



Shellharbour City Council

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Shellharbour Coastal Management Program
Scoping Study-Summary Report



Shellharbour CMP Scoping Study

Summary Report

Shellharbour City Council

April 2023

311015-00234

Advisian
Worley Group

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PROJECT 311015-00234 - CS-RPT-002: Shellharbour CMP Scoping Study - Summary Report


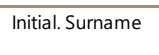
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Executive summary

Shellharbour Coastal Management Program Stage 1 Scoping Study – at a glance

About the CMP

The CMP is a plan for the management of the coastal zone of Shellharbour and Elliot Lake

Addresses any existing risks and gaps in the existing arrangements for management of the coastline.

About the Scoping Study

Confirms the issues affecting the coastline

Summarises current management practices and identifies whether changes are required, or gaps need filling

Identifies the strategic objectives for managing the coast and 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.

Next Steps

Development of CMPs for the Shellharbour Open Coast and Elliot (Little) Lake

Address the known gaps in our knowledge for the high priority areas

Develop management options to address the risks

Achieve buy-in and in-principle agreement on the management actions from the community and all stakeholders.

What is a Scoping Study?

This Scoping Study comprises Stage 1 in the development of a Coastal Management Program (CMP) for the Shellharbour coastline. The Stages of the CMP process are provided in Figure 1.

The Scoping Study sets the scene for Shellharbour 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.

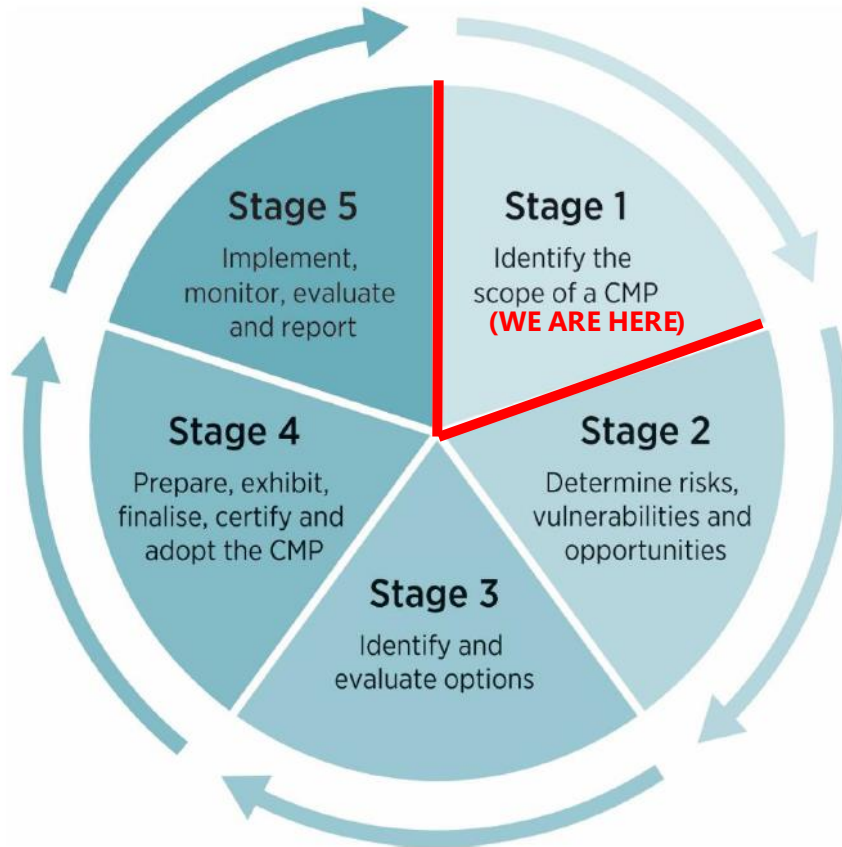


Figure 1 - Stages in preparing and implementing a CMP (Coastal Management Act 2018)

What is a Coastal Management Program?

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

The new CMP will build on the work undertaken in 2018 in developing the Shellharbour Coastal Zone Management Plan (CZMP), which was certified by the Minister for the Environment in June 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 Shellharbour region.

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

The Shellharbour City Council community is one which values the ‘preservation and enhancement of...(its)... natural environment’ and ‘efficient use of...(its) natural resources and a sustainable and healthy built environment’ (Shellharbour City Council, 2018). The population also values being a part of a local community and the range of recreational opportunities that living in the area provides, such as camping, fishing, swimming, surfing and bushwalking (Shellharbour City Council, 2018).

The Vision and Purpose for the CMP were developed by the Shellharbour Coastal Management Committee and are given below.

Vision: An Accessible and connected city, meets a diverse, safe & sustainable environment

Purpose: To develop a program for the sustainable management of our open coast, Little Lake and harbours to conserve and enhance social, economic, cultural and environmental values, enjoyed by all.

The Strategic Objectives for the CMP as outlined in Section 2.2 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 context of Shellharbour
- 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 the Shellharbour Local Environment Plan 2013, Development Control Plan, Local Strategic Planning Statement and Community 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?

Shellharbour City Council manages 7km of coastline comprising four beaches, two boat harbours, and one estuary (not including Lake Illawarra, the management of which is the subject of a separate CMP).

The Council managed beaches and estuaries of the Shellharbour region together with the designated Coastal Management Areas are shown in Figure 2.

A detailed account of the environmental and physical context of the open coast and estuaries in Shellharbour is provided in **Appendix B** of the main Scoping Study report.

The Shellharbour CMPs will broadly cover the coastal zone and the estuarine catchments draining to the ocean along Shellharbour local government area's coastline between Windang Island in the north and Bass Point 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. However, the CMP will provide comments on the management of these areas (including Killalea Regional Park) also.

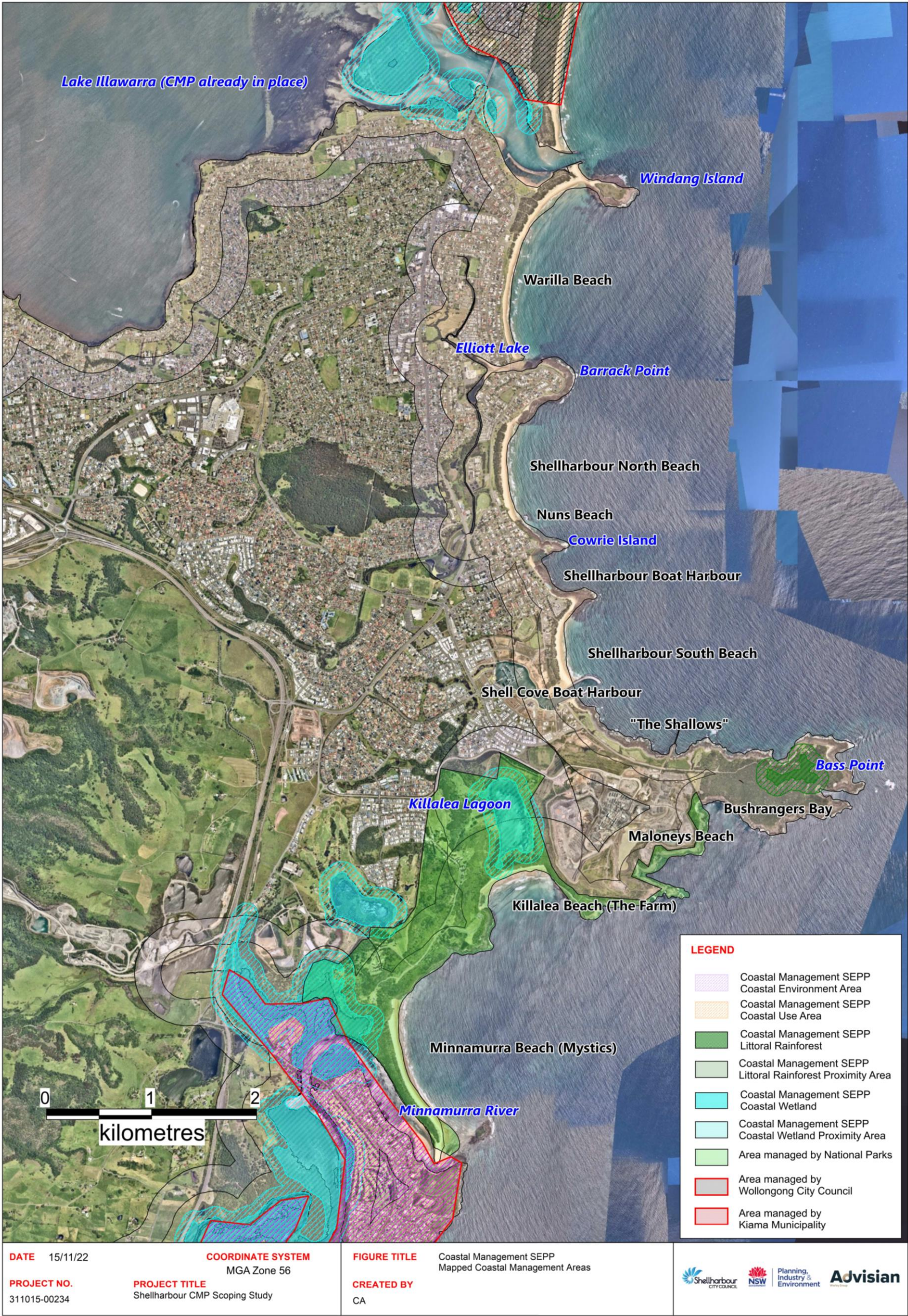


Figure 2 - Council-managed beaches and estuaries stretching from Windang Island to Bass Point, and Coastal Management Areas



Warilla Beach Sunrise

Elliot Lake on the Shellharbour coastline provides a diverse, healthy and productive aquatic habitat of high ecological value.

The beaches and headlands provide significant visual amenity benefits to Shellharbour'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.

Consultation

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

Shellharbour City Council has undertaken extensive community and stakeholder engagement regarding the management of the coastal areas under its management. This engagement has been completed to inform the development of various plans, including the recent Shellharbour Coastal Zone Management Plan, 2018 and associated studies.



Bass Point Reserve

The Shellharbour Coastal Zone Management Plan, 2018 was developed to 'provide practical actions to address the risks to assets and land from coastal hazards (erosion, recession, inundation and slope instability) at present to 2100' (BMT WBM, 2018).

Key engagement and communication activities undertaken to support the development of that Plan included:

- A project webpage, including an online survey
- A colour brochure detailing frequently asked questions- available in print and online
- A community drop-in session, where the community were provided the opportunity to speak with the study team
- Meetings with key stakeholders including state agencies- NSW Office of Environment and Heritage, Lake Illawarra Authority and others.
- Risk assessment workshop involving Council and key state agencies
- Presentation of management option to community and other stakeholders

- Public exhibition of the Coastal Zone Management Plan (BMT WBM,2018).

Earlier engagement regarding coastal management as well as engagement undertaken to inform other Council plans, such as the Shellharbour City Council Community Strategic Plan 2018-2028 has informed the development of the Community Engagement Strategy for the CMP and will guide engagement and communications throughout the CMP process.

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

A workshop was held with the Shellharbour Coastal Management Committee in April 2022 which included Council, community 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 stakeholders
- Identify the role and concerns of the committee members and Agency representatives with a stake in coastal management in Shellharbour
- Formulate a Vision, Purpose, Strategic and specific Management Objectives for the Shellharbour CMP
- Identify gaps in the existing CZMP and EMPs
- Gather some suggestions on key issues and risks that are relevant to the management of the coastline.

A community drop-in information session was held at the Shellharbour Civic Centre in April 2022 specifically to inform this Scoping Study. The session provided an opportunity for community members to speak with the study team directly on key issues and risks for the coastline of Shellharbour, as well as view a series of colour posters and flyers that provided information on the CMP and key issues and risks within the study area. In addition, a map was provided to allow drop-in session participants to pinpoint locations where issues of concern were identified.

An online community survey to capture key information on coastal issues and values was developed and posted on Council's "Let's Chat" webpage, which was open from March to May 2022, the survey received over 100 responses. The Survey and results are provided in **Appendix E** of the main Scoping Study report.

Individual meetings were held with local stakeholders including:

- the Illawarra Local Aboriginal Land Council
- NSW DPI Fisheries
- NSW Local Land Services
- NSW Crown lands
- Transport for NSW
- NSW DPE - Department of Planning
- Shellharbour Council's Planning division

- NSW DPE - National Parks and Wildlife Service
- Shellharbour Council's Access and Inclusion Advisory Committee.

What were the results of the consultation?

Stakeholders expressed the importance of the natural environment, including flora and fauna, as well as access to beaches and the foreshore, as the two key elements that they value most about Shellharbour's coast. Visual amenity and the local coastal lifestyle are also key important attributes of the coast valued by the local community.

Overall, respondents who participated in the consultation expressed feelings of concern around the effect of climate change on the foreshore, as well as beach and foreshore erosion, stormwater pollution and catchment health, degradation of ecosystems and habitats, and weed infestation. Access to the coast, water quality, the need to protect native wildlife and visual amenity of the coast were identified as being of great importance to stakeholders.

The key insights and issues identified from the consultation sessions are listed in Table 1 and discussed in Section 5 of this report. Information provided to the public as part of the engagement process is shown in **Appendix E** of the main Scoping Study report.

Council's online survey received 107 responses to May 2020. The survey identified that Council manages its coastal recreational facilities very well, however, there is room for improvement in management of foreshore vegetation, weeds, nature reserves and foreshore access routes. The detailed results of the Questionnaire are provided in **Appendix E** of the main Scoping Study report.

Table 1 – Key insights from community consultation sessions for this Scoping Study

Area	Issue
Bass Point	Bushland being damaged by ad-hoc/illegal parking Impacts on natural environment from boating Foreshore access for diving/snorkelling Conflicts between boaters and swimmers/snorkellers Education and signage
Shellharbour South Beach	Impact of Shell Cove Boat Harbour on beach erosion and wave climate of Shellharbour South Beach Management of off-lead dog areas Beach Safety
Shell Cove Boat Harbour	Maintaining water quality Ongoing beach nourishment and rehabilitation of the beaches north and south of the breakwaters Monitoring of the breakwater/groyne and access channel wave monitoring to ensure the wave climate is suitable. Pedestrian access/safety on the breakwaters

Area	Issue
Shellharbour Harbour	<p>Boat ramp can be difficult for launching and retrieving vessels due to ocean surging.</p> <p>A review of the role this smaller harbour now that the Shell Cove Boat Harbour is operational is required.</p>
Shellharbour North Beach	<p>Coastal erosion at southern end with the surf lifesaving club and some properties within the zone impacted by coastal processes.</p> <p>Difficulty of access due to coastal erosion</p> <p>Connectivity of coastal walkways</p>
Barrack Point	Cliff Instability
Warilla Beach	<p>Coastal erosion</p> <p>Upgrade of seawall – impact on erosion</p> <p>Wind-blown sand at north end</p> <p>Management and destruction of dune vegetation</p>
Windang Island	<p>Cliff instability.</p> <p>Preservation of aboriginal cultural heritage</p> <p>Reliability of access</p> <p>Weeds and dune vegetation</p> <p>Safety for rock fishers</p>
Elliot Lake/Little Lake	<p>Water quality</p> <p>Flooding and tidal inundation</p> <p>Adhoc structures around the lake foreshore</p> <p>Human interactions</p> <p>Entrance management</p> <p>Erosion</p> <p>Sedimentation of the entrance area</p> <p>Navigability for recreational craft</p> <p>Preservation of Aboriginal heritage and ecology</p>
Overall	<p>Climate Change impacts on coast</p> <p>Beach and Foreshore Erosion</p> <p>Loss and degradation of foreshore ecology</p> <p>Management of nature reserves</p> <p>Stormwater pollution</p> <p>Community education</p>

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 efficiently 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 D** of the main Scoping Study report.

What are the identified coastal and estuary management risks faced in the Shellharbour LGA?

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 Shellharbour open coast and estuaries. The full risk assessment is presented in **Appendix F** of the main Scoping Study report.

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

- 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.

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 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

Table 2 - Key Issues, Existing Management Controls, Key Performance Indicators and Information Gaps

Issue/Risk	Existing Management Controls	Key Performance Indicator	Additional information required
<p>Poor water quality from industrial or urban runoff affecting the estuary ecology and estuarine vegetation</p> <p>Discharge of low pH (acid) water due to urban development and excavation in the floodplain</p>	<p>Licensing of industrial discharges</p> <p>Implementing urban stormwater treatment technologies</p> <p>Provision of riparian zones along estuarine foreshores</p> <p>Public education</p> <p>Beachwatch recreational water quality monitoring at Shellharbour North and Warilla</p>	<p>Measurable improvements over time in water quality indicators (chlorophyll, nutrients, pathogens, suspended sediments)</p>	<p>Regular water quality monitoring program for Elliot Lake and analysis and reporting of results</p> <p>Identification of opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment</p>
<p>Coastal inundation, emergency management and the management of estuary entrance to reduce flood risk</p> <p>Tidal inundation of foreshore private and public assets from climate change and sea level rise</p>	<p>Flood studies to identify at risk areas</p> <p>Emergency action plans/floodplain management plans</p> <p>Planning controls to reduce community risk</p>	<p>No future approvals of inappropriate development in flood risk areas</p> <p>Emergency management procedures in place</p>	<p>Covered in Elliot Lake Floodplain Management Plan</p>
<p>Poor access or insufficient facilities for recreational use and disability access</p>	<p>Provision of additional facilities for recreational users</p>	<p>Improved accessibility of waterways to the community</p>	<p>Demand studies, monitoring of recreational facilities, community/ stakeholder consultation to address</p>

Issue/Risk	Existing Management Controls	Key Performance Indicator	Additional information required
Conflict between users of the waterways e.g. powered craft and swimmers/snorkellers			demand for recreation facilities and assess disability access. Plan of Management for Bass Point Reserve
Bank erosion at Elliot Lake caused by wind waves and flood flows Siltation caused by urban runoff and ingress of sand from tidal and wave processes	Provision of riparian zones and foreshore erosion protection works	Reduction in bank erosion visible from boat surveys and aerial imagery Improved estuarine foreshore habitat Reduction in suspended sediment concentrations	Bank erosion surveys to identify priority sites for revegetation/erosion protection works Regular visual inspections of bank erosion protection measures Education/incentives for private landholders to manage foreshore erosion Mapping of existing foreshore protection works and erosion within Elliot Lake
Spread of weeds caused by previous landuse practices, urban runoff and proximity to urban areas Damage to estuarine vegetation leading to loss of habitat for fish and degradation of estuarine ecology, caused by sedimentation, bank erosion, or deliberate damage of foreshore vegetation to improve views Threat to threatened species including waders and shorebirds from feral animals.	Provision of riparian zones and weed control measures along estuarine foreshores Implementing urban stormwater treatment technologies Public education Bushcare/Dunecare groups	Measurable reduced occurrence of weeds along foreshore	Ecological surveys to identify occurrence of weeds in Elliot Lake and beach dunes Updated ecological surveys within Elliot Lake 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 Resourcing for dunecare/landcare groups
Risk to infrastructure, coastal use areas and environmental values from coastal hazards including coastal erosion, beach	Development controls through DCP for coastal areas	No damage to public or private infrastructure from coastal erosion	Updated coastal hazard assessment for Shellharbour South Beach, Boollwarroo Parade

Issue/Risk	Existing Management Controls	Key Performance Indicator	Additional information required
<p>recession, coastal inundation including increased future risk from climate change</p> <p>Impact of new developments on coastal processes</p>	<p>LGA-wide coastal hazard studies and mapping</p> <p>Implement management actions from CZMP and coastal risk assessment</p>		<p>Inclusion of most recent coastal hazard information and relevant development controls in Council DCP</p> <p>Completion of coastal protection works at Warilla Beach</p> <p>Regular updates every few years to coastal hazard assessments and mapping for key beaches where infrastructure is at risk</p> <p>Regular review every few years of coverage and effectiveness of coastal development controls</p> <p>Regular survey and monitoring of known key coastal erosion/inundation hotspots</p> <p>Investigation into ongoing sand loss at the southern end of Shellharbour South Beach</p> <p>Adoption of updated coastal hazard assessment for Shellharbour South Beach based on morphological changes occurring as a result of construction of the Shell Cove Boat Harbour</p>
<p>Risk to infrastructure and safety from geotechnical hazards in cliff and bluff areas</p>	<p>Implement Cliff and Bluff areas risk assessment recommendations</p> <p>DCP for cliff and bluff areas</p> <p>Implement management actions from CZMP</p>	<p>No damage to public or private infrastructure or injuries</p>	<p>Covered in CZMP, except for slope behind Nuns Beach and Windang Island</p>

Issue/Risk	Existing Management Controls	Key Performance Indicator	Additional information required
<p>Impact of informal beach accessways on dune vegetation, including vehicle access</p> <p>Loss of or damage to cultural heritage sites due to poor documentation, coastal erosion and surrounding landuses</p> <p>Damage to coastal accessways from minor storms</p> <p>Wind-blown dune erosion due to damage to dune vegetation.</p> <p>Safety for rock fishers and recreational activities.</p>	<p>Signage</p> <p>Dune revegetation</p> <p>Fencing</p>	<p>Healthy dune vegetation</p> <p>Stabilised dunes</p>	<p>Identification and assessment of cultural heritage sites and installation of appropriate protection measures</p> <p>Identification and assessment of informal beach accessways</p> <p>Dune vegetation surveys</p> <p>Best practice guidelines for post-storm repair of beach accessways</p> <p>Community education</p>
<p>Provision of sufficient facilities to cater for the impact of high visitor numbers.</p> <p>Lack of facilities for all-ability beach and foreshore access</p>	<p>Demand studies, visitor surveys</p>	<p>Reduced overcrowding at recreation sites during peak tourist season</p>	<p>Demand studies, monitoring of key recreational areas, community/ stakeholder consultation, Plan of Management for Bass Point and Killalea Reserves to manage visitor numbers, facilities, traffic, access for recreational users and manage conflicts between boating and snorkelling/diving</p>
<p>Risk of inappropriate planning controls and development being approved in inappropriate locations</p>	<p>Coastal hazard and flood studies to define level of risk</p> <p>Council DCP</p>	<p>No damage to private or public infrastructure</p>	<p>Inclusion of most recent coastal hazard information and relevant development controls in Council DCP</p> <p>Regular updates every few years to coastal hazard assessments and mapping for key beaches where infrastructure is at risk</p> <p>Regular review every few years of coverage and effectiveness of coastal development controls</p>

Issue/Risk	Existing Management Controls	Key Performance Indicator	Additional information required
			Regular survey and monitoring of known key coastal erosion/inundation hotspots Effective communication and information for Councillor decision makers
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.	Council website for provision of information, community consultation Regular meetings of coastal and estuary management committees Provision of coastal and estuary-related education resources for schools and community groups	Improved community understanding of coastal issues and risks Community involvement in coastal and estuary management projects that align with the CMP objectives	Implementation of CMP Community Engagement Strategy and Action Plan

How much do we already know and what do we still need to learn so we can better manage our coast and Little Lake?

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. A list of all known relevant documents, together with a summary of the key documents, is provided in **Appendix B** of the Scoping Study report.

An extensive body of specialised studies and reports have been undertaken and included in the existing CZMP. However, the development of the Shell Cove Boat Harbour has modified the coastal processes around Shellharbour South Beach, with studies of the coast in this area since being undertaken as part of the consent process for the Shell Cove Boat Harbour development. The outcomes of these studies are to be made available and included within the CMP for the open coast. Further, advanced planning and design for a new seawall to replace the existing 1960's seawall at Warilla Beach is underway, which will provide improved protection against erosion and coastal inundation for urban development at Warilla Beach. The CMP will need to allow for inclusion of the most recent coastal hazard information and the changing nature of the coastline within Council's existing planning framework.

In addition to incorporating the latest information into the CMP, it is recommended that Council work to forge partnerships with local community 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.

Where to from here?

In consideration of the risks, complexities and existing level of development of coastal management at Little Lake and the open coast of Shellharbour, it is recommended that Council proceed with a CMP for Little Lake and another separate CMP for the open 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 the tables below.

The next step in the process is for Council's 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 CMPs to be adopted by the end of 2023.

Table 3 – Proposed CMP Implementation Program – Open Coast

Estuary or Beach CMP	CMP Target completion	Key Risks	Information required/ Study Description	Rationale	Responsibility	Likely Timeframe	Likely Costs
Shellharbour Open Coast	Stage 2 complete by Q4 2023	Vulnerability of infrastructure to erosion and inundation	Develop Planning Proposal to update LEP mapping based on existing Coastal hazard assessments	<ul style="list-style-type: none"> 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 and geotechnical hazards. 	Consultant	By Q1 2023	\$10,000
	Stage 3 complete by Q2 2024	Safety	Include development controls for coastal hazards in Council's DCP				
	Ongoing review and consultation	Recreational amenity Dune vegetation Development Controls	Updated assessment of coastal hazards at Shellharbour South Beach (Boollwarroo Parade) <ul style="list-style-type: none"> Coastal hazard mapping has been carried out for this area as part of the Shell Cove Boat Harbour development and can be formally adopted by Council This would enable updated coastal vulnerability mapping to be provided for inclusion in Council's DCP. 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. Investigation into observed beach changes at the southern end of Shellharbour South Beach 	<ul style="list-style-type: none"> This area has undergone significant changes to coastal processes since construction of the Shell Cove Boat Harbour and these need to be taken into account in an updated hazard assessment for Shellharbour South Beach. The wave transformation model can be used as a tool to investigate historical changes in wave climate along the beach. 	Consultant	By Q1 2023	\$10,000 - \$20,000 (assuming mapping for Shell Cove is adopted)
			Review of existing Geotechnical hazards and mapping <ul style="list-style-type: none"> Inspection and mapping of areas not mapped in SMEC (2010) study as per recommendations of CZMP. Coastal hazard assessment for shorelines with combined rocky and sandy foreshores as per recommendations in CZMP High-level inspection of slopes mapped in SMEC (2010) for comparison with previous assessment <p>Updated mapping should be provided to Council in GIS format. Proposed development controls as per recommendations of CZMP that would be based on the mapping, to include in an update of Council's DCP.</p>	<ul style="list-style-type: none"> Currently geotechnical hazard mapping dates from 2010, existing slopes require inspection to assess whether any significant changes in risk or rock falls have occurred. Geotechnical hazard mapping does not include all areas e.g. Nuns Beach, Windang Island and beach erosion mapping does not include all coastal foreshores in the study area. Cliff and bluff areas that may be subject to geotechnical hazard are not currently mapped in Council's LEP/DCP. 	Geotechnical/ Coastal engineering Consultant	By Q3 2023	\$40,000 - \$60,000

Estuary or Beach CMP	CMP Target completion	Key Risks	Information required/ Study Description	Rationale	Responsibility	Likely Timeframe	Likely Costs
			<p>Updated risk assessment for environment, coastal use areas.</p> <ul style="list-style-type: none">This should build upon the preliminary risk assessment presented in the Scoping Study based on community and Coastal Management Committee feedback.	<ul style="list-style-type: none">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.There is already a detailed risk assessment for the Coastal Vulnerability Areas relating to the coastline, undertaken as part of the CZMP.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, as part of Stage 2 and 3 of the CMP process.	Council	By Q2 2023	\$10,000 - \$20,000
			<p>Shellharbour Coastal Values Project – Aboriginal cultural values, current status, risks and vulnerabilities.</p>	<ul style="list-style-type: none">The Aboriginal cultural values and assets within the Shellharbour LGA coastal region remain partly unknown. Aboriginal coastal cultural values and assets, and those still to be identified, are at risk due to coastal hazards. These risks are significant enough to warrant a detailed technical study to inform the preparation of the CMP.This technical study will apply a community-led placed-based approach to identify the known and predicted Aboriginal cultural values within the Shellharbour LGA coastal regions. These values will be determined by Traditional Owners, custodians and knowledge holders. Aboriginal people will play an active role in the cultural values assessments and be central to controlling how these values are best protected, conserved, and/or managed.The technical study will undertake a cultural values vulnerability assessment, utilising the outcomes of the key hazards assessments to determine the risks, vulnerabilities and opportunities relevant to Aboriginal Cultural Values. Coastal management issues relating to Aboriginal cultural values and assets and high-level actions and/or interventions to manage the impacts of coastal hazards as identified by the Aboriginal community will inform Stages 3 – 5 of the CMP process	ILALC	By Q4 2023	\$30,000 - \$60,000
			<p>Develop and update draft management actions for Stage 3</p>	<ul style="list-style-type: none">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 Q3 2023	\$40,000 - \$60,000
			<p>Community and Stakeholder consultation for Stage 3</p> <p>Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to:</p> <ul style="list-style-type: none">Draft updated risk assessmentsProposed management actions and timing	<ul style="list-style-type: none">To assist in developing management actions.To capture new issues of importance to the community that have not been captured in previous risk assessments.To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance.	Council comms team, Consultant	By Q4 2023	\$30,000 - \$50,000

Estuary or Beach CMP	CMP Target completion	Key Risks	Information required/ Study Description	Rationale	Responsibility	Likely Timeframe	Likely Costs
			Obtain agreement on management actions from Government Agencies Depending on the management actions developed, specific Agencies may need to be consulted as the management action may fall into their area of responsibility.	<ul style="list-style-type: none"> 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 2023	N/A
			Prepare CMP Report for the Shellharbour Coastline <ul style="list-style-type: none"> Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management Manual Public exhibition of draft CMP, finalisation, adoption. 	<ul style="list-style-type: none"> CMP report to bring together management actions, risk assessments and updated studies addressing management gaps. 	Consultant	By Q1 2024	\$50,000 - \$80,000
							TOTAL \$220,000 - \$360,000

Table 4 – Proposed CMP Implementation Program – Elliot Lake

Estuary or Beach CMP	CMP Target completion	Key Risks	Information required/ Study Description	Rationale	Responsibility	Likely Timeframe	Likely Costs
Elliot Lake	Stage 2 complete by mid 2023	Vulnerability of infrastructure to erosion and inundation	Compile water quality data collected by DPE and Council and undertake water quality and environmental health study of Elliot Lake. <ul style="list-style-type: none"> Water quality data collection has been taking place at a number of sample locations within Elliot Lake and its catchment. 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. 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. 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. Consider installation of a temporary real-time telemetered water quality buoy to assess water quality changes in response to estuary management initiatives. Undertake updated estuary vegetation mapping and include in coastal wetland/littoral rainforest Coastal Management Area if appropriate. 	<p>This is needed as there is a perception in the community of poor water quality in the estuary. The water quality and environmental health study would provide much needed background data to inform the CMP.</p> <p>Existing water quality data for the lake is not publicly available. Baseline water quality information in the lake would be supplemented by the recommended event water quality sampling and analysis of existing data recommended here.</p> <p>Updated estuary vegetation mapping would allow a determination on whether any areas in the estuary should be included within the coastal wetland/littoral rainforest CMA under the Resilience and Hazards SEPP. Existing estuary vegetation mapping dates from 2006.</p>	Council/ Consultant	By Q2 2023	\$50,000 - \$70,000
	Stage 3 complete by Q4 2023	Water Quality					
	Ongoing review and consultation	Coastal Inundation					
		Foreshore Erosion					
		Recreational amenity					
		Community Education					
		Estuary ecology					
			Review and update of available data on Elliot Lake (Stage 2) <ul style="list-style-type: none"> Analyse most recent water level, aerial photographs/ photogrammetry, water quality data on the estuary Assess the extent of shoaling of the entrance area since the completion of the 2003 Estuary Management Plan and 2014 EMP Review Assess the vulnerability of Elliot Lake infrastructure and coastal environment/coastal use areas against tidal inundation, including changes in tailwater levels due to future sea level rise. This should include mapping of vulnerable areas in the estuary addressing tidal inundation and include the effects of future sea level rise. The outcome would be a set of updated tidal inundation maps that would be included in Council's coastal vulnerability mapping, Categorise and assess bank erosion within Elliot Lake and suggest management actions. 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. Study would require field work and analysis of historical aerial photography/photogrammetry. 	<ul style="list-style-type: none"> An updated review of available data on water levels, foreshore erosion/protection works bathymetry and water quality 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. This is needed because the most recent update of estuary processes study was in 2003, and estuary/catchment conditions/community expectations have evolved since that time. Tidal inundation hazard has not been assessed for the lower estuary area beyond the existing flood studies and NSW Estuary Tidal Inundation Exposure Assessment. Existing data would be used to inform the review. 	Consultant	By Q3 2023	\$60,000 - \$80,000
			Identify opportunities for urban runoff treatment e.g. provision of swales, inline stormwater treatment.	<ul style="list-style-type: none"> 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

Estuary or Beach CMP	CMP Target completion	Key Risks	Information required/ Study Description	Rationale	Responsibility	Likely Timeframe	Likely Costs
			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.				
			Detailed risk assessment for coastal environment, coastal vulnerability, coastal use areas. <ul style="list-style-type: none">This should build upon the preliminary risk assessment presented in the Scoping Study based on community and Coastal Management Committee feedback.	<ul style="list-style-type: none">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. 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 2023	\$5,000 - \$10,000
			Develop management actions for Stage 3	Management actions to be developed based on the outcome of the detailed risk assessment, updated information from Stage 2 and in close consultation with the Coast and Estuary Management Committee.	Council/ Consultant	By Q3 2023	\$20,000 - \$30,000
			Community and Stakeholder consultation for Stage 3 Community and Stakeholder Consultation would need to occur during the development of the Draft CMP to obtain specific feedback in relation to: <ul style="list-style-type: none">Draft updated risk assessmentsProposed management actions and timing	<ul style="list-style-type: none">To assist in developing management actions.To capture new issues of importance to the community that have not been captured in previous risk assessments.To engage with specific Stakeholder groups to ensure that the CMP considers issues of importance.	Council/ Consultant	Q3 2023	\$30,000 - \$40,000
			Obtain agreement on management actions from Government Agencies 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 2023	N/A
			Prepare CMP Report for Elliot Lake <ul style="list-style-type: none">Draft CMP report for Stage 3 activities to be prepared in accordance with the requirements of the NSW Coastline Management ManualPublic exhibition of draft CMP, finalisation, adoption.	CMP report to bring together management actions, risk assessments and updated studies addressing management gaps.	Council/ Consultant	Q1 2024	\$40,000 - \$60,000

Acronyms and abbreviations

Acronym/abbreviation	Definition
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AMP	Asset Management Plan
AS/NZS	Australian and New Zealand Standard
BPPOM	Bass Point Reserve Plan of Management
CBA	Cost Benefit Analysis
CEA	Coastal Environment Area defined under the SEPP (Resilience and Hazards)
CLM	Crown Land Management Act 2016
CM	Coastal Management
CMA	Coastal Management Area
CMP	Coastal Management Program
CSP	Community Strategic Plan
CUA	Coastal Use Area defined under the SEPP (Resilience and Hazards)
CVA	Coastal Vulnerability Area defined under the SEPP (Resilience and Hazards)
CWLRA	Coastal Wetland and Littoral Rainforest Area defined under the SEPP (Resilience and Hazards)
CZMP	Coastal Zone Management Program, adopted by Shellharbour Council and certified in 2018
DCP	Development Control Plan
DPE	Department of Planning and Environment
DoI	Department of Industry
DPI	Department of Primary Industry (Fisheries)
EMC	(Lake Illawarra) Estuary Management Committee
EMP	(Elliot Lake – Little Lake) Estuary Management Plan
EPL	Environmental Protection License
GIS	Geographic Information Software

Acronym/abbreviation	Definition
ICOLL	Intermittently Closed and Open Lake or Lagoon
ILALC	Illawarra Local Aboriginal Land Council
IPCC	Intergovernmental Panel on Climate Change
IP&R	Integrated Planning and Reporting Framework
ISO 31000	International Standards Organization Risk Management Standard
km	kilometres
LEOCON	Local Emergency Operations Controller
LEP	Local Environment Plan
LIDAR	Light Detection and Ranging, refers to laser scanning of the earth's surface to produce a high-resolution ground elevation map
LG	Local Government (Act)
LGA	Local Government Area
m	metres
MEM	Marine Estate Management
MER	NSW Monitoring, Evaluation and Reporting Strategy
MEERA	Modern Engineering Equivalent Replacement Asset
MGA	Map Grid of Australia, a spatial coordinate system
MIDO	Maritime Infrastructure Delivery Office of Transport for NSW
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
NPWS	National Parks and Wildlife Service
NSW	New South Wales
OEH	Office of Environment and Heritage, now Department of Planning and Environment (DPE)
POM	Plan of Management
PRP	Pollution Reduction Program (refers to Sydney Water's wet weather overflow abatement pollution reduction program)
Q1, Q2, Q3, Q4	Quarter periods of a calendar year
RCP	Representative Concentration Pathway, a scenario for ongoing carbon emissions for estimating the impacts of future climate change
REF	Review of Environmental Factors
RMS	Roads and Maritime Services

Acronym/abbreviation	Definition
SEPP	State Environmental Planning Policy
SES	NSW State Emergency Service
SFMP	Shellharbour Foreshore Management Plan
SLR	Sea Level Rise
SLSC	Surf Life Saving Club
SLSNSW	Surf Life Saving NSW
STP	Sewage Treatment Plant
STS	Sewage Treatment System
SWAN	Simulating Waves Nearshore, a numerical wave transformation model for estimating wave conditions at different locations along the coast.
TfNSW	Transport for NSW, formerly RMS (Roads and Maritime Services)
UoW	University of Wollongong
WWTP	Waste Water Treatment Plant

Glossary

Term	Definition
Accretion	The accumulation of (beach) sediment, deposited by natural fluid flow processes.
Aeolian	Adjective referring to wind-borne processes.
Annual Exceedance Probability (AEP)	The probability of a storm event being exceeded during any one year, expressed as a percentage e.g. 1% AEP is a storm event with a 1% probability of being exceeded in any given year, equivalent to a 100 year Average Recurrence Interval storm.
Australian Height Datum (AHD)	A benchmark for height measurement across Australia, approximately equal to mean sea level.
Backshore	(1) The upper part of the active beach above the usual reach of the tides (high water), however the backshore may be affected by large waves occurring during a high tide or storm event. (2) The accretion or erosion zone, located landward of ordinary high tide, which is normally wetted only by storm tides.
Bar	An offshore ridge or mound of sand, gravel, or other unconsolidated material which is submerged (at least at high tide), especially at the mouth of a river or estuary, or lying parallel to, and a short distance from, the beach.
Bathymetry	The spatial measurement of depths of water in oceans, seas and lakes; also the information derived from such measurements.
Beach profile	A perpendicular cross-section of a given beach contour; the profile may include the face of a dune or sea wall, extend over the backshore, across the foreshore, and seaward underwater into the nearshore zone.
Beach Scraping	A Nature Assisted Beach Enhancement (NABE) technique often used after erosion events. Sand scraping removes a portion of sand from the beach berm at low tide and adds this sand to the dune system creating a gentle slope. Modifying the shape of the dune slope and facilitates the natural recovery process of sand deposition and maintenance of the beach profile.
Berm	A nearly horizontal raised plateau on the beach face or backshore.
Breaker zone	The zone within which waves approaching the coastline commence breaking, typically in water depths of around 2 m to 3 m in fair weather and around 5 m to 10 m during storms
Breaking depth	The still-water depth at the point where the wave breaks.
Chart datum	The plane or level to which soundings, tidal levels or water depths are referenced, usually low water datum.
Coastal processes	Collective term covering the action of natural forces on the shoreline, and the nearshore seabed.
Datum	Any position or element in relation to which others are determined, as datum point, datum line, datum plane.
Deep water	In regard to waves, where depth is greater than one-half the wavelength. Deep-water conditions are said to exist when the surf waves are not affected by conditions on the bottom, typically in water depths of around 60 m to 100 m.
Design Storm Erosion Demand	The volume of sand, expressed in m ³ per metre length of beach expected to be eroded from a beach during a chosen design storm erosion event e.g. a 1% Annual Exceedance Probability event.

Term	Definition
Dunes	Accumulations of wind-blown sand on the backshore, usually in the form of small hills or ridges, often stabilised by vegetation
Dynamic equilibrium	Short term morphological changes that do not affect the morphology over a long period.
Ebb tide	A non-technical term used for falling tide or ebb current. The portion of the tidal cycle between high water and the following low water.
Elevation	The distance of a point above a specified surface of constant potential; the distance is measured along the direction of gravity between the point and the surface.
Erosion	On a beach, the loss of beach sediments and material by wave action, tidal currents or by deflation.
Erosion Escarpment	The vertical face of sand on a beach immediately following a storm erosion event
Flood	An overflow of a large amount of water beyond its normal limits, usually referred to as surge of water over normally dry land.
Flood tide	A non-technical term used to define a rising tide or flood current i.e. the portion of the tidal cycle between low water and the following high water.
Geomorphology	That branch of physical geography that deals with the form of the Earth, the general configuration of its surface and its distribution across land and water.
High water (HW)	Maximum height reached by a rising tide. The height may be solely due to the periodic tidal forces or it may have superimposed upon it the effects of prevailing meteorological conditions. Nontechnically, also called the high tide.
Intermittently Closed or Open Lake or Lagoon (ICOLL)	An Intermittently Closed or Open Lake or Lagoon is a lake or lagoon that opens and closes to the ocean depending on the natural build-up or loss of sand at the mouth of the estuary.
Inshore	(1) The region where waves are transformed by interaction with the sea bed. (2) In beach terminology, the zone of variable width extending from the low water line through the breaker zone.
Inshore current	Any current inside the surf zone.
Intertidal	The zone between the high and low water marks.
Inundation	The flooding of an area caused by high ocean water levels and wave runup.
Littoral	(1) Of, or pertaining to, a shore, especially a seashore. (2) Living on, or occurring on, the shore.
Littoral currents	A current running parallel to the beach, generally caused by waves striking the shore at an angle.
Littoral drift	The material moved parallel to the shoreline in the nearshore zone by waves and currents.
Littoral transport	The movement of littoral drift in the littoral zone by waves and currents. Includes movement both parallel (long-shore drift) and perpendicular (cross-shore transport) to the shore.
Longshore	Parallel and close to the coastline.
Longshore drift	Movement of sediments approximately parallel to the coastline.
Long term recession	Long-term gradual landward translation of the dunes and shoreline caused by an imbalance in the sediment (sand) budget of a beach.
Low water (LW)	The minimum height of water reached by each falling tide. Also called low tide.

Term	Definition
Mean high water (MHW)	The average elevation of all high tides recorded at a particular point or station over a considerable period of time (usually 19 years).
Mean high water springs (MHWS)	The average height of the high water tides occurring at the time of spring tides.
Mean low water (MLW)	The average height of the low waters at a given location.
Mean low water springs (MLWS)	The average height of the low water tides occurring at the time of the spring tides.
Mean sea level (MSL)	The average height of the surface of the sea for all stages of the tide over a 19-year period, usually determined from hourly height readings.
Morphology	The form of a river/estuary/lake/seabed and its change with time.
Nature Assisted Beach Enhancement (NABE)	See 'sand scraping'.
Nearshore	In beach terminology, an indefinite zone extending seaward from the shoreline well beyond the breaker zone.
Refraction	The process by which the direction of a wave moving in shallow water at an angle to the bottom contours is changed. The part of the wave moving shoreward in shallower water travels more slowly than that portion in deeper water, causing the wave to turn or bend to become parallel to the contours.
Rip current	A strong current flowing seaward from the shore. It is the return of water piled up against the shore as a result of incoming waves. A rip current consists of three parts: the feeder current flowing parallel to the shore inside the breakers; the neck, where the feeder currents converge and flow through the breakers in a narrow band or "rip"; and the head, where the current widens and slackens outside the breaker line.
Runup	The rush of water up a structure or beach on the breaking of a wave. The amount of run-up is the vertical height above still water level that the rush of water reaches. It includes wave setup.
Shoal	(noun) A coastal landform within, or extending into a body of water such as an estuary or the ocean. These include sandbars or sandbanks that are typically composed of sand, silt or small pebbles. (1) The depths over it are a danger to surface navigation. (2) (verb) To become shallow gradually.
Shore	A section of ground bordering any body of water which is alternately exposed to, or covered by tides and/or waves.
Shoreface	The narrow zone seaward from the low tide shoreline permanently covered by water, over which the beach sands and/or gravels actively oscillate with changing wave conditions.
Shoreline	The intersection of a specified plane of water with the shore.
Significant wave	A statistical term relating to the one-third highest waves of a given wave group; defined by the average of their heights and periods. Refer to https://media.bom.gov.au/social/blog/870/ruling-the-waves-how-a-simple-wave-height-concept-can-help-you-judge-the-size-of-the-sea/ for more information.

Term	Definition
Significant wave height	The average wave height, from trough to crest, of the highest one-third of the waves from a typical wave 'spectrum' for a stated interval of time. It is approximately equal to the wave height estimated by a casual observer.
Spring tide	A tide that occurs at or near the time of new or full moon, and which rises highest and falls lowest from the mean sea level (MSL).
Storm surge	An abnormal rise in sea level, produced by strong winds pushing water onshore. A storm surge is most severe when it occurs in conjunction with a high tide.
Sub-aerial beach	That area of the beach which is uncovered by water (e.g. at low tide sometimes referred to as drying beach).
Surf zone	The nearshore zone along whereby the waves become breakers as they approach the shore.
Swell	Waves generated at sea by wind blowing over ocean surface waters. Swell travels over long distances from their generating area and transform into breakers as they approach the shallow shore.
Tide	The periodic rising and falling of the water that results from gravitational attraction of the moon and sun acting upon the rotating earth.
Unconsolidated sediments	Loose sand and/or gravel material in estuary or ocean environments. Sediments that are not consolidated into rock or held together by vegetation.
Wavelength	The distance between two wave crests
Wave Setup	The increase in mean water level due to the presence of breaking waves..
Zone of Reduced Foundation Capacity	A zone delineated to take account of building foundations and the reduced bearing capacity of the sand adjacent to the storm erosion escarpment.
Zone of Slope Adjustment	A zone delineated to encompass that portion of the seaward face of the beach that would slump to the natural angle of repose of the beach sand following removal of the volume of sand (representing the storm erosion demand) by wave erosion.
Zone of Wave Impact	Delineates an area where any structure or its foundations would suffer direct wave attack during a severe coastal storm. It is that part of the beach which is seaward of the beach erosion escarpment.

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