, community land is required to be used and managed in accordance with the following:

- The plan of management applying to the land

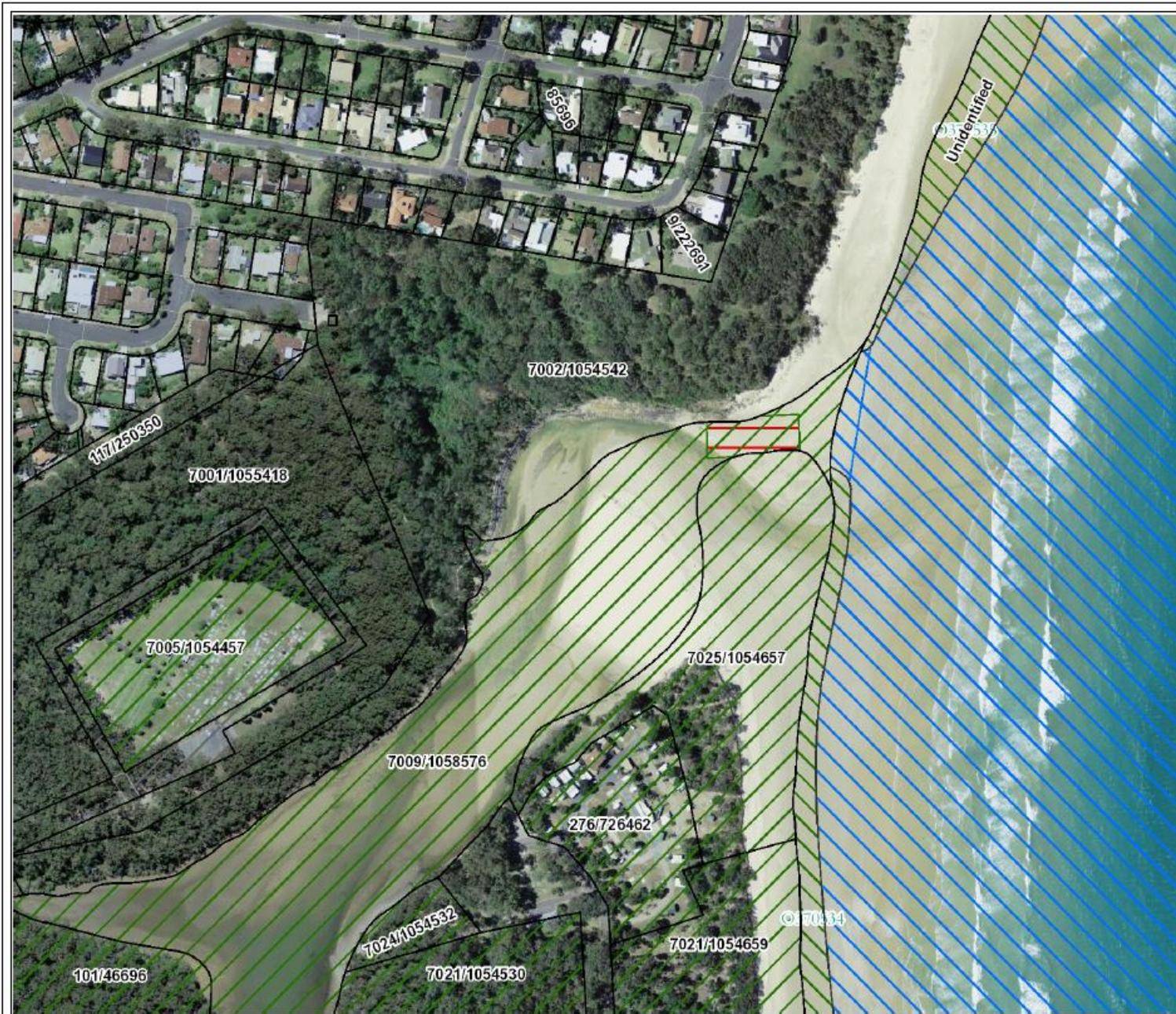
- Any law permitting the use of the land for a specified purpose or otherwise regulating the use of the land

The relevant Plan of Management (PoM) for the Woolgoolga Lake Entrance is “PoM for Part of RESERVE 63076 for PUBLIC RECREATION and RESTING PLACE and RESERVE 72664 for PUBLIC RECREATION (northern section of Woolgoolga Beach Reserve)”. The PoM recognises Entrance Management as a key issue and recommends that an opening strategy / action plan be formalised through the relevant Coastal Zone Management Plan. This procedure forms part of the certified Woolgoolga Lake Coastal Zone Management Plan.

3.1.2 Crown Lands Management Act 2016

Due to the works to the sand berm works affecting the waterway of Woolgoolga Lake and the coastline, it is likely that such works would affect Crown Land. Under the previous Act, works to the entrance required authority by way of a licence from the Crown under Part 4, Division 1 of the Crown Lands Act 1989. The area shown in red hatching in Illustration 3.1 below shows licence area 526557 for extraction of sand held by Coffs Harbour City Council for a term of 5 years ending 13 April 2019. The licence was issued direct by the Crown because, as the former Trust manager, Council was unable to issue a licence for an activity that is inconsistent with the purpose of the reserve (public recreation) whereas the Minister has that discretion.

Under the new Act, the distinction with Trusts being separate from Council no longer exist (refer division 3.4). Council is authorized to manage the Crown Land as if it were public land within the meaning of the Local Government Act 1993. In the circumstances that a tenure from the Crown should no longer be required for the environmental management activity being undertaken by Council, the approval sections will therefore need to focus on the requirements of the Local Government Act.



Legend

Aboriginal Land Claim Boundary	Non Crown Land
Licence (Structure Point)	Crown Land - Undefined Status
Licence (Structure Line)	Crown Road
Licence (Structure Polygon)	Shared Crown / Council Road
Licence (Land Area)	Crown Road - Undefined Status
Crown Licence	Crown Waterway
Enclosure-Permit	All Crown (Land, Road & Water)
Crown Reserve	Local Government Area
Crown Land (Other)	Suburb
Crown Land	National Parks Reserve
Crown Land - Status Unknown	State Forest

Crown Account Details

Parish: WOOLGOOLGA
 Country: FITZROY
 LGA: COFFS HARBOUR
 Suburb: SAFETY BEACH
 Author: DPI/baumap
 Map Created: 1/11/2018 11:54:22 AM

Projection: WGS_1984_Web_Mercator_Auxiliary_Sphere
 Disclaimer: Scale is not accurate. DI Lands must not be liable for any loss or damage (including loss of profits, business, revenue or data) whether in contract, tort (including negligence) or otherwise arising from or in connection with any defect, error or inaccuracy of information or any part thereof or any products or services.
 Copyright: Department of Industry, Lands, 2018

Illustration 3.1: Land tenure and management arrangements Wooloolga Lake Entrance





3.1.3 Fisheries Management Act 1994

The objectives of the Fisheries Management Act 1994 *are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.* The provisions of Division 3, Part 7 of the Act are likely to be relevant to any works associated with the works to the opening of Woolgoolga Lake.

The provisions relate to the protection of aquatic habitat. Although flood mitigation works would be precluded from requiring consent under ISEPP, the provisions of the Fisheries Management Act 1994 are still applicable and as part of the REF process concurrence from the Department of Primary Industries (Fisheries) may be required for certain activities. Table 3.1 outlines the relevant provisions of the Act that would apply to works to the opening of Woolgoolga Lake.

A dredging and reclamation permit is required and will be sought for the works to the Woolgoolga Lake Entrance as per Sections 198 – 202 of the Act.

Table 3.1 : Activities requiring concurrence under the Fisheries Management Act 1994

Fisheries Management Act 1994	Sections 198-202	Concurrence is required from the Minister, Department of Primary Industries (Fisheries) for dredge and reclamation works on defined water land. The nature of works to the opening would constitute dredge works and also potentially reclamation works in watered land. Hence a permit and concurrence may be required prior to commencement of any works.
	Sections 219-220	Concurrence is required when barriers to the movement of fish including water course crossings are to be constructed or modified. Any proposed works to the opening is unlikely to create a barrier to the movement of fish. However such specifics would need to be confirmed within the REF.
	Sections 204-205	Any works to the opening would likely be restricted to the sand berm. Any works must not affect mangroves or other protected marine vegetation. If marine vegetation would be harmed by flood mitigation works a permit must be sought from the Minister before works commence. Clause 205 (2) states that <i>A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part.</i> It is unlikely that any such vegetation would be affected by activities associated with the works to the opening of Woolgoolga Lake, however the REF must confirm this.
	Schedules 4, 4A, 5 and 6	The REF prepared for works associated with works to the opening would need to consider any presence of local threatened aquatic habitat for flora or fauna. Thus Key Threatening Processes (KTPs) would need to be considered in preparation of the REF. The following KTPs may be relevant and required consideration: <ul style="list-style-type: none"> • <i>Degradation of native riparian vegetation along NSW water courses.</i> • <i>Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.</i>

3.1.4 Marine Estate Management Act 2014 and Regulations

Woolgoolga Lake lies within the habitat protection zone of the Solitary Islands Marine Park and is subject to special provisions to protect its precious environmental, social, cultural and economic values. Clause 1.8 of the Marine Estate Management (Management Rules) Regulation 1999 specifies the objectives for habitat protection zones. It is an offence under clause 1.16 of the Marine Estate Management (Management Rules) Regulation 1999 to damage, take or interfere with or attempt to damage any part of the habitat including soil, sand, shells or other natural material except with the consent of the relevant Ministers. Consent may only be given for activities specified in the legislation. Artificial opening of the Woolgoolga Lake entrance requires consent under clause 1.16. A marine park permit must be sought from the Department of Primary Industries - Fisheries.

3.1.5 Water Management Act 2000

A controlled activity approval under the Water Management Act 2000 (WM Act) is required for certain types of developments and activities that are carried out in or near a river, lake or estuary (water land). Under the WM Act, a controlled activity means:

- the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
- the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
- the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- the carrying out of any other activity that affects the quantity or flow of water in a water source.

Works to the opening of Woolgoolga Lake would constitute a controlled activity under the WM Act. However, under the Water Management (General) Regulation 2011, Clause 38 Controlled activities—public authorities, states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.*

Although Coffs Harbour City Council would be exempt from requiring a Controlled Activity Approval, Clause

37, Condition applying to all exemptions under this Subdivision, of the Regulations states:

An exemption conferred under this Subdivision is subject to the condition that the person by whom the relevant controlled activity is carried out must comply with applicable requirements (if any) of the Minister that are published in the Gazette, or notified in writing to the person, for the purposes of this clause and that are for the protection of:

- (a) the waterfront land on which the activity is carried out, or*
- (b) any river, lake or estuary to which that land has frontage.*

The proposed strategy should be consistent with the 'Guidelines for Controlled Activities' on waterfront land (NRAR, 2018). Any take of water from groundwater or surface water sources must be appropriately licensed unless subject to an exemption as per Schedule 5 of the Water Management (General) Regulation 2018.

3.1.6 National Parks and Wildlife Act 1974

The entrance to Woolgoolga Lake is bordered by Coffs Coast Regional Park to the north and Crown Land managed by Coffs Harbour City Council to the south. The management of Coffs Coast Regional Park is undertaken through a partnership approach involving the Coffs Coast Regional Park Trust Board, Coffs Harbour City Council and the National Parks and Wildlife Service.

The Trust Board is responsible for the care, control and management of the park in accordance with the National Parks and Wildlife Act and National Parks and Wildlife Regulation and is subject to the provisions of the Act. The implementation of park management is shared between the National Parks and Wildlife Service and Coffs Harbour City Council which act on behalf of the Trust Board who facilitate management arrangements.

As the Woolgoolga Entrance Management works are conducted outside the boundaries of the Coffs Coast Regional Park, consultation / concurrence is not required with the National Parks and Wildlife Service or the Trust Board.

3.1.7 Native Title

Woolgoolga Lake is within Crown Land Reserve (CR 70416) and accordingly an investigation to consider Native Title is required in relation to the proposed opening procedure.

Council has determined that the proposed works are in accordance with Section 24LA (Low impact future acts) of the Native Title Act 1993 (Cth), and:

1. There has been no approved determination that native title exists over the proposed future act area; and
2. The proposed future act is capable of being stopped if a determination is made that native title exists over the area covered by the future act; and
3. The proposed future act is not specifically excluded from being a low impact future act. To clarify this point the proposed future act falls within one of the exclusions; however it also falls in to one of the exceptions to the exclusions as follows:

'The proposed future act consists of, authorises or otherwise involves the excavation or clearing of any of the land or waters (being scraping of sand) and the excavation or clearing is reasonably necessary for the protection of public health or public safety (being the removal of stagnant water and reduction in the risk of flooding during significant rainfall).'

In accordance with Section 24LA Native Title Act 1993 (Cth), there are no procedural rights that must be provided to native title parties.

3.1.8 Aboriginal Land Rights

The NSW Aboriginal Land Council (NSWALC) has made a claim (ALC 26478) on CR 70416 (Woolgoolga Lake) on behalf of the Coffs Harbour and District Local Aboriginal Land Council (CH&DLALC). In accordance with the Crown Land Management Act, Council has consulted with both parties in relation to the proposed works for the lake opening procedure. The NSWALC and the CH&DLALC have both confirmed that they do not oppose the works, provided they are undertaken in accordance with the plan of management and lake opening procedure.

3.2 Summary of Potential Approvals

Works to the opening of the entrance for the purpose of flood mitigation is permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However, the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed works to the opening of the entrance to Woolgoolga Lake estuary. The REF needs to be consistent with the adopted CZMP and Entrance Management Procedure for Woolgoolga Lake estuary.

Preparation of this Procedure and any future reviews, will involve consultation with relevant state government agencies. This will confirm the necessary approvals and licences required for works to the opening of the entrance. It is recommended an REF is prepared and approvals obtained on a rolling basis to allow a proactive planned approach to occur rather than reactive approach when water levels are rising. Preliminary assessment indicates the following approvals and licences may be necessary:

- a permit from the Department of Primary Industry – Fisheries under the Marine Estate Management Act 2014.
- a permit from the Department of Primary Industry – Fisheries under the Fisheries Management Act 1994.

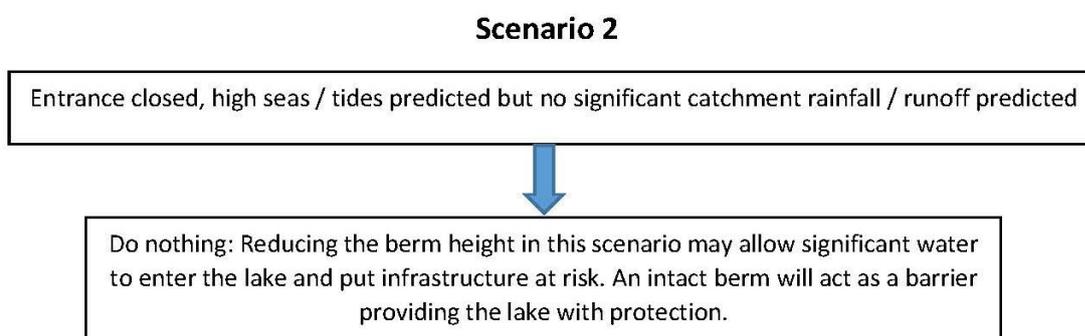
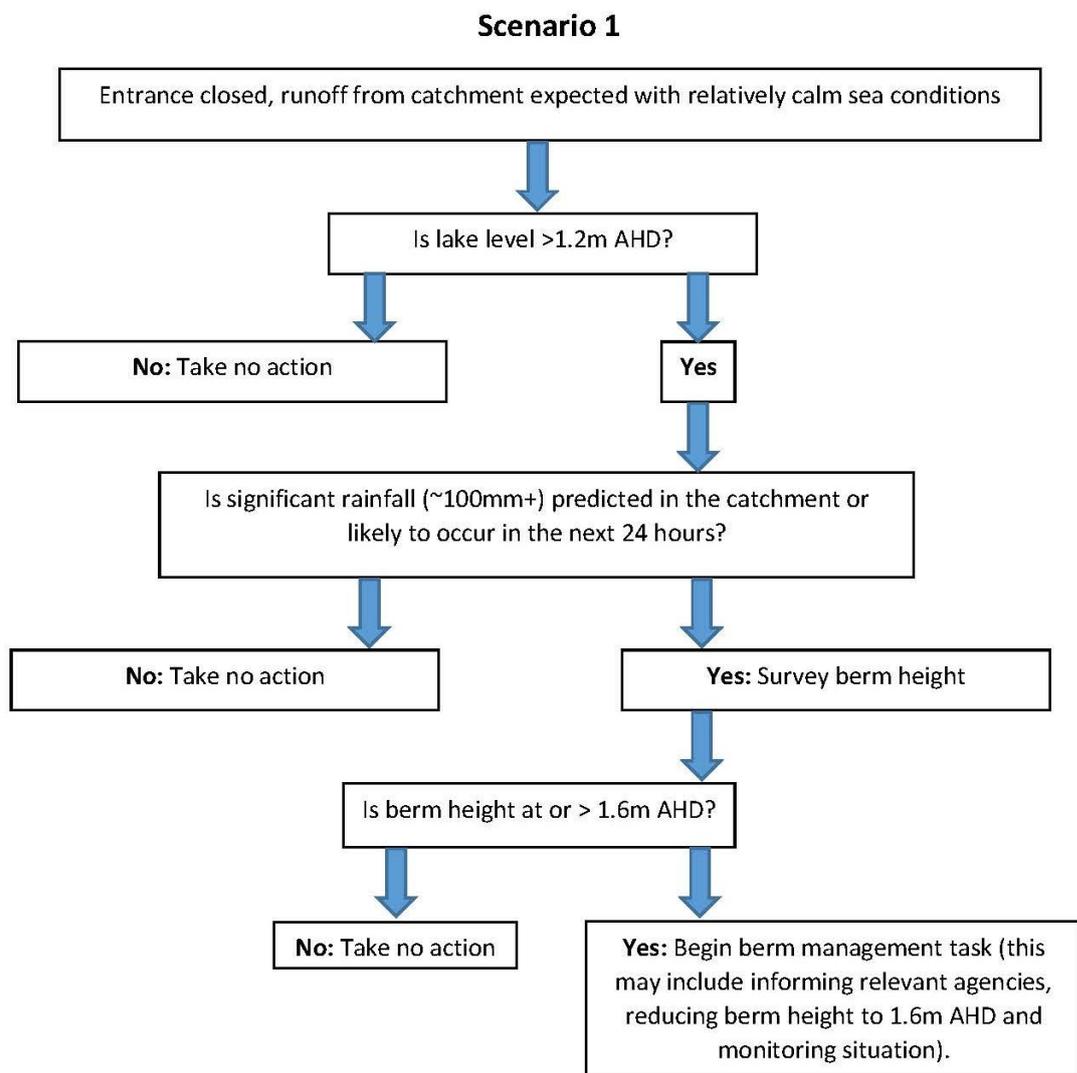
It is noted that a Controlled Activity Approval under the Water Management Act 2000 is not required due to the Water Management (General) Regulation 2011, Clause 38 Controlled activities - public authorities, which states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.* However, Council is still required to follow any applicable guidelines of NSW Office of Water under the Water Management Act 2000.

4 Lake Management Procedure

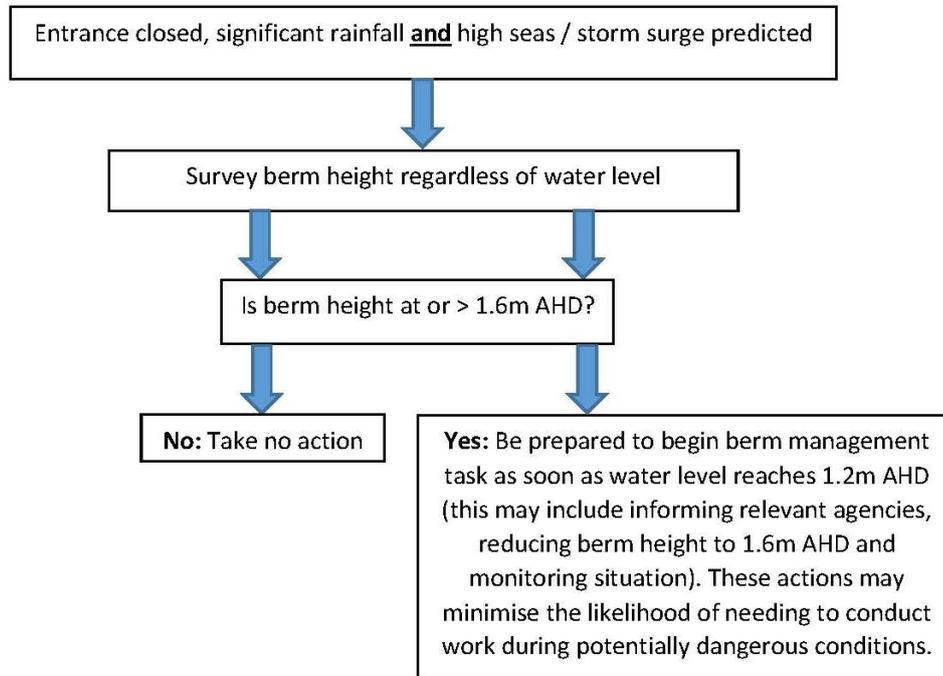
4.1 Decision Making Process

The logic of the decision making process relates to avoiding flooding of low-lying properties and the local sewerage system. Nuisance flooding of low-lying properties occurs at lake water levels of approximately 1.6 m AHD. At higher levels of approximately 1.8 m AHD, water will flood Sewage Pump Station No.1 in Ganderton Street causing excess pumping and potentially leading to sewage entering the lake system via Jarrett Creek. Council has recently sealed Sewer Man Hole B/01 which will eliminate the flooding risk for Sewage Pump Station No. 1. This Procedure recommends surveying other low lying infrastructure around the lake and where feasible, raising, modifying or relocating assets in line with the Woolgoolga Lake Estuary CZMP.

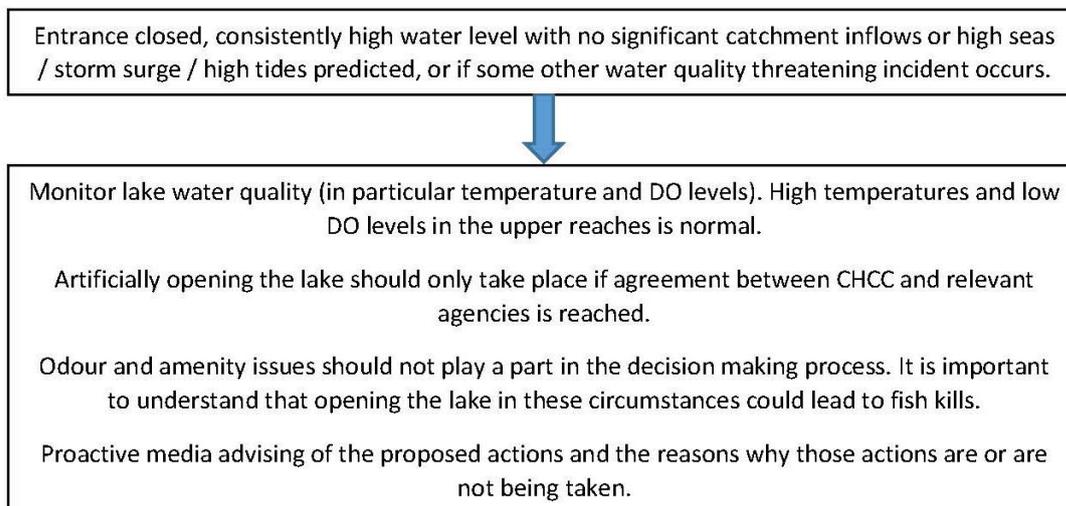
The general decision making process is shown in the flow chart in Scenarios 1- 4.



Scenario 3



Scenario 4



4.1.1 Opening Notes

- The alert level of 1.20 m AHD will be based on water level data automatically monitored at 15 minute intervals by Manly Hydraulics Laboratory (MHL) at Woolgoolga Lake station at the footbridge in Woolgoolga Creek (refer to Illustration 1.1). An alert will be automatically sent to Council if the level of 1.20 m AHD is reached. Following the 1.20 m AHD alert, Council will monitor rainfall forecasts to predict if water levels are likely to rise significantly.
- During site assessment Councils designated officers will:
 - assess the site and observe relevant factors such as condition / height of sand berm, best location to scrape berm, safety and access arrangements, prevailing and forecast conditions.
- In preparation for an entrance management event, Council staff will:
 - make arrangements for deployment of personnel / machinery
 - Alert relevant State Government Agencies of the potential entrance management works
 - Closely monitor forecasts
- When a decision to take action is made, Council's personnel and machinery will be deployed to the entrance if the site assessment considers it appropriate and safe. There may be times where it is not safe to deploy machinery to the site due to prevailing or forecast weather conditions, in these situations flood evacuation of some areas may be required (refer to the Woolgoolga Floodplain Risk Management Study and Plan and the Coffs Harbour CZMP Emergency Action Sub Plan). The recommended access route will be used unless the site assessment indicates it is unsafe.
- Additional requirements for opening include:
 - works to only occur if the entrance is closed
 - if nesting shorebirds are found to be breeding at the entrance site, entrance management works should take this into consideration. This may involve contacting NPWS for advice, establishment of buffers and / or adjusting timing of entrance management activities;
 - all machinery used on site is to be suitably sterilised before accessing the beach, and to be in a well maintained condition to reduce the likelihood of any contamination and/or spills;
 - appropriate spill kits are to be available and at hand on site, to enable immediate response in the event of a spill. Spill kit procedures are to be addressed in the site tool box talk;
 - appropriate pedestrian safety measures are to be in place during the works i.e. either signage or CHCC staff to prevent pedestrian access within 20m of machinery and the entrance;
 - survey equipment to be used to shoot levels of the berm and confirm a height above 1.60m AHD;
 - backhoe then proceeds to scrape berm to appropriate level while continually cross referencing levels with survey equipment;
 - once level is achieved, operator to level sand to make safe for foot traffic.
 - where possible, scraped sand will be placed in the intertidal zone where it can be moved naturally by the tide and currents.
- Council's personnel and machinery will remain at the entrance (or the nearest location deemed suitable under the prevailing/forecast conditions) until such time that the lake opens of its own accord, or the operation is cancelled by Council's designated officers.
- Monitoring and reporting are essential for informing future management, determining improvements to the procedure, and for reporting as required by licensing conditions (monitoring form included in appendix 1). At a minimum the following should be recorded:
 - date and time of opening;
 - water level of lake prior to opening (obtain from MHL water level recorder);
 - water levels over 24 hours following opening (obtain from MHL water level recorder);
 - location and length of works;
 - ocean swell conditions (wave height and direction)
 - preceding rainfall;
 - date of closure;
 - digital photographs.

4.2 Responsibilities for Works

4.2.1 Responsibility

Coffs Harbour City Council is responsible for works to the sand berm.

4.2.2 Notifications

Council has consulted with a range of relevant Government Agencies in the preparation of this Procedure. Key contacts are listed below.

Table 4.1: Key agency contacts

Organisation	Contact
Office of Environment and Heritage (Water, Floodplain and Coast)	Principal Environmental Officer (Coast and Estuary)
Department of Primary Industries (Fisheries)	Manager Solitary Islands Marine Park
Department of Industry Crown Lands	Natural Resource Management Project Officer
National Parks and Wildlife Services	Ranger – Coffs Coast Area

4.2.3 Key Personnel

Councils designated officers responsible for the implementation of this Procedure are listed below:

- Senior Environmental Project Officer (Alternate – Environmental Project Officer)
- Coastal Works, Section Leader roads and Open Spaces
- Coastal Works, Maintenance Coordinator

Councils officers responsible for Procedure review and development are listed below:

- Coast and Environment Officer
- Team Leader (Biodiversity, Coastal & Flooding)

5 Procedure Updates

5.1 Review and Update of this Procedure

This Procedure and the associated REF should be reviewed every three years or in response to:

- outcomes of the Floodplain Risk Management Study and Plan for Woolgoolga Lake;
- augmentations to components of the local sewerage system that are impacted by flood levels;
- legislation changes; and
- any other significant factors relevant to works to the management of the entrance of Woolgoolga Lake Estuary.

This procedure should also be reviewed in line with the completion of key actions within the Woolgoolga Lake Estuary CZMP. These key actions include:

- Undertake an audit and assessment to identify key services and assets vulnerable to sea level rise impacts around Woolgoolga Lake which have the potential to necessitate artificial opening of the lake entrance (e.g. sewer PS 1 and PS 16 and low-lying properties).
- Develop appropriate strategies for relocation, replacement or modification of these services and assets (this relates to Action A-3 and A-4 in Council’s Climate Change Mitigation and Adaptation Action Plan).
- Relocate, replace or modify essential services and assets where appropriate to reduce potential for disruption and/or the need for artificial opening of the entrance.

Review of the Procedure will include analysis of all monitoring data collected over that period to ensure that predictions, assumptions and trigger levels outlined in the current Procedure and REF are correct or appropriate. This will include a review of changes to climate change and sea level rise predictions and consequent impacts to this Procedure.

6 References

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- Bewsher Consulting (1989). *Sunset Lakes Estate, Woolgoolga, Flood Study*. September 1989. BMT WBM (2016). *Woolgoolga Floodplain Risk Management Study and Plan*. Report prepared for Coffs Harbour City Council.
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7 Acronyms

AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CHLEP	Coffs Harbour Local Environmental Plan
CZMP	Coastal Zone Management Plan
ICOLL	Intermittently Closed and Open Lake and Lagoon
ISEPP	State Environmental Planning Policy (Infrastructure), 2007
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory
PS	Pump Station
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy

8 Appendix

8.1 Entrance Monitoring Form

Woolgoolga Lake Entrance Monitoring Form	
Opening Date / Time	
Natural or CHCC initiated opening	
Opening Water Level (m AHD)	
Berm Height (m AHD)	
Summary of conditions (rainfall, swell etc.)	
Location of works	
Date of closure	
Notes	

* Images of works, water level screen shots (MHL) and BoM forecasts should be included in monitoring folder