Shoalhaven City Council

Shoalhaven River Entrance Management Policy

Cover image: Shoalhaven Entrance 11th February 2020

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Acknowledgement *of Country*

Walawaani (welcome),

Shoalhaven City Council recognises the First Peoples of the Shoalhaven and their ongoing connection to culture and country. We acknowledge Aboriginal people as the Traditional Owners, Custodians and Lore Keepers of the world's oldest living culture and pay respects to their Elders past, present and emerging.

Walawaani njindiwan (safe journey to you all)

This acknowledgment includes Dhurga language. We recognise and understand that there are many diverse languages spoken within the Shoalhaven.

Contents

1 Introduction

1.1 Shoalhaven River Entrance Management Policy overview

The Shoalhaven River entrance area at Shoalhaven Heads is culturally, environmentally, and socially significant. The scenic and recreational values of the area are very important to residents and visitors to the region. The entrance area is one of the most important sites on the New South Wales (NSW) coast for populations of migratory wading birds (protected under international agreements) and, at times, threatened species of other shorebirds nesting at the site.

The natural entrance of the Shoalhaven River was historically located at Shoalhaven Heads. However, since the excavation of Berry's Canal in 1822, which connected the Shoalhaven River to the Crookhaven River, the canal has gradually widened to several hundred metres due to erosion. This morphological change, along with the construction of the north breakwall at Crookhaven Heads in 1912, resulted in the Crookhaven River becoming the permanent entrance to the Tasman Sea. The Shoalhaven River entrance at Shoalhaven Heads is opened by floods and subject to closure by natural onshore coastal processes. In smaller flood events with a closed entrance, floodwater can discharge to the Tasman Sea via Berry's Canal and Crookhaven Heads without adverse impacts.

If the entrance of the Shoalhaven River at Shoalhaven Heads were to remain closed during a flood event, water levels may be higher for longer in some parts of the floodplain. This could result in greater impacts on the Shoalhaven community such as inundation of existing low-lying property and cutting of access roads / evacuation routes, especially at the villages of Shoalhaven Heads and Greenwell Point, .

Council is responsible for managing the Shoalhaven River entrance at Shoalhaven Heads for the purpose of flood mitigation for low-lying properties in accordance with authorisations provided by the NSW Government. The mechanical opening of the Shoalhaven River entrance will not prevent flooding of houses within the entirety of the catchment. Even if the entrance is fully open at the start of a large flood (i.e., it has recently been scoured by a preceding flood) there are existing houses that can still be flooded as has been demonstrated by the *Lower Shoalhaven River Flood Study (2022)* and *EMP Trigger Level Review (2024).* Accordingly, the Entrance Management Policy (EMP) aims to reduce, not eliminate, the impacts of flooding.

The purpose of this Shoalhaven River EMP is to administer a clear plan to facilitate:

- Expedient and swift mechanical intervention in the path of floodwaters to help reduce the impact of flooding on the Shoalhaven community. It is noted that the purpose of an EMP is to assist with flood mitigation to habitable floor areas of low-lying properties for smaller more frequent flood events. An EMP does not assist with flood mitigation to low-lying non-habitable structures which can lawfully be constructed below the Flood Planning Level
- Responsible environmental management of the entrance berm (refer Figure 6-2 and Figure 6-3) and shorebird habitat, and the protection of the structural integrity of the coastal dune system and estuary at Shoalhaven Heads

This Shoalhaven River EMP describes:

- The procedures to be followed by Council to maintain a dry notch (refer Figure 6-2 and Figure 6-3) at the entrance
- The conditions that should be satisfied prior to a mechanical opening
- The procedures to be followed by Council for mechanical openings of the entrance (should this course of action be necessary)
- The course of action to reduce the sand burden needed to be removed in a planned opening of the entrance in times of flood (maintenance of a dry notch)

1.2 Objectives

The general objectives of the Shoalhaven River Entrance Management Policy are:

- To ensure that timely intervention is possible if riverine flooding is predicted
- To attempt to control flood breakout timing and location to reduce flood levels and reduce the chances of major morphological changes in the river channel and foreshores
- Reduce flood levels in the event that a mechanical entrance opening is not safe or possible
- To ensure that the Shoalhaven River entrance at Shoalhaven Heads is managed in an ecologically sustainable manner and minimise unnecessary entrance openings
- To determine key responsibilities and to streamline the decision-making process by quantifying the variables to be addressed by decision makers
- To set out the entrance management strategy so that all participating managers can undertake responsibilities in sympathy with overall objectives
- To set out the entrance management strategy so that the broader community can understand and support the process

The specific objectives of the Shoalhaven River Entrance Management Policy are:

- To clarify responsibilities and accountabilities in relation to the maintenance of the dry notch while the entrance is closed
- To clarify responsibilities and accountabilities in relation to breaching the entrance through mechanical intervention (excavation of a pilot channel or entrance berm lowering / management)
- To clarify when, where, and how the coastal berm is to be mechanically breached or lowered
- To clarify responsibilities and accountabilities in relation to sand trapping and dune care in the entrance environs to ensure that all efforts are consistent with overall entrance management strategies
- To detail the procedures and responsibilities for monitoring the entrance

1.3 Policy development and review

The EMP has been developed based on the findings of the Lower Shoalhaven River Coastal Management Program (CMP), *Lower Shoalhaven River Flood Study (2022),* Lower Shoalhaven River Floodplain Risk Management Study & Plan (due to be completed in late-2025), and *Shoalhaven LGA Floor Level Survey for Flood Planning (2024)* investigations.

Modelling undertaken as part of the EMP Trigger Level Review (2024) found that peak flood levels for all flood events were reduced by a maximum of 7cm for the lower trigger level scenarios (1.5m Australian Height Datum (AHD) and 1.7m AHD) which were investigated. The lower trigger levels investigated resulted in negligible impact on time till flooding occurs and the duration of flooding. The EMP Trigger Level Review (2024) recommended to retain the trigger levels included in the *Shoalhaven River Entrance Management Plan for Flood Mitigation (2006).*

The EMP Trigger Level Review (2024) also investigated opening the Shoalhaven River entrance on a Flood Watch rather than a Flood Warning. This investigation concluded that opening the Shoalhaven River entrance at Shoalhaven Heads on a Flood Watch is not recommended as it provides no entrance management benefits and could lead to unnecessary adverse environmental impacts and impose an unnecessary financial burden on Council.

A Flood Watch provides early advice of a developing situation based on forecast rainfall that may lead to flooding. A Flood Watch isn't a warning of imminent flooding. A Flood Watch can be issued up to four days in advance of possible flooding. Flood Warnings are more targeted and are issued for specific locations within catchments. Flood Warnings typically include predictions about the level a river will rise to and the timing of flooding.

2 Land to which this EMP applies

The EMP applies to lands located at the entrance of the Lower Shoalhaven River at Shoalhaven Heads, including those lands where excavation of sand would be carried out as part of entrance management and those lands where excavated sand may be beneficially placed. In the latter case, such lands could include the low dune crest locations along Shoalhaven Heads beach, and the estuarine foreshore adjacent to River Road. These locations are all within the same tertiary sediment compartment for this stretch of coastline as described in the Open Coast and Jervis Bay CMP and the Lower Shoalhaven River CMP.

The REF for management of the entrance considers the wider Shoalhaven River estuary and catchment.

The land to which the EMP applies is shown graphically in **Figure 2-1**.

Figure 2-1: Land to which the EMP applies

3 Review of Environmental Factors

A Review of Environmental Factors (REF) has been prepared to support the EMP and will be updated over time in line with any Policy changes, Crown Land licence applications and/or new information. The REF describes the activities involved in management of the entrance in accordance with the EMP, outlines the potential impacts of implementing the EMP on the coastal and estuary environments, and details the mitigation measures to be adopted to minimise potential impacts in accordance with the *Environmental Planning and Assessment Act 1979, Part 5*.

4 Climate change

The current proposed trigger values for the management of the entrance of the Shoalhaven River at Shoalhaven Heads (outlined in **Section 6.3** and **Section 6.5**) will need to be revised considering future sea level rise. These revisions should be considered at the proposed review periods of the Policy (refer **Section 10**) or at such other times determined by Council.

As of 2025, Council's adopted sea level rise projections are as below:

- 0.10 metres by 2030
- 0.23 metres by 2050
- 0.85 metres by 2100

In accordance with Council's Sea Level Rise Framework, Council will continue to monitor state and federal government advice and future Intergovernmental Panel on Climate Change (IPCC) reports to review existing sea level rise projections every seven (7) years.

5 Relevant legislation, policy and approvals

This Policy complies with the relevant State Government legislation and policies for the environmental management of estuaries, and will be applied with consideration of the following federal and state legislation and policies:

- Federal legislation:
    - Commonwealth Environmental Protection and Biodiversity Conservation Act 1999
    - Commonwealth Native Title Act (1993)
- State legislation:
    - NSW Environmental Planning & Assessment (EP&A) Act 1979 and Environmental Planning and Assessment Regulation 2021
    - NSW Local Government Act 1993
    - NSW Crown Land Management Act 2016
    - NSW Coastal Management Act 2016 and Chapter 2 of the State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021
    - NSW Fisheries Management Act 1994 and Policy and guideline for fish habitat conservation and management (2013 update) (Fairfull, 2013)
    - NSW Biodiversity Conservation Act 2016
    - National Parks and Wildlife Act 1974
    - NSW Marine Estate Management Act 2014 and Marine Estate Management Regulation 2017
    - NSW Aboriginal Land Rights Act 1983
    - Water Management Act 2000
    - Work Health and Safety Act 2011

- Policies and manuals:
    - State Environmental Planning Policy (Transport and Infrastructure) 2021
    - NSW Coastal Management Manual (2018)
    - NSW Government's Floodplain Risk Management Manual and Flood Prone Land Policy (2023)

Table 5-1 provides a list of potential permits/approvals that may be required for the carrying out of mechanical interventions at the entrance. These will be confirmed following completion of the supporting REF for the EMP.

Table 5-1: Potential permits and approvals for mechanical interventions at the entrance

Relevant Act	Approvals required	Approval body
NSW Crown Land Management Act 2016	Licence to carry out activities on Crown Land	NSW Department of Planning, Housing and Infrastructure – Crown Lands
NSW Fisheries Management Act 1994	Permit to harm marine vegetation, if applicable.	NSW Department of Primary Industries and Regional Development - Fisheries
NSW Biodiversity Conservation Act 2016	Species Impact Statement (SIS), if applicable.	NSW Department of Climate Change, Energy, the Environment and Water
NSW National Parks and Wildlife Act 1974	Aboriginal Heritage Impact Permit (AHIP), if applicable.	NSW Department of Climate Change, Energy, the Environment and Water

6 Entrance management principals and procedures

The EMP will be implemented in accordance with the principles and procedures set out in the following sections.

The core approach for management of the entrance of the Lower Shoalhaven River at Shoalhaven Heads includes maintenance of a dry notch, berm management, and excavation of a pilot channel and/or berm lowering when water level triggers are met or forecast to be met based on a Bureau of Meteorology Flood Warning for the Shoalhaven River.

6.1 Management principles

This EMP aims to implement a management regime which is consistent with the principles of ecologically sustainable development.

Entrance management procedures differ for dry notch maintenance and berm management, compared with planned openings.

The following general principles apply to management of the Shoalhaven River entrance at Shoalhaven Heads:

- Open the entrance when water level triggers (refer **Section 6.5**) are reached or forecast to be reached based on a Flood Warning from the Bureau of Meteorology
- Implementation of long-term flood mitigation measures, as identified in the Lower Shoalhaven River Floodplain Risk Management Plan (underway), to negate the need for mechanical intervention to restore a more natural opening regime over time
- Incorporate provisions for increasing water level triggers commensurate with sea level rise and in accordance with Council's Sea Level Rise Framework. This would need to be undertaken in conjunction with the implementation of long-term flood mitigation measures investigated through a Floodplain Risk Management Study and Plan to ensure that existing low-lying dwellings and assets are raised or relocated over time and new development is appropriately located

6.2 Monitoring

6.2.1 Berm height monitoring

Council will monitor sand levels in the entrance area during periods of closure as follows:

- Detailed survey at approximately monthly intervals when closed to the sea, and at other times considered necessary (such as after the issue of a Bureau Flood Watch (where possible))

Cost effective and rapid survey techniques will be further investigated, particularly for the surveys that are to be done in response to a Flood Watch notice.

As part of Council's commitment to the expanded documentation of entrance conditions and natural processes, detailed surveys of ground levels at the entrance area have been completed at varying intervals since June 2001. In recent years, since approximately 2020, surveys have been completed on an approximate monthly basis when the entrance was closed. All entrance surveys are validated against a number of State Survey Marks in accordance with best practice survey procedures. These surveys indicated that on most occasions the berm crest was just above 2.0m AHD, and as such, no excavation was required for maintenance of the dry notch which was typically lower than 2.0 m AHD.

A historical berm height analysis was undertaken for the Shoalhaven River entrance at Shoalhaven Heads by consultants Water Technology in 2024. The historical berm height analysis provides guidance as to the likely frequency and volume of sand to be removed from ongoing dry notch maintenance.

6.2.2 Monitoring of Entrance Openings

Monitoring of both mechanical and natural entrance openings, including openings as a result of berm lowering, will be undertaken by Council, which includes recording of any relevant impacts of mechanical openings and entrance berm maintenance.

A record of conditions prior to opening and after opening will be undertaken by Council.

A record of the excavated east-west length, north-south width, and depth of the breach will be recorded where possible based on safety considerations. Tides and prevailing winds should also be recorded and should be supported by photos from one or two consistent vantage points where possible.

The entrance of the Shoalhaven River can be extremely hazardous prior to, during, and immediately following an entrance opening, with rising floodwater in the estuary and wash-over from the sea generally occurring. Safety concerns typically require staff and equipment to quickly leave the entrance area after the pilot channel has been excavated. The amount of information that can be collected to monitor entrance openings will therefore be highly dependent on an on-site assessment of the safety of the operator and equipment for each individual flood event. Some information can also be obtained from satellite imagery.

6.3 Maintenance of a dry notch

6.3.1 Location, configuration and maintenance of the dry notch

Dry notch maintenance comprises the periodic lowering of the 'dry notch' area (refer **Figure 6-1**, **Figure 6-2** and **Figure 6-3**) under closed entrance conditions as a preparatory measure to reduce the burden of sand to be removed at the time of a mechanical entrance opening. This activity is intended to form part of the ongoing management of the Shoalhaven River entrance at Shoalhaven Heads to manage flood risk. The excavation and maintenance of a dry notch can benefit mechanical interventions (i.e. pilot channel excavation and berm lowering) as it can lead to a reduced pilot channel length (allowing for greater scour potential), and a reduced volume of sand to be excavated when undertaking mechanical interventions, allowing a faster opening to be achieved.

Historically, there has been a tendency for an open entrance to scour northward threatening public facilities and scouring the main surf beach. This pattern of scour is dependent on a number of factors such as the position of the dry notch, the existing sand burden on the coastal berm at the entrance and to the north, prevailing winds, prevailing ocean currents, etc. The following considerations will determine the exact position of the notch on each occasion:

- The natural variations in the height, length, and shape of the entrance berm and dune that occur from time to time
- The location of deeper water inland, which may mean that less sand needs to be scoured when an emergency opening takes place
- The location of nesting shorebirds

Given the importance of minimising the volume of sand in the entrance area, greater consideration needs to be given to the location of the notch immediately after closure of the entrance. The procedure should be based on aerial photography, land survey, and potentially hydrosurvey. This procedure should allow Council to determine the area that provides the least volume of sand for a future breakout, as well as meeting the other requirements.

The configuration of the notch is shown diagrammatically in **Figure 6-2** and graphically in **Figure 6-3.**

The dry notch will be excavated to a level of 2.0m AHD across a 50m minimum stretch of the entrance in a north-south direction. The east-west length of the notch will be determined by the shape of the entrance berm and dune at the time. The western limit of excavation will be determined by the point where the natural sand level drops below 2.0m AHD. The eastern limit of excavation is discussed below.

The crest of the berm (over a narrow east-west distance) will naturally rise and fall significantly over short time periods in response to oceanic conditions. Experience at the Shoalhaven River entrance at Shoalhaven Heads has shown that it is not practical or desirable to attempt to maintain this berm or dune crest at 2.0m AHD. Not only would the work be operationally ineffective, but it may compromise the maintenance life of the notch further to the west, by allowing more frequent wave wash-over and dumping of sand in the notch. This wash-over could also affect the nesting success of shorebirds that may be present (such as Little Terns and Pied Oystercatchers).

For these reasons the notch will not extend to the fullest extent possible eastward, through the crest of the berm or dune, but will be maintained as follows:

- During the months of March to October the dry notch will be mechanically excavated to 2.0m AHD to within approximately 10 metres west of the high point of the berm or dune
- During the potential shorebirds breeding season (i.e. October to March) the dry notch will be mechanically excavated to 2.0m AHD to within approx. 20 metres west of the high point of the berm or dune, if this can be done without direct disturbance to nesting birds. The exact offset distance will be determined in consultation with NSW National Parks and Wildlife Service (NPWS)

A decision flow chart for management of the Shoalhaven River entrance is shown in **Figure 6-4**.

Figure 6-1 Shoalhaven River Entrance Area

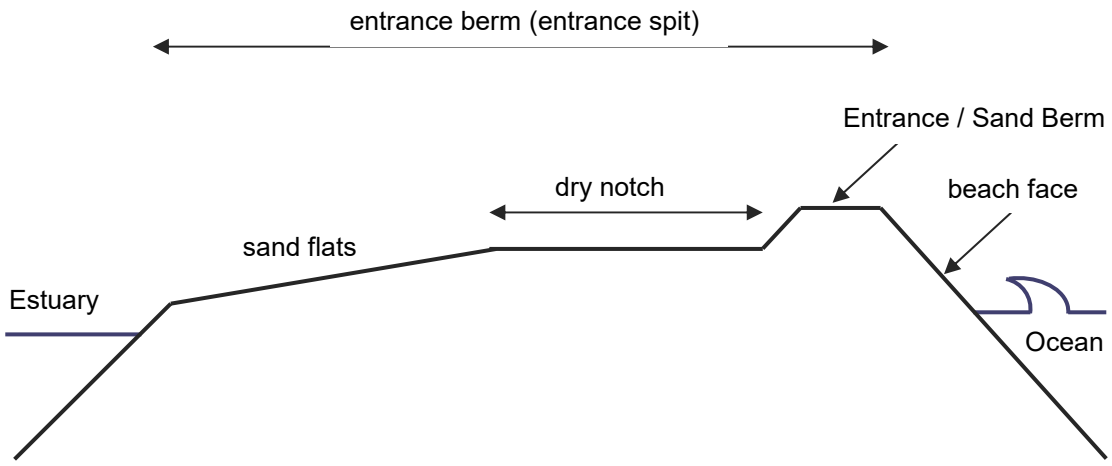

Figure 6-2 Diagramatic East-West Section Showing Configuration of the Dry Notch

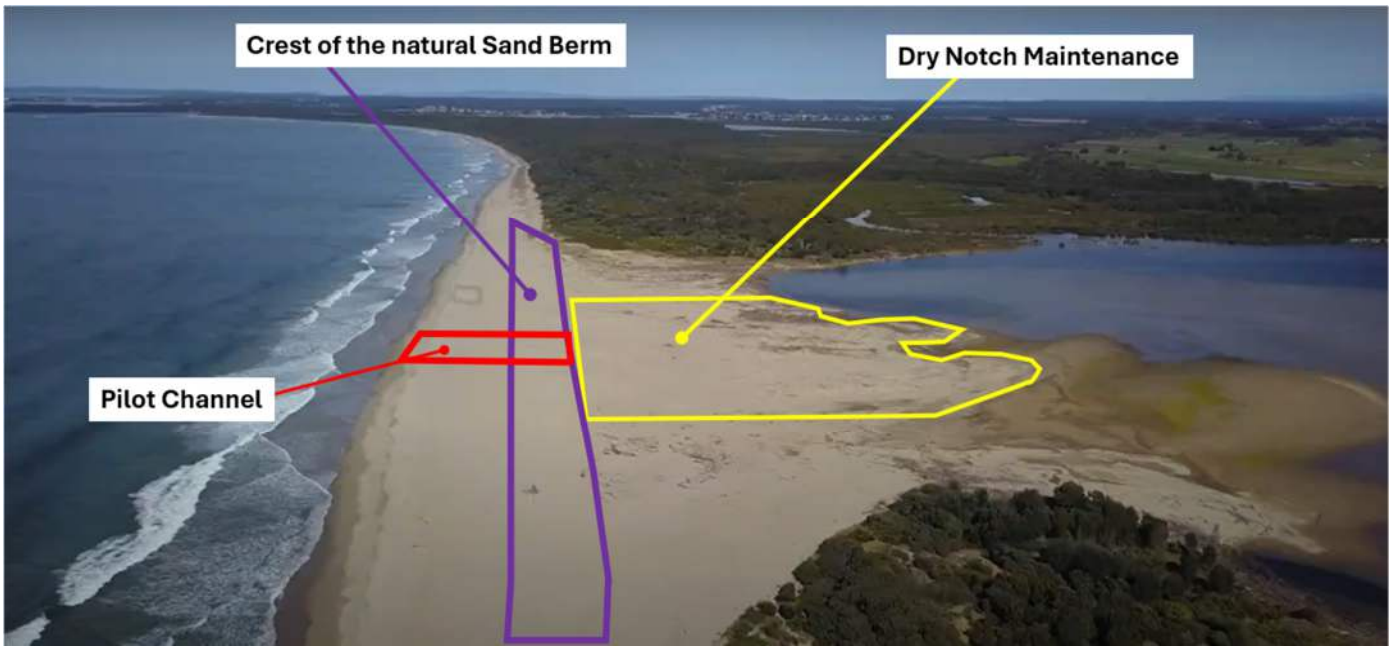

Figure 6-3 Approximate Configuration of the Dry Notch Area, Sand Berm Crest and Pilot Channel

6.3.2 Dune strengthening strategy

As a result of historical opportunistic strengthening of the dunes to the north of the entrance, aiming to mitigate the potential for northward scour damage, a well vegetated dune system is now established (refer **Figure 6-1**). This vegetation now also assists in preventing inland sand migration by heavy seas and/or onshore winds.

Earlier revisions of the Shoalhaven River EMP indicated that the strengthening of the northern dune should continue further southward into the entrance area. However, the Lower Shoalhaven River Flood Study (PWA, 1990) assumed that the entrance would be able to scour to a north-south width of 400 metres. **Table 6-1** shows the results of additional modelling (Webb McKeown and Associates, 2006) of the impact of restricting the final north-south dimension of the channel. This finding was also confirmed by dynamic entrance breach modelling undertaken as part of the *Lower Shoalhaven River Flood Study (2022).*

Table 6-1 Results of Modelling Effect of North-South Scour Width

N-S dimension (m)	400	300	200	100	50
Flood impact (m)	base	+0.14	+0.31	+0.53	+0.68

It is therefore important that the channel be allowed to scour to a north-south width of at least 400 metres in order to maintain current flood planning levels. Dune strengthening works that would prevent this from happening should not be undertaken. As such, there should be no strengthening of the dune in the area indicated in Figure 6-1.

6.3.3 Earthmoving machinery required for regular maintenance of dry notch

If possible, sand removal for dry notch maintenance should be utilised to contribute to strengthening of the dune north of the entrance area adjacent to the Shoalhaven Heads Surf Club. This will generally mean transportation of material will also be required. The recommended combinations are:

- Bulldozer of approx. CATD6/D7 size
- Excavator and 2/3 x6WD dump trucks

6.4 Berm management

Computer modelling (Webb Mckeown and Associates, 2006) indicates that the volume of sand contained within the higher dune crest is not large and would not significantly impact on flood levels, provided the crest is breached when or before local flood levels reach 2.0m AHD.

The EMP trigger level review (2024) assessment identified that should Council be unable to open the entrance, and that the entrance berm is high (such as 2.6m AHD), that this could lead to adverse flood impacts. It is worth noting that the 2.6m AHD level is highly conservative, representing the highest recorded berm height over 23 years of available entrance survey data. Review of the available survey data (taken approximately 2 to 4 times a year between 2001 and 2024) identified that the entrance only exceeded 2.3m AHD 20% of the time.

However, despite the low likelihood of the berm height reaching 2.6m AHD or higher, there remains a risk that if the berm level is high and Council is unable to undertake a mechanical opening, then flood impacts may be worsened.

It is noted that the management of the dry notch would work alongside berm management to help manage flood risk.

The presence of the dry notch means that opening the entrance requires the removal of the sand berm crest (entrance berm) only, and not a full excavation of the dune as would be required without the dry notch. This allows for a quicker and safer opening procedure.

The EMP trigger level review (2024) recommended that entrance berm height management be investigated as part of the REF for inclusion in the EMP. It is noted that berm management complements a mechanical opening and is not intended to replace it.

From a flooding perspective, the EMP trigger level review (2024) recommended that entrance berm height management would allow Council to either:

- Maintain the entrance berm and prevent it rising higher than a set level
- Reduce the entrance berm level, if required, in the event of a Flood Watch or Flood Warning. Berm lowering prior to a flood event allows the rising floodwater to overtop the entrance berm at a level which minimises the chance of any adverse flood impacts

Maintaining the entrance berm constantly at a low level would likely be impractical due to the rapid infilling that occurs from wind and wave action.

Therefore, the entrance berm does not need to be maintained constantly at a set level. To reduce the environmental and financial impacts, the berm could be lowered on a Flood Watch (assuming the berm height is higher than the applicable EMP trigger level). Actively reducing the berm level in the event of a Flood Watch would seek to ensure that should a subsequent opening not be possible, then the risk of potential flood impacts is mitigated as far as reasonably practical. In addition, works required to undertake an opening would likely be reduced due to the preparatory works undertaken during the berm lowering.

Maintaining the entrance berm at a lower level (or lowering it via berm lowering such as on a Flood Watch) may increase the likelihood of wash-over, potentially preventing further mechanical intervention from occurring (such as excavating a pilot channel). However, a lowered berm would reduce the risk of adverse flood impacts from occurring by allowing the Shoalhaven River entrance at Shoalhaven Heads to naturally overtop at a lower level.

A decision flow chart for management of the Shoalhaven River entrance is shown in **Figure 6-4**.

6.5 Water level indicators for a planned opening

There are two automatic water level recorders in the river at Shoalhaven Heads – one at the western end of Hay Avenue near the Bevan Creek entrance and one opposite the River Road boat ramp at the caravan park. A gauge that used to be at the end of Wharf Road was decommissioned when the Hay Avenue gauge was installed. The two gauges are owned and maintained by Manly Hydraulics Laboratory and Council. They are real-time gauges and Council has access to the water level information via an online dashboard. The Shoalhaven Heads gauge will generally be used by Council's flood engineers in the case of a flood, but the Hay Avenue gauge should be monitored as a backup.

There is also a gauge plate in the water next to River Road. The numbers on the plate are in metres above AHD. This will be monitored by the site supervisor, as required.

6.6 Triggers for mechanical opening (excavation of a pilot channel)

If the entrance is closed and flood levels (actual or forecast) are below the opening trigger levels, floodwater can discharge to the Tasman Sea via Berry's Canal and Crookhaven Heads without impacts. In this scenario, the entrance is not required to be opened.

If the entrance is closed but the beach berm elevation is below the planned opening level, the entrance can naturally open without mechanical intervention before the trigger levels are reached. In this scenario, the entrance is not required to be mechanically opened. Monitoring of the entrance berm is required during a flood event.

If the entrance is closed and the beach berm is above the planned opening level, Council can mechanically open the entrance at times of flood as per the EMP to help alleviate impacts from low-level flooding.

When a Flood Watch notice is received from the Bureau of Meteorology, Council will initiate a planned opening if it becomes necessary (including putting machinery on standby, obtaining a new entrance survey (where possible), and inspecting the site for sand build up and the presence of shorebirds). If there is considerable sand build up in the notch, then an excavator should be moved to the site and excavation (berm lowering and/or dry notch excavation) will commence at this stage subject to satisfaction of requirements regarding threatened migratory shorebirds. Once the notch is re-established, consideration should be given to keeping the machine at Shoalhaven Heads for the duration of the Flood Watch.

A minimum of 6 to 9 hours warning will be available of significant river rises at Nowra as part of the Bureau's Flood Forecast and Warning Service for the Shoalhaven River.

Intervention trigger conditions for mechanical opening (excavation of a pilot channel) are as follows:

(a) **Potential opening:** Immediately after a Flood Warning is received predicting a flood level exceeding 2.5m AHD or greater at Nowra Bridge, machinery will mobilise to the Shoalhaven River entrance at Shoalhaven Heads and excavation will commence, working from inland towards the Tasman Sea; OR

Note: Ordinarily the final breach should not take place unless 3.0m AHD is reached, or is forecast to reach or rise beyond 3.0m AHD at the Nowra gauge, or if the water level at Shoalhaven Heads is rapidly approaching 2.0m AHD, indicating that Broughton Creek catchment may be contributing significant flows.

Note: The process should be aborted if subsequent forecasts are revised to be confident that a level of 3.0m AHD is not anticipated to be reached and/or sustained at Nowra Bridge and 2.0m AHD is not anticipated to be reached and/or sustained at Shoalhaven Heads.

(b) **Immediate opening**: An actual or forecast (based on Bureau of Meteorology Flood Warning) river level of 3.0m AHD at Nowra Bridge OR 2.0m AHD at Shoalhaven Heads facilitates an immediate entrance opening; AND,

Note: Where possible, excavation is to be planned so that final breakout occurs on a receding tide to optimise available scouring time. However, if the river level has already reached 2.0m AHD at Shoalhaven Heads and sea conditions are considered appropriate, then the opening should proceed irrespective of whether the tide is rising or falling.

(c) Satisfaction of requirements regarding threatened migratory shorebirds. [subject to REF and licence conditions]

A decision flow chart for management of the Shoalhaven River entrance is shown in **Figure 6-4**.

The final breach should not be made if it is considered that sea conditions are inappropriate. Elevated ocean levels and large waves can aggravate flooding effects within the Shoalhaven River floodplain. If the ocean water level is higher than the river water level, then breaching the river entrance could exacerbate flooding at Shoalhaven Heads by allowing the sea to flow into the estuary. The hazard may be increased if ocean waves were to penetrate into the bay and propagate across the foreshore of the caravan park. In addition, elevated ocean levels and large waves may

make conditions on the entrance berm and dune so treacherous that it would be impossible and extremely unsafe to take machinery there to open the river. In this instance, it is required to wait until conditions subside and/or the tide falls sufficiently to allow mechanical opening to proceed.

Once the criteria above have been met, the exact timing of the opening will be determined based on local Shoalhaven Heads conditions as set out in Council's flood event procedures.

6.6.1 Preferred physical opening location

The exact breach position is to be determined on site. It is to be as far south as is reasonable, preferably within the area shown in **Figure 6-1**. It is then to be determined on economies: shortest, lowest line of sand will obviously be quickest and cheapest. This will generally be in the line where the dry notch has been maintained. Naturally, judgement is required as quantity of sand to be removed, access to deeper water inland and other related factors will play a part. The presence of threatened migratory shorebirds must also be considered.

Cognisance does need to be given to the potential damage that can occur if the scour is northward and/or the entrance opening begins too far northward. Diligence to attempt to mitigate this factor is strongly emphasised.

6.6.2 Access roads

Machinery would, typically, be required to travel on Bolong Road from Bomaderry to Shoalhaven Heads. Under most circumstances, and with appropriate preparedness, it will be possible to get machinery to Shoalhaven Heads before the road is closed by floodwaters at the following levels.

6.6.3 Entrance opening procedure

A channel approximately 1 metre deep and 4 metres wide should be excavated from the river to the Tasman Sea. Excavation should commence on the river side of the entrance sand dune and progress towards the sea, so that advantage can be taken of drier conditions on the lower ground in the early stages of the excavation. The exact dimensions of the channel will be determined by given restraints in time, natural repose of the sand, etc. The machinery decrease efficiency by trying to dig deeper than natural forces will allow to remain.

The exact dimensions of the pilot channel may be varied (within a range of metres) depending on operational experience and local site factors at the time.

The berm should not be breached until all conditions outlined in **section 6.5** have been met.

The breach is to be as clear as possible of surplus sand in its immediate environs. Thus, the sand burden removed to create the breach is to be moved as far as is possible from the channel. This is where, if it is practically possible and affordable, an additional excavator (or a D7 type dozer, or bigger) would be beneficial as one can be digging and the extra machine can be removing sand away from the channel to mitigate against sand burden infilling of the excavated breach.

6.6.4 Risk to life and equipment

The machinery is likely to be operating in a harsh environment (high seas, wind and wave action, possible darkness) with a significant risk to life and potential for loss of equipment (bogged or cut off from retreat).

A risk assessment has been carried out for the activity. It includes measures for mitigating the risks to operators and equipment. All works must be completed in accordance with the Work Health and Safety Act (2011).

There is considerable danger to members of the public that might choose to be at the site during excavation. The potential hazards include being hit by large machinery or being swept to sea by the river as the banks of the scouring entrance channel collapse. To help reduce such risks, Council's rangers should provide crowd control where possible when an opening is taking place.

The operation would be more hazardous if carried out in darkness. The procedures for the site supervisor provide for opening of the entrance before nightfall if other conditions allow. Despite this, there may be times when the job will need to be done in darkness provided Council have assessed the suitability of undertaking these works safely and appropriate work health and safety (WHS) controls implemented. Personnel will be trained to undertake the task.

6.7 Mechanical berm lowering

Mechanical berm lowering comprises the pre-emptive lowering of entrance berm levels under closed entrance conditions ahead of a predicted flood event by excavation of sand over the dry notch footprint and the sand plug at the beach face (berm crest). This should be carried out in daylight hours under certain circumstances to promote natural opening when flooding is expected to occur overnight, and further mechanical intervention may not be possible due to safety reasons. In these circumstances, undertaking pilot channel excavation procedures (refer **Section 6.6.3**) would be hindered by the timing of the expected trigger level breach and coastal processes are anticipated to result in excavation works being ineffective (i.e. wave action results in return of sand to the berm and beach face, infilling pilot channel excavations). It should be noted that wave conditions will also impact the longevity of the berm lowering and that some sand build-up could occur again prior to the entrance opening being achieved. Hence it is important to undertake berm lowering at a time that has considered possible impacts of oceanic conditions and the predicted timing for the trigger level being met (i.e. the day prior).

Mechanical berm lowering is an effective management strategy in the following situation:

- A low river level prior to a forecast flood event
- Surveyed berm elevation is above the planned immediate opening level of 2.0m AHD
- A forecast flood event would result in the trigger levels for an immediate opening potentially being reached overnight or in unsafe conditions to allow the excavation of a pilot channel

Mechanical berm lowering in this situation allows the river level to rise and then naturally open at the planned opening level, reducing the risk of flooding and possibility that further mechanical works may not be possible due to unsafe conditions on the entrance berm. In the event that the flood level does not reach the level of the lowered berm, the entrance would not overtop and scour open.

Refer to decision flow chart for management of the Shoalhaven River entrance at Shoalhaven Heads as shown in **Figure 6-4**.

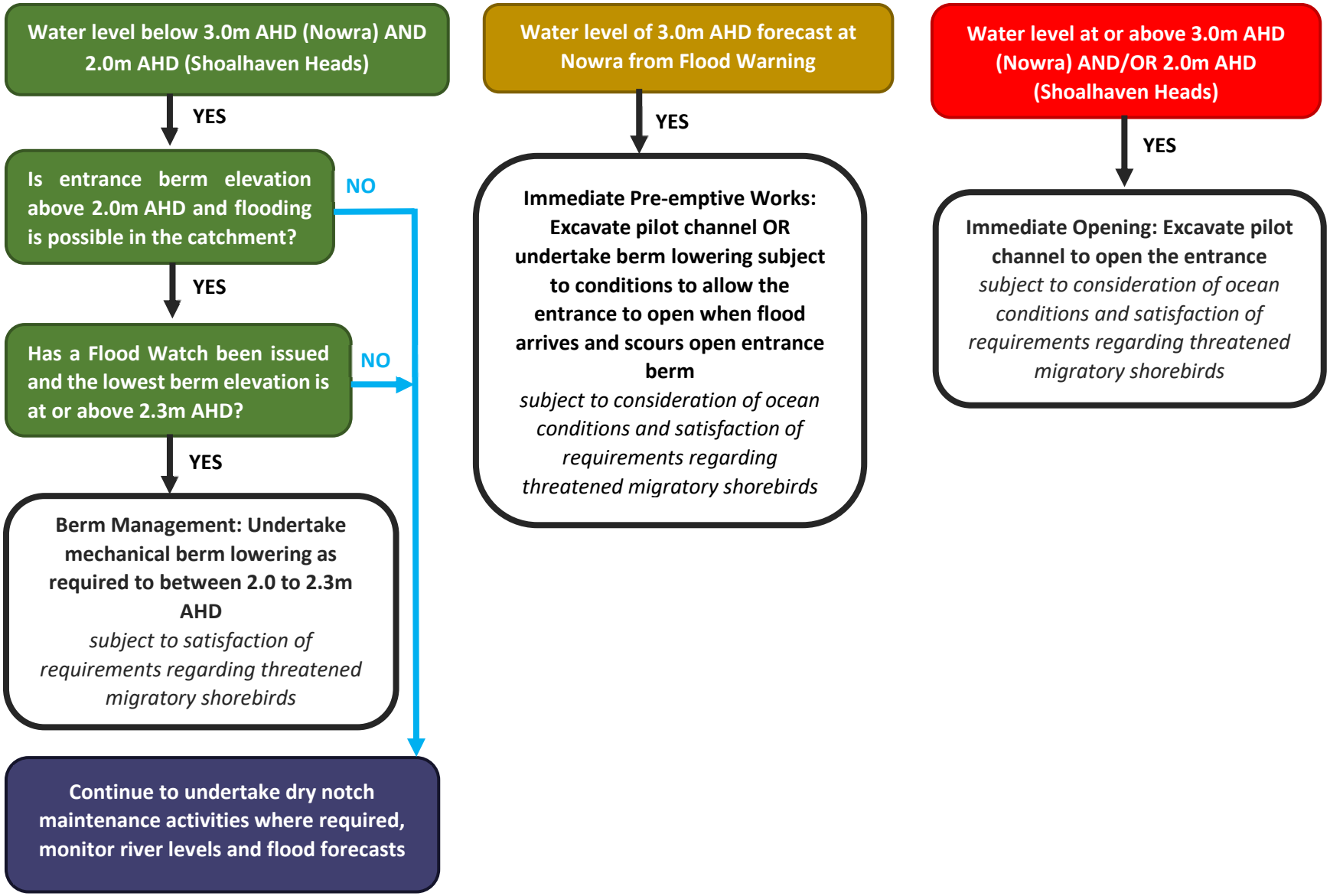

Figure 6-4: Decision Flow Chart

7 Responsibility

Primarily responsibility for implementing this EMP is with Council.

8 Penalties

Council has the authority to penalise persons opening the Shoalhaven River entrance without appropriate authorisation under Section 632(1) of the *Local Government Act 1993*. In some circumstances it is also illegal under the *Fisheries Management Act 1994* to conduct non-authorised opening of the Shoalhaven River entrance.

9 Contacts

The responsible officer in respect to sanctioning mechanical intervention is the Shoalhaven City Council Director City Development or their appointed delegate.

The responsible officer in managing the mechanical excavation and monitoring process shall be Shoalhaven City Council City Services Works and Services Manager. Council's Works and Services Manager would normally delegate responsibility for regular maintenance of dry notch, berm management and planned openings (pilot channel excavation or entrance berm lowering), in accordance with this policy, to officers in City Services such as the Northern District Engineer. The site works would normally be delegated to Council's Northern Maintenance Engineer who will assign the task to the site supervisor.

The Works and Services Manager should also nominate an officer to liaise with other groups as required. These would include Council's rangers, Council's liaison officer at the Emergency Operations Centre (EOC), the State Emergency Service and NSW Government agencies as required.

Contact will be made with officers of Environmental Services (namely, the Coastal Management Unit) by appropriate Shoalhaven City Council processes, in respect to sand disposal options.

The NPWS Area Manager, South Coast, is the officer that will arrange for Council to be informed any time that shorebirds are known to be nesting at the Shoalhaven River entrance at Shoalhaven Heads. Council's Environmental Services section shall liaise with NSW NPWS to determine if there are any shorebirds present as part of the pre-entrance opening planning or dry notch maintenance procedures.

Details of essential emergency communications are set out in the Council procedures supporting this EMP.

Key contacts regarding implementation of this EMP are shown in **Table 9-1**.

All key contacts are to be advised of any intention to carry out entrance works, prior to the activities.

Table 9-1: Shoalhaven River Entrance Management Policy - Contacts

Organisation	Contact details
Shoalhaven City Council	Lead Floodplain Management Number: 1300 293 111 Email: Floodplain.Management@shoalhaven.nsw.gov.au Lead Coastal Management Number: 1300 293 111 Email: coastal.management@shoalhaven.nsw.gov.au Manager Environmental Services Number: 1300 293 111 Email: Environmental.Services@shoalhaven.nsw.gov.au
NSW Department of Climate Change, Energy, the Environment and Water	Senior Coast and Estuaries Officer (South East Regional Delivery – Shoalhaven LGA) Number: (02) 4221 6917 (Wollongong office) Email: admin-southeast@environment.nsw.gov.au
NSW Department of Primary Industries and Regional Development – Fisheries	Fisheries Manager – Coastal Systems Number: 1800 043 536 Email: information-advisory@dpi.nsw.gov.au and ahp.central@dpi.nsw.gov.au
National Parks and Wildlife Service – Shoalhaven Area	Number: (02) 4554 9500 (Ulladulla) or (02) 4428 6300 (Nowra office) Email: npws.shoalhaven@environment.nsw.gov.au
National Parks and Wildlife Service	Shorebird Ranger Number: (02) 4428 6300 (Nowra office) Email: npws.shoalhaven@environment.nsw.gov.au
NSW Department of Planning, Housing and Infrastructure – Crown Lands	Area Manager Number: 1300 886 235 Email: cl.enquiries@crownland.nsw.gov.au
Jerrinja Local Aboriginal Land Council	Number: (02) 4447 5669
NSW State Emergency Service	Number: 132 500

10 Review of policy

This EMP is to be reviewed as necessary every 5 to 10 years depending on the duration of the NSW Crown Lands licence. This will be determined following the receipt of a NSW Crown Lands Licence.

The EMP has been developed based on the findings of the Lower Shoalhaven River Coastal Management Program (CMP), Lower Shoalhaven River Flood Study (2022), Lower Shoalhaven River Floodplain Risk Management Study & Plan (due to be completed in late-2025), and Shoalhaven LGA Floor Level Survey for Flood Planning (2024) investigations.

This policy should be reviewed in the future:

- To be updated to incorporate new information (for example in relation to sea level change), new legislation and the community's changing needs as required
- At no less than 10-year intervals, to ensure staff and community understanding of the principles to be applied
- After a flood event, if Council staff and/or any government agency suggest that any part of the procedure is inappropriate
- In light of changing flood patterns and/or other flood protection strategies, such as implementation of flood mitigation measures identified in the Lower Shoalhaven River Flood Risk Management Study and Plan

11 Amendments

[*This section of the EMP should summarise the amendments to the EMP since its first adoption. The summary should include the date of the amendment, a brief description of the amendment, and the section within the EMP where the amendment can be found*].

12 References

Public Works Department (1984) Shoalhaven River Entrance Management Report

Public Works Department (1984) Shoalhaven River Entrance Management Report

Rhelm (2023) Coastal Management Program for the Lower Shoalhaven River: Review of the Entrance Management Plan, Prepared for Shoalhaven City Council

Rhelm (2024) Lower Shoalhaven River Entrance Management Policy Trigger Level Review, Prepared for Shoalhaven City Council.

Smith, P. (1991) The Biology and Management of Waders (suborder Charadrii) in NSW. Species Management Report Number 9, NPWS.

Stantec (2022) Lower Shoalhaven River Flood Study.

Water Technology (2025) Shoalhaven River Entrance Opening Historical Berm Height Analysis, Prepared for Shoalhaven City Council.

Water Technology (2025) Shoalhaven River Entrance Opening Review of Environmental Factors, Prepared for Shoalhaven City Council.

Webb, McKeown and Associates Pty Ltd (2006) Shoalhaven River Entrance Management Plan Review, Prepared for Shoalhaven City Council.