# Shoalhaven CMP Scoping Study

## Report

Shoalhaven City Council

**August 2020**

**Level 17**
**141 Walker Street**
**North Sydney NSW 2060**

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Advisian
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## 301015-04030-001 – Shoalhaven CMP Scoping Study: Report

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# Executive Summary

## What is a Scoping Study?

This Scoping Study documents Stage 1 in the development of a Coastal Management Program (CMP) for the Shoalhaven coastline. The Stages of the CMP process are provided in Figure E-0-1.

The Scoping Study sets the scene for Shoalhaven City Council's coastal planning process leading to the development of a Coastal Management Program (CMP), as required by the NSW *Coastal Management Act* 2016.

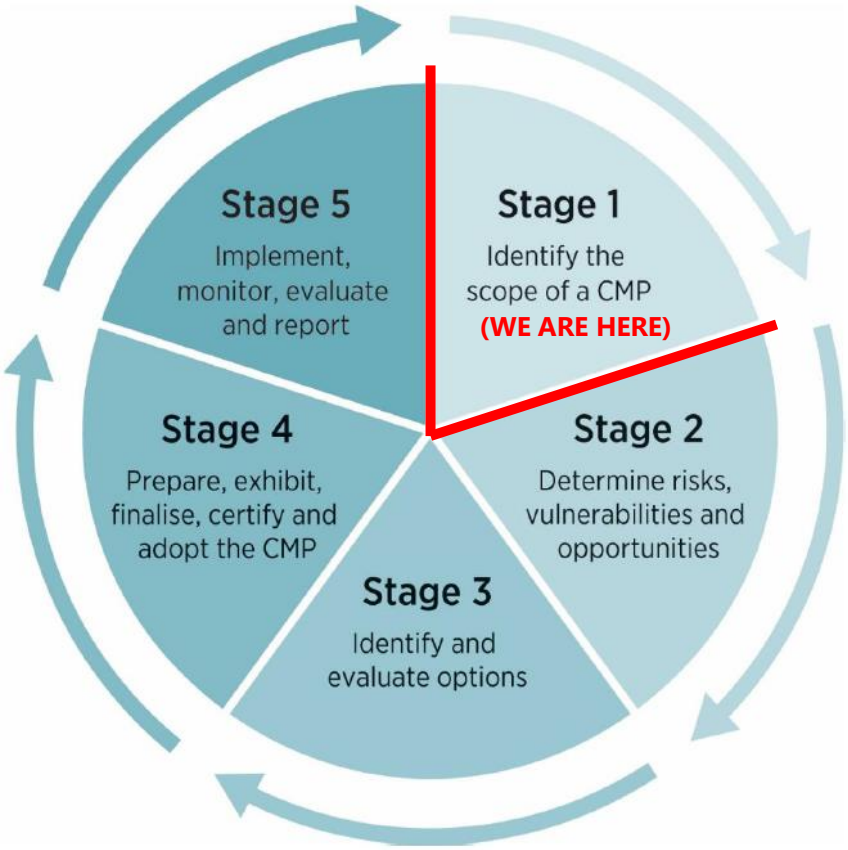



*Figure E-0-1 – Stages in preparing and implementing a CMP (Coastal Management Act 2018)*

## What is a Coastal Management Program?

The Coastal Management Program (CMP) is a plan for the management of the coastal zone and estuaries of the Shoalhaven. It may be thought of as a natural progression of the existing coastal management processes in place within the Shoalhaven and is intended to encompass and build upon the large body of work already carried out with respect to coastal management in the Shoalhaven, by addressing any existing risks and management gaps in the existing arrangements.

The new CMP will build on the work undertaken in 2012 in developing the Shoalhaven Coastal Zone Management Plan (CZMP), which was updated in 2017/18 and certified by the Minister for the Environment in September 2018.

## What is covered in this Scoping Study?

This Scoping Study is structured to provide the following information:

1. An outline of the strategic context of the CMP.
2. A clear statement of what the Council intends to achieve with the CMP, including a purpose, vision for the coast and management objectives.
3. A description of key management issues to be the focus of the CMP.
4. A review of current coastal management issues and challenges and the effectiveness of existing management arrangements, responses and land-use planning instruments.
5. A description of roles, responsibilities and governance.
6. A description of where action is required including the results of a first pass risk assessment to identify priority threats and hazards.
7. A stakeholder and community engagement strategy, that outlines how public authorities, community organisations and individuals will be offered appropriate opportunities to be involved in objectives, decisions and actions for the management of the coast.
8. A preliminary business case for the preparation of the remaining stages of the CMP.
9. A discussion on whether a Planning Proposal is likely to be required to amend the Coastal Management Area or LEP mapping.
10. A forward program with subsequent stages in the preparation of a CMP.

## What this Scoping Study does not cover

It is important to note that the development of management actions for the identified issues in the coastal zone is not the focus of this Scoping Study – identifying and developing management options is covered in Stage 3 of the CMP process. The Scoping Study also is not intended to replace the existing body of work on Coastal Management in the Shoalhaven.

## What is the Purpose of the CMP and Vision for the Coastal Zone?

A Vision, Strategic and Specific objectives of the CMP have been developed as part of the Scoping exercise for the Shoalhaven CMP. The overarching Vision is:

> **Vision:** *We care for and protect the coast so that current & future generations continue to be refreshed & inspired by their coastal experience.*

Council has identified the Purpose of the CMP as:

> **Purpose:** *"to develop a plan for the future management of the Shoalhaven's open coast and its estuaries in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the Shoalhaven".*

The Strategic Objectives for the CMP as outlined in Section 2 of this report have been drafted to capture the following themes:

- Give effect to all relevant ***NSW legislation and policy***, as applied to the coastal zone, in the Shoalhaven context
- Manage all coastal systems in an ***integrated manner that recognises the links*** between catchment, lake, estuary and open coast processes
- Manage the coastal zone ***adaptively***, with a clear process for ***modifying management approaches*** as new knowledge becomes available
- Invest in effective and efficient strategies to achieve ***positive natural, social, cultural and economic outcomes*** within Council's responsibilities
- Take ***coastal hazards*** into account in Council's ***land use planning***
- Maintain ***natural systems and processes*** to improve the ***health and diversity*** of natural systems
- Support the ***social and economic wellbeing*** of local ***communities*** by ***maintaining safe access*** to beaches and headlands and supporting recreational activities.

- ***Align*** the Coastal Management Program with Local Environment Plan 2014, Development Control Plan 2014, Local Strategic Planning Statement and Integrated Strategic Plan
- ***Engage with the community*** in the review and preparation of coastal management programs
- Keep the ***community informed*** about coastal processes and management responses

## What is the Environmental and Physical Context for the CMP?

Shoalhaven City Council manages 40 of Shoalhaven's 109 beaches and 9 of its 14 estuaries, over a 165 km stretch of coastline. This is the largest stretch of managed coastline within any local government area in NSW.

The Council managed beaches and estuaries of the Shoalhaven are shown in Figure E-0-2.

A detailed account of the environmental and physical context of the open coast and estuaries in the Shoalhaven is provided in **Appendix B**.

The Shoalhaven CMPs will broadly cover the coastal zone and the estuarine catchments draining to the ocean along the Shoalhaven local government area's coastline between Seven Mile Beach in the north and Durras Lake in the south. The CMPs will generally not cover National Parks and Wildlife Service (NPWS) or Marine Park managed areas, unless there are cross boundary or other shared issues that need to be addressed, as these already have their own management plans.

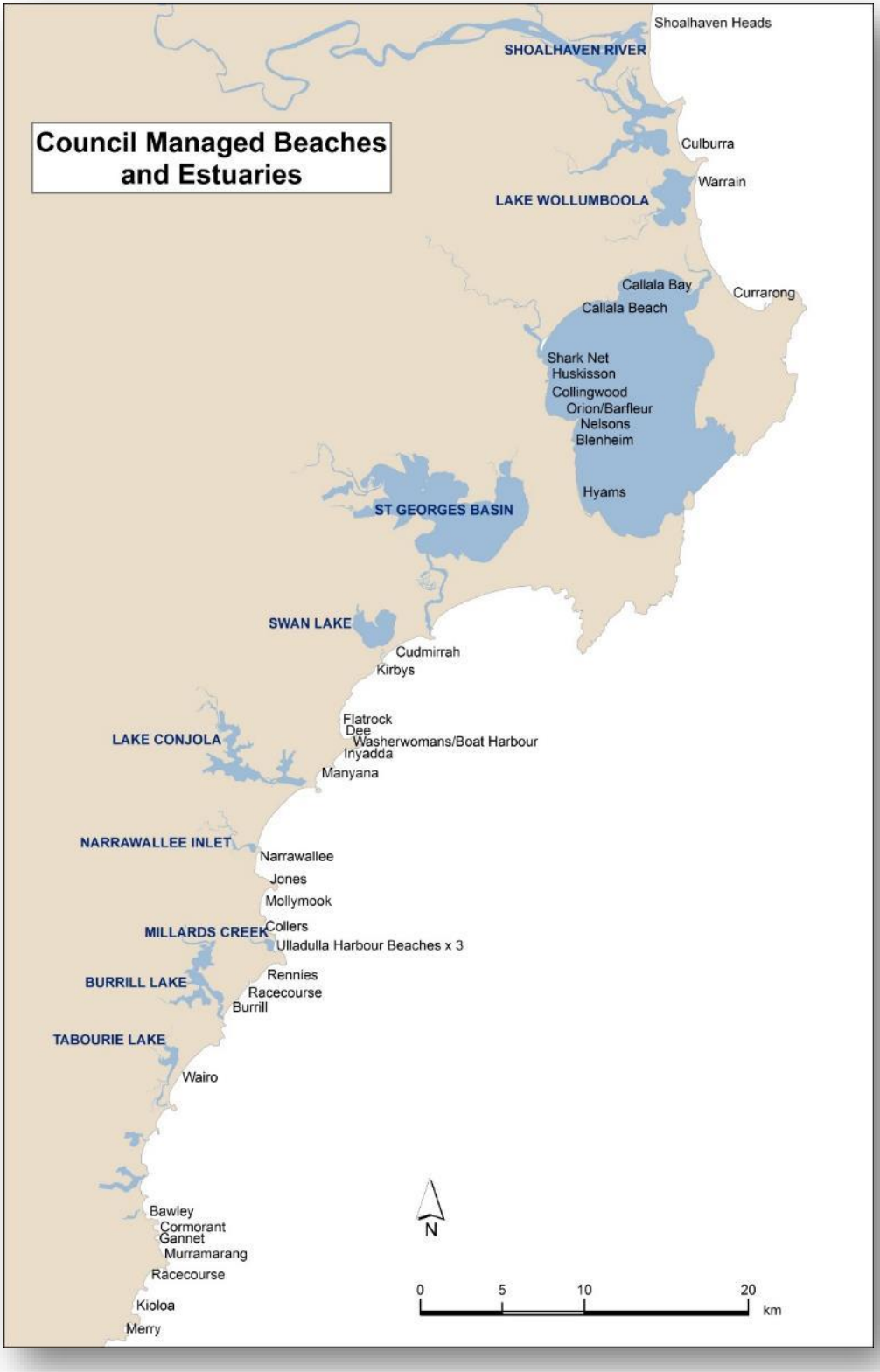



*Figure E-0-2 – Council-managed beaches and estuaries*

*Bendalong Boat Harbour Beach*

Coastal lakes and estuarine creeks along the Shoalhaven coastline provide a diverse, healthy and productive aquatic habitat of high ecological value. There are extensive areas of several endangered ecological communities and roosting, feeding and breeding habitat for migratory shorebirds.

The beaches and headlands provide significant visual amenity benefits to Shoalhaven's coastline landscape and contribute to the cultural character of the region. Locals use the coastal environment for a number of recreational activities including swimming, diving, surfing, fishing and hiking.

The coastal zone supports activities such as tourism and fisheries, which form a substantial portion of Shoalhaven's economy.

## Consultation

***What consultation has been undertaken in the past and what have we learned from this?***

Community engagement was previously undertaken for the open coast and many of the estuaries under Council's management, as part of the preparation of the Open Coast CZMP, and Estuary Management Plans, Natural Resources Management Strategies and Entrance Management Policies for many of the estuaries in the Shoalhaven LGA.

*Seven Mile Beach, Shoalhaven Heads*

The following key activities were carried out by and on behalf of Council:

- Our Coast Our Lifestyle (2016) – an extensive, broad-based consultation process with the objective of educating the community about risks of coastal erosion and the coastal management options that are available to respond to that risk, and to understand community preferences for those different management options and the factors that SCC has to consider when responding to coastal erosion risks and storm damage
- Ongoing consultation through Council's website and Frontline newsletter on coastal management
- Consultation with residents, ratepayers and visitors through Council's website during preparation of the CZMP in 2012, 2016 and 2018

- Consultations with the community in 2017 regarding management actions to be adopted in the lower Shoalhaven River Estuary
- Stakeholder and community consultation in relation to the development of the Shoalhaven River Estuary Management Plan in 2008
- Consultation with the community through the development of previous Estuary Management Plans, Natural Resource Management Strategies, Flood studies and Estuary Entrance Management Policies for the key estuaries, mainly through surveys of the community to gauge the issues of most concern.

***What new stakeholder and community consultation has been undertaken for the Scoping Study?***

An Agency workshop was held in February 2019 with Council and key Government Agency stakeholders. The purpose of the workshop was to:

- Communicate the scope of the CMP and an outline of what work has been done to date with relevant Agency stakeholders
- Identify the role and concerns of Agencies with a stake in coastal management in the Shoalhaven
- Formulate a Vision, Purpose, Strategic and specific Management Objectives for the Shoalhaven CMP
- Identify gaps in the existing CZMP and EMPs
- Define a suitable community engagement strategy for the CMP
- Gather some suggestions on how the CMPs for the Shoalhaven should be prioritised.

Six community workshops and drop-in information sessions were held in September/October 2019 specifically to inform this Scoping Study. Sessions were held at the following locations:

- Shoalhaven Heads
- St Georges Basin
- Sussex Inlet
- Lake Conjola
- Ulladulla
- Nowra.

These sessions were facilitated by specialist communication consultants, RPS Group. A total of 233 people attended these sessions, with 550 pieces of feedback collected as well as a number of formal submissions. These sessions have captured a range of issues of concern and feedback from the community.

The outcomes from this community consultation are summarised in Section 5 of the Scoping Study and in Table E-0-1. A detailed Consultation Outcomes Report is provided in **Appendix D.**

Council have also produced a Questionnaire open to the public to provide insight into their key values, use and issues for the open coast and estuaries. The Questionnaire and results are provided in **Appendix E.**

***What were the results of the consultation?***

Stakeholders expressed the social importance, values, strong connections and sense of belonging people have with their local areas. Stakeholders expressed they wanted to improve social and economic wellbeing of local communities, by improved maintenance of beaches and headlands which support recreational and business activities. Stakeholders valued the natural environment and recognised the importance of tourism for job creation and increased infrastructure for their local areas.

Overall, respondents who participated in the consultation commonly expressed feelings of concern around foreshore erosion, dune management, over-development, sedimentation, jurisdictional issues between Government agencies, flooding, tourism, boat wake and active estuary management, in particular the management of lake openings at Lake Conjola and Shoalhaven Heads. In seeking to determine an appropriate way forward for coastal management planning there was universal support amongst stakeholders for increased transparency from Council around its decision making and prioritisation of projects. In highlighting the importance of transparency, community stakeholders seek opportunities to have their concerns adequately recognised and addressed.

The key insights and issues identified from the consultation sessions are listed in Table E-0-1 and discussed in Section 5 of this report with the full report of the consultation outcomes provided in **Appendix D**.

Council's Questionnaire received 444 responses to November 2019, with 425 responses from individuals, 11 from businesses or government agencies and 8 from community groups/organisations. The Questionnaire identified that swimming and walking were the most popular activities at the open coast, with paddling and fishing being popular activities at Lake Conjola, St. Georges Basin and Sussex Inlet. Picnicking, wildlife watching/appreciating nature were identified as important activities at all the locations. All areas were rated highly for scenic beauty and for being peaceful and relaxing. The open coast, Jervis Bay and Narrawallee Inlet were rated by over 80% of respondents as either "very healthy" or "moderately healthy", with a majority of respondents rating all the estuaries as either "very healthy" or "moderately healthy". The exception was for Lake Conjola, which was rated as "moderately unhealthy" or "very unhealthy" by a majority of the survey responses. The detailed results of the Questionnaire are provided in **Appendix E**.

In addition to the above, a number of formal submissions to the scoping study have been made by individuals and community groups. The submissions identify further community issues and key risks at specific locations and are outlined in **Section 5** of this Study.

*Table E-0-1 – Key insights from community consultation sessions for this Scoping Study (RPS, 2019)*

| Consultation Session | Summary of key findings | |
|---|---|---|
| | **Issue** | |
| **Ulladulla** | Tourism | • The natural beauty of local foreshores, beaches and estuaries is a draw card.<br>• Improve beach access, disabled access, improve local boat ramps, dune management and signage for visitors to the areas around Ulladulla.<br>• Visitor volume changes along North Mollymook beach is becoming unsafe.<br>• Future CMP to improve existing infrastructure to deal with increases in population |
| | Climate change | • Council to improve overall resilience and plan for upper thresholds.<br>• Want a clear approach from Council on how they will plan and prepare for future climate related disasters to the area.<br>• Improve mitigation measures around planning for coastal risk, access risks and inundation vulnerability. |
| | Safety and erosion | • Concern regarding erosion of beachfront properties at Mitchell Parade, Beach Road North Mollymook and the degree of personal responsibility.<br>• Risks to the community included the vulnerability of existing sewerage infrastructure and the management of this with expected higher sea levels.<br>• Increase in vegetation planting and riparian corridors to stabilise soil and minimise sedimentation into local waters. |
| | Conflicting recreation | • Enforcement of dog leash areas to protect nesting shorebirds at Buckleys Beach, North Mollymook, Lake Tabourie, Lake Conjola and Sussex Inlet.<br>• Jet skis and speeding boats making excess noise, eroding river banks and creating unsafe environments for swimmers. |
| | Collaboration | • Council to involve and engage with local high school students within the CMP process. |
| **St Georges Basin** | Flooding | • Sea level rise and increased flooding will impact low lying areas of the Basin more often<br>• CMP to help facilitate future connection roads and limit over development if determined to be in a high-risk area. |
| | Multi-tenure arrangements | • CMP to address the complexity around coastline and estuary management between Government agencies. |
| | Collingwood beach | • Residents from Collingwood Beach expressed concerns of dune renourishment not being carried out and erosion at the back of the beach due to stormwater runoff.<br>• Banksia trees are not appropriate in holding together the dunes, need to be replaced by other dune plantings |
| | Inundation lines | • Inundation lines need to determined through site visits instead of via satellite.<br>• Need increased transparency for hazard maps and to inform property owners of next steps. |
| | Tree removal | • 45 degree rule being exploited by developers and in return urban deserts have been made through large subdivisions.<br>• Potential tree vandalism around the Basin for increased views |
| | Emergency response | • Need for more evacuation centres in response to Sussex Bowling Club no longer being available. |
| | Tourism | • Council is struggling to keep a balance between tourism and the natural environment.<br>• Facilities are inadequate to handle population growth, giving an example of Hyams Beach and access to Vincentia |
| | Protection of heritage | • Protect assets that are important to the social fabric of the community.<br>• New tourist development and subdivisions changing local character for example Huskisson. |

| Consultation Session | Issue | |
|---|---|---|
| **Nowra** | Hazard maps and policy | • Improved communication and engagement from Council around hazard mapping, identified geotechnical cliffs, slopes instability hazards and inundation studies. |
| | Tourism | • A need for improved facilities to bring in tourists and places for the community to get together on the foreshore.<br>• 45 degree rule being used wrongly due to market demand for views and vistas of the beaches and waterways. |
| | Water quality | • Emphasised the value of the River and its social and ecological value to the community.<br>• Plastic silage wraps a contributing source of plastic pollution in the Shoalhaven River.<br>• Sedimentation from recent foreshore and subdivision developments are impacting existing oyster farm businesses that rely on clean water.<br>• Need to engage oyster farmers early on in the process when large subdivisions are being proposed. |
| | Agricultural land use | • Erosion of riverbanks and E. coli from unrestricted cattle on Dairy Farms encroaching onto the waters along the Crookhaven River and Shoalhaven River<br>• Need for increased support from DPI and Crown Lands to enforce controls on farmers to minimise impacts on water quality of the Rivers. |
| | Land tenure | • Complexity between Inter Government agencies in particular for addressing erosion, asset risk and remediation works.<br>• Need for more short-term responses to practical actions in response to damage done by East Coast Lows and high tide events. |
| **Lake Conjola** | Transparency | • Council to increase transparency, clarity on decisions and listening to concerns from the community.<br>• Stakeholders expressed need for a longer-term lake entrance opening outcome that provides certainty and a more responsive management approach. |
| | Previous reports and studies | • Importance for Council in its CMP to adopt actions and recommendations from the Patterson Britton & Partners Report 1999. |
| | ICOLL classification | • Intermittently Closed and Open Lake and Lagoon (ICOLL) classification for Lake Conjola not supported by most within the community.<br>• The existing Interim Entrance Management Policy for Lake Conjola does not provide enough flexibility in terms of management. |
| | Health of Lake Conjola | • Most stakeholders wanted the entrance to be dredged on an ongoing basis to improve water quality, boat access, swimming conditions and overall amenity.<br>• Groundwater readings around the existing treatment plant had tested evidence of nutrient plumes exceeding safety standards.<br>• Stakeholders raised concerns that older developments at Manyana, Cunjurong, Bendalong have uncontrolled runoff into the Lake. |
| | Funding sources | • Stakeholders wanted to see more investment back into Lake Conjola, Fisherman's Paradise and Berringer Lake through upgraded boat ramps to improve accessibility for larger boats. |
| | Ecological communities | • The rapid rate of deforestation from farmers and residential development along the coast and the use of fertilisers were contributing to reduced water quality levels within local lakes, waterways, wetlands and estuaries. |
| **Sussex Inlet** | Environment | • Area has a history of excellent water quality and should not be allowed to deteriorate in the face of new development.<br>• Boats should be prohibited entering Badgee Lagoon beyond the Taliac Canal intersection due to fuel spillage and the disturbance of water birds and marine life. |
| | Erosion | • Excessive boat wash was resulting in bank erosion and ageing shoreline structures need replacement to prevent hazards, erosion and sedimentation. |
| | Navigational Safety | • Flood tide shoal leading from the estuary into St. Georges Basin is getting too shallow for vessel navigation. |

| | | |
|---|---|---|
| | Inundation lines | • Concerned around properties impacted by inundation lines and want clarity about the official position of Council regarding defending it's coast, estuaries, floodplains or retreating. |
| | Swan Lake | • Due to worsening conditions of the Lake should have a CMP and a review of the Swan Lake Entrance Management Policy. |
| | Emergency response | • Need to establish a community action team to respond to events when isolated from SES. |
| | Floodplains | • Major part of the existing housing and commercial component of the town has been built on the floodplain. |
| **Shoalhaven Heads** | Tourism | • Need for improved maintenance and enhancement of Shoalhaven Heads for tourism related purposes.<br>• With increased development and tourism impacts, water quality needs to be monitored more closely in order to protect the unique historical asset of oyster farming in the South Coast. |
| | Entrance Management | • Shoalhaven River entrance area to be dredged to help widen the channel and reduce flooding risk. |
| | Consultation and engagement | • State Government agencies, Council, community and key stakeholders need to work more collaboratively to have improved oversight on decsions.<br>• Renourished sand dunes in front of existing Shoalhaven Heads Surf Life Saving Club have impeded patrols of beach. |
| | Environmental management | • Need for improved mitigation around stormwater pipes, due to pipes causing erosion and siltation, in particular around River Road.<br>• Coomonderry Swamp, Seven Mile Beach National Park and Comerong Island need the CMP to better protect the diverse range of birds, reptile and frog species, which includes a significant population of the threatened green and golden bell frog. |

***What Community Engagement Strategy should we adopt for the various Stages of the CMP process?***

A Stakeholder and Community Engagement Strategy has been developed for the CMP, with appropriate communication channels and tools identified and selected to target specific audiences and ensure that the information about the project is communicated effectively and efficiency to the community.

A Consultation Plan has been developed which outlines actions, timeframes and responsibilities in relation to stakeholder and community engagement throughout the CMP process. The Strategy is detailed in **Appendix F.**

***How can the Shoalhaven community be involved in Coastal and Estuary Management?***

To determine the best approach to engage and work collaboratively with stakeholders in the preparation of the CMP, the local community were asked to identify:

- How should a new Coast and Estuary Management Committee operate during the development of the CMP?
- How should consultation and engagement take place in the future?
- What are the community's preferred methods of consultation?

To oversee the CMP process, it is recommended that a Coast and Estuary Management Committee be set up. The community has provided suggestions on the structure and scope of a Coastal and Estuary Advisory committee, which are outlined in Section 5.5.1. It is recommended that these suggestions be adopted in formulating the Committee.

A proposed model for the formation of a Coast and Estuary Management Committee and local CMP sub-working group has been presented, together with commentary on the committee structure, representation and charter. This model is presented in Figure E-0-3 and discussed in Section 5 of this Scoping Study.

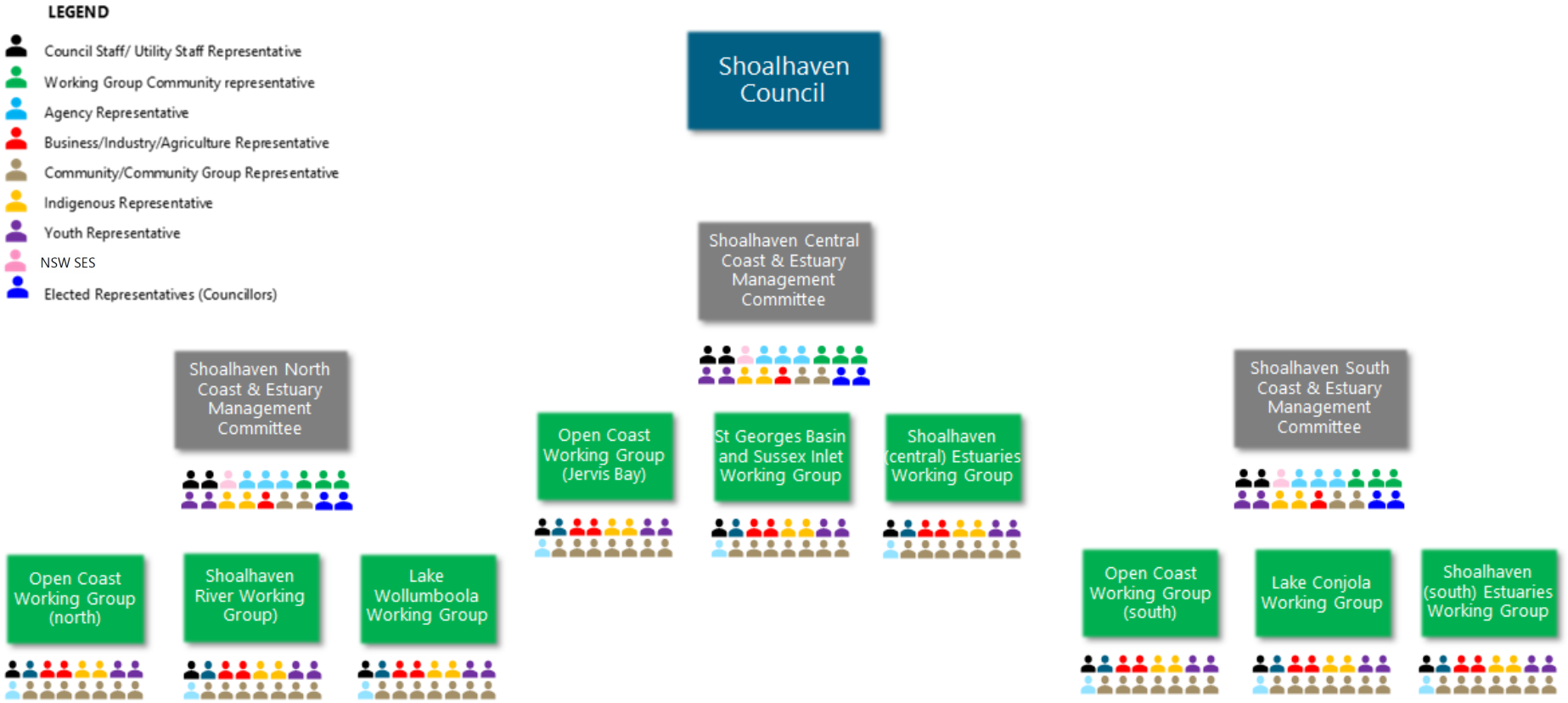



*Figure E-0-3 – Suggested make-up of Coast and Estuary Management Committee and working groups for oversight of CMP process*

## What are the identified coastal and estuary management risks faced in the Shoalhaven?

A First Pass Risk Assessment has been carried out to assist with identifying key management issues and threats requiring further assessment during Stage 2 of the development of the CMP for the Shoalhaven open coast and estuaries. The full risk assessment is presented in **Appendix G.**

A detailed Risk Register has been developed that categorises the risks for the estuaries and open coast areas of the Shoalhaven in terms of the four coastal management areas as referred to in the SEPP (Coastal Management):

i) coastal wetland and littoral rainforest area

ii) coastal vulnerability area

iii) coastal environment area

iv) coastal use area.

The risks are categorised as environmental, risks to infrastructure, safety, amenity or financial risks. The risk register is intended to be used as a living document that can act as a tool for the development of management actions for the CMP and a method for ongoing assessment of the effectiveness of the management actions.

For the estuaries, the key risks identified relate to:

- Poor water quality from industrial, agricultural or urban runoff affecting the estuary ecology and estuarine vegetation
- Flooding, emergency management and the management of estuary entrances to reduce flood risk
- Estuary entrance management for community/environmental outcomes
- Tidal inundation of foreshore private and public assets from climate change and sea level rise
- Poor access or insufficient facilities for navigation and recreational boating
- Conflict between users of the waterways e.g. powered and non-powered craft
- Bank erosion caused by unrestricted access to foreshores by cattle, changes to estuary tidal regimes and boat wash
- Spread of weeds caused by agricultural and urban runoff
- Damage to estuarine vegetation caused by changes to tidal regimes, clearing or boating activity.

For the open coast and cliff areas, the key risks relate to the following:

- Risk to infrastructure, coastal use areas and environmental values from coastal hazards including coastal erosion, beach recession, coastal inundation including increased future risk from climate change

- Risk to infrastructure and safety from geotechnical hazards in cliff and bluff areas
- Impact of informal beach accessways on dune vegetation, including vehicle access
- Damage to coastal accessways from minor storms
- Provision of sufficient facilities to cater for the impact of high visitor numbers.

At a city-wide scale, the key process or management-related risks are:

- Risk of inappropriate planning controls and development being approved in inappropriate locations
- Poor community understanding of coastal issues and coastal risks
- Poor communication between stakeholders leading to reduced effectiveness of coastal management and poorer coastal management outcomes.

## What are we currently doing to address these risks?

Many of the risks are ongoing and are being addressed progressively over time. The key risks and existing management measures are summarised in Table E-0-2, together with the outcome that we are trying to achieve to address the risk and the additional information we need to help us address the risk.

## How much do we already know and what do we still need to learn so we can better manage our coasts and estuaries?

Through existing studies and mapping undertaken by Council, the NSW Government and from previous studies, there is a large amount of supporting information available to define the existing levels of risk. Council has compiled a list of all known documents relevant to its management of the coasts and estuaries. This list is provided in **Appendix H.**

In addition to the specialised studies and reports available when the CZMP was prepared, many new studies, and reviews of existing studies, have been undertaken since then.

Local community groups maintain their own databases of information – for example, the Conjola Community Association maintains a library of documents relevant to the Lake Conjola estuary, at https://www.lakeconjola.org/estuary-and-entrance-management.html. Other community groups, (e.g. Callala Bay Community Association) maintain their own libraries of information relevant to their area and coastal management in general, which serve to educate their members and the communities they represent. Other community representatives record estuary entrance openings, make and record photographic observations and measurements of local coastal management issues e.g. survey data collected on a regular basis by the Collingwood Beach Preservation Group.

These libraries and databases of local information are invaluable in informing coastal management in the Shoalhaven. It is recommended that Council work and continue to forge partnerships with these community groups to share information and harness the passion and dedication that the local community have for their area to help collect data through citizen science projects, to help educate the wider community and shape the CMP.

*Table E-0-2 – Key Issues, Existing Management Controls, Key Performance Indicators and Information Gaps*

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| Poor water quality from industrial, agricultural or urban runoff affecting the estuary ecology and estuarine vegetation, including acid sulfate soil runoff from drained floodplains | Regular water quality monitoring programs for all estuaries - Council does WQ monitoring with data available online via https://shoalhaven.nsw.gov.au/Environment/Aqua-Data<br>Licensing of industrial discharges<br>Implementing urban stormwater treatment technologies<br>Provision of riparian zones and fencing of estuarine foreshores<br>Working with landowners to manage drained floodplain areas in the lower Shoalhaven to minimise acid runoff<br>Public education | Measurable improvements over time in water quality indicators (chlorophyll, nutrients, pH, pathogens, suspended sediments) | GIS/aerial image analysis to identify areas where riparian zones can be established<br>Identification of opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment<br>Database of key stakeholders |
| Flooding, emergency management and the management of estuary entrances to reduce flood risk | Flood studies to identify at risk areas<br>Emergency action plans/floodplain management plans<br>Estuary entrance management policies in place that balance infrastructure and community protection against flooding with environmental outcomes<br>Planning controls to reduce community risk | Known flooding risks at all estuaries<br>No future approvals of inappropriate development in flood risk areas<br>Estuary entrance management policies in place for all estuaries developed in consultation with all stakeholders | Updated flood studies for key estuaries<br>Updated estuary processes and entrance management policies for key estuaries |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| | | Emergency management procedures in place | |
| Poor access or insufficient facilities for navigation and recreational boating<br>Conflict between users of the waterways e.g. powered and non-powered craft | Provision of additional facilities for recreational boating, demand studies | Improved accessibility of waterways to the community | Demand studies, boating surveys, community/ stakeholder consultation |
| Bank erosion caused by unrestricted access to foreshores by cattle, changes to estuary tidal regimes and boat wash | Provision of riparian zones and fencing of estuarine foreshores<br>Boating speed restrictions | Reduction in bank erosion visible from boat surveys and aerial imagery<br>Reduced loss of agricultural land<br>Improved estuarine foreshore habitat<br>Reduction in suspended sediment concentrations | Bank erosion surveys from aerial imagery/drones to monitor bank erosion<br>Regular visual inspections of key estuaries from vessels |
| Spread of weeds caused by agricultural and urban runoff | Provision of riparian zones and fencing of estuarine foreshores | Measurable reduced occurrence of weeds in estuaries and foreshores | Ecological surveys to identify occurrence of weeds in all estuaries |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| | Implementing urban stormwater treatment technologies<br>Public education<br>Bushcare groups | | Identification of mechanisms for spreading of weeds |
| Damage to estuarine and dune vegetation caused by changes to tidal regimes, cattle grazing, mowing, clearing or boating activity. | Provision of environmentally friendly moorings<br>Signage<br>Community education<br>Minimise interference with natural estuarine tidal regimes | No reduction in estuarine vegetation extent, visible damage to seagrasses or change in community assemblages | Ecological survey of estuarine vegetation for all estuaries<br>Identify where damage to estuarine vegetation is occurring<br>Updated estuary process studies to understand natural flow and sedimentation regime<br>Identify and map areas for migration of estuarine vegetation with sea level rise |
| Risk to infrastructure, coastal use areas and environmental values from coastal hazards including coastal erosion, beach recession, coastal inundation including increased future risk from climate change | Development controls through DCP for coastal areas<br>LGA-wide coastal hazard studies and mapping<br>Implement management actions from CZMP and coastal risk assessment | No damage to public or private infrastructure from coastal erosion | Regular updates every few years to coastal hazard assessments and mapping for key beaches where infrastructure is at risk<br>Regular review every few years of coverage and |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| | | | effectiveness of coastal development controls<br>Regular survey and monitoring of known key coastal erosion/inundation hotspots |
| Risk to infrastructure and safety from geotechnical hazards in cliff and bluff areas | Implement Cliff and Bluff areas risk assessment recommendations<br>DCP for cliff and bluff areas<br>Implement management actions from CZMP | No damage to public or private infrastructure or injuries | Updated cliff and bluff risk mapping for inclusion in Council DCP |
| Impact of informal beach accessways on dune vegetation, including vehicle access<br>Damage to coastal accessways from minor storms | Signage<br>Dune revegetation<br>Fencing | Healthy dune vegetation<br>Stabilised dunes | Identification and assessment of informal beach accessways<br>Dune vegetation surveys<br>Best practice guidelines for post-storm repair of beach accessways |
| Provision of sufficient facilities to cater for the impact of high visitor numbers. | Demand studies, visitor surveys | Reduced overcrowding at recreation sites during peak tourist season | Demand studies, monitoring of key recreational areas, community/ stakeholder consultation |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| Risk of inappropriate planning controls and development being approved in inappropriate locations | Coastal hazard and flood studies to define level of risk<br>Council DCP | No damage to private or public infrastructure | Regular updates every few years to coastal hazard assessments and mapping for key beaches where infrastructure is at risk<br>Regular review every few years of coverage and effectiveness of coastal development controls<br>Regular survey and monitoring of known key coastal erosion/inundation hotspots<br>Effective communication and information for Councillor decision makers |
| Poor community understanding of coastal issues and coastal risks<br>Poor communication between stakeholders leading to reduced effectiveness of coastal management and poorer coastal management outcomes. | Council website for provision of information, community consultation<br>Appointment of coastal and estuary management committee and CMP Working Groups<br>Provision of coastal and estuary-related education resources for schools and community groups | Improved community understanding of coastal issues and risks<br>Community involvement in coastal and estuary management projects that align with the CMP objectives | Strong Terms of Reference for Coastal and Estuary Management Committee<br>Social Media and communications expertise |

## Where to from here?

In consideration of the risks, complexities and existing level of development of coastal management at the various estuaries and the open coast of the Shoalhaven, the recommended priority and groupings for development of the CMPs is:

1. Develop a CMP for **Lake Conjola (high priority).**
2. Develop a CMP for the **Shoalhaven Coastline (high priority).**
3. Develop a CMP for **Jervis Bay (high priority).**
4. Develop a CMP for **Sussex Inlet, Swan Lake and Berrara Creek (high priority).**
5. Develop a CMP for **St. Georges Basin (high priority).**
6. Develop a CMP for **Shoalhaven River (including Broughton Creek)** estuary **(high priority).**
7. Develop a CMP for **Lake Wollumboola (medium priority).**
8. Develop a CMP for **Burrill Lake, Lake Tabourie and Willinga Lake (medium priority)**.
9. Develop a CMP for **Currambene Creek and Moona Moona Creek (medium priority)**.
10. Develop a CMP for **Shoalhaven Urban and Rural estuaries** (covering Narrawallee Inlet, Meroo Lake, , Termeil Lake, Nerrindah Creek, Mollymoke Farm Creek, Blackwater Creek, Currarong Creek, Millards Creek, Willinga Lake, other small estuaries near urban areas under Council control, **lower priority**).

The rationale for grouping and prioritising the CMPs is provided in Figure E-0-4.

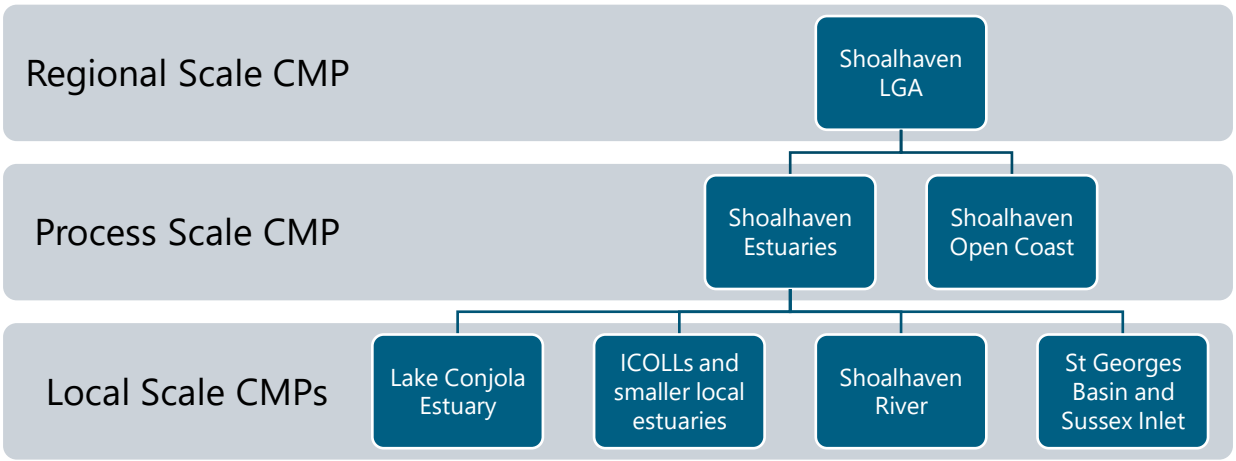



*Figure E-0-4 – Rationale for developing CMPs for the Shoalhaven coast*

A detailed forward program for the development of the CMPs with suggested information required and estimated funding needed to address the gaps in our knowledge is provided in Section 7.

The next step in the process is to appoint the Coastal and Estuary Management Committee to oversee the development of the CMPs and to move forward with addressing the known gaps in our knowledge for the high priority areas (Stage 2). Once we have enough knowledge to update the Risk Assessment, management options can be developed to address the risks (Stage 3), with the aim to achieve buy-in and in-principle agreement on the management actions from the community and all stakeholders to allow the high priority CMPs to be adopted by the end of 2021.

# 1 Introduction

This Scoping Study documents Stage 1 in the development of a Coastal Management Program (CMP) for the Shoalhaven coastline.

The Scoping Study sets the scene for Shoalhaven City Council's coastal planning process leading to the development of a Coastal Management Program (CMP), as required by the NSW *Coastal Management Act* 2016.

The Coastal Management Program may be thought of as a natural progression of the existing coastal management processes in place within the Shoalhaven and is intended to encompass and build upon the large body of work already carried out with respect to coastal management in the Shoalhaven, by addressing any management gaps in the existing arrangements.

As a first step in identifying and addressing the gaps, Council held a Workshop in February 2019 with key Agency stakeholders that have a specific interest and responsibility for coastal management in the Shoalhaven. The workshop helped to identify gaps in the existing management arrangements as well as addressing the following questions:

- What should be the **Vision, Purpose and Management Objectives** of a Coastal Management Program for the Shoalhaven? How do these align with the Vision Purpose and Management Objectives presently adopted in Council's existing coastal management plans?
- What should be the **Strategic Objectives** of a Coastal Management Program for the Shoalhaven? Do these capture all the issues and themes which are important for managing the coast?
- What should be the **Specific Objectives**?
- **Gaps** - what would you like to see included in the CMP that is not covered in the existing coastal zone management plans and estuary management plans? Do the existing plans cover all the issues that are important? Are there any existing projects being considered by key stakeholders that could be included within a new CMP for the Shoalhaven?
- **Spatial extent** - Which areas should a CMP cover? Do the existing coastal zone management plans and estuary management plans cover all these areas or should more be included? Should there be specific CMPs covering particular geographic areas or natural groupings?
- How should we **engage with the community** during the CMP process? How do we communicate the changes in legislation and what is the purpose of the CMP?

These questions set the scene for the development of a new Coastal Management Program for the Shoalhaven.

## 1.1 Why we are developing a new Coastal Management Program

NSW has developed a new coastal management framework through the *Coastal Management Act* 2016 (CM Act), State Environmental Planning Policy (Coastal Management) 2018 and the Coastal Management Manual 2018.

The NSW Coastal Management Manual 2018 sets out the framework in detail and defines the requirements for a Coastal Management Program (CMP). The purpose of a CMP is to set the long-term strategy for the coordinated management of the coastal zone with a focus on achieving the objects of the CM Act.

As Council has an existing Coastal Zone Management Plan (including an emergency action subplan) that was certified under the *Coastal Protection Act* 1979, the savings and transitional arrangements in Schedule 3 of the CM Act mean it will continue to have effect until 31 December 2021 unless replaced by a CMP prepared and adopted under the CM Act.

The Coastal Management Manual recommends that councils follow a five-stage risk management process for the preparation and implementation of a CMP.

The five-stage process is illustrated in Figure 1-1, below.

The Coastal Management Manual identifies that Council may choose to fast-track the process in Figure 1-1 where the existing management approach is performing well and the key drivers for change have not passed thresholds for the introduction of a new approach.

This report documents the Scoping Study under Stage 1 of the process identified in Figure 1-1.

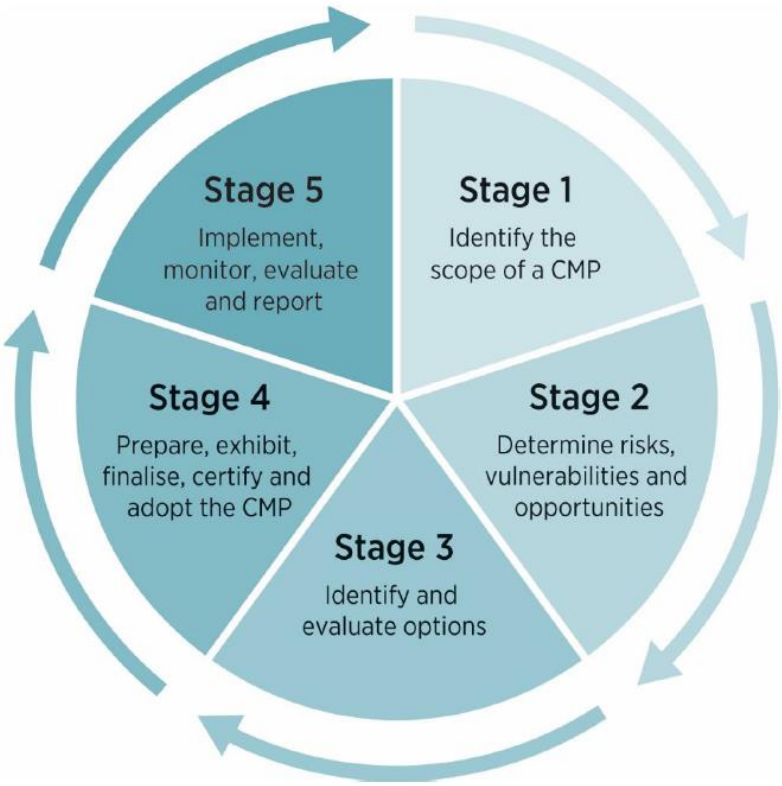



*Figure 1-1 - Stages in preparing and implementing a CMP (Coastal Management Act 2018)*

Shoalhaven Council have developed the existing Coastal Zone Management Plan for the open coast, which was certified in 2018. The Coastal Zone Management Plan is a culmination of many supporting studies and plans but has evolved over time with changes in NSW Government Policy, including introduction of the Stage 1 NSW Coastal Reforms and withdrawal of the 2009 NSW sea level rise benchmarks. Coastal hazard assessments, local area emergency action subplans and risk assessments were carried out for the open coast beaches of the Shoalhaven, including those beaches that were analysed in the updated coastal hazard studies undertaken by Advisian (2016).

The beaches for which updated hazard mapping has been carried out include (from north to south):

- Shoalhaven Heads
- Culburra Beach
- Warrain Beach
- Currarong
- Callala Beach
- Collingwood Beach
- Bendalong Boat Harbour
- Narrawallee
- Mollymook
- Collers Beach.

Detailed coastal hazard risk assessments were carried out for each of the beaches, as well as for the cliffs and bluffs at the following locations:

- Penguin Head
- Plantation Point
- Hyams Point
- Berrara Point
- Inyadda Point, Manyana
- Narrawallee
- Bannisters Point
- Collers Beach Headland
- Rennies Beach
- Racecourse Beach.

Council have also developed Estuary Management Plans for the significant estuaries within the Shoalhaven, including Lake Conjola and St Georges Basin.

The Coastal Zone Management Plan and Estuary Management Plans were put together on the basis of the pre-existing coastal management framework that existed under the former NSW *Coastal Protection*

*Act* 1979. As this has now been replaced by a new coastal management framework, there is a need to prepare and implement a new CMP to cover the Shoalhaven coastline.

The overall aim of the Scoping Study is to identify priority issues and management gaps in preparation for the development of the CMP.

It also:

- Confirms which of the four 'management areas' identified by the NSW Government are relevant to the CMP i.e. Coastal Wetlands and Littoral Rainforests Area, Coastal Vulnerability Area, Coastal Environment Area, Coastal Use Area
- Confirms the nature of the issues affecting each of the relevant management areas
- Summarises current management practices and arrangements and identifies whether changes are required or gaps need filling
- Identifies the strategic objectives for management of the coast
- Identifies further studies that are required
- Proposes a timetable for completion of the CMP
- Develops a business case for the preparation and implementation of the CMP.

The purpose of a Coastal Management Program is to support the goals and objectives of the NSW Government's Coastal Management legislation. It is intended to manage coastal issues, vulnerabilities and risks as well as help foster opportunities for coastal communities.

The new CMP will build on the work undertaken in 2012 in developing the Shoalhaven Coastal Zone Management Plan (CZMP), which was updated in 2017/18 and forwarded to the Minister for the Environment for certification in June 2018.

## 1.2 Which areas should be included in a CMP?

The Shoalhaven CMPs will broadly cover the coastal zone and the estuarine catchments draining to the ocean along the Shoalhaven local government area's coastline between Seven Mile Beach in the north and Durras Lake in the south. The CMPs will generally not cover National Parks and Wildlife Service (NPWS) or Marine Park managed areas, unless there are cross boundary or other shared issues that need to be addressed, as these already have their own management plans.

A map showing the coastal areas managed by NPWS, together with the Council-managed beaches and estuaries, is provided in Figure 1-2 and Figure 1-3.

The hierarchy of coastal management areas as referred to in the SEPP (Coastal Management) is identified below, from highest to lowest priority:

i) **coastal wetland and littoral rainforest area** (CWLRA) - areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by

SEPP 14 and SEPP 26. Development controls for the mapped CWLRA aim to continue existing protection for these important ecological communities.

ii) **coastal vulnerability area** (CVA) - areas subject to coastal hazards such as coastal erosion and tidal inundation. Development controls for the CVA are concerned with managing risk to human life, infrastructure, and public and private property that may be impacted by coastal hazards, and ensuring that we do not create legacy issues for future generations to deal with.

iii) **coastal environment area** (CEA) - areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included. Development controls for the CEA aim to protect and improve natural coastal features, coastal waters and environmental values for places such as beaches, dunes, surf zone and undeveloped headlands.

iv) **coastal use area** (CUA) - land adjacent to coastal waters, estuaries and coastal lakes and lagoons where impacts of development on the use and enjoyment of the beaches, foreshores, dunes, estuaries, coastal lakes and lagoons, and the ocean, need to be considered. Development controls for CUA are concerned with ensuring appropriate urban development for coastal areas, considering urban design issues such as the bulk, scale and size of proposed development, water sensitive urban design, and preventing adverse impacts on scenic qualities, visual amenity and Aboriginal cultural heritage.

### 1.2.1 Which Beaches to include?

The Shoalhaven CMPs will broadly cover the beaches and headlands along the Shoalhaven local government area's coastline between Seven Mile Beach in the north and Durras Lake in the south. The CMPs will generally not cover National Parks and Wildlife Service (NPWS) or Marine Park managed areas, unless there are cross boundary or other shared issues that need to be addressed, as these already have their own management plans. A map showing the coastal areas managed by NPWS, together with the Council-managed beaches and estuaries, is provided in Figure 1-2 and Figure 1-3.

The existing CZMP identifies areas vulnerable to coastal hazards for ten key open coast beaches and ten key coastal cliffs and slope stability sites within the Shoalhaven area, but not for all 40 beaches and adjacent headlands and not for the estuaries.

Note that there are 109 beaches within the Shoalhaven LGA, but of these, Council manages 40 of the beaches. The CMP process covers the 40 Council-managed beaches in the LGA including those where assets have been identified to be at risk from coastal processes, but beaches managed by other entities (e.g. National Parks) have not been included in the scope of the CMP. Management of these other beaches, however, should be undertaken with reference to the CMP and be broadly consistent with the CMP, likewise, the CMP needs to be consistent with the management regime already adopted by other entities for beaches under their care.

Figure 1-4 shows all the beaches that are included within the scope of the CMP. These beaches all have Council assets at risk from coastal hazards, including assets such as accessways, day use facilities and fencing. These beaches are in addition to the ten key beaches and adjacent cliffs/bluffs with major assets at risk from coastal hazards including sewage pumping stations, water infrastructure, sewer infrastructure, roads and buildings that have been identified in the CZMP.

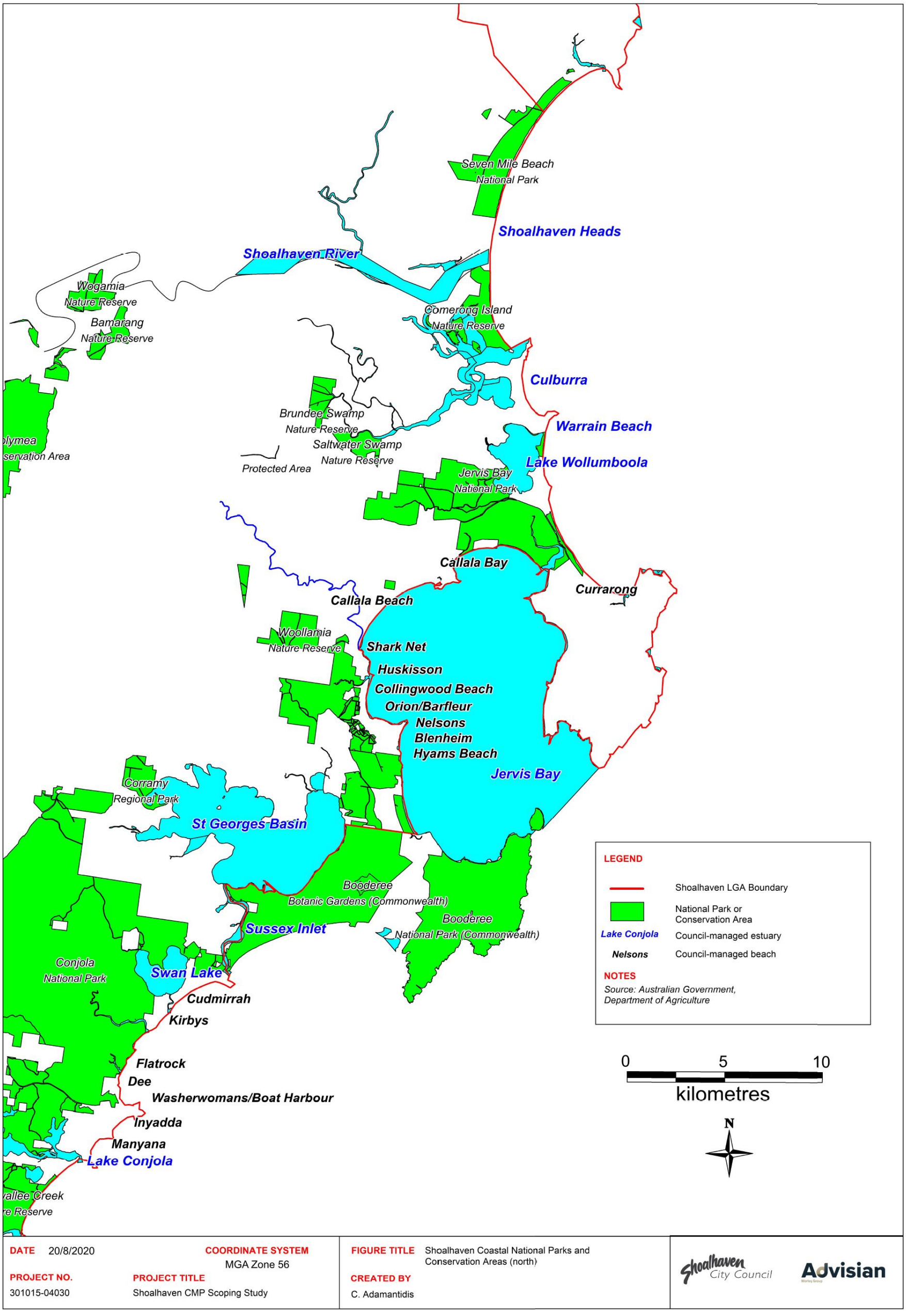



*Figure 1-2 – Shoalhaven National Parks and Conservation Areas (north)*

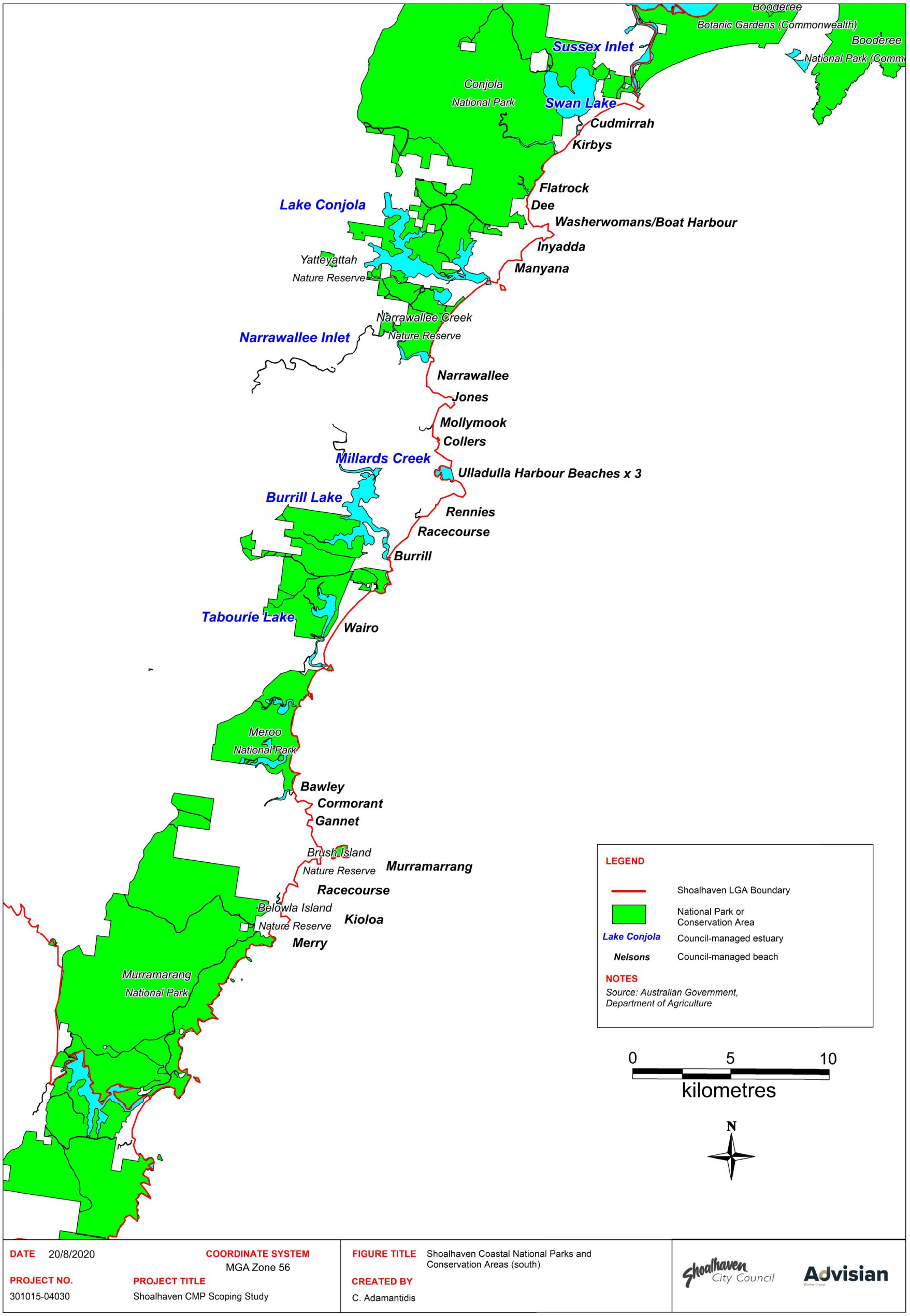



*Figure 1-3 – Shoalhaven Coastal National Parks and Conservation Areas (south)*

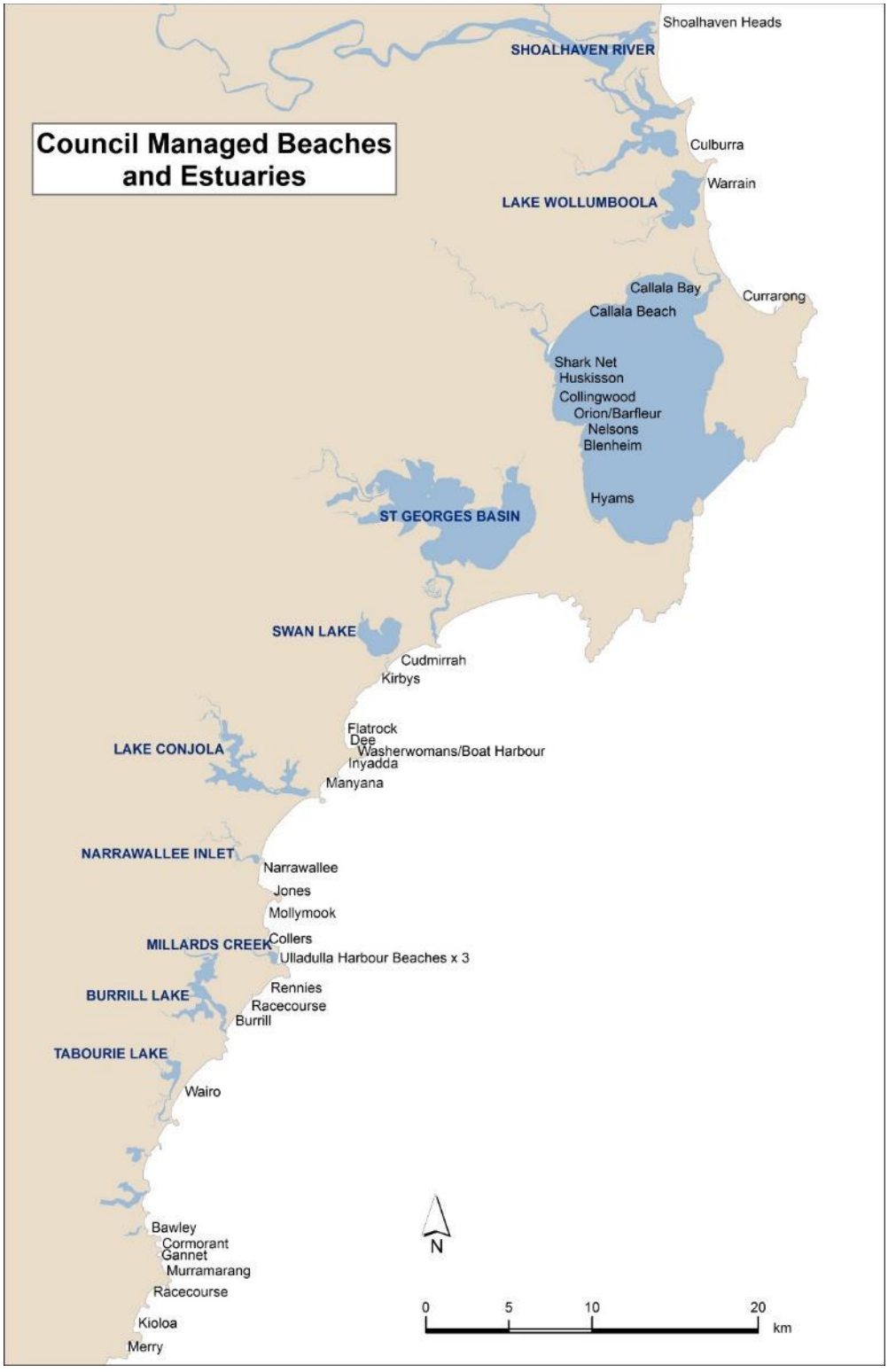



*Figure 1-4 – Map showing Council managed beaches and estuaries*

### 1.2.2 How should we group the CMPs for different areas?

It is recognised that the intent of the legislation is that a single CMP be developed for each coastal Council area in NSW. However, it is pertinent to explore whether the study area should be divided into different components for the provision of either a combined CMP, or a series of discrete CMPs that focus on particular areas. It has been identified by Council and the Project Working Group that a single CMP covering the entire study area and estuaries might be too much to cover in a single CMP and that attempting to do this may lead to a poorer outcome. For this reason, various approaches can be considered for dividing the study area into natural groupings for separate CMPs. For example, the natural groupings may be on the basis of sediment compartments, or a community-centred approach based on geographic area. The wider coastal sediment compartments identified in the Shoalhaven are:

- A compartment centred on the Shoalhaven River estuary, encompassing Seven Mile Beach at Shoalhaven Heads, Culburra, Warrain and Currarong beaches.
- A compartment centred on Jervis Bay, encompassing Callala and Collingwood beaches.
- A compartment between Bannisters Point and Jervis Bay, encompassing Bendalong and Narrawallee beach.
- A compartment between Warden Head and Bannisters Point, encompassing Ulladulla Harbour, Collers and Mollymook beaches.

These sediment compartments can be broken down further into sub-compartments, as illustrated in Figure 1-6 .

Another approach may be to undertake a separate CMP that focusses on each of the four coastal management areas that could combine together to create a single overarching CMP (i.e. create separate sub-CMPs that cover exclusively the coastal wetlands and littoral rainforest with a focus on coastal ecology, another that covers the coastal environment area, coastal use area and coastal vulnerability).

A suggested approach for developing CMPs to cover the study area is provided in Figure 1-5. The rationale behind this approach is as follows:

- The CMP for the Shoalhaven can be developed as a series of CMPs that consider processes occurring at local and regional scales, as well as the community context and unique issues that apply to each area.

- The Shoalhaven coastline including the beaches of the Open Coast, cliffs and bluffs would be included in a single CMP as the existing coastal management arrangements for the open coast are relatively well developed, with a certified coastal zone management plan already in place.

- The major estuaries in the study area have unique management issues and represent discrete communities – the largest of these, Shoalhaven River, St. Georges Basin/Sussex Inlet and Lake Conjola all warrant their own individual CMP. The remaining estuaries including intermittently closed/open lakes and lagoons (ICOLLs) and the coastal creeks and lakes outside of the three largest estuaries could be combined into a single local scale CMP, or grouped in terms of their characteristics, geographic locations and level of risk as discussed in Section 6.5. These

estuaries would include those managed by Council, i.e. Lake Wollumboola, Swan Lake, Narrawallee Inlet, Millards Creek, Lake Tabourie and Lake Burrill.

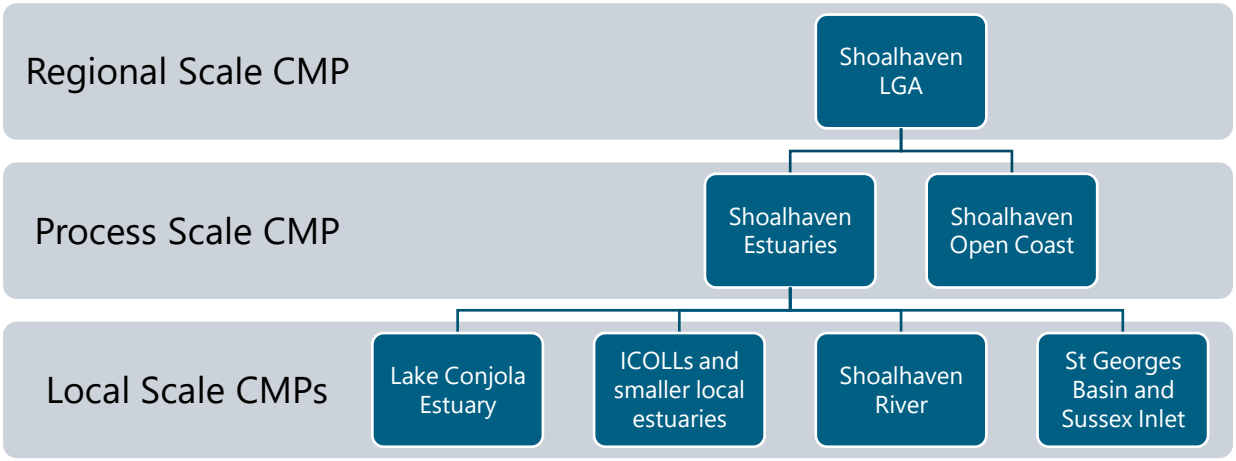



*Figure 1-5 – Rationale for developing CMPs for the Shoalhaven coast*

Of the above, the coastal management arrangements for the Shoalhaven Open Coast, Jervis Bay, and St Georges Basin/Sussex Inlet are considered to be the most developed and represent ideal pilot cases for the development of a CMP as both have adopted management plans already in place. Lessons learnt from the development of the CMP for these areas can then be applied to complete the CMPs for the remaining areas in parallel as identified in Section 7.

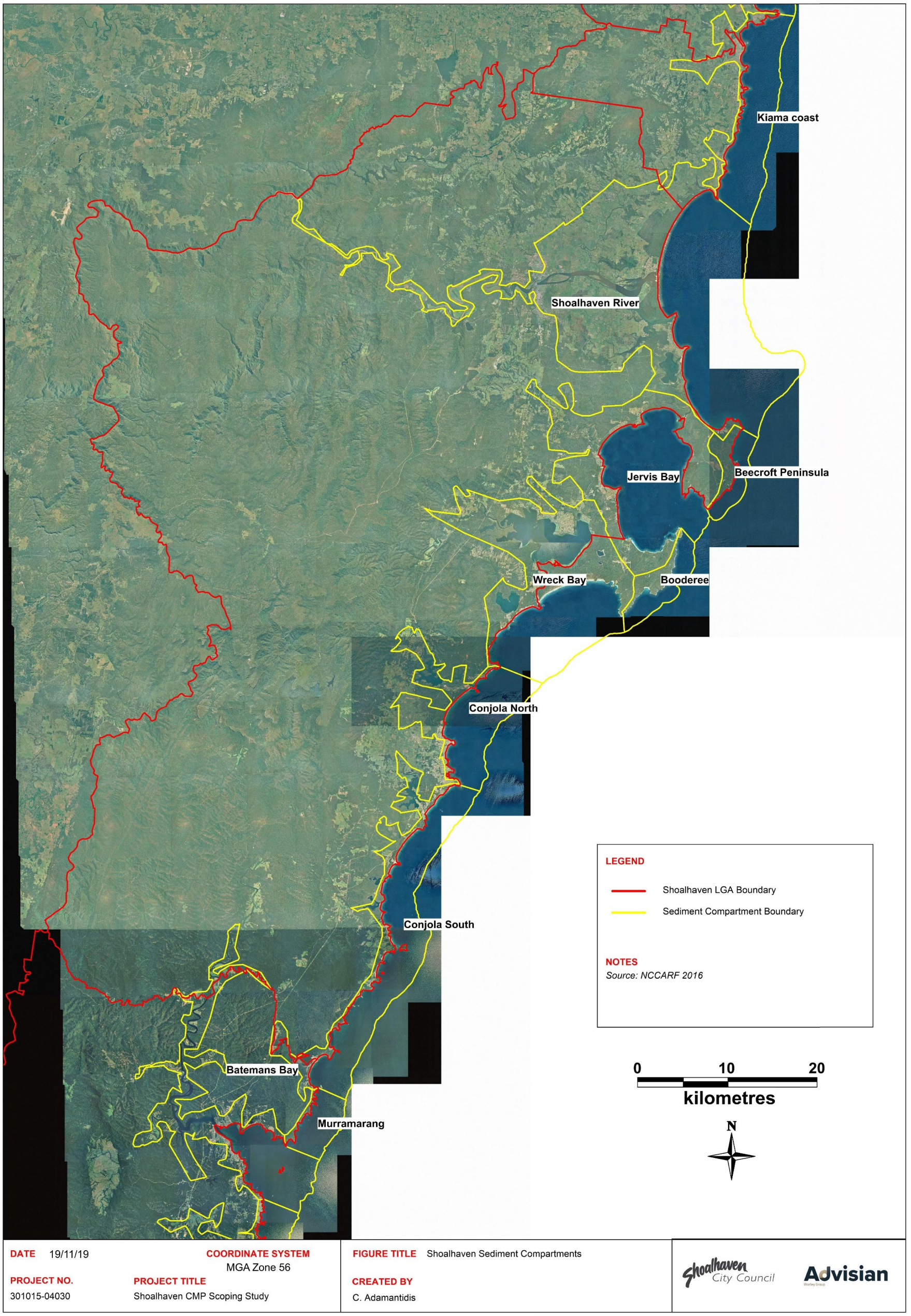



*Figure 1-6 – Shoalhaven Sediment Compartments (NCCARF, 2016)*

## 1.3 What is covered in this Scoping Study?

This Scoping Study is structured to provide the following information:

1. An outline of the strategic context of the CMP.

2. A clear statement of what the Council intends to achieve with the CMP, including a purpose, vision for the coast and management objectives.

3. A description of key management issues to be the focus of the CMP for time frames including 20 years, 50 years, 100 years and beyond. A description of the area covered by the CMP (Open coast and estuaries), including which of the four coastal management areas will be included.

4. A review of current coastal management issues and challenges and the effectiveness of existing management arrangements, responses and land-use planning instruments.

5. A description of roles, responsibilities and governance.

6. A description of where action is required including the results of a first pass risk assessment to identify priority threats and hazards, consistent with the ISO31000 standard. A prioritised list of knowledge gaps and information needs required in Stages 2 and/or 3 (from Figure 1-1) and the coastal management areas to which they apply, together with the rationale for additional studies where required. Future stages of the CMP will need to further consider pathways and planning timeframes from now, 20 years, 50 years and 100 years and beyond.

7. A stakeholder and community engagement strategy, that outlines how public authorities, community organisations and individuals will be offered appropriate opportunities to be involved in objectives, decisions and actions for the management of the coast.

8. A preliminary business case for the preparation of the remaining stages of the CMP.

9. A discussion on whether a Planning Proposal is likely to be required to amend the Coastal Management Area or LEP mapping.

10. A forward program with subsequent stages in the preparation of a CMP, including rationale for any proposed 'fast tracking', a determination on whether a planning proposal will be prepared to amend coastal management area maps (an LEP) and an indicative timeframe for completing the relevant stages.

This Scoping Study covers the Shoalhaven Open Coast and estuaries and provides the basis for development of a CMP for the Shoalhaven.

# 2 Purpose, Vision and Management Objectives

## 2.1 Overview

Shoalhaven Council has identified a Purpose, Vision and Management Objectives for the Open Coast areas of the Shoalhaven, within the Shoalhaven Coastal Zone Management Plan 2018.

Council has broadly identified the primary purpose of the CMP, which is to develop a plan for the future management of the Shoalhaven's open coast and estuaries in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State. Council developed a Vision and Management Objectives which have been outlined in the Coastal Zone Management Plan for the open coast.

The preliminary Purpose, Vision and Management Objectives were presented for discussion at a workshop involving Council and NSW Government Agencies in February 2019. Based on the outcomes of that workshop, the Purpose, Vision and Management Objectives for the CMP have been refined and are presented below.

For the CMP, there is a need to set an overarching Vision that is consistent with the state's vision while reflecting the local context, to help communities to identify with the future of their coast, encourage a sense of community ownership of the actions in the CMP and foster commitment to its preparation and implementation.

The Vision and Purpose are considered to be at the top of the hierarchy for the CMP, as they set the framework for the definition of the strategic objectives, which in turn allow specific objectives to be set. The relationship between the Vision, Purpose and Specific Objectives is illustrated in Figure 2-1.

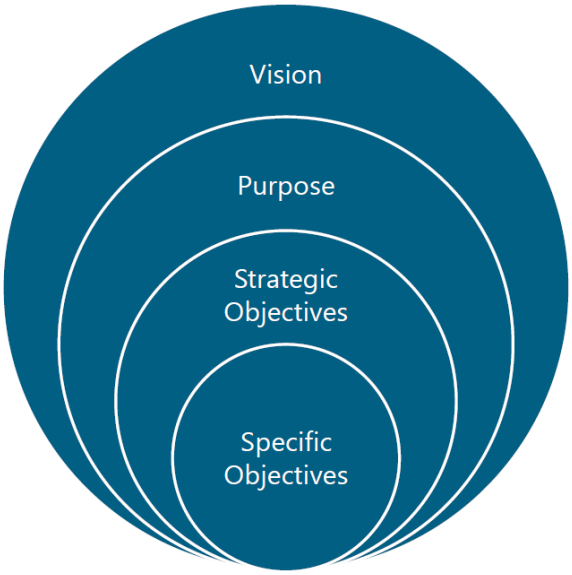



*Figure 2-1 – Relationship between Vision, Purpose and Strategic Objectives*

## 2.2 Vision for the CMP

The Vision for the CMP has been defined by Council and discussed in a Council and Agency Workshop in February 2019.

An updated Vision Statement was drafted during the Workshop, below:

> **Vision:** *We care for and protect the coast so that current & future generations continue to be refreshed & inspired by their coastal experience.*

## 2.3 Purpose of the CMP

Council has identified the Purpose of the CMP as:

> **Purpose:** *"to develop a plan for the future management of the Shoalhaven's open coast and its estuaries in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the Shoalhaven".*

## 2.4 Strategic Objectives

Council has defined the following Strategic Objectives of the CMP for the Shoalhaven, which drive the overall strategy behind the CMP, with the key themes highlighted in ***bold***:

- Give effect to all relevant ***NSW legislation and policy***, as applied to the coastal zone, in the Shoalhaven context
- Manage all coastal systems in an ***integrated manner that recognises the links*** between catchment, lake, estuary and open coast processes

- Manage the coastal zone ***adaptively***, with a clear process for ***modifying management approaches*** as new knowledge becomes available
- Invest in effective and efficient strategies to achieve ***positive natural, social, cultural and economic outcomes*** within Council's responsibilities.
- Take ***coastal hazards*** into account in Council's ***land use planning.***
- Maintain ***natural systems and processes*** to improve the ***health and diversity*** of natural systems.
- Support the ***social and economic wellbeing*** of local ***communities*** by ***maintaining safe access*** to beaches and headlands and supporting recreational activities.
- ***Align*** the Coastal Management Program with Local Environment Plan 2014, Development Control Plan 2014 and Integrated Strategic Plan.
- ***Engage with the community*** in the review and preparation of coastal management programs.
- Keep the ***community informed*** about coastal processes and management responses.

## 2.5 Specific Objectives

The following Specific Objectives of the CMP for the Shoalhaven have been adopted, based on the objectives of the *Coastal Management Act* 2016, with the key themes highlighted in ***bold***.

- to ***protect*** and enhance natural ***coastal processes*** and ***coastal environmental values*** including natural character, scenic value, biological diversity and ecosystem integrity and resilience,
- to support the ***social and cultural values*** of the coastal zone and maintain public access, amenity, use and safety,
- to ***acknowledge and protect Aboriginal peoples'*** spiritual, social, customary and economic use of the coastal zone, and
- to recognise the coastal zone as a vital ***economic*** zone and support sustainable coastal economies,
- to facilitate ***ecologically sustainable development*** in the coastal zone and promote sustainable land use planning decision-making,
- to ***mitigate current and future risks*** from coastal hazards, taking into account the effects of ***climate change***,
- to recognise that the ***local and regional scale*** effects of coastal processes and the inherently ambulatory and dynamic nature of the shoreline may result in the loss of coastal land to the sea (including estuaries and other arms of the sea), and to ***manage coastal use and development*** accordingly,
- to promote ***integrated*** and co-ordinated coastal planning, management, reporting and response,

- to encourage and promote plans and strategies to improve the ***resilience*** of coastal ***natural and built assets*** to the impacts of an uncertain climate future including impacts of extreme storm events,
- to ensure ***co-ordination*** of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities,
- to support ***public participation*** in coastal management and planning and greater public ***awareness, education*** and ***understanding*** of coastal processes and management actions,
- to facilitate the ***identification of land*** in the coastal zone for acquisition by public or local authorities in order to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone, and
- to support the objects of the *Marine Estate Management Act 2014*.

# 3 Strategic Context

## 3.1 Introduction

As outlined at Section 1.3 of the *NSW Coastal Management Manual Part B: Stage 1* (OEH, 2018), establishing the strategic context for the CMP is important in providing councils with an understanding of the internal and external context in which they are operating. This will ultimately help in identifying and addressing coastal management issues in a risk framework.

Section 3 and Section 4 of this Scoping Study describes the:

- **Legal context** - relevant legislation and policies, land tenure and land managed as national park or Crown reserve
- The **policies, guidelines and plans** relevant to the Shoalhaven coastal zone
- **Social context** - population growth and seasonal demographic changes
- **Cultural context** - cultural background of residents and other stakeholders and the presence of places of historical or cultural significance such as Aboriginal sites
- **Political and governance context** - relationships between the council, adjoining councils and other public authorities
- **Economic context** - equity, distribution of wealth, willingness to pay and the reliance of the community on coastal related tourism or other coast-dependent businesses such as aquaculture
- **Environmental context** - including physical features and processes such as coastal sediment compartment, habitat extent and health, catchment characteristics and climate change
- **Technical context** - understanding of coastal processes and climate change or the need to review and amend the mapping of the coastal management areas.

## 3.2 Legislative Context

### 3.2.1 Overview

The key NSW legislation relevant to developing a Coastal Management Program for the Shoalhaven includes:

- the NSW Coastal Management Act 2016
- the State Environmental Planning Policy (Coastal Management) 2018
- Shoalhaven Local Environment Plan 2014
- Crown Land Management Act 2016 no. 58
- Fisheries Management Act 1994
- Local Government Act 1993

- Biodiversity Conservation Act 2016
- National Parks and Wildlife Act 1974
- Marine Estate Management Act 2014
- Environmental Planning and Assessment Act 1979
- Aboriginal Land Rights Act 1983.

A detailed overview of the relevant legislation is provided in **Appendix A**, with the key obligations and responsibilities of Council set out in Table 3-1.

*Table 3-1 – Matrix of key legislation relevant to preparation of a Coastal Management Program for the Shoalhaven*

| Legislation | Obligation | Responsibility |
|---|---|---|
| *Coastal Management Act 2016*<br>*Coastal Management SEPP* | s13. A local council may, and must, if directed to do so by the Minister, prepare a coastal management program in accordance with **Part 3** of the CMA 2016. | Shoalhaven Council |
| | s18. Local council is to ensure that its coastal management program is reviewed at least once every 10 years. The review is to be undertaken in accordance with the coastal management manual. | |
| | s22 (1). A local council is to give effect to its coastal management program and, in doing so, is to have regard to the objects of this Act<br>s22 (2). In particular, without limiting subsection (1), a local council is to give effect to its coastal management program in:<br>(a) the preparation, development and review of, and the contents of, the plans, strategies, programs and reports to which Part 2 of Chapter 13 of the *Local Government Act 1993* applies, and<br>(b) the preparation of planning proposals and development control plans under the *Environmental Planning and Assessment Act 1979*. (Note s29 provides that failure to do so does not render any resulting instrument or plan invalid) | |

| Legislation | Obligation | Responsibility |
|---|---|---|
| | s23 (1). Public authorities (other than local councils) are to have regard to coastal management programs to the extent that those programs are relevant to the exercise of their functions<br>(2) In particular, those public authorities are to have regard to relevant coastal management programs and the coastal management manual in the preparation, development and review of, and the contents of, any plans of management that those public authorities are required to produce and, in doing so, are to have regard to the objects of this Act. | Other public authorities |
| *Local Government Act 1993* | The content in the following local council strategic planning documents are to be prepared, developed or reviewed to give effect to the coastal management program:<br>• Community strategic plan<br>• Resourcing strategy<br>• Delivery program<br>• Operation plan<br>• Integrated planning and reporting guidelines | Shoalhaven Council |
| *Crown Land Management Act* | s3.23(6). Council is to develop a plan of management (POM) for Crown land as though it were community land. | Shoalhaven Council |
| | S3.23(7) specifies an 'initial period' of three years from the commencement of Part 3 of CLM Act (ending 30 June 2021) during which a council must ensure that the first POM applicable to the land is adopted as soon as practicable.<br>Council managers may amend existing POMs so that they apply to Crown reserves. | |

## 3.3 Policies, Guidelines and Plans

### 3.3.1 Overview

This Section provides an overview of the key policies, guidelines and plans relevant for the development of a CMP for the Shoalhaven, including:

- The NSW Coastal Management Manual
- Shoalhaven 2027 Community Strategic Plan
- NSW Marine Estate Strategy 2018-2028
- Illawarra Shoalhaven Regional Plan 2015
- Coastal Zone Management Plan for the Shoalhaven Coastline 2018
- Shoalhaven River Estuary Management Plan
- Lake Conjola Estuary Management Plan Review
- St Georges Basin Revised Estuary Management Plan
- Shoalhaven Local Environment Plan 2014 (LEP)
- Shoalhaven Development Control Plan (DCP)
- Policy and Guidelines for Fish Habitat Conservation and Management (2013)
- NSW Oyster Industry Sustainable Aquaculture Strategy (2016)
- Healthy Estuaries for Healthy Oysters Guidelines (2017)
- Other relevant Plans and Policies, including the Shoalhaven DCP 2014 and the Shoalhaven LEP.

A detailed description of the management issues for the open coast and each of the estuaries as gleaned from these documents is provided in **Appendix B**.

### 3.3.2 Coastal Management Manual Part A & B and Toolkit

The NSW *Coastal Management Manual* provides guidance for developing a CMP which is required to be prepared by councils in accordance with the Act.

The Coastal Management Toolkit is a compendium of technical information that will further assist councils with preparing coastal management programs.

### 3.3.3 Shoalhaven 2027 Community Strategic Plan

The Community Strategic Plan (CSP) sits at the top of Council's planning hierarchy and identifies the community's main priorities and expectations for the future and ways to achieve these goals. All

Councils across NSW are required by the Local Government Act to develop a CSP, forming part of an Integrated Planning and Reporting framework.

The plan must:

- Have a long-term focus with a minimum of 10 years
- Address key issues relating to social, environmental, economic and civic leadership objectives
- Be developed using an adopted community engagement strategy that enables Council to communicate and consult with the community
- Outline the principles on which the plan is based
- Provide for measuring, monitoring and reporting on progress in implementing the plan

The Shoalhaven CSP has four themes and ten key priorities as an important focus for the community. An assessment was undertaken to ensure alignment between these key priorities and the strategic objectives in the Coastal Management Program.

An overarching strategic objective is to 'Align the CMP with Council's LEP, DCP and Integrated Strategic Plan'. This may require the LEP and DCP to be updated to include any updated coastal vulnerability mapping that may be developed during the CMP process.

The following table (Table 3-2) outlines the direct linkages and strong alignment between all of the strategic objectives in the CMP and the CSP.

*Table 3-2 – Direct linkages between Community Strategic Plan 2027 and Coastal Management Program*

| Community Strategic Plan 2027 Theme/Key Priority | Coastal Management Program Strategic Objective |
|---|---|
| 1.- Resilient, safe and inclusive communities<br><br>1.1.- Build inclusive, safe and connected communities | Invest in effective and efficient strategies to achieve positive natural, social, cultural and economic outcomes within Council's responsibilities |
| 1.-Resilient, safe and inclusive communities<br><br>1.3.- Support active, healthy liveable communities | Support the social and economic wellbeing of local communities by maintaining safe access to beaches and headlands and supporting recreational activities |
| 2.- Sustainable, liveable environments<br><br>2.1.- Plan and manage appropriate and sustainable development | Manage the coastal zone adaptively, with a clear process for modifying management approaches as new knowledge becomes available<br><br>Take coastal hazards into account in Council's land use planning |

| Community Strategic Plan 2027 Theme/Key Priority | Coastal Management Program Strategic Objective |
|---|---|
| 2.- Sustainable, liveable environments<br><br>2.3.- Protect and showcase the natural environment | Manage all coastal systems in an integrated manner that recognises the links between catchment, lake, estuary and open coast processes<br><br>Maintain natural systems and processes to improve the health and diversity of natural systems |
| 3.- Prosperous communities<br><br>3.1.- Maintain and grow a robust economy with vibrant towns and villages | Invest in effective and efficient strategies to achieve positive natural, social, cultural and economic outcomes within Council's responsibilities<br><br>Support the social and economic wellbeing of local communities by maintaining safe access to beaches and headlands and supporting recreational activities |
| 4.- Responsible governance<br><br>4.2.- Provide advocacy and transparent leadership through effective government and administration | Give effect to all relevant NSW legislation and policy, as applied to the coastal zone, in the Shoalhaven context |
| 4.- Responsible governance<br><br>4.3.- Inform and engage with the community about the decisions that affect their lives | Engage with the community in the review and preparation of coastal management programs<br><br>Keep the community informed about coastal processes and management responses |

### 3.3.4 NSW Marine Estate Strategy 2018 – 2028

The *NSW Marine Estate Management Strategy 2018-2028* was developed to support the objectives set out in the *Marine Estate Management Act 2014* in delivering holistic management of the marine estate as one continuous system.

The strategy identifies a number of environmental, social, cultural and economic threats to the NSW marine estate. In managing these threats, the Marine Estate Management Authority sets out nine management initiatives:

1. Improving water quality and reducing litter
2. Delivering healthy coastal habitats with sustainable use and development
3. Planning for climate change
4. Protecting the Aboriginal cultural values of the marine estate

5. Reducing impacts on threatened and protected species
6. Ensuring sustainable fishing and aquaculture
7. Enabling safe and sustainable boating
8. Enhancing social, cultural and economic benefits
9. Delivering effective governance

Preparation of the Shoalhaven CMP will consider the initiatives set out by this strategy document.

### 3.3.5 Illawarra Shoalhaven Regional Plan 2015

The purpose of the Illawarra-Shoalhaven Regional Plan is to provide for a strategic policy, planning and decision-making framework to guide sustainable growth in the region from the period 2015 – 2035. The key principles underpinning the regional plan that are relevant to Coastal Management in Shoalhaven include the following:

- Identify and protect land with high environmental value and recognise cultural heritage values;
- Support the sustainable use of land and water resources and build resilience to natural hazards and climate change;
- Support a strong, resilient and diversified economy that will enable the community to respond to environmental, economic and social challenges.

The plan for the Shoalhaven region is to build towards a sustainable future with a resilient community capable of adapting to the changing economic, social and environmental circumstances. The Shoalhaven CMP will consider the long-term objectives set out by the regional plan.

### 3.3.6 Coastal Zone Management Plan for the Shoalhaven Coastline 2018

Shoalhaven City Council, often in partnership with state government agencies, manages 40 open coast beaches bays, headlands, 9 coastal lakes and estuaries. The CZMP covers the Shoalhaven open coastline (including Jervis Bay) and does not include the lakes or estuaries. The purpose of the CZMP was to set out a plan of actions for the next five years to manage threats to the open coast. The key strategies and action plans in this document were to:

1. Regulate development for environmental protection and resident safety;
2. Balance beach stability and user amenity;
3. Manage risk of public and private assets; and
4. Ensure the coastline continues to be a valued asset.

The key coastal processes addressed in the document were coastal erosion, climate change and sea level rise. Additionally, the report outlines community values and concerns with an engagement plan put forward to improve community consultation in coastal management.

To address localised issues along the Shoalhaven open coast, local area plans were also developed for locations sharing similar coastal features, coastal hazards and locality. These regions included:

- Seven Mile Beach and Culburra Beach
- Warrain Beach and Penguin Head
- Jervis Bay Marine Park Area
- Berrara, Bendalong, Inyadda point, Manyana
- Narrawallee Beach, Bannisters Point, Mollymook Beach and Collers Beach
- Ulladulla Harbour, Rennies Beach and Racecourse Beach.

### 3.3.7 Shoalhaven River Estuary Management Plan

The *Shoalhaven River Estuary Management Plan* was completed and adopted by Council in 2008 (Umwelt Australia, 2008), and was developed with community input *via* the Shoalhaven Natural Resources and Floodplain Management Committee. The Plan identifies and provides a description of the natural, economic social and cultural values of the estuary as well as a suite of management actions and an implementation strategy to address the values. The Plan incorporated community input through a comprehensive exhibition process prior to finalisation.

Issues identified included:

- Flooding
- Erosion and Sedimentation (due to poorly vegetated riparian zones, flooding and tidal movements)
- Water Quality (including salinity, acid sulfate soil discharge, freshwater extraction and point source pollution)
- Ecology (instream structures affecting fish passage, changes to salinity gradients, integrity of vegetation in the riparian corridor, feral animals, limited connectivity between isolated areas of high habitat value)
- Recreation (open public spaces for fishing, watersports, conflict between powered and non-powered recreational boat users, congestion at boat ramps)
- Aboriginal and European Heritage (poor awareness of the significance of Aboriginal cultural values by landuse decisionmakers, low level of involvement by local Aboriginal people in landuse planning)
- Socioeconomics (primary production, tourism, fishing, need for farm management plans to be developed for areas with active bank erosion)
- Climate Change (sea level rise, change in frequency of floods and extreme weather events)
- Visual Amenity
- Entrance Management

- Catchment Flows

### 3.3.8 Lake Conjola Estuary Management Plan Review 2015

The Lake Conjola EMP Review prepared by GHD looked at the focus management areas identified in the original EMP prepared by Council in 1998. The scope of these management areas was updated to reflect current environmental challenges, legislative changes, climate change and community – cultural considerations. The focus areas include:

1. Biodiversity and ecosystem protection and rehabilitation
2. Access, recreation and tourism
3. Entrance management
4. Flooding
5. Adapting to climate change
6. Cultural heritage

A review of the completed and incomplete actions was recorded. Further, additional recommendations were made to improve the management of these areas involving continued research, community engagement, monitoring and environmental protection. The responsible party for each of these recommendations was also put forward.

### 3.3.9 St Georges Basin Revised Estuary Management Plan 2013

The St Georges Basin Revised EMP is a review conducted by SCC of the 1998 St Georges Basin EMP also prepared by SCC. The purpose was to review the scope of the management areas to reflect current environmental challenges, legislative changes, climate change and community – cultural considerations.

1. Catchment Inputs and their Impacts – Sewer water, urban stormwater and sediment run-off.
2. Biodiversity and Ecosystem Protection and Rehabilitation – Terrestrial, aquatic and riparian Habitat.
3. Access and Recreation – Foreshore access, swimming and boating and boat navigation
4. Natural Hazards - Adapting to Climate Change – Sea level rise and floodplain risk management
5. Cultural Heritage – Aboriginal and European heritage.

A review of the completed and incomplete actions was recorded. Further, additional recommendations were made to improve the management of these areas involving continued research, community engagement, monitoring and environmental protection. The responsible party for each of these recommendations was also put forward.

### 3.3.10 Shoalhaven Local Environment Plan 2014 (LEP)

*Shoalhaven Local Environmental Plan 2014* (the LEP) sets out planning provisions to:

- encourage the proper management, development and conservation of natural and man-made resources,
- facilitate the social and economic wellbeing of the community,
- ensure that suitable land for beneficial and appropriate uses is made available as required,
- manage appropriate and essential public services, infrastructure and amenities for Shoalhaven,
- to minimise the risk of harm to the community through the appropriate management of development and land use.

*Clause 7.4 Coastal Risk Planning* of the LEP sets out provisions to ensure that the use and development of land in Shoalhaven is compatible with the associated coastal risks and hazards as defined by the *Coastal Management Act* 2016. The LEP would require an update to include updated coastal risk planning maps that may arise as a result of the CMP process.

### 3.3.11 Shoalhaven Development Control Plan (DCP)

Council's Shoalhaven DCP 2014 Chapter G6 identifies several precincts for development controls for beach erosion and/or inundation areas. These precincts are based on coastal hazard mapping undertaken in 2017 for the beaches on the basis of Council's adopted sea level rise projections, as well as the combined coastal erosion and creek instability hazard that was assessed for the beaches of the Shoalhaven at that time. Cliff instability hazard is included in the DCP based on geotechnical hazard mapping undertaken in 2009. The DCP provides links to Council's interactive coastal hazard mapping on their website. The coastal hazard precincts defined in the DCP are illustrated in Figure 3-1.

The performance criteria against which development is assessed as outlined in Shoalhaven DCP 2014 Clause 5.1.1, 5.1.2 and 5.1.3 are:

*P 1.1, 2.1 & 3.1 Development avoids or minimises exposure to immediate coastal risks within the immediate hazard area (or floodway).*

*P 1.2, 2.2 & 3.2 Development provides for the safety of residents, workers or other occupants on-site from risks associated with coastal processes.*

*P 1.3, 2.3 & 3.3 Development does not increase coastal risks to properties adjoining or within the locality of the site.*

*P 1.4, 2.4 & 3.4 Infrastructure, services and utilities on-site maintain their function and achieve their intended design performance.*

*P 1.5, 2.5 & 3.5 Development accommodates natural coastal processes including those associated with projected sea level rise.*

*P 1.6, 2.6 & 3.6 Coastal ecosystems are protected from development impacts.*

*P 1.7, 2.7 & 3.7 Existing public beach, foreshore or waterfront access and amenity is maintained.*

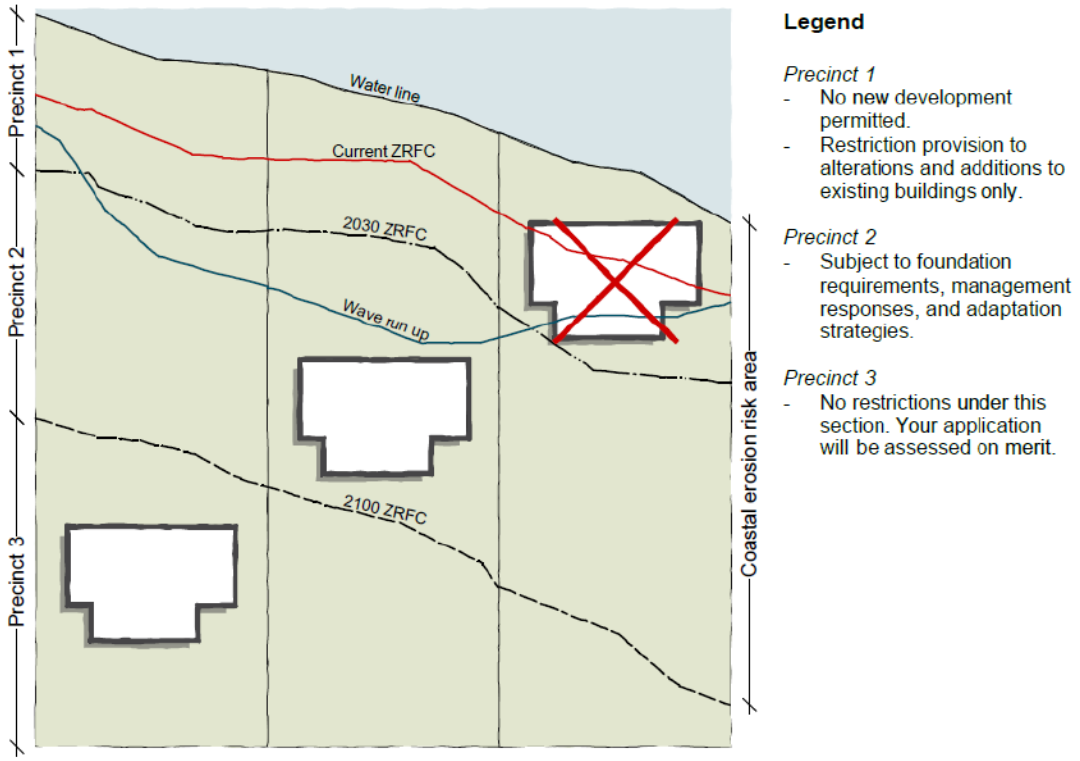



*Figure 3-1 – Coastal hazard precincts as defined by Shoalhaven DCP Chapter G6.*

### 3.3.12 Policy and Guidelines for Fish Habitat, Conservation and Management (DPI Fisheries, 2013)

This document outlines policies and guidelines aimed at maintaining and enhancing fish habitat for the benefit of native fish species, including threatened species, in marine, estuarine and freshwater environments.

The document aims to help developers, their consultants and government and non-government organisations to ensure compliance with legislation, policies and guidelines as they relate to fish habitat conservation and management. It can be used to inform land use and natural resource management planning, development planning and assessment processes. It is also a valuable tool to improve awareness and understanding of the importance of fish habitats and how impacts can be mitigated, managed or offset.

The document will feed into a range of NSW Government reform programs including strategic and regional planning processes, the assessment of State Significant Development and Infrastructure projects, aquatic biodiversity offsetting and other environmental regulation reforms, to ensure the sustainable management, and "no net loss", of key fish habitats in NSW.

### 3.3.13 NSW Oyster Industry Sustainable Aquaculture Strategy (DPI Fisheries, 2016)

The NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS):

- identifies those areas within NSW estuaries where oyster aquaculture is a suitable and priority outcome;
- secures resource access rights for present and future oyster farmers throughout NSW;
- documents and promotes environmental, social and economic best practice for NSW oyster farming and ensures that the principles of ecological sustainable development, community expectations and the needs of other user groups are integrated into the management and operation of the NSW oyster industry;
- formalises industry's commitment to environmental sustainable practices and a duty of care for the environment in which the industry is located;
- provides a framework for the operation and development of a viable and sustainable NSW oyster aquaculture industry with a clear approval regime and up-front certainty for existing industry participants, new industry entrants, the community and decision makers;
- identifies the key water quality parameters necessary for sustainable oyster aquaculture and establishes a mechanism to maintain and where possible improve the environmental conditions required for sustainable oyster production; and
- ensures that the water quality requirements for oyster growing are considered in the State's land and water management and strategic planning framework.

Within the Shoalhaven, oyster leases are identified at Burrill Lake, Lake Conjola, Crookhaven River and Shoalhaven River. However, it is understood that oyster farming is currently active only in the Shoalhaven and Crookhaven Rivers.

### 3.3.14 Healthy Estuaries for Healthy Oysters – Guidelines (DPI Fisheries 2017)

The objective of this document is to provide councils, state government agencies, private landowners and developers with advice about how to ensure development in close proximity to estuaries is compatible with the requirements of oyster aquaculture. A range of mitigation measures for improving water quality in estuaries is provided within these Guidelines.

The guidelines have been prepared to meet the requirements of management action (MA 7) of the NSW Diffuse Source Water Pollution Strategy (NSW DECC, 2009). This strategy identified pathogen levels exceeding the Australia and New Zealand Environment and Conservation Council (ANZECC) Guidelines as one of the top three priority problems from diffuse source water pollution in NSW.

### 3.3.15 Other relevant Plans and Policies

Many of the estuaries in the Shoalhaven have been the subject of plans, policies and studies, with relevant reference documents including:

- Burrill Lake Estuary and Catchment Management Plan (December 2002)

- Burrill Lake Interim Entrance Management Policy (Peter Spurway & Associates, 2008)
- Lake Tabourie Revised Estuary Management Plan. Adopted June 2013
- Tabourie Lake Entrance Management Policy (Cardno, 2018). Adopted 2019
- Lake Wollumboola Estuary Management Plan (2000) and Revised Estuary Management Plan (2013)
- Narrawallee Inlet Natural Resources Management Strategy (2002)
- Swan Lake and Berrara Creek Natural Resources Management Strategy (SCC, 2002)
- Swan Lake Entrance Management Policy (SCC, 2004)
- Shoalhaven River Entrance Management Plan for Flood Mitigation (SCC, 2006)
- Lake Conjola Entrance Study (Patterson Britton & Partners, 1999)
- Lake Conjola Interim Entrance Management Policy (GHD, 2013)
- Lake Conjola Estuary Management Plan (GHD, 2015)
- NSW Flood Prone Land Policy
- Floodplain Development Manual 2005

A detailed description of the management issues for each of the estuaries above as obtained from these documents is provided in **Appendix B**.

## 3.4 Social and Cultural Context - Community Profile

### 3.4.1 Locality

Shoalhaven City is located on the south coast of NSW, about 160 kilometres south of Sydney CBD. Shoalhaven LGA is bounded by Kiama LGA to the North and Eurobodalla Shire LGA to the south. The region is a growing residential and tourist area and is the most visited LGA in NSW outside of Sydney. It encompasses a total land area of 4,561 square kilometres composed of national park, state forest, bushland, beaches and lakes. The population is primarily concentrated along the coast in major centres and numerous small centres. The major centres are Nowra-Bomaderry, Milton-Ulladulla, Huskisson-Vincentia, St Georges Basin District, Culburra Beach and Sussex Inlet. At least 55.6% of Shoalhaven's population lives in coastal areas, of which 37% live in the Huskisson-Vincentia and Ulladulla-Mollymook urban areas. These two areas have been identified as significant growth centres in the Illawarra-Shoalhaven Regional Plan.

### 3.4.2 Population growth and seasonal fluxes

Total population in Shoalhaven City is 103,012 and has been forecasted to grow 21.59% from 2019-41 reaching a future total of 126,255. As a heavy favourite holiday location in NSW, the summer population of coastal villages peak at double or triple its normal value. In recent years the Shoalhaven has seen significant increases in daytrip visitors to its coast and tourism outside of peak season has increased by 40%.

Projected use of coastal land for infrastructure, housing, commercial, recreation and commercial purposes is addressed in the Illawarra Shoalhaven Regional Plan (NSW Government, 2015). The Plan identifies Nowra as Major Regional Centre, as well as identifying a need for 8,600 additional dwellings in the Shoalhaven between 2016 and 2036. Areas around Nowra have been identified as Regionally Significant housing release areas – these areas are shown in blue in Figure 3-2. Further, the Illawarra Shoalhaven Regional Plan identifies large areas of land in the Shoalhaven River catchment area as being Biophysical Strategic Agricultural Land, and identifies areas around Ulladulla as well as north and south of Jervis Bay as fisheries (Figure 3-3). The riverfront precinct in the Nowra CBD is identified as a tourism activation precinct,

Industrial landuse areas in the Shoalhaven are identified around Nowra, with smaller industrial areas in Ulladulla, Sussex Inlet, St Georges Basin and Huskisson, as indicated in Figure 3-4.

The Illawarra Shoalhaven Regional Plan identifies the estuaries in the Shoalhaven as being "sensitive" – i.e. that they need to be protected from inappropriate development that affects water quality or ecological function (NSW Government, 2015). To this end, the Regional Plan describes the setup of the Sensitive Urban Lands Panel by the NSW Government in 2006, to guide the planning outcomes for seven potential urban development sites in sensitive coastal locations within the Shoalhaven (Culburra Beach, Badgee Lagoon, Comberton Grange, Berrara, North Bendalong, Bendalong and Berringer Lake/Manyana).


*Figure 3-2 – Regionally significant housing release areas in the Shoalhaven (NSW Government 2015)*

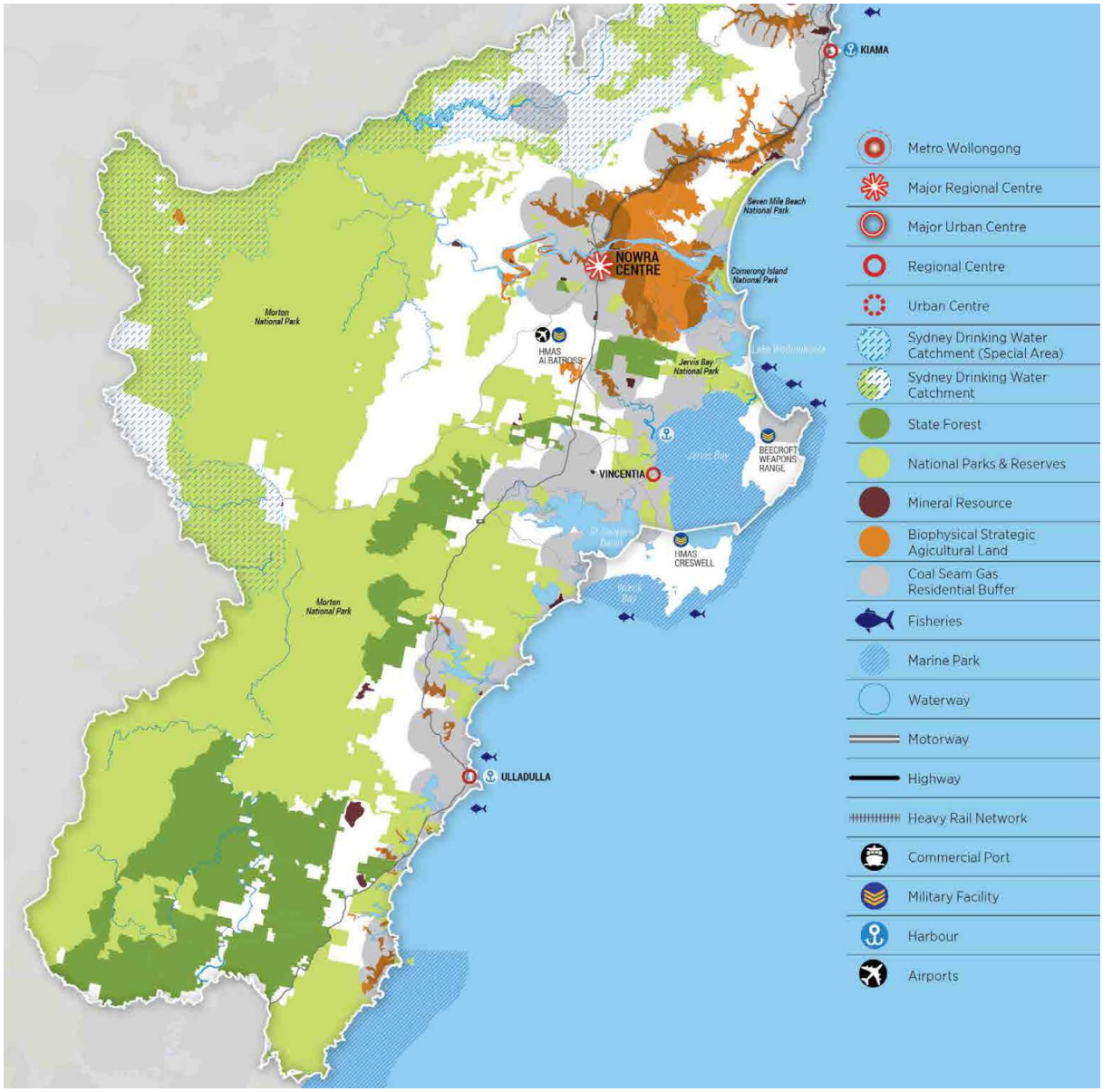



*Figure 3-3 – Agricultural and resources landuse in the Shoalhaven (NSW Government 2015)*

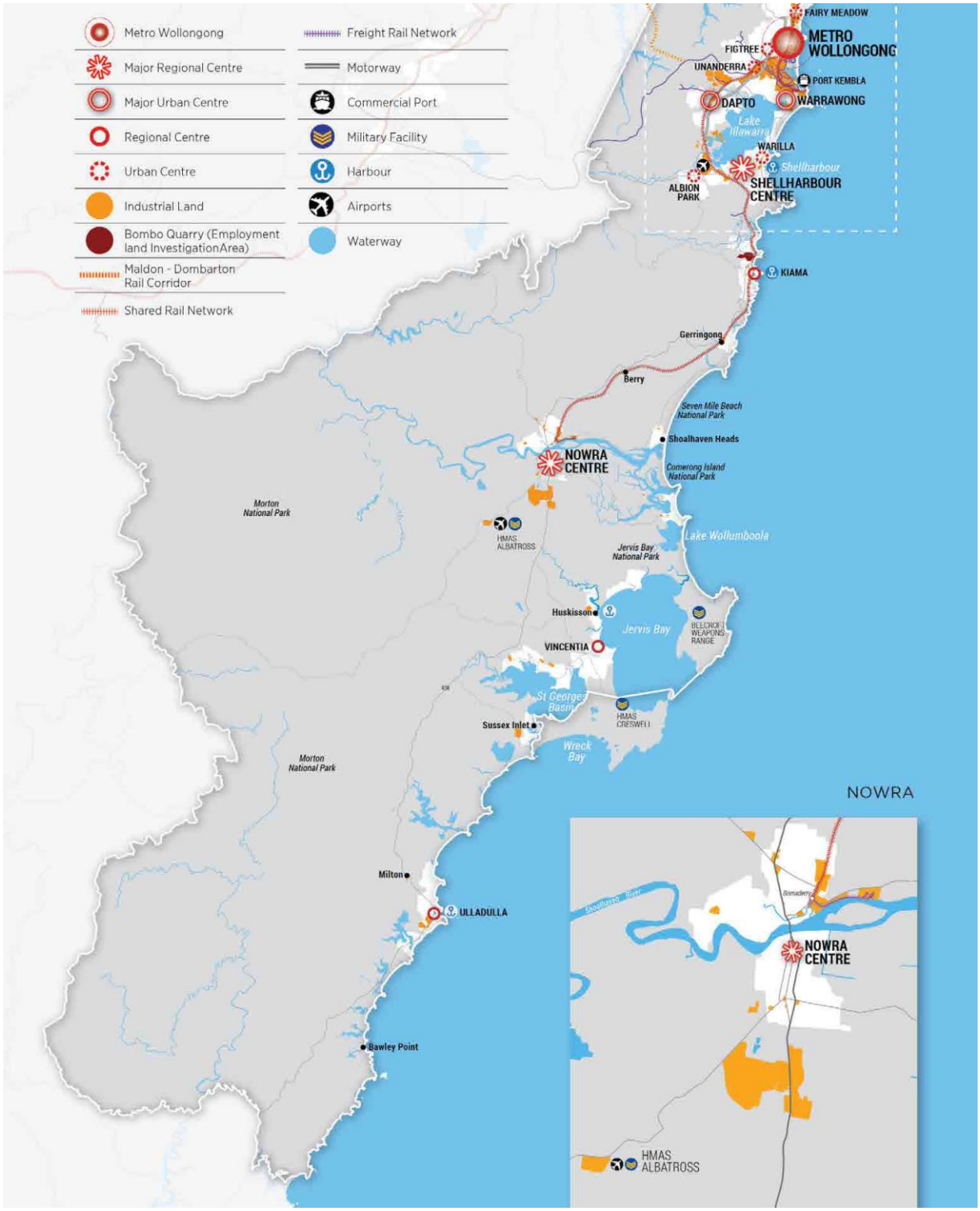



*Figure 3-4 – Shoalhaven's industrial land and freight transport network (NSW Government, 2015)*

### 3.4.3 Social values and culture

In the Shoalhaven region there exists a high proportion of absentee land owners with permanent residential occupancy rates of less than 50%. The age of people in the region is generally high as retirees settle permanently and young adults leave for employment or education. With at least 55% of Shoalhaven's population living in coastal areas the residents have a strong interest in protecting long established values of the coast.

Those living in this region participate recreationally in swimming, diving, surfing, boating, water skiing, fishing, bush walking, picnics, art and photography, conservation activities, sightseeing and car touring. High social and cultural value is associated with individual, family and community experiences with the natural landscape.

The three largest ancestries in Shoalhaven City Council were English, Australian and Irish. 5.5% of the population are Aboriginal and Torres Strait Islander people. 88.9% of the population are Australian citizens.

The original inhabitants of Shoalhaven City were the Wodi Wodi and Wandandian Aboriginal people.

## 3.5 Political and Governance Context

### 3.5.1 Relevant Public Authorities

The following public authorities have a role in coastal management in the Shoalhaven, with some having a final sign-off role at each stage of the CMP process. Input should be sought from all the authorities listed below at each stage of the CMP.

**NSW Department of Planning, Industry and Environment – Environment, Energy and Science (DPIE)** – The Environment, Energy and Science Group of DPIE has the role of supporting councils and communities in managing the open coast, estuaries and coastal lakes. The Department provides oversight of the State's coastal management program. The Department is the first point of contact for local councils planning to prepare and implement a CMP. The Department's role is to work in partnership with councils and local communities to manage the coast in accordance with the Coastal Management Framework. DPIE provides the following data and technical advice:

- wave data and data on historical coastline changes
- information on coastal and estuarine processes, sediment cells and coastal geomorphology/coastal engineering
- information on coastal hazard and risk assessment
- advice on ecosystem health and habitat mapping.

The Department administers the Coastal and Estuary Grants Program that provides funding for councils to prepare and implement their coastal management program.

The Wollongong DPIE team in DPIE Biodiversity and Conservation Division are in the South East Water Floodplains and Coast Team and directly support Councils between Wollongong and the Victorian border with Floodplain, Coastal and estuary issues.

**Shoalhaven City Council -** Local councils have a central role in managing the coast, specifically in preparing the CMP that sets out the long-term strategy for management of the coastal zone in its area. Local councils also identify the costs of the actions, proposed cost-sharing arrangements and viable funding mechanisms to ensure delivery.

**Crown Lands (DPIE – Housing and Property) –** Crown Lands are responsible for the management of NSW's Crown land, covering 42% of the state, including parks, reserves, roads and cemeteries. Much of the land in the coastal zone of the Shoalhaven is Crown Land. Crown Lands work in partnership with a range of agencies to make sure that natural resource management is managed across public land in NSW, and regulations and policies are met.

**Transport for NSW (TfNSW)** – TfNSW, through Roads and Maritime Services, is the operating agency responsible for provision and management of road and maritime networks as part of the transport system. Through the maritime division, TfNSW is responsible for managing recreational boating activities, navigable waterways and assets in the Shoalhaven.

**NSW State Emergency Service (NSW SES) -** NSW SES is the combat agency for floods, storms and tsunami. NSW SES is responsible for planning for and responding to flood, storm and tsunami events, including evacuation of those at risk. Coastal erosion events that are not caused by storms are the responsibility of the Local Emergency Operations Controller (LEOCON). The NSW State Storm Plan (2018) aligns with the *Coastal Management Act* 2016. Under this Act, Local Government Councils have the responsibility for developing Coastal (Zone) Management Plans (which outline the management of the coastal zone). Part of this plan outlines actions that can be undertaken during emergency situations, to minimise damage to the coastal zone (known as a Coastal Zone Emergency Action Plan).

**NSW Department of Primary Industry - DPI Fisheries -** DPI Fisheries has a regulatory role which seeks to ensure that developments comply with the requirements of the Fisheries Management Act, (namely the aquatic habitat protection and threatened species conservation provisions in Part 7 and 7A of the Act, respectively), and the associated Policy and Guidelines for Fish Habitat Conservation and Management (2013). DPI Fisheries is also responsible for the management of the Jervis Bay Marine Park under the Marine Estate Management (MEM) Act 2014. CMPs should take into account the objective of the MEM Act and associated regulations which includes the zoning plans.

**DPIE National Parks and Wildlife Service – NPWS -** NPWS manage over 7 million hectares of land across NSW, including more than 870 national parks and reserves, 4 World Heritage-listed sites, a number of Australian National Heritage sites and 17 Ramsar wetlands. These protected areas play a critical role in conserving biodiversity, as well as natural and cultural heritage. NPWS manages the estuaries and beaches within national parks on the Shoalhaven coastline and is responsible for provision of facilities such as picnic areas, boardwalks and lookouts in the national park areas.

**Infrastructure NSW** - Infrastructure NSW was established in July 2011 to assist the NSW Government in identifying and prioritising the delivery of critical public infrastructure for NSW. It is an independent statutory agency, established under the Infrastructure NSW Act 2011. Among other functions as outlined in the Infrastructure NSW Act 2011, Infrastructure NSW is responsible for preparing project

implementation plans for major infrastructure projects, reviewing and evaluating proposed major infrastructure projects by government agencies or the private sector, overseeing and monitoring the delivery of major infrastructure projects and other infrastructure projects identified in plans adopted by the Premier and managing and assessing the risks involved in planning, funding, delivering and maintaining infrastructure.

**NSW Local Land Services -** Local Land Services is a regional-focused NSW Government agency delivering quality customer services to farmers, landholders and the wider community. Local Land Services connect people with groups, information, support and funding to improve agricultural productivity and better manage our natural resources. The agency's remit covers agricultural production, biosecurity, natural resource management and help during emergencies. Local Land Services administer a variety of funding opportunities to assist farmers, landholders, Landcare, Aboriginal community groups and other partners to assist and promote the adoption of sustainable land management practices.

### 3.5.2 Relationships between council, adjoining councils and other public authorities

Internally, the Council's coastal staff are to be made aware that the management actions undertaken as a result of the CMP may affect the current projects or decision-making of other departments in the Council. As such it is important to inform staff of CMP preparation and how they may be affected.

Adjoining councils (e.g. Kiama Council) will need to cooperate in aligning similar management actions for sediment compartments which cross council boundaries.

If management actions for the CMP require the cooperation of other public authorities, they should be engaged and collaborated with.

### 3.5.3 Barriers for preparation of CMP planning process

The following have been identified as barriers for the preparation of a CMP and implementation of management actions:

- Political barriers (e.g. political pressure on Council to take actions that may be inconsistent with existing council policies and state legislation). These barriers may be overcome by ensuring that there is good communication and collaboration with stakeholders on coastal management issues.

- Governance barriers (e.g. having the processes in place to ensure that Council policies are adhered to and formally reviewed on a regular, scheduled basis, so that actions are undertaken that are consistent with Council's policies and not as a result of political pressure).

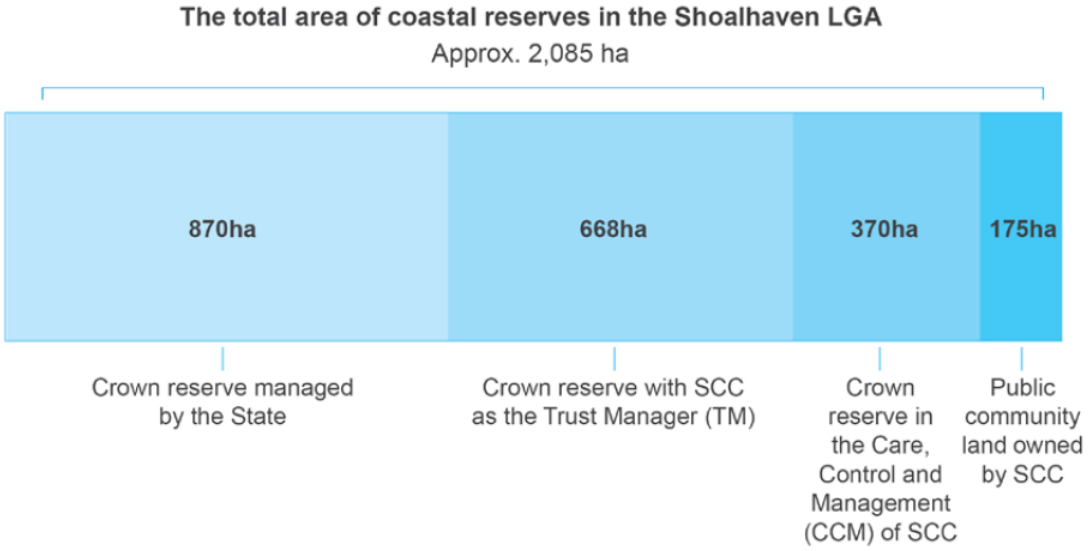
- Capacity issues (e.g. ensuring that Council has the resources to manage the CMPs and implement the required management actions). These barriers could be overcome by reviewing Council's staffing needs as well as by setting up coastal end estuary management working groups and empowering local communities to enable implementation of management actions using a "ground-up" rather than "top-down" approach.

There have been some legal issues in implementing Council's DCP, for example, for a particular case in relation to a DA for a screen wall at Hyams Beach which was taken to the Land and Environment Court based on legal interpretations of Council's DCP. In addition, it is known that there is some confusion in the community regarding the interpretation of Council's DCP, in relation to whether a particular development is allowable and under what circumstances (for example, whether developments can be considered "new" or simply "additions and alterations" under Council's DCP at Callala Beach), or under what circumstances a coastal engineering report would be required.

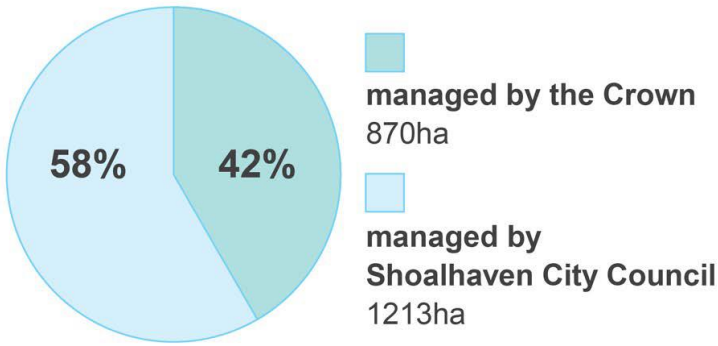
To reduce the risk of future legal challenges and to ensure consistency with the Coastal Management SEPP and *Coastal Management Act* 2016, it is suggested that the wording of the DCP be reviewed by Council's legal department to ensure that ambiguities are removed, for the benefit of the Councillors, Council development assessors and for those who seek to submit development applications.

### 3.5.4 Land Tenure

The coastline is almost entirely in public ownership and is therefore accessible to all the community as National Park or Crown land or Council reserve. Excluding national parks and state forests, the coastal reserves are owned and managed as depicted below:




As of 1 July 2018, the Council has been automatically appointed as Crown land manager for all reserves which they are currently the appointed reserve trust manager. The Act authorises councils to manage this Crown land as if it were public land under the *Local Government Act* 1993 (LG Act) with the default classification of community land.




- Generally, Crown land identified as 'local land' will be transferred to Council, as community land. The proportion of Crown land that Council manages is therefore likely to change.
- The other major change will allow Council to apply the Local Government Act to locally significant Crown land. The requirement to develop plans of management for each reserve will be phased in over time.
- Council consults with, and seeks approval from, the Department of Industry to carry out activities such as foreshore protection works on Crown reserves still managed by the NSW Government.

Over one third of the Shoalhaven's area is national parks managed by the NSW National Parks and Wildlife Service. There parks include:

- Cudmirrah National Park (NP)
- Booderee NP (Owned by Wreck Bay Aboriginal Community)
- Conjola NP
- Jervis Bay NP
- Morton NP
- Seven Mile Beach NP
- Murramarang NP

### 3.5.5 Aboriginal Heritage

The below information is drawn from the Shoalhaven CZMP 2018.

Owing to the productive nature of the land and its proximity to the sea, there are many sites with significant Aboriginal heritage value. Along the coast this includes middens, burial sites, artefacts and ceremonial areas. The areas of historical and cultural significance are described for each region:

- Seven Mile Beach and Culburra Beach: The Crookhaven Headland is a focal point for traditional cultural activities for the Jerrinja Aboriginal people who continue to live there. The aboriginal site register records a natural ceremonial King's Chair, natural water holes,

ceremonial artefacts, shell middens (one with quartz flakes), a tribal burial and a traditional swimming hole.

- Warrain Beach and Penguin Head: Aboriginal people camped at Kinghorn Point and around Lake Wollumboola. Heritage items in this area include middens, a waterhole and a burial site at the northern end of Lake Wollumboola.
- Jervis Bay Marine Park: There are middens at Callala Point, on the northern bank of Callala Creek and the southern side of the Callala Bay headland
- Lake Conjola where an AHIMS search undertaken for the Shoalhaven Dredging REF (Royal Haskoning 2015) identified 32 sites comprising 22 artefact scatters, 4 middens, 3 burials and 3 Potential Archaeological Deposits (PADs).
- Berrara, Bendalong, Inyadda Point, Manyana: Identified Aboriginal cultural heritage in this area of the coast consists of middens, stone artefacts and, in two locations, burials.
- Narrawallee Beach, Bannisters Point, Mollymook Beach and Collers Beach: There is one recorded midden site and one unrecorded midden site in Narrawallee although, we can assume that Narrawallee Inlet would have been a valuable food resource for Aboriginal people.
- Ulladulla Harbour, Rennies Beach and Racecourse Beach: The Harbour was one of the first places in Shoalhaven to be occupied by Europeans with the town being gazetted in 1829. There are illustrations and texts depicting Aboriginal people living around the Harbour and fishing from bark canoes. The rock platforms would also have been a rich food resource. Right up to the 1940s Aboriginal people still camped on the southern headland where a freshwater spring flowed into the Harbour and today there is an area known locally as the 'Danceground' on the headland where large numbers of Aboriginal people gathered for ceremonies.

## 3.6 Economic Context

### 3.6.1 Equity and distribution of wealth

The distribution of income in the Shoalhaven exhibits a larger proportion of the population earning a low income as compared to other regional areas. Population growth from lifestyle migration into the area is predicted to enhance economic growth in the area.

### 3.6.2 Reliance of community on coastal related tourism

The coastal zone supports tourism and fisheries in the region with an estimated 12% of jobs supported by tourism. Local villages are economically dependent on income from holiday makers using tourist parks, accommodation, restaurants and coastal recreation activities (dolphin cruises, arts and crafts markets). Ulladulla is a key centre for commercial fishing, processing and marketing of fish while recreational fishing is popular across the region.

### 3.6.3 Aquaculture

In early 2015 approval was granted for three aquaculture leases in Jervis Bay. This allows commercial operators to farm a number of native shellfish species including mussels, scallops and oysters in the bay. The clean and varied coastline of this region is also well positioned to support the emerging

industry of aquatic biotechnology. The Shoalhaven provides an appealing environment for this industry with a focus on the development of seaweed and algae products.

Greenwell Point and the lower Shoalhaven River Estuary is a significant oyster growing region, where both Sydney Rock and Pacific Oysters are grown, with at least 11 active oyster farms (Figure 3-5).

### 3.6.4 Willingness to fund coastal management actions

*Our Coast Our Lifestyle*, a community engagement study undertaken between 2015 – 16 by Straight Talk, found that the community supports the cost of coastal management being shared across the whole community, via rates or levies if necessary, and wishes Council to consider other revenue sources.

*Figure 3-5 – Oyster leases at Crookhaven River, between Greenwell Point and Orient Point*

# 4 Environmental and Physical Context

## 4.1 Overview

This Section of the Scoping Study summarises the environmental and physical context of the open coast and the larger key estuaries of the Shoalhaven.

A detailed account of the environmental and physical context of the open coast and estuaries in the Shoalhaven is provided in **Appendix B**.

Shoalhaven City Council manages 40 of Shoalhaven's 109 beaches and 9 of its 14 major estuaries, over a 165 km stretch of coastline. This is the largest stretch of managed coastline within any local government area in NSW.

The Council managed beaches and estuaries of the Shoalhaven are shown in Figure 4-1. The estuary catchment area boundaries within the Shoalhaven LGA are shown in Figure 4-2. This map also shows the coastal National Parks, Coastal Use area and Coastal Environment Area. It is noted that the estuaries that are managed by other entities such as National Parks and Wildlife Service are not included within the scope of the CMP – only the Council-managed estuaries shown in Figure 4-1 are included. Crooked River catchment and Seven Mile Beach are shared with Kiama Council to the north, with Durras Lake and Clyde River catchments shared with Eurobodalla Council to the south. Shoalhaven River catchment is shared with Kiama, with the upper portions of the catchment shared with Wingecarribee Shire. Goulburn/Mulwaree and Queanbeyan-Palerang regional Councils. These LGA's have a stake in the management of the catchment areas of the estuaries and it is recommended that they be consulted in developing the subsequent stages of the CMPs for these estuaries.

A listing of all the estuaries in the Shoalhaven LGA is provided in Table 4-1. This table shows which group is responsible for the management of each estuary and its entrance areas. Only estuaries that are managed at least in part by Council are included within this Scoping Study. Further detail on the estuaries listed in Table 4-1, including the smaller estuaries managed by Council, is provided in **Appendix B**.

It is noted that the Shoalhaven LGA includes a number of Key Biodiversity Areas (KBAs), including at Lake Wollumboola, Jervis Bay and St. Georges Basin, and the entire Shoalhaven coastal area south from Ulladulla. KBAs are an international system of the recognition and acknowledgement of 'nature's hotspots', which "contribute significantly to the global persistence of biodiversity" under the conventions of the International Union for Conservation of Nature [I.U.C.N.] and its global partners.

*Table 4-1 – List of Estuaries within the Shoalhaven LGA*

| | Management responsibility | Plan status | Entrance management & responsibility | Type | Included in CMP? |
|---|---|---|---|---|---|
| **GROUP 1: LARGER ESTUARIES WITH MAJORITY PRIVATE LAND TENURE** | | | | | |
| **Shoalhaven River estuary (including Broughton Creek & Crookhaven River)** | | Shoalhaven River Estuary Management Plan.<br>Adopted March 2008 | Shoalhaven City Council (SCC). Parts of the catchment are within Kiama Municipality. | Major river estuary and floodplain | Yes |
| **Lake Wollumboola** | NPWS – 52.2%<br>SF – 14.5%<br>SCC – 1.8%<br>Crown – 0.1%<br>Freehold – 31.4% | Lake Wollumboola Estuary Management Plan 2000.<br>Revised Estuary Management Plan prepared in 2013<br>Jervis Bay NP PoM 2011 | NPWS – for flood mitigation | ICOLL | Yes |
| **Jervis Bay** | Jervis Bay Marine Park, NPWS, SCC, Defence, Federal Government | Jervis Bay NP PoM 2011<br>Shoalhaven CZMP 2018 | Open Entrance | Embayment | Yes |
| **St Georges Basin and Sussex Inlet** | NPWS – 25%<br>SF – 20%<br>Crown – 3%<br>SCC – 1%<br>Freehold – 36% | St Georges Basin Estuary Management Plan.<br>Adopted June 2013 | N/A | Coastal lake | Yes |
| **Swan Lake** | Largely NPWS<br>SCC, Crown | Swan Lake and Berrara Creek Natural Resources Management Strategy.<br>Adopted 17.1.2002<br>Conjola NP PoM 2009 | SCC | ICOLL | Yes |
| **Narrawallee Inlet** | NPWS, Crown, SCC, freehold – farmland and urban | Narrawallee Inlet Natural Resources Management Strategy.<br>Adopted 25.6.2002<br>NPWS Narrawallee Creek Nature Reserve PoM 2006 | Stable open entrance | Estuarine inlet | Yes |
| **Lake Conjola and Pattimores Lagoon** | NPWS, SCC, Crown, farmland, State Forests | Lake Conjola Estuary Management Plan Review. Adopted 8.12.2015 | SCC | ICOLL | Yes |

| | Management responsibility | Plan status | Entrance management & responsibility | Type | Included in CMP? |
|---|---|---|---|---|---|
| | | Conjola NP PoM | | | |
| **Burrill Lake** | NPWS – 29% | Burrill Lake Estuary & Catchment Management Plan.<br>Adopted 17.12.2002 | SCC | ICOLL | Yes |
| **Lake Tabourie** | NPWS – 31.7%<br>SF – 11.9%<br>Crown – 3.1%<br>SCC – 1.7%<br>Freehold – 46.3% | Lake Tabourie Revised Estuary Management Plan.<br>Adopted June 2013 | SCC | ICOLL | Yes |
| **GROUP 2: SMALLER ESTUARIES** | | | | | |
| **Currarong, Abrahams Bosom and Plutus Creeks** | Largely Commonwealth of Australia & Crown Lands. Small areas - SCC | Currarong Natural Resources Management Strategy.<br>Adopted 18.12.2001 | SCC | | Yes |
| **Wowley Creek/Gully** | JB Marine Park – Sanctuary Zone, NPWS, undeveloped freehold, SCC – very small area at entrance | Jervis Bay NP PoM 2011<br>Jervis Bay Marine Park commenced October 2002, | No history of SCC management responsibility | | No |
| **Berrara Creek** | Largely NPWS | Swan Lake & Berrara Creek Natural Resources Management Plan.<br>Adopted 17.12.2002 | NPWS - does not support artificial opening | ICOLL | Yes |
| **Currambene Creek** | Jerrinja LALC, Crown, SCC, Defence, large areas of freehold – developed, undeveloped, farmland, urban, JB Marine Park – Habitat Protection Zone and Sanctuary Zone | Currambene Creek Catchment Management Plan 1999<br>Jervis Bay Marine Park commenced October 2002 | JB Marine Park | Coastal creek | Yes |
| **Mollymoke Farm Creek - Mollymook Beach** | Heavily urbanised, Creek corridor – mostly SCC | nil | SCC – trained entrance | ICOLL | Yes |

| | Management responsibility | Plan status | Entrance management & responsibility | Type | Included in CMP? |
|---|---|---|---|---|---|
| **Blackwater Creek – Mollymook Beach** | Mollymook Golf Club, SCC | nil | SCC – trained entrance | ICOLL | Yes |
| **Millards Creek – Ulladulla Harbour** | Heavily urbanised, creek corridor - SCC | Millards Creek Urban Stream Corridor Management Plan. Adopted 18.12.2007 | SCC – permanently open | Coastal Creek | Yes |
| **GROUP 3 - ESTUARIES FOR WHICH THE MAJORITY OF LAND TENURE IS NPWS OR JBMP** | | | | | |
| **Carama Inlet** | NPWS (Jervis Bay NP), JB Marine Park Sanctuary Zone | Jervis Bay Marine Park commenced October 2002,<br>Operational Plan 2003<br>Jervis Bay NP PoM 2011 | No history of SCC management responsibility | | No |
| **Moona Moona Creek** | NPWS (Jervis Bay NP) JB Marine Park – Habitat Protection Zone and Sanctuary Zone, State of NSW (?), SCC – Moona Moona Ck Reserve | Jervis Bay Marine Park commenced October 2002,<br>Operational Plan 2003<br>Jervis Bay NP PoM 2011 | JB Marine Park<br>No history of SCC management responsibility | | No |
| **Nerrindillah Creek Lagoon (Monument Beach)** | NPWS – Conjola NP | Conjola NP PoM 2009 | NPWS - does not support artificial opening<br>No history of SCC management responsibility | ICOLL | No |
| **Termeil Lake** | Largely NPWS | Meroo NP PoM 2010<br>Pre 1998 Management Plan in SCC archives | NPWS - does not support artificial opening<br>SCC management history | ICOLL | No |
| **Meroo Lake** | Largely NPWS | Meroo NP PoM 2010<br>Pre 1998 Management Plan in SCC archives | NPWS - does not support artificial opening<br>SCC management history | ICOLL | No |
| **Willinga Lake** | Largely private land. Merroo NP on northern side of entrance | Meroo NP PoM 2010 | SCC | ICOLL | Yes |
| **Durras Lake** | NPWS | Murramarang NP PoM 2002 | NPWS - does not support artificial opening. Estuary shared with Eurobodalla Shire | ICOLL | No |

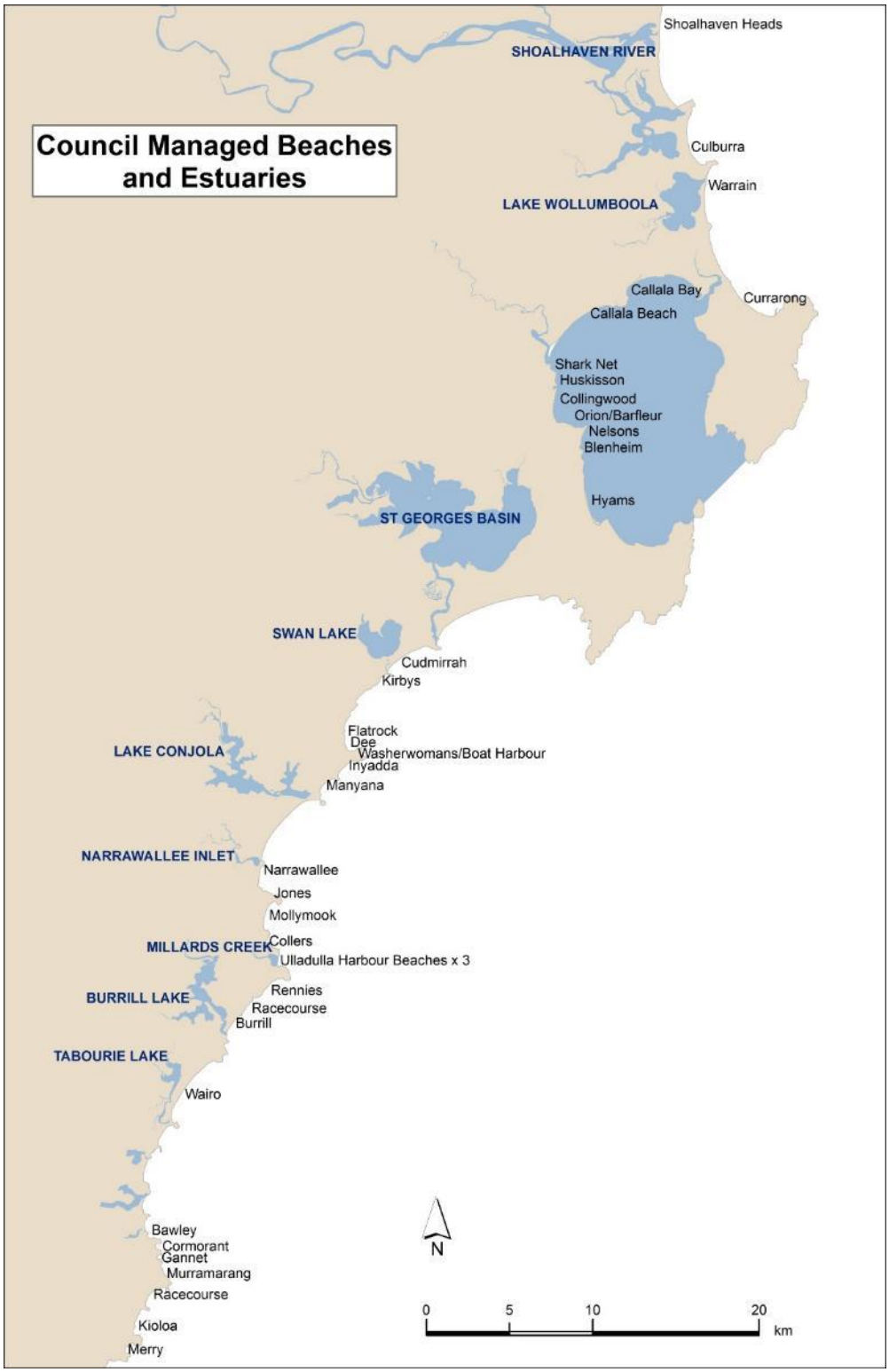



*Figure 4-1 – Map showing Council managed beaches and estuaries*

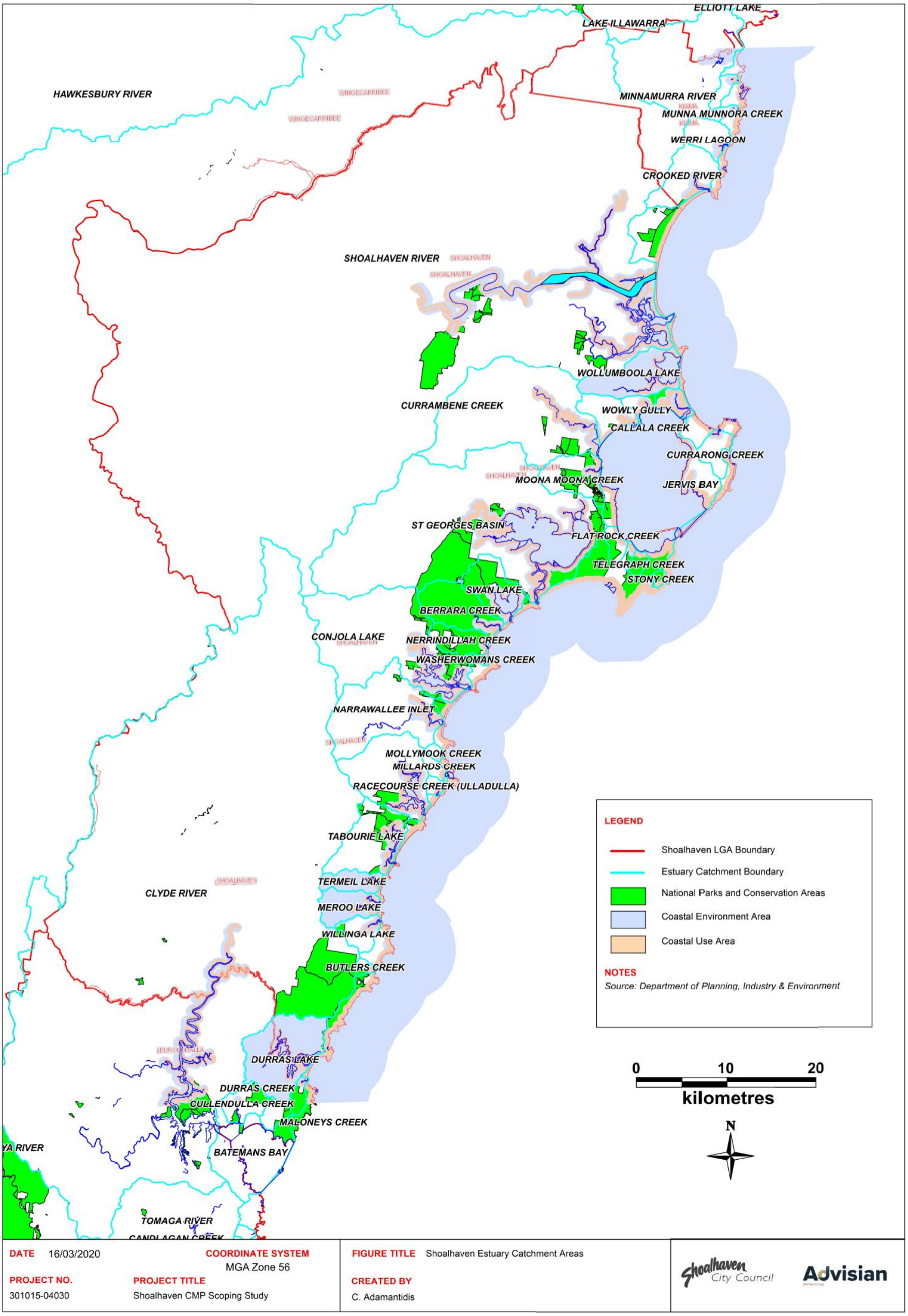



*Figure 4-2 – Map showing estuary catchment boundaries in relation to LGA boundaries. National Parks, Coastal Use Area and Coastal Environment Area also shown.*

## 4.2 Environmentally Significant events

Since this Study went on public exhibition, several large bushfires have affected a large portion of the estuary catchments in the study area. The bushfires have burned large areas and changed the runoff characteristics of the catchments, leading to a potential for increased nutrient loadings, sedimentation and potential for higher maximum flows and shorter concentration times for flows into the estuaries. The higher flows and loss of vegetation due to the fires has led to an increased potential for erosion in the waterways, an increased potential for flooding as well as the possibility of water quality impacts.

Council, in conjunction with Bega Valley and Eurobodalla Councils, has applied for funding through the NSW Government's Coastal and Estuary Grants Program for Bushfire affected coastal waterways to prepare a Regional Waterways Recovery Plan. Shoalhaven Council has been successful with their application for grant funding for two projects including a joint recovery plan and catchment rehabilitation works. The information below is taken from https://www.environment.nsw.gov.au/topics/water/coasts/coastal-and-estuary-grants/bushfire-affected-coastal-waterways/grants-awarded#shoalhaven and is current as of August 2020:

- **Shoalhaven local government area catchment stabilisation and ecological monitoring works** - The recent fires have critically impacted communities and the environment across the Shoalhaven local government area. The landscape-scale fires have burnt across a total of over 300,000 hectares and impacted over 25 estuaries and coastal catchments, including sensitive Intermittently Closed and Open Lakes and Lagoons (ICOLLs). This project involves implementing priority emergency sediment and erosion control measures to minimise impacts to estuary health. These devices will capture some of the sediment, ash and other burnt material before it can be discharged into the region's coastal estuaries and waterways. In some areas, revegetation will be also be used to manage erosion and speed up regeneration of ground cover.

- **South east catchment and waterways bushfire recovery plan** - The landscape-scale fires experienced across the Shoalhaven City Council, Eurobodalla Shire Council and Bega Valley Shire Council local government areas burnt a total of over 1 million hectares and impacted approximately 47 estuaries and coastal catchments. This project involves preparing a catchment and waterways bushfire recovery plan. The plan will support the emergency measures being implemented through the individual council grants, that will include installation of soil and water management controls and other rehabilitation works. The plan will also develop a medium and long-term plan of management for these areas. The project will provide consistency and efficiency across the three local government areas.

Note that actions for which funding is sought under the Bushfire affected coastal waterways program are not required to be identified in Council's certified Coastal Zone Management Plan, Emergency Action Sub Plan or certified Coastal Management Program. While the medium and longer-term priority actions to be developed under the Bushfire Recovery Plan do not need to be repeated within the CMP, the Bushfire Recovery Plan should be referenced.

### 4.2.1 Incorporating bushfire impacts into CMP development

It is recommended that the Bushfire Recovery Plan be referenced in developing management actions for the CMPs, so that there is a link between the two Plans.

Ongoing impact of the recent bushfires should be considered for the development of the CMPs through water quality monitoring in the estuaries and monitoring of the recovery of sensitive ecosystems in the catchments, as well as considering bushfire vulnerability in addition to coastal hazards in the assessment of risk of the four coastal management areas. As of August 2020, water quality monitoring of bushfire impacts has been included as part of the Shoalhaven grant funded program. The Regional Recovery Plan will also include an assessment of bushfire impacts, risk assessment and prioritisation of actions with a plan to be implemented in response to the bushfires. Additional water quality monitoring as described in Section 7.10 can complement the monitoring already occurring and planned under the grant.

## 4.3 Environmental Context - Open Coastline

The Shoalhaven open coastline extends 165 km along the NSW south coast, from Shoalhaven Heads down to North Durras. There are 109 beaches along the coast, of which Council manages 40. The following ten (10) beaches were assessed to be at greater risk of coastal erosion and required the preparation of coastal hazard studies and mapping for the Shoalhaven CZMP.

- Shoalhaven Heads
- Culburra Beach (Figure 4-3)
- Warrain Beach
- Currarong Beach
- Callala Beach
- Collingwood Beach
- Narrawallee Beach
- Mollymook Beach
- Collers Beach
- Boat Harbour, Bendalong

The following coastal cliffs and slope instability locations were identified in previous studies:

- Penguin Head (Figure 4-4)
- Plantation Point
- Hyams Point
- Berrara Point
- Inyadda Point, Manyana
- Narrawallee
- Bannisters Point
- Collers Beach Headland
- Rennies Beach
- Racecourse Beach

Shoalhaven's open coastline is separated into the following primary sediment compartments:

1. The northern sediment compartment is centred around the Shoalhaven River Estuary, which encompasses Seven Mile Beach at Shoalhaven Heads, Culburra, Warrain and Currarong beaches.
2. Jervis Bay compartment encompassing Callala and Collingwood beaches.
3. A compartment between Bannisters Point and Jervis Bay, encompassing Narrawallee Beach.
4. A compartment between Warden Head and Bannisters Point, encompassing Ulladulla Harbour, Collers and Mollymook Beaches.

A more detailed delineation of sediment compartments has been developed in a research project funded by the Australian Government through the Department of the Environment and managed by NCCARF. Scientists have divided the Australian coast into 359 discrete units, or sediment compartments, within which there are broadly homogeneous features that may include geology, landform types, near-shore currents and sediment availability and movement. A compartment might be, for example, a bay lying between two headlands. The compartment approach provides a spatial framework that integrates driving forces with landform type and condition to support and improve coastal risk assessments at regional scales under conditions of climate change.

A map showing the sediment compartments for the Shoalhaven coast is provided in Figure 1-6. From this map, it can be seen that the Shoalhaven River sediment compartment is shared with neighbouring Kiama Council to the north, and that the Conjola South compartment is shared with neighbouring Eurobodalla Council to the south.

Land tenure on the coastline is almost entirely in public ownership in the form of National Parks, NSW Crown reserves or Local Crown reserves.

### 4.3.1 Natural and built asset values of the Shoalhaven Open Coast

Coastal lakes and estuarine creeks along the Shoalhaven coastline provide a diverse, healthy and productive aquatic habitat of high ecological value. There are extensive areas of several endangered ecological communities and roosting, feeding and breeding habitat for migratory shorebirds.

The beaches and headlands provide significant visual amenity benefits to Shoalhaven's coastline landscape and contribute to the cultural character of the region. Locals use the coastal environmental for a number of recreational activities including swimming, diving, surfing, fishing and hiking.

The coastal zone supports activities such as tourism and fisheries, which form a substantial portion of Shoalhaven's economy.

Owing to the productive nature of the land and its proximity to the sea, there are many sites with significant Aboriginal heritage value. Along the coast this includes middens, burial sites, artefacts and ceremonial areas. Several rock platforms and headlands are listed in the National Heritage List.

*Figure 4-3 – Example Shoalhaven open coast landscape - Culburra Beach, looking south showing foredune vegetation*

*Figure 4-4 – Example Cliff and Bluff and landscape – Penguin Head, Culburra*

### 4.3.2 Challenges relating to the Open Coast

The coastline is continually changing in response to the natural processes of wave climate, currents, tides, winds, rainfall and sea-level change. Hazards that currently threaten the beaches and headlands of Shoalhaven include storm cuts, dune instability, coastal inundation, movement of entrances, shoreline recession and slope stability of cliffs and bluffs.

Storm cuts (short-term erosion) occur during storms when waves transport unconsolidated sands from the beach face into the water. The storm cut is defined as the volume of beach eroded from the beach subaerial (above 0m AHD). Shoalhaven Heads, Culburra Beach and Warrain Beach are the most severely affected areas by storm cut.

Dune slumping, or dune instability, occurs when the dune face dries out after a storm cut. Dune sediments lose their cohesive properties due to removal of water pore pressure and leave the dune at more risk to erosion.

Sand that is eroded from beaches are typically replaced back onto the beach face through ocean swells. This beach rebuilding process can take from months to years. However, this rebuilding process does not always result in beaches being fully restored to their previous state, with sand being lost to various sinks. This results in long-term recession of the beach shoreline. Currarong Beach, Culburra Beach and Callala beach have been identified as experiencing shoreline recession.

## 4.4 Shoalhaven River Estuary

### 4.4.1 Site Description

The Shoalhaven River Estuary flows out towards the low-lying floodplains at Nowra through a remote gorge 30 kilometres east of Goulburn. A map of the lower estuary showing the main features and mapped Coastal Wetland and Littoral Rainforest areas is provided in Figure 4-5. A map showing the Coastal Environment Area as mapped under the Coastal Management SEPP is provided in Figure 4-6 and a map showing the Coastal Use area is provided in Figure 4-7. The estuary has a water surface area of 31.9 $km^2$ and a total catchment area of 7085.8 $km^2$. The estuary is unique in its diverse landforms and can be divided into three zones:

- Upper estuary – The river passes through steep vegetated slopes and sandstone cliffs, with discontinuous pockets of floodplains (refer Figure 4-8).
- Lower estuary – Once downstream of Nowra, or the Bomaderry Creek junction, the river widens into a large extensive floodplain (refer Figure 4-9).
- Entrance – There are two entrances to the estuary, with the northern entrance located at Shoalhaven Heads (Figure 4-10) and the southern entrance at Crookhaven Heads located above Culburra (Figure 4-10).

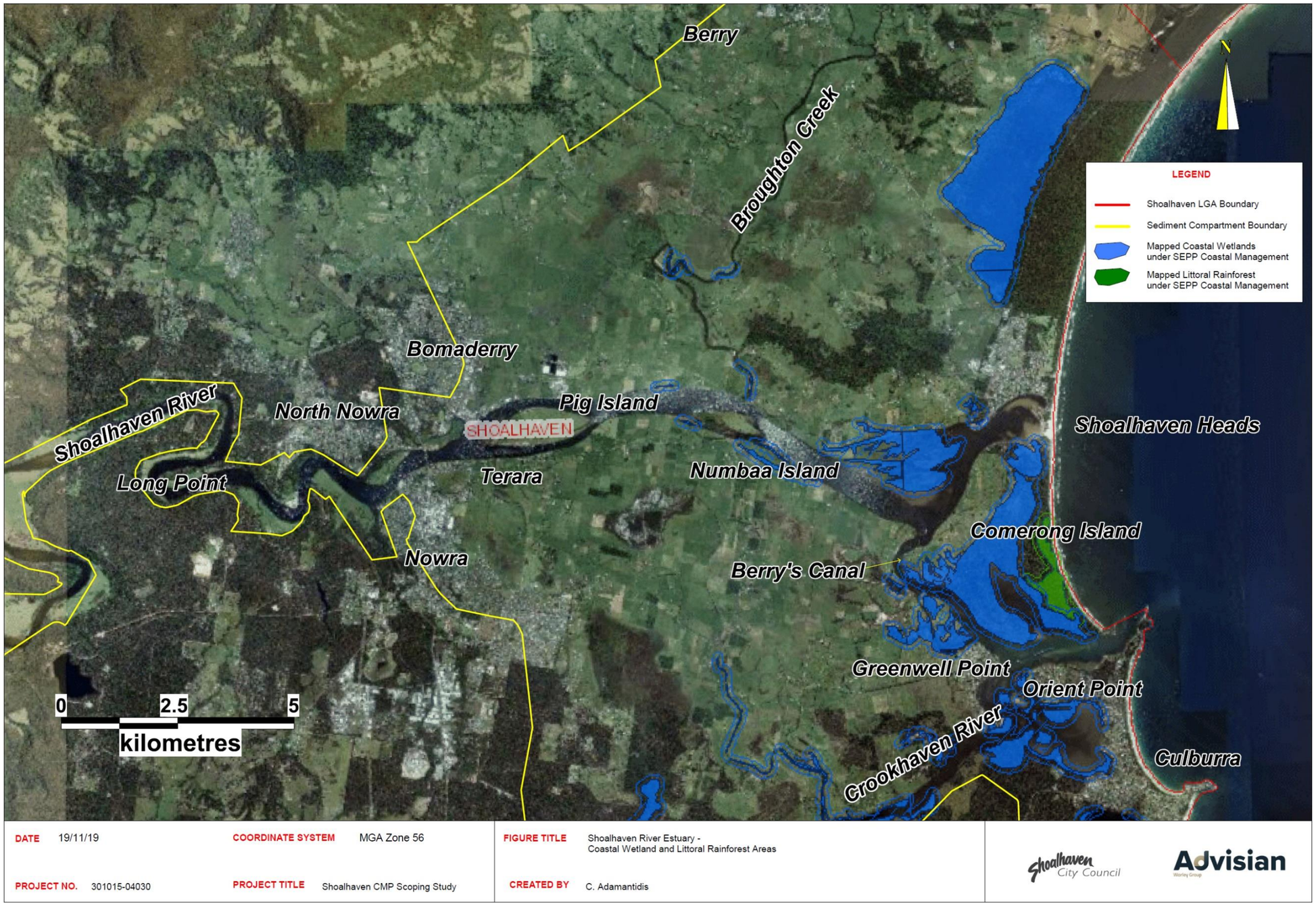



*Figure 4-5 – Shoalhaven River Estuary – Coastal Wetland and Littoral Rainforest areas*

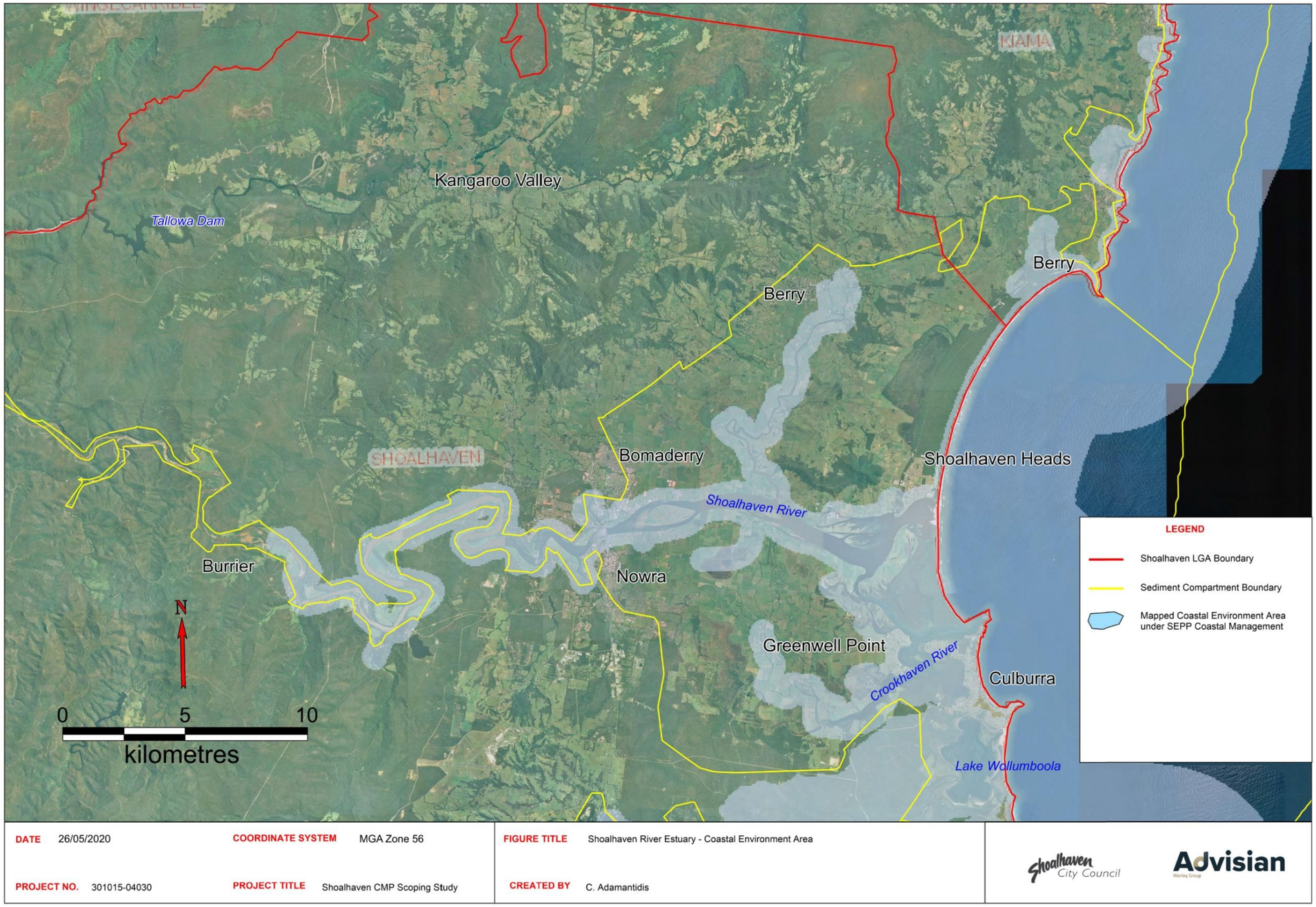



*Figure 4-6 – Shoalhaven River Estuary – Coastal Environment Area*


*Figure 4-7 – Shoalhaven River Estuary – Coastal Use Area*

*Figure 4-8 – Shoalhaven River Estuary – Typical upper estuary landscape*

*Figure 4-9 – Lower Shoalhaven estuary landscape showing wide floodplain and agricultural landuse*

*Figure 4-10 – Shoalhaven River Estuary Entrance – Top: Shoalhaven Heads entrance; Bottom: Entrance at Crookhaven Heads*

### 4.4.2 Natural and built asset values

Shoalhaven River Estuary provides habitat to an extensive and diverse range of flora species, which includes seagrass, mangroves, saltmarsh and estuarine wetlands that are listed the Directory of Important Wetlands in Australia. The estuary has an extensive area of approximately 1km$^2$ of seagrass (primarily Zostera), 3.5km$^2$ of mangrove and 1.5km$^2$ of saltmarsh. Seagrass meadows provide high ecological value by fostering growth and fish and stabilise the sediment bed, which regulates nutrient levels and water quality in the basin. Mangroves grow between mid and high tidal levels, provide

shoreline protection and serve as an important food source. The saltmarsh is an endangered ecological community and grows above the mangroves at the highest tidal levels. They play an important role in the estuarine food chain, providing habitat for invertebrate breeding and a foraging area for fish and shorebirds.

The largest area of littoral rainforest in the South Coast is located on Comerong Island. The sand shoals at Shoalhaven Heads and wetlands on Comerong Island are an important area for around 90 species of shorebirds and waders, including 27 species that are subject to international agreements. Coomonderry Swamp is the largest freshwater wetland on the south coast and remains in good condition; providing drought refuge and habitat for sensitive species.

The visual quality of the Shoalhaven River landscape is highly regarded by local residents and visitors. The following qualities are particularly valued: diversity, natural and rural outlooks, expansive views and still protected waters. The natural gorge of the upper estuary directly contrasts with the wide waterways and open floodplain landscape of the lower estuary. The landscape provides a mixture of natural areas, historic villages and horticultural land in both the upper and lower estuary, and many of the farming community continue to occupy old weatherboard farmhouses. Shoalhaven River is distinct to other estuaries in the south coast due to the size of its system and contrast between narrow river gorge and floodplain country. Tallowa Dam is located in the upper reaches of the River and supplies water to the Shoalhaven and to Greater Sydney in times of drought.

The well-performing water quality in the estuary is a significant contributor to the healthy estuarine ecology, oyster and fishing production and water-based recreation. However, the water's salinity levels fluctuate with varying levels of outgoing freshwater flows and incoming tidal flows. Further, acid levels in Broughton Creek and other creeks that drain into the Shoalhaven River are often above the ANZECC guidelines, due to acid sulphate soils in the area and altered flow regimes from agricultural drainage.

Further, Shoalhaven River estuary is home to many culturally important Aboriginal places including Cullunghutti and Crookhaven Headland. Rock shelters and art sites can be found in the sandstone regions bordering the Upper estuary.

### 4.4.3 Challenges

Flooding and tidal inundation is considered a challenge in the Lower Estuary where many residential areas are low lying and vulnerable to inundation from minor floods. These areas include Terara village, Greenwell Point and Shoalhaven Heads. Often the road and residence access can be flooded early on during a storm event, which creates evacuation challenges and increased safety risk. In 2006 the average annual tangible damages to the lower estuary floodplain was estimated to be $1.8 million, not including damage to public utilities.

Bank erosion and siltation is a challenge in some areas, where there is a lack of riparian vegetation to hold the banks together. Bank erosion from vessel wash has been identified as a challenge in the area upstream of Nowra Bridge. Water quality is also a significant challenge, with urban and agricultural runoff affecting the water quality, and cattle freely able to access the riverbanks and coastal wetlands within some areas, trampling and grazing upon estuarine vegetation and leading to increased siltation, nutrient and bacterial inputs.

There is significant threat to the reduction in area of endangered ecological communities from clearing of riparian and floodplain vegetation along the river banks, examples include clearing of mangroves and mowing of saltmarsh. This is further compounded by floodplain drainage and flood mitigation schemes which have changed the hydrology of the wetlands and increased the acidity of surface and groundwater. Broughton Creek and Greenwell Point wetlands have both decreased in area. Further, there are physical and chemical barriers to fish passage such as flood gates, roads, culverts and acidic water discharges from acid sulfate soils.

Ongoing morphological change has been occurring in the lower estuary since the creation of Berry's Canal, with continuing widening of the Canal and increase in flow conveyance through the trained entrance at Crookhaven Heads. This ongoing morphological change has reduced the flow through the original entrance at Shoalhaven Heads and ongoing siltation of the area at Shoalhaven Heads has been perceived to be occurring over time. The full extent of these changes need further study and assessment.

Sea level rise is a threat that needs to be considered for the lower estuary, with the potential for inundation and landward migration of saltmarsh, mangroves and changes to seagrass distribution.

The long-term sustainability of commercial fisheries and oyster farming in the estuary is threatened by the reduction of the fishery habitat, poor water quality/siltation as well as higher costs associated with meeting legal compliance and regulations.

## 4.5 Lake Wollumboola

### 4.5.1 Site Description

Lake Wollumboola is located between Crookhaven River – Curley's Bay to the north and Jervis Bay to the south. Lake Wollumboola's catchment size is relatively small compared to its lake size and therefore does not open often to sea, with closures lasting up to eight years without artificial intervention. Maps and records have shown that since European settlement in 1805, the lake has not changed much in physical form.

A map of the estuary showing the mapped Coastal Wetland and Littoral Rainforest areas is provided in Figure 4-12. A map showing the Coastal Environment Area from the Coastal Management SEPP is provided in Figure 4-13, and a map showing the Coastal Use Area is provided in Figure 4-14.

Lake Wollumboola and parts of its catchment are included in Jervis Bay National Park. The NSW NPWS South Coast Branch is responsible for the Lake's management, including management of the lake entrance, as well as parts of its catchment. Council's area of responsibility includes Crown land along the lake's northern shore above 0.86 m AHD, including Lakeside Park and the boat ramp area. Consultation with NPWS is needed to ensure that the CMPs are consistent with NPWS policy and management practice regarding Lake Wollumboola and to clarify responsibilities.

*Figure 4-11 – Aerial view of Lake Wollumboola*

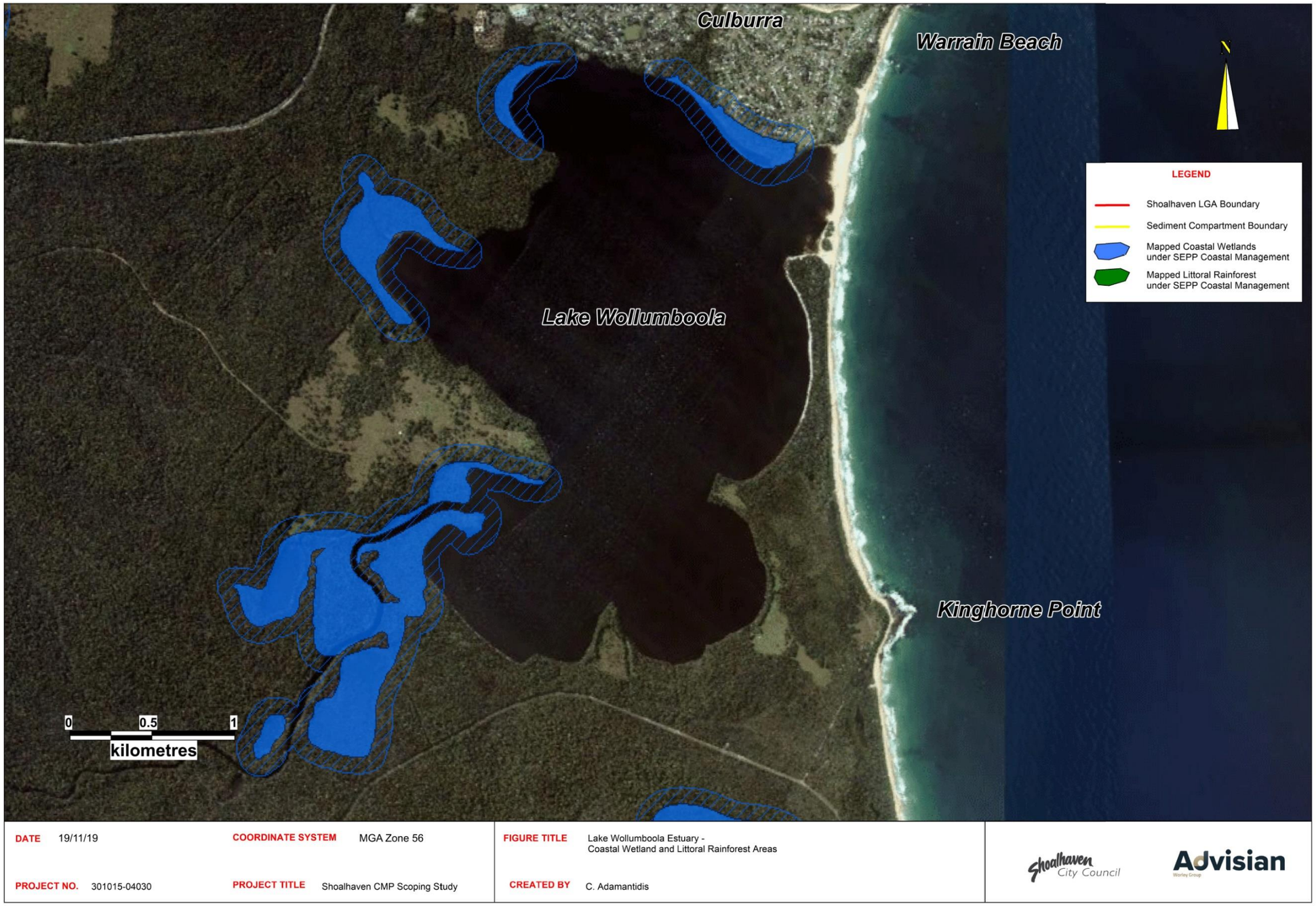



*Figure 4-12 – Lake Wollumboola Estuary – Coastal Wetland and Littoral Rainforest Areas*

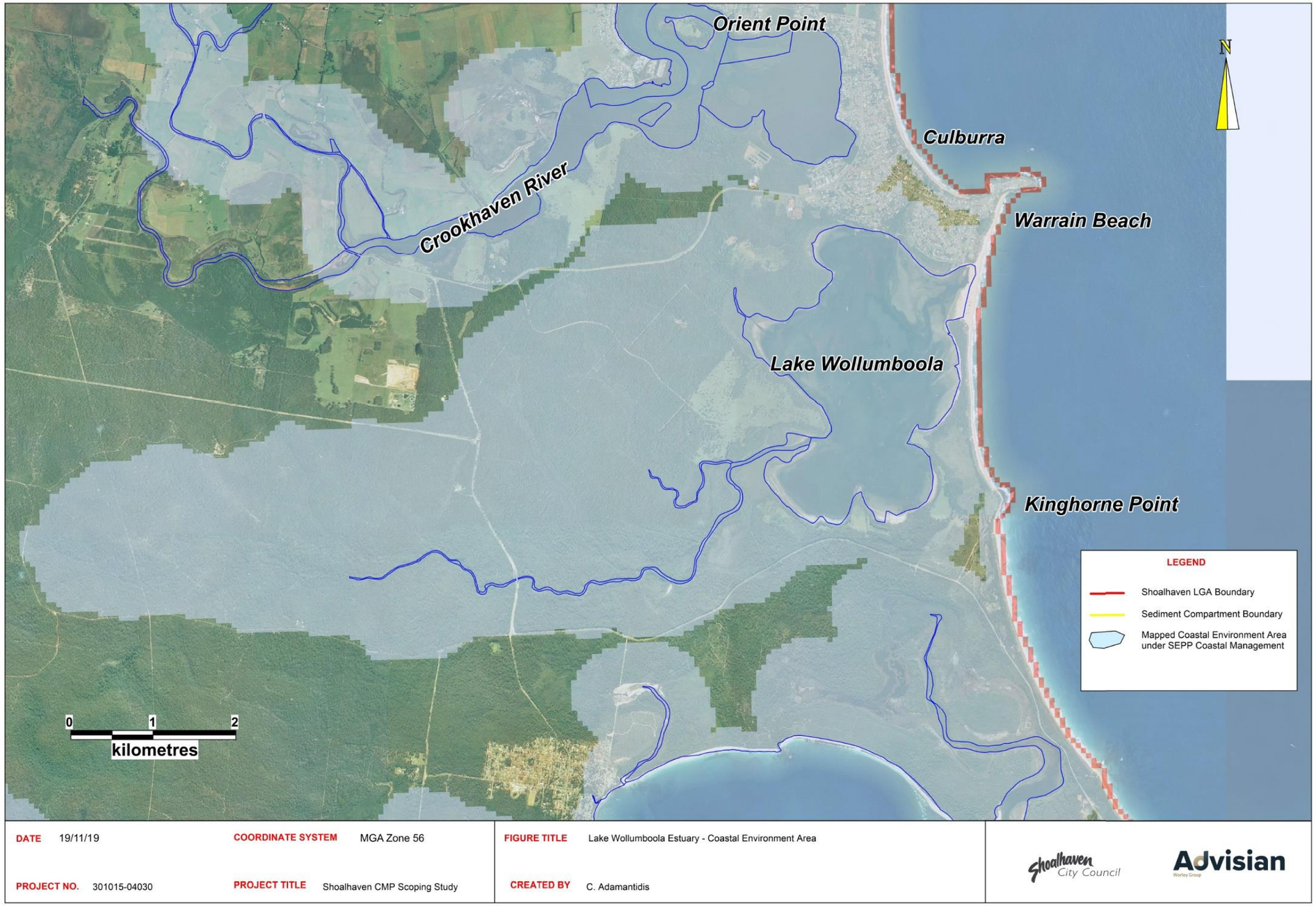



*Figure 4-13 – Lake Wollumboola Estuary Coastal Environment Area*


*Figure 4-14 – Lake Wollumboola Estuary – Coastal Use Area*

### 4.5.2 Environmental values

Lake Wollumboola is a broad shallow ICOLL (Intermittent Closed or Open Lake or Lagoon) that is unique to most ICOLLs based on its maturity, trapping efficiency, height above sea level and complex ecological processes. It is listed on the "Directory of Important Wetlands in Australia".

The lake is rich in biodiversity with over 300 flora species and over 300 fauna species. It provides habitat for 23 internationally protected species, and a breeding habitat for the coastal Little Tern. Lake Wollumboola's high biodiversity and complex physical and hydrological character are recognised by its inclusion in Jervis Bay National Park and listing as a Wetland of National Importance, mainly for bird life. Lake Wollumboola is recognised in Australian Government agreements with China, Japan and South Korea as internationally significant migratory bird habitat for 34 species, as part of the East Asian-Australasian Flyway, recognised by Birdlife International and International Union for Conservation of Nature as a globally important Key Biodiversity Area (KBA) particularly for Black Swan and Chestnut Teal and as a drought refuge for native water birds. The extent of the KBA for Lake Wollumboola is shown in Figure 4-16.

Hydrogen sulphide odours may be released occasionally when the lake opens and the water drains out exposing 60% of the lake bed, as it is perched above mean sea level, for example, if the entrance is opened artificially. A preferred management approach is to minimise change to the lake's natural opening regime and focus on managing external factors such as improving quality of catchment runoff, stormwater treatment, and revegetating the foreshores to reduce sediment and nutrient runoff.

Baseline water quality monitoring has been undertaken in the past, measuring nutrients, turbidity and pathogens, with the results dating back to 1997 published on the Aquadata portal on Council's website. Generally, the results indicate that the water quality of Lake Wollumboola has been good, but can suffer from low dissolved oxygen levels, low pH levels or elevated pathogen levels from time to time.

Lake Wollumboola is used mainly for passive recreation activities, including birdwatching, fishing, lake-watching, fishing, walking and canoeing, and contributes significantly to the visual amenity of the South Coast landscape.

### 4.5.3 Challenges

Flora and fauna are at risk of being impacted upon by most forms of development. The lake also experiences occasional episodes of poor water quality and generation of strong odours as a result of hydrogen sulphide release, past unscheduled lake openings and large scale development close to the foreshore. Localised and less severe odours occur as a result of seagrass decay.

The lake entrance is managed by NSW NPWS, who maintain a policy of artificially opening the lake to protect low lying property in the lake catchment once water levels reach 2.75m AHD. Management of the entrance to balance flooding issues with the lake's ecological sensitivity is a significant challenge.

As with the other estuaries. sea level rise is a threat that needs to be considered, with the potential for inundation of infrastructure and endangered ecological communities, and landward migration of saltmarsh, mangroves and changes to seagrass distribution.

*Figure 4-15 – Lake Wollumboola foreshore, West Crescent*


*Figure 4-16 – Lake Wollumboola Key Biodiversity Area (source: [https://www.birdlife.org.au/projects/KBA](https://www.birdlife.org.au/projects/KBA))*

## 4.6 St Georges Basin and Sussex Inlet

### 4.6.1 Site Description

St Georges Basin and Sussex Inlet estuary lies directly south-west of Jervis Bay. It is a relatively large estuary with a total surface area of 41km$^2$ and a catchment area of 327.1km$^2$. The basin has an average depth of 5.3m with the deepest sections reaching 10m, and is considered to be in an immature state, unfilled with sediment, compared to other coastal lakes. A map of the estuary showing the mapped Coastal Wetland and Littoral Rainforest areas is provided in Figure 4-18. The Coastal Environment Area is shown in Figure 4-19 and the Coastal Use Area is shown in Figure 4-20.

It is noted that the Aboriginal-Dhurga word for St Georges Basin is *Bherwerre*. The Bherwerre barrier, a large sand barrier, separates St Georges Basin from Wreck Bay. The basin instead discharges to Wreck Bay through Sussex Inlet, a 6.5km channel with a narrow width of 5m – 300m. There been no historical records of Sussex Inlet entrance being closed, however it has been confined by sand shoals from time to time.

Today, St Georges Basin and Sussex Inlet serve as tourism hotspots and residential areas for the South Coast with infrastructure and development in close vicinity to the basin for ease of access to a coastal and estuarine setting. The basin provides space for recreational activities including boating, sailing, water-skiing, fishing and swimming, while Sussex Inlet provides opportunities for boating, swimming, kayaking, fishing and stand-up paddle boarding as well as walking and cycling, bushwalking, birdwatching and sightseeing.

*Figure 4-17 – Aerial view of St. Georges Basin and Sussex Inlet*

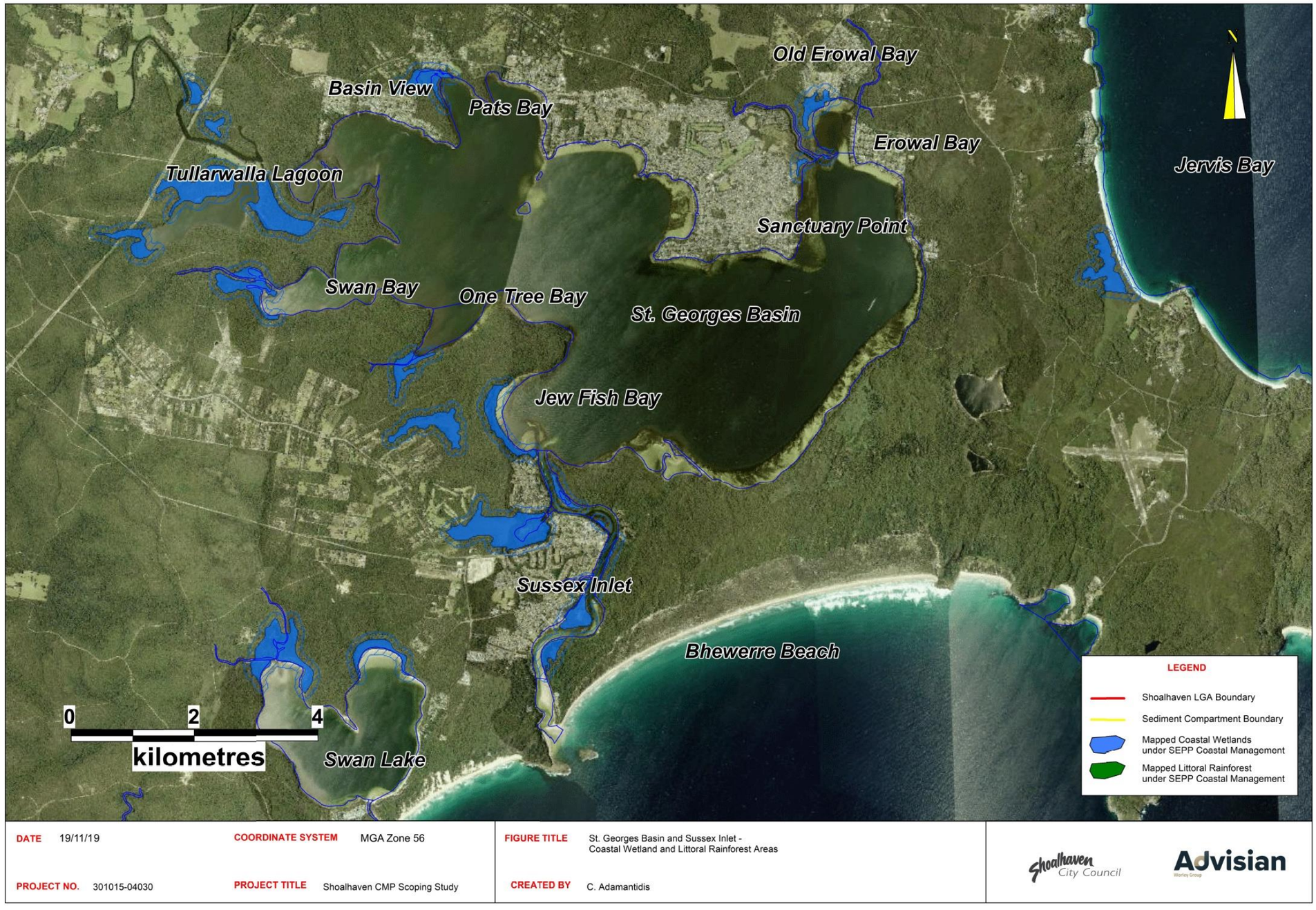



*Figure 4-18 – St. Georges Basin, Sussex Inlet and Swan Lake – Coastal Wetland and Littoral Rainforest areas*

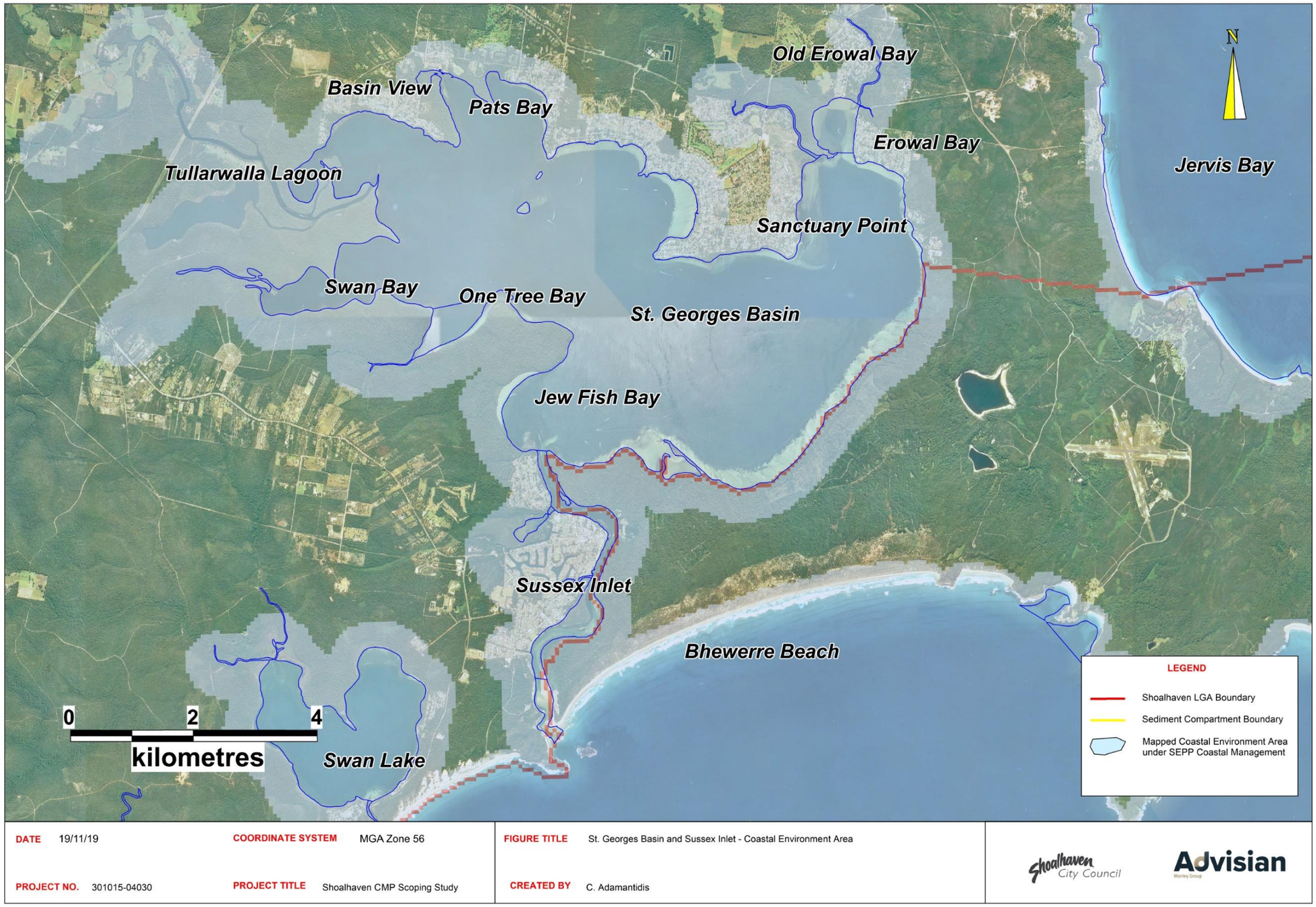



*Figure 4-19 – St. Georges Basin, Sussex Inlet and Swan Lake – Coastal Environment Area*


*Figure 4-20 – St. Georges Basin, Sussex Inlet and Swan Lake – Coastal Use Area*

### 4.6.2 Environmental values

St Georges Basin's habitat can be classified into three zones: the terrestrial zone, aquatic zone and riparian zone. The basin's riparian habitat includes endangered ecological communities such as the Coastal Saltmarsh and Swamp Oak Floodplain Forest. Native vegetation along the riparian strip bordering the Basin has contributed significantly to containing the shoreline recession for the past 6000 years. The north edge of the Basin however has been cleared of vegetation with only a single strip of casuarinas left on the foreshore, which renders it vulnerable to wind and wave erosion.

The aquatic habitat is made up of seagrass, mangroves and saltmarsh. Seagrass meadows provide high ecological value by fostering growth and fish and stabilise the sediment bed, which regulates nutrient levels and water quality in the basin. Mangroves grow between mid and high tidal levels and provides shoreline protection and serves as an important food source. The saltmarsh is an endangered ecological community and grows above the mangroves at the highest tidal levels. They play an important role in the estuarine food chain, providing habitat for invertebrate breeding and a foraging area for fish and shorebirds.

The terrestrial habitat is composed on wetlands, national parks and state forests. There are 18 wetlands identified by the Coastal SEPP in the St Georges Basin catchment. These areas are considered to be of national significance as a habitat for migratory waders and shorebird species, as well as a large range of other birds, some of which are threatened. It is noted that the estuary is partly within the Jervis Bay Key Biodiversity Area (KBA), refer Figure 4-21.

Water quality is considered to be generally good in St Georges Basin. Processes which affect water quality include stormwater discharge, sewage overflows, sediment runoff, tidal exchange and nutrient cycling. Regular water quality monitoring has been undertaken by Council in St. Georges Basin and Sussex inlet, with the results published on the Aquadata portal on Council's website. The results indicate that water quality generally meets default trigger values in the ANZECC Guidelines for Fresh and Marine Water Quality (2000), for physical and chemical stressors for south-east Australia for slightly disturbed estuarine ecosystems.

St Georges Basin is rich in Indigenous history due to the abundance of coastal and estuarine resources available for the Aboriginal people. The basin would have supported the local food supply and allowed the Aboriginal people to spend considerable periods of time at the same location.


*Figure 4-21 – Jervis Bay Key Biodiversity Area (source: [https://www.birdlife.org.au/projects/KBA](https://www.birdlife.org.au/projects/KBA))*

### 4.6.3 Challenges

Challenges at St Georges Basin and Sussex Inlet include bank and dune erosion due to channel migration, impacting on recreational amenity, infrastructure and navigability for recreational boating.

Flooding and tidal inundation is a significant challenge, specifically emergency evacuation from Sussex Inlet during flood events. Damage to seagrass beds from boating activities (e.g. propeller scarring of seagrass), mowing of saltmarsh, provision of sufficient facilities for recreational boating, water quality and buildup of seagrass wrack have all been identified as significant challenges at St Georges Basin, as has the removal of trees. Maintenance of infrastructure and channel sedimentation at Riviera Keys in Sussex Inlet have also been identified. It is noted that Riviera Keys are classified as "Drainage Canals" with unique challenges as they are at present under specific and very different environmental management plans to those of natural waterways.

As with the other estuaries. sea level rise is a threat that needs to be considered, with the potential for inundation of infrastructure and endangered ecological communities, and landward migration of saltmarsh, mangroves and changes to seagrass distribution.

## 4.7 Swan Lake and Berrara Creek

### 4.7.1 Site Description

Swan Lake is a large brackish coastal lake located south of St Georges Basin and Jervis Bay. It is an ICOLL that is closed most of the time due to its relatively small catchment with lake openings lasting only a few weeks or months. The behaviour of the entrance significantly affects the lake's characteristics such as its estuarine ecosystem, water quality, and flooding patterns. Swan Lake has a surface area of 4.5 – 5 $km^2$ and a catchment area of 32 $km^2$. Swan Lake entrance is managed by Council.

Berrara Creek is located two kilometres south of Swan Lake. The lower three kilometres of the creek normally behaves as a tidal estuary, however the mouth of the creek occasionally closes to the sea. Berrara Creek has a surface area of 0.2 $km^2$ and a catchment area of 37 $km^2$. Berarra Creek's entrance is managed by NSW National Parks and Wildlife Service.

Swan Lake and Berrara Creek are important places for the significant value they provide from an environmental, social, commercial and recreational context. However, the unmanaged use of the estuaries by the local community and visitors has put pressure on the natural environment and systems.

A view of the Swan Lake foreshore is shown in Figure 4-22. A map of the estuary showing the mapped Coastal Wetland and Littoral Rainforest areas is provided in Figure 4-18. The Coastal Environment Area as mapped under the Coastal Management SEPP is shown in Figure 4-19, and the Coastal Use Area is shown in Figure 4-20.

*Figure 4-22 – Foreshore of Swan Lake*

### 4.7.2 Environmental Values

Swan Lake's catchment supports a great variety of habitats, with its biodiversity of approximately 500 plant species, 150 bird species and at least 23 native mammal species. Most of this catchment lies in the Conjola National Park.

The distribution and quantity of fish, shellfish and crustaceans are reliant on the behaviour of the lake's entrance opening patterns. The protected Green and Golden Bell Frog Litoria aurea has been detected breeding in the Sussex Inlet Sewer Treatment Plant overflow ponds. There has been no confirmation of these species in Swan Lake, however there is potential for it to occur if certain conditions are met.

The vertebrate fauna of the area includes a variety of fish, frogs, lizards, snakes, water birds, shore birds, forest birds, bats and tree and ground dwelling mammals. Common waterbirds present at times on the waterways include Black Swans, Pelicans, Egrets, and various species of Cormorants and Ducks.

There is little development in the catchments and large areas of land remain in unspoilt condition. The fish, shellfish, crustaceans and other aquatic species are a valuable resource.

Healthy seagrass, algae and foreshore vegetation provide important habitats, oxygenate the water and assist to stabilise the sediments of the lake and creek. A range of internationally protected wading birds use the foreshore vegetation, sand and mud flats, rock shores, beach sands and wetlands for feeding, resting and breeding.

Water quality in Swan Lake and Berrara Creek is generally good. Regular water quality monitoring has been undertaken by Council in Swan Lake and Berrara Creek, with the results published on the Aquadata portal on Council's website. The results indicate that water quality generally meets default trigger values in the ANZECC Guidelines for Fresh and Marine Water Quality (2000), for physical and chemical stressors for south-east Australia for slightly disturbed estuarine ecosystems.

Wetlands to the north of Swan Lake and at the mouths of Mondayong and Teatree Creek are protected under the Coastal SEPP.

Swan Lake and Berrara Creek are situated within the lands of the Wandandian speaking people and Budawang/Murramarang tribes of the Dhurga language group. Today, the area is covered by the Jerrinja Local Aboriginal Land Council.

### 4.7.3 Challenges

Challenges at Swan Lake and Berrara Creek include flooding, the impact of artificial lake openings on lake ecology and foreshore erosion.

As with the other estuaries. sea level rise is a threat that needs to be considered, with the potential for inundation of infrastructure and endangered ecological communities, and landward migration of saltmarsh, mangroves and changes to seagrass distribution.

## 4.8 Lake Conjola

### 4.8.1 Site Description

Lake Conjola is located 50km south of Nowra covering a surface area of 7km$^2$ and draining a small catchment area of 145km$^2$ of mostly forested land managed by State Forests and National Parks and Wildlife Service. Lake Conjola is an ICOLL separated from the ocean by a shallow sandy inlet 3km long, with an average channel depth of 1m compared to the inner lake depths of 10m. The entrance to the lake is composed of a delta of clean marine sand which occasionally forms a berm to close the lake. A view of the Lake Conjola entrance area is shown in Figure 4-23. A map of the estuary showing the mapped Coastal Wetland and Littoral Rainforest areas is provided in Figure 4-24. The Coastal Environment Area as mapped under the Coastal Management SEPP is shown in Figure 4-25, and the Coastal Use Area is shown in Figure 4-26.

*Figure 4-23 – View of Lake Conjola entrance area looking north (December 2018)*

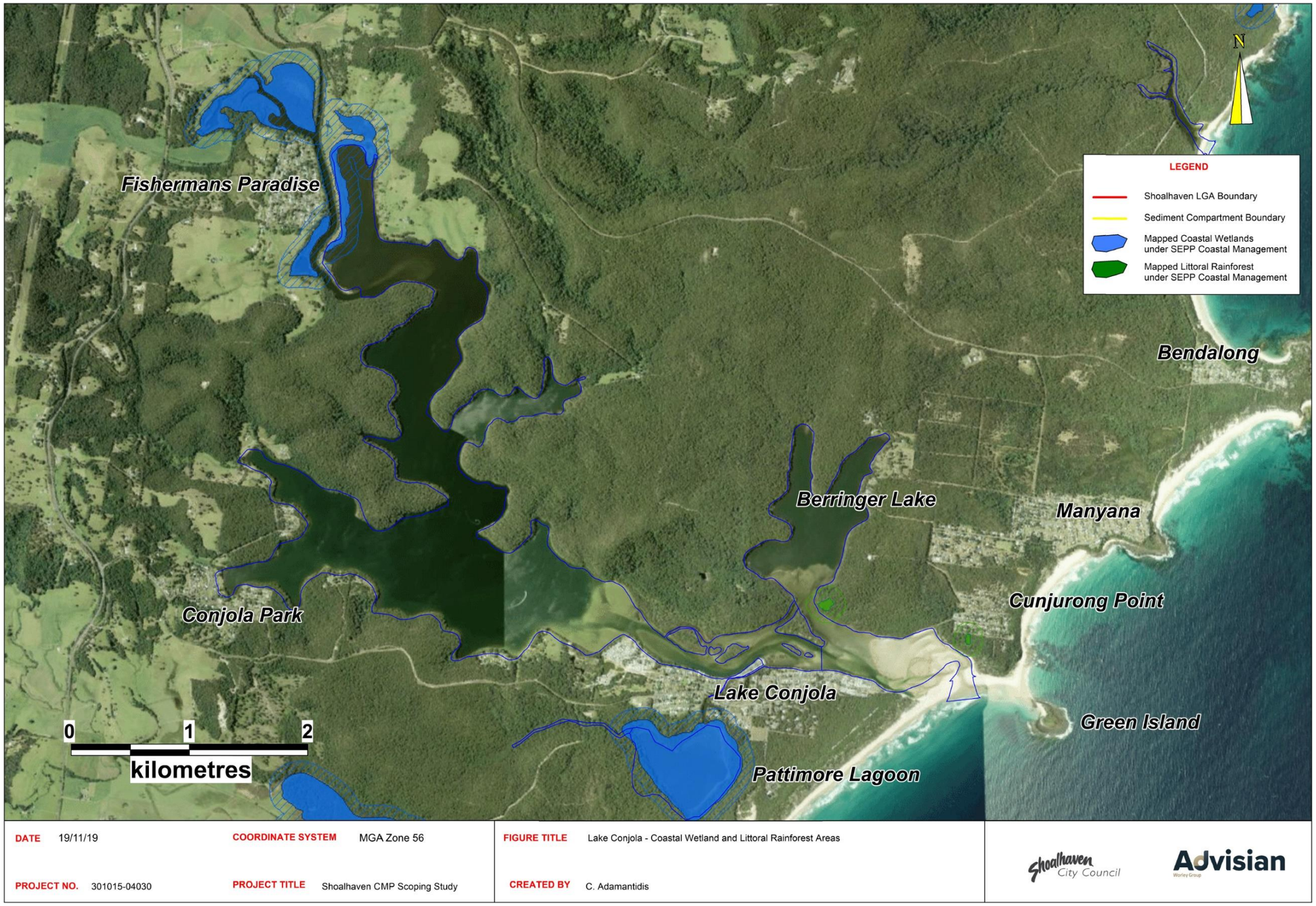



*Figure 4-24 – Lake Conjola Estuary Coastal Wetland and Littoral Rainforest Area*


*Figure 4-25 – Lake Conjola Coastal Environment Area*


*Figure 4-26 – Lake Conjola Coastal Use Area*

### 4.8.2 Environmental values

A diverse range of habitats lie within Lake Conjola, which include seagrass beds, saltmarsh, shoals, wetlands and rocky outcrops. In a 1985 Lake Conjola study, three seagrass beds were recorded in the lake. Seagrass communities were last reported to be in poor status in 2010 with a 68% loss in seagrass area from 1985 to 2006. Previous studies have attributed this decline to the increase in recreational boating over shallow seagrass beds. The seagrass beds in the lake play an important role in providing shelter and food for a wide range of aquatic biota and are vulnerable to impacts from propeller impact or high turbidity. The saltmarsh is an endangered ecological community and grows at the highest tidal levels. They play an important role in the estuarine food chain, providing habitat for invertebrate breeding and a foraging area for fish and shorebirds. It is noted that recent mapping of marine vegetation in Lake Conjola is currently being finalised by DPI Fisheries as part of the Marine Estate Management Strategy, and this could be used in preparation of the CMP to analyse more recent trends in seagrass distribution.

The entrance berm at Lake Conjola is an important habitat for shorebirds and migratory waders, and a known nesting site for the endangered Little Tern, which is known to prefer large expanses of clean sand for their nesting habitat.

Lake Conjola provides for several hundred species of finfish, crustaceans (crabs, shrimps and prawns), molluscs (octopus, oysters, clams etc) and other invertebrates. These are all species that occur widely along the coastline of south-east Australia, with none specifically unique to Lake Conjola.

Lake Conjola is a popular recreation area used for boating, fishing and swimming. There are a number of oyster leases within the Lake, as outlined in the NSW Oyster Industry Sustainable Aquaculture Strategy, however, these are not currently being used for oyster production.

Aboriginal people have utilised the resources of the South Coast region for the last 20,000 years, particularly the Lake and coastline areas. Lake Conjola is situated within the lands of the Wanda Wandian speaking people and the Budawang/Murramarang tribes of the Dhurga language group. Conjola National Park contains a large number of Aboriginal sites including burials, middens, campsites, rock shelters and grinding grooves.

### 4.8.3 Challenges

Challenges at Lake Conjola include water quality, flooding and tidal inundation, entrance management, sedimentation of the entrance area, navigability for recreational craft, and preservation of Aboriginal heritage and shorebird nesting areas.

The water quality in Lake Conjola is affected by a number of factors, which include catchment inflows, point source pollutants, tidal water exchange and internal lake processes. Council runs a water quality testing program known as Aquadata, which reports on water quality monitoring results at a number of locations throughout the LGA, including at Lake Conjola. While there are some instances of elevated faecal coliforms and nutrient levels recorded in the data in the estuary (for example, after heavy rainfall in February 2020), generally the water quality is good, with water quality meeting default trigger values in the ANZECC Guidelines for Fresh and Marine Water Quality (2000) for physical and chemical

stressors for south-east Australia for slightly disturbed estuarine ecosystems. Issues of elevated faecal coliform levels, turbidity, change in salinity and decrease in oxygen levels have been raised by the community. The community perceives that water quality deteriorates when the entrance is closed.

The potential sources of sedimentation in Lake Conjola include the following: aeolian transport of barrier dune sands, fine catchment soil carried via flooding or storms, coarser sediment from bank erosion transported down tributary streams, estuary bank erosion from wind and boat wake, human influence and natural channel meandering and marine sand carried into the inlet channel by tidal exchange when the entrance is open.

There are three primary causes of flooding in Lake Conjola: intense rainfall with subsequent runoff into the lake, severe ocean conditions such as tidal forces and storm surges or a gradual rise in lake level during long periods of entrance closure. The Council's Flood Risk Management Study concluded that the nature of the entrance had little impact on major catchment flood events, which will occur regardless of the entrance's state.

As with the other estuaries, clearing of riparian vegetation, damage to seagrass beds through propeller impacts and mowing of saltmarsh are potential threats. The impact of the existing entrance management regime on the estuarine ecology is currently not well defined. Sea level rise is a threat that needs to be considered, with the potential for increased inundation of infrastructure, the threat of future entrance interventions to prevent flooding becoming ineffective due to increased ocean tailwater levels, threats to shorebird habitat from inundation and threats to endangered ecological communities, due to landward migration of saltmarsh, mangroves and changes to seagrass distribution.

## 4.9 Narrawallee Inlet

### 4.9.1 Site Description

Narrawallee inlet is permanently open to the sea and is about 4km long. It enters the sea immediately north of the Narrawallee Headland. The entrance is considered to be stable and remains in a near natural state.

The inlet has four main tributaries: Croobyar, Yackungarrah and Currowar Creeks; and Garrads Lagoon. The creeks rise in the escarpment forest within 30km of the coast and traverse through agricultural lands joining the estuary in a floodplain and mature estuarine wetland and coastal forest complex. Most of the land surrounding the village is bushland reserved for public recreation, environmental and/or scenic protection. The catchment of Narrawallee Inlet is about 80 $km^2$.

A map of the estuary showing the mapped Coastal Wetland and Littoral Rainforest areas is provided in Figure 4-27. The Coastal Environment Area as mapped under the Coastal Management SEPP is shown in Figure 4-28, and the Coastal Use Area is shown in Figure 4-29.

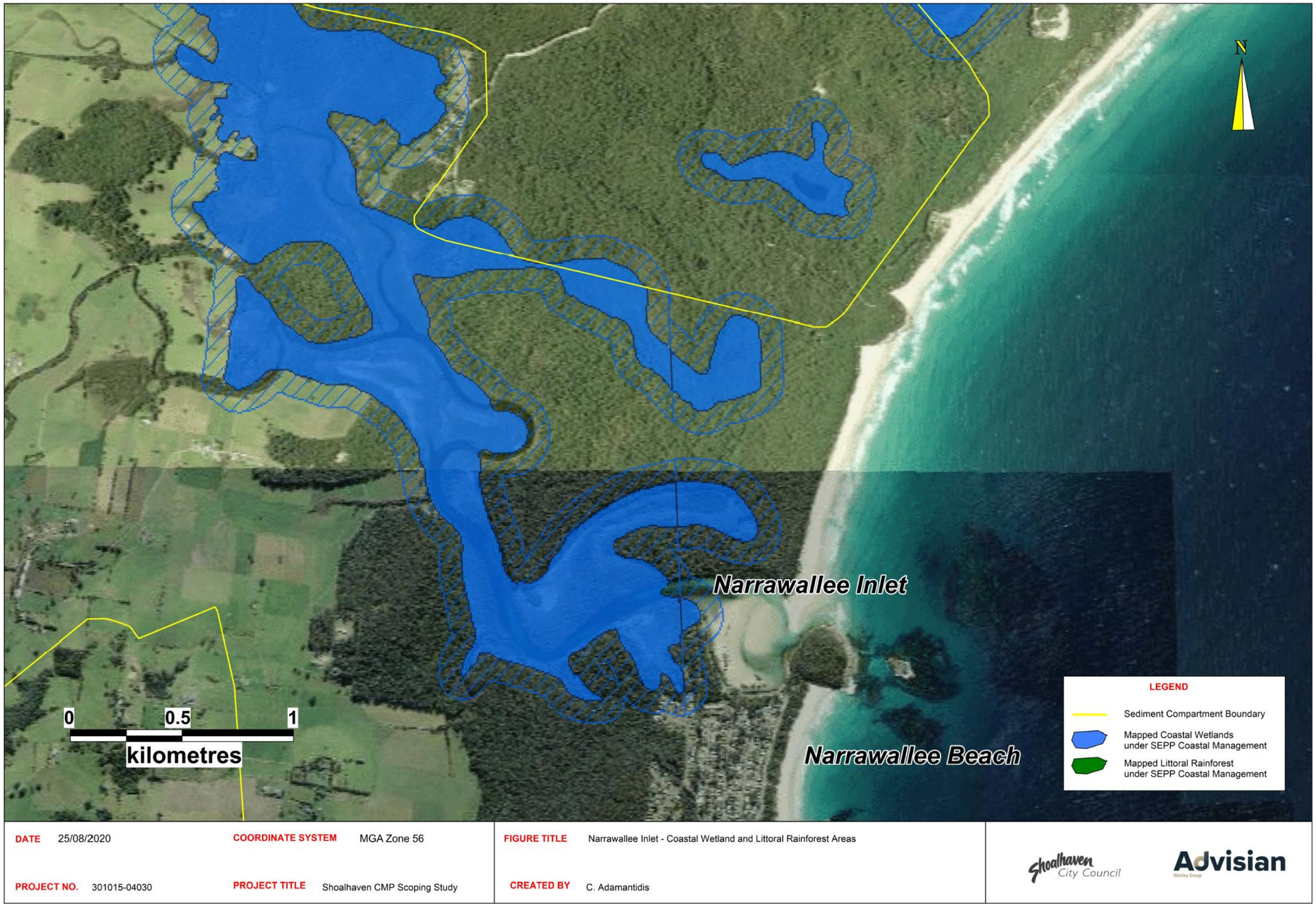



*Figure 4-27 – Narrawallee Inlet Coastal Wetland and Littoral Rainforest Area*

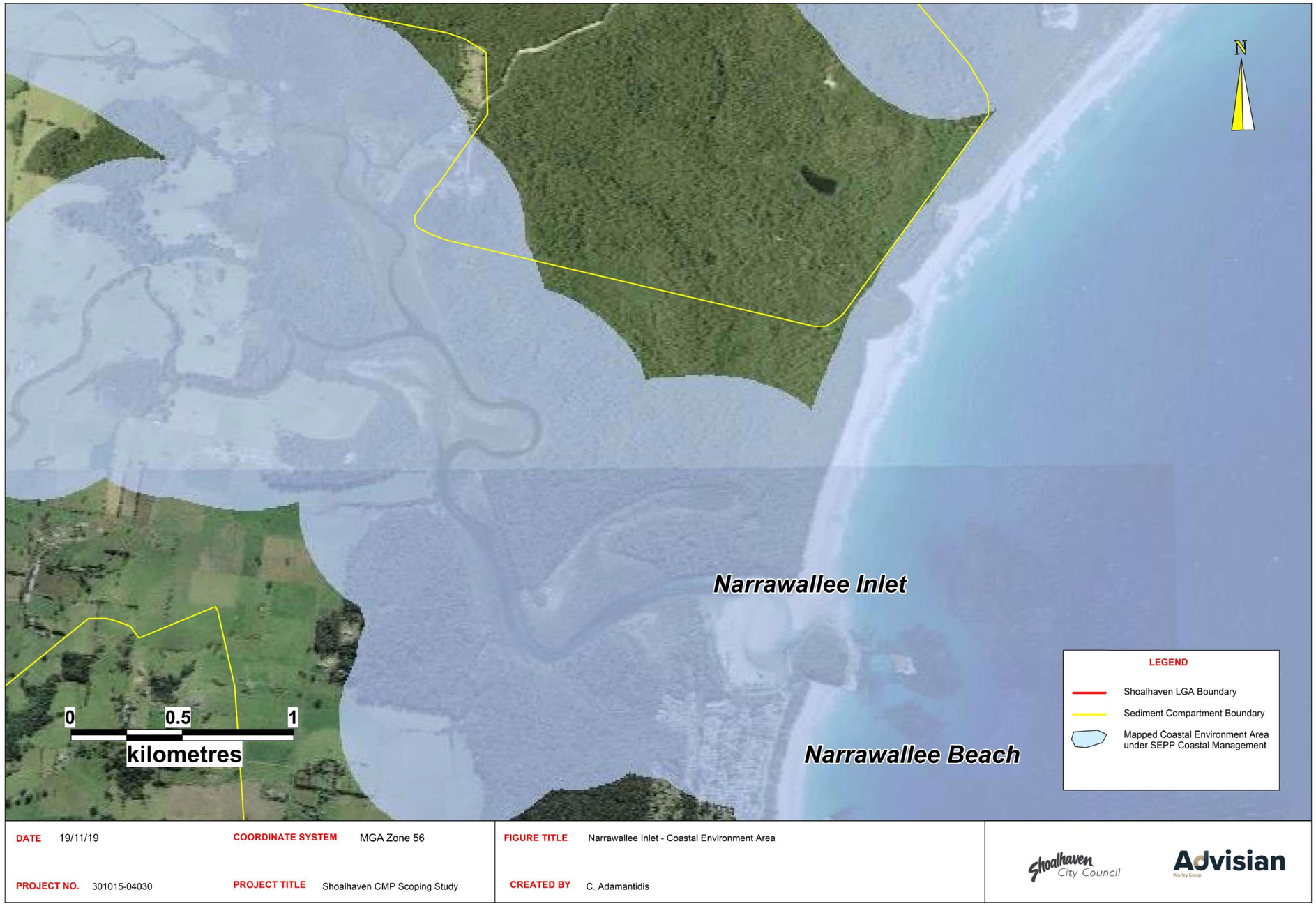



*Figure 4-28 – Narrawallee Inlet Coastal Environment Area*


*Figure 4-29 – Narrawallee Inlet Coastal Use Area*

### 4.9.2 Environmental Values

The inlet's tidal exchange allows marine and terrestrial processes to interact and produces a complex coastal environment. The inlet is mostly infilled with marine sands. The inlet includes theses habitats:

- Estuarine ecosystem – few water quality issues and minor changes to habitat.
- Freshwater ecosystem – much of the riparian vegetation has been cleared on agricultural land.
- Freshwater and estuarine wetlands – 196ha are protected under former SEPP 14 wetland (now included within the Coastal Management SEPP).
- Coastal eucalypt/banksia forest along dune system – historically damaged by ocean storms.
- Eucalypt, turpentine and forest red gum forests – remnants and pockets survive.
- Subtropical rainforest – appears to be stable.

Some low-lying wetland areas along Narrawallee Creek are classified as coastal wetlands under the former SEPP 14. There are also threatened and/or endangered flora and fauna species located within the Narrawallee catchment and Inlet communities afford foreshore protection.

The water quality of the Narrawallee Inlet is considered to be good due to effective flushing during tidal exchange. Council runs a water quality testing program known as Aquadata, which reports on water quality monitoring results at a number of locations throughout the LGA, including at Narrawallee Inlet. While there are some instances of elevated faecal coliforms and nutrient levels recorded in the data in the estuary, generally the water quality is good, with water quality meeting default trigger values in the ANZECC Guidelines for Fresh and Marine Water Quality (2000) for physical and chemical stressors for south-east Australia for slightly disturbed estuarine ecosystems. However, there have been instances of poor water quality at the Inlet in the past (2000/01). Water quality issues occur in some of the creeks after rainfall and via surface run-off from upstream land management practices which can affect aquatic life in the freshwater creeks and potentially the upper reaches of the estuary.

### 4.9.3 Challenges

The foreshore of Narrawallee Inlet is considered to be relatively stable but are at risk of erosion from boating activity or flooding. The banks and wetlands of the upper estuary are susceptible to erosion due to cattle grazing.

The Narrawallee Creek Nature Reserve is significant for the quality of its habitats. Key nature conservation issues include:

- The spread of weeds in native bushland
- Littering and degrading of natural areas
- The threat to fish stocks from loss of habitat.

## 4.10 Burrill Lake

### 4.10.1 Site Description

Burrill Lake is located approximately 65km south of Nowra and 6km south of Ulladulla. Burrill Lake covers an area of approximately 4 $km^2$, consisting of an entrance channel of 4km length and 100 – 500m width and the Stoney Creek major tributary. The Burrill Lake catchment covers an area of 78 $km^2$, which is largely dry sclerophyll forest in the south and west and agricultural lands to the north.

Burrill Lake is an ICOLL that has historically been open to sea most of the time. The channel is relatively shallow with a depth less than 3m. The entrance shoal is the only active shoal and is located between a rock platform and beach sand barrier, resulting in a constricted mouth. Condition of the entrance governs key values in the inlet and estuary including water quality, inundation of low-lying areas, the ecology of the wetlands around the inlet and diversity of aquatic species.

A view of Burrill Lake is shown in Figure 4-30. A map of the estuary showing the mapped Coastal Wetland and Littoral Rainforest areas is provided in Figure 4-31. The Coastal Environment Area as mapped in the Coastal Management SEPP is provided in Figure 4-32, and the Coastal Use Area is provided in Figure 4-33.

*Figure 4-30 – Aerial view of Burrill Lake and entrance area*

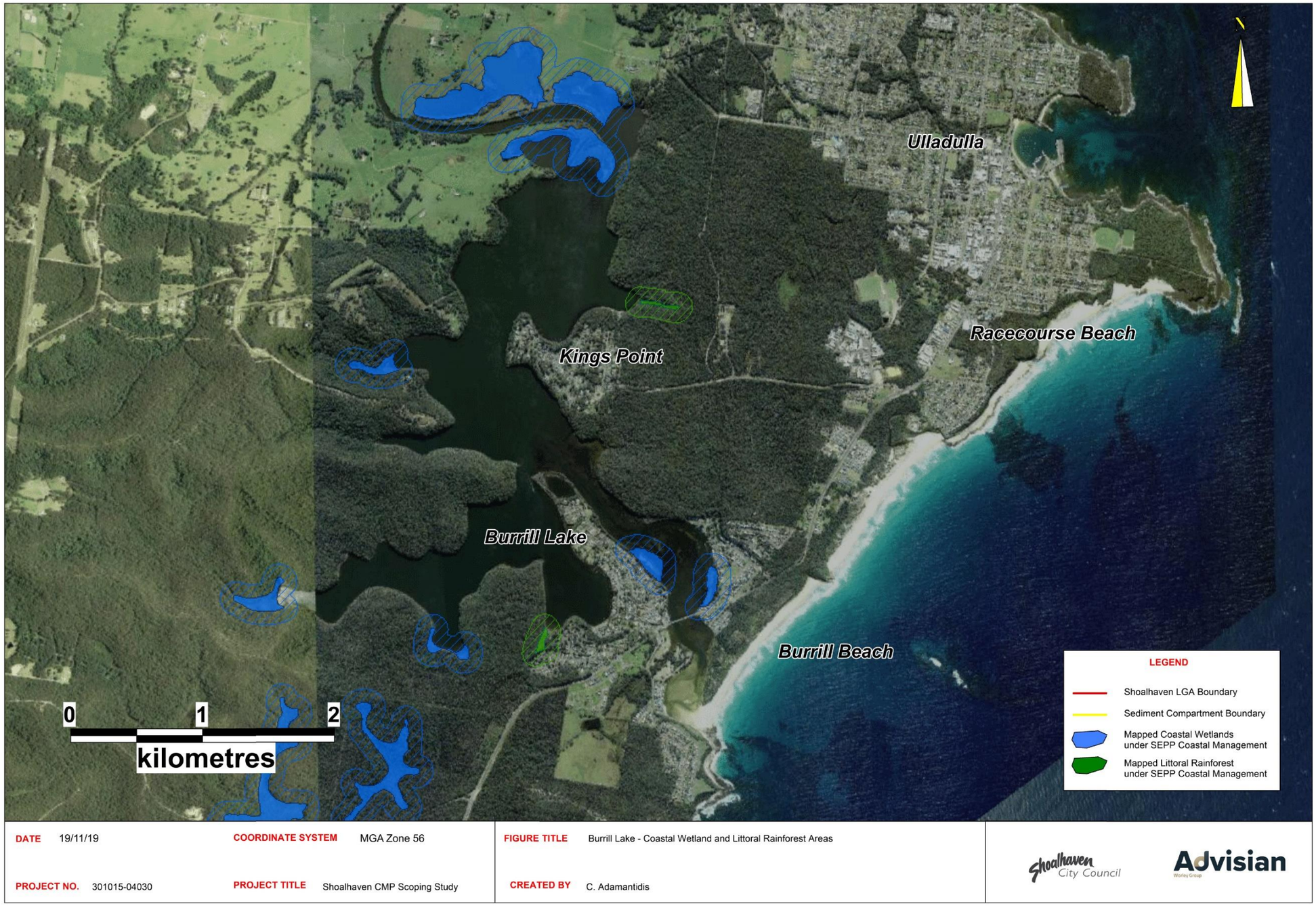



*Figure 4-31 – Burrill Lake Coastal Wetlands and Littoral Rainforest area*


*Figure 4-32 – Burrill Lake Coastal Environment Area*


*Figure 4-33 – Burrill Lake Coastal Use Area*

### 4.10.2 Environmental values

The major habitats in Burrill Lake include the water column, reeds and sedges, seagrass, rocky shores and unvegetated soft substrates (sand and mud flats). Burrill Lake's foreshore vegetation has been recorded by CSIRO as the most diverse of eight south-coast estuaries. The reeds and sedges meet the definition of Coastal Saltmarsh and recently have been listed as an endangered ecological community. There are three main species of saltmarsh in the area: *Juncus kraussi, Cyperus laevigatus* and *Baumea* sp.

Burrill Lake's water quality has generally been considered to be of moderate to high quality, making it suitable for recreational use, fostering aquatic systems and producing aquatic seafood. The water can also be used for irrigation, stock and domestic use. Council has recorded the results of historical and present day water quality monitoring at various sites within Burrill Lake on the Aquadata portal on their website, which shows that recent water quality results within the lower estuary have been good, with very few instances of elevated pathogen levels, following upgrade of the sewer system in the early 2000's. However, there are still existing water quality issues present in Burrill Lake. A 2001 State of the Environment Report found there were a few instances of fluctuations in dissolved oxygen levels and higher faecal coliform levels between 1998 – 2000. Grazing operations were considered to be the largest contributor to these water quality issues, in conjunction with the poor flushing frequency in the catchment. A Burrill Lake Processes study undertaken in 2001/2 identified that the tidal section of Stoney Creek had the poorest water quality, caused by runoff from large agricultural catchments and poor flushing frequency (>150 days).

Burrill Lake and its tributaries support a large range of ecological communities. The seagrass beds in the lake play an important role in providing shelter and food for a wide range of aquatic biota which include fish species such as the Sea Mullet, Luderick, Yellow-fin Leatherjacket, Sand Mullet and Six-spined Leatherjacket. The largest threat to fishing resources of the lake will arise from elevated turbidity levels, which will indirectly reduce the growth of seagrass. Seagrass mapping has been recently completed by DPI and may be useful for understanding estuary health in the development of the CMP.

Burrill Lake's catchment has been the site of Aboriginal occupation for over 20,000 years. The Burrill Rock Shelter is the most significant of these Aboriginal sites, being of international archaeological significance. The catchment is also rich in relics from early European settlement. Many farm buildings and public buildings in Milton highlight the importance of agricultural production from the area. 73 items from Milton were listed on the Shoalhaven Heritage Study, as well as 23 from the rural area and three from Burrill Lake.

### 4.10.3 Challenges

Erosion on Burrill Lake is most significantly contributed to by developments, intensive agriculture and instream erosion. The creek banks and watercourse along the agricultural areas are generally poorly vegetated and when coupled with grazing pressure there is increased erosion of banks and loss of estuarine vegetation from coastal wetlands.

Flooding and tidal inundation in Burrill Lake occurs from three scenarios, major flooding throughout catchment caused by high rainfall events, localised flooding caused by moderate rainfall or inundation of foreshore areas caused by entrance closure. The construction of the new bridge and removal of the causeway has had measurable impacts on tidal range, erosion and the morphology of the lake that need further study and assessment.

As with the other estuaries. sea level rise is a threat that needs to be considered, with the potential for increased frequency of inundation of infrastructure and endangered ecological communities, landward migration of saltmarsh, mangroves and changes to seagrass distribution.

The visual amenities provided by the natural qualities of Burrill Lake can be impacted by insensitive development around the foreshore, clearing of lakeside vegetation e.g. mowing of saltmarsh, propeller impacts to seagrass beds accelerated development of rural areas, and too many private foreshore structures such as jetties and reclaimed land.

## 4.11 Lake Tabourie

### 4.11.1 Site Description

Tabourie Lake is about 200km south of Sydney. The Lake is an ICOLL separated from the ocean by a shallow sandy inlet 3km long. The estuary is 1.5 $km^2$ with a catchment area of 47.7 $km^2$. The main basin of the lake is typically one metre in depth and the lake entrance is restricted allowing for minimal tidal exchange or flushing when open to the ocean. The lake connects to the ocean via Tabourie Creek and there are several sub-catchment areas for Tabourie Lake. A map of the estuary showing the coastal wetland and littoral rainforest areas is provided in Figure 4-34. The Coastal Environment Area as mapped in the Coastal Management SEPP is provided in Figure 4-35 and the Coastal Use Area is provided in Figure 4-36.

### 4.11.2 Environmental values

Results of historical water quality monitoring dating back to the 1990's are published on the Aquadata portal on Council's website, which indicate only some isolated instances of elevated faecal coliforms and enterococci in the lower estuary since the early 2000's. Historical water quality data indicated some tributaries of the Lake having elevated nutrient levels. During the 2008 – 10 water quality sampling period in the lake basin, a Water Quality Index (WQI) fluctuating between 'medium' to 'good'. Nutrient levels, dissolved oxygen levels and faecal coliform levels can fluctuate from typical counts. Furthermore, an estuary health report card (2010) for the Lake based on chlorophyll-a, turbidity and saltmarsh extents indicated a 'fair' rating.

Tabourie Lake contains ecological communities (animals and plants) in the terrestrial, riparian and aquatic zone. The catchment contains endangered ecological communities (EECs), which include the terrestrial community of Bangalay Sand Forest and riparian communities of Swamp Oak Floodplain Forest and Coastal Saltmarsh and Swamp Sclerophyll Forest. The aquatic community of Tabourie Lake consists primarily of seagrass, mangroves and saltmarsh. Seagrass communities in the estuary was reported in the State of the Catchments (SoC) report (DECCW 2010) as 'very poor', which has been accounted for as a natural occurrence of fluctuations in water level (and also potentially due to estuary

entrance intervention), resulting in Ruppia disappearance. Scattered stands of mangroves have been reported around the lake. Saltmarsh is vulnerable to changes from sea level rise, however, saltmarsh communities in the estuary were reported as being in 'very good' condition in the 2010 SoC. No fish species classified as threatened are known or expected to occur in the lake.

Tabourie Lake provides for recreational opportunities such as swimming, fishing and canoeing which is complimented by other activities at the coastal beach at the mouth of the estuary. Boating navigation around the shallow water of the lake basin is generally not an issue. However, navigation at the confluence of Lemon Tree Creek and the entrance channel can be an issue during times of drought coinciding with very low lake levels.

The local Aboriginal people inhabited the Shoalhaven region and the coastal and estuarine environments of Tabourie Lake. Middens are known to occur beside Tabourie Lake, which confirms that the lake and rock platforms of Crampton Island provided for shellfish targeted as food. The local Aboriginal people would have hunted fish and crustaceans from the lake and wetlands.

Europeans have used the area for transport, industry and recreation since the 1800s. A dray track crossed the mouth of Tabourie and pine plantations around Tabourie Lake were introduced in the 1920s. Most of the pine was destroyed in a 1968 wildfire and a long-term rehabilitation program have been implemented for the pine areas.

### 4.11.3 Challenges

Climate change is expected to increase flood and tidal inundation risks to settlements, the delivery of services and natural ecosystems in and around the coastal and estuarine environments at Tabourie Lake. Landward migration of saltmarsh, mangroves and changes to seagrass distribution may occur as a result of sea level rise. Entrance management, coastal inundation and flooding issues are important challenges to consider.

There are potential impacts on the lake entrance and the physical, chemical and biological processes of the lake. A first pass assessment indicated the following key issues resulting from lake level rise: reduction in area to the foreshore reserve available for public recreation; inundation of EECs and some without the possibility of retreating landward; major impact on entrance intervention levels; and release of acidity from acid sulfate soils at some areas.

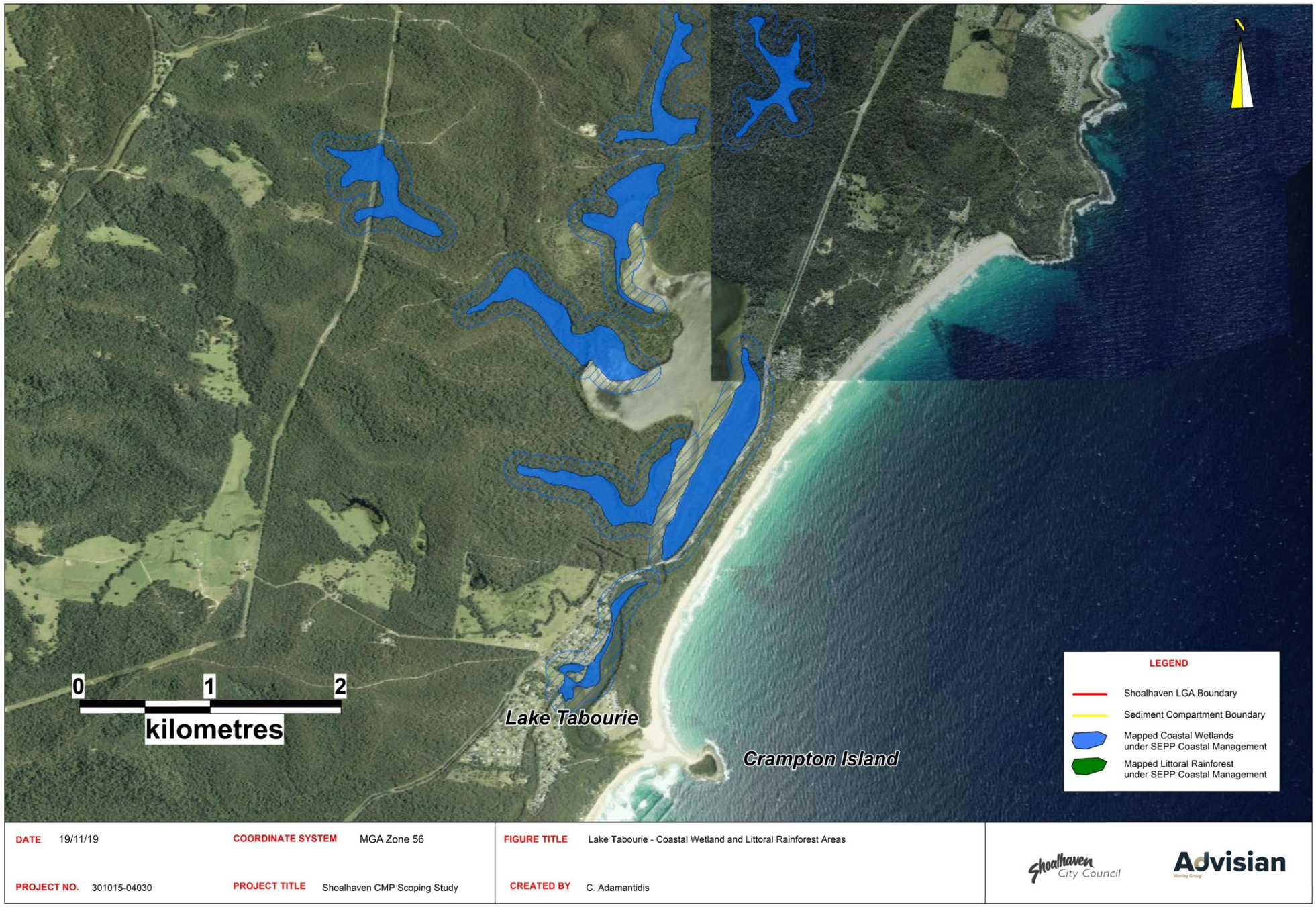



*Figure 4-34 – Lake Tabourie Coastal Wetlands and Littoral Rainforest area*

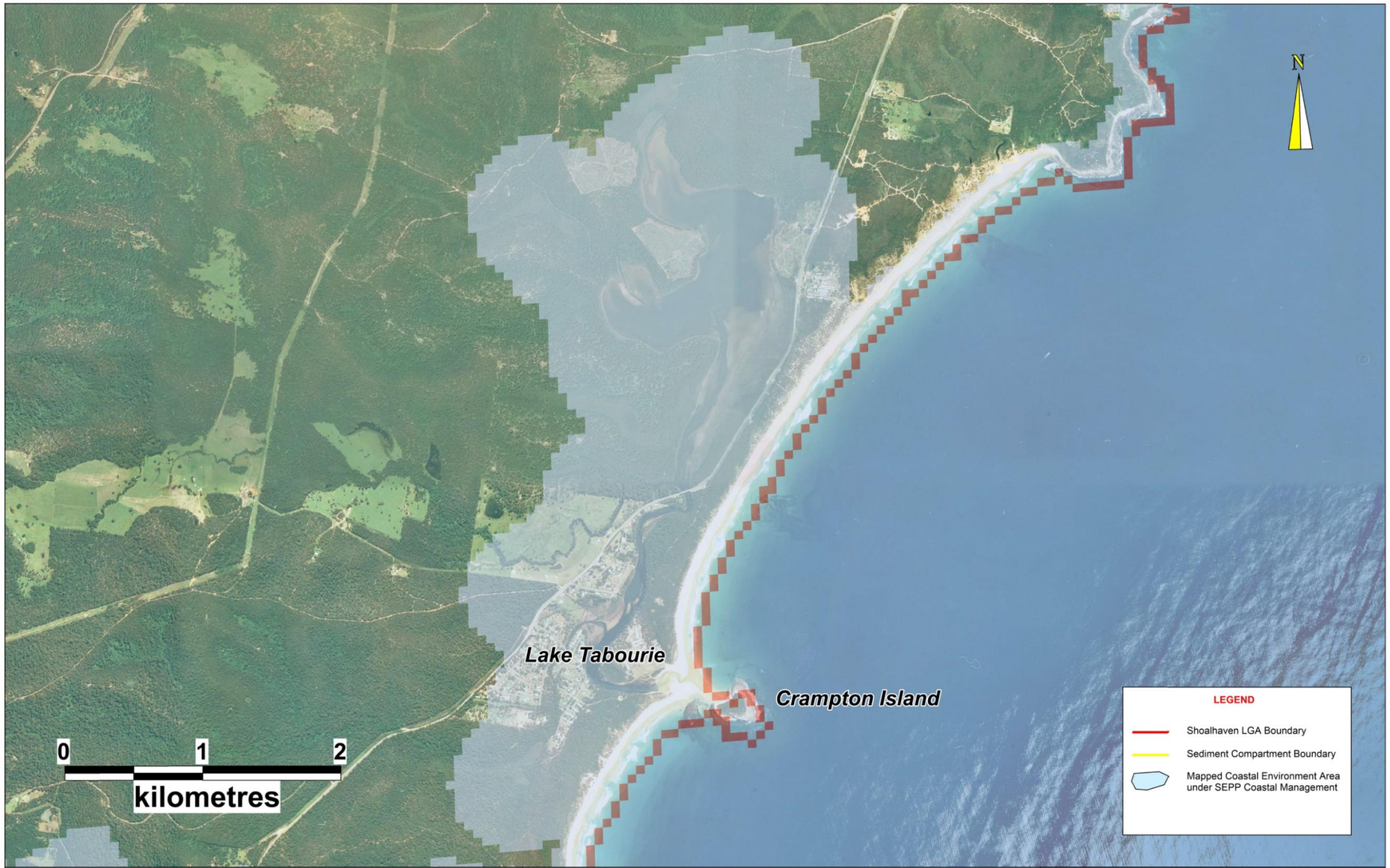



*Figure 4-35 – Lake Tabourie Coastal Environment Area*


*Figure 4-36 – Lake Tabourie Coastal Use Area*

# 5 Consultation and Engagement

## 5.1 Overview

This section of the Scoping Study answers the following questions:

- ***What consultation has been undertaken in the past and what have we learned from this?***
- ***What new stakeholder and community consultation has been undertaken for the Scoping Study?***
- ***What were the results of the consultation?***
- ***What Community Engagement Strategy should we adopt for the various Stages of the CMP process?***
- ***How can the Shoalhaven community be involved in Coastal and Estuary Management?***

### 5.1.1 Past Consultation Activities

Community engagement has been undertaken for the open coast and many of the estuaries under Council's management, as part of the preparation of the Open Coast CZMP, and Estuary Management Plans, Natural Resources Management Strategies and Entrance Management Policies for many of the estuaries in the Shoalhaven LGA.

The following key activities were carried out by and on behalf of Council:

- Our Coast Our Lifestyle (2016) – an extensive, broad-based consultation process with the objective of educating the community about risks of coastal erosion and the coastal management options that are available to respond to that risk, and to understand community preferences for those different management options and the factors the SCC has to consider when responding to coastal erosion risks and storm damage
- Ongoing consultation through Council's website and Frontline newsletter on coastal management
- Consultation with residents, ratepayers and visitors through Council's website during preparation of the CZMP in 2012, 2016 and 2018
- Consultations with the community in 2017 regarding management actions to be adopted in the lower Shoalhaven River Estuary
- Stakeholder and community consultation in relation to the development of the Shoalhaven River Estuary Management Plan in 2008

- Consultation with the community through the development of previous Estuary Management Plans, Natural Resource Management Strategies, Flood studies and Estuary Entrance Management Policies for the key estuaries, mainly through surveys of the community to gauge the issues of most concern.

A summary of the community engagement undertaken as part of these previous studies for the open coast and for each of the major estuaries in the LGA is provided in this Section, including the engagement methods used, values identified by the community and the management issues of most concern to the community.

### 5.1.2 Agency Consultation for this Scoping Study

An Agency workshop was held in February 2019 with Council and key Government Agency stakeholders. The purpose of the workshop was to:

- Communicate the scope of the CMP and an outline of what work has been done to date with relevant Agency stakeholders
- Identify the role and concerns of Agencies with a stake in coastal management in the Shoalhaven
- Formulate a Vision, Purpose, Strategic and specific Management Objectives for the Shoalhaven CMP
- Identify gaps in the existing CZMP and EMPs
- Define a suitable community engagement strategy for the CMP
- Gather some suggestions on how the CMPs for the Shoalhaven should be prioritised.

The workshop was facilitated by Advisian and attended by representatives from the following Agencies:

- Shoalhaven City Council
- NSW Department of Planning, Industry and Environment (DPIE), including:
    - DPIE Environment, Energy and Science (Biodiversity and Conservation Division, SE Water Floodplains and Coast Team)
    - National Parks and Wildlife Service NPWS
    - DPIE Planning and Assessment
    - DPIE Housing and Property – Crown Lands
- Department of Regional NSW - NSW Local Land Services
- Department of Regional NSW – Department of Primary Industries – Marine Parks
- Department of Regional NSW – Department of Primary Industries – Fisheries
- Transport for NSW - Roads and Maritime Services

- NSW Local Land Services
- NSW State Emergency Service (NSW SES)
- Australian Defence Force. (ADF)

The Agenda, workshop presentation and a summary of the workshop outcomes from the Agency stakeholder consultation is provided in **Appendix C**.

The above Public Authorities were individually contacted and invited to review and provide comment on this Study. As of March 2020, comments have been received from the following Agencies:

- **Department of Planning, Industry and Environment - Environment Energy and Science (Biodiversity and Conservation Division)**
- **Department of Primary Industries, Fisheries and Marine Parks**.
- **NSW State Emergency Service (NSW SES)**.

The main feedback received from the agencies is summarised below.

*Department of Planning, Industry and Environment - Environment Energy and Science (Biodiversity and Conservation Division)*

The Department of Planning, Industry and Environment (DPIE) undertook a detailed review of the Scoping Study during the exhibition period and has provided general oversight of the project, together with a detailed assessment of the study against the guidance in the NSW Coastal Management Manual, 2018.

DPIE suggested modifications that would be required to ensure that the Scoping Study satisfies the objects and relevant statutory requirements of the *Coastal Management Act, 2016*. These modifications have been incorporated in conjunction with Council and DPIE.

*Department of Primary Industries, Fisheries and Marine Parks*

DPI Fisheries and Marine Parks made the following general comments:

- It is important that actions within the CMP for the Shoalhaven Region are aligned with both the FM Act and the *Policy and Guidelines for Fish Habitat Conservation and Management (2013)*.
- DPI Fisheries emphasises the need for evidence-based decision making, and clear evidence-based justifications for proposed management actions.
- DPI Fisheries is also responsible for the management of the Jervis Bay Marine Park under the *Marine Estate Management (MEM) Act 2014*. CMPs should take into account the objective of the MEM Act and associated regulations which includes the zoning plans. Further consultation and engagement should be undertaken with marine parks staff as the CMP progresses.
- the NSW Marine Estate Threat and Risk Assessment Final Report contains a valuable assessment of threats to the marine estate in NSW, including the south coast. Also, the Marine

Estate Management Strategy (MEMS) outlines actions the NSW Government is undertaking to protect and enhance our waterways, coastline and estuaries from 2018-2028.

- There are a number of MEMS projects that DPI Fisheries is planning to implement within the Shoalhaven area that can be included in future CMPs, including: work on floodgate and floodplain drainage issues; foreshore structure strategies; bank management strategies; estuarine vegetation habitat mapping; marine vegetation strategies; and potentially oyster reefs. These projects, and other projects under the MEMS, can assist, inform or be included in CMPs. DPI Fisheries will keep Council Coastal Management Staff informed on the progression of MEMS Stage 2 if approved and any associated projects to be conducted within the Shoalhaven LGA.

*NSW State Emergency Service (NSW SES)*

A summary of the comments provided by NSW SES is given below:

1. Tsunamis are a risk that need to be considered in the CMP. The NSW SES is the response agency for Tsunami and Council should consider and include Tsunami risk in the CMPs.

The following map (Figure 5-1) indicates (in red) potential areas of inundation along the NSW coast.


*Figure 5-1 – Areas at risk from tsunami inundation (provided by NSW SES).*

Further and more detailed modelling can be viewed through the link below: https://nswses.maps.arcgis.com/apps/webappviewer/index.html?id=d54531ab176d48c4951b7fd40c27be68.

NSW SES also provided a link to the 'Tsunami Hazard and Risk' Supplementary Document which provides additional information:

https://www.ses.nsw.gov.au/media/2814/tsunami-hazard-and-risk.pdf.

The NSW SES supports Council's consideration of coastal hazards, including flooding, in their land use planning strategies  Following are some primary Emergency Management Principles that guide NSW SES strategy in regards to response during flood events:

- The NSW SES's primary response strategy to combat the effects of flooding on a community is to evacuate an at-risk community out of the at-risk area to an area not exposed to, or surrounded by flood water (State Flood Plan, part 5).
- Self-evacuation of the affected community should be achievable in sufficient time before the onset of a flood, should be by vehicle where feasible, with pedestrian evacuation as a backup option, and must not require people to drive of walk through flood water.
- The NSW SES is opposed to development controls that require private or site-specific flood evacuation/emergency plans to address the flood risk to future occupants.  There is no legislative basis to ensure the upkeep of such plans.
- The NSW SES supports and encourages development controls that result in critical and sensitive land uses being located on land above the probable maximum flood (PMF).  The NSW SES considers that critical infrastructure includes emergency service facilities, hospitals and residential care facilities.  Sensitive land uses include seniors living, caravan parks, childcare centres, educational facilities, correctional facilities, respite day care centres, public utilities (such as electricity substations), communication facilities and liquid fuel depots, etc.
- The NSW SES does not encourage development controls that require a developer to provide areas of buildings that enable occupants to shelter in place, rather than enabling evacuation, in order to overcome future flood risk.  The NSW SES has an obligation to continually monitor a community that is surrounded by flood water to ensure safety until the flooding dissipates.  A strategy of 'shelter in place' does not eliminate the risk but transfers that risk to the future community, the NSW SES and other emergency services.  'Shelter in place' strategies increase the risk to emergency service personnel.  It is possible that such a strategy will result in the need to rescue people.  Before attempting rescue, emergency service personnel will assess the risk to their own safety.  There is therefore no guarantee that rescue will be available for residents who are effectively entrapped in a building during a flood.
- Strategies relying on an assumption that mass rescue may be possible, where evacuation either fails or is not implemented, are not acceptable to the NSW SES.

The NSW SES provided a copy of the NSW SES Coastal Erosion Fact Sheet (Figure 5-2) to provide further detail on the NSW SES involvement in and response to this hazard.

## Coastal Erosion Fact Sheet
### *NSW SES Roles*

NSW GOVERNMENT
SES NSW STATE EMERGENCY SERVICE

**Background:**

NSW SES is responsible for the emergency management of storms, including coastal erosion caused by storms. Coastal erosion events that are not caused by storms are the responsibility of the Local Emergency Operations Controller (LEOCON).

The NSW State Storm Plan (2018) now aligns to the Coastal Management Act 2016. Under this Act, Local Government Councils have the responsibility for developing Coastal (Zone) Management Plans (which outline the management of the coastal zone). Part of this plan outlines actions that can be undertaken during emergency situations, to minimise damage to the coastal zone (known as a Coastal Zone Emergency Action Plan).

The State Storm Plan Section 5.3 outlines that Councils are responsible for the coordination of the actions outlined within their Coastal Zone Emergency Action Plan. The NSW SES role in coastal erosion is limited to the actions listed below.

**What is the Coastal Zone?** The Coastal Zone is defined as the 'coastal vulnerability area, coastal wetlands and littoral rainforests, coastal use area and coastal environment area'. Interactive maps of the Coastal Zone can be found on the NSW Department of Planning and Environment website (Policy & Legislation→ Coastal Management).

**What is the NSW SES role in coastal erosion?**

| What NSW SES **CAN** do | What NSW SES **CANNOT** do |
|---|---|
| ✓ Evacuate residents at risk; | ✗ Shore up properties;* |
| ✓ Assist with removal of readily movable items; | ✗ Reinforce dunes, sea walls, or other structures in the coastal zone;* |
| ✓ Assistance activities as requested by Council; | ✗ Build structures (including sandbag structures) within the coastal zone.* |
| | *unless requested by Council as per the Coastal Zone Emergency Action Plan. |

**What is Council's role in coastal erosion?**

- Activate the Coastal Zone Emergency Action Plan;
- Coordinate activities/resources in the coastal zone (excluding evacuation);
- Determine response actions such as reinforcement of structures, shoring, use temporary structures etc.

**For further information please contact the Emergency Risk Management team via erm@ses.nsw.gov.au**

*Figure 5-2 – NSW SES Coastal Erosion Fact Sheet*

The NSW SES welcomes the opportunity to be part of the various Coastal and Estuary Management Committees and working with Council to ensure the safety and resilience of communities during Flood, Storms and Tsunamis. NSW SES will endeavour to have representative/s attend scheduled committee meetings but ask that Council is mindful that NSW SES members are volunteers within their communities and may need some flexibility with meeting times to ensure that the right representatives are available to attend. Where resources permit NSW SES also welcome the opportunity to work with the various communities and Council when developing Emergency Action Plans referred to in the Scoping report.

*Agency endorsement*

Following review from the above Agencies, responses to their review and further amendments to this Study as a result of Agency feedback, it is considered that the Agencies have endorsed the forward process proposed for preparing the CMP.

Note that the final CMP will require letters of support from the Agencies, and to show evidence that they have been engaged.

### 5.1.3 Community Engagement for this Scoping Study

Six community workshops and drop-in information sessions were held in September/October 2019 specifically to inform this Scoping Study. Sessions were held at the following locations:

- Shoalhaven Heads
- St Georges Basin
- Sussex Inlet
- Lake Conjola
- Ulladulla
- Nowra.

These sessions were facilitated by specialist communication consultants, RPS Group. A total of 233 people attended these sessions, with 550 pieces of feedback collected as well as a number of formal submissions. These sessions have captured a range of issues of concern and feedback from the community.

The outcomes from this community consultation are summarised in this Section of the Scoping Study. A detailed Consultation Outcomes Report is provided in **Appendix D.**

Council have also produced a Questionnaire open to the public to provide insight into their key values, use and issues for the open coast and estuaries. The Questionnaire and results are provided in **Appendix E**, with the key insights provided below.

### 5.1.4 Stakeholder and Community Engagement for Future Stages of the CMP

There are several different methods that will be utilised to communicate and engage with the key stakeholders throughout each stage of the CMP. Each communication channel and tool has been selected to target specific audiences and ensure that the information about the project is communicated effectively and efficiency to the community. It is essential that SCC ensures that the community can provide feedback to the SCC about this project.

An action plan has been developed for future consultation activities, which provides detail of the key communication and engagement activities that will be undertaken during each stage of the project. Activities may change throughout the project in response to community needs and issues that may arise. The action plan will be reviewed and updated as required.

- Consultancy team preparing the CMP - Consultant
- Coastal and Estuary Management team – CEM team
- Communications and community engagement team – Comms team

A Stakeholder and Community Engagement Strategy has been developed for use in subsequent stages of the CMP that identifies the key stakeholders and this is provided in **Appendix F.**

## 5.2 Insights from Past Consultation

The following key insights were obtained from specific past consultation activities in the Shoalhaven. A detailed account of the past consultation activities and outcomes is provided in the Stakeholder and Community Engagement Strategy provided in **Appendix F**.

### 5.2.1 Our Coast Our Lifestyle (2016)

The objectives of the OCOL engagement process were to:

- Educate the community about risks of coastal erosion and the coastal management options that are available to respond to that risk.
- Understand community preferences for those different management options and the factors the SCC has to consider when responding to coastal erosion risks and storm damage.

Information gathered from the community included:

- gauging the community's knowledge on the coast,
- what assets/natural assets were valued by the community;
- the community's preference for different coastal management methods; and
- the financial funding options they are prepared to make to support the coast.

The following are numerous key insights which have informed the decision-making of the SCC regarding coastal management since finalisation of the consultation process. The engagement process identified that the community:

- Is concerned about coastal erosion.
- Is unaware of the SCC's coastal management role.
- Strongly values the natural environment.
- Supports the SCC prioritising community assets and infrastructure when spending taxpayers' money on coastal management.
- Expects the SCC to take a long-term, cost-effective approach to managing the risk of coastal erosion, based on scientific evidence and expert advice.
- Except in specific circumstances, the community supports use of soft protection options, particularly dune management, over hard protection options such as seawalls and groynes.
- Considers environmental impact and community safety as the core values of coastal management.
- The community is split in opinion on whether coastal risk is higher than it has ever been or has stayed the same.
- Supports the cost of coastal management being shared across the whole community via rates or levies if necessary and wishes the SCC to consider other revenue sources.

### 5.2.2 Consultations during preparation of Shoalhaven CZMP 2018

In preparation of the Coastal Zone Management Plan, the SCC consulted with stakeholders and community (residents, ratepayers and visitors) in 2012, 2016 and 2018. The SCC used a **special project website** to provide information.

The website educated about:

- Background information on coastal hazards, coastal legislation and policy, coastal research and coastal management.
- Progress on a range of projects which affect the future quality of the coastal environment and lifestyle of residents.
- Information on the science of climate change and sea level rise, which were major concerns for coastal property owners.

Over the six-year period, SCC conducted community briefings and workshops at Nowra (Council Chambers), Callala Bay, Callala Beach, Ulladulla, Huskisson and Mollymook to discuss the community's personal experience and observations of coastal change and building objectives for the future of the coast's issues, hazards, risks and management responses. Further, SCC engaged with stakeholders and residents to discuss the use of environmental planning instruments such as the Shoalhaven LEP and DCP to manage the use and development of the coast.

The following community groups were consulted:

- SCC's Community Consultative Bodies (CCBs)

- Bushcare groups and Dunecare groups
- Community/Environment groups such as surf clubs, fishing clubs, sailing clubs, environmental groups, bird watching groups and South Coast Shore Bird Recovery Program
- Aboriginal community groups and organisations, including Wreck Bay community, Local Aboriginal Land Councils
- Businesses and Chambers of Commerce
- Interested residents and property owners
- Visitors to Shoalhaven

### 5.2.3 Community Issues Identified – Open Coast

The issues identified by the community from previous consultation are outlined in Table 5-1.

*Table 5-1 – Community Issues and Values identified from past consultation activities*

| Community Issues and Values Identified |
|---|
| **Coastal Processes and Climate Change** |
| Impact of climate change induced erosion and inundation on coastal dunes, foreshore reserve properties and disturbing beach amenity (Currarong, Culburra, Collingwood, Callala, Mollymook). |
| Impact of climate change on community infrastructure, roads, pathways, sewerage systems and water supply. |
| Impact of coastal erosion and recession on private property – damage to existing assets but also impact of risk controls on the value of assets**.** |
| Adequacy of coastal hazard mapping of beaches. |
| Impact of geotechnical instability of cliffs and bluffs on private property and public safety. |
| **Urban Water Management** |
| Management of discharge from stormwater drains and small coastal creeks (tributaries) affecting water quality, geotechnical stability and dune erosion. |
| **Access Management through Coastal Reserves and Foreshores** |
| Decision-making and communication processes relating to the number of tracks, spacing of tracks and maintenance of tracks across dunes, headlands and bluffs. |
| Private usage of public reserve lands on dunes and bluffs including garden encroachment, private access ways and blocking of public access. |
| Conflicts on beaches most often regarding dog exercise areas. |
| Access suitability for diverse use groups – aged, disabled, variety of recreational users, permanent residents and visitors**.** |
| Access by people, dogs and vehicles onto shorebird nesting areas disrupts breeding success. |
| **Vegetation** |
| Priority given to maintaining coastal features including beaches, dunes, headlands and intertidal rock reefs. Conservation of endangered ecological communities, threatened species and habitat. |
| Management of vegetation on coastal bluffs and cliffs including weed removal, drainage, species selection and contribution to instability. |
| Management of vegetation on coastal dunes, particularly the height and density of rehabilitated vegetation along urban foreshores. There is only a narrow margin of vegetation and dune between the tidal zone and residential development. This has an impact on views and the function of these strips are questioned. |
| Participation by Bushcare and Dunecare Groups. |
| Management of invasive species on coastal dunes. |

| Community Issues and Values Identified |
|---|
| **Other Social and Cultural Concerns** |
| Management plans and reports are currently in various forms and stages of implementation. This can create confusion for local communities about how the various pieces of coastal management fit together. |
| Protection and recognition of Aboriginal sites of cultural significance. |
| General concern over water quality particularly in high-use areas, including the impacts of fishing, mooring on seagrass beds and high impact areas. |
| Vehicles in reserves and on beaches can create safety issues and damage the natural environment. |
| Lack of signage for environmentally sensitive areas. |
| Where concrete/rock walls have been built to protect a foreshore area, they should be properly designed and maintained and allow for safe access. |
| Estuaries not included in CZMP (will be included in CMP). |

### 5.2.4 Estuary Community Engagement

Council has previously undertaken community consultation as part of the development of the following Plans Strategies and Policies for the estuaries in the Shoalhaven, moving from north to south:

- **Shoalhaven River Estuary** Management Plan
- Assessment of coastal management options for the Lower Shoalhaven River estuary at Shoalhaven Heads – community drop-in session
- **Lower Shoalhaven River** Drainage Remedial Action Plan - a landowner survey was sent out by Council to seek information from landowners about their level of knowledge on Acid Sulfate Soils and their willingness to adopt various remediation strategies. Council releases a periodic newsletter, the Gumboot News, to inform the local community in the Shoalhaven River Floodplain about Acid Sulfate Soils, improving water quality, soil quality, agricultural production and the health of the wetlands and estuary. Shoalhaven City Council, in conjunction with NSW SES, has produced a series of videos to assist the community to better understand flooding and minimise risks to personal safety and property.
- **Lake Wollumboola** Estuary Management Plan and flood study
- Currarong Natural Resources Management Strategy (Shoalhaven City Council, 2001) and **Currarong Creek** Entrance Management Plan (Shoalhaven Council, 2007)
- **St. Georges Basin** Estuary Management Plan – included a community questionnaire

- The ***Swan Lake*** *and* ***Berrara Creek*** *Natural Resources Management Strategy* was undertaken in 2002, with community involvement through the Swan/Berrara Estuary Management Task Force. Community consultation undertaken for this Strategy included informal discussions and a survey of the local community to gauge community values and issues.

- **Lake Conjola -** As part of the *Interim Entrance Management Policy* and *Flood Risk Management Study and Plan*, community consultation sessions have previously been conducted with brochures, web pages and flyers to inform the community on entrance behaviour and management.

- The ***Narrawallee Inlet*** *Natural Resources Management Strategy* was undertaken in 2002, with community involvement through the Narrawallee Inlet Task Force, which was established as an advisory committee to Council. Community consultation undertaken as part of the development of the Management Strategy included informal discussions and a questionnaire distributed to all residential areas in Narrawallee and Milton.

- The ***Millards Creek*** *Urban Stream Corridor Management Plan* was adopted by Council in December 2007, with community involvement through the Ulladulla Harbour and Millards Creek Natural Resources and Floodplain Management Committee. The broader community has had input to the Plan through the public exhibition process.

- **Burrill Lake** - As part of the *Interim Entrance Management Policy* (Peter Spurway and Associates, 2008), the Burrill Lake Estuary and Catchment Management Plan (Shoalhaven Council, 2002) and Burrill Lake Estuary Processes Study (WBM Oceanics, 2002), community consultation sessions have previously been conducted and a number of pertinent issues identified. The Burrill Lake Task Force advisory committee to Council was established in 1996 and re-established in 2000 as a forum for community consultation and input into the Estuary Management Planning Process. During this process a questionnaire was distributed to the Burrill Lake community to gauge community opinions on a set of draft values and issues.
- **Lake Tabourie** - In 2009, the Far Southern Natural Resources and Floodplain Management Committee undertook a community survey to gauge community priorities and concerns, as part of the revised Estuary Management Plan for Tabourie Lake. Prior to that, in 1996 during the exhibition of the Tabourie Lake Estuary Management Plan the local community raised specific issues for Lake Tabourie. As part of the Tabourie Lake Entrance Management Policy updated in November 2018 (Cardno, 2018), a community workshop was held to discuss the findings of the entrance management policy review. Six entrance management options were ranked by the community.

A detailed account of the issues raised in previous consultation is provided in **Appendix F**. The main issues raised through this process for each estuary are summarised in Table 5-2.

*Table 5-2 – Key issues identified from past community engagement exercises at the estuaries of the Shoalhaven*

| Issue/Value | Shoalhaven River Estuary | Lake Wollumboola | Currarong Creek | St. Georges Basin and Sussex Inlet | Swan Lake and Berrara Creek | Lake Conjola | Narrawallee Inlet | Millards Creek | Burrill Lake | Lake Tabourie |
|---|---|---|---|---|---|---|---|---|---|---|
| Entrance Management | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| Changes to tidal incursion and salinity due to entrance management | ✓ | ✓ | ✓ | | | ✓ | | | ✓ | ✓ |
| Poor water quality from stormwater, sewerage overflows and industrial discharges | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Poor water quality from agricultural landuse runoff | ✓ | | | | | | | | ✓ | |
| Flooding | ✓ | ✓ | | ✓ | | ✓ | | | ✓ | ✓ |
| Foreshore Erosion | ✓ | | | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| Recreational Amenity (swimming, kayaking, fishing) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| Congestion at boat ramps and recreation areas | ✓ | | | ✓ | | ✓ | | | ✓ | |
| Bank erosion from boat wakes, channel changes or lack of foreshore vegetation | ✓ | | | ✓ | | ✓ | | | | |
| Navigation | | | ✓ | ✓ | | ✓ | | | ✓ | |
| Support for community-based bush care and river care programs | ✓ | ✓ | | | | | | | | |
| Habitat destruction | ✓ | ✓ | | | ✓ | | ✓ | ✓ | | |
| Removal or reduction in the area of individual Endangered Ecological Communities (EECs) through land clearing, severe bank erosion or channel change. | ✓ | ✓ | | | | | ✓ | | | |

| Issue/Value | Shoalhaven River Estuary | Lake Wollumboola | Currarong Creek | St. Georges Basin and Sussex Inlet | Swan Lake and Berrara Creek | Lake Conjola | Narrawallee Inlet | Millards Creek | Burrill Lake | Lake Tabourie |
|---|---|---|---|---|---|---|---|---|---|---|
| Change in the balance between habitat types due to changes in sediment loads or sea level rise | ✓ | | | | | ✓ | | | | |
| Changes to freshwater inflows | ✓ | | | | | | | | | |
| Degradation of microhabitats for fish | ✓ | | | | | | | | | |
| Barriers for fish passage | ✓ | | | | | | | ✓ | | |
| Acid Sulfate Soils | ✓ | | | | | | | | | |
| Inclusion of Aboriginal community values | ✓ | | | | | | | ✓ | | |
| Documentation of European Heritage | ✓ | | | | | | | ✓ | | |
| Excessive seagrass growth | | ✓ | ✓ | | | | | | | |
| Odours | | ✓ | | | ✓ | ✓ | | | | |
| Introduced animals | | ✓ | ✓ | | ✓ | | ✓ | | | |
| Health of estuarine vegetation | | ✓ | | | | ✓ | ✓ | | ✓ | ✓ |
| Scenic and Visual Quality | ✓ | ✓ | | | ✓ | | | | ✓ | ✓ |
| Waterbirds | | ✓ | | | ✓ | ✓ | | | | |
| Tourism | ✓ | | | ✓ | | ✓ | | | ✓ | ✓ |
| Oyster Farming | ✓ | | | | | | | | ✓ | |
| Spread of Caulerpa | ✓ | | | ✓ | | ✓ | | | ✓ | |

## 5.3 Insights from Community Consultation for this Scoping Study

The key insights from the community consultation undertaken for this Study are provided below.

### 5.3.1 Key insights from RPS consultation sessions

Six community workshops and drop-in information sessions were held in September/October 2019 specifically to inform this Scoping Study.

Stakeholders expressed the social importance, values, strong connections and sense of belonging people have with their local areas. Stakeholders expressed they wanted to improve social and economic wellbeing of local communities, by improved maintenance of beaches and headlands which support recreational and business activities. Stakeholders valued the natural environment and recognised the importance of tourism for job creation and increased infrastructure for their local areas.

Overall, respondents who participated in the consultation commonly expressed feelings of concern around foreshore erosion, dune management, over-development, sedimentation, jurisdictional issues between Government agencies, flooding, tourism, boat wake and active estuary management, in particular the management of lake openings at Lake Conjola and Shoalhaven Heads. In seeking to determine an appropriate way forward for coastal management planning there was universal support amongst stakeholders for increased transparency from Council around its decision making and prioritisation of projects. In highlighting the importance of transparency, community stakeholders seek opportunities to have their concerns adequately recognised and addressed.

The key insights and issues identified from the consultation sessions are listed in Table 5-3, with the full report of the consultation outcomes provided in **Appendix D**.

Regarding the constitution and recruitment of participants to a proposed Coastal and Estuary Management Committee the following suggestions were made:

- Need to structure the management committee to reflect people impacted, range of demographics, and tourists.
- Engage the community through multiple platforms to engage a wider range of demographics.
- Engage High Schools and local TAFEs for potential partnerships and future engagement.
- Inform the community of the outcomes of this engagement and how they can continue to be engaged to influence Council's future CMPs.
- Conservation Groups to be included in the Committee Model e.g. Shorebird Recovery Group.
- What's the criteria to join the management committee? Is it merit based? If so this needs to be made public.
- Shoalhaven Water/ NSW SES representation needed in the new Committee Model.
- A committee is only as good as its Terms of Reference. Needs strong Terms of Reference to be functional and 'not a toothless body'.

- A committee needs a good cross-section of people with local experiences and represent the community not just their own views.
- How can Council better engage business and industry that don't have time for these meetings?
- Need to have presence from the Traditional owners of this land to have representation in the new Committee Model and have a say in management.

*Table 5-3 – Key insights from community consultation sessions for this Scoping Study (RPS, 2019)*

| Consultation Session | Summary of key findings | |
|---|---|---|
| | **Issue** | |
| **Ulladulla** | Tourism | • The natural beauty of local foreshores, beaches and estuaries is a draw card.<br>• Improve beach access, disabled access, improve local boat ramps, dune management and signage for visitors to the areas around Ulladulla.<br>• Visitor volume changes along North Mollymook beach is becoming unsafe.<br>• Future CMP to improve existing infrastructure to deal with increases in population |
| | Climate change | • Council to improve overall resilience and plan for upper thresholds.<br>• Want a clear approach from Council on how they will plan and prepare for future climate related disasters to the area.<br>• Improve mitigation measures around planning for coastal risk, access risks and inundation vulnerability. |
| | Safety and erosion | • Concern regarding erosion of beachfront properties at Mitchell Parade, Beach Road North Mollymook and the degree of personal responsibility.<br>• Risks to the community included the vulnerability of existing sewerage infrastructure and the management of this with expected higher sea levels.<br>• Increase in vegetation planting and riparian corridors to stabilise soil and minimise sedimentation into local waters. |
| | Conflicting recreation | • Enforcement of dog leash areas to protect nesting shorebirds at Buckleys Beach, North Mollymook, Lake Tabourie, Lake Conjola and Sussex Inlet.<br>• Jet skis and speeding boats making excess noise, eroding river banks and creating unsafe environments for swimmers. |
| | Collaboration | • Council to involve and engage with local high school students within the CMP process. |
| **St Georges Basin** | Flooding | • Sea level rise and increased flooding will impact low lying areas of the Basin more often<br>• CMP to help facilitate future connection roads and limit over development if determined to be in a high-risk area. |
| | Multi-tenure arrangements | • CMP to address the complexity around coastline and estuary management between Government agencies. |
| | Collingwood beach | • Residents from Collingwood Beach expressed concerns of dune renourishment not being carried out and erosion at the back of the beach due to stormwater runoff.<br>• Banksia trees are not appropriate in holding together the dunes, need to be replaced by other dune plantings |
| | Inundation lines | • Inundation lines need to determined through site visits instead of via satellite.<br>• Need increased transparency for hazard maps and to inform property owners of next steps. |
| | Tree removal | • 45 degree rule being exploited by developers and in return urban desserts have been made through large subdivisions.<br>• Potential tree vandalism around the Basin for increased views |
| | Emergency response | • Need for more evacuation centres in response to Sussex Bowling Club no longer being available. |
| | Tourism | • Council is struggling to keep a balance between tourism and the natural environment.<br>• Facilities are inadequate to handle population growth, giving an example of Hyams Beach and access to Vincentia |
| | Protection of heritage | • Protect assets that are important to the social fabric of the community.<br>• New tourist development and subdivisions changing local character for example Huskisson. |

| Consultation Session | Issue | |
|---|---|---|
| **Nowra** | Hazard maps and policy | • Improved communication and engagement from Council around hazard mapping, identified geotechnical cliffs, slopes instability hazards and inundation studies. |
| | Tourism | • a need for improved facilities to bring in tourists and places for the community to get together on the foreshore.<br>• 45 degree rule being used wrongly due to market demand for views and vistas of the beaches and waterways. |
| | Water quality | • Emphasised the value of the River and its social and ecological value to the community.<br>• Plastic silage wraps a contributing source of plastic pollution in the Shoalhaven River.<br>• Sedimentation from recent foreshore and subdivision developments are impacting existing oyster farm businesses that rely on clean water.<br>• Need to engage oyster farmers early on in the process when large subdivisions are being proposed. |
| | Agricultural land use | • Erosion of riverbanks and E. coli from unrestricted cattle on Dairy Farms encroaching onto the waters along the Crookhaven River and Shoalhaven River<br>• Need for increased support from DPI and Crown Lands to enforce controls on farmers to minimise impacts on water quality of the Rivers. |
| | Land tenure | • Complexity between Inter Government agencies in particular for addressing erosion, asset risk and remediation works.<br>• Need for more short-term responses to practical actions in response to damage done by East Coast Lows and high tide events. |
| **Lake Conjola** | Transparency | • Council to increase transparency, clarity on decisions and listening to concerns from the community.<br>• Stakeholders expressed need for a longer-term entrance opening outcome that provides certainty and a more responsive management approach. |
| | Previous reports and studies | • Importance for Council in its CMP to adopt actions and recommendations from the Patterson Britton & Partners Report 1999. |
| | ICOLL classification | • Intermittently Closed and Open Lake and Lagoon (ICOLL) classification for Lake Conjola not supported by most within the community.<br>• The existing Interim Entrance Management Policy for Lake Conjola does not provide enough flexibility in terms of management. |
| | Health of Lake Conjola | • Most stakeholders wanted the entrance to be dredged on an ongoing basis to improve water quality, boat access, swimming conditions and overall amenity.<br>• Groundwater readings around the existing treatment plant had tested evidence of nutrient plumes exceeding safety standards.<br>• Stakeholders raised concerns that older developments at Manyana, Cunjurong, Bendalong have uncontrolled runoff into the Lake. |
| | Funding sources | • Stakeholders wanted to see more investment back into Lake Conjola, Fisherman's Paradise and Berringer Lake through upgraded boat ramps to improve accessibility for larger boats. |
| | Ecological communities | • The rapid rate of deforestation from farmers and residential development along the coast and the use of fertilisers were contributing to reduced water quality levels within local lakes, waterways, wetlands and estuaries. |
| **Sussex Inlet** | Environment | • Area has a history of excellent water quality and should not be allowed to deteriorate in the face of new development.<br>• Boats should be prohibited entering Badgee Lagoon beyond the Taliac Canal intersection due to fuel spillage and the disturbance of water birds and marine life. |
| | Erosion | • Excessive boat wash was resulting in bank erosion and ageing shoreline structures need replacement to prevent hazards, erosion and sedimentation. |
| | Navigational Safety | • Flood tide shoal leading from the estuary into St. Georges Basin is getting too shallow for vessel navigation. |

| | | |
|---|---|---|
| | Inundation lines | • Concerned around properties impacted by inundation lines and want clarity about the official position of Council regarding defending it's coast, estuaries, floodplains or retreating. |
| | Swan Lake | • Due to worsening conditions of the Lake should have a CMP and a review of the Swan Lake Entrance Management Policy. |
| | Emergency response | • Need to establish a community action team to respond to events when isolated from SES. |
| | Floodplains | • Major part of the existing housing and commercial component of the town has been built on the floodplain. |
| **Shoalhaven Heads** | Tourism | • Need for improved maintenance and enhancement of Shoalhaven Heads for tourism related purposes.<br>• With increased development and tourism impacts, water quality needs to be monitored more closely in order to protect the unique historical asset of oyster farming in the South Coast. |
| | Entrance Management | • Shoalhaven River entrance area to be dredged to help widen the channel and reduce flooding risk. |
| | Consultation and engagement | • State Government agencies, Council, community and key stakeholders need to work more collaboratively to have improved oversight on decsions.<br>• Renourished sand dunes in front of existing Shoalhaven Heads Surf Life Saving Club have impeded patrols of beach. |
| | Environmental management | • Need for improved mitigation around storm pipes, due to pipes causing erosion and siltation, in particular around River Road.<br>• Coomonderry Swamp, Seven Mile Beach National Park and Comerong Island need the CMP to better protect the diverse range of birds, reptile and frog species, which includes a significant population of the threatened green and golden bell frog. |

### 5.3.2 Council Questionnaire Our Coast, River and Estuaries

Council have also produced a Questionnaire (*Our Coast, River and Estuaries*) open to the public to provide insight into their key values, use and issues for the open coast and estuaries. The Questionnaire and results are provided in **Appendix E**, with the key insights provided below. The purpose of the Questionnaire was to:

- identify the attributes of the coast and estuaries that the community value most
- identify the primary recreational activities that respondents are most involved in when visiting the coast and estuaries
- identify which areas are visited most for recreational activities and how often
- identify the community's perceptions on the environmental health of the estuaries and beaches in the Shoalhaven
- identify the issues of most concern to the community
- identify which issues the community rates as highest priority for management actions for each area
- understand the community's future aspirations for their area

- solicit suggestions for management actions from community members
- understand what methods of engagement are preferred by the community.

As of November 2019, over 440 responses have been received, with 425 responses from individuals, 11 from businesses or government agencies and 8 from community groups/organisations.

While the questionnaire responses represented a broad cross-section of the community, the median age of respondents was 60 – 69, which is older than the median demographic of the coastal communities. Over 85% of respondents live and/or own property in or near the coastal zone.

Swimming and walking were the most popular activities at the open coast, with paddling and fishing being popular activities at Lake Conjola, St. Georges Basin and Sussex Inlet and picnicking, wildlife watching/appreciating nature being important activities at all the locations.

All areas were rated highly for scenic beauty and for being peaceful and relaxing.

The open coast, Jervis Bay and Narrawallee Inlet were rated by over 80% of respondents as either "very healthy" or "moderately healthy", with a majority of respondents rating all the estuaries as either "very healthy" or "moderately healthy". The exception was for Lake Conjola, which was rated as "moderately unhealthy" or "very unhealthy" by a majority of the survey responses.

The top five issues of most concern to survey respondents at each location (i.e. rated as "very concerned" by the highest number of respondents) are summarised in Table 5-4, together with the highest priority issues as rated by survey respondents.

The respondents nominated that they would like to be kept informed through a new quarterly CMP newsletter sent directly to their email address, through the Frontline News Council newsletter and via Council's website. Many respondents also nominated that they would like to have the Coastal Management Project Officer personally attend and update their existing Community Group/Organisation meeting on the outcomes from the scoping study.

*Table 5-4 – Highest priority issues as rated by questionnaire respondents*

| Estuary/Beach | Issues of most concern | Highest priority issue for management |
|---|---|---|
| Open Coast | 1. Entrance Management<br>2. Habitat loss or degradation<br>3. Litter/marine debris<br>4. Beach erosion/shoreline<br>5. Flooding | Litter/marine debris |
| Lower Shoalhaven River | 1. Riverbank erosion<br>2. Poor water quality<br>3. Flooding<br>4. Litter/marine debris<br>5. Entrance Management | Riverbank erosion |
| Shoalhaven Heads | 1. Entrance Management<br>2. Flooding<br>3. Riverbank erosion<br>4. Beach erosion/shoreline<br>5. Sand buildup/siltation | Entrance Management |
| Greenwell Point/Crookhaven Heads | 1. Litter/marine debris<br>2. Climate Change/sea level rise threats<br>3. Beach netting/commercial fishing<br>4. Increasing use of hard engineering solutions (i.e. rock walls) instead of soft (i.e. dredging)<br>5. Riverbank erosion. | Litter/marine debris |
| Culburra/Lake Wollumboola/ Currarong | 1. Habitat loss or degradation<br>2. Litter/marine debris<br>3. Beach netting/commercial fishing<br>4. Poor water quality<br>5. Conflicts of use (e.g. swimming & water craft; beach access & shorebirds) | Litter/marine debris |
| Jervis Bay | 1. Beach erosion/shoreline<br>2. Litter/marine debris<br>3. Foreshore vegetation/weeds<br>4. Habitat loss or degradation<br>5. Climate change/ sea level rise threats | Habitat loss or degradation |
| St. Georges Basin | 1. Litter/marine debris<br>2. Entrance management<br>3. Beach netting/commercial fishing<br>4. Habitat loss or degradation<br>5. Foreshore vegetation/weeds | Litter/marine debris |
| Sussex Inlet/Swan Lake/ Berrara | 1. Entrance management<br>2. Riverbank erosion<br>3. Sand buildup/siltation/shoaling | Entrance Management |

| Estuary/Beach | Issues of most concern | Highest priority issue for management |
|---|---|---|
| | 4. Litter/marine debris<br>5. Flooding | |
| Bendalong/Manyana/ Cunjurong | 1. Entrance Management<br>2. Beach accretion/sand buildup<br>3. Habitat loss or degradation<br>4. Sand buildup/siltation/shoaling<br>5. Litter/marine debris | Entrance Management |
| Lake Conjola / Berringer Lake / Pattimores Lagoon | 1. Entrance Management<br>2. Poor water quality<br>3. Sand buildup/siltation/shoaling<br>4. Flooding<br>5. Beach accretion/sand buildup | Entrance Management |
| Narrawallee/Mollymook | 1. Habitat loss/degradation<br>2. Climate change/sea level rise threats<br>3. Litter/marine debris<br>4. Foreshore vegetation/weeds<br>5. Uncontrolled companion animals (e.g. dogs) | Habitat loss or degradation |
| Burrill Lake | 1. Entrance Management<br>2. Habitat loss or degradation<br>3. Litter/marine debris<br>4. Algal blooms<br>5. Climate change/sea level rise threats | Poor water quality |
| Tabourie Lake | 1. Habitat loss or degradation<br>2. Litter/marine debris<br>3. Entrance Management<br>4. Poor water quality<br>5. Algal blooms | Climate change/sea level rise threats |
| Lake Termeil / Bawley Point / Kioloa | 1. Litter/marine debris<br>2. Habitat loss or degradation<br>3. Algal blooms<br>4. Poor water quality<br>5. Foreshore vegetation/weeds | Habitat loss or degradation |

### 5.3.3 Summary of formal submissions to the CMP Scoping Study

As of mid November 2019, a number of formal pre-exhibition submissions have been received in relation to the Scoping Study. The full submissions have been kept on file and the issues raised by the submissions are summarised in Table 5-5, below.

*Table 5-5 – Summary of formal submissions received to mid November 2019*

| Submission | Location | Issues Raised |
|---|---|---|
| 1. | St. Georges Basin | • Formation of an isthmus at the end of Collett Place at St. Georges Basin impeding the flow of tidal water<br>• Buildup of seagrass wrack or weed at the busy bathing area at Blackett Park in front of the Aloha Caravan Park<br>• Problem caused by construction works in the early 1980's<br>• Requests Council investigate removal of soil buildup<br>• Raises concern about runoff from planned unit developments at Anson Street |
| 2. | Sussex Inlet | • Raises concern about erosion of dunes on the western side of Sussex Inlet<br>• Prior to a flood in 1971 pedestrians could walk from Alamein to the river entrance<br>• Following 1971 flood alignment of the channel changed and western dunes have progressively eroded and closure of pedestrian access resulted<br>• Council undertook dredging in 2016 and reformed the beach with a sandbag groyne but this has since eroded away and the dune erosion is continuing<br>• Urges protection of the dunes as they are the largest dune system south of Myall Lakes. |
| 3. Callala Bay Community Association | Callala Bay | • The natural setting of Jervis Bay and National Park, the forests and coastline, especially the foreshore area of Callala Bay is the lively heart of the village. These assets are the reason for the village being there. They are the primary attraction for residents and visitors. The maritime character is valued as a setting for quiet contemplation and for active participation in very many forms of sport and recreation.<br>• Erosion of Callala Bay beach and park/reserve (and erosion of the dune at Callala Beach) needs to be addressed<br>• Monitoring further beach dune and Callala Point headland erosion for the next 5 years with a view to longer term practical defensive treatments. (The headland also loses vegetation and some matrix in each storm.)<br>• Stopping erosion of the park dune or berm, the loss of park trees, of recreational area and of beach access. |

| Submission | Location | Issues Raised |
|---|---|---|
| | | • The submission provides suggestions on how the erosion could be stopped, For example it suggests stopping beach erosion, by reducing wave impact by nourishing the beach, by restoring suitable slope, and by continuing that gradient over the protective barrier at base of vegetated berm / dune, and saving the end of Sheaffe St by street storm water control (not just diversion!), and by continuing the dune's new protective barrier.<br>• Halting beach and berm erosion caused by existing hard surfaces which deflect wave energy to erode the nearby soft structures (the dune). Those hard surfaces include the rock-faced extended groyne for pier and boat ramp, on which are built the car turning circle & boat wash-down, any proposed paths, ramps, platforms, storm water outlets.<br>• Remove foreshore dinghy storage: it takes public space; it blocks growth of binding vegetation; it dries the sand or soil, making the foreshore easier to erode.<br>• Improve beach access for pedestrians including people with disabilities, for emergency vehicles, for salvage equipment (controlled use).<br>• The Creating Callala planning document was produced through the workshop and extensive further consultation processes by wider Callala Bay, Myola and Callala Beach communities in 2012-2013. It distilled some major issues and remains fundamentally valid today. |
| 4. Safe Navigation Group Inc. (SNAG) | Sussex Inlet and Swan Lake | • The submission comprises a Recovery, Restoration and Rehabilitation Plan for Sussex Inlet and Swan Lake.<br>• At Swan Lake, there is a concern for the lake siltation as a result of foreshore erosion and silt from run off. This has been exacerbated by the construction of the bridge and the extent of the fill material used to carry out the project. Another cause is the depositing of sand during lake opening periods. Channel optimisation to provide tidal exchange to the lake at times the lake is open. Sand to be utilised for nourishment within the catchment. Coastal engineers to monitor tidal exchange and environmental changes. Detailed assessment of the future care of the lake and its entrance will be required when the old bridge is replaced and road approaches removed.<br>• St Georges Basin is tidal and open to the ocean via the Sussex Inlet River. Although remaining open it becomes restricted by a moving sand delta which is hazardous to vessels and restricts flows in the |

| Submission | Location | Issues Raised |
|---|---|---|
| | | floodway. At this stage it is important in the interest of safe navigation, that the mouth/delta of the Basin be optimised regularly to keep it deep and wide. This will improve environmental flows and enhance flood mitigation.<br>• Vision is to create a plan that addresses navigational safety; improved water depth; reduce foreshore erosion in the waterways; water quality; and also to develop a plan that will keep the Sussex River in a state of flood readiness.<br>• The submission suggests to locate and remove the sand and Ballast Rock and any foreign material considered to be a pollutant, to a depth that will allow access to and from the river mouth and create a safe navigable channel in all tides.<br>• The submission also recommends that regular survey of the channel be collected and depths monitored to show where optimization is required to maintain navigation depths<br>• It is suggested that the delta/entrance of St Georges basin is considered dangerously shallow and that this be maintained at a depth of 3 metres and width of 50 metres.<br>• Restore the Navigational Channel of the estuary to the centre of the river in the region of Alamein to The Haven, with the objectives being to be able to walk along the foreshore to the entrance, maintain the navigation channel and maintenance of stormwater outlets<br>• The issue of erosion of the dunes at Alamein and Stingray Bay is discussed as is the replacement of an existing timber seawall constructed in the 1970s.<br>• Erosion of the channel between Nielson Boat Ramp and Badgee Bridge<br>• Maintenance of foreshore reserve and walkways<br>• Maintenance of channel navigation in Chris Creek<br>• Maintenance of sufficient channel depth to accommodate marine rescue vessels<br>• Channel optimisation, sand nourishment/maintenance to revetment walls, review of the Canals Management Plan at Riviera Keys |
| 5. | Callala Bay | • Climate Change/Sea level Rise - supports replacing the Council sea level rise (SLR) policy of February 2015 with another which better matches (a) the most recent global warming scientific observations, (b) |

| Submission | Location | Issues Raised |
|---|---|---|
| | | the current federal and state advice (and policies), (c) the advice of Council's commissioned consultants and Council's professional staff.<br>• A high-probability projection of sea level rise (much better than present policy's 15% likely, or 85% unlikely) can provide a reliable basis for Council, business and citizens to evaluate and prioritise investment in assets. It will be a vital basis for much of Shoalhaven's planning. It clearly affirms dealing transparently and "in good faith". It will be legally defensible. It applies the precautionary principle and upholds intergenerational justice. It should ultimately contribute to an appropriate and robust local and national tackling of the underlying human-caused contributions to climate changes and consequent sea level rise.<br>• Dogs running uncontrolled (off-leash) on beaches and their impact on habitat and shorebirds<br>• Dredging natural inlets and altering natural beach processes appear to be acceptable and desirable to Council for use of pleasure craft operators. Artificially opening of "entrances" to coastal lakes and inlets is advanced for recreational boat use (not necessarily to prevent flooding of settlements). Mistakes are expensive and damage the ecosystems. Applied science should / could veto duplicating or compounding such damage.<br>• It is recommended that Council (a) commit to consistently seek scientifically-sound and evidence-based professional recommendations, especially in relation to matters which will affect our natural environment both now and in coming decades; (b) commit to apply such science-based information to policy, openly and without distortion, and (where such conflict may be perceived to arise) without preferring present vested interests over the decisions which would better serve the people and environment by protecting and preparing for the years to come. |
| 6. | Collingwood Beach | • Comments on the survey simply relating to managing the environment and not social management (adaption plans for residents) or economic management (impact on commerce).<br>• Council to make a strategic statement in the CMP to commit to defend, not retreat or relocate from the coast and waterways in Shoalhaven<br>• Develop action plans for Collingwood Beach that will cause Collingwood beach to be removed from the list of the ten high risk beaches in the Shoalhaven |

| Submission | Location | Issues Raised |
|---|---|---|
| | | • Assess accuracy, of flawed hazard lines along Collingwood – accuracy of dune heights re. 2016 wave runup hazard line<br>• CMP to address stormwater issues<br>• Develop an appropriate Dune Vegetation Plan for Collingwood beach that will comply with the Coastal Dune Management Manual, respond to the Frequently Asked Questions submitted by the CBPG technical expert, incorporate a Banksia Management plan. Remove of all the current vegetation and start from scratch. The ideal time to do this would be with the relocation of sewer lines, retention of the water main at Illfracombe Ave, commissioning of a toe in sand seawall (Haskoning recommendation ) and commission effective process to collect, harvest and discharge storm water.<br>• Develop an action plan to return sand lost from Collingwood beach into Moona Creek, and develop an estuary or appropriate management plan for Moona Creek.<br>• Incorporate a Coast and Waterways Risk Management Committee that will be made up of "affected property owners" whose properties are subject to coastal hazard risks. Representation from each location across the Shoalhaven is to be encouraged.<br>• Invite the affected property owners to participate in any cost benefit analysis and for such to be peer reviewed by independent commercial specialists in capital investment processes.<br>• Develop an action plan for the resources and facilities for Collingwood Beach to be recognised as a Life Saving beach, taking into consideration the requirement of the CMP scoping for social context such as seasonal demographic changes and cultural context, including the cultural background of residents and other stakeholders including tourists and visitors.<br>• Review and take into consideration the Royal Haskoning Erosion Remediation Report of 2014 for any action plans developed for the defence of Collingwood Beach.<br>• Include actions in the Collingwood Beach Vegetation Plan responding to the Frequently Asked Questions raised by the CBPG in Aug 2017. Include actions in the Collingwood Beach Vegetation plan in response to motions passed by Council in 2019 in respect of vegetation, be it at Collingwood or across the shoalhaven. |

| Submission | Location | Issues Raised |
|---|---|---|
| | | • Adaptation Planning in the new CMP is to Include an action to obtain immediately approval in principle for any defence actions identified in the adaptation plan. The community does not want any adaptation plan to be delayed because of wrangling or big brother approach from other agencies for approvals.<br>• Provide for funding to be shared between the three tiers of government<br>• The three action plans ( i.e. LA3.18 to LA 3.20 ) in the current CZMP are inadequate, the new CMP must include actions to address all of the above list of issues for Collingwood. Action must be taken to retain the current access ways and the reduction of access ways as per the current CZMP must only be a temporary action.<br>• A separate submission with comments on Council's amendments to the DCP 2014 has been submitted by the Collingwood Beach Preservation Group. |
| 7. | St. Georges Basin, Swan Lake | • Issues raised include flooding, foreshore erosion, sea level rise, sand shoaling, preservation of the dune system, water quality, ecology, seagrass wrack, the socio-economic environment and fish and prawns.<br>• For flooding, straightening the channel and removing shoals is suggested.<br>• Foreshore erosion at Alamein – suggested realignment of the channel to reduce the erosion, wash from high boat traffic exacerbating erosion on foreshores with ageing shoreline structures.<br>• A table of recommended actions and responsibilities to address the identified issues is included<br>• Discussion on dredging configurations and a retaining wall to protect the dunes from further erosion<br>• Discussion on reviewing the entrance management of Swan Lake to take into account foreshore erosion rather than flooding only as the criteria for setting the trigger level for opening the entrance. |
| 8. | Jervis Bay | • Voices concern with respect to the Scoping Study questionnaire and lack of consultation with non-resident property owners<br>• Council has not pointed out the long term consequences of a property being located in a coastal vulnerability area<br>• Council has not included or referenced the location of coastal hazard line mapping in its correspondence to property owners |

| Submission | Location | Issues Raised |
|---|---|---|
| | | • Jervis Bay is unique and the beaches of Jervis Bay are not on the open coast, Jervis Bay is also nominated as a sediment compartment in the Coastal Management Act 2016, accordingly Jervis Bay must have its own CMP<br>• Council's Our Coast, River and Estuaries Questionnaire does not address social management (adaptation or retreat plans),economic management (impact on commerce) and community attitude to risk, in that regard the questionnaire does not source the information necessary to inform the development of robust CMPs.<br>• Puts forward the view that Council's community consultation process has not satisfied the mandatory requirements of the Coastal Management Manual, and that any CMPs produced will simply reflect the views of Council staff and its consultants.<br>• Council must involve all members of the community in a meaningful manner and particularly the key stakeholders who may face the loss of their properties if a sound scientific approach is not adopted in the development of the CMPs. |
| 9. | Riviera Keys, Sussex Inlet | • This submission presents a CMP for Riviera Keys Island and Reserve<br>• The presentation highlights a way forward for improvements and safety on the Island, the boat ramp and surrounding areas.<br>• Dirt ramp needed to be repaired allowing for the safe reversing of a boat trailer.<br>• Ramp surface needs levelling, people have tried to put dual wheel trailers on the ramp and have got caught, bogged and left large holes on the ramp.<br>• Restore Previous retainer walls. There is a need to reduce the current serious erosion caused by boats, weather, floods, tides and time. It is envisaged that it may assist in preventing serious siltation as is currently experienced.<br>• In 2016 Shoalhaven City Council engaged Sandpiper Dredging Pty Ltd to undertake the refurbishment of the Island and reserve. This work resulted in the revetment wall seen above being reinforced with rock on both sides and then the dredged sand was placed over the top to create a beach.<br>• This was very successful for about 2 years but now the sand has moved back into the water and the rocks are exposed causing a serious hazard and the possibility of injury to the public |

| Submission | Location | Issues Raised |
|---|---|---|
| | | • Our vision is to create a plan that addresses the reduction of foreshore erosion around the Island, improve water quality and flow around the island, by introducing a regular maintenance program that will assist in this process and create a safe environment for the community to use.<br>• The submission provides suggestions for:<br>  ○ stabilization of sand pathways to the beach with turf,<br>  ○ relocating rocks at revetment walls and dragging back sand to cover the rocks to improve safety,<br>  ○ provide a small access jetty to assist elderly and disabled persons to board/disembark from vessels,<br>  ○ remove excessive overgrowth of weed on western shoreline,<br>  ○ installation of steps on the eastern side of the island because this has eroded due to foot traffic, safety hazard.<br>  ○ Relocating rocks on the eastern shore to restore a beach area, rocks have been deliberatively moved to access mussels and oysters<br>  ○ Removal of weed growth in stormwater exits in the Reserve, stormwater outlets are blocked and can worsen flooding<br>  ○ Lack of depth in the Channel from Chris Creek to the Sussex River, total depth of water is not acceptable and can contribute to issues related to flooding<br>• The Riviera Keys Island & Reserve Parkcare group have since formation in September 2015, carried out a number of projects, that have improved the island and as such the Community are taking pride in the island and instead of abusing it they are using it and taking ownership, and enjoying the facilities that have been given to them.<br>• A suggested action list for the Riviera Keys is provided in the Submission. |
| 10. | Collingwood Beach | • Survey (Questionnaire for the Scoping Study) serves no practical purpose<br>• Council staff have pursued a failed policy of protecting inappropriate vegetation on the dunes at Collingwood Beach contrary to the CZMP which deems Banksias to be unsuitable. |

| Submission | Location | Issues Raised |
|---|---|---|
| | | • Banksias have been vandalised, removal of new growth Banksia seedlings and saplings is required on a regular basis to prevent further monocultural spread.<br>• Effectiveness of the ability of low growth vegetation to protect resilient dunes has been ignored<br>• In the 1990s Councl advised that introduced vegetation at Collingwood Beach are low growing varieties that will not obstruct people's views. Iconic views of Jervis Bay are being destroyed by the introduced Banksias.<br>• Banksias will not assist to protect Collingwood Beach from storm surges<br>• There is a dominant "green" culture within Council that ignores the science<br>• Stormwater issues and ongoing CZMP undertakings need to be addressed. |
| 11. National Parks Association of NSW (NPA) | Lake Conjola, ICOLLS in general | • Lake Conjola is a large open body of saline or brackish water which has a relatively narrow permanent or intermittent connection to the sea.<br>• Lake Conjola and Burrill Lake are examples of ICOLLs<br>• Many ICOLLs have been, and continue to be, manually or artificially opened to the ocean by various authorities. Heavy equipment, such as excavators and dredges, are used to artificially open ICOLLs by digging a channel through the sand berm between the ICOLL edges to the ocean. The main reason for artificially opening an ICOLL entrance is to mitigate and reduce the impacts of flooding.<br>• Council has responsibility for undertaking artificial openings of ICOLL entrances. SCC has traditionally opted to artificially open ICOLL entrances when they are at certain levels, and to dredge navigation and other channels at the behest of local owners, usually with boating or recreation interests.<br>• NSW Office of Environment and Heritage (now DPIE) seems to have a different view, In a paper titled "The Risky Business of ICOLL Entrance Management", a strong case is put forward to argue that artificial entrance management is associated with a range of negative impacts, some of which may take many years to become evident.<br>• ICOLLs are very complex environments and the impact of artificially opening entrances on fish species and fish habitats is not well understood.<br>• A number assertions about ICOLL dredging are made by the NSW OEH (now DPIE) authors of the paper, including: |

| Submission | Location | Issues Raised |
|---|---|---|
| | | ○ the opening of an ICOLL alone is not likely to significantly improve water quality<br>○ it was "virtually impossible to artificially manipulate entrance opening with any certainty of enhancing fish or prawn recruitment"<br>○ Negative impacts of ICOLL dredging are many and varied and include increased and more stable salinities which lead to changes in aquatic vegetation communities<br>• artificially opening the entrance can have ongoing recreational and environmental impacts, including fish kills which can be the most immediate environmental impact of the opening, due to anoxic conditions and increased sand shoaling at the entrance due to inefficient scour at low opening levels.<br>• Impact of sea level rise, further negative impacts will arise due to projected sea level rise which will increase the level and frequency of low level asset inundation and flood risk.<br>• Dredging of lakes such as Conjola are expensive but speculative operations at best, generally unsupported by the latest science.<br>• Dredging of navigation channels has proven to be largely a waste of time and public money, due to the massive sand shifts which occur when natural openings of entrances occur.<br>• The challenge facing community leaders is to adopt a long term approach to the operation of ICOLLs, while still responding to shorter term community concerns as to flooding and recreational and commercial impacts. The alleviation of low level nuisance flooding, the most common form at Lake Conjola, would be better addressed by the provision of levees in critical locations and better management of foreshore and lake banks as outlined in the most recent action plan for lake management (GHD 2015). This would also provide stable, long term solutions.<br>• The most recent reports on management of Lake Conjola show that dredging to artificially open the estuary is detrimental to lake ecology. Management of the estuary through natural processes need not adversely affect recreational values.<br>• Overall, scientific evidence shows that dredging of navigation channels to permanently open ICOLL entrances is expensive and fundamentally inappropriate. Dredging provides, at best, only short term solutions and is harmful to lake ecology. Public money might be better spent on long term, ecologically appropriate solutions. |

| Submission | Location | Issues Raised |
|---|---|---|
| | | • The submission also refutes claims from the Conjola Community Association petition and asserts that:<br>  ○ The Lake is not drying up and water levels fluctuate naturally, and are recorded and able to be viewed on Council's website<br>  ○ It is a natural occurrence that the type of fish and stock of certain type of fish fluctuate depending on how long the lake is open or closed. Lake Conjola has the ecology of an ICOLL with an environment that is not found outside of estuaries and the plants and animals have adapted to the variability of such a system.<br>  ○ Nature tourism is increasing and a natural environment is something that is becoming rarer. The Shoalhaven, including Lake Conjola, has the potential of offering an unspoilt experience. Shifting the focus from boat and car based tourism, with their high demand on infrastructure and maintenance and with almost unmanageable peaks in the summer, to nature tourism, with its softer footprint on the environment, would benefit all. Extension of the walking track from Bawley Point right through to the Shoalhaven River would benefit Lake Conjola.<br>  ○ The water quality in Lake Conjola is regularly monitored and the sites of monitoring have been increased to 4 sites. So far the water quality has been good or satisfactory. Algal blooms are a natural occurrence in drought conditions.<br>• The NSW Department of Primary Industry states that permanently opening an ICOLL by regular dredging or building of rock walls or groynes opens up the estuary to the sea at all time and changes the ecology of the lake. It affects fish stocks and fish habitat, changes flood behaviour in the catchment. Ocean floods are more likely with a reduced sand bank or berm and the predicted sea level rise will increase this threat. Permanent opening may lead to poorer water quality due to altered tidal flushing and sediment movement, and leads to higher salinity in the far reaches of the lake.<br>• Lake entrance works are very costly (millions of dollars). Perceived problems with Lake Conjola should be addressed by dealing with issues in the catchment rather than undertaking costly dredging or building groynes.<br>• Any revision of the management plans requires a factual, non-political, impartial and scientific examination of all the variables. The aim needs to be to preserve and if necessary restore Lake Conjola |

| Submission | Location | Issues Raised |
|---|---|---|
| | | as a healthy ICOLL while outlining measures to manage the risk of flooding and health threats to residents, businesses and visitors, not changing it to a permanent open inlet. |
| 12. Sussex Inlet Bowling Club Fishing and Social Club | Sussex Inlet | This submission makes the following suggestions to facilitate public safety.<br><br>1. Upgrade to Lakehaven Drive boat ramp:<br>• repair or renew boat ramp<br>• pontoon in the middle of ramp/additional pontoon<br>• wash down bay (reclaiming the water)<br>• additional parking for large trailers<br><br>2. Further upgrade to Chris Creek Boat ramp including a parallel pontoon to facilitate small boat access.<br><br>3. Upgrade Swan lake boat ramp:<br>• extend boat ramp to improve access when lake is low<br>• widen ramp to two lanes wide<br><br>4. Increase landbased fishing opportunities – more wharves & pontoon numbers /vegetation clearing so boats & fishing don't clash.<br><br>5. Bar education strategies to facilitate safe crossing ie: warning signage showing bar safety like fire safety signage to show danger rating<br><br>6. Increased coastal patrol presence especially in peak tourist times<br><br>7. Investigation of why the sand is narrowing at Lions Park Channel & methods to fix access<br><br>8. Illumination of all cardinal & navigational marks/points |

| Submission | Location | Issues Raised |
|---|---|---|
| | | 9. Improvement to recycling & waste management in all waterway & foreshore areas<br><br>10. Further improvement, development & expansion of artificial reefs to facilitate replenishments of fish stocks |
| 13. | Collingwood Beach | This submission raises the following issues:<br>• Storm water outlets along Collingwood Beach - Storm water must be included in the Coastal Management Program Scoping Study. At present storm water from Elizabeth Drive is being collected and being discharged through head walls at the rear of the fore dune. This occurs in three locations along Collingwood Beach, Church Street, Montague Street and Bayswater Street. As a result the storm water cuts a path through the fore dune and incipient dune with loss of sand. In total there are 11 stormwater outlets along the beach which all contribute to the loss of sand at the outlets.<br>• Sand collection Moona Moona Creek - At the northern end of Collingwood Beach is the entrance to Moona Moona Creek which is filled with a large volume of sand. The amount of sediment in this area has increased significantly over the last six or seven years. This sediment is the result of longshore transport of sand from south to north along the beach. Recycling of the sand from Moona Moona Creek could assist in providing sand to nourish Collingwood Beach and negate future impact of sea level rise - If it can be established that a significant proportion of sand which is say sourced from the entrance of Moona Moona Creek is transported alongshore back to the entrance of the creek (say 60% or more), then that sand could potentially be sustainably recycled and a backpass scheme established. I feel this should be included in the Scoping Study.<br>• Dune erosion Moona Moona Creek - At the entrance to Moona Moona Creek situated at the northern end of Collingwood Beach, there is serious erosion of the dune at the southern side of the creek. It appears that inappropriate vegetation has been planted and not holding the face of the dune from erosion.<br>• Inundation lines Collingwood Beach - The location of the inundation line on the 2016 Hazard Map appears to be inconsistent with dune height levels recorded in previous surveys carried out by the |

| Submission | Location | Issues Raised |
|---|---|---|
| | | Collingwood Beach Preservation Group. Further survey of the area taking into account actual Finished Floor Levels of the houses should be addressed and clarification of the inundation line also be investigated in the Scoping Study. Survey lines shown on the Coastal Hazard Map 2016 should be reviewed as the lines are inconsistent with fact. The mapping of this line has an impact on Home insurance premiums and property values for property owners along Collingwood Beach and should be included in the Scoping Study and be reviewed.<br>• Defending property and infrastructure, not retreat or relocate - The Coastal Management Program must include a commitment from Shoalhaven City Council to DEFEND properties and infrastructure, not retreat or relocate from the coast and waterways in the Shoalhaven.<br>• The sand dunes on Collingwood Beach near Moona Moona Creek have been heavily eroded during the previous 5 years and it appears this sand is now causing the sand build up in the creek along with the sand being eroded from the stormwater erosion further south on the beach. Could the construction of the footbridge at Moona Moona slightly narrowing the creek opening had any impact on the sand build up in this area? This area needs to be investigated and included in the Scoping Study.<br>• A common sense coastal vegetation management plan for all coastal areas need to be investigated with the major input coming from the affected nearby property owners. The unimpeded growth of vegetation on the dunes has caused the loss of amenity for nearby homes and the loss of the panoramic iconic views to all ratepayers and tourists. A new planting regime needs to be considered and acted upon. |
| 14. Collingwood Beach Preservation Group | Collingwood Beach | The Collingwood Beach Preservation Group has submitted several attachments. The issues raised in these attachments include:<br>1. Review of Council's DCP 2014 Chapter G6 (letter CBPG 1903 and attachments)<br>• Raises questions regarding accuracy of inundation mapping for Collingwood Beach i.e. dune heights from LIDAR data vs. on-ground measurements<br>• Raises questions with respect to use of the Zone of Reduced Foundation Capacity instead of the Zone of Slope Adjustment to define coastal hazard extents in the DCP |

| Submission | Location | Issues Raised |
|---|---|---|
| | | • Treatment of the inundation line as a "hazard line"<br>• Is planned retreat now known or to be known under a different term ?<br>• What is the official position of Council, is it to defend its coast, estuaries., floodplains and estuaries or retreat?<br>• Evidence based sea level rises for the last 100 years in the paper by Daniel Fitzhenry – Hydrographic Surveyor which reflects the mean sea level in 2019 is 6cm lower than 1914<br>• The CBPG seek confirmation the Council will commit to recognition and inclusion of the Collingwood Beach Preservation Group as a key stakeholder in the ongoing development of the Coastal Management Program.<br>• There is an attachment with submissions from Collingwood Beach Preservation Group on Chapter G6 of Shoalhaven DCP 2014.<br>2. Letter CBPG 1905 - This is a site visit report and attachments with the CEO, Directors Keech and Costello, staff, affected property owners and Councillors White and Proudfoot identifying risks with dunes of Collingwood, particularly in respect of the process to collect, harvest and despatch storm water, vegetation and other ongoing issues.<br>3. Letter CBPG 1906 – a site visit report raising stormwater risks, damage from large trees in the 1974 storm event and issues with Moona Moona Creek.<br>4. Closing input including a reflection on the ineffectiveness of the survey/questionnaire by its lack of attention to coastal and risk management. Asks whether the staff of SCC have an objective of planned retreat for Collingwood Beach. |

### 5.3.4 Public Exhibition of the Scoping Study

In addition to the pre-exhibition formal submissions, the Study was publicly exhibited in January and February 2020, with 66 submissions received.

Submissions were received from a range of local community groups, CCBs, individuals and agencies. The submissions demonstrate the strength of the community's passion for their local area and coastal management issues. Some key themes that emerged from the public exhibition process included:

- Suggestions for improvement of Vision statement and inclusion of natural values
- Issues raised by the Collingwood Beach Preservation Group included dune vegetation, need for a separate CMP for Jervis Bay, rather than including it together with the remainder of the coastline.
- Ensure that there is recognition of bird habitat and Key Biodiversity Areas in the CMPs.
- Management of estuary entrances is an important issue for the community, e.g. Lake Conjola.
- Consideration of recent bushfires needs to be made in the CMP.
- There were some suggestions to improve the proposed structure of the Coastal and Estuary Management Committee e.g. three committees, northern, central and southern
- There is a lack of up to date information, with many studies being very old and no longer current
- There was commentary on the validity of Council's adopted sea level rise projections
- There was commentary on Council's existing coastal hazard mapping
- There were comments about recreational facilities in particular areas
- Some community submissions provided suggestions for additional key risks to be included and additional specific local issues to be addressed
- There was a need to report on the status of existing actions from the existing management plans.

The submissions received from the community during the exhibition period are summarised in **Appendix I,** including a summary of how the issues raised have been addressed in the updated Scoping Study or will be addressed in the CMP.

## 5.4 Future Community Engagement and Communication

A Stakeholder and Community Engagement Strategy has been developed for the CMP, with appropriate communication channels and tools identified and selected to target specific audiences and ensure that the information about the project is communicated effectively and efficiency to the community.

Available methods for engagement include:

- **Public meetings** – these provide an opportunity to consult large groups of people.
- **Drop-in sessions** – these can be used to capture the views and comments of large numbers of people in a more spontaneous manner in high visitation public areas.
- **Scheduled one-on-one sessions** – these can be used to gain detailed and unique perspective from individuals
- **Community Consultative Bodies (CCBs)** – these are a network of community groups supported by SCC and intended to be representative of the general public. They raise issues with SCC, and provide feedback to SCC, when required.
- **Physical Q&A Surveys (hard copy)** – these can be undertaken to identify the views of a large number of people, using a standard, easily collated format.
- **Telephone Q&A Survey** – these can be used to identify views and collect information from a large number of people.
- **Non-digital media** – includes print media such as newspapers, newsletters, fact sheets and posters which can be used to inform a large portion of the community in an effective manner.
- **Audio-visual media** – which is effective in providing information in more engaging manners such as using interviews with experts to provide credibility.
- **Digital media** – includes Social Media, Electronic Direct Mail, Email letters and Council's website

The outcome of the engagement process for Stage 1 of the CMP is intended to be:

- Increase community and stakeholder understanding of the new legislative and planning frameworks – CM Act, SEPP (CM) 2018 and the Manual.
- Establish strong working relationships with community networks and stakeholders which are built on mutual trust and respect.
- Be clear about the coastal management roles and responsibilities of the council and public authorities.
- Understand community goals and aspirations for the coastal zone and community views on values, opportunities and priorities.
- Understand community motivations for participation and preferred approaches and processes, to encourage increased community interest and willingness to actively participate in coastal management.
- Increase community and stakeholder understanding of the dynamic nature of coastal processes, risks and opportunities and the need to set long-term objectives.
- Determine the engagement activities that are required during the preparation of subsequent stages of the CMP.

An Action Plan has been developed which outlines actions, timeframes and responsibilities in relation to stakeholder and community engagement throughout the CMP process. The Strategy is detailed in **Appendix F.**

## 5.5 Recommendations for Coastal and Estuary Management Group

As part of the community and stakeholder consultation process and to determine the best approach for Shoalhaven City Council to engage and work collaboratively with stakeholders in the preparation of the CMP the local community were asked to identify:

- How should a new Coast and Estuary Management Committee operate during the development of the CMP?
- How should consultation and engagement take place in the future?
- What are the community's preferred methods of consultation? Advertising and notification? More stakeholder workshops? Community information sessions? or Online engagement - 'Get Involved' page and questionnaire?

Participants at both the workshop and community information sessions shared feedback on their preferred methods and channels of communications and engagement to help inform the future consultation and engagement strategy and ensure that approaches are targeted to the right audience and are accessible and fit for purpose.

### 5.5.1 Feedback on Coast and Estuary Management Committee Structure

The following feedback was obtained from the community on the structure of a Coastal and Estuary Management Group to inform the CMP process:

- Need to structure the management committee to reflect people impacted, range of demographics, and tourists.
- Engage the community through multiple platforms to engage a wider range of demographics.
- Engage High Schools and local TAFEs for potential partnerships and future engagement.
- Inform the community of the outcomes of this engagement and how they can continue to be engaged to influence Council's future CMPs.
- Conservation Groups to be included in the Committee Model e.g. Shorebird Recovery Group.
- What's the criteria to join the management committee? Is it merit based? If so this needs to be made public.
- Shoalhaven Water/ NSW SES representation needed in the new Committee Model.
- A committee is only as good as its Terms of Reference. Needs strong Terms of Reference to be functional and 'not a toothless body'.
- A committee needs a good cross-section of people with local experiences and represent the community not just their own views.
- How can Council better engage business and industry that don't have time for these meetings?

- Need to have presence from the Traditional owners of this land to have representation in the new Committee Model and have a say in management.

A large number of suggestions were put forward by the community on preferred methods of consultation as well as for the structure of the Coast and Estuary Committee at the consultation sessions – these are outlined in the RPS Consultation Outcomes Report in **Appendix D.**

### 5.5.2 Discussion on Coast and Estuary Management Committee

Discussion on the structure of a Coast and Estuary Committee is provided below, including recommendations for appointment of the committee members, meeting times/frequencies, charter and rules.

- **Process for appointing the Committee** – This could be by invitation to known groups, or via a formal application process, with a call for expressions of interest to be part of the group at the community workshops or through advertisement. An optimum size of such a group would be around 15 -20 people. From previous experience, it would be difficult to gain consensus on important issues from a group that is larger and the voices of individuals within the group may not be heard.
- **Make-up of the committee** - Such a group would ideally include community representation from all local areas, without being weighted toward a single local area or single issue. To achieve this, the makeup of such a committee would need to be carefully considered so that important groups are not left out and so that a good diversity of views and geographical representation is included in the committee. Further, it is recommended that the Committee include representatives from community groups who have some natural resources management experience and would be able to contribute positively to the CMP process.
- **Council Representation** - The committee should include Council representation, to act as a conduit between Council and the community and to facilitate reporting through Council's existing reporting mechanisms.
- **NSW Government Agency Representation** - The committee should include NSW Government Agency representation, this should include representatives from key agencies including DPI Fisheries and NSW SES that can represent their Agency, or at least act as a communication conduit between the various Agencies and the community. It is suggested that a representative from DPIE with a scientific background be involved (SE-Water Floodplains and Coast Team - Biodiversity and Conservation Division - Environment Energy and Science -DPIE), and that representatives from agencies with a sign-off role be invited to provide policy advice.
- **Community Representation** – The committee should also include Indigenous representation, as well as Business representation – the committee needs a good cross-section of people that is reflective of the population structure of the Shoalhaven, with local experiences and who represent the broader community.
- **Invited representatives** from universities or scientific institutions could be involved in the committee, either in a full-time capacity, or on an invitation basis as speakers to share knowledge with the group through presentations on topics relating to coastal and estuary management.

It is recommended that due to the large number of areas and issues involved, local working groups be formed with carriage of the individual local area CMPs. In addition, an overarching Shoalhaven Coast and Estuary Committee should be appointed, with some representation from each of the local area CMP working groups.

The meetings of the Main Committee should be facilitated by Council Natural Resources Staff and it is suggested that these meetings be held at Council Chambers in Nowra, perhaps bi-monthly immediately preceding or following general Council meetings.

The local area working group meetings should be held at least monthly and can be held in a suitable local venue. The initial meetings may be attended and chaired by Council staff, but after several meetings the working group would ideally be self-sufficient and may wish to elect a chairperson from amongst its members who could facilitate the meetings, with the chairperson role rotating every approximately six months. These meetings can be held in the evenings and in the local areas, to encourage a wide range of community stakeholders to become involved.

In forming the Working Groups, the feedback obtained from the community through the engagement activities for this Scoping Study should be considered. The Working Groups may draw upon local expertise from community groups, some of whom have their own charter and are experienced in facilitation and conducting meetings. Further it is suggested that the Working groups operate with a formal agenda, with the power to draft resolutions, recording of minutes and decisions to be made by consensus.

In addition to having access to Council's natural resources expertise, it is suggested that the Working group may be allocated an operating budget to facilitate small local projects, for example, local area information sessions with invited guest speakers for self and community education purposes. Consideration for the implementation phase of the CMP could include provision of practical support for projects such as replanting vegetation on eroded riverbanks, development and dissemination of community information resources and practical know-how for community groups and landholders.

A diagram showing the suggested structure for the Coastal and Estuary Management Committee for the CMP process is shown in Figure 5-3.

### 5.5.3 Terms of Reference

A clear Terms of Reference for the overarching Coastal and Estuary Management Committee should be developed, with a separate Terms of Reference for the local area CMP working groups.

A potential model for a Terms of Reference could be similar to that currently adopted by Eurobodalla Council, which is outlined below (from https://www.esc.nsw.gov.au/development-and-planning/considerations/coastal-and-flooding-considerations/coast-and-environment-management-advisory-committee/terms-of-reference):

- Advise on integrated planning and management of the coast, floodplains, biodiversity and natural landscapes
- Provide advice in accordance to the principals of Ecologically Sustainable Development and relevant Federal, State and Local Government Policy and Legislation

- Inform the development, review and adoption of Coastal Management Programs for the Shoalhaven LGA;
- Incorporate the latest knowledge of climate change into coastal, floodplain and natural landscape planning to assist Council with the integration of adaptation strategies into planning policies and instruments
- Provide and review scientific advice and integrate this knowledge into the preparation and review of coastal management programs
- Facilitate broader community participation in coastal, floodplain and natural resource management through informing and liaising with member community groups
- Foster opportunities for joint projects, information sharing and grant funding to facilitate comprehensive and cost effective coastal, floodplain and natural resource management
- Monitor State and Federal Government natural resource management direction and advise Council on appropriate response
- Make recommendations for Council consideration.

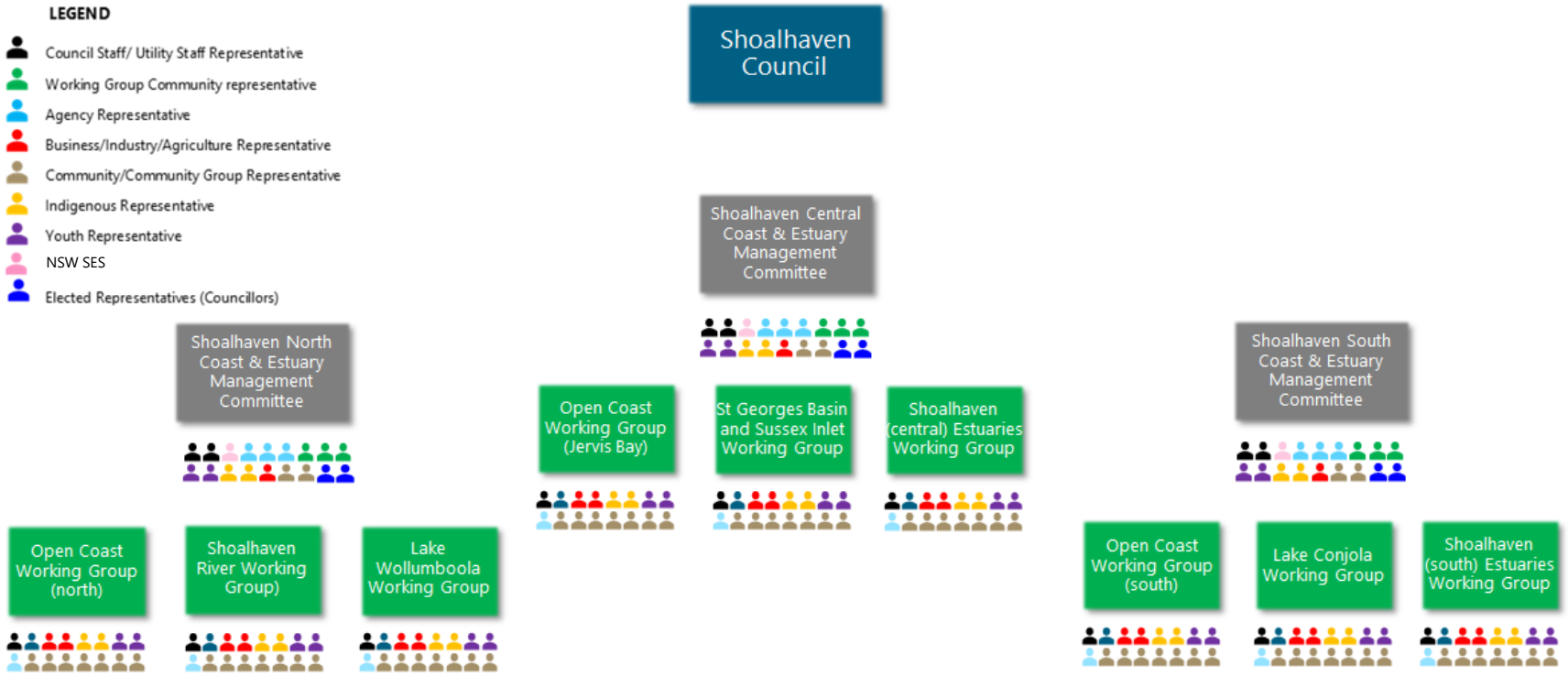



*Figure 5-3 – Suggested make-up of Coast and Estuary Committee and working groups for oversight of CMP process*

# 6 Key Management Issues and Risk Assessment

## 6.1 Overview

This section of the Scoping Study answers the following questions:

- ***What are the key management issues identified in the coastal zone and estuaries in each area?***
- ***What are the Coastal Management Areas and what are the key risks in each?***
- ***What management actions and risk reduction measures are currently in place to control the risks?***
- ***How severe are these risks under our existing management regime?***
- ***What gaps do we have in our knowledge to allow us to understand and address these risks?***

## 6.2 First Pass Risk Assessment

### 6.2.1 Preamble

A First Pass Risk Assessment has been carried out to assist with identifying key management issues and threats requiring further assessment during Stage 2 of the development of the CMP for the Shoalhaven open coast and estuaries. This section of the Scoping Study documents the risk assessment and provides commentary on the existing levels of risk, identifying the issues of highest risk for the Shoalhaven estuaries and coastal zone. For the detailed risk assessments in subsequent stages of the CMP, it is recommended that estuary health mapping that is currently being prepared by DPIE and the statewide NSW Marine Estate Threat and Risk Assessment (BMT WBM 2012) be reviewed, refined and updated, with ground truthing during Stage 2 of the CMP.

The first pass Risk Assessment is presented below but documented in detail in **Appendix G** together with the full Risk Register developed for this Scoping Study**.**

The *Coastal Management Act* 2016 requires councils to follow a risk management process when preparing their Coastal Management Programs (CMPs) and identifying where management actions are required. This includes identifying and assessing risks and benefits to environmental, social and economic values and evaluating and selecting management actions to address those risks.

In Stage 1 of the CMP process, councils prepare a first-pass risk assessment. This is a qualitative risk assessment using available information, to help inform the scope of the CMP.

The Risk Assessment has been undertaken in accordance with the process outlined in AS/NZS ISO 31000: Risk Management – Principles and Guidelines and identified in Part B of the NSW Coastal

Management Manual (OEH, 2018). The purpose of the Risk Assessment is to highlight priorities for management actions while recognising the uncertainties associated with natural systems and future scenarios.

Risk can be quantified as the integration of probability (i.e., frequency analysis of the hazard) and consequences. The Risk Assessment documented herein has considered both the "likelihood" (or probability) of the hazard occurring and the "consequence" to define the level of risk.

A detailed Risk Register has been developed that categorises the risks for the estuaries and open coast areas of the Shoalhaven in terms of the four coastal management areas as referred to in the SEPP (Coastal Management):

v) coastal wetland and littoral rainforest area

vi) coastal vulnerability area

vii) coastal environment area

viii) coastal use area.

The risks are categorised as environmental, risks to infrastructure, safety, amenity or financial risks. The risk register is intended to be used as a living document that can act as a tool for the development of management actions for the CMP and a method for ongoing assessment of the effectiveness of the management actions.

The steps involved in the risk management process are outlined in Figure 6-1.

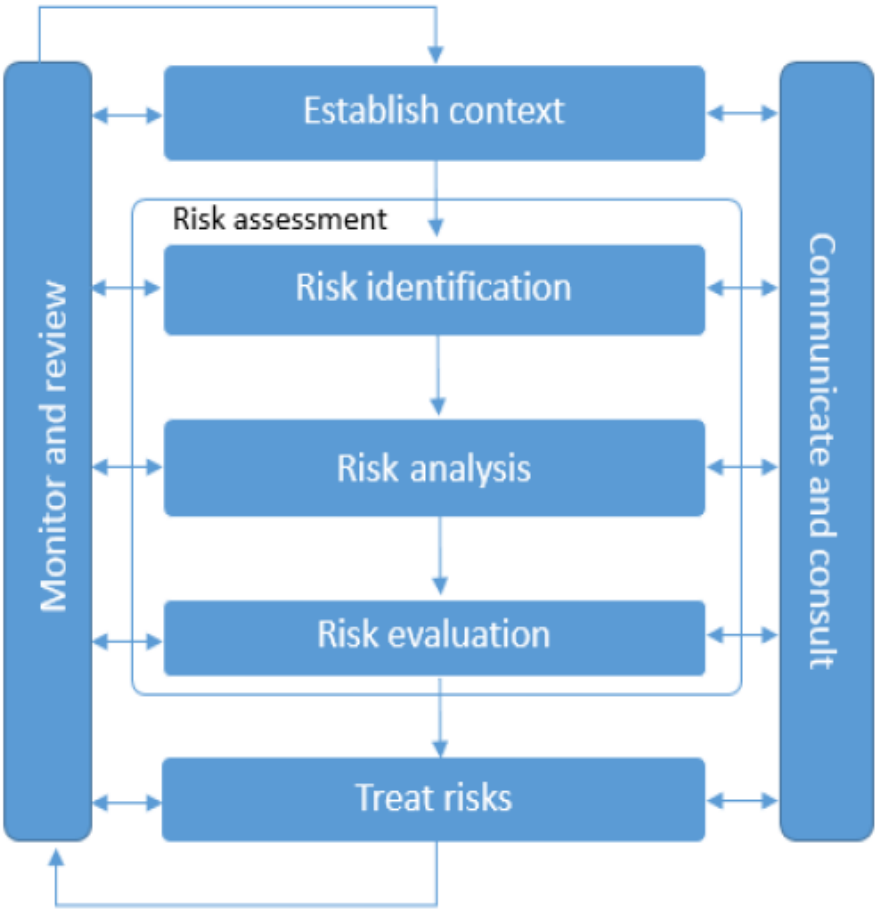



*Figure 6-1 – Risk Management Process (AS/NZS ISO 31000: Risk Management – Principles and Guidelines, as documented in the NSW Coastal Management Manual 2018)*

### 6.2.2 Coastal Management Areas

The *State Environment Planning Policy (Coastal Management) 2018 (*the SEPP), commencing in April 2018, supports implementation of the management objectives set out in the Coastal Management Act 2016. It consolidates the three now-repealed coastal-related SEPPs; SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan, into one planning policy. The Coastal Management Areas (with the exception of the Coastal Vulnerability area), defined in the new Act, are mapped in the new Coastal Management SEPP.

The hierarchy of coastal management areas as referred to in the SEPP (Coastal Management) is identified below, from highest to lowest priority:

i) **coastal wetland and littoral rainforest area** (CWLRA) - areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26. Development controls for the mapped CWLRA aim to continue existing protection for these important ecological communities. Mapping of these areas for the estuaries of the Shoalhaven is presented in this report in Figure 4-5, Figure 4-12, Figure 4-18, Figure 4-24, Figure 4-27, Figure 4-31 and Figure 4-34.

ii) **coastal vulnerability area** (CVA) - areas subject to coastal hazards such as coastal erosion and tidal inundation. Development controls for the CVA are concerned with managing risk to human life, infrastructure, and public and private property that may be impacted by coastal hazards, and ensuring that we do not create legacy issues for future generations to deal with.

iii) **coastal environment area** (CEA) - areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included. Development controls for the CEA aim to protect and improve natural coastal features, coastal waters and environmental values for places such as beaches, dunes, surf zone and undeveloped headlands. Mapping of these areas for the Shoalhaven is provided in Figure 4-6, Figure 4-13, Figure 4-19, Figure 4-25, Figure 4-28, Figure 4-32 and Figure 4-35.

iv) **coastal use area** (CUA) - land adjacent to coastal waters, estuaries and coastal lakes and lagoons where impacts of development on the use and enjoyment of the beaches, foreshores, dunes, estuaries, coastal lakes and lagoons, and the ocean, need to be considered. Development controls for CUA are concerned with ensuring appropriate urban development for coastal areas, considering urban design issues such as the bulk, scale and size of proposed development, water sensitive urban design, and preventing adverse impacts on scenic qualities, visual amenity and Aboriginal cultural heritage. Mapping of these areas for the Shoalhaven is provided in Figure 4-7, Figure 4-14, Figure 4-20, Figure 4-26, Figure 4-29, Figure 4-33 and Figure 4-36.

Each of the above areas has outcome-oriented management objectives so that councils can apply appropriate management tools and development controls.

### 6.2.3 Likelihood Scale

For the first-pass risk assessment, the likelihood of the identified risks occurring has been defined in a qualitative sense. The purpose of the risk assessment is to identify the main risks, identify existing controls in place to reduce the risk and to identify knowledge gaps so that new controls or management actions to reduce the risks can be developed in subsequent phases of the CMP process.

The likelihood scale adopted for this risk assessment is presented in Table 6-1. The likelihood descriptors have been adapted from those in the Shoalhaven CZMP and accord with those presented in the NSW Coastal Management Manual (2018).

*Table 6-1 - Likelihood Scale for Coastal Risk Assessment, Shoalhaven Coastline*

| Likelihood Descriptor |
|---|
| **Almost certain**<br>**Expected to occur, many recorded incidents, strong anecdotal evidence, great opportunity, reason or means to occur. May occur or be exceeded once every 1-5 years** |
| **Likely**<br>**Will probably occur, consistent record of incidents and good anecdotal evidence; considerable opportunity, reason or means to occur. May occur or be exceeded once every 20 years** |
| **Possible**<br>**Might occur, a few recorded incidents in the locality and some anecdotal evidence in the community; some opportunity, reason or means to occur. May occur or be exceeded once every 100 years. Will generally be close to or exceed past records of severity.** |
| **Unlikely**<br>**Is not expected to occur. Isolated recorded incidents in this country with anecdotal evidence in other communities. Little opportunity, reason or means to occur. May occur or be exceeded once every 250 years. Will almost always break previous records of severity.** |

### 6.2.4 Consequence Scale

The consequence scale for the risk assessment considers financial, infrastructure, environmental, safety and amenity consequences. Some consequences in the coastal zone can be described quantitatively (*i.e.*, assigned a dollar value), but with the currently available information and methodologies, many consequences can only be described qualitatively.

For the qualitative risk assessment developed for this Scoping Study, the risks have been categorised in terms of the following categories:

- Environmental
- Amenity
- Infrastructure
- Financial
- Safety

The consequence can be:

- Catastrophic
- Major
- Moderate

- Minor, or
- Insignificant.

The consequence matrix that describes the definition of each category and consequence rating is provided in Table 6-3.

For **infrastructure** related risks, the consequence scale takes into account also the vulnerability of the asset or landuse associated with the asset.

### 6.2.5 Risk Evaluation

The risk for each issue within the coastal zone was evaluated by applying a risk matrix combining the "likelihood" and "consequence" ratings.

This process has enabled a qualitative risk rating to be applied to each risk. Quantitative risk ratings that consider rare and catastrophic events will also be considered in subsequent stages of the CMP.

The risk matrix applied to quantify the risk is provided in Table 6-2.

*Table 6-2 – Risk Matrix applied to evaluate risk*

| Risk Rating Matrix | | | | | |
|---|---|---|---|---|---|
| **Likelihood** | **Consequence** | | | | |
| | Insignificant 1 | Minor 2 | Moderate 3 | Major 4 | Catastrophic 5 |
| Almost Certain 5 | MODERATE | HIGH | HIGH | EXTREME | EXTREME |
| Likely 4 | LOW | MODERATE | HIGH | HIGH | EXTREME |
| Possible 3 | LOW | MODERATE | HIGH | HIGH | HIGH |
| Unlikely 2 | LOW | LOW | MODERATE | MODERATE | HIGH |
| Rare 1 | LOW | LOW | LOW | LOW | MODERATE |

*Table 6-3 – Consequence Scale adopted for the Risk Assessment*

| Consequence Scale | Financial | Infrastructure | Environmental | Safety | Amenity |
|---|---|---|---|---|---|
| Catastrophic | Extensive financial loss or collapse of an industry, > $10m | Irreversible loss of residential or commercial buildings, assets or essential infrastructure that affects the ability to service an area. | Extreme and widespread devastating long term impacts. Recovery unlikely. | Multiple fatalities or permanent disability of employees, contractor or members of the public | Extreme and widespread impacts on amenity, Complete loss of beach or recreational facility with no replacement nearby |
| Major | Major financial loss or impact on industry, $1m to $10m | Loss of ancillary structures or damage to infrastructure temporarily affecting the ability to service an area. Reversible only through intense management efforts. | Major habitat loss and/or triggering of nuisance species proliferation, over a wide area. Recovery may take many years. | Serious illness, death of employee, contractor or member of the public | Major impact on amenity, reversible only through intense management efforts. No beaches or recreational facilities available nearby in the short term. |
| Moderate | Significant financial loss $100,000 to $1m | Moderate impact on infrastructure or services reversible through management efforts, including reversible impacts on ancillary structures. | Significant environmental changes isolated to a localised area. Recovery may take several years. | Medical attendance, time off work | Moderate impact on amenity reversible mainly through management efforts. Beaches or recreational facilities available nearby for use in the short term. |
| Minor | Minor financial loss $10,000 to $100,000 | Minor impact on infrastructure reversible through management efforts. Results in no significant disruption to services. | Environmental damage of a magnitude consistent with seasonal variability | Minor injury with first aid required | Minor impact on amenity, mainly reversible through management efforts. Beaches or recreational facilities available for use nearby in the short term. |
| Insignificant | Little or no financial loss <$10,000 | Temporary impact on minor infrastructure requiring no remediation. | Little or no impact on terrestrial or aquatic ecosystems. | Minor injury with no treatment required | Little or no change to amenity. |

## 6.3 Key Coastal and Estuarine Risks

Many of the key risks are common across several areas and some are occurring at specific locations rather than throughout an entire estuary or beach. These risks generally have existing management controls in place or management controls that can be readily implemented, so the focus of the subsequent stages of the CMP process will be to assess what further management actions could be implemented to reduce these risks and to monitor the effectiveness of the actions. Some of the identified risks have varying root causes – for example, poor water quality could be the result of agricultural or urban runoff, or poor water quality may be exacerbated by sedimentation from bank erosion.

For the estuaries, the key risks identified relate to:

- Poor water quality from industrial, agricultural or urban runoff affecting the estuary ecology and estuarine vegetation
- Flooding, emergency management and the management of estuary entrances to reduce flood risk
- Tidal inundation of foreshore private and public assets from climate change and sea level rise
- Poor access or insufficient facilities for navigation and recreational boating
- Conflict between users of the waterways e.g. powered and non-powered craft
- Bank erosion and siltation caused by unrestricted access to foreshores by cattle, changes to estuary tidal regimes and boat wash
- Spread of weeds caused by agricultural and urban runoff
- Damage to estuarine vegetation leading to loss of habitat for fish and degradation of estuarine ecology, caused by changes to tidal regimes, clearing or boating activity, or deliberate damage of foreshore vegetation to improve views.
- Threat to threatened species including waders and shorebirds from feral animals, loss of habitat due to damage to marine vegetation, sea level rise and unrestricted access.

For the open coast and cliff areas, the key risks relate to the following:

- Risk to public and private infrastructure, coastal use areas and environmental values from coastal hazards including coastal erosion, beach recession, coastal inundation including increased future risk from climate change
- Risk to public and private infrastructure and safety from geotechnical hazards in cliff and bluff areas
- Impact of informal beach accessways on dune vegetation, including vehicle access
- Damage to coastal accessways from minor storms
- Provision of sufficient facilities to cater for the impact of high visitor numbers.

At a city-wide scale, the key process or management-related risks are:

- Risk of inappropriate planning controls and development being approved in inappropriate locations
- Poor community understanding of coastal issues and coastal risks
- Poor communication between stakeholders leading to reduced effectiveness of coastal management and poorer coastal management outcomes.

Examples and observations of the key risks and existing management controls are provided in Figure 6-2, Figure 6-3, Figure 6-4 and Figure 6-5.

### 6.3.1 Discussion on Existing Controls for Key Risks

The existing controls for the key risks identified in this assessment are outlined in the Risk Register in **Appendix G**.

Existing management responses, key performance indicators and further information required to develop management actions to address the key risks are identified in Table 6-4, below.

*Table 6-4 – Key Issues, Existing Management Controls, Key Performance Indicators and Information Gaps*

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| Poor water quality from industrial, agricultural or urban runoff affecting the estuary ecology and estuarine vegetation, including acid sulfate soil runoff from drained floodplains | Regular water quality monitoring programs for all estuaries - Council does WQ monitoring with data available online via https://shoalhaven.nsw.gov.au/Environment/Aqua-Data<br><br>Licensing of industrial discharges<br><br>Implementing urban stormwater treatment technologies<br><br>Provision of riparian zones and fencing of estuarine foreshores<br><br>Working with landowners to manage drained floodplain areas in the lower Shoalhaven to minimise acid runoff<br><br>Public education | Measurable improvements over time in water quality indicators (chlorophyll, nutrients, pH, pathogens, suspended sediments) | GIS/aerial image analysis to identify areas where riparian zones can be established<br><br>Identification of opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment<br><br>Database of key stakeholders |
| Flooding, emergency management and the management of estuary entrances to reduce flood risk | Flood studies to identify at risk areas<br><br>Emergency action plans/floodplain management plans<br><br>Estuary entrance management policies in place that balance infrastructure and community | Known flooding risks at all estuaries<br><br>No future approvals of inappropriate development in flood risk areas | Updated flood studies for key estuaries<br><br>Updated estuary processes and entrance management policies for key estuaries |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| | protection against flooding with environmental outcomes<br>Planning controls to reduce community risk | Estuary entrance management policies in place for all estuaries developed in consultation with all stakeholders<br>Emergency management procedures in place | |
| Poor access or insufficient facilities for navigation and recreational boating<br>Conflict between users of the waterways e.g. powered and non-powered craft | Provision of additional facilities for recreational boating, demand studies | Improved accessibility of waterways to the community | Demand studies, boating surveys, community/ stakeholder consultation |
| Bank erosion caused by unrestricted access to foreshores by cattle, changes to estuary tidal regimes and boat wash | Provision of riparian zones and fencing of estuarine foreshores<br>Boating speed restrictions | Reduction in bank erosion visible from boat surveys and aerial imagery<br>Reduced loss of agricultural land | Bank erosion surveys from aerial imagery/drones to monitor bank erosion<br>Regular visual inspections of key estuaries from vessels |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| | | Improved estuarine foreshore habitat<br>Reduction in suspended sediment concentrations | |
| Spread of weeds caused by agricultural and urban runoff | Provision of riparian zones and fencing of estuarine foreshores<br>Implementing urban stormwater treatment technologies<br>Public education<br>Bushcare groups | Measurable reduced occurrence of weeds in estuaries and foreshores | Ecological surveys to identify occurrence of weeds in all estuaries<br>Identification of mechanisms for spreading of weeds |
| Damage to estuarine and dune vegetation caused by changes to tidal regimes, cattle grazing, mowing, clearing or boating activity. | Provision of environmentally friendly moorings<br>Signage<br>Community education<br>Minimise interference with natural estuarine tidal regimes | No reduction in estuarine or dune vegetation extent, visible damage to seagrasses or change in community assemblages | Ecological survey of estuarine vegetation for all estuaries<br>Identify where damage to estuarine vegetation is occurring<br>Updated estuary process studies to understand natural flow and sedimentation regime<br>Identify and map areas for migration of estuarine vegetation with sea level rise |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| Risk to infrastructure, coastal use areas and environmental values from coastal hazards including coastal erosion, beach recession, coastal inundation including increased future risk from climate change | Development controls through DCP for coastal areas<br>LGA-wide coastal hazard studies and mapping<br>Implement management actions from CZMP and coastal risk assessment | No damage to public or private infrastructure from coastal erosion | Regular updates every few years to coastal hazard assessments and mapping for key beaches where infrastructure is at risk<br>Regular review every few years of coverage and effectiveness of coastal development controls<br>Regular survey and monitoring of known key coastal erosion/inundation hotspots |
| Risk to infrastructure and safety from geotechnical hazards in cliff and bluff areas | Implement Cliff and Bluff areas risk assessment recommendations<br>DCP for cliff and bluff areas<br>Implement management actions from CZMP | No damage to public or private infrastructure or injuries | Updated cliff and bluff risk mapping for inclusion in Council DCP |
| Impact of informal beach accessways on dune vegetation, including vehicle access<br>Damage to coastal accessways from minor storms | Signage<br>Dune revegetation<br>Fencing | Healthy dune vegetation<br>Stabilised dunes | Identification and assessment of informal beach accessways<br>Dune vegetation surveys<br>Best practice guidelines for post-storm repair of beach accessways |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| Provision of sufficient facilities to cater for the impact of high visitor numbers. | Demand studies, visitor surveys | Reduced overcrowding at recreation sites during peak tourist season | Demand studies, monitoring of key recreational areas, community/ stakeholder consultation |
| Risk of inappropriate planning controls and development being approved in inappropriate locations | Coastal hazard and flood studies to define level of risk<br>Council DCP | No damage to private or public infrastructure | Regular updates every few years to coastal hazard assessments and mapping for key beaches where infrastructure is at risk<br>Regular review every few years of coverage and effectiveness of coastal development controls<br>Regular survey and monitoring of known key coastal erosion/inundation hotspots<br>Effective communication and information for Councillor decision makers |
| Poor community understanding of coastal issues and coastal risks | Council website for provision of information, community consultation<br>Appointment of coastal and estuary management committee and CMP Working Groups | Improved community understanding of coastal issues and risks | Strong Terms of Reference for Coastal and Estuary Management Committee |

| Issue/Risk | Existing Management Controls | Key Performance Indicator | Additional information required |
|---|---|---|---|
| Poor communication between stakeholders leading to reduced effectiveness of coastal management and poorer coastal management outcomes. | Provision of coastal and estuary-related education resources for schools and community groups | Community involvement in coastal and estuary management projects that align with the CMP objectives | Social Media and communications expertise |

a) Shoalhaven River at Nowra. Discharge from stormwater and industry on the river can be a source of pollutants in the River.

b) Runoff from agricultural activities such as dairying can contribute to poor water quality in the Shoalhaven River.


c) Lake Wollumboola, 5/2/2018 – Algal growth can occur in coastal lakes from time to time, fed by nutrients from urban runoff (source: Nearmap)

d) Blockage of stormwater outlets by sediment from catchment runoff, Riviera Keys Island Reserve, Sussex Inlet (photo courtesy Riviera Keys Island and Reserve Parkcare)

*Figure 6-2 – Examples of risks to water quality*

a) Bank erosion at Berrys Canal due to ongoing channel adjustment

b) Foreshore erosion, Alamein, Sussex Inlet

c) Boat wash with potential to cause bank erosion (Sussex Inlet)

d) Bank erosion at Sussex Inlet

e) Bank erosion at Shoalhaven River at a break in the riparian zone.

f) Ongoing dune erosion at Alamein, Sussex Inlet (photo Safe Navigation Action Group Inc.)

*Figure 6-3 – Examples of bank erosion at estuaries in the Shoalhaven*


a) Example of illegal tree vandalism at coastal dunes

b) Foreshore erosion at Callala Bay.

c) Buildup of seagrass wrack at the base of boat ramps with the potential to damage boats at St. Georges Basin (Jervis Bay Flatty Flickers Facebook page)

d) Dune erosion due to ad-hoc pedestrian access, Mollymook

e) Erosion at Mollymook resulting from southward migration of creek entrance at Blackwater Creek


f) Damage to seagrass beds caused by swing moorings, Callala Bay (source: Nearmap)

*Figure 6-4 – Examples of risks including erosion due to dune access, dune vegetation management, migration of creek entrances, damage to estuarine vegetation due to boating activity, ongoing beach erosion and need for maintenance of community infrastructure*

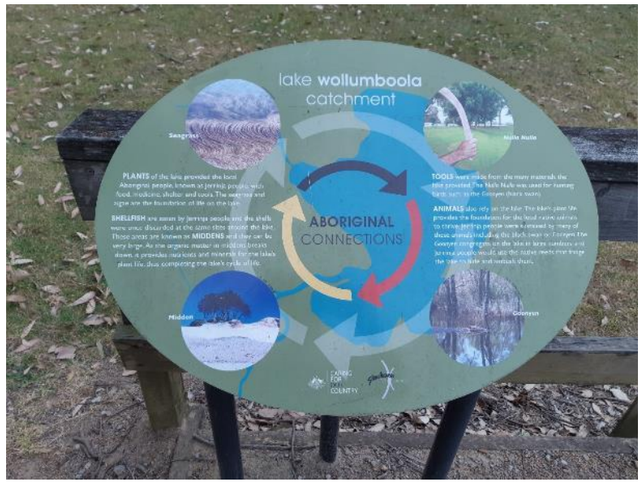
a) Example of damage to seagrass beds from boat anchors (St. Georges Basin, Nearmap)

b) Ad-hoc foreshore protection works, Shoalhaven River.


c) Educational and interpretive signage at key estuarine rehabilitation sites

d) Flood levee to protect against flooding, Shoalhaven River Nowra

e) Example of foreshore protection works incorporating estuarine vegetation and timber kayak launching ramp, Greenwell Point




f) Example of educational signage, Lake Wollumboola

*Figure 6-5 – Examples of risks and existing management measures*

## 6.4 Existing Information and Key Information Gaps

### 6.4.1 Existing information for defining coastal risk

***Council commissioned Studies***

Through existing studies and mapping undertaken by Council, the NSW Government and from previous studies, there is a large amount of supporting information available to define the existing levels of risk. Council has compiled a list of all known documents relevant to its management of the coasts and estuaries. This list is provided in **Appendix H.**

In addition to the specialised studies and reports available when the CZMP was prepared, many new studies, and reviews of existing studies, have been undertaken since then including:

- Several that focus on coastal hazards, vulnerability, adaptive strategies and emergency management for Shoalhaven's high risk beaches e.g.
    - Shoalhaven Coastal Erosion Remediation, adaptive works strategy for transitioning from 'make-safe make-good' to end state protection. (Royal Haskoning 2014) for 8 high risk beaches
    - Review of Coastal Hazard Mapping (Advisian 2016)
    - Foreshore Stabilisation at Mollymook Beach (south) – concept design report (Royal Haskoning 2016), commissioned following the 2016 ECL and damage done to the existing foreshore protection structures
    - The Boat Harbour Beach (Bendalong) Coastal Hazard Study (Adisian 2017), also commissioned as a result of the 2016 ECL which heavily impacted this north facing beach.
- Review of estuary management plans
    - Lake Conjola (2015)
    - St Georges Basin (2013)
- A comprehensive regional sea level rise study, undertaken in 2014 in conjunction with Eurobodalla Shire Council, in order for both councils to choose their own SLR projections. This came as a result of the NSW Government's SLR benchmarks being withdrawn in 2009 as part of Stage 1 Coastal Reforms together with support provided by the NSW Government for Councils' to commission their own regional studies.
- A 2016 review of the 2009 coastal hazard mapping based on new data (e.g. LiDAR, bathymetry, photogrammetry, beach survey transects) together with Council's SLR projections adopted in 2014 i.e.
    - 100mm for 2030
    - 230mm for 2050
    - 360mm for 2100
- Research papers undertaken in partnership with universities providing valuable information for the CMP e.g.

- Assessment of Relative Vulnerability to Sea-Level Rise and Associated Erosion Process of 8 Exposed Beaches in Shoalhaven. Fahim Tonmoy & Abbas El-Zein, University of Sydney 2014
- Shoreline and Beach Volume Change at Seven Mile Beach-Comerong Island, Southeastern Australia. Rafael C. Carvalho et al, UOW 2015.
- Lower Shoalhaven River Drainage Remediation Action Plan (RAP), WRL 2014, Report on Drainage and Acid Sulfate Soil issues in the lower Shoalhaven

- The Coast & Estuary Asset Management Plan has had a major review in 2014 and remains a 'living document' as improvements are made to asset management practices and mapping. All coastal assets are now visible on Council's GIS – beach access ways, viewing areas, fishing platforms, service vehicle access to beaches, canoe launching ramps and foreshore protection assets.

***Local Community Group databases***

Local community groups maintain their own databases of information – for example, the Conjola Community Association maintains a library of documents relevant to the Lake Conjola estuary, at https://www.lakeconjola.org/estuary-and-entrance-management.html. Other community groups, (e.g. Callala Bay Community Association) maintain their own libraries of information relevant to their area and coastal management in general, which serve to educate their members and the communities they represent. Other community representatives record estuary entrance openings, make and record photographic observations and measurements of local coastal management issues e.g. survey data collected on a regular basis by the Collingwood Beach Preservation Group.

These libraries and databases of local information are invaluable in informing coastal management in the Shoalhaven. It is recommended that Council form partnerships with these community groups to share information and harness the passion and dedication that the local community have for their area to help collect data through citizen science projects, to help educate the wider community and shape the CMP.

***Other information***

Some relevant examples of additional information available publicly are provided in **Appendix H**. Examples include:

- Updated coastal hazard mapping for Shoalhaven open coast beaches (Advisian 2016)
- Estuarine health report cards for estuaries in the Shoalhaven (Wiecek *et al.*2012)
- Areas of severe, moderate or minor bank erosion in the Shoalhaven River from past studies (Patterson Britton & Partners, 2004)
- Online spatial databases of coastal and estuary data e.g. Seamap Australia https://seamapaustralia.org/ (a nationally synthesised product of seafloor habitat data collected from various stakeholders around Australia, Lucieer *et al.* 2017), CoastAdapt https://coastadapt.com.au/

- Online spatial databases of predicted inundation due to future sea level rise using the "bath-tub" or "bucket-fill" approach e.g. Coastal Risk Australia database http://coastalrisk.com.au/viewer
- Updated detailed bathymetric LIDAR data for the entire NSW coast developed by the NSW Government in 2019 (available at https://elevation.fsdf.org.au/)
- Previous flood studies, coastal process studies, estuary management plans, dredging management strategies, cost benefit analyses, entrance management policies and natural resources management plans commissioned by Council.

***Detailed Risk Assessments for the Open Coast, Cliffs and Bluffs***

A detailed risk assessment evaluating the risks to public and private assets for the beaches listed above was undertaken for the CZMP (Advisian 2018), based on Council's GIS database of wastewater, water supply, roads, buildings and other Council owned infrastructure, superimposed onto the updated hazard mapping GIS layers and aerial photography. That risk assessment identified a detailed Action Plan to address the priority risks, with a focus on vulnerability of assets.

A separate risk management report with recommendations for the Shoalhaven Coastal Cliffs and Slopes (Royal Haskoning, 2018) was carried out, covering geotechnical hazards and concentrating on risk to property, assets and life for the following areas:

- Penguin Head and Culburra Beach
- Plantation Point
- Hyams Point
- Berrara Point
- Inyadda Point
- Narrawallee
- Bannisters Point
- Collers Beach
- Rennies Beach
- Racecourse Beach

The detailed risk assessments remain valid for defining the coastal vulnerability area risks for the open coast, cliffs and bluffs. However, detailed mapping of the geotechnical hazards for the cliffs and bluffs has not been carried out since 2010 and will require an update for the CMP.

The first pass risk assessment presented in this Scoping Study is not intended to replace the existing detailed risk assessments; rather, the Scoping Study risk assessment complements the existing detailed Risk Assessments.

***Adequacy of Existing Information***

There are a large number of studies that have been undertaken on the estuaries, beaches and cliffs and bluffs of the Shoalhaven, and these have been identified in **Appendix H**. Comments on the adequacy of the information from these studies are provided in the tables in **Appendix H.**

Information from the existing studies has been used to develop the Environmental and Physical context for the Shoalhaven coastline and estuaries, as presented in detail in **Appendix B**. However, some of these studies are no longer current as they are based on conditions that existed at the time of the study, as well as community values as identified at that time, which have since changed. For example, the sewerage system in the catchments of Lake Conjola, St. Georges Basin/Sussex Inlet, and Lake Burrill have been upgraded since the last detailed studies were undertaken on these estuaries. Some of the studies that are considered outdated and that would need to be revisited during the CMP process include:

- Shoalhaven Coastline Risk Management Report (2004) – this document was the basis for identifying the key beaches on the coast that are at highest risk from coastal processes and should be the subject of the CZMP. The key beaches with assets at risk are still relevant today, although the CMP would need to consider all 40 beaches managed by Council that contain assets at risk from coastal processes.
- Shoalhaven River Entrance Management Plan for Flood Mitigation (SCC, 2006) – the management of the Shoalhaven River entrance will need to be updated in light of contemporary sea level rise projections, morphological changes occurring in the estuary entrance and tidal inundation hazards.
- Shoalhaven River Foreshore Definition Study (Patterson Britton and Partners, 2004) – it is recommended that this study be updated to assess where bank erosion is occurring today.
- Lake Wollumboola Estuary Management Plan (Kinhill, 2000)
- Swan Lake and Berrara Creek Natural Resources Management Strategy (SCC, 2002) – this study is no longer current as there have been changes in the management of the catchment of this estuary since the study was undertaken.
- Swan Lake Entrance Management Policy (SCC, 2004) – the CMP process provides an opportunity to assess whether the management of Swan Lake entrance is still appropriate given contemporary sea level rise projections, and tidal inundation hazards.
- Lake Conjola Entrance Study (Patterson Britton & Partners, 1999) – an updated entrance study is needed that takes account of additional data available since 1999, contemporary best practice and community values with regard to entrance management.
- Lake Conjola Entrance Management Plan (MHL, 2003)
- Currarong Natural Resources Management Strategy (Shoalhaven City Council, 2001)
- Burrill Lake Estuary and Catchment Management Plan (Shoalhaven City Council, 2002) December.
- Narrawallee Inlet Natural Resources Management Strategy (Shoalhaven City Council, 2002a).

In addition to the above, all existing EMPs and NRM Strategies need reviewing to meet the requirements of the 2016 Coastal Management Act.

### 6.4.2 Key information gaps

Key information gaps identified through the risk assessment process and review of existing available information include, in order of priority:

- Effective communication and provision of coastal and estuary information for Councillor decision makers, Terms of Reference for Coastal and Estuary Management Committee and CMP Working Groups, Social Media and communications expertise.
- Updated tidal inundation studies for key estuaries, estuary processes and entrance management policies for key estuaries to understand natural flow and sedimentation regimes
- Regular survey and monitoring of known key coastal erosion/inundation hotspots
- Comprehensive database of key stakeholders
- Updated cliff and bluff risk mapping for inclusion in Council DCP
- Ecological surveys to identify areas of damage to estuarine vegetation, mapping of areas for migration of estuarine vegetation with sea level rise, occurrence of weeds in all estuaries, foreshore areas and beach dune areas and identification of mechanisms for spreading of weeds
- GIS/aerial image analysis and regular visual inspections of key estuaries from vessels to identify estuarine areas where bank erosion is occurring and riparian zones can be established
- Demand studies, boating surveys, monitoring of recreational facilities, community/ stakeholder consultation to address demand for boating and recreation facilities
- Identification and assessment of informal beach accessways
- Mapping of existing and proposed coastal protection works and other proposed actions
- Identification of opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment
- Regular updates every few years to coastal hazard assessments and mapping for additional key beaches where infrastructure is at risk
- Regular review every few years of coverage and effectiveness of coastal development controls

### 6.4.3 Council Sea Level Rise Policy Framework

It is noted that Council has a Sea Level Rise policy and framework in place, which was adopted in February 2015. It is noted that since the Stage Government repeal of their Sea Level Rise Policy in 2012 as part of the Stage 1 coastal reforms, Councils were encouraged to adopt their own sea level rise projections that are consistent with widely accepted scientific opinion.

It is noted that Council's governance practice requires that all policies are to be reviewed within 12 months of an election of a new Council. It is noted also that Council's adopted sea level rise projections differ from those of neighbouring Councils including Eurobodalla.

Through Council's governance processes, it is recommended that, when the opportunity arises, it be re-considered whether the existing policy is consistent with widely accepted scientific opinion, as per recommendations of existing studies (e.g. the South Coast Regional Sea Level Rise Policy and Planning Framework, Whitehead and Associates 2014). Since the policy framework was adopted, new information has been made available to inform a review, including information from the NSW Government climate change tool: AdaptNSW, which contains guidance for local government on sea level rise https://climatechange.environment.nsw.gov.au/Impacts-of-climate-change/Coasts-and-sea-level-rise ).

### 6.4.4 Threats and Opportunities

Council has undertaken an analysis of gaps, threats and opportunities relating to coastal and estuary management in the Shoalhaven. These are listed below in Table 6-5.

*Table 6-5 – Current Management, Threats and Opportunities identified by Council*

| Current management | Threats & gaps | Opportunities |
|---|---|---|
| <u>Information management</u><br>SCC has huge amounts of information, based on the best available science, regarding coastal management.<br>Documents prepared for SCC by consultants are listed in **Appendix H**.<br>As well as this comprehensive 'library', Council also has easy access to vast amounts of web-based information and research papers. | The challenge is being able to efficiently access and mine this trove of 'big data' to achieve the most effective coastal management practices for the Shoalhaven coast and community. | New and emerging methods for analysing existing data that could be applied to the Shoalhaven coast to achieve more strategic and cost effective coastal management practice.<br>Cataloguing and presenting Council's 'library' of documents in order to make it more accessible and therefore, of more use, for staff and the public. |
| <u>Sea Level Rise</u><br>South Coast Regional Sea Level Rise Policy and Planning Framework Whitehead and Associates 2014<br>Coastal Hazard Review Advisian 2016. | Uncertainty around SLR projections.<br>Lack of probabilistic mapping | Review Council's SLR planning framework in light of ongoing evidence of increasing SLR and include other beaches where risk is emerging.<br>Probabilistic mapping where required, for key beaches where assets are at risk from coastal processes and sufficient data is available to allow this (e.g. Callala Beach, Culburra Beach, Collingwood Beach, Mollymook Beach) The need for probabilistic mapping may be identified from the more detailed risk assessment in Stage 3 of the CMP process. |
| <u>Cliffs & bluffs</u><br>Documents listed in **Appendix H** relating to | Mapping of geotechnical hazards referred to in DCP outdated. | Implement recommendations in the Shoalhaven Coastal Cliffs and Slopes Risk Management Program and Emergency Action Sub Plan RHDHV 2018 document, as identified in the CZMP 2018.<br>Undertake updated geotechnical hazard mapping for inclusion in DCP. |

| Current management | Threats & gaps | Opportunities |
|---|---|---|
| vulnerable beaches, cliffs and bluffs. | | |
| Adaptive Management for Open Coast Beaches<br>Royal Haskoning Adaptive management report | Potential adaptive management strategies and options for high risk beaches | Sharing this information, and implementing engagement processes, with individual communities at high risk beaches to strengthen community resilience. |
| Community Engagement:<br>Our Coast Our Lifestyle<br>Community engagement project (2016) on coastal risk and erosion management.<br>Frontline News<br>A community newsletter about coastal management. Issues are published and direct mailed to a contact list. Links on this page of Council's website | Rising community expectations regarding beach management.<br>As identified in the Our Coast Our Lifestyle project, the community has very little knowledge of Council's role in coastal management. | • Our Coast Our Lifestyle (2016) provides a sound foundation for decision making around the management of coastal erosion and risk. Use the outcomes as reference in developing this Scoping Study and the CMP.<br>• Continue production of Frontline News, and issue more frequently, to educate on coastal issues and how Council is involved in coastal management (including repair costs following storms) and the science behind the issues.<br>• Frontline News can be utilised for disseminating information about the development of the CMP<br>• Update coastal pages on Council's website |

| Current management | Threats & gaps | Opportunities |
|---|---|---|
| <u>Entrance management</u><br>Policies for Shoalhaven River, Swan Lake, Lake Conjola, Burrill Lake and Tabourie Lake | Community knowledge gaps and misinformation regarding entrance management, dune management, legislation and other coastal issues. | • Work with SCC Governance staff to develop an Environmental Services Communications Plan to provide clear, well-presented information for councillors, staff & community on specific topics (e.g. coastal hazards, entrance management, dune management)<br>• Use technology (apps) and social media to raise awareness of coastal environments and management issues and assist with data collection |
| <u>Dune management</u><br>NSW Dune Management Manual<br><br>Collingwood Beach Dune Vegetation Management Plan (draft) | Vandalism of dune vegetation, impacting dune resilience, causing community division and disproportionately taking up staff time and budgets | Prepare a SCC Dune management strategy based on the NSW Dune Management Manual and more recent research, to strategically and consistently manage dunes in Coastal Vulnerability areas. |
| <u>Asset Management</u><br>Coastal and Estuary Asset Management Plan<br><br>Asset mapping and custodianship information on GIS | Lack of a strategic and coordinated approach to management of coastal assets.<br>Need for collaboration with other relevant sections of Council to manage coastal precincts. Preparation of MAPs assists with this. | • Prepare a strategic decision making framework for the removal of assets or creation of new, more appropriate assets, especially for high-risk beaches.<br>• Continue to seek funding from SCC and the Coastal Program for the upgrade, expansion or replacement of existing structures and for new works that may be required into the future<br>• Monitor use of beach access ways and continue rationalisation program and upgrade of those selected to be retained<br>• Continue reviewing and improving the Coastal and Estuary Asset Management Plan to reflect more consistent and strategic decision making. Include MAPs. |

| Current management | Threats & gaps | Opportunities |
|---|---|---|
| Management Actions Plans (MAPs) for specific coastal beaches and adjacent reserves e.g. Huskisson, Mollymook.<br><br>Boat Harbour Beach Master Plan | At times a MAP may be elevated to a Master Plan e.g. Boat Harbour Beach, Bendalong<br>Lack of resources to properly manage the asset data base and GIS mapping to keep it up to date. | • Continue prioritised preparation of MAPs to assist with the coordinated planning and implementation of operational activities in beach precincts. The preparation of MAPs is an effective means of community engagement and provides community approved direction for operational activities. |
| <u>Adaptation</u><br>Assessment of Relative Vulnerability to Sea-Level Rise and Associated Erosion Process of 8 Exposed Beaches in Shoalhaven 2014 | Adaptive management strategies and options needed for high risk beaches | Developing site specific adaptive management strategies with individual coastal communities at high risk beaches to strengthen community resilience.<br>There are opportunities to partner with other organisations e.g. Griffith University, as for Sussex Inlet.<br>Prepare Adaptation Strategy for high risk beaches |
| <u>Emergency plans</u><br>Site Specific Emergency Action Plans 2018 (open coast). | Lack of site specific emergency plans for estuaries. | • Undertake Emergency Action Subplans for the estuaries during development of the CMPs for each area. |
| <u>Monitoring</u><br><u>East Coast Lows</u> | Lack of consistent coastal monitoring, especially at high risk beaches<br>Need for expert post storm analysis | • Establish key monitoring points to establish bench marks to monitor impacts of climate change over time. This will inform updates to management actions and CMP.<br>• Engage the community in citizen science to assist with monitoring using available, innovative technology e.g. NatureMapr<br>• Work with research bodies (e.g. MHL, universities) to ensure a detailed analysis is undertaken following each significant ECL |

| Current management | Threats & gaps | Opportunities |
|---|---|---|
| <u>Aboriginal Cultural Heritage</u> | Conflict regarding emergency coastal protection works to mitigate risk following storms and coastal erosion and the need to protect cultural heritage | • More realistic support for reconciling the protection of Aboriginal Cultural Heritage (e.g. middens) with managing public risk following storm events and beach erosion.<br>• Better protect and interpret known heritage sites (Aboriginal and European) in coastal areas |
| <u>Estuary management</u><br>Seven estuary management plans and three natural resources management strategies for smaller creeks and estuaries currently exist, including the Shoalhaven River EMP 2008 and the St Georges Basin EMP 2013<br><br>Lower Shoalhaven River and Crookhaven River Stormwater Quality Remediation Plan 2015<br><br>Lower Shoalhaven River Drainage Remediation Action Plan (RAP) WRL 2014<br><br>Estuary Health Report Cards | All EMPs and NRM Strategies need reviewing to meet requirements of the 2016 Coastal Management Act | • Prepare CMPs for the Shoalhaven River and St Georges Basin. Updates of all other EMPs and NRM strategies, to CMP status, will roll out over the coming years<br>• Preparation of hazard assessments for Shoalhaven River and St Georges Basin<br>• Research opportunities for issues such as the impacts of ICOLL interventions and dredging<br>• Implement a regular monitoring program for foreshore erosion and foreshore protection structures and implement works as required. Provide construction and maintenance technical advice to other internal custodians of foreshore protection structures<br>• In conjunction with Assets and Works, implement the Lower Shoalhaven River and Crookhaven River Stormwater Quality Remediation Plan (2015)<br>• Secure funding and manage the ongoing implementation of sub catchment remediation works identified in the RAP<br>• Update Estuary Health Report Cards |
| | Lack of coastal hazard assessment for estuaries | |
| | Knowledge gaps regarding impacts of more frequent intervention for opening ICOLL entrances | |
| | Lack of a clear rationale for dredging in estuaries.<br>Lack of evaluation of impacts of previous dredging projects | |
| | Ageing and failing estuary foreshore protection structures | |
| | Foreshore erosion occurring in new locations, not previously | |

| Current management | Threats & gaps | Opportunities |
|---|---|---|
| | treated with protection structures | |
| | Tidal inundation occurring in previously unaffected areas or at increasing frequencies due to sea level rise caused by climate change. | |
| | Lack of resources to improve estuary water quality implement the Lower Shoalhaven River and Crookhaven River Stormwater Quality Remediation Plan and other storm water actions listed in EMPs and NRMs | |
| | Resources required for ongoing implementation of the RAP. | |
| | Need for extra staff to manage all of the above | |
| | Estuary Health Report Cards need updating | |
| Tourism | 6% annual growth in tourism placing pressure on coastal environment areas | • Undertake research (in partnership with a university) to assess the capacity of coastal environments to support 6% annual tourism growth and apply a risk management approach to assessing the impacts |

| Current management | Threats & gaps | Opportunities |
|---|---|---|
| Shoalhaven Sustainable Tourism Master Plan | Damaging spikes in visitor numbers at specific locations e.g. Lake Wollumboola (over several months after the Lake opened in the August 2015 ECL) when thousands of people arrived to harvest prawns and crabs causing damage to the foreshore, depleting food sources for wildlife and leaving huge amounts of rubbish and human waste. | • Work in partnership with NPWS and DoI Fisheries to better manage tourism impacts in relevant locations such as Lake Wollumboola<br>• Work more closely with other sections of Council e.g. Tourism & Ranger Services, for more consistent environmental messages and sustainable outcomes for coastal environment areas<br>• Continue to work with NPWS and SCC Tourism staff to better protect nesting shorebirds and deliver appropriate messages regarding dogs on beaches. |
| Education resources produced in-house such as,<br>'Lake Conjola – lake processes and sustainable management', 'Protecting our Saltmarsh' | Community knowledge gaps and misinformation regarding entrance management, foreshore management, water quality and legislation | • Work with SCC Governance staff to develop an Environmental Services Communications Plan to build on existing resources and provide clear, well-presented information for councillors, staff & community on estuarine topics and specific estuaries – Shoalhaven River and St Georges Basin<br>• Use social media and technology (apps) to raise awareness of estuarine environments and management issues. E.g. NatureMapr for photo monitoring of selected locations |

## 6.5 Status of Actions from previous Management Plans

### 6.5.1 Actions from existing CZMP and Estuary Management Plans

Of the coastal and estuary management plans in place within the Shoalhaven, only the Shoalhaven Coastal Zone Management Plan (CZMP) has been certified by the NSW Government, with the other plans requiring additional review to meet minimum requirements for certification. The CZMP was certified in 2018; however, many of the estuary management plans date from the early 2000's and many of the proposed actions have either been implemented, or are no longer current and require review.

The status of key actions from the CZMP is presented in Table 6-6.

*Table 6-6 – Status of key actions from Shoalhaven CZMP*

| Action | CZMP Action Referemce | What is proposed | Status |
|---|---|---|---|
| Strategy 1 – Integrate management of the entire coastal zone | C1.1 | In consultation with the community, identify coastal zone objectives and principles, for application in future reviews of this Plan and future coastal management programs. | Undertaken in this Scoping Study |
| | C1.2 | Present information on Council's website and in community engagement activities that shows how coastal zone systems function and how integrated management responses benefits Council's and local communities. This will include reporting on long term improvements to efficiency and to the condition of coastal zone systems. | Undertaken through Council's online community engagement, ongoing commitment needed. |
| | C1.3 | Work with all sections of Council to improve integration of coastal zone risk management and protection. | Ongoing |
| | C1.4 | Investigate and scope feasible, long-term funding options for effective, integrated management of the Shoalhaven coastal zone. Funding strategies will include Council rates and levies, leveraged by grant applications. | This is underway at a number of locations including Mollymook and Currarong. |
| | C1.5 | Review and update Council's Coastline Risk Management Report 2004. | This is still needed to confirm the key beaches at risk from coastal hazards, although Bendalong Boat Harbour and Huskisson beaches are additional locations that have been considered in the CZMP. |
| | C1.6 | Review and assess management coastal erosion concept designs, and other technical reports containing management options for high risk beaches to identify appropriate future actions for community consultation and progression to detailed design where appropriate. | This is underway at a number of locations including Mollymook, Callala Bay and Currarong. |
| | C1.7 | Collate all monitoring actions within the Coastal Zone Management Plan, and other supporting documents, to develop an Environmental Monitoring Program (EMP), which | Commenced. |

| Action | CZMP Action Referemce | What is proposed | Status |
|---|---|---|---|
| | | will address matters such as dune crest height monitoring, effectiveness of sustainable tourism strategies, plastics and rubbish, water quality, encroachment or trampling from access ways and dune vegetation vandalism. The EMP will include 'citizen science' opportunities. | |
| | C1.8 | Maintain the Ecological Monitoring Program (which forms part of the EMP above) to ensure assessment of the extent of invasive species impact. | Yet to be implemented, however Council has been undertaking ongoing water quality monitoring within the estuaries. |
| | C1.9 | At intervals of five years, report on what has been achieved in terms of implementation of the Coastal Zone Management Plan. | Has not yet been done, less than five years have elapsed. This action would be a prerequisite for converting the CZMP to a new CMP for the coastline. |
| | C1.10 | Each year, review actions to ensure they are appropriate and current, and remove actions if implementation has been successful. These reviews will be reported in Council's annual report. | Not yet implemented. |
| | C1.11 | After 10 years, conduct a full review of the implementation of the Coastal Zone Management Plan (or new Coastal Management Program). | Not yet implemented. |
| | C1.12 | Maintain a full-time coastal zone coordinator position to coordinate design investigations, develop the implementation strategy (including long-term funding options) and build Council's capacity to respond. | Implemented in April 2020. |
| | C2.1 | Prepare and deliver community information for residents at key risk beaches and other emerging priority coastal areas. | Ongoing |

| Action | CZMP Action Referemce | What is proposed | Status |
|---|---|---|---|
| Strategy 2 – Engage Communities and Partners | C2.2 | Engage with foreshore reserve property owners, residents and beach goers around risk, environmental, cultural and social issues | Ongoing |
| | C2.3 | Continue to work collaboratively with National Parks and Wildlife Service staff and volunteers to implement the NSW South Coast Shorebird Recovery Program | Ongoing |
| | C2.4 | Prepare information for landholders living adjacent to geotechnical hazards and how they can contribute to risk reduction | Not yet implemented |
| | C2.5 | Collaborate with Council's Tourism and Visitor's Services staff to encourage sustainable tourism strategies and 'citizen science' opportunities | Not yet implemented |
| | C2.6 | Review relevant asset management plans and incorporate opportunities for disabled access where feasible. Investigate opportunities for disabled access at beaches and progress to detailed design where appropriate. | Commenced |
| Strategy 3 – Implement Planning System Controls | C3.1 | Update and maintain notation to section 10.7 (5) certificates for properties affected by coastal hazards consistent with NSW Government legislation. | Ongoing |
| | C3.2 | Implement and maintain planning controls, in Shoalhaven Local Environmental Plan 2014 and Shoalhaven Development Control Plan 2014 G6 Coastal Management Areas, which require specific information and assessment for proposed development in coastal hazard areas. | Implemented |
| | C3.3 | Use appropriate zoning in the Shoalhaven Local Environmental Plan to protect frontal dune systems from development that reduces resilience to coastal hazards. | Ongoing |
| | C3.4 | Make necessary amendments to the Shoalhaven Local Environmental Plan 2014 and Shoalhaven Development Control Plan 2014, including:<br>• Council to require geotechnical assessments to support applications for landslip remediation works on private property, including confirmation that risk will be | Implemented. |

| Action | CZMP Action Referemce | What is proposed | Status |
|---|---|---|---|
| | | reduced to levels considered acceptable (geotechnical engineer to approve the design of the remediation measures and works)<br>• Development consent conditions to include maintenance requirements for new developments on sloping blocks within risk areas<br>• All risk areas to be included in the appropriate locations in the Shoalhaven Local Environmental Plan 2014 and/ or Shoalhaven Development Control Plan 2014<br>• Mapping in Shoalhaven Development Control Plan 2014 and SLEP 2014 (Coastal Risk Planning) to be updated to reflect the revised Coastal Hazard Mapping for beaches (Advisian, 2016) | |
| Strategy 4 – Protect Coastal Biodiversity and Ecosystems | C4.1 | Update the Coastal Asset Management Plan to include a beach access strategy that includes a methodology for rationalisation of beach accesses based on environmental, social and economic risks | Asset Management Plan was updated in 2016. This is currently being revised, a successful grant to undertake this has been awarded. Ongoing. |
| | C4.2 | Review and update plans of management and the Foreshore Reserves Policy 2005 to ensure consistency with the Coastal Zone Management Plan | Yet to be implemented |
| | C4.3 | Maintain and enhance ecological communities in coastal reserves (including dunes), considering appropriate ecological strategies for urban (foreshore recreation reserve) and non-urban areas | Ongoing |
| | C4.4 | Wherever possible, use zoning and planning controls in Shoalhaven Development Control Plan 2014 to maintain open spaces where coastal dunes and associated habitats can roll landward in response to climate change and sea level rise. On the open coast, this management action is linked to planning for vegetated foreshore reserves on coastal dunes. | Ongoing |

| Action | CZMP Action Referemce | What is proposed | Status |
|---|---|---|---|
| | C4.5 | Support bush regeneration programs in coastal reserves | Ongoing |
| | C4.6 | Incorporate measures to protect Aboriginal cultural heritage. This will include appropriate Aboriginal cultural heritage due diligence assessments for all coastal works<br><br>Where actions are proposed on Crown land, Aboriginal Land Claims lodged under the NSW Aboriginal Land Rights Act 1983 must be considered. Any works will need to be compliant with the Commonwealth Native Title Act 1993. | This is currently being done for all new coastal works e.g. ermergency management works at Currarong, Bendalong Boat Harbour. |
| Strategy 5 – Prepare for Emergency Response | C5.1 | Activate emergency action sub-plans as required | On an as-needs basis |
| | C5.2 | Prepare and implement Nature Assisted Beach Enhancement (beach scraping) plans for all Council managed beaches to support the emergency action sub-plans. | Completed |
| | C5.3 | As part of any beach scraping activities, establish a monitoring program to continue investigations of baseline ecological condition or diversity for affected beaches. The monitoring program will be established in consultation with DPI Fisheries | Yet to be implemented |
| Strategy 6 – Incorporate Coastal Risk in Public Asset Management | C6.1 | Review and update all asset management plans (AMPs), relevant to the coastal zone. AMPs by asset type will be updated by relevant asset custodian. | Commenced, at risk-assets identified in CZMP. |
| | C6.2 | Implement high priority recommendations from the Coastal Erosion Stormwater Impact Assessment (Footprint Sustainable Engineering, 2015) | Commenced |
| | C6.3 | Review the coastal cliff and slopes hazard lines and extent of risk areas, to be informed by the on-going geotechnical assessment of foreshore sites undertaken to date. | Yet to be done, action to be carried over into CMP. |
| | C6.4 | Incorporate monitoring of public land and infrastructure, including viewing platforms, stormwater drainage, sewer and water infrastructure in identified coastal cliffs and slopes risk areas, to ascertain any leaks or requirements for repair, into Council's maintenance programs. Relocate viewing platforms where necessary. | Commenced. |

| Action | CZMP Action Referemce | What is proposed | Status |
|---|---|---|---|
| | C6.5 | Undertake a hydraulic assessment to assess stormwater drainage adjacent to or within identified coastal cliffs and slopes risk areas | Yet to be completed |
| Strategy 7 – Implement Adaptive Management Procedures | C7.1 | Establish coastal monitoring program to collect baseline condition data for post storm beach erosion, king tide monitoring and entrance condition (e.g. use LiDAR data for beaches and dunes, when available from the NSW Government, to analyse change to coastal landforms and vegetation). Utilise 'citizen scientists' where applicable. | In progress, implemented for 2016 East Coast Low storm event |
| | C7.2 | Carry out surveys to ground-truth and map the distribution and condition of EECs in coastal erosion risk areas using the Biodiversity Conservation Act, Biodiversity Assessment Methodology. | Yet to be completed |
| | C7.3 | Continue to collaborate with universities, government agencies and others in research | Ongoing |
| | C7.4 | Continue the role of the Council's Natural Resources & Floodplain Management Committee in implementing the Coastal Zone Management Plan. | A new Coastal and Estuary Management Committee structure has been proposed in this Scoping Study. |
| Local Area Plans | LA | Local area plans have been developed for key locations including<br>• Seven Mile Beach<br>• Culburra Beach<br>• Penguin Head<br>• Warrain Beach<br>• Plantation Point & Hyams Point<br>• Berrara Point<br>• Bendalong<br>• Inyadda Point<br>• Narrawallee Beach<br>• Mollymook Beach & Bannisters Point | The status of the key actions from the Local Area Plans is provided in Section 3.2.2 of the CZMP document. The status of these actions is still current. |

| Action | CZMP Action Referemce | What is proposed | Status |
|---|---|---|---|
| | | • Currarong Beach<br>• Callala Bay<br>• Callala Beach<br>• Huskisson Beach<br>• Collingwood Beach<br>• Collers Beach<br>• Ulladulla Harbour & Warden Head<br>• Rennies Beach<br>• Racecourse Beach. | |

There are numerous Estuary Management Plans for the various estuaries in the Shoalhaven, these are discussed in **Appendix B.**

The status of several of the key actions from the existing Estuary Management Plans is indicated in Table 6-7.

*Table 6-7 – Status of actions from existing Estuary Management Plans and CZMPs.*

| EMP/CZMP | Action | Status |
|---|---|---|
| Shoalhaven River Estuary Management Plan | Entrance Management plan review | To be carried over to CMP. |
| | Bank Erosion management plan review | Not carried out since 2004, action to be carried over to CMP. |
| | Drainage Remediation action plan review | Complete |
| Lake Wollumboola Estuary Management Plan | Estuary Management Plan Review | Draft 2013 EMP review stalled due to Halloran land proposal |
| | Entrance Management Plan review | To be carried over to CMP |
| | Flood Study | Completed |
| | Urban Drainage Remediation action plan review | Completed |
| Currarong Creek Natural Resource Management Strategy | Coastal erosion remediation | Emergency actions including beach nourishment, repair of accessways, complete. Trial groyne proposal not implemented as being reviewed by Crown Lands. |
| | Flood Study | In progress |
| | EMP review with major changes regarding Crown Land management | To be carried over to CMP |
| St Georges Basin | Implement revised 2013 EMP Including water quality program | Council records water quality through its AquaData monitoring portal. |
| | Urban Drainage Remediation action plan | In progress |
| | Dredging investigations as per Safe Navigation Action Group | Dredging investigations undertaken in 2015. |
| Swan Lake and Berrara Creek NRM plans | Entrance Management plan review | To be carried over to CMP |
| | Estuary Management Plan review | To be carried over to CMP |
| | Slope stability issues at Berrara | Captured in CZMP, mapping to be reviewed. |
| Lake Conjola EMP | Entrance Management Plan review Dredging Strategy | Dredging study undertaken in 2015. Entrance Management Plan Review to be carried over into CMP. |

| EMP/CZMP | Action | Status |
|---|---|---|
| | Bank stabilization, Boating Management plan<br>Council foreshore stabilisation asset Management plan | Bank stabilization investigations commenced, boating management plan to be carried over into CMP. |
| | Entrance Dune Management plan | To be carried over to CMP |
| | Estuary Health Monitoring Program | Estuary health currently monitored through existing water quality monitoring, estuary health monitoring program to be carried over to CMP. |
| Narrawallee Inlet Natural Resources Management Strategy | Urban stormwater management plan review | To be implemented |
| | Vegetation and bank stabilisation study review<br>Foreshore access strategy with new developments around Garrad Lagoon | To be implemented |
| | Estuary Health Monitoring Program<br>Foreshore stabilisation review | Estuary health currently monitored through existing water quality monitoring, estuary health monitoring program to be carried over to CMP. |
| | Dune crest monitoring and slope stability studies at the south end | To be implemented |
| Burrill Lake EMP | Entrance and Estuary Management Plan review | To be implemented |
| | Foreshore erosion post Bridge replacement | To be implemented |
| | Foreshore recreation and Tourism issues review | To be implemented |
| | Urban stormwater management plan review | To be implemented |
| Millards Creek Ulladulla Urban Stream corridor Management Plan | Flood Study | To be implemented |
| | Vegetation and bank stabilisation study review | To be implemented |
| | Urban stormwater management plan review | To be implemented |
| | Ulladulla Harbour bank stability study review | Bank stability reviewed in 2009. |
| Tabourie Lake Revised EMP | Entrance Management Plan review | Completed |
| | Estuary Health Monitoring Program | Estuary health currently monitored through existing water quality monitoring, estuary health |

| EMP/CZMP | Action | Status |
|---|---|---|
| | | monitoring program to be carried over to CMP. |
| | Foreshore stabilisation and access strategy | To be completed. |

### 6.5.2 Emergency Response – June 2016 East Coast Low

A significant East Coast Low storm event occurred in June 2016 which impacted many areas within the Shoalhaven. The June 2016 East Coast Low was particularly damaging for Bendalong Boat Harbour and other north-east facing beaches in the Shoalhaven, (such as Currarong), due to the storm approach direction. The east coast low event and its impacts were documented in a special edition of Council's Frontline News, which is distributed to the community.

The east-northeast approach direction of the June 2016 East Coast Low made that event particularly significant for Currarong and Bendalong Boat Harbour – due to the approach direction, that storm event is likely to have resulted in higher erosion than for other notable storm events that caused significant erosion at other beaches in the Shoalhaven (such as the May-June 1974 storm events, which had a more southerly approach direction).

At the Botany Bay offshore Waverider buoy which provides wave data representative of the region, offshore significant wave heights reached a maximum of 7.2 m, from the east during the June 2016 event. The 6-hour duration offshore significant wave height was 6.15 m, with an offshore direction of 87°TN. From Table 6-8 the 100 year ARI significant wave height for waves from the East is 7.0 m – this means that the June 2016 East Coast Low is in excess of a 1 in 100 year ARI event for storms from the easterly direction. The storm coincided with the maximum spring tide of the year, making this storm particularly damaging for beaches worst affected by swells from the east.

The combined probability of the storm approach direction, wave height and period makes the June 2016 East Coast Low a very rare event at the north-east facing beaches which are normally sheltered from the prevailing southerly swells, with an annual exceedance probability of less than 1%.

*Table 6-8 - 100 Year ARI 1 hour Significant Wave Heights and Periods for Sydney*

| Direction | NE | ENE | E | ESE | SE | SSE | S | WSW |
|---|---|---|---|---|---|---|---|---|
| *Significant*[1] Wave Height $H_s$ (m) | 4.4 | 6.0 | 7.0 | 7.3 | 8.5 | 9.3 | 8.8 | 5.5 |
| Peak Wave Period[2], $T_p$ (s) | 9.2 | 10.7 | 11.6 | 11.8 | 12.7 | 13.3 | 13.0 | 10.2 |

[1] *Significant* wave height refers to the average of the highest 33% of waves in any given wave record.
[2] Peak wave period is the peak time between two consecutive wave crests in any given wave record.

This storm caused significant damage throughout the Shoalhaven and triggered Council's Emergency Response plans, and implementation of emergency actions as recommended in the supporting documentation for Council's Coastal Zone Management Plan.

Areas impacted included:

- Ulladulla Harbour – erosion of the foreshore within Ulladulla Harbour occurred, threatening infrastructure including the Princes Highway
- Currarong Beach – major erosion occurred resulting in the loss of 6 m of dune and damage to several beach accessways and stairs.
- Lake Tabourie – loss of a foreshore boardwalk due to combined ocean and catchment flooding
- Shoalhaven Heads – moderate erosion of the River Road foreshore and loss of beach accessways at the Shoalhaven Heads open coast beach
- Mollymook Beach – exposure of the Golf Club gabion revetment, inundation of the stormwater system at Ocean Street and damage to the training wall at the creek at the northern end of the beach.
- Culburra Beach – some damage to beach accessways at the southern end of the beach
- Vincentia – inundation of the stormwater outlets at Collingwood Beach and damage to beach access points at Plantation Point
- Greenwell Point – erosion of existing foreshore protection structures at Adelaide Street.
- Bendalong Boat Harbour – erosion uncovering Aboriginal midden deposits, undermining of the foreshore and trees at the foreshore reserve.

*Ulladulla Harbour foreshore protection*

The June 2016 storm caused major erosion of a 30-metre section of the existing rear harbour revetment and the loss of the tidal beach affecting park infrastructure, public amenity and potentially the Princes Highway if no remediation was carried out. The damage is shown in Figure 6-6.

Response:

- Post storm survey investigations completed and hazard management installed and undermined park furniture removed;
- Site meetings held with Roads & Maritime Services (RMS, now Transport for NSW), DPIE and DPI Crown Lands.
- Remediation works included extension of protection and rock fill of the upper embankment and beach scraping as well as relocating sand from the southern beach fronting the boat ramp carpark, these were completed in December 2016 at a cost of $60,000. The completed remediation works are shown in Figure 6-7.

*Figure 6-6 – Impacts of June 2016 storm on Ulladulla Harbour foreshore*

*Figure 6-7 – Completed remediation works at Ulladulla Harbour*

*Currarong Beach*

The June 2016 storm caused significant beach sand loss. More than 20,000m$^3$ of sand was lost under elevated tide and NE storm conditions along Warrain Crescent. There were also damages to park and road assets at the rock pool and Dolphin Reserves. Nine beach access ways were closed along Warrain Crescent. Damage from the storm and an example of the repairs carried out are shown in Figure 6-8 and Figure 6-9.

Council's response included the following:

- Short term safety and clean up measures included temporary hazard fencing and remediation of park infrastructure around Abrahams Bosom reserve carpark. Sand recovery and rock pools remediation completed at a cost of $25,000;
- Beach access hazard closure and reshaping of beach access at Peel St and Currarong Creek completed;
- Land survey of erosion profiles as part of beach erosion monitoring program;
- Community consultation, public meeting, in September 2016 to discuss short and long term responses.
- Review of Environmental Factors (REF) completed and relevant permits obtained for interim works; and
- Coastal engineering advice, Aboriginal Heritage assessment, consultation with DPIE and local Aboriginal community as well as Currarong community informed short-term works (beach scraping and nourishment) and step access replacement (limited to two) along Warrain Crescent. Soil Conservation Service were contracted to do the works in early November at an approximate cost of $150,000; which required Aboriginal Land Council supervision given the sensitivity of the site.
- Following community consultation, Council were progressing design for a trial geofabric groyne construction and placement of 10,000m$^3$ sand nourishment on Currarong Beach, sourced from the western beach. Future construction of an additional beach access on the western end of the beach is subject to Aboriginal Heritage assessment and approval. Beecroft Avenue frontage will require rock armour protection to safeguard the public sewer, reserve and private property.

*Lake Tabourie*

The 80m foreshore boardwalk was lifted during the combined ocean storm/flood event and damaged beyond repair. Council's response included the following measures:

- Short term responses included hazard signage, temporary fencing with the staged removal of the structure completed with post foundations removed prior to September school holidays to make site safe; and

- Land survey was completed in late September and confirmed existing land level provided reasonable access along the estuary foreshore within the current "open entrance" scenario and reasonable access levels within the intervention level for Tabourie entrance of 1.2m AHD.

*Figure 6-8 – Eight beach access stairs were destroyed at Currarong along Warrain Crescent.*

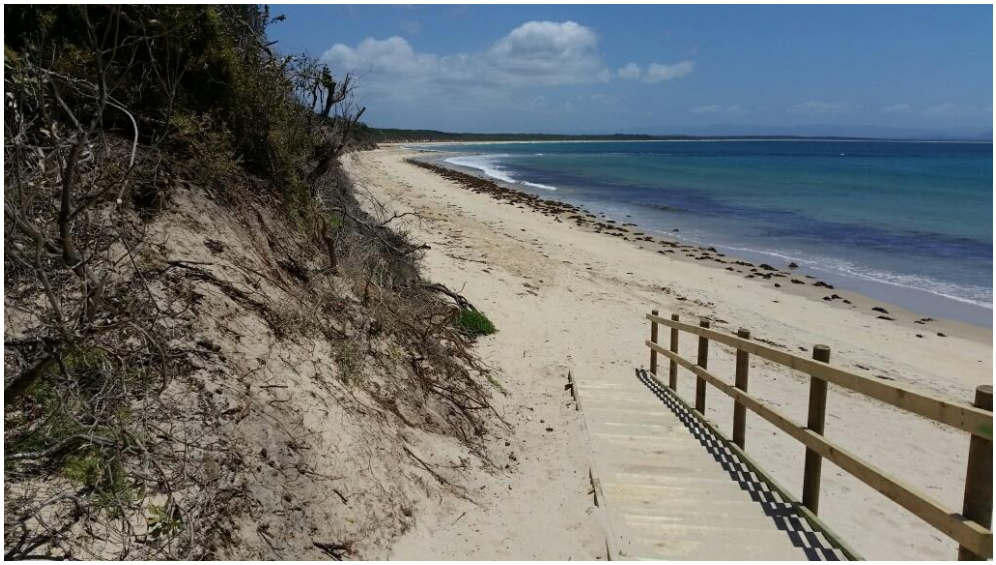


*Figure 6-9 – New beach access stairs at western end of beach*

*Shoalhaven Heads*

The River Road estuary foreshore experienced moderate erosion impact as the flood notch breached and allowed the significant ocean swell / king tide to enter and combine with local catchment flooding.

The Shoalhaven Heads open beach access ways were damaged and beach erosion warning signs in place since the 2015 event were upgraded during September.

Council's response included the following:

- Contactors were engaged to reshape the main beach access points for public safety with other beach access points remaining closed;
- Tree inspection along the River Road foreshore led to the removal of 45 dangerous trees;
- Building waste has emerged from bank failures containing asbestos, a monitoring program has commenced with removal of asbestos;
- Land survey and comparative survey has commenced to monitor erosion of the River Road frontage;
- Contractors were engaged to undertake additional 'make safe' works along the River Rd foreshore including beach scraping to cover exposed tree root plates that present a public risk, and spread tree mulch left on site from initial dangerous tree removal.

*Mollymook Beach*

The south end of the beach damage included exposure of the Golf Club protective gabion wall and inundation of the Ocean St road stormwater system and damage to the sandstone retaining wall. The Blackwater creek sand nourishment area suffered minor damages, and the creek training wall at north end of the beach was also damaged.

Council's response included the following measures:

- Repair to the northern creek retaining wall was completed in October 2016 where a section of rock gabions was replaced with geotextile sand bags (cost $25,000);
- Minor beach reshaping to beach access and repair of sand nourishment at Blackwater Creek was completed in October 2016;
- The south Mollymook foreshore (gabion) protection structure protecting the sewer, stormwater, road, pathway, foreshore and Golf Club was partly exposed and damaged during the storm. The structure is also nearing the end of its useful life. Regular inspections of gabion structure to monitor public risk will continue (in particular from protruding gabion structure's wire). Several sand nourishment covers of the gabions have been funded by Council to maintain sand protection for the wall's integrity and public safety:

*Culburra Beach*

Southern beach access ways were damaged from The Haven north along the entire beach with some rock outcrops uncovered. Council's short-term response included preliminary staff inspection and engagement of contractors to inspect and reshape some beach access points where feasible.

*Vincentia*

Collingwood Beach stormwater outlets were inundated and erosion occurred at the bridge abutments of the shared pathway along Collingwood Beach. Beach access points at Plantation Point were damaged. Council's emergency response included the following:

- Repair of the shared pathway bridge abutments and additional rock protection was completed in October - $7500; and
- The most northern access to Nelsons Beach from Plantation Point reserve, closest to the point, was closed due to erosion and risk to users. Upgrade of the access point near the play equipment was completed prior to Christmas at a cost of $15,000. A survey of users at the site identified the access near the playground more frequently used compared to the most northern access.
- Closure of a cliff line access further east was recently required due to public safety. Assessment of potential repairs and replacement is underway.

*Greenwell Point Foreshore*

Existing shoreline protection structures at Adelaide St were eroded. The shared footpath at Titania Park was eroded/undermined and the sandstone wharf site, which was damaged in 2015, was further undermined. Council's response included:

- Hazard areas immediately isolated with hazard signage and barriers;
- Beach scraping of shared cycleway frontage completed; and
- Minor repairs of damaged rock protection and recreation beaches completed.

Next steps would include:

- Repairs of rock protection assets, including the storm damaged boat ramp-turning circle have been scheduled.
- A draft landscape design for the Heritage Stone Wharf Precinct prepared to submit to DPIE Heritage for a Permit to proceed with remediation works when funds become available. As drawn, these works are estimated at $100,000. Any future works would require community consultation.

*Bendalong Boat Harbour*

The storm scoured several areas in the bay uncovering Aboriginal midden deposits and shell deposits. In two sections of this high use park, the embankment and trees were undermined.

DPIE heritage staff have inspected the site and provided preliminary advice and detailed assessment has commenced to accompany a landscape master plan for the reserve.

Council's response included:

- Contractors were engaged to place safety fencing in high public risk areas and place rock bollards along the road verge; and
- Several beach scraping and rock bollard installations were required following repeated extreme rain events and beach erosion episodes.

A draft Bendalong Boat Harbour Masterplan has been developed in consultation with the community. The aim for the Masterplan is to guide the long-term management of the park, boat ramp and foreshore whilst also addressing coastal and stormwater erosion.

### 6.5.3 Learnings from Implementation Process

Council's emergency management responses have been relatively successful, with repairs to infrastructure having been completed in a timely and effective manner, and with appropriate advice from experts.

However, the following challenges and learnings were encountered by Council in implementing the emergency response to this storm event:

- Need to consider adaptive management strategies due to irreparable damage to infrastructure such as accessways and picnic tables, with budgetary constraints precluding the replacement of all the assets.
- Aging infrastructure – many beach accessways are nearing the end of their design life and in need of major repair or replacement.
- Community consultation is key to the success of the emergency management program, to ensure that community support for the proposed measures is achieved.
- Some of the long-term management responses require expert technical expertise to implement
- There is a need for close consultation with responsible agencies (e.g. Crown Lands, DPIE, Fisheries), the local Aboriginal community and the Coastal Council to ensure that the required approvals and permits are in place in the early planning stages of a proposed management action.

Council has an Emergency Action Plan in place for the open coast, including site-specific emergency action subplans in the CZMP, with specific management actions and mapping at the key sites. However, for estuaries, the responses to emergency management have been partly reactive following storm events, due to the following:

- lack of site-specific emergency plans for estuaries
- the need to review entrance management policies
- a lack of consistent coastal monitoring, especially at high risk beaches, and expert post storm analysis.

### 6.5.4 Emergency Response – February 2020 Flood event, Lake Conjola

A flood event occurred in NSW on 7 – 10 February 2020 which was the result of a combination of:

- very heavy rainfall over those three days along the Shoalhaven coast, including within the catchment area of Lake Conjola
- high tides combined with high significant wave heights, peaking at 6.15 m on 9 February.
- average berm elevation of 2.05 m AHD prior to the storm event.

The Council Officer responsible for carrying out any decision to open lakes and rivers in the Shoalhaven Local Government Area is the Director of Assets & Works (or Acting Director of Assets and Works). The Natural Resources and Floodplain Unit (NRFU) provide intelligence, recommendations, obtain relevant approvals and notify relevant stakeholders in a flood event. The Council officer responsible for operations – plant management and onsite control is the relevant Regional District Engineer, or in their absence the Maintenance Supervisor.

Figure 6-10 shows the Lake Conjola water level (in blue), Jervis Bay tidal level (in light green), Burrill Lake water level (in dark green) and the Lake Tabourie water level (in purple). Based on the finished floor level survey that was undertaken as part of the *Lake Conjola Flood Risk Management Study and Plan* (BMT WBM, 2013) there are an estimated 34 habitable floors impacted by this flood event.

Figure 6-11 shows the state of the Lake entrance during the storm event, prior to and following the entrance intervention.

The Flood Emergency Plan was triggered into action on 7 February by the Bureau of Meteorology Flood Watch, with notifications sent to relevant staff on 7 February.

Council is obligated to follow the adopted *Interim Entrance Management Policy* (GHD, 2013). The emergency trigger level of 1.2 m AHD was reached on Monday 10th February 2020 at 2:10am due to significant rainfall overnight. At 3.55am Council staff issued an emergency opening notification with the instruction to open Lake Conjola in accordance with the *entrance policy* when it is considered safe to do so. Lake Conjola was mechanically opened at approx.11:25am. At this time the lake level was 2.0 m AHD.

### 6.5.5 Learnings from Implementation

Council's emergency response to this flood event was relatively successful, given the physical constraints, and was able to be undertaken in a timely and orderly manner (as soon as it was safe to do so) due to the Flood Emergency Plan that Council has in place.

The learnings from the emergency management of this flood event were:

- The peak water level of 2.0 m AHD reached at Lake Conjola corresponds to a 10% AEP event from the *Lake Conjola Flood Risk Management Study and Plan* (BMT WBM, 2013). For a 10% AEP event with an open entrance coinciding with high tide and wave height, flooding of the Lake Conjola village would occur due to the high ocean tailwater levels that occur in such an event, irrespective of whether the lake entrance is open or closed.
- The lake water level can rise quickly and for this event, the level had already risen above the trigger value for intervention prior to the flood warning being issued by the Bureau of Meteorology, given the small catchment area and short response time for flows to reach the lake from the catchment. Rapid response and response at the right time is critical.
- Intervention at the lake entrance can only be carried out in accordance with the approved Interim Entrance Management Policy (GHD 2013). However, the effectiveness of the intervention is highly dependent on the ocean water level at the time of the opening, the timing of the opening and the state of the entrance berm prior to the storm. If the opening is carried out, for example, at a rising tide, this could result in rapid closure of the entrance berm and the opening being ineffective to scour the entrance.
- The intervention that was carried out highlighted the knowledge gap that exists with respect to management options such as the maintenance of a "dry notch" (such as is used at Shoalhaven River) to manage flooding and the effectiveness of a "managed entrance" to alleviate flooding, when compared with the existing Interim Management Policy.
- More information is needed to ascertain whether it is feasible to control flooding at all in a large event, due to the coincidence of elevated ocean tailwater levels with catchment flows (and the prospect of increasing tailwater levels due to sea level rise), and to assess the social and environmental impact of entrance management protocols in the longer term.

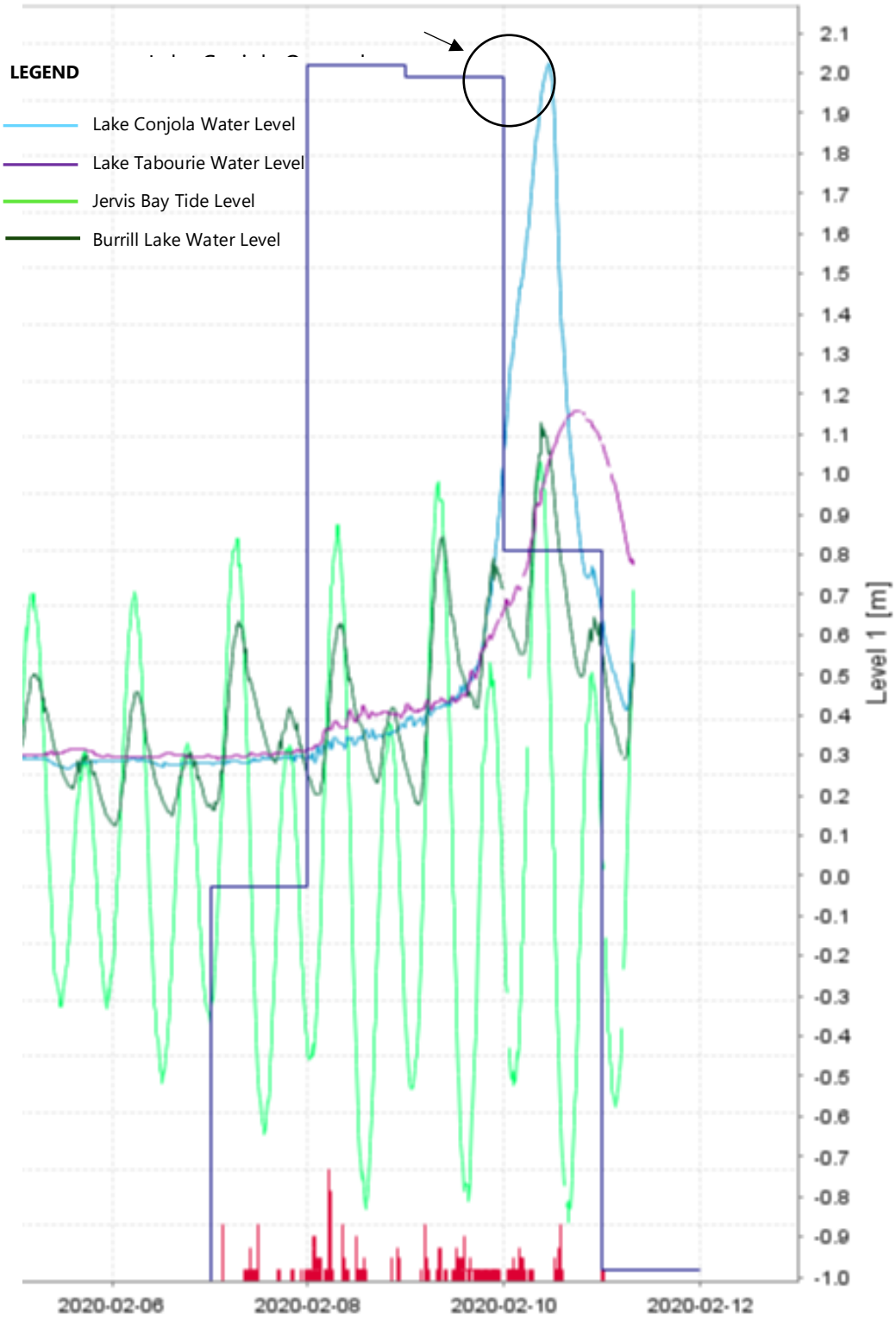



*Figure 6-10 – Water levels at Lake Conjola from 6 – 10 February 2020 (MHL)*

*Figure 6-11 – Lake Conjola entrance berm during February 2020 storm event. Top – Entrance berm prior to opening, 11.50 am 10 February. Bottom – Entrance berm following opening at 2pm 10 February (photo provided by Shoalhaven Council)*

# 7 Prioritisation Strategy and Forward Program

## 7.1 Overview

This Section of the Scoping Study outlines a prioritization strategy for the production of targeted CMPs throughout the Shoalhaven LGA, answering the following question:

***Which areas require their own CMP and what is the priority?***

***What are the next steps?***

## 7.2 Background

From the review of existing studies, policies, management plans, from the outcomes of the consultation and from the risk assessment undertaken for this Scoping Study, the following information can be gleaned:

- Many of the estuaries have existing estuary management plans, entrance management policies and resource management strategies in place, although these are varying in terms of the level of detail, states of development and some need to be updated to capture contemporary issues and management actions already undertaken.
- The coastline has a certified Coastal Zone Management Plan (CZMP) in place, supported by detailed coastal hazard mapping and risk assessments concentrating on assets for both the beaches and the cliffs and bluffs. Under current arrangements, the current CZMP is due to expire at the end of 2021 unless it is replaced by a Coastal Management Program developed under the 2016 Coastal Management Act.
- Some of the estuaries are large and complex, with a large range of issues and stakeholders involved (e.g. Shoalhaven River, Lake Conjola, Sussex Inlet/St Georges Basin), whereas others are smaller and have fewer management issues and risks (e.g. Willinga Lake, Berrara Creek).
- Some of the estuaries are perceived by the local communities to be in a relatively healthy state, where as others are perceived to be unhealthy or require more active management.
- Different estuaries are valued in different ways by the local communities, for example, some areas are valued for recreational boating, swimming and tourism, whereas others are more valued for their natural environment and scenic beauty.
- The CMPs will need to consider risks to the environment, coastal use areas and coastal vulnerability. The Coastal Management SEPP 2018 legislates the hierarchy of priority for coastal management as Coastal Wetlands/Littoral Rainforest, Coastal Vulnerability, Coastal Environment and Coastal Use, so the priorities for development of local area CMPs will need to reflect this hierarchy.

## 7.3 Recommended priority for CMPs

In consideration of the risks, complexities and existing level of development of coastal management at the various estuaries and the coastline of the Shoalhaven, and the feedback received during the community consultation process, the recommended priority and groupings for development of the CMPs is given below:

1. Develop a CMP for **Lake Conjola (high priority).**
2. Develop a CMP for the **Shoalhaven Coastline (high priority).**
3. Develop a CMP for **Jervis Bay (high priority).**
4. Develop a CMP for **Sussex Inlet, Swan Lake and Berrara Creek (high priority).**
5. Develop a CMP for **St. Georges Basin (high priority).**
6. Develop a CMP for **Shoalhaven River (including Broughton Creek)** estuary **(high priority).**
7. Develop a CMP for **Lake Wollumboola (medium priority).**
8. Develop a CMP for **Burrill Lake, Lake Tabourie and Willinga Lake (medium priority)**.
9. Develop a CMP for **Currambene Creek and Moona Moona Creek (medium priority)**.
10. Develop a CMP for **Shoalhaven Urban and Rural estuaries** (covering Narrawallee Inlet, Meroo Lake, Termeil Lake, Nerrindah Creek, Mollymoke Farm Creek, Blackwater Creek, Currarong Creek, Millards Creek, Willinga Lake, other small estuaries near urban areas under Council control, **lower priority**).

## 7.4 Rationale behind CMP prioritisation

The rationale behind the priority and groupings for development of the CMPs is provided below.

### 7.4.1 Lake Conjola Estuary

The rationale for development of a CMP for Lake Conjola as a high priority is:

- The community and stakeholder engagement activities have identified a high degree of community concern for the health of Lake Conjola estuary.
- There is conflicting information and conflicting opinions on how management of the estuary entrance should best be carried out and this will need to be resolved through the CMP process. The conflict stems from a perceived lack of consensus between all stakeholders, including local community groups, Council and the NSW Government on a vision for the management of the estuary, rather than from a lack of information on estuary processes.
- Infrastructure at Lake Conjola is at high risk from flooding and this impacts on the coastal vulnerability and coastal use areas in the coastal zone.

- The estuary includes a complex range of issues and risks, including management of migratory shorebirds at the entrance, flooding, the need to maintain and improve recreational amenity, estuarine vegetation including saltmarsh and seagrass, and Indigenous heritage.

### 7.4.2 Shoalhaven Coastline

The rationale behind prioritising a CMP for the Shoalhaven coastline (beaches, cliffs and headlands) includes:

- A CZMP is current and already in place for the coastline, the risks relating to vulnerability are well understood and there are fewer information gaps that need to be addressed.
- Council has the policy infrastructure in place to address the coastal vulnerability risks on the coastline through the DCP and LEP, and has a framework that can be adapted for other beaches and headlands on the coast.
- Council has recently completed community and stakeholder engagement through Our Coast Our Lifestyle which has provided a comprehensive assessment of community values and expectations for management of the coastline.
- The current engagement has identified additional coastal management risks that need to be considered and can be included in a CMP.
- The identified risks from this Scoping Study have existing management arrangements in place. The CMP will provide a framework for further development of management actions to deal with identified coastal risks.

### 7.4.3 Jervis Bay

The rationale behind prioritising a CMP for Jervis Bay (beaches, cliffs and headlands) includes:

- A CZMP is current and already in place covering the beaches backed by urban infrastructure at Jervis Bay, the risks relating to vulnerability are well understood and there are fewer information gaps that need to be addressed.
- Council has the policy infrastructure in place to address the coastal vulnerability risks on the coastline through the DCP and LEP, and has a framework that can be adapted for other beaches and headlands on the coast.
- Council has recently completed community and stakeholder engagement through Our Coast Our Lifestyle which has provided a comprehensive assessment of community values and expectations for management of the coastline including Jervis Bay.
- The current engagement has identified additional coastal management risks in Jervis Bay that need to be considered and can be included in a CMP, as well as a desire to have a standalone Jervis Bay CMP.
- Jervis Bay forms its own sediment compartment separate to the remainder of the coastline.
- The beaches of Jervis Bay are part of the Jervis Bay Marine Park which is managed separately to the open coast by the Department of Primary Industries (Fisheries).

- The identified risks from this Scoping Study have existing management arrangements in place. The CMP will provide a framework for further development of management actions to deal with identified coastal risks.

Through the community engagement process, there was a suggestion that Jervis Bay should be the subject of a separate stand-alone CMP. While the beaches of Jervis Bay were included in the existing certified CZMP and are subject to coastal processes, hazards and issues that have similarities to beaches outside of Jervis Bay, developing a CMP specifically dedicated to Jervis Bay would ensure that the key issues affecting Jervis Bay in particular are captured.

### 7.4.4 Sussex Inlet, Swan Lake and Berrara Creek

These estuaries are considered a high priority for development of a CMP, because the community and stakeholder consultation process in this Scoping Study identified a large number of high priority risks and issues which are cause for community concern.

It should be noted that Sussex Inlet is part of the St. Georges Basin Estuary, and Sussex Inlet and St. Georges Basin need to be considered as a single system for scientific and management purposes. For this reason, the Sussex Inlet CMP needs to have strong linkages with the St Georges Basin CMP. However, the community engagement process identified a community desire for a separate stand-alone CMP for Sussex Inlet, due in part to these communities being geographically separated and subject to a unique set of issues at each location. Development of a Sussex Inlet CMP would ensure that the key unique issues affecting Sussex Inlet in particular are captured.

Swan Lake and Berrara Creek have also been considered for inclusion in a CMP with Sussex Inlet, as a result of feedback from the community consultation. The communities at Swan Lake and Berrara Creek are closely linked geographically and socially with the Sussex Inlet community, and feedback from the community consultation identified that these estuaries should be included in a single CMP together with Sussex Inlet.

### 7.4.5 St. Georges Basin

This estuary is considered a high priority for development of a CMP for the following reasons:

- An existing Estuary Management Plan is in place for St. Georges Basin, although that requires review to ensure that the key risks identified from this Scoping Study have been captured and have appropriate management actions assigned to them.
- Through the community and stakeholder consultation process in this Scoping Study, a large number of high priority risks and issues have been identified which are cause for community concern.

It should be noted that St. Georges Basin and Sussex Inlet are part of the one system and need to be considered as a single system for scientific and management purposes. Although both have some unique environmental, social and economic considerations, what we do in one part of the system will affect the other parts. The community engagement process identified a community desire for a separate stand-alone CMP for Sussex Inlet, due in part to these communities being geographically separated and subject to a unique set of issues at each location. However, the CMP for St. Georges

Basin will therefore require close linkages with the CMP for Sussex Inlet to ensure consistency of management approaches at the two locations.

### 7.4.6 Shoalhaven River Estuary

The rationale for development of a CMP for Shoalhaven River estuary as a high priority is:

- There is a recent Estuary Management Plan already in place for the estuary, together with management plans to deal with specific risks such as acid sulfate soils. These existing plans can be adapted relatively readily to a CMP.
- The estuary is the largest in the LGA and has a complex range of issues and environments, which involve and directly affect the largest number of stakeholders in the Shoalhaven LGA.
- There is a well evolved understanding of the key issues and risks in the estuary and a general consensus on management approaches between stakeholders.

### 7.4.7 Medium Priority Estuaries

These estuaries are considered to be medium priority for the development of individual CMPs. They are large enough and have sufficient identified risks and issues to warrant an individual CMP but the issues have management actions already in place, or the risks are assessed as less severe than in those estuaries assigned a high priority. While these estuaries have previously been the subject of estuary management, there is a need to update these as well as bring together existing management documents into a single CMP.

Estuaries in this category include:

- Burrill Lake and Lake Tabourie – it is suggested that these Lakes be grouped together as both have similar issues, similar attributes, similar community profiles and are located in close proximity to each other. Willinga Lake has been considered for inclusion with Burrill and Tabourie Lakes due to its geographical proximity,
- Lake Wollumboola – this Lake is relatively compact but is near an urban area, and has high environmental and community use values.
- Currambene Creek and Moona Moona Creek – Currambene Creek is in a high-profile urban and tourist area with a range of issues and risks and warrants its own CMP. Moona Moona Creek is also in Jervis Bay with a similar community profile and could be considered for inclusion within the Currambene Creek CMP.

It is recommended that CMPs for these areas be initiated within the next five years.

### 7.4.8 Lower priority estuaries

These estuaries are considered to be lower priority for development of a CMP for the following reasons:

- The estuaries are relatively small and the issues are not as complex as at the larger estuaries
- Some of the estuaries are in a relatively healthy state with few conflicts between estuary use, few assets at risk and a healthy environment (e.g. Narrawallee Inlet).
- Similar management approaches can be adopted for the smaller estuaries near urban areas.

Estuaries in this category include:

- Currarong Creek
- Moona Moona Creek
- Narrawallee Inlet
- Blackwater Creek
- Millards Creek
- Meroo Lake
- Willinga Lake
- Termeil Lake
- Nerrindah Creek
- Mollymoke Farm Creek.

It is recommended that CMPs for these estuaries be initiated within the next 10 years, following the successful implementation of CMPs at the high and medium priority areas.

## 7.5 Fast-Tracking of Stages 2 – 3 of the CMP

As outlined in the NSW Coastal Management Manual (2018), Councils can choose to fast-track stages 2 to 3 (or parts of those stages). Fast-tracking is only recommended where the management approach is performing well and key drivers of change have not passed thresholds for introducing a new approach.

The Manual indicates that a fast-track process for the preparation or review of a CMP may be appropriate where:

- the first-pass risk assessment indicates that the vulnerability is low and the risks are acceptable
- the management issues are not complex and the council can demonstrate that they are adequately managed
- there are few stakeholders and/or there is an existing, successful management partnership between stakeholders, including adjoining councils, public authorities and key community groups
- council has previously prepared a detailed study to evaluate all relevant coastal hazards and risks and has robust, up-to-date scientific information about coastal change, and

- council has a clear understanding of trends in the condition of natural systems in the coastal environment area, and the ecosystem services they provide, based on up-to-date scientific evidence
- the council demonstrates that it has adopted and is implementing best practices in its role in protecting the condition of the coast
- there have been no major events or new studies released that would change the previous assessment of risk, including likely changes in socioeconomic conditions
- council has a clear understanding of community satisfaction with coastal management processes, costs and benefits distribution and outcomes, that supports continuation of the current approach
- council has a sustainable funding strategy in place for coastal management, which is integrated with its resourcing strategy and asset management plan under the IP&R process.

It is considered that the Shoalhaven Coastline CMP would be the most suitable for fast-tracking through Stage 2 to Stage 3, as it meets most of the criteria above, with a few gaps that would need to be addressed as indicated in Table 7-1. For the estuaries, fewer of these criteria are met and fast-tracking is generally not feasible, except for those elements where the criteria have been met. For example, Shoalhaven River estuary has had many recent studies and management plans undertaken which would likely provide useful, relevant information and would not need to be repeated during the CMP process. The recommended actions needed to progress the CMPs, taking the fast-tracking process into account, are illustrated in Table 7-2.

## 7.6 Need for Planning Proposal

A planning proposal can be prepared to facilitate any proposed statutory amendments to the coastal management area as established in the *Shoalhaven Local Environmental Plan 2014* (the LEP).

It is not considered that changes to the coastal management area maps are required or warranted at this time with respect to the coastal use, environment areas of coastal wetland/littoral rainforest areas as mapped in the Coastal Management SEPP.

Current mapping that identifies areas that are vulnerable to coastal hazards, that can be used to develop a coastal vulnerability area via a planning proposal, has been carried out for the beaches of the coastline. However, it is possible that updated mapping for the LEP will be needed following updated geotechnical risk mapping for the cliffs and slopes. Presently the LEP simply identifies existing lots at risk and these are not expected to change, however it will be subject to Council's discretion on whether to include more detailed risk mapping of the cliffs and slopes in an updated LEP. For the beaches it is not considered that the hazard mapping in the LEP requires updating prior to reaching Stage 4 of the Shoalhaven Coastline CMP process in 2020.

Existing erosion and inundation mapping of some of the estuaries, particularly the lower Shoalhaven River, St. Georges Basin and Sussex Inlet, will need to be updated following the carrying out of coastal inundation studies with reference to improved analysis techniques and updated data. Coastal inundation and erosion mapping of some of the medium priority estuaries will also require updating as part of the development of their CMPs, as outlined in Table 7-2.

Following Stage 4 the coastal hazard mapping may need to be updated as a result of future Council resolutions, data collection and NSW Government policy updates, with updated coastal hazard mapping. This may need to be included in the LEP during Stage 5 of the process, sometime after 2020.

With respect to coastal vulnerability mapping, it is expected that a planning proposal to include the updated geotechnical hazard mapping in the LEP would be required.

Mapping of coastal hazards in the estuaries is expected to be an outcome of the later stages of the CMPs. These updates could be included in the LEP in the future, to fully define the Coastal Vulnerability Area. In particular:

- Coastal Inundation – this has been mapped for open coast beaches, however, tidal inundation mapping would need to be updated for the estuaries.
- There is currently little mapping of bank erosion in estuaries.
- Council's Sea Level Rise Policy is due for a review under Council's governance processes every 7 years, with the next review due in 2022. This would provide an opportunity to update coastal hazard mapping and include probabilistic mapping for key sites (i.e. Mollymook, Callala Beach, Collingwood Beach).

Provisions for the making of a planning proposal in order to amend an environmental planning instruments for local areas are provided under Part 3, Division 3.4 of the *Environmental Planning and Assessment Act 1979*. Advisian recommends that the planning proposal include the following detail at minimum in accordance with the 'A guide to preparing planning proposals' (Department of Planning and Environment (DPE, 2016) and 'A guide to preparing local environmental plans' (DPE, 2016):

- Executive Summary
- Overview
    - Background
- Description of the Site
    - The Locality of Proposed Mapping Changes
    - Development in the Surrounding Area
    - Existing Key Planning Controls
- Objectives and Intended Outcomes
- Explanation of Provisions
- Justification
    - Need for Planning Proposal
    - Relationship to Strategic Planning Framework
    - Environmental, Social and Economic Impact (if necessary)
    - State and Commonwealth Interests (if necessary)
    - State and Commonwealth Interests (if necessary)
- Mapping
    - Zoning and Development Standards
- Community Consultation
- Timeline for Completion of the Planning Proposal
- Conclusion

## 7.7 CMP Review

It is recommended that the CMPs be developed as living documents, with key objectives that are measurable and achievable, and reviewed every ten years as a minimum.

## 7.8 Risks of not proceeding with CMPs

The risk of not proceeding with CMPs at the high priority locations include:

- Risk of damage to infrastructure or impact on safety from lack of agreed management actions
- Risk of a lack of agreement on management actions from responsible Government Agencies, which could delay their implementation and result in damage to the environment or infrastructure
- Risk of ad-hoc management actions being undertaken without approval that can cause environmental damage, impact safety or place infrastructure at risk
- Risk of inappropriate development being allowed in highly vulnerable areas where safety, the environment and infrastructure is at threat
- Ongoing worsening of existing risks, leading to damage to the local economy and environment
- Risk of de-engaging and de-educating the community on coastal management issues, leading to political conflict.

## 7.9 Integrated Planning and Reporting Framework

The Integrated Planning and Reporting (IP&R) framework recognises that most communities share similar aspirations: a safe, healthy and pleasant place to live, a sustainable environment, opportunities for social interaction, opportunities for education and employment, and reliable infrastructure. The difference lies in how each community responds to these needs. It also recognises that council plans and policies should not exist in isolation - that they are inter-connected. This framework allows NSW councils to draw their various plans together, understand how they interact and get the maximum leverage from their efforts by planning holistically and sustainably for the future (https://www.olg.nsw.gov.au/councils/integrated-planning-and-reporting).

The Framework is illustrated in Figure 7-1. It is intended that the CMPs will fit into the Framework under "Other Strategic Plans" and that they would be categorised in groupings as discussed in Section 7.4.

The Community Strategic Plan (CSP) sits at the top of Council's planning hierarchy and identifies the community's main priorities and expectations for the future and ways to achieve these goals. The Shoalhaven CSP has four themes and ten key priorities as an important focus for the community. An assessment was undertaken to ensure alignment between these key priorities and the strategic objectives in the Coastal Management Program.

The CSP is discussed in Section 3.3.3, together with a table outlining the direct linkages and strong alignment between all of the strategic objectives in the CMP and the CSP.

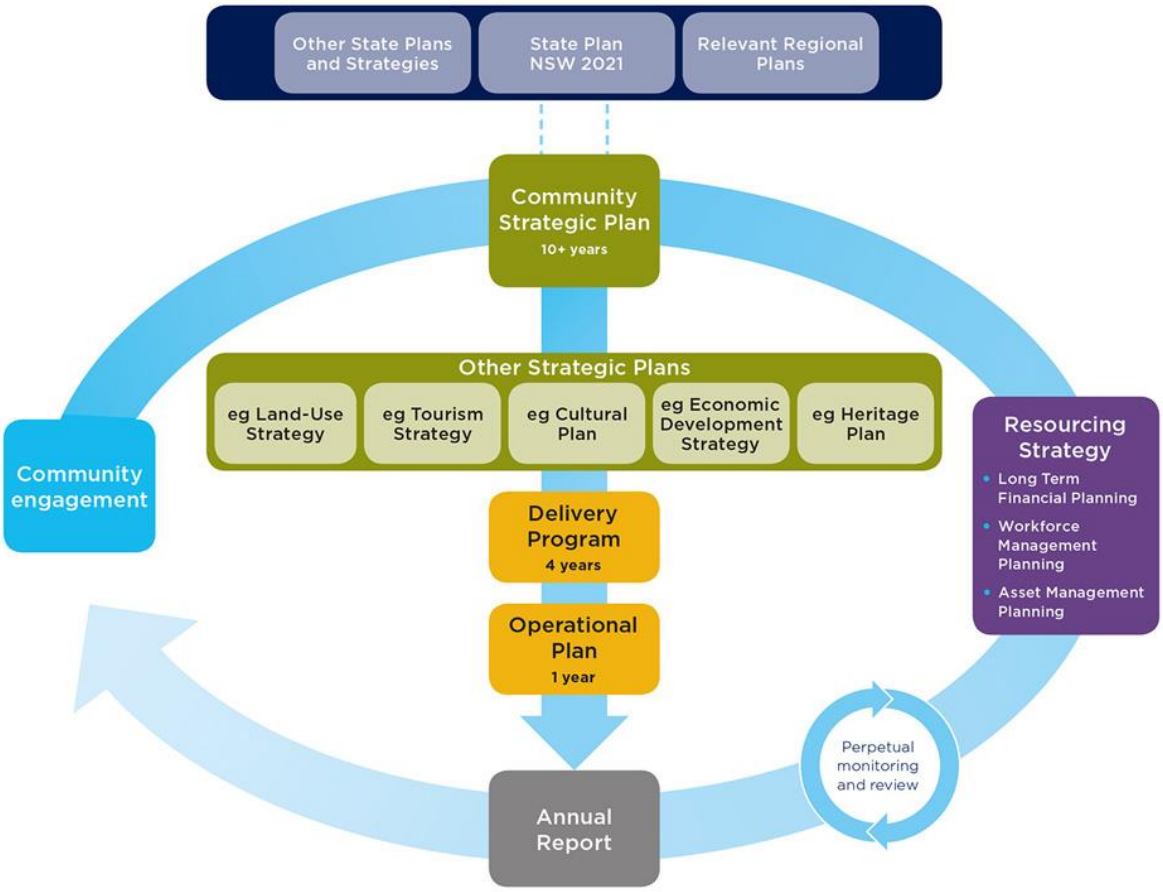



*Figure 7-1 – Integrated Planning and Reporting Framework*

*Table 7-1 – Assessment of suitability for fast-tracking Stages 2 and 3 of the CMP Process*

| Area | Criteria for fast-tracking | Criteria met | Comment |
|---|---|---|---|
| Shoalhaven Coastline | the first-pass risk assessment indicates that the vulnerability is low and the risks are acceptable | Partially met | Vulnerability is high but the risks are well understood as detailed risk assessments for vulnerability have already been carried out during the CZMP process, this allows a simplified Stage 2 process and fast-tracking to Stage 3. |
| | the management issues are not complex and the council can demonstrate that they are adequately managed | Partially met | Management issues are complex but a framework exists for their management through the CZMP. There is room for additional management options to be considered for Stage 3 of the CMP. |
| | there are few stakeholders and/or there is an existing, successful management partnership between stakeholders, including adjoining councils, public authorities and key community groups | Not met but initiated | While a Coast and Estuary Management Committee has existed in the past for the development of the CZMP, a new Working Group has been proposed and this needs to be put in place prior to the Shoalhaven Coastline CMP progressing to Stage 3. |
| | council has previously prepared a detailed study to evaluate all relevant coastal hazards and risks and has robust, up-to-date scientific information about coastal change, and<br>council has a clear understanding of trends in the condition of natural systems in the coastal environment area, and the ecosystem services they provide, based on up-to-date scientific evidence | Partially met | Council has an up-to-date detailed study on coastal hazards for the coastline. The need to update the geotechnical hazard information for the cliffs and bluffs has been identified and this would need to be done prior to fast-tracking to Stage 3. The first pass risk assessment for the coastal environment area would need to be developed further to a detailed risk assessment to inform Stage 3. |

| Area | Criteria for fast-tracking | Criteria met | Comment |
|---|---|---|---|
| | the council demonstrates that it has adopted and is implementing best practices in its role in protecting the condition of the coast | Largely met | Best practice is always evolving; however, it is considered that Council's coastal management is in accord with present-day best practice sufficient to allow fast-tracking the process to Stage 3. Future best practice should be included in subsequent updates of the CMP (i.e. Stage 5) |
| | there have been no major events or new studies released that would change the previous assessment of risk, including likely changes in socioeconomic conditions | Largely met | It is recommended that the results of the recent Mollymook CBA study be considered during the CMP process and that the significance of changes to the previous assessment of risk as a result of that study be evaluated. |
| | council has a clear understanding of community satisfaction with coastal management processes, costs and benefits distribution and outcomes, that supports continuation of the current approach | Partially Met | The community consultation for this Study provides information in this regard. Costs and benefits and community acceptance of new management actions developed during Stage 3 of the process need to be evaluated. |
| | council has a sustainable funding strategy in place for coastal management, which is integrated with its resourcing strategy and asset management plan under the IP&R process. | Partially met | Council has a funding strategy for the actions in the existing CZMP but new funding mechanisms may be needed for a new suite of management actions that may come from Stage 3 of the CMP process. |

## 7.10 Prioritisation Strategy and Forward Program

The Prioritisation Strategy and Forward Program for the development of the CMPs for the Shoalhaven is presented in Table 7-2. The Strategy outlines estimated costs, timeframes and responsibilities for each CMP.

Note that the Strategy and forward program covers the CMP process up to Stage 3, implementation costs cannot be defined at this stage as these will depend on the outcomes from Stage 3 and the management actions adopted.

*Table 7-2 – Proposed CMP Implementation Program*

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| **Lake Conjola** | HIGH | Stage 2 complete by Q1 2021<br>Stage 3 complete by Q4 2021<br>Coast and Estuary Committee appointed by Q2 2020<br>Ongoing review and consultation | Lake Entrance Management<br>Flooding<br>Recreational Amenity<br>Foreshore Erosion<br>Shorebirds<br>Community expectations | **Appointment of CMP Working Group** | • Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q3 2020 | N/A |
| | | | | **Develop Management Objectives for Lake Conjola**<br>This should build upon the preliminary risk assessment presented in the Scoping Study based on a review of previous estuary management plan objectives, as well as community and CCB feedback.<br>• Assess whether the management objectives for the estuary have evolved or are still relevant today and propose updated management objectives. These should be informed by feedback from the community consultation activities and workshop with the Estuary Management Committee. | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. This can be done by Council Team. | Council, Coastal and Estuary Committee. | By Q4 2020 | N/A |
| | | | | **Review and update of Estuary Processes Study (Stage 2)**<br>Undertake a review of the 1999 Patterson Britton and Partners Estuary Processes Study to:<br>• Analyse water level, aerial photographs/ photogrammetry, water quality data on the estuary<br>• Assess the extent of shoaling of the entrance area since the completion of the 1999 Estuary Process study<br>• Assess the vulnerability of Lake Conjola infrastructure and coastal environment/coastal use areas against tidal inundation, including changes in tailwater levels due to future sea level rise and impacts of changes to entrance management protocols on tidal ingress, ranges and inundation, based on the outcomes of existing studies. | • An updated Estuary Process Study would allow management objectives for the estuary to be reassessed based on an additional 20 years of data, as well as present-day community expectations and an improved understanding of estuarine ecology.<br>• This is needed because the most recent update of estuary processes study was in 1999, and estuary entrance/catchment conditions/community expectations have evolved since that time.<br>• Existing data would be used to inform the review. | Consultant | By Q2 2021 | $30,000 - $40,000 |
| | | | | **Undertake Estuary Management Study (Stage 3)** | • The study should provide an assessment of available entrance management options, including ecological and morphodynamic | Consultant | By Q4 2021 | $50,000 - $75,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | • Propose various management options for the estuary based on the management objectives developed above. For example, is the assumption that a closed/shoaled entrance area has a negative impact on water quality in the lake still valid in the present day given that Lake Conjola has a reticulated sewer system?<br>• Assess the morphodynamic, as well as ecological, environmental and economic impacts of the potential entrance management options, against updated management objectives for the estuary (i.e. undertake a Multi-Criteria Analysis of the various management options). | impacts on the lake system and inform updated Lake Entrance Management Policy. These may need to be modelled.<br>• This study should consider existing entrance conditions, information on shorebird nesting areas and use of the entrance area by migratory waders, indigenous heritage, updated data e.g. information on flood risk areas and observations from citizen scientists/Council, existing interventions, and updated sea level rise projections. | | | |
| | | | | **Update Lake Entrance Management Policy (Stage 3)**<br>This would be informed by the estuary process study review, estuary management study, inundation mapping and the review of the efficacy of the existing management protocol. The review should include:<br>• A review of the existing trigger levels for emergency mechanical entrance opening, including the effect of changing the trigger level and the effect of implementing a wider trigger "window" for entrance management actions.<br>• Assess the effectiveness of the existing management regime against the proposed management objectives, including impact on shorebird nesting areas, recreational amenity and flooding, and practical barriers to implementation.<br>• A medium-long term policy that may include specific trigger conditions for larger entrance interventions, or alternative strategies for managing impacts such as flooding that avoid entrance intervention. | • Existing Entrance Management Policy is perceived by some in the community to have led to an increase in shoaling of the entrance with associated problems of flooding and poor recreational amenity.<br>• A review of the existing entrance management policy is required to assess whether the policy adequately balances the needs of the lake environment and the local community. | Consultant | by Q4 2021 | $50,000 - $75,000 |
| | | | | **Compile water quality data from AquaData and undertake water quality and environmental health study of Lake Conjola.** | This is needed due to changes in catchment conditions (e.g. upgraded sewer system), bushfire impacts and changes in estuary entrance | Council/ Consultant | By Q4 2020 | $20,000 - $30,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | • Water quality data collection has been taking place at a number of sample locations within Lake Conjola. More regular water quality testing (example weekly regular testing to provide a baseline, and more regular e.g. daily or continuous monitoring following a significant event) is required at the existing locations, particularly in response to events such as bushfires, heavy rainfall, and entrance management. This would provide an improved indication of how the estuary water quality responds to particular events.<br>• Assess the NSW Monitoring, Evaluation and Reporting Strategy (MER) estuary health monitoring results to determine the current estuary condition, and compare with results from previous years.<br>• The data should be compiled in a format that is easily digestible for the local community, for example, in a regular water quality snapshot/summary report on Council's webpage or via the existing Aqua Data portal. QA/QC and analysis of existing data needed.<br>• Consider installation of a temporary real-time telemetered water quality buoy to assess water quality changes in response to entrance management interventions.<br>• Include recently updated seagrass mapping in the estuary health assessment. | conditions. The water quality and environmental health study would provide much needed background data to inform the estuary entrance management options studies.<br>The existing samples do not provide a good indication of short-term fluctuations in response to discrete events within the lake system. Baseline water quality information in the lake would be supplemented by the recommended event water quality sampling and analysis of existing data recommended here. | | | |
| | | | | **Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas.**<br>This should build upon the preliminary risk assessment presented in the Scoping Study based on community and CCB feedback and include additional risks identified from entrance management options study. | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | Council/ Coast and Estuary Management Committee, Consultant | By Q2 2021 | $5,000 - $10,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | **Develop management actions for Stage 3** | Management actions to be developed based on the outcome of the detailed risk assessment, Estuary Process/Management Study and in close consultation with the Coast and Estuary Management Committee. | Council/ Consultant | By Q3 2021 | $20,000 - $30,000 |
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | Council/ Consultant | Q3 2021 | $20,000 - $30,000 |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | • Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | Q4 2021 | N/A |
| | | | | **Prepare CMP Report for Lake Conjola**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | • CMP report to bring together management actions, risk assessments and updated studies addressing management gaps. | Council/ Consultant | Q4 2021 | $30,000 - $50,000 |
| | | | | | | | | TOTAL $225,000 - $340,000 |
| **Shoalhaven Coastline** | HIGH | Stage 2 complete by mid 2020<br>Stage 3 complete by Q3 2021 | Vulnerability of infrastructure to erosion and inundation<br>Safety<br>Recreational amenity | **Appointment of Coast and Estuary Management Committee and working groups** | • Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q3 2020 | N/A |
| | | | | **Updated assessment of Geotechnical hazards (Geotechnical Hazard Study and mapping)** | • Currently geotechnical hazard mapping dates from 2010 and has not been reviewed despite updated geotechnical risk assessments, LIDAR | Geotechnical Consultant | By Q3 2020 | $30,000 - $40,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | Coast and Estuary Management Committee appointed by Q3 2020<br>Ongoing review and consultation | Dune vegetation<br>Development Controls | • This would enable updated coastal vulnerability mapping to be provided for inclusion in Council's DCP.<br>• The geotechnical hazard study and mapping should identify a zone landward of the cliff edge considered "high risk" – depending on the geology, LIDAR, and identified features based on local field observations carried out by a qualified geotechnical engineer.<br>• Mapping should be provided to Council in GIS format together with proposed development controls that would be based on the mapping, to include in an update of Council's DCP. | information and landslips that have occurred since the previous assessments.<br>• Not all cliff and bluff areas that may be subject to geotechnical hazard are currently mapped in Council's LEP/DCP. | | | |
| | | | | **Develop Planning Proposal to update LEP mapping based on outcome of updated Geotechnical Hazards assessments** | Updated mapping to be included in Council's DCP to form a basis for future assessment of development applications in areas that have been identified as being subject to geotechnical hazards. | Consultant | By Q4 2020 | $10,000 |
| | | | | **Updated risk assessment for environment, coastal use areas.**<br>• This should build upon the preliminary risk assessment presented in the Scoping Study based on community and CCB feedback.<br>• Stormwater runoff and erosion at stormwater outlets have been identified as significant issues, and stormwater assessments need to be captured in the updated risk assessment. | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• There is already a detailed risk assessment for the Coastal Vulnerability Areas relating to the coastline, undertaken as part of the CZMP.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | Council | By Q3 2020 | $5,000 - $10,000 |
| | | | | **Develop and update draft management actions for Stage 3** | • Management actions to be developed based on the outcome of the detailed risk assessment and in close consultation with the Coast and Estuary Management Committee, | Consultant | By Q2 2021 | $30,000 - $50,000 |
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments. | Council comms team, Consultant | By Q3 2021 | $30,000 - $50,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | • Proposed management actions and timing | • To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | | | |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | • Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | By Q3 2021 | N/A |
| | | | | **Prepare CMP Report for the Shoalhaven Coastline**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | • CMP report to bring together management actions, risk assessments and updated studies addressing management gaps. | Consultant | By Q4 2021 | $30,000 - $50,000 |
| | | | | **Develop Planning Proposal to update LEP coastal hazard mapping**<br>This may be required if the CMP recommends that coastal hazard mapping be revised, based on:<br>• Future Council resolutions on sea level rise<br>• Future storm events<br>• Data collection and improved analysis techniques. | • Updated mapping to be included in Council's DCP to form a basis for future assessment of development applications in areas that have been identified as being subject to coastal hazards. | Council, Consultants | After Q4 2021 | $10,000 |
| | | | | | | | | TOTAL $145,000 - $220,000 |
| **Jervis Bay** | HIGH | Stage 2 complete by Q1 2021<br>Stage 3 complete by Q3 2021<br>Coast and Estuary Management Committee | Vulnerability of infrastructure to erosion and inundation<br>Safety<br>Recreational amenity<br>Dune vegetation | **Appointment of Coast and Estuary Management Committee and working groups** | • Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q3 2020 | N/A |
| | | | | **Updated assessment of Geotechnical hazards (Geotechnical Hazard Study and mapping)**<br>• This would enable updated coastal vulnerability mapping to be provided for inclusion in Council's DCP. | • Currently geotechnical hazard mapping dates from 2010 and has not been reviewed despite updated geotechnical risk assessments, LIDAR information and landslips that have occurred since the previous assessments. | Geotechnical Consultant | By Q3 2020 | $10,000 - $15,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | appointed by Q3 2020<br>Ongoing review and consultation | Stormwater Erosion<br>Development Controls | • The geotechnical hazard study and mapping should identify a zone landward of the cliff edge considered "high risk" – depending on the geology, LIDAR, and identified features based on local field observations carried out by a qualified geotechnical engineer.<br>• Mapping should be provided to Council in GIS format together with proposed development controls that would be based on the mapping, to include in an update of Council's DCP. | • Not all cliff and bluff areas that may be subject to geotechnical hazard are currently mapped in Council's LEP/DCP. | | | |
| | | | | **Updated risk assessment for environment, coastal use areas.**<br>• This should build upon the preliminary risk assessment presented in the Scoping Study based on community and CCB feedback.<br>• New DPIE marine LIDAR data available for sensitivity analysis of inundation.<br>• There needs to be a coordinated approach between Council and Tourism industry for managrement of infrastructure and sustainable tourism.<br>• Stormwater runoff and erosion at stormwater outlets have been identified as significant issues, and stormwater assessments need to be captured in the updated risk assessment. | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• There is already a detailed risk assessment for the Coastal Vulnerability Areas relating to the coastline, undertaken as part of the CZMP.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | Council | By Q3 2020 | $10,000 - $20,000 |
| | | | | **Develop and update draft management actions for Stage 3** | • Management actions to be developed based on the outcome of the detailed risk assessment and in close consultation with the Coast and Estuary Management Committee | Consultant | By Q2 2021 | $30,000 - $50,000 |
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups including Tourism industry, to ensure that the CMP considers issues of importance. | Council comms team, Consultant | By Q3 2021 | $15,000 - $25,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | • Liaise closely with Government Agencies and Tourism Industry to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | By Q3 2021 | N/A |
| | | | | **Prepare CMP Report for Jervis Bay**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | • CMP report to bring together management actions, risk assessments and updated studies addressing management gaps.<br>• Separate CMP Chapter Report to be completed for Jervis Bay to address issues specific to Jervis Bay as requested by the local community.<br>• The separate Jervis Bay CMP Chapter Report should be produced such that it would be suitable to act as a stand-alone CMP document, but publicly exhibited, finalised and adopted together with the remainder of the Shoalhaven Coastline CMP. | Consultant | By Q4 2021 | $20,000 - $30,000 |
| | | | | | | | | $85,000 - $140,000 |
| **Sussex Inlet, Swan Lake and Berrara Creek** | HIGH | Stage 2 complete by Q4 2021<br>Stage 3 complete by Q4 2022<br>Coast and Estuary Management Committee appointed by Q2 2020 | Foreshore Erosion<br>Recreational boating<br>Flooding | **Appointment of Coast and Estuary Management Committee and working groups** | • Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q3 2020 | N/A |
| | | | | **Boating study of Sussex Inlet**<br>A study on boating facilities within Sussex Inlet is required to assess whether there is sufficient capacity for vessels and whether there is a need to improve existing facilities or reduce the impact of boating on the environment. The study could provide a business case for grant applications through the Transport for NSW Boating Now scheme.<br>The study should include the following scope: | This Scoping Study has identified that there is conflict between recreational boat users and non-motorised craft users, as well as bank erosion within Sussex Inlet, and a high demand for recreational boating,<br>The boating study would identify whether there is any need for additional or upgraded recreational boating facilities as well as identify the impact of boating on the estuarine environment and provide recommendations for addressing this impact. | Council/ Consultant | By Q4 2020 | $15,000 - $30,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | Ongoing review and consultation | | • Demand studies to obtain an estimate of boat usage patterns throughout the estuary,<br>• boating surveys,<br>• monitoring of recreational facilities,<br>• community/ stakeholder consultation to address demand for boating and recreation facilities,<br>• assess impact on bank erosion, conflicts between users and address adequacy of facilities. | | | | |
| | | | | **Undertake a tidal inundation study of St. Georges Basin and Sussex Inlet.**<br>This should include mapping of vulnerable areas in the estuary addressing tidal inundation and include the effects of future sea level rise.<br>The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping,<br>The results of the study would feed into the St Georges Basin CMP also. | Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood studies and NSW Estuary Tidal Inundation Exposure Assessment. | Council/ Consultant | By Q1 2021 | $20,000 - $40,000 |
| | | | | **Undertake a tidal inundation study of Swan Lake and Berrara Creek.**<br>This should include mapping of vulnerable areas addressing tidal inundation and include the effects of future sea level rise. Mapping can draw upon recent flood study assessments.<br>The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping, as well as a review of the effectiveness of existing entrance management policies. | Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood studies and NSW Estuary Tidal Inundation Exposure Assessment. | Council/ Consultant | By Q3 2021 | $20,000 - $30,000 |
| | | | | **Undertake an assessment of ongoing morphological changes/bank erosion in Sussex Inlet**<br>There has been ongoing bank erosion identified in this Scoping Study at Sussex Inlet.<br>The aim of this study would be to categorise and assess the coastal hazard of bank erosion within Sussex Inlet specifically and suggest management actions. | There are no specific studies on bank erosion in the estuary. It would be prudent to identify which areas have been subject to bank erosion so that this risk can be addressed.<br>The study should identify possible causes for the erosion and conceptual options to address the erosion. | Council/ Consultant | By Q3 2020 | $15,000 - $30,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | This study should identify priorities for treatment of erosion, conceptual management actions to address the erosion as well as severity and risk/vulnerability assessment that can be included in vulnerability mapping of the estuary.<br>Study would require boat-based field work and analysis of historical aerial photography/photogrammetry. | | | | |
| | | | | **Design and implement regular water quality monitoring and sampling program**<br>Water quality sampling frequency should be increased at existing monitoring sites as there is only irregular information available from Aqua Data.<br>For example, weekly regular testing would provide a baseline, and more regular e.g. daily or continuous monitoring at key sites following a significant event.<br>Assessment of the NSW Monitoring, Evaluation and Reporting Strategy (MER) estuary health monitoring results to determine the current estuary condition, and compare with results from previous years is required.<br>The water quality sampling program should aim to provide more information for local communities with respect to recreational water quality and to assess the impact of storm events, floods and bank erosion on water quality. The reporting can be implemented through the existing Aqua Data portal. | While there are numerous water quality sites in the estuary, more frequent sampling is needed to provide a comprehensive dataset of water quality in the estuary, both as a resource for local communities, and to monitor the environmental health at various locations along the lower estuary. | Council | By Q3 2020 | $5,000 - $15,000 |
| | | | | **Identify opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment.**<br>This would require analysis of the urban stormwater network within urban centres by a drainage engineer, and identification of where treatment measures can be implemented e.g. identifying locations for constructed wetlands, swales and inline stormwater treatment, MUSIC numerical modelling to inform potential improvements in water quality. | This would assist in addressing water quality issues in the estuary which have been identified as a risk in the Scoping Study. | Council/ Consultant | By Q3 2020 | $10,000 - $15,000 |
| | | | | **Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas.**<br>This should build upon the preliminary risk assessment presented in the Scoping Study based on community | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas. | Council/ Consultant | By Q4 2020 | $10,000 - $20,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | and CCB feedback and include additional risks identified from studies recommended above.<br>There is a need to review the existing Estuary Management Plan to ensure key risks are identified and appropriate management actions assigned. These key risks should be captured in the detailed risk assessment. | • It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | | | |
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | Council/ Consultant | Q4 2020 – Q4 2021 | $20,000 - $30,000 |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | By Q4 2022 | N/A |
| | | | | **Prepare CMP Report for Sussex Inlet, Swan Lake and Berrara Creek**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastal Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | • CMP report to bring together management actions, risk assessments and updated studies addressing management gaps. | Council/ Consultant | By Q4 2022 | $40,000 - $60,000 |
| | | | | | | | | TOTAL $155,000 - $270,000 |
| **St. Georges Basin** | HIGH | Stage 2 complete by Q4 2021 | Foreshore Erosion | **Appointment of Coast and Estuary Management Committee and working groups** | • Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q2 2020 | N/A |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | Stage 3 complete by Q4 2022<br>Coast and Estuary Management Committee appointed by Q2 2020<br>Ongoing review and consultation | Recreational boating<br>Flooding | **Boating study of St. Georges Basin**<br>A study on boating facilities within St. Georges Basin is required to assess whether there is sufficient capacity for vessels and whether there is a need to improve existing facilities or reduce the impact of boating on the environment. The study could provide a business case for grant applications through the Transport for NSW Boating Now scheme.<br>The study should include the following scope:<br>• Demand studies to obtain an estimate of boat usage patterns throughout the estuary,<br>• boating surveys,<br>• monitoring of recreational facilities,<br>• community/ stakeholder consultation to address demand for boating and recreation facilities,<br>• assess impact on bank erosion, conflicts between users and address adequacy of facilities. | This Scoping Study has identified that there is conflict between recreational boat users and non-motorised craft users, as well as bank erosion within Sussex Inlet, and a high demand for recreational boating,<br>The boating study would identify whether there is any need for additional or upgraded recreational boating facilities as well as identify the impact of boating on the estuarine environment and provide recommendations for addressing this impact. | Council/ Consultant | By Q4 2020 | $15,000 - $20,000 |
| | | | | **Undertake a tidal inundation study of St. Georges Basin and Sussex Inlet.**<br>This should include mapping of vulnerable areas in the estuary addressing tidal inundation and include the effects of future sea level rise.<br>The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping, | Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood studies and NSW Estuary Tidal Inundation Exposure Assessment. | Council/ Consultant | By Q4 2020 | Included in Sussex Inlet CMP |
| | | | | **Undertake an assessment of foreshore erosion in St Georges Basin**<br>The aim of this study would be to categorise and assess the coastal hazard of forehroe erosion within St Georges Basin specifically and suggest management actions.<br>This study should identify priorities for treatment of erosion, conceptual management actions to address the erosion as well as severity and risk/vulnerability assessment that can be included in vulnerability mapping of the estuary. | There are no specific studies on bank erosion in the estuary. It would be prudent to identify which areas have been subject to bank erosion so that this risk can be addressed.<br>The study should identify possible causes for the erosion and conceptual options to address the erosion. | Council/ Consultant | By Q3 2020 | $15,000 - $20,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
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| | | | | Study would require boat-based field work and analysis of historical aerial photography/photogrammetry. | | | | |
| | | | | **Design and implement regular water quality monitoring and sampling program**<br><br>Water quality sampling frequency should be increased at existing monitoring sites as there is only irregular information available from Aqua Data.<br><br>For example, weekly regular testing would provide a baseline, and more regular e.g. daily or continuous monitoring at key sites following a significant event.<br><br>The water quality sampling program should aim to provide more information for local communities with respect to recreational water quality and to assess the impact of storm events, floods and bank erosion on water quality. The reporting can be implemented through the existing Aqua Data portal. | While there are numerous water quality sites in the estuary, more frequent sampling is needed to provide a comprehensive dataset of water quality in the estuary, both as a resource for local communities, and to monitor the environmental health at various locations along the lower estuary. | Council | By Q3 2020 | $5,000 - $15,000 |
| | | | | **Identify opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment.**<br><br>This would require analysis of the urban stormwater network within urban centres by a drainage engineer, and identification of where treatment measures can be implemented e.g. identifying locations for constructed wetlands, swales and inline stormwater treatment, MUSIC numerical modelling to inform potential improvements in water quality. | This would assist in addressing water quality issues in the estuary which have been identified as a risk in the Scoping Study. | Council/ Consultant | By Q3 2020 | $10,000 - $15,000 |
| | | | | **Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas.**<br><br>This should build upon the preliminary risk assessment presented in the Scoping Study based on community and CCB feedback and include additional risks identified from studies recommended above.<br><br>There is a need to review the existing Estuary Management Plan to ensure key risks are identified and appropriate management actions assigned. These key risks should be captured in the detailed risk assessment. | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | Council/ Consultant | By Q4 2020 | $10,000 - $20,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | Council/ Consultant | Q4 2020 – Q4 2021 | $20,000 - $30,000 |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | By Q4 2022 | N/A |
| | | | | **Prepare CMP Report for St. Georges Basin**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastal Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | • CMP report to bring together management actions, risk assessments and updated studies addressing management gaps.<br>• Separate CMP Chapter Report to be completed for Sussex Inlet to address issues specific to Sussex Inlet as requested by the local community.<br>• The separate Sussex Inlet CMP Chapter Report should be produced such that it would be suitable to act as a stand-alone CMP document, but publicly exhibited, finalised and adopted together with the remainder of the St. Georges Basin CMP. | Council/ Consultant | By Q4 2022 | $40,000 - $60,000 |
| | | | | | | | | TOTAL $115,000 - $180,000 |
| **Shoalhaven River Estuary** | HIGH | Stage 2 complete by Q4 2021<br>Stage 3 complete by Q4 2023 | Water Quality<br>Flooding<br>Foreshore Erosion<br>Acid Sulfate Soils | **Appointment of CMP Working Group** | Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q2 2020 | N/A |
| | | | | **Boating study of the lower Shoalhaven**<br>A study on boating facilities within the Shoalhaven estuary is required to assess whether there is sufficient | This Scoping Study has identified that there is conflict between recreational boat users and non-motorised craft users, bank erosion as a result of | Council/ Consultant | By Q4 2020 | $30,000 - $40,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | Coast and Estuary Management Committee appointed by Q2 2020<br>Ongoing review and consultation | Recreational Amenity<br>Entrance Management<br>Community Education<br>Heritage<br>Ecology | capacity for vessels and whether there is a need to improve existing facilities or reduce the impact of boating on the environment. The study could provide a business case for grant applications through the Transport for NSW Boating Now scheme.<br>This study should also include a review of how Council is tracking against the implementation of recommendations from previous studies including "Riverbank Vulnerability Assessment using a Decision Support System (WRL, 2013).<br>The study should include the following scope:<br>• Demand studies to obtain an estimate of boat usage patterns throughout the estuary,<br>• boating surveys,<br>• monitoring of recreational facilities,<br>• community/ stakeholder consultation to address demand for boating and recreation facilities,<br>• assess impact on bank erosion, conflicts between users and address adequacy of facilities. | wake from vessels in the upper estuary, and a high demand for recreational boating,<br>The boating study would identify whether there is any need for additional or upgraded recreational boating facilities as well as identify the impact of boating on the estuarine environment and provide recommendations for addressing this impact. | | | |
| | | | | **Undertake a tidal inundation study of the lower Shoalhaven Estuary.**<br>This should include mapping of vulnerable areas in the lower estuary addressing tidal inundation separately to catchment flooding and include the effects of future sea level rise and changes to tidal planes within the lower estuary as a result of ongoing morphological changes in the river (e.g. the continual widening of Berry's Canal).<br>The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping, as well as an indication of<br>• how tidal wetlands could migrate and evolve with future sea level rise<br>• potential changes in groundwater levels and exposure of acid sulfate soils. | • Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood studies and NSW Estuary Tidal Inundation Exposure Assessment. | Council/ Consultant | By Q4 2020 | $30,000 - $40,000 |
| | | | | **Undertake an assessment of ongoing morphological changes in the lower estuary area** | • It is well known that there have been ongoing morphological changes in the lower estuary as a result of past and present management | Consultant | By Q2 2021 | $30,000 - $50,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
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| | | | | Berrys canal has continued to widen since it was first cut and the tidal prism of the lower estuary as well as morphology of the former entrance at Shoalhaven Heads has been continuing to adjust due to the hydraulics of the entrance at Crookhaven Heads.<br>These effects should be studied to address the following:<br>• Assess morphological changes with reference to historical aerial photography, assess ongoing changes in tidal prism,<br>• analyse photogrammetry data at key locations e.g. Berrys Canal to predict where erosion and sediment deposition is occurring.<br>• Analyse the vulnerability of the estuarine environment and infrastructure from erosion and inundation due to ongoing morphological changes.<br>• Provide recommendations on what ongoing monitoring is needed and what management actions would be needed to address the observed changes. | practices. Understanding these changes and their progression over time is key to developing management responses to include in a CMP. | | | |
| | | | | **Design and implement regular water quality monitoring and sampling program**<br>Water quality sampling frequency should be increased at existing monitoring sites as there is only irregular information available from Aqua Data.<br>For example, weekly regular testing would provide a baseline, and more regular e.g. daily or continuous monitoring at key sites following a significant event.<br>The water quality sampling program should aim to provide more information for local communities with respect to recreational water quality and to assess the impact of storm events, floods and bank erosion on water quality. The reporting can be implemented through the existing Aqua Data portal. | While there are numerous water quality sites in the estuary, more frequent sampling is needed to provide a comprehensive dataset of water quality in the estuary, both as a resource for local communities, and to monitor the environmental health at various locations along the lower estuary. | Council/ Consultant | By Q3 2020 | $5,000 - $15,000 |
| | | | | **Updated Bank erosion study**<br>The aim of this study would be to categorise and assess the coastal hazard of bank erosion along entire | An existing bank erosion study for the entire estuary was last carried out by Patterson Britton and Partners in 2003. It would be prudent to identify whether there are any areas where bank erosion has been ongoing since that time, and | Council/ Consultant | By Q3 2021 | $30,000 - $50,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
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| | | | | estuary and suggest management actions, most recent bank erosion study was done in 2003.<br>This should identify priorities for treatment of erosion, conceptual management actions to address the erosion as well as severity and risk/vulnerability assessment that can be included in vulnerability mapping of the estuary.<br>Study would require boat-based field work and analysis of historical aerial photography/photogrammetry. | whether there are any new areas of bank erosion that have since occurred.<br>The study should identify possible causes for the erosion and conceptual options to address the erosion. | | | |
| | | | | **GIS/aerial image analysis to identify estuarine areas where riparian zones can be established**<br>This can be based on recent high-resolution aerial photography that has recently become available e.g. Nearmap.<br>The GIS-based study would identify these areas based on existing vegetation types, supplemented with ground truthing, identify current land ownership and provide recommendations to consult with/support landowners in establishing an effective riparian zone. | The Scoping Study has identified bank erosion and lack of riparian zones as a risk to be addressed in the lower estuary. The study would identify:<br>• Locations where riparian zones could be established<br>• Recommendations for methods for establishing riparian zones<br>• Benefits to and support for landowners in establishing riparian zones. | Council or consultant | By Q4 2020 | $10,000 - $20,000 |
| | | | | **Identify opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment.**<br>This would require analysis of the urban stormwater network at Nowra and within other urban centres in the Shoalhaven estuary catchment by a drainage engineer, and identification of where treatment measures can be implemented e.g. identifying locations for constructed wetlands, swales and inline stormwater treatment, MUSIC numerical modelling to inform potential improvements in water quality. | This would assist in addressing water quality issues in the estuary which have been identified as a risk in the Scoping Study.<br>This costing may be able to be sourced from Council's stormwater levy. | Council/ Consultant | By Q3 2020 | $20,000 - $30,000 |
| | | | | **Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas.**<br>This should build upon the preliminary risk assessment presented in the Scoping Study based on community and CCB feedback and include additional risks identified from studies recommended above. | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | Council/ Consultant | By Q4 2020 | $10,000 - $20,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
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| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | Council/ Consultant | Q4 2021 – Q4 2022 | $30,000 - $50,000 |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | By Q2 2023 | N/A |
| | | | | **Prepare CMP Report for Shoalhaven River Estuary**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | CMP report to bring together management actions, risk assessments and updated studies addressing management gaps. | Council/ Consultant | Q4 2022 | $90,000 - $120,000 |
| | | | | | | | | TOTAL $285,000 - $435,000 |
| **Lake Wollumboola** | MEDIUM | 2025 | Shorebirds<br>Estuarine Vegetation<br>Water Quality<br>Ecology | **Appointment of Coast and Estuary Management Committee and working groups** | Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q1 2023 | N/A |
| | | | | **Review existing OEH Water Quality and ecological study.**<br>• Broaden scope of existing OEH water quality and ecological study to be suitable for CMP, make findings publicly available.<br>• Undertake regular ecological survey to compile information on shorebird and migratory wader habitat, monitor changes in shorebird numbers and monitor ongoing environmental health of foreshore habitat. | This would allow the community to be better informed about the ecological importance of the estuary and catchment. | Council/ Consultant | By Q2 2023 for review | $10,000 - $20,000 (review only)<br>$10,000 p.a. annual ecological survey (ongoing) |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
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| | | | | • Liaise with local community groups to share knowledge and resources regarding shorebirds and migratory waders in Lake Wollumboola. | | | | |
| | | | | **Design and implement regular water quality monitoring and sampling program**<br>• Water quality sampling frequency should be increased at existing monitoring sites as there is only irregular information available from Aqua Data. For example, weekly regular testing would provide a baseline, and more regular e.g. daily or continuous monitoring at key sites following a significant event.<br>• Assess the NSW Monitoring, Evaluation and Reporting Strategy (MER) estuary health monitoring results to determine the current estuary condition, and compare with results from previous years.<br>• The water quality sampling program should aim to provide more information for local communities with respect to recreational water quality and to assess the impact of storm events, floods and urban runoff on water quality. The reporting can be implemented through the existing Aqua Data portal. | While there are numerous water quality sites in the estuary, more frequent sampling is needed to provide a comprehensive dataset of water quality in the estuary, both as a resource for local communities, and to monitor the environmental health at various locations within the estuary. | Council/ Consultant | By Q3 2023 | $5,000 - $15,000 |
| | | | | **Undertake a tidal inundation study of Lake Wollumboola.**<br>This should include mapping of vulnerable areas addressing tidal inundation and include the effects of future sea level rise. Mapping can draw upon recent flood study assessments.<br>The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping, as well as a review of the effectiveness of existing entrance management policies. | • Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood studies and NSW Estuary Tidal Inundation Exposure Assessment. | Council/ Consultant | By Q3 2023 | $20,000 - $30,000 |
| | | | | **Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas.**<br>This should build upon the preliminary risk assessment presented in the Scoping Study based on community | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas. | Council/ Consultant | By Q3 2023 | $10,000 - $20,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
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| | | | | and CCB feedback and include additional risks identified from studies recommended above. | • It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | | | |
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | Council/ Consultant | Q3 2023 | $15,000 - $30,000 |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | By Q3 2023 | N/A |
| | | | | **Prepare CMP Report for Lake Wollumboola**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | CMP report to bring together management actions, risk assessments and updated studies addressing management gaps. | Council/ Consultant | Q4 2023 | $40,000 - $60,000 |
| | | | | | | | | TOTAL $110,000 - $185,000 |
| **Burrill Lake, Lake Tabourie and Willinga Lake** | MEDIUM | 2025 | Flooding<br>Entrance Management<br>Foreshore Erosion | **Appointment of Coast and Estuary Management Committee and working groups** | Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q1 2022 | N/A |
| | | | | **Undertake a tidal inundation study of Burrill Lake, Lake Tabourie and Willinga Lake.**<br>This should include mapping of vulnerable areas in the estuaries addressing tidal inundation and include the effects of future sea level rise and physical changes to | Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood studies and NSW Estuary Tidal Inundation Exposure Assessment. | Council/ Consultant | By Q2 2022 | $20,000 - $40,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
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| | | | | the estuary entrance channels on tidal prism within the lakes.<br>The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping, as well as a review of the effectiveness of existing entrance management policies. | | | | |
| | | | | **Morphological study of the lower Burrill Lake estuary and entrance.**<br>This study should focus on documenting and understanding the morphological changes that have been occurring in the estuary following removal of the causeway, specifically:<br>• Impact of changed tidal conveyance and impact on tidal prism/erosion due to construction of causeway and future sea level rise<br>• Understanding the mechanisms for these changes<br>• The study would enable the causes of erosion to be understood and ranked in severity. Outcome would inform coastal vulnerability mapping.<br>• Reviewing effectiveness of existing entrance management protocol<br>• Proposing management actions to address the risks arising from these changes. | There has been ongoing erosion within the lower Burrill Lake estuary and it is prudent to identify the cause of the erosion, morphological changes and management actions to address this erosion. | Council/ Consultant | By Q2 2022 | $20,000 - $30,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | **Design and implement regular water quality monitoring and sampling program**<br>Water quality sampling frequency should be increased at existing monitoring sites as there is only irregular information available from Aqua Data.<br>For example, weekly regular testing would provide a baseline, and more regular e.g. daily or continuous monitoring at key sites following a significant event.<br>The water quality sampling program should aim to provide more information for local communities with respect to recreational water quality and to assess the impact of storm events, floods and bank erosion on water quality. The reporting can be implemented through the existing Aqua Data portal. | Existing studies are based on outdated information e.g. pre sewer system upgrade, the existing baseline needs to be better understood. | Council/ Consultant | By Q3 2022 | $5,000 - $15,000 |
| | | | | **Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas.**<br>This should build upon the preliminary risk assessment presented in the Scoping Study based on community and CCB feedback and include additional risks identified from studies recommended above. | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | Council/ Consultant | By Q4 2022 | $10,000 - $20,000 |
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | Council/ Consultant | Q1 2023 | $30,000 - $50,000 |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the | • Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with | Council | Q2 2023 | N/A |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
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| | | | | management action may fall into their area of responsibility. | DPI Crown Lands would be required for management actions that affect Crown Land. | | | |
| | | | | **Prepare CMP Report for Burrill Lake, Lake Tabourie and Willinga Lake**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | • CMP report to bring together management actions, risk assessments and updated studies addressing management gaps.<br>• Separate CMP Chapter Reports to be completed for each estuary within this grouping. | Council/ Consultant | Q4 2023 | $50,000 - $100,000 |
| | | | | | | | | TOTAL $135,000 - $255,000 |
| **Currambene Creek and Moona Moona Creek** | MEDIUM | 2025 | Foreshore Erosion<br>Flooding<br>Navigation<br>Water Quality<br>Stormwater<br>Ecology | **Appointment of Coast and Estuary Management Committee and working groups** | Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | By Q1 2023 | N/A |
| | | | | **Undertake a tidal inundation study of Currambene Creek and Moona Moona Creek.**<br>This should include mapping of vulnerable areas addressing tidal inundation and include the effects of future sea level rise. Mapping can draw upon recent flood study assessments.<br>The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping, as well as a review of the effectiveness of existing entrance management policies. | Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood studies and NSW Estuary Tidal Inundation Exposure Assessment. | Council/ Consultant | By Q3 2023 | $20,000 - $30,000 |
| | | | | **Undertake an assessment of ongoing morphological changes/bank erosion in Currambene Creek**<br>There has been ongoing bank erosion identified in this Scoping Study at Currambene Creek.<br>The aim of this study would be to categorise and assess the coastal hazard of bank erosion within Currambene Creek specifically and suggest management actions.<br>This study should identify priorities for treatment of erosion, conceptual management actions to address the erosion as well as severity and risk/vulnerability | There are no specific studies on bank erosion in the estuary. It would be prudent to identify which areas have been subject to bank erosion so that this risk can be addressed.<br>The study should identify possible causes for the erosion and conceptual options to address the erosion. | Council/ Consultant | By Q3 2023 | $15,000 - $30,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | assessment that can be included in vulnerability mapping of the estuary.<br>Study would require boat-based field work and analysis of historical aerial photography/photogrammetry. | | | | |
| | | | | **Boating study of Currambene Creek**<br>A study on boating facilities within Currambene Creek is required to assess whether there is sufficient capacity for vessels and whether there is a need to improve existing facilities or reduce the impact of boating on the environment. The study could provide a business case for grant applications through the Transport for NSW Boating Now scheme.<br>The study should include the following scope:<br>• Demand studies to obtain an estimate of boat usage patterns throughout the estuary,<br>• boating surveys,<br>• monitoring of recreational facilities,<br>• community/ stakeholder consultation to address demand for boating and recreation facilities,<br>assess impact on bank erosion, conflicts between users and address adequacy of facilities. | This Scoping Study has identified that there is conflict between recreational boat users and non-motorised craft users, as well as bank erosion within Currambene Creek, bank erosion in the upper estuary, and a high demand for recreational boating,<br>The boating study would identify whether there is any need for additional or upgraded recreational boating facilities as well as identify the impact of boating on the estuarine environment and provide recommendations for addressing this impact. | Council/ Consultant | By Q4 2023 | $15,000 - $30,000 |
| | | | | **Design and implement regular water quality monitoring and sampling program**<br>Water quality sampling frequency should be increased at existing monitoring sites as there is only irregular information available from Aqua Data. For example, weekly regular testing would provide a baseline, and more regular e.g. daily or continuous monitoring at key sites following a significant event.<br>The water quality sampling program should aim to provide more information for local communities with respect to recreational water quality and to assess the impact of storm events, floods and bank erosion on water quality. The reporting can be implemented through the existing Aqua Data portal. | While there are numerous water quality sites in Currambene Creek and a site at Moona Moona Creek, more frequent sampling is needed to provide a comprehensive dataset of water quality in the estuary, both as a resource for local communities, and to monitor the environmental health at various locations along the lower estuary. | Council/ Consultant | By Q3 2023 | $5,000 - $15,000 |
| | | | | **Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas.** | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full | Council/ Consultant | By Q4 2023 | $10,000 - $20,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | This should build upon the preliminary risk assessment presented in the Scoping Study based on community and CCB feedback and include additional risks identified from studies recommended above. | breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups to identify key issues with the existing risk assessments used as a starting point. | | | |
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | Council/ Consultant | Q1 2024 | $15,000 - $30,000 |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | • Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | Q2 2024 | N/A |
| | | | | **Prepare CMP Report for Currambene Creek and Moona Moona Creek**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | • CMP report to bring together management actions, risk assessments and updated studies addressing management gaps.<br>• Separate CMP Chapter Reports to be completed for each estuary within this grouping. | Council/ Consultant | Q4 2024 | $40,000 - $60,000 |
| | | | | | | | | TOTAL $120,000 - $215,000 |
| **Shoalhaven Urban and Rural Estuaries** | LOW | 2030 | Weeds<br>Water Quality<br>Urban Runoff<br>Flooding | **Appointment of Coast and Estuary Management Committee and working groups** | Coast and Estuary Management Committee and Working Groups to manage CMP and act as a conduit between Council and the community. | Council | 2023 | N/A |
| | | | | **Undertake a tidal inundation study of the larger estuaries in this grouping.** | Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood | Council/ Consultant | 2023 | $30,000 - $50,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | Recreational Amenity<br>Ecology | This should include mapping of vulnerable areas addressing tidal inundation and include the effects of future sea level rise. Mapping can draw upon recent flood study assessments.<br>The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping, as well as a review of the effectiveness of existing entrance management policies. | studies and NSW Estuary Tidal Inundation Exposure Assessment. | | | |
| | | | | **Design and implement regular water quality monitoring and sampling program**<br>Water quality sampling frequency should be increased at existing monitoring sites as there is only irregular information available from Aqua Data. For example, weekly regular testing would provide a baseline, and more regular e.g. daily or continuous monitoring at key sites following a significant event.<br>The water quality sampling program should aim to provide more information for local communities with respect to recreational water quality and to assess the impact of storm events, floods and urban runoff on water quality. The reporting can be implemented through the existing Aqua Data portal. | While there are numerous water quality sites in the estuaries, more frequent sampling is needed to provide a comprehensive dataset of water quality, both as a resource for local communities, and to monitor the environmental health at various locations within the estuaries. | Council | 2023 | $5,000 - $10,000 |
| | | | | **Identify opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment.**<br>This would require analysis of the urban stormwater network at Ulladulla and within other urban centres by a drainage engineer, and identification of where treatment measures can be implemented e.g. identifying locations for constructed wetlands, swales and inline stormwater treatment, MUSIC numerical modelling to inform potential improvements in water quality. | This would assist in addressing water quality issues in the estuary which have been identified as a risk in the Scoping Study. | Council/ Consultant | 2024 | $10,000 - $15,000 |
| | | | | **Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas.**<br>This should build upon the preliminary risk assessment presented in the Scoping Study based on community and CCB feedback and include additional risks identified from studies recommended above. | • Existing risk assessment in this Scoping Study is at a high level and may not capture the full breadth and depth of issues in the Coastal Environment and Coastal Use areas.<br>• It is suggested that the risk assessment be workshopped through the Coast and Estuary Management Committee and Working Groups | Council/ Consultant | 2024 | $5,000 - $10,000 |

| Estuary or Beach CMP | Priority | CMP Target completion | Key Risks | Information required/ Study Description | Rationale | Responsibility | Likely Timeframe | Likely Costs |
|---|---|---|---|---|---|---|---|---|
| | | | | | to identify key issues with the existing risk assessments used as a starting point. | | | |
| | | | | **Community and Stakeholder consultation for Stage 3**<br>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:<br>• Draft updated risk assessments<br>• Proposed management actions and timing | • To assist in developing management actions.<br>• To capture new issues of importance to the community that have not been captured in previous risk assessments.<br>• To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance. | Council/ Consultant | 2024 | $10,000 - $20,000 |
| | | | | **Obtain agreement on management actions from Government Agencies**<br>Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility. | • Liaise closely with Government Agencies to obtain their agreement on management actions that relate to their specific areas of responsibility. For example, close liaison with DPI Crown Lands would be required for management actions that affect Crown Land. | Council | 2025 | N/A |
| | | | | **Prepare CMP Report for Shoalhaven Urban and Rural Estuaries**<br>• Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual<br>• Public exhibition of draft CMP, finalisation, adoption. | • CMP report to bring together management actions, risk assessments and updated studies addressing management gaps.<br>• Separate CMP reports addressing each specific estuary. | Council/ Consultant | 2025 | $40,000 - $60,000 |
| | | | | | | | | TOTAL $100,000 - $165,000 |

# 8 Conclusions and Recommendations

This Scoping Study documents Stage 1 in the development of a Coastal Management Program (CMP) for the Shoalhaven coastline. It sets the scene for Shoalhaven City Council's coastal planning process leading to the development of a Coastal Management Program (CMP), as required by the NSW *Coastal Management Act* 2016.

The Coastal Management Program, or CMP, may be thought of as a natural progression of the existing coastal management processes in place within the Shoalhaven and is intended to encompass and build upon the large body of work already carried out with respect to coastal management in the Shoalhaven, by addressing any management gaps in the existing arrangements. The purpose of a Coastal Management Program is to support the goals and objectives of the NSW Government's Coastal Management legislation. It is intended to manage coastal issues, vulnerabilities and risks as well as help foster opportunities for coastal communities.

The Shoalhaven Coastal Zone Management Plan and Estuary Management Plans were put together on the basis of the pre-existing coastal management framework that existed under the former NSW *Coastal Protection Act* 1979. As this has now been replaced by a new coastal management framework, there is a need to prepare and implement a new CMP to cover the Shoalhaven coastline.

The overall aim of the Scoping Study is to identify priority issues and management gaps in preparation for the development of the CMP.

It also:

- Confirms which of the four 'management areas' identified by the NSW Government are relevant to the CMP i.e. Coastal Wetlands and Littoral Rainforests Area, Coastal Vulnerability Area, Coastal Environment Area, Coastal Use Area
- Confirms the nature of the issues affecting each of the relevant management areas
- Summarises current management practices and arrangements and identifies whether changes are required or gaps need filling
- Identifies the strategic objectives for management of the coast
- Identifies further studies that are required
- Proposes a timetable for completion of the CMP
- Develops a business case for the preparation and implementation of the CMP.

Agency and stakeholder engagement has been carried out to assist in developing the Scoping Study. A community engagement program was put together specifically for this Scoping Study. Six community workshops and drop-in information sessions were held in September/October 2019 specifically to inform this Scoping Study. Sessions were held at the following locations:

- Shoalhaven Heads

- St Georges Basin
- Sussex Inlet
- Lake Conjola
- Ulladulla
- Nowra.

These sessions were facilitated by specialist communication consultants, RPS Group. A total of 233 people attended these sessions, with 550 pieces of feedback collected as well as a number of formal submissions. These sessions have captured a range of issues of concern and feedback from the community.

Council have also produced a questionnaire open to the public to provide insight into their key values, use and issues for the coastline and estuaries.

A First Pass Risk Assessment has also been developed as part of this Study, to identify key issues, risks and information gaps.

From the community engagement and risk assessment, recommendations for the formation of a new Coast and Estuary Management Committee, priorities for development of CMPs for the coast and estuaries and a forward program outlining next steps have been developed.

The new CMP will build on the work undertaken in 2012 in developing the Shoalhaven Coastal Zone Management Plan (CZMP), which was updated in 2017/18 and forwarded to the Minister for the Environment for certification in June 2018.

# 9 References


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# Appendix A
# Legislative Context

# Appendix B
# Detailed Environmental and Physical Context

# Appendix C
# Agency Stakeholder Consultation Materials

# Appendix D
# RPS Consultation Outcomes Report

# Appendix E
# Council Scoping Study Questionnaire

# Appendix F
# Stakeholder and Community Engagement Strategy

# Appendix G
# First Pass Risk Assessment

# Appendix H
# Relevant Existing information

# Appendix I Public Exhibition Outcomes