Shoalhaven City Council

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Lower Shoalhaven River Coastal Management Program

Final CMP

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Acknowledgement of Country

Walawaani (welcome),

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

Walawaani njindiwan (safe journey to you all)

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

Acknowledgement of Financial Assistance

Shoalhaven City Council has prepared this document with financial assistance from the NSW Government through its Coastal and Estuary Grants Program. This document does not necessarily represent the opinions of the NSW Government or the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW).

Executive Summary

Shoalhaven City Council (hereafter 'Council') has, with the assistance of the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), prepared a Coastal Management Program (CMP) to provide strategic direction and specific actions to address threats to the estuary and maintain the ecological, social and economic values of the Lower Shoalhaven River coastal zone.

The CMP is a plan of action for Council, public authorities and land managers responsible for management of the Lower Shoalhaven River coastal zone to:

- Address coastal hazard risks, such as tidal and coastal inundation and estuary foreshore bank erosion;
- Preserve and enhance critical habitats, cultural values, and uses within the estuary and along its foreshore (including riparian vegetation, intertidal wetlands, and water quality monitoring and management);
- Encourage sustainable and adaptive agricultural, economic and built development in the coastal zone;
- Maintain or improve recreational amenity and resilience (including boating facilities and foreshore access); and
- Adapt to emerging issues such as population growth and climate change (e.g. in particular sea level rise impacts on low-lying areas).

The NSW Coastal Management Manual (OEH, 2018b) specifies five stages in preparing a CMP (**Figure ES-1**).

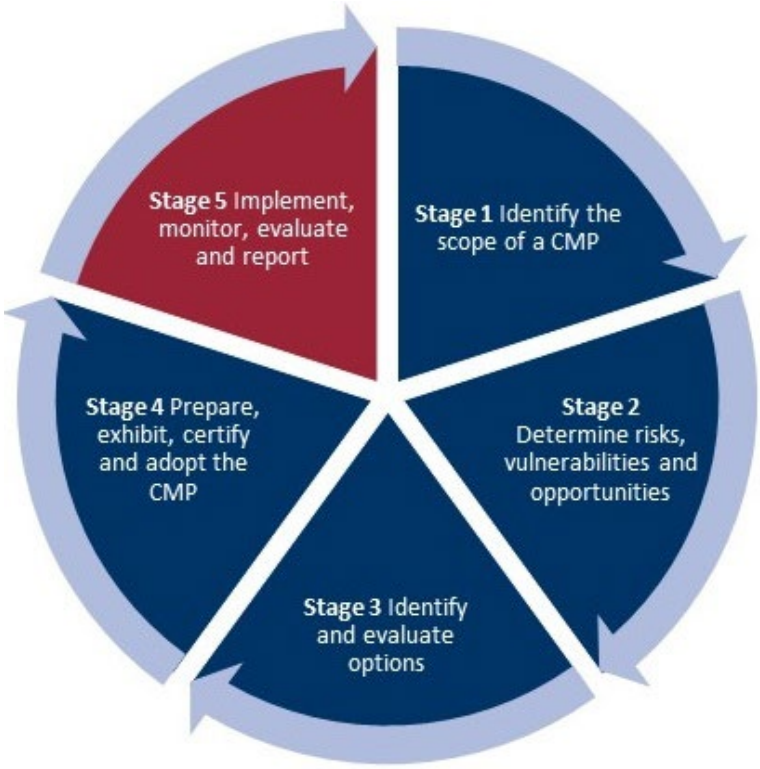

Figure ES-1 Stages in preparing and implementing a CMP (after: OEH, 2018b)

The CMP Study Area

The area covered by the Lower Shoalhaven River CMP comprises the coastal zone within the lower catchment of the Shoalhaven and Crookhaven Rivers. It also includes the intermittently open entrance area at Shoalhaven Heads. The landward extent of the study area is defined by the coastal management areas within the catchment of the Shoalhaven River estuary, as mapped in the *State Environmental Planning Policy (Resilience and Hazards) 2021* (the Resilience and Hazards SEPP). The coastal boundary of the study area has been defined to align with the adjacent Shoalhaven Open Coast and Jervis Bay CMP.

A map of the study area is provided in **Figure ES-2**.

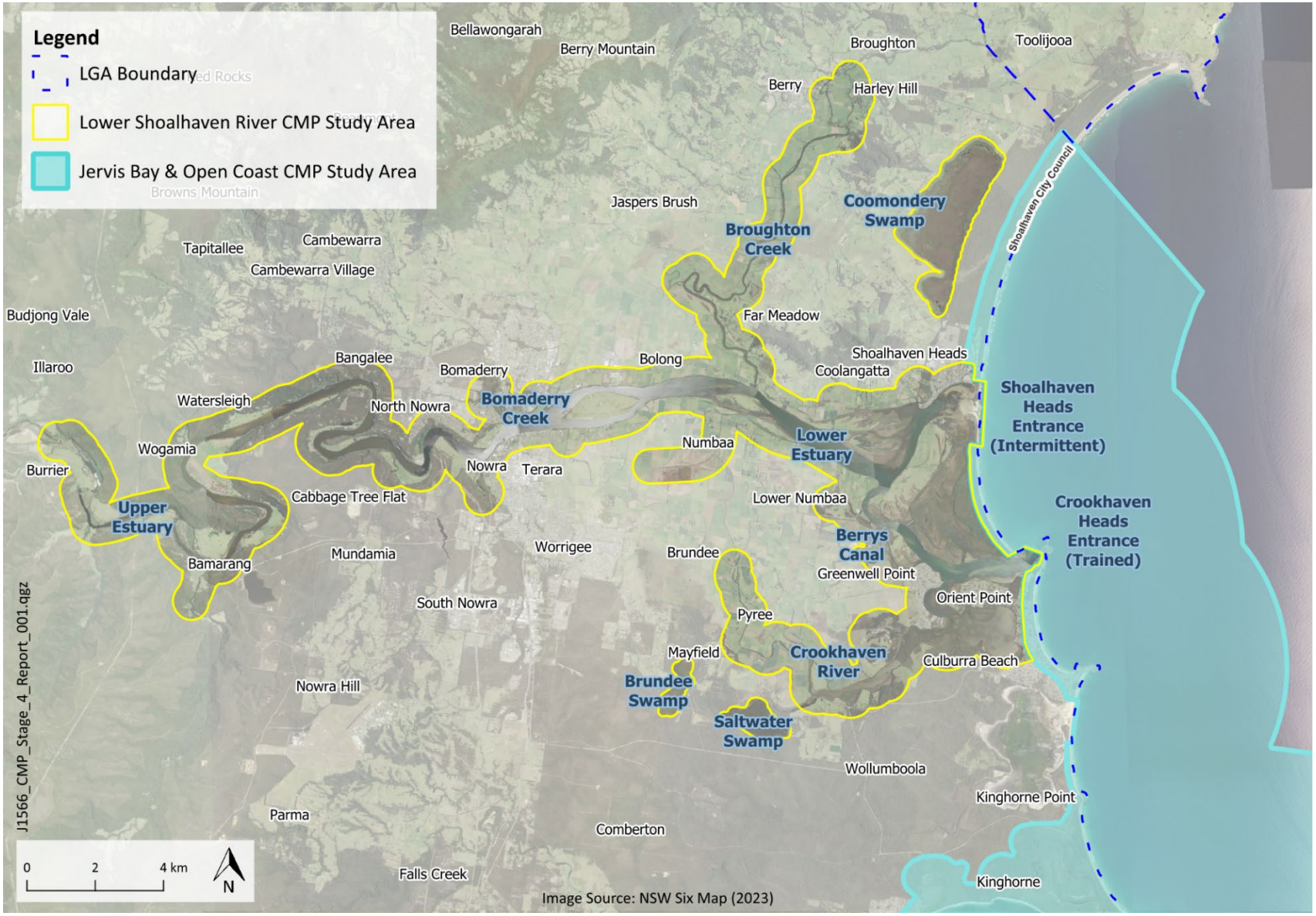

Figure ES-2 Lower Shoalhaven River CMP Study Area

Purpose, Vision, Objectives and Strategic Direction

The purpose of the CMP, as defined in the NSW *Coastal Management Act 2016* (CM Act), is to set the long-term strategy for the coordinated management of land within the coastal zone, with a focus on the objects of the CM Act.

The CMP provides a strategic and collaborative approach for relevant land managers to implement a range of credible, evidence-based actions to address current and future risks, not only from coastal hazards, but for a broad range of community, stakeholder, economic, climate change, catchment processes and environmental issues and values. Certification of the CMP will enable Council to apply for State Government funding to implement coastal management actions on a priorities basis for the coastline, estuaries and lower catchments of the study area. A certified CMP also streamlines approvals for certain types of works such as environmental protection works, and coastal protection works.

The long-term strategic direction for the study area is encapsulated in the following vision statement:

We care for and protect the Lower Shoalhaven River and its catchment so that current & future generations continue to be refreshed & inspired by their coastal experience.

The following purpose statement further refines the vision of the Lower Shoalhaven River CMP:

To develop a plan for the future of the Lower Shoalhaven River in a manner consistent with the principles of ecologically sustainable development for the social, cultural, and economic wellbeing and safety of the people of the Shoalhaven.

Supporting the vision and purpose of the CMP are a series of local coastal management objectives that have been developed to align with the objects of the CM Act, as further detailed in **Section 1.4**.

Snapshot of Issues and Key Values

The coastal zone supports a broad diversity of activities and uses, spanning residential, passive and active recreation, industrial and commercial, agriculture, fisheries, oyster farming, tourism and biodiversity conservation.

A synthesis of the key coastal values is presented in **Table ES-1**.

A risk-based approach was utilised to identify key threats to the values of Lower Shoalhaven River coastal zone, following legislation and guidelines. Risks were initially identified in the Stage 1 Scoping Study (Advisian, 2020) and further refined through Stage 2 Hazard and Vulnerability Assessments (Rhelm, 2023a).

The risks identified within the Lower Shoalhaven River, relevant to this CMP, are summarised in **Table ES-2.**

Table ES-1 Key Values of the CMP Study Area

Theme	Values
Environmental Values	• The Shoalhaven River estuarine ecosystem, including seagrass, mangroves, saltmarsh, and oyster reefs provides multiple benefits to the community and economy. • Healthy habitats for key species and biodiversity, especially in areas like Comerong Island and Coomonderry Swamp. • Biological diversity and ecological resilience to a changing climate. • Good water quality and ecosystem health for oyster and fishing industries as well as recreation. • Manage impacts of acid sulfate soils and blackwater events to maintain ecological balance.
Social and Cultural Values	• Safe and easy access to the estuary's natural and scenic amenity. • Recreational activities like boating, fishing, and community events in safe, accessible public spaces. • Extensive Aboriginal cultural heritage sites and continued connection to Country along the estuary. • Visual amenity and unique character of the estuary landscape, valued by residents and visitors.
Economic Values	• A thriving local economy based on sustainable tourism, agriculture, and waterfront activities. • Sustainable development that respects the local character and values. • Infrastructure that supports the coastal zone's development, use, and enjoyment. • Well managed resources that sustainably support a diverse range of economic activities like agriculture, oyster farming, recreational and commercial fishing.
Coastal Processes, Hazards and Resilience	• The dynamic nature of shoreline and estuarine processes and their importance to estuary health and function. • Natural and built resilience to coastal and natural hazards, including climate change and extreme weather events. • Timely and flexible responses to coastal flooding and erosion. • Effective and sustainable management strategies to mitigate erosion and maintain navigable waterways. • Well managed impacts of human activities such as boating and dredging on coastal processes.
Land Use Planning	• Ecologically sustainable development with appropriate planning and regulatory measures. • Integrated coastal management objectives with local and State planning frameworks. • Coordinated and durable bank restoration solutions.
Equity and Access	• Equitable access to the coastal zone for all, including historically underrepresented groups. • Inclusive planning to maintain and enhance public spaces for community use.
Integrated and Collaborative Management	• Coordinated and cohesive coastal management between various levels of government and community groups. • Aligned management activities with public authority policies to ensure integrated coastal zone management. • Active, informed and engaged community input in coastal management decisions. • Widespread public awareness about coastal values, processes, and the importance of sustainable management.

Table ES-2 Summary of Risks Associated with Threats to the Coastal Zone

Threat Theme	Risk Rating			
	Present Day	2040	2070	2120
Bank Erosion and Berry's Canal Adjustment	**High**	**High**	**Extreme**	**Extreme**
Changes in Tidal Inundation as a Result of Sea Level Rise	**Low**	**Low**	**Medium**	**High**
Coastal Inundation (from coastal storms and extreme tides)	**High**	**High**	**High**	**Extreme**
Changes in Catchment Hydrology[1][2]	**Medium**	**High**	**High**	**Extreme**
Land Clearing and Development (urban and rural)	**Medium**	**Medium**	**High**	**High**
Acid Sulfate Soils and Drainage Structures	**High**	**High**	**High**	**High**
Boating and Associated Waterway and Foreshore Usage	**High**	**High**	**High**	**High**
Commercial and Recreational Fishing	**High**	**High**	**High**	**Extreme**

Recommended Coastal Management Actions

The CMP provides a suite of coastal planning and management actions that have been developed and prioritised based on the assessment of threats and risk to the values associated with the study area, and with respect to how well the proposed actions addressed the CMP management objectives.

In Stage 3, a total of 215 potential management options spread across the entire Lower Shoalhaven River coastal zone were compiled via an audit of previous management plans and studies, engagement with the community and agency stakeholders, and the outcomes of the Stage 2 CMP Vulnerability Assessments. Potential options were assessed in terms of feasibility, viability, and acceptability as per the requirements of the NSW Coastal Management Manual (CM Manual; OEH, 2018b) as discussed in **Section 3.1**. Additional options were identified during public exhibition via submissions (details provided in **Appendix B**). These options were considered against the options assessment framework, and two additional options were recommended as an outcome of this process.

[1] All flood risk mitigation is assessed in the Lower Shoalhaven River Floodplain Risk Management Study and Plan. Entrance management as a flood risk mitigation measure is supported by the CMP.
[2] Referred to in the Stage 2 Risk Assessment as 'Changes in Catchment Flooding and Freshwater Flows'

Based on the options assessment (both pre and post public exhibition), 58 management options are recommended for inclusion as actions in the CMP. Actions consist of a range of knowledge building activities, investigations and engineering designs, on-ground works, and monitoring programs.

The management actions for Council and those to be led by other stakeholders are identified in **Section 3.2**. Detailed descriptions of select complex actions are discussed in **Section 3.2.4** and provided in **Appendix C**. All recommended actions that have a specific location associated with them are shown on map series **RG-01-10A-G**. Key location overviews for areas where several management actions are designed to address management issues in an integrated manner are discussed in **Section 3.2.5** and provided in **Appendix D**.

The Business Plan

A Business Plan has been developed for the CMP which outlines the key components of the funding strategy for the CMP, including the cost of proposed actions (estimated at the time of writing), proposed cost-sharing arrangements and other potential funding mechanisms (**Section 5**). Once the program is certified, Council will be responsible for facilitating the implementation of the program through its governance and budgetary processes.

Management actions have been developed for a 10-year period and have been aligned with Council's four-year Delivery Programs under the NSW IP&R Framework.

Delivery of the Lower Shoalhaven River CMP is estimated to cost $24.45 million (2024 dollars) over 10 years. The CMP actions are expected to be funded through Shoalhaven City Council and State Government contributions, monetary grants and volunteer works by community members and organisations.

Implementation and Review

A monitoring, evaluation, and reporting (MER) program has been designed to ensure the actions remain relevant and the implementation of the program is being achieved. The program is structured into three components:

- monitoring the implementation of actions,
- monitoring relevant environmental parameters, and
- evaluating the CMP's performance against the objects of the CM Act.

As this CMP is considered a 'living document', this systematic approach ensures the CMP's progress is continually measured and adjusted as needed. A strategic review of the CMP should occur at least once every 10 years to assess the effectiveness of the CMP in achieving its objectives and to incorporate changes in light of new information, legislative and policy changes, and improved understanding of the local coastal and estuarine processes.

Table of Contents

Executive Summary ..... **iii**

1 Introduction **1**

1.1 Purpose of the Lower Shoalhaven River CMP 1

1.2 Strategic and Statutory Context 2

1.3 Area Covered by this CMP 3

1.3.1 Rationale for the CMP Study Area 4

1.3.2 Coastal Management Areas Included in the CMP 6

1.3.3 Coastal Sediment Compartments 6

1.4 Vision, Objectives and Strategic Direction 6

1.5 Key Stakeholders, their Interests and Issues 13

1.5.1 Community and Stakeholder Engagement 14

1.6 Governance Structure 16

1.7 Review of Existing Information and Management Arrangements 17

2 A Snapshot of Issues **19**

2.1 Key Values of the Lower Shoalhaven River Coastal Zone 19

2.2 Threats to the Lower Shoalhaven River Coastal Zone 21

2.2.1 Coastal Hazard Threats 21

2.2.2 Threats Refined by Stage 2 (and other) Studies 21

2.2.3 Key Threats to the Lower Shoalhaven River Estuary 29

2.3 Snapshot of Issues for Each Coastal Management Area 32

3 Actions to be Implemented by the Council or by Public Authorities **35**

3.1 Evaluation of Coastal Management Options 35

3.1.1 Confirm Strategic Approach 36

3.1.2 Identifying Options 37

3.1.3 Evaluating Options 37

3.1.4 Options Evaluation Outcomes 46

3.2 Recommended Management Actions 51

3.2.1 Overview 51

3.2.2 Actions to be Implemented by Council 52

3.2.3 Actions to be Implemented by Public Authorities 70

3.2.4 Detailed Description of Complex Actions 72

3.2.5 Key Location Overviews 73

4 Whether the CMP Identifies Recommended Changes to Planning Controls, Including any Proposed Maps **74**

5 A Business Plan **75**

5.1 Intent and Values of Implementing the Lower Shoalhaven River CMP 75
5.2 Resourcing, Funding and Financing 75
5.3 Alignment with the IP&R Framework 83
6 Coastal Zone Emergency Action Subplan, if the *Coastal Management Act 2016* Requires that Subplan to be Prepared 88
7 Monitoring, Evaluation and Reporting Program 89
7.1 Overview of the Monitoring, Evaluation and Reporting Process 89
7.2 Component 1 – Implementation Status of CMP Actions 91
7.3 Component 2 – Relevant Environmental Parameters 91
7.4 Component 3 - Performance of the CMP for Meeting the Objects of the CM Act 94
8 Maps 96
8.1 Overview of Mapping 96
8.2 Study Area 96
8.3 Coastal Management Areas 96
8.4 Coastal Sediment Compartments 96
8.5 Mapping of the CVA / Land Subject to Coastal Hazards 96
8.6 Site-specific Management Actions 97
9 Reference List 98
Glossary and Abbreviations 100

Appendices

Appendix A –Compendium of Maps
Appendix B – Communications and Engagement Plan and Summary Report
Appendix C – Detailed Action Descriptions
Appendix D – Key Location Overviews
Appendix E – Coastal Zone Emergency Action Subplan
Appendix F – Deferred Actions

Tables

Table 1-1 Lower Shoalhaven River Coastal Management Objectives 8
Table 1-2 Alignment with the Objects of the CM Act 9
Table 1-3 Alignment with the Management Objectives for CMAs under the RH SEPP 11
Table 1-4 Summary of Engagement Activities Undertaken During Each Stage of the CMP 15
Table 1-5 Governance Structure for the CMP 16
Table 2-1 Key Values of the Lower Shoalhaven River Coastal Zone 20
Table 2-2 Summarised Risk Assessment and Table of Threats to the Lower Shoalhaven River Coastal Zone 31
Table 2-3 Key Coastal Management Threats Within Each Coastal Management Areas 33
Table 3-1 Source of Potential Options Assessed in Stage 3 37
Table 3-2 Feasibility Assessment Criteria 39
Table 3-3 Objectives and Threat Mitigation Scoring System 42
Table 3-4 Cost Adjusted Scoring System 42
Table 3-5 Community and Stakeholder Acceptability Scoring System 43
Table 3-6 Potential Range for Options Evaluation Scores 44
Table 3-7 CMP Actions to be Implemented by Council 53
Table 3-8 CMP Actions to be Implemented by Public Authorities 70
Table 5-1 Potential CMP Funding Mechanisms 77
Table 5-2 Legend for Funding Sources in Table 5-3 83
Table 5-3 CMP Business Plan 84

Figures

Figure 1-1 Coastal Management Framework (Adapted from OEH, 2018b) 2
Figure 1-2 The Five Stages of a CMP (Adapted from OEH, 2018b) 2
Figure 1-3 Study Area of the Lower Shoalhaven River CMP 5
Figure 2-1 Forecast boating activity by type 2022-2040 (Rhelm, 2023c) 23
Figure 2-2 DCCEEW MER results for the Shoalhaven River from 2007-2020 24
Figure 2-3 Shoalhaven River floodplain subcatchment rankings of the acid prioritisation assessment (WRL, 2023) 26
Figure 2-4 Floodplain subcatchment rankings of the blackwater prioritisation assessment (WRL, 2023) 27
Figure 2-5 Shoalhaven River floodplain vulnerability with sea level rise (far future ~2100) (WRL, 2023) 28
Figure 3-1 Options Identification and Evaluation Process (after: OEH, 2018b) 35
Figure 3-2 Staged Option Evaluation Process (from OEH, 2018b) 38
Figure 3-3 Flowchart of the Feasibility Assessment 40
Figure 3-4 Flowchart of the Viability Assessment 41
Figure 3-5 Flowchart of the Acceptability Assessment 43
Figure 3-6 Flowchart of the Entire Options Evaluation Process 45
Figure 3-7 Overview of Feasibility Assessment Outcomes 46
Figure 3-8 Overview of Management Actions in the CMP 47

Figure 3-9 Site map depicting location of mangrove seedling maintenance activity (shaded blue) authorised under Fisheries Permit (PN19/338). 49
Figure 3-10 Rendering of a Living Shoreline option (Option BE_46) (Source - Eurobodalla Shire Council). 50
Figure 5-1 Overview of CMP Implementation Costs 75
Figure 7-1 Overview of the Monitoring, Evaluation and Reporting Program for the CMP 90

1 Introduction

This Coastal Management Program (CMP) has been prepared by Shoalhaven City Council (Council) with the assistance of NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) to provide strategic direction and specific actions to address threats to the coastal zone and to maintain the ecological, social and economic values of the Lower Shoalhaven River estuary.

The Lower Shoalhaven River CMP has been prepared in accordance with the mandatory requirements for CMPs specified in the *Coastal Management Act 2016* (the CM Act) and accompanying NSW Coastal Management Manual (CM Manual; OEH, 2018b).

1.1 Purpose of the Lower Shoalhaven River CMP

The purpose of a CMP is to set the long-term strategy for the coordinated management of land within the coastal zone with a focus on achieving the objects of the CM Act. This CMP outlines the strategic aims for the coordinated management of the Lower Shoalhaven River and identifies specific actions to mitigate the threats and issues identified for the estuary that are to be implemented over the next 5 to 10 years. Clear details for how actions will be implemented, funded, monitored, and reviewed are provided in this CMP. A CMP is a plan of action for Council, public authorities and land managers responsible for management of the coastal zone to:

- Address coastal hazard risks, such as tidal and coastal inundation and estuary foreshore bank erosion;
- Preserve and enhance critical habitats, cultural values, and uses within the estuary and along its foreshore (including riparian vegetation, intertidal wetlands, and water quality monitoring and management);
- Encourage sustainable and adaptive agricultural, economic and built development in the coastal zone;
- Maintain or improve recreational amenity and resilience (including boating facilities and foreshore access); and
- Adapt to emerging issues such as population growth and climate change (e.g. in particular sea level rise impacts on low-lying areas).

Entrance at Crookhaven Heads (Photo – Shoalhaven City Council)

1.2 Strategic and Statutory Context

Under Part 3 of the CM Act, Local Councils in NSW are required to prepare CMPs in accordance with the coastal management framework (**Figure 1-1**), which reflects the broader suite of statutory instruments and strategies that provide for the Ecologically Sustainable Development (ESD) of the coastal zone of NSW. The CM Manual (OEH, 2018b) provides information and guidance to Councils in preparing their CMPs. A CMP is prepared in five stages as shown in **Figure 1-2**.

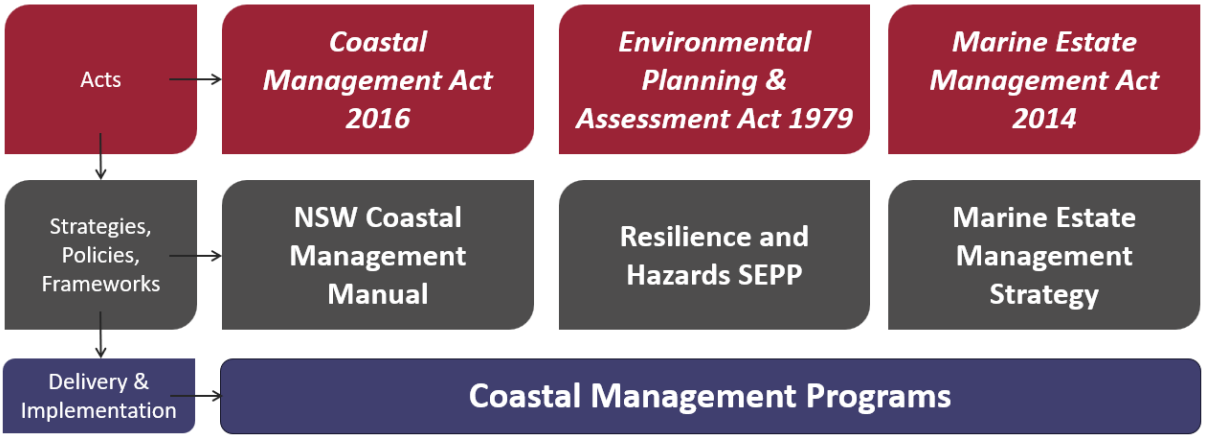

Figure 1-1 **Coastal Management Framework (Adapted from OEH, 2018b)**

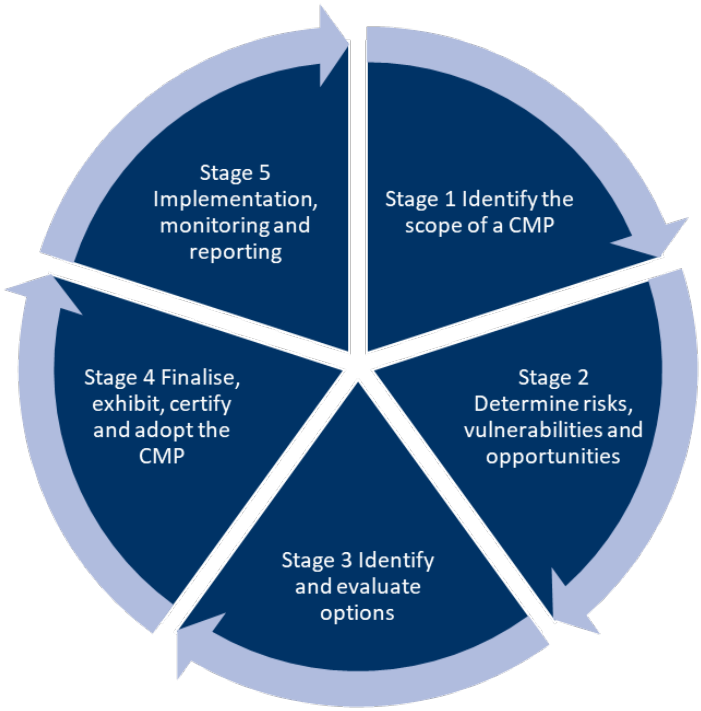

Figure 1-2 **The Five Stages of a CMP (Adapted from OEH, 2018b)**

Previous stages that have been completed and support this CMP include:

- **Stage 1 Scoping Study** for the entire Shoalhaven City Council Local Government Area (LGA) coastal environment (Advisian, 2020), which set the context and scope for this CMP.
- **Stage 2 Vulnerability Assessments** for the Lower Shoalhaven River, including:
    - Stage 2 Synthesis of Current Knowledge Report (Rhelm, 2023a)
    - Detailed Risk Assessment (Rhelm, 2023b)
    - Lower Shoalhaven River Tidal and Coastal Inundation, Morphological Changes to Berry's Canal, Groundwater and Acid Sulfate Soils Assessment (Stantec, 2023)
    - Boating Study (Rhelm, 2023c)
    - Water Quality and Monitoring Program Assessment (Rhelm, 2023d)
    - Urban Runoff Assessment and Treatment Options (Rhelm, 2023e)
    - Bank and Riparian Condition Assessment (Rhelm, 2023f)
    - Review of 2006 Entrance Management Plan and Recommendations for entrance management in the CMP (Rhelm, 2023g).
- **Stage 3 Report - Identification and Evaluation of Options** (Rhelm, 2024).

This CMP document constitutes Stage 4 of the CMP process for the Lower Shoalhaven River estuary and will be publicly exhibited prior to adoption, certification and implementation. The implementation, monitoring, and reporting of this CMP will occur in Stage 5.

1.3 Area Covered by this CMP

The Shoalhaven River rises in the Southern Tablelands east of the Great Dividing Range. It runs through a gorge 30 kilometres east of Goulburn and flows towards the low-lying floodplains around Nowra and Bomaderry. The river has two openings to the Tasman Sea – a permanent and trained entrance at Crookhaven Heads, and an intermittent opening at Shoalhaven Heads. The Shoalhaven Heads entrance was historically the main pathway for the Shoalhaven River until the construction of Berry's Canal in 1822 connected that waterway with the smaller Crookhaven River, irreversibly altering the hydrodynamics of the estuary.

The estuary comprises of the tidal portion of the Shoalhaven River. The estuary has a water surface area of approximately 32 km^2 and a total catchment area of approximately 7,086 km^2 (Advisian, 2020). The estuary contains diverse landforms and can be divided into three zones:

- **Upper Estuary** – Starting at the upstream tidal limit at Burrier, the river passes through steep vegetated slopes and sandstone cliffs, with discontinuous pockets of floodplains.
- **Lower Estuary** – Once downstream of Nowra, or the Bomaderry Creek junction, the river widens into a large extensive floodplain.
- **Entrance** – There are two entrances to the estuary, with the northern entrance located at Shoalhaven Heads and the southern entrance at Crookhaven Heads located north of Culburra Beach.

Besides the primary channel of the Shoalhaven River, the key waterway features in the study area include Berry's Canal and the tidal portions of the Crookhaven River, Bomaderry Creek, and Broughton Creek. There are also important coastal wetlands in the catchment that, although they are not within the tidal portion of the estuary, are important features of the estuary from an ecological and

hydrological perspective. These areas include Coomonderry Swamp, Saltwater Swamp and Brundee Swamp. These would have been hydrologically connected to the estuary, but the historical construction of floodplain drainage structures has disconnected these areas.

1.3.1 Rationale for the CMP Study Area

The extent of the study area for the Lower Shoalhaven River CMP was defined in consultation with key stakeholders (including the former Department of Planning and Environment (DPE, now DCCEEW) during the Stage 1 Scoping Study (Advisian, 2020). At that time Council determined that they would prepare several CMPs for the coastal zone of the Shoalhaven City Council LGA, including one for the Lower Shoalhaven River estuary.

The area covered by the Lower Shoalhaven River CMP comprises the coastal zone within the lower catchments of the Shoalhaven and Crookhaven Rivers. It also includes the intermittently open and closed entrance area at Shoalhaven Heads. The landward extent of the study area is defined by the coastal management areas mapped in the *State Environmental Planning Policy (Resilience and Hazards) 2021* (the Resilience and Hazards SEPP, or RH SEPP) that are within the catchment of the Shoalhaven River estuary. This includes Coomonderry Swamp, Saltwater Swamp and Brundee Swamp.

Considerations for the border of the CMP study area include:

- Extent of the mapped coastal management areas under the RH SEPP; and
- Alignment with the adjacent Shoalhaven Open Coast and Jervis Bay CMP.

The CMP study area is shown in **Figure 1-3** as well as **Map RG-01-01** in **Appendix A**.

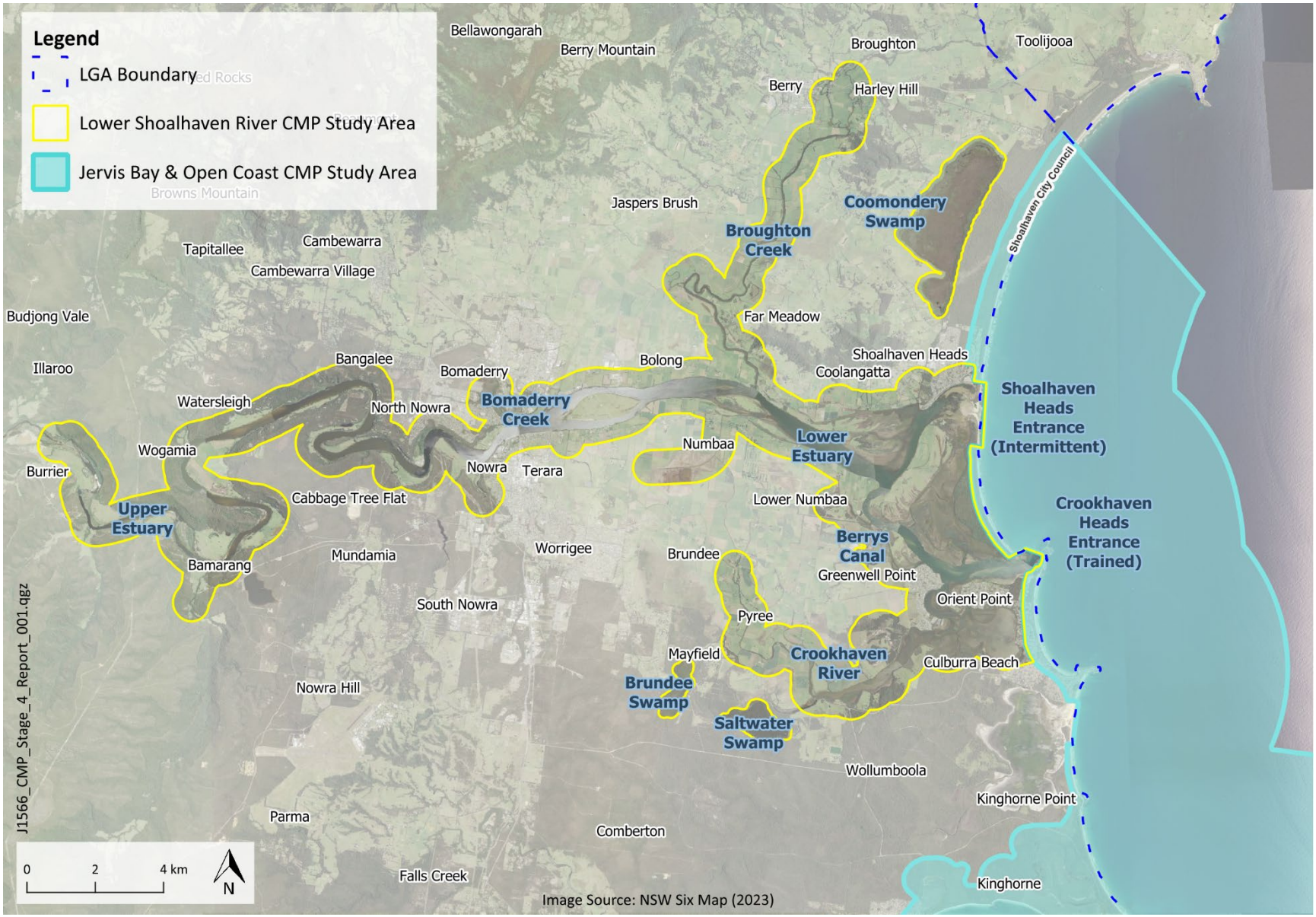

Figure 1-3 Study Area of the Lower Shoalhaven River CMP

1.3.2 Coastal Management Areas Included in the CMP

There are four coastal management areas (CMAs) as defined by the CM Act and RH SEPP. Three of these CMAs are mapped for the study area and therefore fall within the scope of the Lower Shoalhaven River CMP:

- **Coastal Wetlands and Littoral Rainforests Area (CWLRA)** – There are extensive areas of Coastal Wetlands throughout the study area in Coomonderry Swamp, Comerong Island, Kurrajong Island, along the Crookhaven River, Saltwater and Brundee Swamps, surrounding Orient Point and Curley's Bay. Smaller coastal wetland areas are located in Broughton Creek, Shoalhaven Heads, and near Numbaa Island. Comparatively smaller areas of Littoral Rainforest are present in the study area on the eastern side of Comerong Island. These areas are mapped in **Map RG-01-02**.
- **Coastal Environment Area (CEA)** – The CEA comprises land containing coastal features such as the coastal waters of the State, estuaries, coastal lakes, coastal lagoons and land adjoining these features, including headlands and rock platforms (OEH, 2018b). The extent of the CEA within the study area is mapped in **Map RG-01-03**.
- **Coastal Use Area (CUA)** – The CUA includes land adjacent to coastal waters, estuaries, coastal lakes and lagoons where development is or may be carried out (now or in the future) (OEH, 2018b). There are a range of social and economic activities and development within the Lower Shoalhaven CUA, as mapped in **Map RG-01-04**.

Large parts of the study area and adjacent areas are vulnerable to coastal hazards, as identified through the Stage 2 Vulnerability Assessments (Stantec, 2023; Rhelm 2023f). However, there is presently no mapping of a Coastal Vulnerability Area (CVA) for the Shoalhaven River area under the RH SEPP. The context for Council's decision to map a CVA is detailed in **Section 4** and is supported by an action (CTF_13) in the CMP to develop a planning proposal to update the RH SEPP mapping, including the CVA.

1.3.3 Coastal Sediment Compartments

The Lower Shoalhaven CMP study area is located within one primary sediment compartment, the Illawarra compartment, which extends from Port Hacking Point in the north to Beecroft Head in the south. Within this larger primary sediment compartment, the study area is entirely contained within the Shoalhaven River secondary sediment compartment which extends from Black Head (Gerroa) to Beecroft Head. The study area within these sediment compartments is mapped in **Map RG-01-05.**

1.4 Vision, Objectives and Strategic Direction

The vision, objectives and strategic direction for the Lower Shoalhaven River CMP provide local context and recognise the unique values and attributes of the study area and the wider community's aspirations for the coastal zone.

The long-term strategic direction for the study area is encapsulated in a vision statement established for management of the Lower Shoalhaven River coastal zone and is consistent with the objects of the CM Act and community values. The vision statement for the Lower Shoalhaven River CMP is as follows:

We care for and protect the Lower Shoalhaven River and its catchment so that current & future generations continue to be refreshed & inspired by their coastal experience.

The purpose statement of the Lower Shoalhaven River CMP further refines the vision:

> ***To develop a plan for the future of the Lower Shoalhaven River in a manner consistent with the principles of ecologically sustainable development for the social, cultural, and economic wellbeing and safety of the people of the Shoalhaven.***

Supporting the vision and purpose statements are locally relevant coastal management objectives that have been developed to align with the objects of the CM Act and further shape the strategic direction of the Lower Shoalhaven River CMP. These management objectives, developed during Stage 1 of the CMP (Advisian, 2020), provide guidance during the evaluation and selection of management actions in the CMP. The management objectives for the Lower Shoalhaven River CMP are summarised in **Table 1-1**. The CM Act requires that, in preparing a CMP, a local Council must:

- Consider and promote the objects of the CM Act; and
- Give effect to the management objectives for CMAs covered by the Program.

These requirements are addressed in **Table 1-1, Table 1-2 and Table 1-3**, respectively. It is noted that, although there is no mapped CVA for the Lower Shoalhaven coastal zone, the objects for Coastal Vulnerability Areas have still been discussed in the context of the Lower Shoalhaven River CMP.

Sunset and Riparian Vegetation in the Shoalhaven River (Photo – Shoalhaven City Council)

Table 1-1 Lower Shoalhaven River Coastal Management Objectives

Theme	Objective
Environmental Values	Protect and enhance natural estuarine processes and environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience.
Social and Cultural Values	Support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety. Acknowledge the diversity of uses and values of the Shoalhaven River coastal zone.
Aboriginal Values	Acknowledge, protect and promote Aboriginal peoples' spiritual, social, customary and economic use and access to the coastal zone.
Coastal Processes	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.
Coastal Economies	Recognise the coastal zone as a vital economic zone and support sustainable coastal economies. Especially relevant are the tourism, oyster, recreational and commercial fishing, and agriculture industries.
Land Use Planning	Facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making. This is achieved through planning instruments, development controls, and other strategic planning facilitated by local and state government.
Coastal Hazards	Mitigate current and future risks from coastal hazards, taking into account the effects of climate change. 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.
Integrated and Collaborative Management	Promote integrated and co-ordinated coastal planning, management, reporting and response amongst and between various government, industry and community organisations, and ensure co-ordination of the policies and activities of government and public authorities relating to the coastal zone to facilitate the proper integration of their management activities.
Public Participation	Support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes, values and management actions.

Table 1-2 Alignment with the Objects of the CM Act

Objects of the Act	How this is addressed in this CMP
3 The objects of this Act are to manage the coastal environment of New South Wales 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, and in particular—	
(a) To protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience, and	This object is reflected in the 'Environmental Values', 'Coastal Processes' and 'Land use planning' management objectives for the CMP (refer **Table 1-1**). Consideration of these values and relevant threats have been detailed in **Sections 2.1 and 2.2**, and a number of management actions developed to support these values and address these threats (refer **Section 3**).
(b) To support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety, and	This object is reflected in the 'Social and Cultural Values' and 'Land use planning' management objectives for the CMP (refer **Table** 1-1). Consideration of these values and relevant threats have been detailed in **Sections 2.1 and 2.2**, respectively, and a number of management actions developed to support these values and address these threats (refer **Section 3**). This includes several activities to provide for public access and safety, as well as a Coastal Zone Emergency Action Subplan (CZEAS; refer **Section 6** and **Appendix C**).
(c) To acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone, and	This object is reflected in the 'Aboriginal Values' management objective for the CMP (refer **Table 1-1**). Engagement was undertaken with Traditional Owners during preparation of this CMP, as detailed in **Section 1.5** and **Appendix B**. Several management actions are included in the CMP to address identified threats and support Aboriginal cultural heritage values and practices (refer **Section 3**).
(d) To recognise the coastal zone as a vital economic zone and to support sustainable coastal economies, and	This object is reflected in the 'Coastal Economies' management objectives for the CMP (refer **Table 1-1**). Consideration of these values and relevant threats have been detailed in **Sections 2.1 and 2.2**, respectively, and a number of management actions developed to support these values and address these threats (refer **Section 3**).
(e) To facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making, and	This object is reflected in the 'Land Use Planning' management objective for the CMP (refer **Table 1-1**). Consideration of these values and relevant threats have been detailed in **Sections 2.1 and 2.2**, respectively, and a number of management actions developed to support these values and address these threats (refer **Section 3**). This CMP does not propose any amendments to the existing mapping of the CEA, CUA, or CWLR areas currently gazetted with the RH SEPP. Mapping for the CVA has not been provided from the RH SEPP, and no such CVA map yet exists for the Shoalhaven LGA. Subsequently, it is the intent of Council to propose, by way of a planning proposal, the adoption of a map indicating a CVA. This is discussed further in **Section 4 and included as action CTF_13.**

Objects of the Act	How this is addressed in this CMP
(f) To mitigate current and future risks from coastal hazards, taking into account the effects of climate change, and	This object is reflected in the 'Coastal Processes' and 'Coastal Hazards' management objectives for the CMP (refer Table 1-1). Current and future risk from coastal hazards was assessed in Stage 2 (Stantec, 2023; Rhelm 2023f; and Rhelm, 2023g). Consideration of these threats has been detailed in **Section 2.2**, and a number of management actions have been included in the CMP to directly address the threats from coastal hazards under current and future sea levels. These include planning controls (see above), works, adaptation planning, monitoring, and education and awareness raising activities (refer **Section 3**).
(g) 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, and	This object is reflected in the 'Coastal Processes' management objective for the CMP (refer **Table 1-1**). Consideration of these threats have been detailed in **Section 2.2**, and local and regional coastal processes were described in the Stage 2 Synthesis of Current Knowledge Report (Rhelm, 2023a). A range of management actions have been included in this CMP to ensure improved recognition of coastal processes and provide for improved resilience in this regard, including recommendations for planning controls, monitoring and community education (refer **Section 3**).
(h) To promote integrated and co-ordinated coastal planning, management and reporting, and	This object is reflected in the 'Integrated and Collaborative Management' management objective for the CMP (refer **Table 1-1**). Reference is also made to **Section 1.5** and **Appendix B**. Several management actions have been included in this CMP to facilitate coordination (refer **Section 3**), and where other agencies are partnering or leading implementation of actions, this is identified in the Business Plan (**Section 5**).
(i) To encourage and promote plans and strategies to improve the resilience of coastal assets to the impacts of an uncertain climate future including impacts of extreme storm events, and	This object is reflected in the 'Coastal Processes', 'Land Use Planning' and 'Coastal Hazards' management objectives for the CMP (refer **Table 1-1**). Risks to coastal assets are to be addressed through a number of management actions included in this CMP (refer **Section 3**), including land use and planning controls, preparation of adaptation strategies to address long-term risk, and as well as a Coastal Zone Emergency Action Subplan (CZEAS; refer **Section 6** and **Appendix C**).
(j) 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, and	This object is realised through preparation of this CMP, with stakeholder engagement activities documented in **Section 1.5** and **Appendix B**. Letters of support from agencies will be provided along with the Final CMP.
(k) To support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions, and	This object is reflected in the 'Public Participation' management objective for the CMP (refer **Table 1-1**). Community engagement activities undertaken in development of this CMP are documented in **Section 1.5** and **Appendix B**. In addition, there are a number of management actions in this CMP that aim to provide for ongoing community participation and improved public awareness (refer **Section 3**).

Objects of the Act	How this is addressed in this CMP
(l) 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	No land acquisition has been proposed as part of this CMP; however, a range of activities on public land are proposed to provide for protection, enhancement, maintenance and restoration of the coastal environment (refer **Section 3**).
(m) To support the objects of the Marine Estate Management Act 2014.	Refer to stakeholder engagement undertaken for this CMP as summarised in **Section 1.5**. In addition, management actions have been developed that address threats to the Lower Shoalhaven coastal zone that align with several of those identified in the NSW Marine Estate Threat and Risk Assessment for the Marine Estate (BMT WBM, 2017) (refer **Section 2.2**).

Table 1-3 Alignment with the Management Objectives for CMAs under the RH SEPP

Objects for CMAs	How this is addressed in this CMP
*6(2) The management objectives for the **coastal wetlands and littoral rainforests area** are as follows—*	
(a) to protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity,	Threats to CWLRAs in the study area are assessed in the risk assessment described in **Section 2.2** and refined in **Table 2-3**. Related threats identified in the risk assessment include: 'Changes in Tidal Inundation as a Result of Sea Level Rise', 'Changes in Catchment Hydrology (referred to in the Stage 2 risk assessment as Changes in Catchment Flooding and Freshwater Flows)', 'Land Clearing and Development (urban and rural)', and 'Acid Sulfate Soils and Drainage Structures'. A range of management options were considered in Stage 3 to address these threats, and several have been adopted as management actions in this CMP (see **Section 3**). These management actions are considered consistent with the State policies and programs for wetlands and littoral rainforest management.
(b) to promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests,	
(c) to improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration,	
(d) to support the social and cultural values of coastal wetlands and littoral rainforests,	
(e) to promote the objectives of State policies and programs for wetlands or littoral rainforest management.	
*7(2) The management objectives for the **coastal vulnerability area** are as follows—*	
(a) to ensure public safety and prevent risks to human life,	Council has decided to proceed with mapping of a CVA for the study area using the mapping of the land that is vulnerable to coastal hazards prepared for Stage 2 (refer Stantec, 2023), which is discussed in **Section 4**. The risk to both land and built and natural assets from coastal hazards is discussed in **Section 2.2** and refined in **Table 2-3** and include: 'Bank Erosion and Berry's Canal Adjustment', 'Changes in Tidal Inundation as a Result of Sea Level Rise' and
(b) to mitigate current and future risk from coastal hazards by taking into account the effects of coastal processes and climate change,	
(c) to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place,	

Objects for CMAs	How this is addressed in this CMP
(d) to maintain public access, amenity and use of beaches and foreshores,	'Coastal Inundation (from coastal storms and extreme tides)'. A range of management options were considered in Stage 3 to address these threats, and several have been adopted as management actions in this CMP (see **Section 3**), in particular all actions with a unique identifier starting with BE (Bank Erosion) or CTF (Coastal/Tidal Flooding).
(e) to encourage land use that reduces exposure to risks from coastal hazards, including through siting, design, construction and operational decisions,	
(f) to adopt coastal management strategies that reduce exposure to coastal hazards— (i) in the first instance and wherever possible, by restoring or enhancing natural defences including coastal dunes, vegetation and wetlands, and (ii) if that is not sufficient, by taking other action to reduce exposure to those coastal hazards,	
(g) if taking that other action to reduce exposure to coastal hazards— (i) to avoid significant degradation of biological diversity and ecosystem integrity, and (ii) to avoid significant degradation of or disruption to ecological, biophysical, geological and geomorphological coastal processes, and (iii) to avoid significant degradation of or disruption to beach and foreshore amenity and social and cultural values, and (iv) to avoid adverse impacts on adjoining land, resources or assets, and (v) to provide for the restoration of a beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by actions to reduce exposure to coastal hazards,	
(h) to prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency,	
(i) to improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses.	
*8(2) The management objectives for the **coastal environment area** are as follows—*	
(a) to protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity,	Threats to the Lower Shoalhaven CEA are discussed in **Section 2.2** and refined in **Table 2-3**. These include: 'Changes in Catchment Hydrology (referred to in the Stage 2 risk assessment as Changes in Catchment Flooding and Freshwater Flows)', 'Land Clearing and Development (urban and rural)', 'Acid Sulfate Soils and Drainage Structures', 'Boating and Associated Waterway and Foreshore Usage', and 'Commercial and Recreational Fishing'.
(b) to reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change,	
(c) to maintain and improve water quality and estuary health,	

Objects for CMAs	How this is addressed in this CMP
(d) to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons,	A range of management options were considered in Stage 3 to address these threats, and several have been adopted as management actions in this CMP (see **Section 3**).
(e) to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place,	
(f) to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.	
*9(2) The management objectives for the **coastal use area** are as follows—*	
1. to protect and enhance the scenic, social and cultural values of the coast by ensuring that— *(i) the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and* *(ii) adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and* *(iii) urban design, including water sensitive urban design, is supported and incorporated into development activities, and* *(iv) adequate public open space is provided, including for recreational activities and associated infrastructure, and* *(v) the use of the surf zone is considered,*	Threats to the Lower Shoalhaven CUA are discussed in **Section 2.2** and refined in **Table 2-3**. These include 'Bank Erosion and Berry's Canal Adjustment', 'Changes in Tidal Inundation as a Result of Sea Level Rise', 'Coastal Inundation (from coastal storms and extreme tides)', and 'Boating and Associated Waterway and Foreshore Usage'. A range of management options were considered in Stage 3 to address these threats, and several have been adopted as management actions in this CMP (see **Section 3**).
2. to accommodate both urbanised and natural stretches of coastline.	

1.5 Key Stakeholders, their Interests and Issues

Key stakeholders including State Government agencies, Traditional Owners, and local community members and organisations are in some way involved in governance and management of the Lower Shoalhaven River coastal zone (or aspects thereof) due to a regulatory or customary role in coastal management. The CMP study area comprises a mix of tenures and regulatory or statutory jurisdictions. Relevant land tenures include:

- **Crown land**, including dedicated or reserved Crown land and unreserved Crown land, with the latter including all land below the Mean High Water Mark (MHWM). Crown land managers can be Council and non-Council under the *Crown Land Management Act 2016*;
- **National Park estate** lands are also a major land tenure, comprising National Parks, Nature Reserves and State Conservation Areas gazetted under the *National Parks and Wildlife Act 1974* (NP&W Act) and under care and control of the National Parks and Wildlife Service (NPWS);
- Land subject to **Native Title** or a claim under the Commonwealth *Native Title Act 1993* or subject to a successful Aboriginal Land Claim under the NSW *Aboriginal Land Rights Act 1984*. In addition, there are a number of pending claims associated with the study area. Any management actions proposed on Crown land will need to consider the potential for existing or future claims made under either Act;

- Land owned by the **Jerrinja** or **Nowra Local Aboriginal Land Councils** (LALC);
- **Council-owned lands**, including Operational and Community Land managed under the *Local Government Act 1993* (LG Act);
- Land owned by various utilities and other agencies, including Transport for NSW (TfNSW), Ausgrid and the Commonwealth Department of Defence; and
- Freehold land owned as private property.

Various agencies also have a regulatory role with jurisdictions intersecting the coastal zone including:

- Department of Climate Change, Energy, the Environment and Water - Conservation Programs, Heritage, and Regulation Group (DCCEEW – CPHR);
- Department of Planning, Housing, and Industry – Crown Lands and Public Spaces (DPHI – Crown lands);
- Department of Planning, Housing, and Industry – Planning (DPHI – Planning);
- National Parks and Wildlife Service (NPWS);
- Department of Primary Industry and Regional Development – Agriculture and Biosecurity (DPIRD – Agriculture);
- Department of Primary Industry and Regional Development – Fisheries and Forestry (DPIRD – Fisheries);
- Department of Primary Industry and Regional Development –Local Land Services (LLS); and
- Transport for New South Wales (Maritime) (TfNSW (Maritime)).

The need for landowner consent, or to obtain any required approvals, permits or licences, would be addressed in consultation with the relevant organisations at the time of implementation of individual management actions. More details on how these stakeholders are to be involved in the implementation of the CMP is provided in **Section 3.2.3**.

1.5.1 Community and Stakeholder Engagement

An overarching Community and Stakeholder Engagement Plan (CSEP) and Summary Report was developed as part of the Stage 1 Scoping Study (Advisian, 2020). An updated CSEP was prepared for this CMP and is provided in **Appendix B**. That document sets out the strategy that was adopted to engage with the community and key stakeholders, as required by the CM Act and CM Manual.

The engagement activities undertaken in preparing this CMP are summarised in **Table 1-4**.

During preparation of this CMP, Council has engaged with Kiama Municipal Council through the Northern Coastal Management Program Advisory Committee, being the neighbouring Council to the north of the Shoalhaven City Council LGA who share a sediment compartment as defined in the CM Act (see **Map RG-01-05**).

Public authorities and other organisations which will be affected by implementation of the CMP have been consulted regarding the coastal zone management issues and actions in this CMP, as documented in **Appendix B** and **Table 1-4.**

Table 1-4 Summary of Engagement Activities Undertaken During Each Stage of the CMP

CMP Stage	Engagement Activities
Stage 1	• Provision of information, including factsheets, on the CMP and updates on progress via Council's dedicated project webpage on "Get Involved". • Workshops with a range of key agency stakeholders. These were held in February 2019 and provided an opportunity for stakeholders to contribute and have their say regarding the planning for, and implementation of, the range of CMPs proposed for the Shoalhaven LGA. • 6 Community Drop-in Sessions held in September and October 2019 at Shoalhaven Heads, St Georges Basin, Sussex Inlet, Lake Conjola, Ulladulla, and Nowra. • Online survey of community values, uses and key issues related to the coastal zone throughout the Shoalhaven LGA.
Stage 2	• Provision of information on the CMP and updates on progress via Council's dedicated project webpage, including fact sheets, interactive online mapping tool, and a "Get Involved" webpage. • In-person workshop held on 26 September 2022 in Nowra with 15 Council staff and DCCEEW representatives to confirm the outcomes of the risk assessment and potential management approaches. • Virtual workshops held on 30 November 2022 with State Government Agency staff to discuss the risks within the Lower Shoalhaven River within the context of the Stage 2 Vulnerability Assessments. Agencies represented included: ○ DCCEEW – CPHR ○ DPIRD – Fisheries ○ DPIRD – Agriculture ○ TfNSW (Maritime) ○ LLS ○ DPHI – Crown Lands ○ DPHI – Planning ○ NPWS • Interactive online mapping tool where community was invited to provide input on issues and potential management options. The tool was available from 1 April 2022 until 17 November 2023 (Stage 3).
Stage 3	• Continuation of the interactive online mapping tool (see above, Stage 2). • Community drop-in sessions held at Shoalhaven Heads (25 July 2023) and Nowra (26 July 2023) which were used to increase understanding of the Stage 2 Vulnerability Assessments, obtain suggestions for potential management options, and to encourage the use of the interactive online mapping tool. • Engagement with Indigenous Stakeholder groups via targeted meetings, held on 26 July 2023, with members of the Jerrinja Tribal Group as well as the Nowra and Jerrinja LALCs. These were used to review the Stage 2 Vulnerability Assessments, and obtain local knowledge regarding various study area values, risks and opportunities for improved collaboration to address key issues via the CMP. • Targeted meetings, held on 25 July 2023,with key community groups including Shoalhaven Riverwatch and Shoalhaven Heads Taskforce to review the Stage 2 Vulnerability Assessments, and obtain local knowledge regarding various study area values, risks and opportunities for improved collaboration to address key issues via the CMP. • Follow up conversations with Indigenous and community group representatives to discuss details of potential management options for evaluation in Stage 3. • Virtual workshops with a range of agencies involved in different aspects of management of the study area and nominated as lead or support for potential

CMP Stage	Engagement Activities
	management options. Draft management options were presented and detailed feedback was incorporated into the final list of management actions. Agencies represented included: ○ DCCEEW – CPHR ○ DPIRD – Fisheries ○ DPIRD – Agriculture ○ TfNSW (Maritime) ○ LLS ○ DPHI – Crown Lands ○ DPHI – Planning ○ NPWS.
Stage 4	• Engagement via email and telephone with various agency stakeholders to discuss and refine management actions. • Presentation of the first draft CMP to the Northern Coastal Management Program Advisory Committee. • Review of the first draft CMP by members of the Northern Coastal Management Program Advisory Committee, including the NSW DECCW – CPHR and DPHI - Planning. • Correspondence with each affected landholder and organisation nominated as having a role in implementation of management actions under the CMP. Formal letters of support will be provided separately alongside the Final CMP for certification. • Public exhibition of the Draft CMP and review of submissions received. The outcomes of the public exhibition engagement are summarised in the CSEP in **Appendix B**. • Additional discussion with various key stakeholders regarding their management actions in the CMP.

1.6 Governance Structure

The governance across the coastal zone is multi-layered, with the estuaries, beaches, shorelines and riverbanks, reserves, and headlands of the study area (and associated assets) owned and managed by a number of stakeholders across multiple levels of government. One of the objectives of the CMP is to facilitate the integration of management responsibilities across the study area, including the council, land managers and public authorities. The governance structure suggested for the Lower Shoalhaven River CMP is outlined in **Table 1-5**.

Table 1-5 Governance Structure for the CMP

Organisation	Responsibility
Shoalhaven City Council	Council has a central role in managing the coastal zone. Council responsibilities generally relate to management of coastal issues, coastal zone land and assets, and strategic planning. Council is responsible for preparation of a suite of CMPs that set out the long-term strategy for management of the coastal zone in its LGA.
State Government Agencies / Land Managers • DCCEEW – CPHR	Provide support with respect to recommendations for management, collaboration and action(s) for which they are nominated with a lead or supporting

Organisation	Responsibility
• DPHI – Crown Lands • DPHI – Planning • DPIRD – Fisheries • DPIRD – Agriculture • Jerrinja Tribal Group • Jerrinja and Nowra LALCs • NPWS • Southeast Local Land Services (SE LLS) • TfNSW (incl. Maritime Infrastructure Delivery Organisation or MIDO) • NSW State Emergency Service (NSW SES)	implementation role. Engagement should be undertaken with the relevant authority when actions at the time of implementation require it, or where they have a regulatory function such as the issue of any relevant approvals, permits or licences to enable the action to proceed.
Northern Coastal Management Program Advisory Committee Committee members including: • Appointed Chair (Councillor) • Elected members of Council • Chief Executive Officer or nominee • Community representatives • Other relevant government agency representatives	Committee with a non-statutory role who are involved in coordination and oversight of the CMP planning and implementation, and who assist in facilitating local community and stakeholder involvement. The Northern Coastal Management Program Advisory Committee has an advisory role only, potentially as a committee of Council under Section 355 of the LG Act. It should be noted that Council committees are subject to change, and the makeup of any future committees is unknown.

1.7 Review of Existing Information and Management Arrangements

The adequacy review of existing information and management arrangements for the Shoalhaven Council coastal zone was undertaken during the CMP Stage 1 Scoping Study (Advisian, 2020). The Stage 1 Scoping Study also provided a prioritised list of CMPs to be developed by Council and identified additional studies and investigations that must be undertaken during Stage 2 of the CMP.

A detailed risk assessment was undertaken during Stage 2 (Rhelm, 2023b). The risk assessment was informed by the additional Stage 2 Vulnerability Assessments (Rhelm, 2023a-g; Stantec, 2023) and built upon the preliminary risk assessment presented in the Stage 1 CMP Scoping Study (Advisian, 2020). The detailed risk assessment was carried out in consultation with relevant Council asset managers and State Government agency representatives to identify key issues. The updated risk assessment findings are summarised in **Section 2.2.**

Management options and opportunities to mitigate the priority threats and risks to the Lower Shoalhaven River coastal zone were developed during Stage 3 in consultation with the community and key stakeholders, as documented in the Stage 3 report (Rhelm, 2024) and summarised in **Section 3.1**.

Sunset over Shoalhaven Heads (Photo – Shoalhaven City Council)

2 A Snapshot of Issues

The Lower Shoalhaven River coastal zone supports a broad diversity of activities and uses spanning residential, passive and active recreation, industrial and commercial, agriculture, fisheries, oyster farming, tourism and biodiversity conservation.

The Stage 1 Scoping Study (Advisian, 2020) and the Stage 2 Synthesis Report (Rhelm, 2023a) provide detailed descriptions of the environmental, social and cultural, economic and future context for coastal management planning in the Lower Shoalhaven River coastal zone. These set the scope for the CMP and provide an increased understanding of the values and priority threats to the study area.

Sections 2.1 and 2.2 of this report provide a summary of the values of the study area and the priority threats to these values, respectively. Importantly, these values and threats were developed and confirmed in consultation with key stakeholders and based on feedback from the broader community. **Section 2.3** provides a synthesis of this information and describes key management issues for each of the coastal management areas addressed in this CMP.

2.1 Key Values of the Lower Shoalhaven River Coastal Zone

The Stage 1 Scoping Study (Advisian, 2020) provides a review of the natural and built asset values of the coastal zone. The Stage 2 Synthesis Report (Rhelm, 2023a) also discusses the coastal and community values of the study area. Additional information on community values was obtained via the online interactive mapping tool hosted by Council. A synthesis of the key coastal values as described in these sources is presented in **Table 2-1**.

Foreshore pathway and pontoon (Photo – Shoalhaven City Council)

Table 2-1 Key Values of the Lower Shoalhaven River Coastal Zone

Theme	Values
Environmental Values	• The Shoalhaven River estuarine ecosystem, including seagrass, mangroves, saltmarsh and oyster reefs provides multiple benefits to the community and economy. • Healthy habitats for key species and biodiversity, especially in areas like Comerong Island and Coomonderry Swamp. • Biological diversity and ecological resilience to a changing climate. • Good water quality and ecosystem health for oyster and fishing industries as well as recreation. • Manage impacts of acid sulfate soils and blackwater events to maintain ecological balance.
Social and Cultural Values	• Safe and easy access to the estuary's natural and scenic amenity. • Recreational activities like boating, fishing, and community events in safe, accessible public spaces. • Extensive Aboriginal cultural heritage sites and continued connection to Country along the estuary. • Visual amenity and unique character of the estuary landscape, valued by residents and visitors.
Economic Values	• A thriving local economy based on sustainable tourism, agriculture, and waterfront activities. • Sustainable development that respects the local character and values. • Infrastructure that supports the coastal zone's development, use, and enjoyment. • Well managed resources that sustainably support a diverse range of economic activities like agriculture, oyster farming, recreational and commercial fishing.
Coastal Processes, Hazards and Resilience	• The dynamic nature of shoreline and estuarine processes and their importance to estuary health and function. • Natural and built resilience to coastal and natural hazards, including climate change and extreme weather events. • Timely and flexible responses to coastal flooding and erosion. • Effective and sustainable management strategies to mitigate erosion and maintain navigable waterways. • Well managed impacts of human activities, such as boating and dredging, on coastal processes.
Land Use Planning	• Ecologically sustainable development with appropriate planning and regulatory measures. • Integrated coastal management objectives with local and State planning frameworks. • Coordinated and durable bank restoration solutions.
Equity and Access	• Equitable access to the coastal zone for all, including historically underrepresented groups. • Inclusive planning to maintain and enhance public spaces for community use.
Integrated and Collaborative Management	• Coordinated and cohesive coastal management between various levels of government and community groups. • Aligned management activities with public authority policies to ensure integrated coastal zone management. • Active, informed and engaged community input in coastal management decisions. • Widespread public awareness about coastal values, processes, and the importance of sustainable management.

2.2 Threats to the Lower Shoalhaven River Coastal Zone

Key threats for the Lower Shoalhaven River CMP study area were identified through a risk-based approach in line with the legislation and guidance from the CM Manual. The purpose of the risk-based approach is to identify tolerable and unacceptable risks in the coastal zone, which are then addressed by management actions that are determined in Stage 3 and 4 of CMP development.

A risk register was developed as part of the first pass risk assessment in the Stage 1 Scoping Study (Advisian, 2020), and risks for the Lower Shoalhaven River were categorised in terms of the four coastal management areas as referred to in the RH SEPP:

- Coastal wetlands and littoral rainforests area;
- Coastal vulnerability area;
- Coastal environmental area; and
- Coastal use area.

2.2.1 Coastal Hazard Threats

Coastal hazards contribute to the threats to the coastal zone, posing a risk to coastal ecosystems, built assets, human activities and coastal amenity. While the hazards are part of the natural coastal processes, they can affect the human uses of the coastal zone, and responses need to be planned and managed. An understanding of coastal hazards and their potential effects on development, safety and amenity is essential if the coastal zone is to be effectively managed.

Under the NSW *Coastal Management Act 2016* (CM Act), 'coastal hazards' include the following processes relevant to the Lower Shoalhaven River:

- **Coastal lake or watercourse entrance instability** – refers to intermittently open and closed entrance condition and potential migration of the entrance.
- **Coastal inundation** – the temporary flooding of low-lying land in the coastal zone due to a coastal storm event (i.e. storm surge, wave setup, wave run-up and wave overtopping).
- **Tidal inundation –** the inundation of land by tidal action under average meteorological conditions (e.g. King Tides, increases with sea level rise).
- **Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters**.

The threats posed by these coastal hazards, with the exception of *coastal lake or watercourse instability* were assessed in detail as part of the Stage 2 Vulnerability Assessments (along with a range of other non-coastal hazard related threats). The Stage 2 assessments are summarised in **Section 2.2.2**.

2.2.2 Threats Refined by Stage 2 (and other) Studies

Stage 2 of the CMP undertook a range of coastal hazard and Vulnerability Assessments to build on the first pass risk assessment from Stage 1 and address knowledge gaps. These studies are summarised in the Stage 2 Synthesis of Current Knowledge Report (Rhelm, 2023a). The key findings from each study, that refined the understanding of threats to the Lower Shoalhaven River estuary, are provided below.

Lower Shoalhaven River Tidal and Coastal Inundation, Morphological Changes to Berry's Canal, Groundwater and Acid Sulfate Soils Assessment (Stantec, 2023)

Stantec (2023) considered tidal and coastal inundation under seven sea level rise scenarios ranging from 0 to 1.2 m sea level rise and modelled tidal and storm conditions. Tidal inundation for these scenarios

is mapped in **Map RG-01-06** and coastal inundation under storm conditions is mapped in **Map RG-01-07.** The implications of sea level rise include:

- More frequent inundation of low-lying land from high tides and coastal storms;
- Changing environmental conditions leading to the landward migration of estuarine vegetation communities (if accommodation space is available);
- Gradually increasing salinity of groundwater and soils;
- Gradually reduced agricultural capacity of land; and
- Eventual permanent loss of land.

Stantec (2023) also considered changes to ground water level and exposure to acid sulfate soils under a range of sea level rise conditions. Rising sea levels will elevate groundwater levels in the Shoalhaven River floodplain, pushing saltwater further inland. This poses risks of salinisation and structural damage to infrastructure in vulnerable areas.

Projected sea level rise is unlikely to significantly increase the spatial extent of acid sulfate soil (ASS) risk areas in the Shoalhaven River floodplain, as most vulnerable soils are already mapped. However, it may necessitate a shift in management strategies. Allowing tidal flushing in previously drained areas could facilitate acid neutralisation, mitigating the current ASS conditions. However, areas subject to permanent inundation under higher sea level rise scenarios would revert to a pre-drainage hydrological regime, reducing existing ASS but transitioning to potential acid sulfate soil (PASS) status.

Stantec (2023) assessed the ongoing morphological changes to Berry's Canal and predicted future changes. According to the stability analysis conducted, the widening and deepening of Berry's Canal will persist until the cross-sectional area of the canal doubles its current form. Over time, the rate of change is expected to decrease as the canal expands. These morphological changes are projected to continue well into the future, spanning more than 50 years. The projected future shorelines of Berry's Canal are provided in **Map RG-01-08.**

Boating Study (Rhelm, 2023c)

The Boating Study draws from existing literature, stakeholder engagement, and site inspections to undertake an analysis of current boat usage, a review of boating facilities, future demand estimates, and potential management options.

A population-driven forecast for boat registrations in the Shoalhaven LGA anticipates a significant rise in overall registrations by 2040, with recreational vessels continuing to make up the majority. This increase reflects a nearly 20% growth in boat ownership from 2022 to 2040 (**Figure 2-1**).

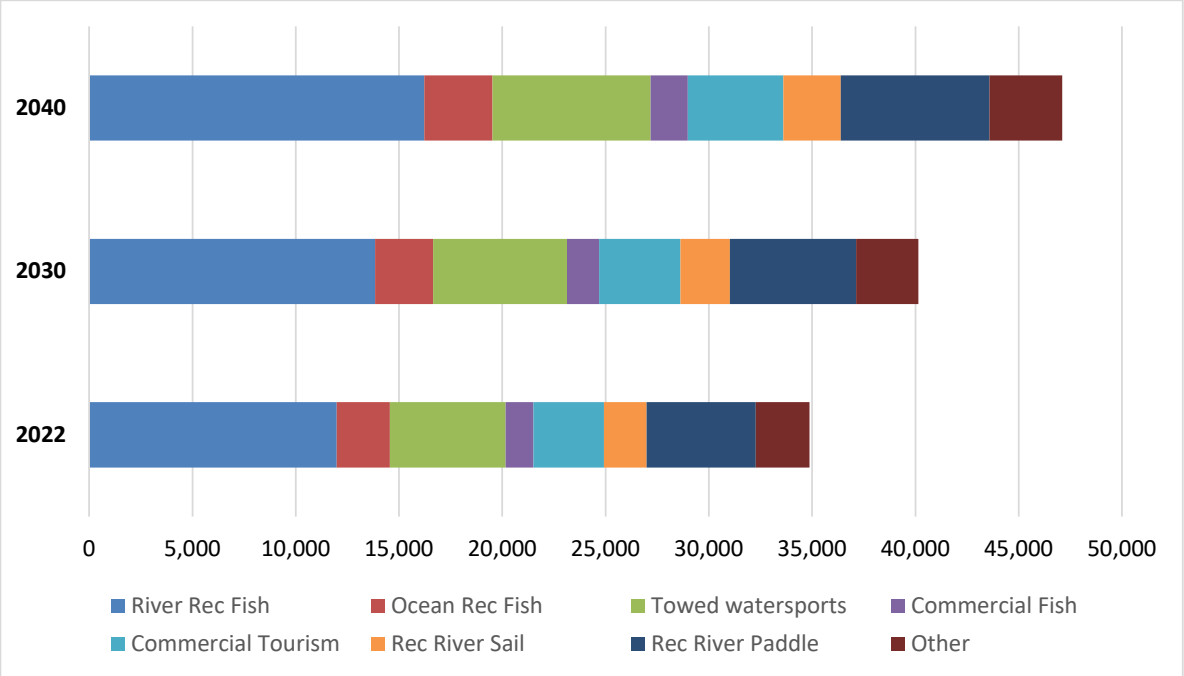

Figure 2-1 Forecast boating activity by type 2022-2040 (Rhelm, 2023c)

Similarly, the number of boating trips across all locations in the Lower Shoalhaven River is expected to see a substantial rise, with a projected 26% increase by 2040. Recreational fishing is expected to remain the most popular boating activity and may become even more prevalent. The key boating issues identified in the Boating Study include:

- High demand and capacity constraints for boating facilities, particularly in peak periods. This can lead to safety concerns, limit boating activity and result in conflict between users;
- Others concerns related to boating infrastructure include poor condition of facilities, lack of lighting, shoaling of approaches, adequacy of Aids to Navigation, and lack of pump outs;
- Boating related conflict between different boaters or between boaters and other users (e.g. swimmers);
- Boating impacts on the river ecology, reflecting concerns about boat wake-induced damage to areas of riverbank; and
- Morphological changes to the river that result in shoaling and shifting channels, impacting navigational access and safety.

Water quality and monitoring program assessment (Rhelm, 2023d)

A review of the available water quality data for the Lower Shoalhaven River was undertaken to identify trends in water quality as they relate to estuarine ecosystem health and aquatic recreation. The aim of the review was to:

- Identify water quality issues and characterise water quality trends in the Lower Shoalhaven River estuary; and
- Comment on the adequacy of Council's existing monitoring and reporting program with respect to both baseline monitoring of ecological health and recreational water quality, as well as significant events.

The estuarine ecosystem health assessment adopted a methodology consistent with the Monitoring, Evaluation, and Reporting (MER) Program, using the data analysis and reporting methods detailed in the MER protocols (NSW Government, 2016; NSW Government, 2020). The analysis of the historical dataset from 1990 to 2021 identified a high range of variation in estuarine water quality. The lower estuary sites generally appear to experience fewer exceedances of recreational water quality trigger values than sites further upstream from the ocean, likely due to the higher rate of tidal flushing in this part of the estuary.

One of the key water quality issues for estuarine health is high levels of turbidity. A link between elevated turbidity levels and rainfall levels suggests that catchment inputs and/or fluvial scour of the banks of the estuary are contributing factors. High turbidity levels can reduce the amount of light reaching seagrass beds and therefore impact seagrass health.

Despite consistently high levels of nutrients in exceedance of MER estuary health trigger levels, concentrations of Chlorophyll-a were more typically within a 'healthy' range, indicating that algal growth in the water column does not often experience bloom conditions. This is shown in **Figure 2-2** which provides results from the DCCEEW (formerly DPE) MER program for the Shoalhaven River.

	Algae	Water clarity	Overall grade
2007-08	A	B	B
2008-09	B	A	A
2009-10	B	B	B
2010-11	B	B	B
2011-12	C	B	B
2012-13	B	B	B
2013-14	B	A	A
2014-15	B	B	B
2015-16	B	A	B
2016-17	B	A	B
2017-18	B	A	B
2018-19	E	B	C
2019-20	B	B	B
2020-21	B	B	B

Figure 2-2 DCCEEW MER results for the Shoalhaven River from 2007-2020

Values for pH are generally lower than the MER estuary health trigger levels, which indicates that floodplain drainage systems and Acid Sulfate Soils may be having an impact on estuarine water quality.

Recreational water quality is generally within acceptable ranges; however, trigger levels have been exceeded throughout the estuary. This may be due to a range of factors, including diffuse agricultural runoff, leaking sewage systems (including on-site sewage systems) and other point sources such as sewage treatment plants. However, those sites with the poorest grades are unlikely to be popular swimming sites. The sites more popular for swimming located at Shoalhaven Heads, Crookhaven Heads and Greenwell Point display water quality within acceptable ranges.

Urban runoff assessment and treatment options (Rhelm, 2023e)

Another key threat to the Lower Shoalhaven River identified in the Stage 1 Scoping Study was the impact of urban stormwater runoff on estuarine water quality and ecology (Advisian, 2020). An analysis of urban stormwater catchments draining to the Lower Shoalhaven River was undertaken in Stage 2 to identify opportunities for stormwater management to reduce this threat to the estuary. The study focused on runoff from the urban areas of North Nowra, Bomaderry, Nowra, Berry, Shoalhaven Heads, Greenwell Point, Orient Point and Culburra Beach.

The stormwater management software MUSIC (v6.3.0) was used to establish models of three high priority sites to identify the potential benefits of various water quality treatment trains with the aim of reducing existing stormwater pollutant loads as much as practical. These sites were evaluated for their inclusion in the CMP actions and are discussed further in **Section 3**.

Bank and riparian condition assessment (Rhelm, 2023f)

The CMP Scoping Study (Advisian, 2020) identified bank erosion and sedimentation as a key threat to the Lower Shoalhaven River estuary, and the issue has been a significant concern for the community for a number of years. An associated issue is the loss of riparian vegetation that functions to stabilise the banks. This Stage 2 study was undertaken to categorise and assess the bank and riparian condition along the Lower Shoalhaven River, identify potential erosion mechanisms and consider appropriate management recommendations.

Bank condition was assessed using the draft Decision Support Tool (DST) for Bank Erosion Management in NSW estuaries (Hydrosphere Consulting, 2020), developed under the NSW Marine Estate Management Strategy (MEMS). The DST utilises inputs gathered during field inspections and recommends management options comprising bank remediation measures. Riparian vegetation condition was assessed using a modification of the AUSRIVAS habitat assessment tool (AUSRIVAS, 2004). Various measures from the AUSRIVAS habitat assessment tool along with observations of macrophytes and common weed species were adopted for this assessment.

The field inspections undertaken for the assessment identified fluvial flows and a lack of riparian vegetation as the key factors resulting in bank erosion. However, previous literature and input from the community have also identified wind waves and boat waves as a likely cause of bank erosion during periods between high flood flows. Bank erosion severity is mapped in **Map RG-01-09**.

Along Broughton Creek the riparian condition was generally poor or very poor, whereas riparian condition was generally good or excellent along the Crookhaven River (Rhelm, 2022c). The most commonly observed issues where riparian condition was poor were shoreline grazing by livestock (especially along Broughton Creek), shoreline access by members of the public and built infrastructure such as flood gates, roads, bridges, culverts and drains. The regeneration of native woody vegetation was typically limited and was generally confined to the lower reaches of the estuary where mangroves were re-establishing or had been planted.

Many sections of bank were observed to have been potentially affected by floods or rainy conditions in the months prior to the assessment and required varying levels of restoration or stabilisation. However, the CMP could only consider a selection of these sites (see site prioritisation in the detailed Stage 2 study) primarily due to the immense costs associated with the works.

Shoalhaven River Floodplain Prioritisation Study (WRL, 2023)

WRL (2023) builds on the work of Glamore *et al.* (2016) who prioritised sub catchments in the Broughton Creek Catchment for rehabilitation for purposes of mitigating acid drainage via the floodplain drainage network. The Shoalhaven Floodplain Prioritisation Study prioritised management actions in the floodplain based on:

- Acid drainage risk (**Figure 2-3**);
- Blackwater potential (**Figure 2-4);** and
- Sea level rise vulnerability (**Figure 2-5**).

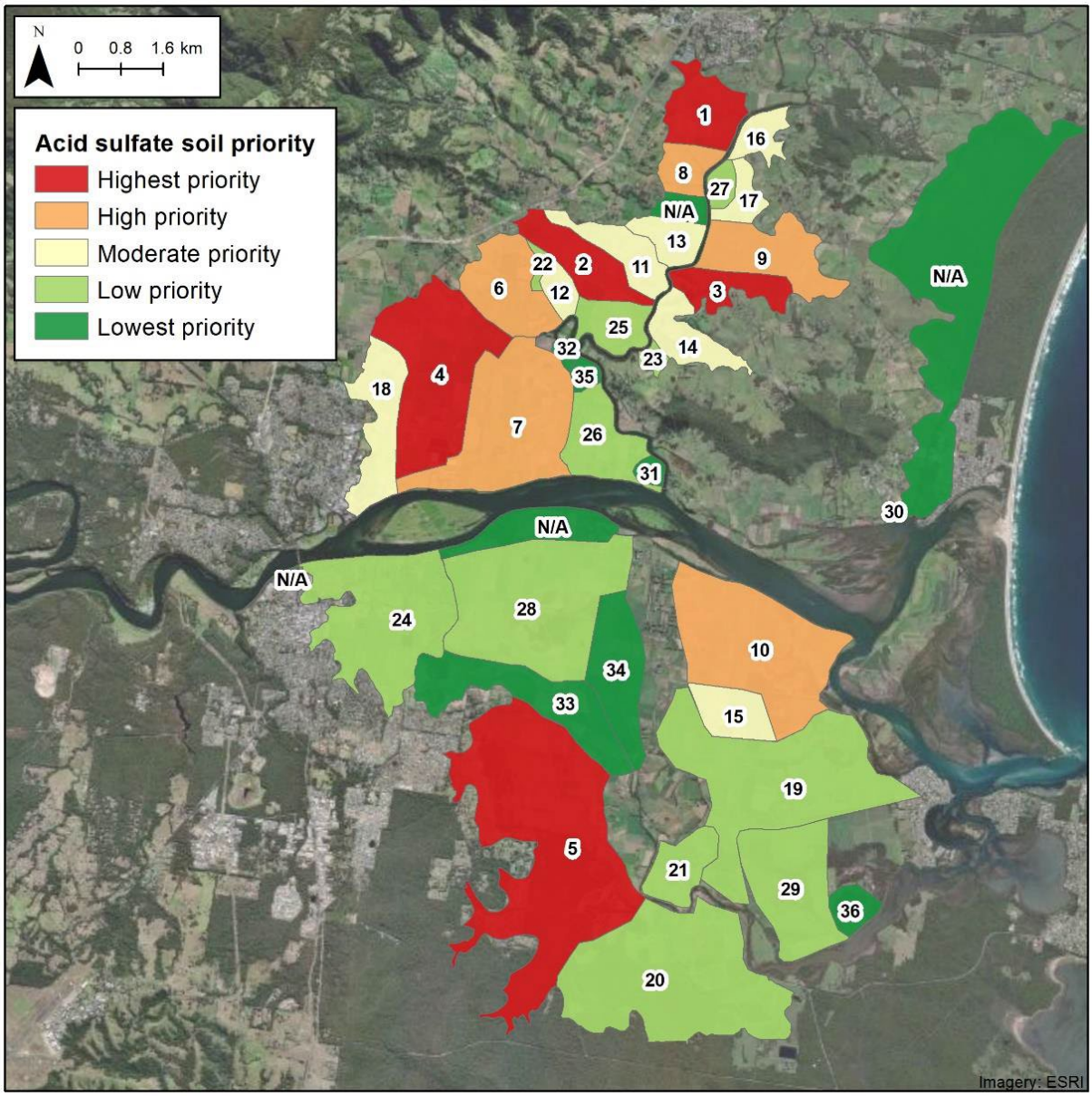

Figure 2-3 Shoalhaven River floodplain subcatchment rankings of the acid prioritisation assessment (WRL, 2023)

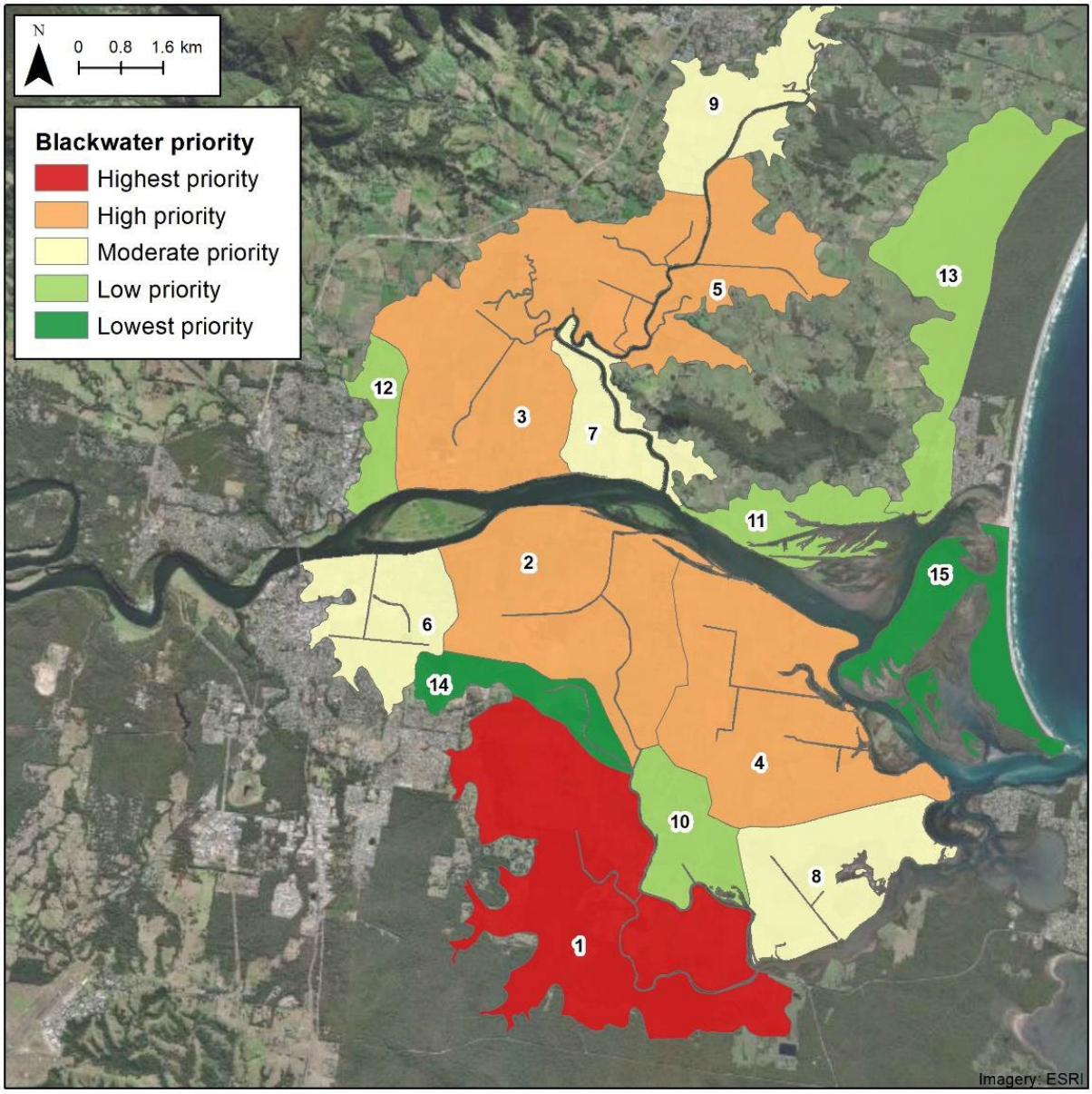

Figure 2-4 Floodplain subcatchment rankings of the blackwater prioritisation assessment (WRL, 2023)

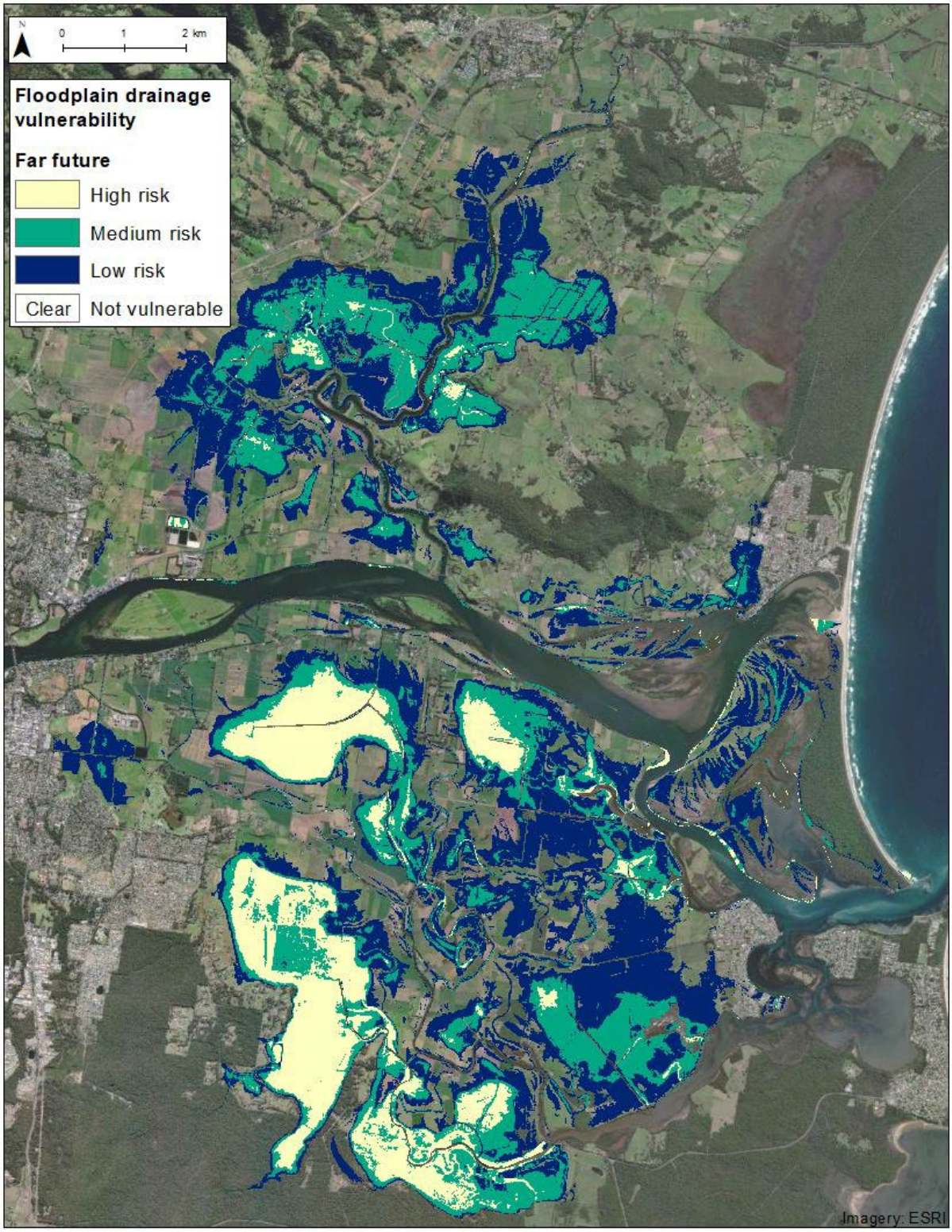

Figure 2-5 **Shoalhaven River floodplain vulnerability with sea level rise (far future ~2100) (WRL, 2023)**

The full details of the recommended short- and long-term options are provided in WRL (2023). The options within the prioritisation study include:

- Modified flood gates;
- Flow diversion channels;
- Estuarine and wetland restoration;
- Drain reshaping;
- Floodwater retention; and
- Wet pasture management.

These options, and broader floodplain management as it relates to coastal hazards and estuary health, were used to inform potential management options, and eventual actions in the CMP, as discussed in **Section 3**.

2.2.3 Key Threats to the Lower Shoalhaven River Estuary

Rhelm (2023b) provides a full report on the detailed risk assessment undertaken for the study area including in-depth descriptions of each key risk that poses a threat to the coastal zone. The risk register was updated as part of the Stage 2 detailed risk assessment (Rhelm, 2023b) to:

- Align with Council's established risk assessment procedure (resulting in the application of revised likelihood and consequence ratings);
- Include planning horizons over the next 100 years (i.e. to 2120) in accordance with the CM Manual;
- Integrate the findings of the Stage 2 studies (i.e. water quality, riparian and bank erosion, tidal and coastal inundation, stormwater treatment, and boating demands); and
- Incorporate input from stakeholder and community engagement completed during Stage 2.

The risks identified within the Lower Shoalhaven River, can be characterised into the following risk themes:

- Bank Erosion and Berry's Canal Adjustment;
- Changes in Tidal Inundation as a Result of Sea Level Rise;
- Coastal Inundation (from coastal storms and extreme tides);
- Changes in Catchment Hydrology (referred to in the Stage 2 risk assessment as Changes in Catchment Flooding and Freshwater Flows)[3];
- Land Clearing and Development (urban and rural);
- Acid Sulfate Soils and Drainage Structures;
- Boating and Associated Waterway and Foreshore Usage; and
- Commercial and Recreational Fishing.

The outcomes of the detailed risk assessment were used to inform the identification and evaluation of potential management options. They were used to ensure potential options are considered that address identified risks, particularly extreme and high risk. They were also used in the multi-criteria analysis (MCA) to evaluate the effectiveness of each potential option at mitigating identified risks (described in

[3] All flood risk mitigation is assessed in the Lower Shoalhaven River Floodplain Risk Management Study and Plan. Entrance management as a flood risk mitigation measure is supported by the CMP.

Section 2.2.3). The information from the detailed risk assessment has been condensed into a summary table (**Table 2-2**) for present day, and future climate scenarios for 2040, 2070, and 2120.

Table 2-2 Summarised Risk Assessment and Table of Threats to the Lower Shoalhaven River Coastal Zone

Threat Theme	Description	Risk Rating			
		Present Day	2040	2070	2120
Bank Erosion and Berry's Canal Adjustment	Bank erosion poses significant threats to both the environment and human activities. Severe erosion can lead to a decrease in agricultural production, loss of riparian habitats, and even the removal or reduction of endangered ecological communities. This erosion impacts recreational amenities at foreshore reserves, damages riverside infrastructure, and results in a loss of biodiversity. The sedimentation and degradation of estuarine habitats further reduce habitats for birds and waders. Additionally, bank erosion can also pose a direct risk of injury to individuals in affected areas. Adjustments to Berry's Canal, such as channel widening, will lead to erosion in the lower estuary. This can damage floodplain infrastructure, posing threats to primary production. Such adjustments can also result in the loss of habitats, bringing about changes to the estuary's ecological balance.	**High**	**High**	**Extreme**	**Extreme**
Changes in Tidal Inundation as a Result of Sea Level Rise	Rising sea levels and changing tides can lead to shifts in habitat balance, including movement of shoals and other estuarine features. Tidal incursions can alter salinity levels, and changes to floodplain aquifers that affect groundwater-dependent ecosystems, public assets, and agricultural lands. While estuarine habitats will migrate landward as the intertidal and subtidal zones expand, this movement can come at the expense of agricultural land. Without adequate accommodation space, estuarine habitats may be lost.	**Low**	**Low**	**Medium**	**High**
Coastal Inundation (from coastal storms and extreme tides)	Coastal inundation, characterised by elevated water levels and flooding due to coastal storm, primarily results in damage to infrastructure. Coastal inundation can also disrupt access to low-lying areas and along some roads.	**High**	**High**	**High**	**Extreme**
Changes in Catchment Hydrology[4]	Climate change, particularly changes in rainfall intensity and patterns, can lead to alterations in flood flows and frequency. This can result in damage to floodplain infrastructure, posing threats to primary production. Communities might face isolation due to flooding, making access to emergency services challenging. Additionally, altered rainfall patterns can lead to a loss of biodiversity in affected regions. Extracting freshwater[5] from natural sources can lead to changes in flows and frequency, resulting in a changing salinity profile, altered sediment dynamics, and impacts on biodiversity.	**Medium**	**High**	**High**	**Extreme**
Land Clearing and Development (urban and rural)	Land clearing and development in both urban and rural contexts have wide-ranging impacts. They can lead to changes in habitat balance, degrade fish habitats, and promote weed encroachment. Such activities can also harm significant cultural heritage places and lead to the loss of terrestrial and riparian habitats in floodplain areas. Poor water quality, especially impacting oyster production, is a major concern. The removal or reduction of endangered ecological communities, impacts on fisheries and oyster farming, and reduced habitats for birds and waders further diminish biodiversity.	**Medium**	**Medium**	**High**	**High**
Acid Sulfate Soils and Drainage Structures	The presence and operation of flood gates and drainage structures can lead to the discharge of low pH water from actual Acid Sulfate Soils and act as physical barriers to fish passage, resulting in a loss of biodiversity. There is also an opportunity in re-naturalising flows and drainage to encourage the restoration of coastal wetlands and production of Blue Carbon.	**High**	**High**	**High**	**High**
Boating and Associated Waterway and Foreshore Usage	Boating is a popular recreational activity, and there is an expected increase in the number of boats due to population increase. Conflicts can arise between users of powered and non-powered crafts. There's also a noted insufficiency in foreshore facilities for recreational use, impacting the overall boating experience. These challenges can decrease recreational amenities and pose safety risks, including potential injuries.	**High**	**High**	**High**	**High**
Commercial and Recreational Fishing	Unregulated commercial and recreational fishing can lead to a reduction in species abundance and diversity, leading to a loss of biodiversity and unsustainable fishery derived economies. This threat is primarily managed by DPIRD Fisheries business as usual actions.	**High**	**High**	**High**	**Extreme**

[4] All flood risk mitigation is assessed in the Lower Shoalhaven River Floodplain Risk Management Study and Plan. Entrance management as a flood risk mitigation measure is supported by the CMP.
[5] Freshwater extraction is managed through Water Sharing Plans (WSP) under the *Water Management Act 2000*

2.3 Snapshot of Issues for Each Coastal Management Area

Table 2-3 identifies the coastal management issues that arise within each of the four CMAs, recognising that some issues may affect more than one CMA.

Open entrance at Shoalhaven Heads (Photo – Shoalhaven City Council)

Table 2-3 Key Coastal Management Threats Within Each Coastal Management Areas

Coastal Management Area (CMA)	Threats within CMA	Context for Threats	Key Locations for Threats
Coastal Wetlands and Littoral Rainforests Area (CWLRA) (incl. proximity area)	Bank Erosion and Berry's Canal Adjustment; Changes in Tidal Inundation as a Result of Sea Level Rise; Changes in Catchment Hydrology; Land Clearing and Development (urban and rural); Acid Sulfate Soils and Drainage Structures;	The key threats to the CWLRA relate to their proximity to urban development and rural land uses. Coastal Wetlands are subject to pressure from urban development and agriculture, particularly with respect to water quality impacts and modifications to wetland hydrology. The latter will become an increasing concern under climate change conditions due to sea level rise and changes to rainfall patterns. The identified threats present a risk to the ecosystem health, biodiversity, resilience and long-term functioning of these areas.	There are extensive areas of Coastal Wetlands throughout the study area, predominantly in the lower estuary in the vicinity of Berry's Canal, Comerong Island, Greenwell Point and along the Crookhaven River. There are some small pockets along the banks of Broughton Creek. There are comparatively smaller areas of Littoral Rainforest in the study area on Comerong Island. Both of these areas are mapped in **Map RG-01-02**.
Coastal Vulnerability Area (CVA)	Bank Erosion and Berry's Canal Adjustment; Changes in Tidal Inundation as a Result of Sea Level Rise; Coastal Inundation (from coastal storms and extreme tides);	The ambulatory and dynamic nature of the foreshore has been considered in the CMP via evaluation of coastal processes to inform management responses, including consideration of how coastal hazards will increase due to climate change. Of the coastal hazard threats, the key ones related to the CVA are: • Coastal inundation; • Tidal inundation; and • Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters. These coastal hazards present a risk to public safety, a risk to life, and a risk to built and natural assets. Coastal and tidal inundation affect large areas of low-lying land throughout the study area. Coastal inundation occurs during storm events and is driven by the combination of astronomical tide and extreme weather conditions that cause temporary elevated water levels. Tidal inundation is the more frequent inundation of low-lying land due to the normal astronomical tidal cycle. The impact of these hazards will escalate as rise in mean sea level occurs, with implications for the long-term viability of some current uses of the coastal zone. Bank erosion is caused by several factors operating on a range of spatial and temporal scale. Loss of vegetation and bank disturbance, whether associated with catchment flooding, unrestricted livestock access, improper public access, boat wakes, or other activities, can materially reduce the resilience of estuarine foreshores. This can threaten foreshore assets, estuarine habitat, and recreational amenity. Eroded sediment can smother seagrass habitat and alter navigation channels. These threats may also impact Aboriginal cultural heritage sites, ceremonial and other important locations, resources and other activities. All stakeholders and the community play an important role in managing these threats to the coastal zone and to appropriately reducing risk and improving resilience to coastal hazards.	While there is currently no CVA mapped for the study area under the RH SEPP, the extent of land vulnerable to coastal hazards has been identified through the Stage 2 vulnerability studies (Stantec, 2023)**.** The key locations identified as being affected by coastal and/or tidal inundation in the Stage 2 vulnerability studies (Stantec, 2023) are mapped in **Map RG-01-06** (tidal inundation) and **Map RG-01-07** (coastal inundation) and include: • Residential areas such as Greenwell Point, Orient Point, Shoalhaven Heads, and the western side of Culburra Beach. • Rural areas including Jaspers Brush, Back Forest, Far Meadow, Coolangatta, Bolong, Numbaa, Terara, Brundee, Pyree, Mayfield, and Worrigee. Key locations identified as being affected by bank erosion in the Stage 2 vulnerability studies (Rhelm, 2023f) include: • Berry's Canal (**Map RG-01-08**) • Foreshore areas as mapped in **Map RG-01-09**. Council proposes to adopt a CVA under the RH SEPP for the study area. This is to be facilitated via action CTF_13 as described in **Section 3.2**. Further discussion on this process is provided in **Section 4.**

Coastal Management Area (CMA)	Threats within CMA	Context for Threats	Key Locations for Threats
Coastal Environment Area (CEA)	All threats	Key impacts to the CEA arise from urban development, agricultural activities, floodplain drainage, recreational activities (including boating and 4WD), and pests and weeds. Water quality issues arise due to multiple characteristics in the catchment. Increasing urbanisation to accommodate projected population growth can change catchment hydrology and increase pollution in urban runoff. Floodplain drainage infrastructure throughout low-lying areas of the catchment exposing acid sulfate soils can lead to acid water discharge. Nutrient run-off from agricultural lands can lead to eutrophication, causing excessive growth of algae and aquatic plants, which in turn depletes oxygen levels in the water, harming aquatic life. Additionally, sedimentation from soil erosion and construction activities can smother aquatic habitats and reduce water quality. Coastal hazards including coastal erosion and coastal inundation, although naturally occurring processes, may occasionally impact coastal ecosystems; however, this would generally be considered to reflect natural variation. In contrast, tidal inundation associated with climate change induced sea level rise has potential to adversely impact a range of ecosystems, including estuarine macrophytes and terrestrial vegetation within the projected inundation extents.	The CEA encompasses most of the Lower Shoalhaven River coastal zone. There is a diverse range of identified threats to the CEA, relating to water quality threats, development and land use, recreational activities, and some coastal hazards. These threats are adversely impacting terrestrial and aquatic ecosystem health and resilience and biological diversity within the study area. This is of particular concern in relation to ecologically significant communities, populations and species, of which there are many located within the study area. These include: • Various National Parks and Nature Reserves; • Estuarine macrophytes and other aquatic habitats, including mangrove, saltmarsh, and seagrass; and • Significant shorebird and wader bird habitat areas. Some of the key locations where recreational activities (including boat wake sports) are adversely impacting ecosystems includes the foreshores of the upper reaches of the estuary which are heavily utilised by boaters, and some nature reserves which are accessed by 4WD vehicles. In agricultural areas, the historical practices of tree and woody debris removal, floodplain clearing and drainage, and shoreline grazing have enabled exotic species invasion and have degraded the native riparian vegetation.
Coastal Use Area (CUA)	Boating and Associated Waterway and Foreshore Usage Commercial and Recreational Fishing Changes in Tidal Inundation as a Result of Sea Level Rise	Threats to the CUA relate to visual and landscape character, economic uses of the coastal zone, recreational activities, and social and cultural values. Tourism, recreational and commercial fishing and boating are major economic uses of the coastal zone. Tourism in particular can contribute to significant increases in population during holiday periods. These seasonal increases in population can place pressure on resources, services and utilities. A population-driven forecast for boat registrations in the Shoalhaven LGA anticipates a significant rise in overall registrations by 2040, with recreational vessels continuing to make up the majority. This increase reflects a nearly 20% growth in boat ownership from 2022 to 2040. Similarly, the number of boating trips across all locations in the Lower Shoalhaven River is expected to see a substantial rise, with a projected 26% increase by 2040. Recreational fishing is a common activity undertaken by waterway users, and pressures associated with this activity are expected to increase with population. Increased frequency and extent of tidal inundation due to sea level rise will put pressure on current uses of the coastal zone. Low-lying locations in the floodplain will undergo gradually diminishing economic capacity of current land uses.	The CUA encompasses much of the Lower Shoalhaven River coastal zone. Some of the key locations where threats are impacting the CMA, or will impact in the future include: • At popular boat ramps that experience congestion, especially during peak holiday times; • Where recreational and commercial boating activities co-occurs with aquaculture operations; • Where different recreational activities conflict with each other, such as active and passive boating activities; and • In low-lying areas, such as around Greenwell Point, Numbaa and Broughton Creek.

3 Actions to be Implemented by the Council or by Public Authorities

3.1 Evaluation of Coastal Management Options

The CMP process detailed in the CM Manual (OEH, 2018b) involves councils identifying coastal management issues affecting the area to which the CMP is to apply. A key objective of the CMP is to develop strategies and identify coastal management actions that address these coastal management issues, reduce exposure to coastal hazards, and to take advantage of opportunities, consistent with provisions in Clauses 14 and 15 of the CM Act. Councils also decide the priority of identified coastal management actions and propose integrated and strategic delivery pathways.

The process prescribed in the CM Manual follows four steps, summarised in **Figure 3-1.**

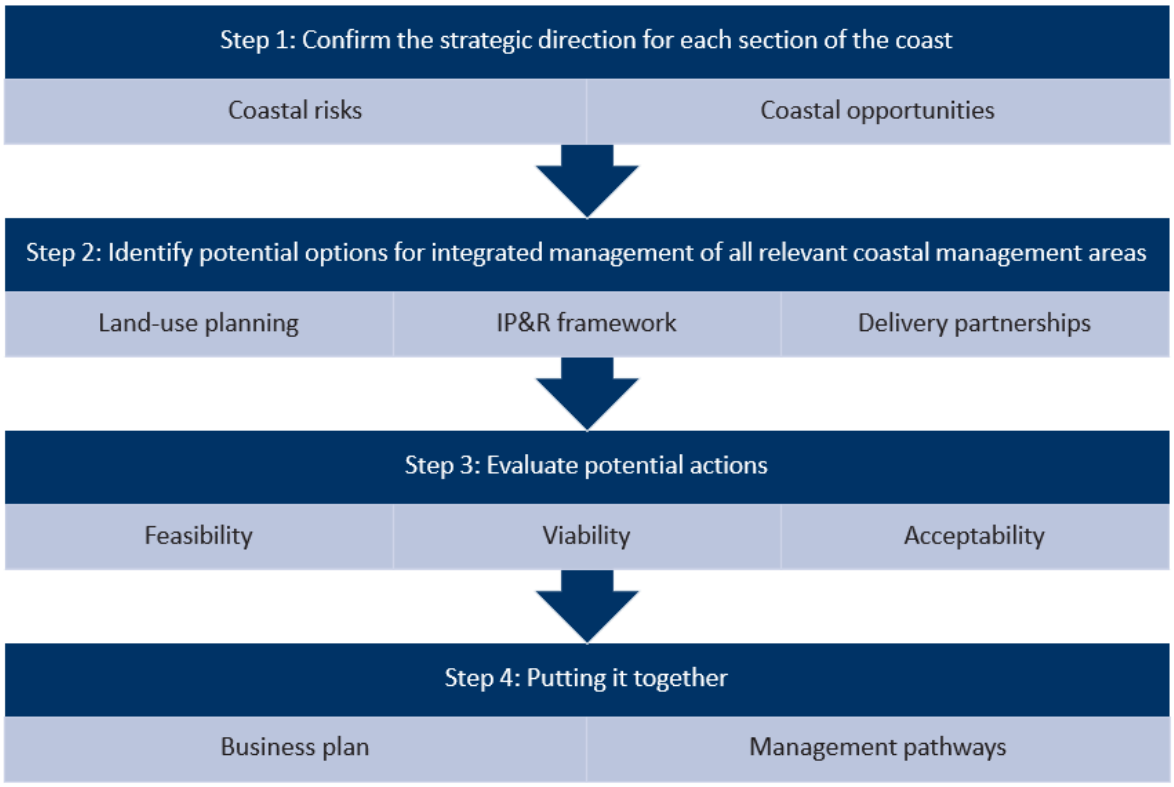

Figure 3-1 Options Identification and Evaluation Process (after: OEH, 2018b)

Stages 1 and 2 of the CMP (including the engagement activities undertaken) developed an understanding of the coastal management issues, including an analysis of the risks, vulnerabilities and opportunities in the study area. As per Step 1 in **Figure 3-1**, the key values, risks and opportunities identified (**Section 2**) provided the basis for the strategic direction of the Lower Shoalhaven River CMP (**Sections 1.4**).

Stage 3 of the Lower Shoalhaven River CMP has involved identification and evaluation of management options, as per Steps 2 and 3 in **Figure 3-1,** to select preferred coastal management actions for inclusion in the CMP with a focus on achieving the objects of the CM Act (**Table 1-2**) and alignment with management objectives for CMAs under the RH SEPP (**Table 1-3**).

Community and stakeholder engagement helped inform this process by providing feedback via an online portal, at workshops and meetings (refer **Section 1.5** and **Appendix B**).

The Stage 3 Summary Report (Rhelm, 2024) provides a more comprehensive summation of the options development and evaluation process.

3.1.1 Confirm Strategic Approach

The purpose of a CMP is to set the long-term strategy for the coordinated management of land within the coastal zone with a focus on achieving the objects of the CM Act. The long-term strategic direction for the Lower Shoalhaven River coastal zone is articulated in the vision and purpose statements that have been developed for the CMP, which is supported by a series of local coastal management objectives aligned with the CM Act. The vision, purpose, and objectives are presented in **Section 1.4.**

To achieve the vision and objectives of the CMP and to ensure compliance with the CM Act, a variety of strategic approaches have been considered in the development of the management actions. These approaches provide a flexible and adaptive framework for addressing the diverse range of risks and challenges present in the Lower Shoalhaven River coastal zone. Each approach is tailored to the varying levels of risk and the specific management needs of different areas within the coastal zone.

The five strategic approaches applied in the CMP are:

- **Alert –** This approach focuses on monitoring and research to track changes in the coastal environment. It is particularly useful where immediate intervention is not necessary, but an understanding of ongoing processes is required to inform future decisions. This 'watch and wait' strategy allows for the identification of critical thresholds that, once reached, will trigger more active management responses.
- **Avoid future impact –** In areas where development pressure exists, proactive land-use planning measures have been considered to guide future development towards low-risk areas. By focusing on prevention, this approach aims to reduce the likelihood of future coastal hazards impacting communities, infrastructure, and the natural environment.
- **Active intervention –** Where immediate risks have been identified, active management options are proposed to protect existing assets and accommodate changes in the coastal zone. This approach aims to manage current risks while maintaining the environmental and social values that are important to the local community.
- **Planning for change –** Recognising the long-term dynamic nature of the coastal zone, this approach includes actions that facilitate adaptation to evolving environmental conditions. It may involve planning for the relocation of assets, the restoration of natural processes, or the migration of habitats in response to sea level rise or other long-term changes.
- **Emergency response** – In areas exposed to extreme events or residual risks, emergency response actions are included to manage immediate threats to public safety and critical infrastructure. These measures ensure preparedness for short-term events that may occur before long-term management strategies take effect.

By applying these strategic approaches where appropriate, the CMP provides a comprehensive and adaptable framework for managing both present and future risks in the Lower Shoalhaven River coastal zone. This ensures that the management actions not only address current challenges but are also forward-looking, positioning the community to respond to changing conditions over time.

3.1.2 Identifying Options

A total of **215** management options were developed based on a review of the implementation status of the relevant existing coastal studies and plans of management that had been prepared for the study area, the outcomes and recommendations of the Stage 2 Vulnerability Assessments and engagement with the community, key stakeholders and Traditional Owners. A summary of the source of the options is provided in **Table 3-1**.

Table 3-1 Source of Potential Options Assessed in Stage 3

Source	Count
Outcomes of Stage 2 Studies	63
Community (Interactive Online Map)	44
Previous and associated studies and plans	39
Adapted from other CMPs*	23
Community (emails and letters)	15
State Gov Recommendations	15
Additional Option Identified by the Project Team	8
Community inputs to Stage 2	6
Traditional Owner Engagement	2
Total	**215**

** Mostly from the SCC Open Coast & Jervis Bay CMP, but some were also from other CMPs across the state.*

The full list of management options and information on how they were identified (i.e., 'source of option') is provided in the Stage 3 Report (Rhelm, 2024). The following details are also provided for each option:

- A unique identifier in the form of an 'Option ID' number for tracking through the options evaluation process;
- An option description, including the option location (which was mapped, where feasible);
- The key coastal threat/management objective that the option addresses; and
- The strategic approach applicable to the management option (i.e., Alert, Avoid Future Impact, Active Intervention, Planning for Change, Emergency Response).

Two additional options were identified during Stage 4, including via submissions during public exhibition. These options were not considered in Stage 3 but were considered against the same evaluation framework before including for recommendation. A summary of updates to the CMP in response to public exhibition is provided in **Appendix B**.

3.1.3 Evaluating Options

The CM Manual recommends councils undertake a methodical and transparent evaluation process to select and adopt the most appropriate coastal management options as actions in the CMP. It is recommended that proposed coastal management options be evaluated in relation to feasibility, viability and acceptability. An overview of the options assessment process, which was adopted in this CMP, is illustrated in **Figure 3-2.**

The long list of **215** options identified in Stage 3 of the CMP were subject to assessment for feasibility, viability and acceptability.

The first step was the feasibility assessment, which comprised a first-pass screening of all options to 'rule out' any options that did not address an existing (or future) risk to the coast or were in some other way infeasible. This step also enabled the consolidation of overlapping options.

The viability assessment was undertaken for those options that progressed through the feasibility assessment and comprised:

- A multi-criteria assessment based on how well the option addressed coastal threats and its alignment with the CMP management objectives; and
- A simplified 'value for money' assessment with respect to the relative cost of implementation over the 10-year CMP.

None of the management options were subject to detailed cost-benefit analysis, preliminary design or viability analyses (e.g. modelling). It was considered that none of the options were sufficiently high cost, complex or high risk to necessitate such analyses.

This section summarises the options assessment process and outcomes, which are more comprehensively documented in the Stage 3 Report (Rhelm, 2024).

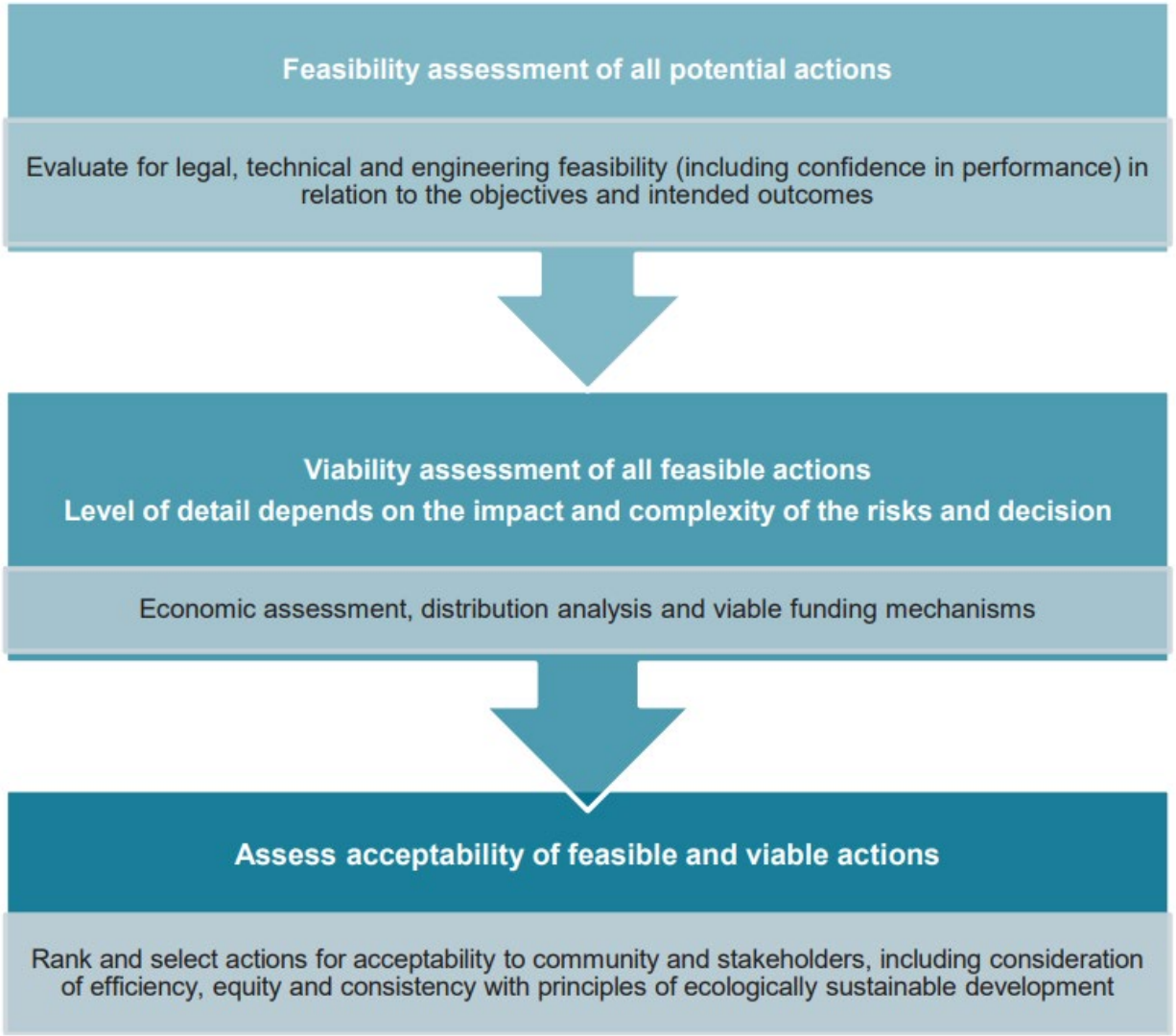

Figure 3-2 Staged Option Evaluation Process (from OEH, 2018b)

3.1.3.1 Feasibility Assessment

The feasibility of the management options was evaluated for their legal, technical and engineering feasibility (including confidence in performance) in relation to the objectives and intended outcomes. This evaluation was undertaken using the guidance from the CM Manual (OEH, 2018b), by assessing the options against the criteria shown in **Table 3-2.** Feasible options were carried forward to a viability assessment, as described in **Section 3.1.3.2.**

Table 3-2 Feasibility Assessment Criteria

Feasibility Criteria	CM Manual Guidance
Statutory and policy compliance	Are consistent with the objects of the CM Act and management objectives of the coastal management areas
	Would be permissible under the legislation
	Comply with policy requirements at local, state and Commonwealth levels
Engineering feasibility	Are feasible in engineering terms (i.e. a structure can realistically be built, given the local process context)
	Are broadly able to be implemented, in terms of available capacity and capability, and would address the intended issue
Reduces risk or enhances values	Can address the identified threats and risks to the coastal zone, or enhance opportunities, based on previous experience / professional judgement
	Are likely to contribute new knowledge for effective and adaptive management; for instance, a response that is structured as a carefully controlled trial of new technology
Adaptive management	Facilitates adaptive decision making, acknowledging uncertainty about future conditions including climate change, or disagreement about which action should be taken

When evaluating the feasibility of the options, the following aspects were also considered in consultation with Council and DCCEEW-CPHR:

- The timeframe over which a management option would remain effective and any limits to the effectiveness of the option (e.g. is there a threshold beyond which the response would fail or is rendered obsolete?).
- Evidence of the successful application of the management option in similar situations.
- The potential for any unintended or unanticipated negative consequences (sometimes referred to as perverse outcomes or maladaptation).
- Whether the option is irreversible and locks in a specific future action or allows for adaptive management.
- Alternatively, whether the option is a low risk or 'no regrets' option, that maintains flexible adaptive capacity.
- The level of expertise required to evaluate the design, implementation, monitoring and review of actions.
- The alignment and consistency with actions in the Marine Estate Management Strategy and objects of the *Marine Estate Management Act 2014*.

During the feasibility assessment, some common reasons for precluding options from progressing to the viability assessment included:

- The option failed to address at least one of the identified threats (**Section 2.2**) in the risk assessment.
- The option would not be permissible under the current statutory framework.
- The option was not considered feasible from an engineering perspective (e.g. insufficient space for implementation or would not achieve the intended outcome).
- The option was not considered an adaptive response, potentially locking in an unsustainable management pathway, or likely leading to maladaptation.
- The option was incorporated into another option, for example, due to overlapping locations or for practicality of implementation.
- The option has already been or is being actioned by Council or another agency and does not require consideration in the CMP.
- The option is out of scope for the CMP and is best addressed through a different mechanism.

A flowchart illustrating the feasibility process is provided in **Figure 3-3**. The feasibility assessment outcomes are provided in Appendix B of the Stage 3 Report (Rhelm, 2024). The feasibility assessment short-listed a total of **50** feasible options to progress to the viability assessment.

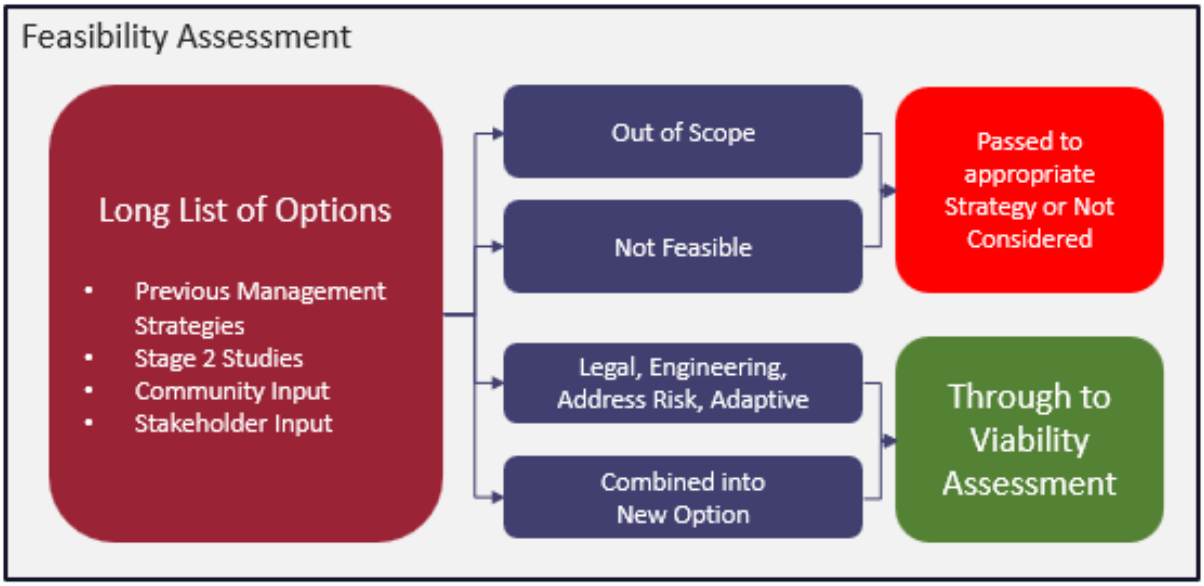

Figure 3-3 Flowchart of the Feasibility Assessment

3.1.3.2 Viability Assessment

The viability of coastal management options was assessed on a largely qualitative basis via a multi-criteria analysis (MCA). The criteria adopted for the MCA were based on the values, threats and management objectives identified in **Section 2**. A high-level estimate of capital and recurring costs of the option over the life of the CMP (assumed to be 10 years) was also factored into the assessment.

The structure of the MCA is driven by the need to confirm consistency with the CM Act and the requirements of the CM Manual, as well as the need to ensure the CMP contains actions that can be realistically funded and implemented. The MCA was used to compare and contrast the 50 management options that passed the feasibility assessment.

A flowchart illustrating the MCA process is provided in **Figure 3-4**.

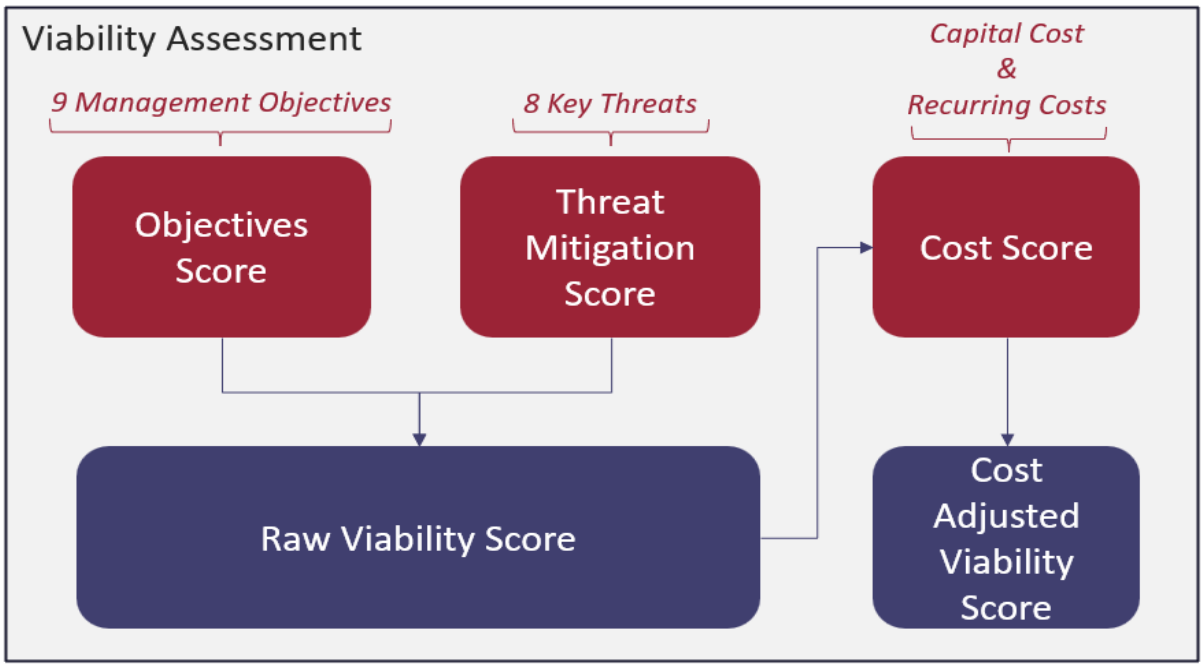

Figure 3-4 **Flowchart of the Viability Assessment**

Objectives Score – scores were applied to each management option with respect to the option's impact on achieving each of the nine (9) management objectives (refer **Table 1-1**). Scores were determined using the descriptors in **Table 3-3**. The score for each individual management objective was then summed to produce an overall *Objectives Score*. No weightings were applied.

Objective Score = Sum of each of the 9 individual objectives scores

Threat Mitigation Score – each option was scored with respect to how effectively it would address each of the eight (8) individual threats listed in **Table 2-2**. The scores were applied in accordance with the descriptors in **Table 3-3** and then weighted based on their present day risk level as shown in **Table 2-2**. The maximum *Threat Mitigation Score* and maximum *Objectives Score* were given equal weight by dividing the threat score by 2. The final *Threat Mitigation Score* was determined according to the following formula:

$$\textit{Threat Mitigation Score} = \sum [(\textit{Individual Threat Score} \times W) / 2]$$

where W is the weighting for each threat, defined by:

- *W=4 for present day Extreme risk*
- *W=3 for present day High risk*
- *W=2 for present day Medium risk*
- *W=1 for present day Low risk*

Table 3-3 Objectives and Threat Mitigation Scoring System

Description of Impact	Score
Direct, positive contribution to threat reduction or achievement of objective	2
Indirect or minor positive contribution to threat reduction or achievement of objective	1
No or neutral impact contribution to threat reduction or achievement of objective	0
Indirect or minor increase in threat or negative impact on objective	-1
Direct increase in threat or negative impact on objective	-2

Raw Viability Score – comprises the sum of the *Threat Mitigation Score* and *Objectives Score*. The theoretical maximum *Raw Viability Score* that could be achieved if a feasible option scored perfectly across all management objectives and key threats would be 36.

Raw Viability Score = Objectives Score + Threat Mitigation Score

Cost Score – the capital and annually recurrent costs were estimated for each feasible option along with the year(s) of implementation to consider the total cost over the 10-year CMP implementation period. A *Cost Score* was then determined as shown in accordance with **Table 3-4.**

Table 3-4 Cost Adjusted Scoring System

Cost of Implementation	Score
<$10,000	1
>$10,000 to <$100,000	2
>$100,000 to <$1,000,000	3
>$1,000,000	4

Cost Adjusted Viability Score – was calculated by dividing the *Raw Viability Score* by the *Cost Score*, providing an indication of value for money. The theoretical maximum *Cost Adjusted Viability Score*, achieved by an option with a perfect *Raw Viability Score* and a total cost of implementation less than $10,000 would be 36. The same option with a cost of implementation greater than $1,000,000 would achieve a *Cost Adjusted Viability Score* of 9.

Cost Adjusted Viability Score = Raw Viability Score / Cost Score

In summary, a higher *Raw Viability Score* indicates a strong management action that supports the management objectives, and/or addresses key threats. A high *Cost Adjusted Viability Score* indicates a strong management action that provides good value for money.

3.1.3.3 Acceptability Assessment

Following the viability assessment, all feasible options were also subject to an acceptability assessment. A simple flowchart illustrating the acceptability assessment process is provided in **Figure 3-5**. This is followed by a more detailed description of the various components that contributed to each options *Acceptability Score*.

Figure 3-5 Flowchart of the Acceptability Assessment

Likely Community Acceptability Score – was based on community sentiment gauged during the community drop-in sessions, the inputs received from the community via the interactive mapping tool, comments received via email or letters to Council. These scores were reviewed following public exhibition of the Draft CMP and feedback received on actions was considered and incorporated into the Final CMP where appropriate. A summary of changes in response to public exhibition is provided in **Appendix B**.

Council & Stakeholder Acceptability Score – was confirmed by Council, DCCEEW-CPHR and other government stakeholders based on existing policy, funding, and governance.

Both the *Likely Community Acceptability Score* and the *Council & Stakeholder Acceptability Score* were determined in accordance with the descriptors in **Table 3-5.**

Table 3-5 Community and Stakeholder Acceptability Scoring System

Likely acceptance	Score
Strong support / wide level of general support	2
Option likely to be supported by some groups or stakeholders and not supported by others.	1
Option likely to face broader opposition and may require careful consideration if it is to be implemented.	0

Acceptability Score – was obtained by summing the *Likely Community Acceptability Score* and the *Council & Stakeholder Acceptability Score*. No weighting was applied. The maximum *Acceptability Score* an option could achieve would be 4, with a minimum score of 0.

***Acceptability Score** = Likely Community Acceptability Score + Council & Stakeholder Acceptability Score*

3.1.3.4 *Final Option Score*

The *Final Option Score* reflects the effectiveness of the option to achieve coastal management objectives and address coastal threats. The value for money is considered through the application of a cost adjustment factor.

The *Final Option Score* was determined by summing the *Cost Adjusted Viability Score* and the *Acceptability Score.* The theoretical maximum *Final Option Score* that could be achieved would be 40. A breakdown of the possible range of scores is provided in **Table 3-6**.

A low score does not necessarily mean the option should not proceed; it might reflect a higher cost required to achieve the intended benefit or may result in the option being of a lower priority than other options.

Table 3-6 Potential Range for Options Evaluation Scores

Score component	Theoretical Minimum	Theoretical Maximum
Objective Score	-18	18
Threat Mitigation Score	-18	18
Raw Viability Score	**-36**	**36**
Cost Score	1	4
Cost Adjusted Viability Score	**-36**	**36**
Likely Community Acceptability Score	0	2
Council & Stakeholder Acceptability Score	0	2
Acceptability Score	**0**	**4**
Final Option Score	**-36**	**40**

A flowchart illustrating the entire options valuation is provided in **Figure 3-6**. Appendices B & C in the Stage 3 Report (Rhelm, 2024) provide details of the evaluation results for all identified options.

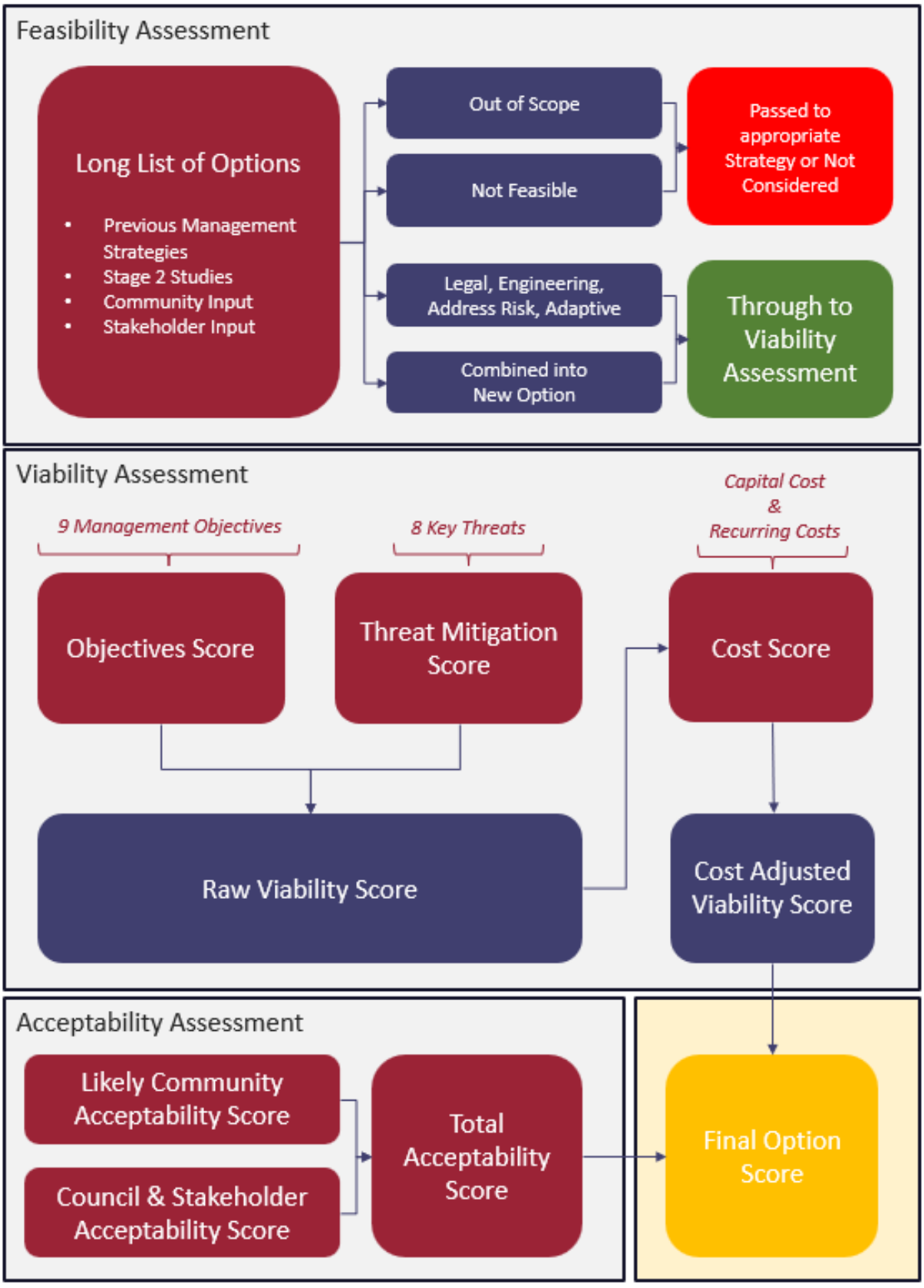

Figure 3-6 **Flowchart of the Entire Options Evaluation Process**

3.1.4 Options Evaluation Outcomes

The decision as to which options should be recommended for inclusion as actions in the CMP is influenced by a range of factors, principally what is feasible with respect to available resources and funding. The evaluation process also provides useful information for prioritising the program of works in the CMP. It is also useful to consider the geographical spread and different types of options that would be included in the CMP, to ensure the program of works is comprehensive and integrated.

Of the **215** identified options on the long list, a total of **50** options were assessed as being feasible and progressed to the viability assessment. An overview of the feasibility assessment outcomes is provided in **Figure 3-7**.

Of the **165** options that did not progress to the viability assessment:

- **126** were combined or integrated into other more comprehensive options that progressed to the viability assessment.
- Twelve (**12**) have already been implemented by Council or another agency or will be completed as part of the CMP development process.
- Twelve (**12**) did not meet the criteria listed in **Table 3-2** including[6]:
    - Nine (9) were deemed to be not feasible from a statutory or policy perspective.
    - Three (3) were deemed to be not feasible from an engineering perspective.
    - Ten (10) were deemed to be not feasible because of their ineffectiveness to address any of the key threats.
    - Five (5) were deemed to be not feasible due to a lack of adaptability to future conditions.
- Fifteen (**15**) were considered to be out of scope of the CMP and best addressed through a different management framework.

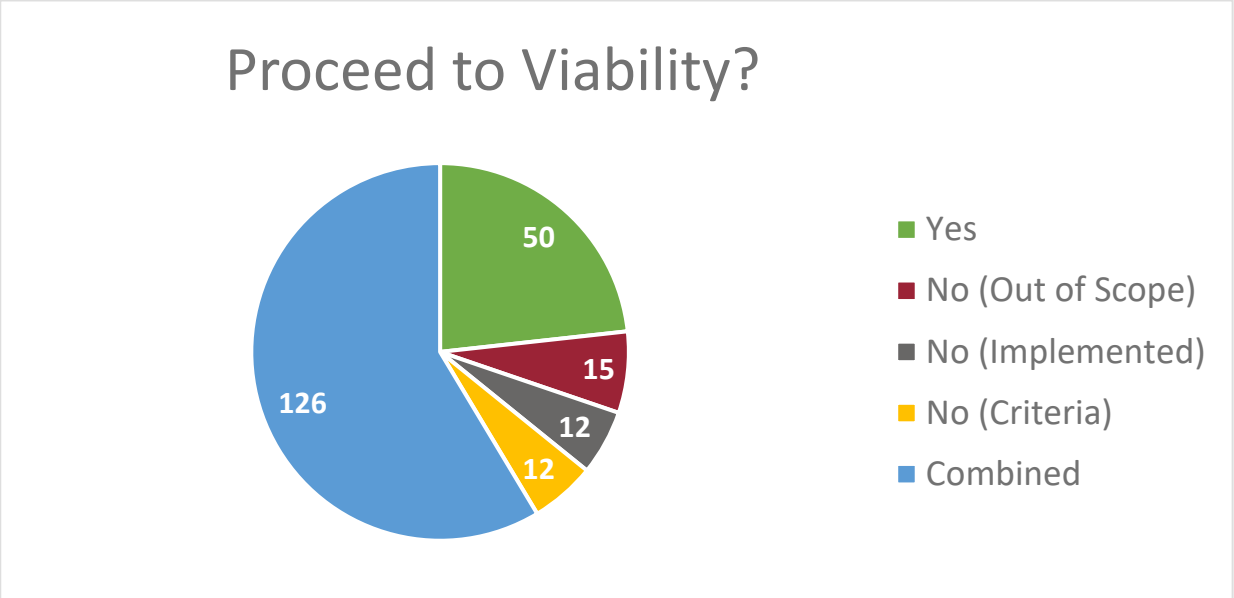

Figure 3-7 Overview of Feasibility Assessment Outcomes[7]

[6] Note that some options did not meet multiple of these criteria.
[7] Options added in response to public exhibition are not included in this chart.

Of the **50** feasible options that were evaluated for viability and acceptability, **48** were recommended by the Stage 3 assessment for inclusion as actions in the CMP. Several of the management actions were split into sub-actions. The rationale for splitting these actions reflects different locations for the same action, with implementation details that are best captured individually. Where this is the case, the sub-actions are listed with a letter appended to the action ID (e.g. BE_43a-i). Including sub-actions, there were **58** individual actions included in the draft CMP document that was made available during public exhibition.

An additional **2** actions were added in response to public exhibition. These actions were considered against the assessment framework objectives before inclusion.

2 actions, led by external agencies, were omitted from the CMP due to uncertainty regarding securing a reliable funding source, thus, making it challenging for agencies to commit to their implementation. Although not formally included in the CMP Business Plan, these two actions are documented in **Appendix F** for future consideration, as the risk assessment process identified them as important for addressing key priority issues. Therefore, a total of **58** individual actions has been included in the final CMP document. An overview of the **58** CMP actions grouped by theme is provided in **Figure 3-8**.

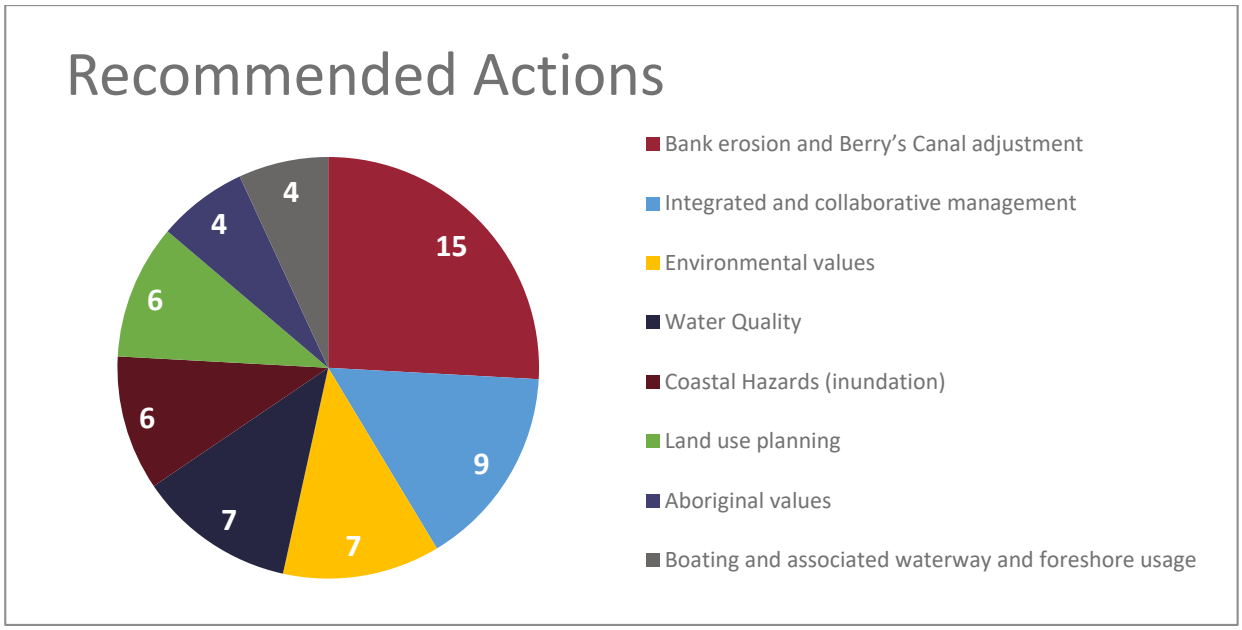

Figure 3-8 Overview of Management Actions in the CMP

Two feasible management options were not recommended for the CMP. This decision was informed by consideration of the cost of implementation of the management option and the potential benefits that might or might not be realised. The two feasible management options that were not recommended for inclusion in the CMP and an explanation of the rationale for not including them is provided below:

BOAT_12 – Investigate dredging shoals where there is a risk to safe navigation that cannot be managed using navigational aids.

The management option BOAT_12 was not recommended for inclusion in the CMP because of the low risk profile associated with not implementing it and the high environmental impact of dredging shoals in the study area. The option scored poorly in the multi-criteria analysis (MCA) for the criteria of cost-effectiveness, social acceptability, ecological value and alignment with the objectives of the CMP. The

option also faced significant regulatory and technical challenges, as dredging activities would require approvals from multiple agencies and could potentially affect the hydrodynamic and sediment transport processes in the estuary. Dredging is also a costly action, further reducing the viability for incorporating it into the CMP.

Furthermore, the option was not supported by the findings of a recently completed dredging feasibility assessment for the navigation channel at Shoalhaven Heads conducted by Advisian (2023). This study was commissioned in support of community concerns about the area, which is considered by the community to be a high priority candidate for navigational channel dredging. This investigation concluded that the existing channel linking two boat ramps at Shoalhaven Heads was suitable under most conditions for normal boating operations and the type of vessels that are typically used in calm weather. The study also found that the most inaccessible conditions for the channel were when the water was rough and the wind was strong, which are times when boats are not advised to be on the water anyway.

The study also recommends ongoing monitoring of the channel, with the potential for dredging to be revisited should channel shallowing, causing access issues, be observed. Monitoring of navigational channels and approaches to boat ramps, as well as maintenance dredging as needed, is recommended in the CMP and included in Action BOAT_37.

As such, this option has been already undertaken at the high priority location of Shoalhaven Heads, and further investigations in the study area have been assessed to be unwarranted, costly and environmentally detrimental, and was not considered further in the CMP.

CS_03 – Removal of mangroves at Shoalhaven Heads beach

The management option CS_03 was also not recommended for inclusion in the CMP. The option aims to enable the continued removal of mangrove seedlings from a designated area of Shoalhaven Heads foreshore directly adjacent to the Holiday Haven park and near the entrance, to improve the amenity and recreational value of the area, which is an important tourism destination and local economic driver. Fisheries Permit (PN19/338) has previously allowed for the removal of mangrove seedlings in the area east of the River Road boat ramp on the foreshore adjacent to the caravan park shown in **Figure 3-9.** However, this permit has an expiration date of 4 October 2024. An analysis of this action under the CMP framework has been undertaken as it falls under the remit of this CMP.

Mangroves provide multiple benefits to the local Shoalhaven Heads area and the broader estuary including assisting with stabilising the shoreline, reducing erosion, filtering pollutants, enhancing water quality, sequestering carbon, providing habitat and food for fish and wildlife, and supporting biodiversity. These benefits are also valued by both residents and visitors, contributing to the appeal of the location as a tourist destination and the associated economic benefits. Removing mangroves would reduce these benefits and potentially increase the vulnerability of the estuary to climate change and sea level rise, which will put increasing pressure on intertidal estuarine ecosystems.

When the MCA was applied to this option, it scored well for only one criterion being that it supports social values associated with foreshore recreation. It scored neutral or negative for the other criteria. As such, on balance, it does not support the objectives of the CMP (which are based on the Objects of the CM Act), nor does it sufficiently mitigate any of the key threats. Therefore, the option was not

considered appropriate for inclusion in the CMP. However, should the need arise, Council can apply for a Fisheries Permit for this activity through other strategic plans and operational mechanisms.

In contrast, the CMP also assessed the viability of an option to implement a living shoreline and associated user amenity opportunities (Option BE_46) at Shoalhaven Heads beach. This option seeks to enhance the recreational amenity and tourism-related appeal while also vastly improving the ecological functionality of this shoreline. These two options (CS_03 and BE_46) were considered in comparison and based on its provision of multiple benefits and much stronger alignment with the CM Act objectives, BE_46 has been put forward as the recommended CMP action in this location. A rendering of a living shoreline option from the Wagonga Inlet is provided in **Figure 3-10** as an example.

Additionally, in further recognition of the importance of foreshore recreation and amenity space, a number of other options seek to maintain and improve the adjacent foreshore area for this purpose. Together these consist of a holistic Shoalhaven Heads key location plan that supports the continued, sustainable and enhanced recreational value of the area (see **Section 3.2.5** and **Appendix D**).

Figure 3-9 Site map depicting location of mangrove seedling maintenance activity (shaded blue) authorised under Fisheries Permit (PN19/338).

Figure 3-10 Rendering of a Living Shoreline option (Option BE_46) (Source - Eurobodalla Shire Council).

3.2 Recommended Management Actions

3.2.1 Overview

Management strategies and actions have been developed for an initial 10-year period for the CMP.

The management actions have been categorised in terms of the key threat or management objective being addressed.

The following information is provided for each management action:

- Action ID;
- Strategic approach of action;
- Action name and description (detailed descriptions are provided for select actions in **Section 3.2.4**);
- Location(s) for implementation (if site specific);
- Responsible and supporting organisations; and
- Performance measures.

A timeframe for implementation of the actions is specified. The term 'ongoing' is used where an action will need to be repeated regularly.

As discussed above, several of the management actions were split into sub-actions. The rationale for splitting these actions reflects different locations for the same action, with different implementation details that are best captured individually. Where this is the case, the sub-actions are listed with a letter appended to the action ID (e.g. BE_43a-i). Including sub-actions, there are **58** individual actions that are recommended in the CMP.

Indicative timing, estimated costs (including capital costs and any ongoing maintenance costs), and potential funding sources associated with implementing these actions are provided in the business plan table in **Section 5**.

Actions are presented in terms of actions to be implemented by Council (**Section 3.2.2**) and by other public authorities (**Section 3.2.3**).

Detailed descriptions of selected complex actions are discussed in **Section 3.2.4** and provided in **Appendix C**.

Key location overviews for areas where several management actions are designed to address management issues in an integrated manner are discussed in **Section 3.2.5** and provided in **Appendix D**.

Where environmental protection works are proposed, it has been assumed (and identified) that these may occur within the CWLRA.

Where management actions are proposed on Crown land (including Crown waterways), authorisations and approvals may be required under the *Crown Land Management Act 2016* (CLM Act). Where proposed works and activities occur on Crown land and Council is the appointed Crown land manager, if the use is consistent with the reserve purpose and there is an adopted Plan of Management, then in most circumstances no other form of authorisation under the CLM Act is required. Management actions undertaken on Crown land must consider Aboriginal Land Claims lodged under the *Aboriginal Land Rights Act 1983*. All activities relating to the use of Crown land must be consistent with *Commonwealth Native Title Act 1993*.

All recommended actions that have a specific location associated with them are shown on map series consisting of seven maps **RG-01-10 (A-G)**. All actions in this CMP apply to areas within the coastal zone.

3.2.2 Actions to be Implemented by Council

Of the 58 management actions, **55** are to be implemented by Council, including:

- 13 actions that address bank erosion and/or Berry's Canal adjustment;
- 8 actions that support integrated and collaborative management;
- 7 actions that address water quality threats;
- 8 actions that support environmental values;
- 5 actions that address threats from coastal hazards (inundation);
- 6 actions that support land use planning;
- 4 actions that support Aboriginal values and use of the coastal zone; and
- 4 actions that support boating and associated waterway and foreshore use and address the threats posed by those activities.

The management actions for implementation by Council are presented in **Table 3-7**.

Table 3-7 CMP Actions to be Implemented by Council

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
BE_17	Greenwell Point	Monitor and maintain the existing foreshore protection structures at Greenwell Point	Sections of Greenwell Point foreshore are currently stabilised by a range of engineered structures including rock revetments, groynes and rock bags. Due to regular wear and tear, these are progressing through their design life and should be monitored and maintained to protect the public recreational foreshore area with suitable shallow nearshore areas where swimming can safely occur. This action involves the regular monitoring and maintenance as needed for these structures. *This action is included in the Greenwell Point location overview in **Section 3.2.5** and **Appendix D**.*	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC		Assets maintain appropriate engineering and safety standards.	Year 1 and Ongoing
BE_38	Whole Study Area	Support private land bank stabilisation and restoration	Foster a supportive framework to facilitate bank protection works on private lands, with a particular focus on education and awareness to encourage proactive landholder involvement. Collaborate with relevant stakeholders, government bodies, and potential funding entities to ensure a coordinated, well-resourced approach to bank restoration on private lands. Key elements include: • Engage with private landholders to identify opportunities for implementing and refining the potential management actions outlined in the Stage 2 Bank Condition Assessment. • Encourage the installation of livestock exclusion fencing. • Aligning with ENV_62, establish educational initiatives to raise awareness among landholders about best practices in bank management and restoration. Provide information on the variety of restoration methods including the use of rocks, large woody debris, vegetation planting, sand sausages, geotextile materials, and other nature based approaches. • Work with supporting partners to raise awareness of required approval pathways and avenues for potential funding support available to landholders. • Based on the assessment and engagement outcomes, prioritise supporting restoration works at identified locations including Bundanon, Shoalhaven Zoo, Mavromattes Reserve, areas downstream and upstream of Nowra Bridge, Broughton Creek, and Bolong Road, among others as identified in erosion severity mapping and prioritisation from the Stage 2 Bank Condition Assessment. • Emphasise vegetation protection and enhancement as key components of the restoration strategy, aligning with broader environmental and sustainability goals. • Focus to replant/regenerate native species on unconsolidated alluvial banks (leave active point bars for ongoing sediment transport in the estuary). • Seek alignment with public stabilisation and environmental bank management works (such as those in action BE_43) to achieve extended benefits and reduce cost. • These activities may be classified as designated development if undertaken in coastal wetlands and littoral rainforests identified under the R&H SEPP, if not undertaken by or on behalf of a public authority.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DCCEEW LLS DPIRD Agriculture DPHI - Crown Lands	Increased awareness of bank management and stabilisation measures and best practice available to private landowners. Take up of livestock exclusion fencing, riparian vegetation management and appropriately designed bank stabilisation (where appropriate). Effective collaboration with LLS and other supporting partners.	Year 1 and Ongoing

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
BE_42	Berry's Canal	Develop an adaptation strategy for land loss along Berry's Canal	Berry's Canal is continually expanding to accommodate tidal and riverine flow, with a balance between tidal flow and channel dimensions estimated to occur only with a doubling of the present-day cross-sectional area of the channel. Complete stabilisation of Berry's Canal is not feasible as it would require substantial hard engineering structures along both of the banks and channel to prevent further erosion and undercutting. Therefore, adaptation is required to manage the unavoidable land loss that will occur into the future. As land along Berry's Canal is owned both privately and publicly (including National Parks Estate), a coordinated strategy is required. Key elements of this action include: • Develop and disseminate educational materials and programs to inform local stakeholders, landowners, and the community about the causes and impacts of land loss along Berry's Canal. • Organise workshops and forums to discuss adaptation strategies, share knowledge, and engage the community in proactive measures to accommodate land loss and mitigate its impacts. Assess the extent of land loss, identify high-risk zones, and develop site-specific and asset-specific adaptation plans. • Incorporate outcomes into asset management plans of relevant asset owners. • Engage with landowners, local authorities, and other stakeholders to discuss potential retreat scenarios, including the identification of alternative locations and the provision of support for affected individuals and businesses. • Develop an integrated and overarching adaptation strategy that can guide long-term decision making. *This action is included in the Greenwell Point location overview in **Section 3.2.5** and **Appendix D**.*	Bank erosion and Berry's Canal adjustment	Planning for Change	SCC	NPWS LLS Private Landholders Traditional Owners (TOs) TfNSW DPHI - Crown Lands	Workshops and forums held. Adaptation strategy developed	Within 4-7 Years
BE_43	**Various**	**Environmental Bank Management, foreshore protection, and riparian restoration on high-priority public foreshores**	This overarching action aims to provide a structured, coordinated, and community-inclusive approach to foreshore protection and environmental bank management at priority Council owned and managed sites along the Lower Shoalhaven River, aligning with the insights from the Stage 2 Bank Erosion Study[8]. There are nine (9) specific sites (described below in BE43a-i). Works are either considered to be coastal protection works (under the RH SEPP), or waterway and foreshore management activities (under the TI SEPP). Appropriate planning pathways for each are described in the action description. Council's role is to lead the implementation of these works with support from multiple stakeholders. A detailed description of this action is discussed in **Section 3.2.4** and provided in **Appendix C** and includes information about: • Details of collaboration • Management techniques • Maintenance and vegetation • Approval pathways • Potential funding sources • Key locations identified in Stage 2	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	Various as listed below in sub actions	Various as listed below in sub actions	Various as listed below in sub actions
BE_43a	Watersleigh	Undertake necessary detailed investigations and environmental bank management works at site SR_018 (Site ID and map provided in Detailed Description)	This is a very high priority site on Council managed land located along the right bank (looking downstream) of the Shoalhaven River, near Watersleigh. The proposed management action is an engineered structure/s of either Large Woody Debris or rock, which could be in the form of bank parallel and/or a mixture of perpendicular structures, covering a length of approximately 415 m. This site is a high use area for towed water sports. Complementary strategies that will need to be considered include riparian revegetation and weeding as well as other management measures such as educational campaigns around appropriate boating behaviour. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW	Bank management works complete, providing effective erosion control and enhanced habitat. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 1-3 Years

[8] The Stage 2 Report (Rhelm, 2023c) has identified other very high priority segments requiring bank management (i.e. Burrier Bank) outside the Coastal Zone that require consideration outside the implementation of this CMP as they impact the study area and general estuary health.

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
BE_43b	Watersleigh	Undertake necessary detailed investigations and environmental bank management works at sites SR_061, SR_062, SR_063 & SR_064 (Site ID and map provided in Detailed Description)	These are very high priority sites on Council managed land located along the left bank (looking downstream) of the Shoalhaven River, near Watersleigh. The proposed management action is an engineered structure/s of Large Woody Debris or rock, which could be in the form of bank parallel and/or a mixture of perpendicular structures, covering a combined length of approximately 2,620 m. Riparian Vegetation Management in combination with engineered structure/s will help to maintain the works over time. There is an opportunity to undertake revegetation works in a cost effective manner at site SR_066 concurrently to works at SR_062 to SR_064. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW	Bank management works complete, providing effective erosion control and enhanced habitat. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 1-3 Years
BE_43c	Longreach	Undertake necessary detailed investigations and environmental bank management works at sites SR_071, SR_073 & SR_082 (Site ID and map provided in Detailed Description)	These are very high priority sites on Council managed land located along the left bank (looking downstream) of the Shoalhaven River, between Longreach and the Ski Park. The proposed management action is an engineered structure/s of Large Woody Debris or rock, which could be in the form of bank parallel and/or a mixture of perpendicular structures, covering approximately 170 m (SR_071), 256 m (SR_073), and 188 m (SR_082), respectively. Riparian Vegetation Management in combination with engineered structure/s will help to maintain the works over time. LLS did some previous works at site SR_082, funded under the NSW Government 2020 Bushfire affected coastal waterways grants. There is an opportunity to align with previous works and an engaged community with recent experience. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW	Bank management works complete, providing effective erosion control and enhanced habitat. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 1-3 Years
BE_43d	Bomaderry Creek	Undertake necessary detailed investigations and environmental bank management works at site BOM_11 (Site ID and map provided in Detailed Description)	This is a high priority site on Council managed land located on Bomaderry Creek, upstream of the Council managed boat ramp. The proposed management action is an engineered structure/s of Large Woody Debris, which could be in the form of bank parallel and/or a mixture of perpendicular structures, covering approximately 255 m. Complementary strategies that may need to be considered might include Geotextile Sand Container and Riparian Vegetation Management. LLS did some works for the private lands adjacent to this site, funded under the NSW Government 2020 Bushfire affected coastal waterways grants. There is an opportunity to align with previous works and an engaged community with recent experience. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW	Bank management works complete, providing effective erosion control and enhanced habitat. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 4-7 Years
BE_43e	Shoalhaven Heads	Undertake necessary detailed investigations and foreshore protection works at site SH_02 (Site ID and map provided in Detailed Description)	This is a high priority site on Council managed land located at Shoalhaven Heads, near Hay Avenue west of the existing rock revetment. The erosion severity here is mapped as "moderate". Riparian vegetation along the mid to upper bank is in reasonable condition. This area corresponds with Zone 1 and Zone 2A from (WRL, 2022) which are mapped as medium/medium-high management priority, and span approximately 500 m. The proposed management action, aligned with recommendations from WRL (2022) and WRL (2017) is beach nourishment. Stabilisation and ongoing monitoring and management utilising best practice revegetation techniques and other erosion and sediment controls is also required. This aligns with action SH.02 from the SCC Open Coast and Jervis Bay CMP which enables sand from the dry notch to be used for nourishment of the beach in front of the Shoalhaven Heads SLSC, or along the River Road foreshore. An additional source of sand from Seven Mile Beach can also be used. Opportunistic beneficial re-use of sediment from nearby navigation channel maintenance dredging can also be used, subject to sediment quality testing and obtaining the requisite approvals. This area is illustrated in **Map RG-01-10A** which indicates where sand can be sourced. These foreshore protection works will be undertaken as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation. *This action is included in the Shoalhaven Heads location overview in **Section 3.2.5** and **Appendix D**.*	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	Foreshore protection works complete, providing effective erosion control and enhanced habitat. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 4-7 Years

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
BE_43f	Crookhaven River	Undertake necessary detailed investigations and maintenance works at site CH_19 (Site ID and map provided in Detailed Description)	This is a high priority site on Council managed land located on the Crookhaven River, near Crookhaven Drive. The primary management strategy is Management of Existing Controls for an approximate 280 m length of the foreshore. Existing controls include a rock wall, intertidal habitat (mangroves) and riparian vegetation. Riparian revegetation and mangrove rehabilitation works have recently been completed at this site, funded by DPIRD's Recreational Fishing Trust's "Habitat Action Grant Program" and LLS's "Marine Estate Management Strategy". The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 4-7 Years
BE_43g	Nowra	Undertake necessary detailed investigations and environmental bank management works at sites SR_094 & SR_096 (Site ID and map provided in Detailed Description)	These are high priority sites on Council managed land, on the left bank (looking downstream) of the Shoalhaven River, stretching from the Ski Park to the Golf Course, where high valued assets at risk from bank erosion are located. The proposed management action is an engineered structure/s of Large Woody Debris or rock, which could be in the form of bank parallel and/or a mixture of perpendicular structures, covering approximately 65 m (SR_094) and approximately 200 m (SR_096). Complementary strategies that may need to be considered might include riparian revegetation works and a Shoalhaven Sand Sausage (one long continuous sandbag filled on site with mud and sand, installed along toe of the bank) installed downstream at the golf course. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	Bank management works complete, providing effective erosion control and enhanced habitat. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 4-7 Years
BE_43h	Bomaderry Creek	Undertake necessary detailed investigations and environmental bank management works at site BOM_13 (Site ID and map provided in Detailed Description)	This is a medium priority site on Council managed land located on Bomaderry Creek, downstream of the Council managed boat ramp. The Management of Existing Control is suggested for an approximate 50 m stretch. Further structural and geotechnical engineering investigation may reduce the scope of works. Complementary strategies to be considered include riparian revegetation works to help maintain the engineered structure/s over time. LLS did some works for the private lands adjacent to this site, funded under the NSW Government 2020 Bushfire affected coastal waterways grants. There is an opportunity to align with previous works and an engaged community with recent experience. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	Bank management works complete, providing effective erosion control and enhanced habitat. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 8-10 Years
BE_43i	Orient Point	Undertake necessary detailed investigations and foreshore protection works at site CH_17 at Orient Point (Site ID and map provided in Detailed Description)	This is a medium priority site on Council managed land located at the Orient Point foreshore reserve (Robert Lonesborough Reserve). The primary management strategy is Rock Fillet or other hybrid revetment stabilising methods that incorporate habitat features such as estuarine vegetation and riparian vegetation and weeding for an approximate 200 m stretch. The stormwater drain, on Council land at the eastern end of the site extending from Orama Crescent to the foreshore, is to be upgraded as part of these works through revegetation and rock lining. The foreshore protection works associated with this action are categorised as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation.	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	Foreshore Protection and stormwater works complete, providing effective erosion control and enhanced habitat. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 1-3 Years

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
BE_44	Shoalhaven Heads	Beach nourishment along the toe of the existing rock revetment at Shoalhaven Heads	A rock revetment was constructed in 2021 along River Road to prevent further erosion and protect valuable assets. The development conditions of consent for this structure were that sand would be used to cover the toe of the revetment. This is necessary for maintaining the designed function of the asset for the purpose of bank erosion. The proposed management action consists of beach nourishment works to: • cover the toe of the revetment in line with the engineering specifications and Asset Management Plan for the structure • reprofile the erosion scarp and nourish the beach extending from the eastern end of the existing rock revetment, up to and including the foreshore area adjacent to the shared user path and the River Road boat ramp infrastructure. The length of shoreline to be nourished is approximately 200 m. The volume of sand needed is approximately 1,500 m^3. The sourcing of marine sands from Seven Mile Beach is required, utilising heavy plant machinery to stockpile and then transport material to the River Road foreshore area. The material can then be scraped and profiled on site. This area is illustrated in **Map RG-01-10A** which indicates where sand can be sourced. Stabilisation and ongoing monitoring and management utilising best practice revegetation techniques and other erosion and sediment controls is also required. DPHI Crown Lands is nominated as a support agency to this action. The works are located on Council managed Crown Reserve 52855 and subject to an existing Crown Lands licence LI 639728 for activities in the Crown Waterway at this location. These foreshore protection works will be undertaken as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation. Nourishment will be undertaken based on observation or survey triggering the need for nourishment and this has been estimated for the purpose of the business plan (**Table 5-3**) to occur twice during the course of the CMP 10-year timeframe. *This action is included in the Shoalhaven Heads location overview in **Section 3.2.5** and **Appendix D**.*	Bank erosion and Berry's Canal adjustment	Active Intervention	SCC	DPIRD Fisheries DPHI - Crown Lands	Nourishment complete. Monitoring and maintenance program established (related to ECON_08 and CTF_16).	Within 4-7 Years
BE_45	Crookhaven Heads	Implement a living shoreline solution along the Crookhaven River shoreline adjacent to Crookhaven Heads	This action will involve the implementation of the final design for a proposed inter-tidal living shoreline solution along the Crookhaven River shoreline adjacent to Crookhaven Heads. This section of shoreline is being investigated concurrently to the CMP to determine opportunities to implement a living shoreline approach to support opportunities for fish habitat and erosion protection within an area of approximately one hectare. The investigations will result in a final design that will be developed in consultation with key stakeholders including State Government agencies, recreational commercial fishers/aquaculture and Traditional Owners. Options being investigated involve the installation of mangroves and riparian vegetation along the foreshore and intertidal area, as well as oyster reef restoration. The design process is being modelled on the successful Wagonga Inlet living shoreline project, of which a rendered illustration is provided in **Figure 3-10**. All necessary approvals and permits will be obtained as part of this initial investigation, so that this management action will address the implementation of this design only. The works associated with this action are categorised as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation.	Environmental Values	Active Intervention	SCC	DPIRD Fisheries TOs/Jerrinja LALC, Jerrinja Tribal Group TfNSW DPHI - Crown Lands Oyster farmers	Living shoreline works complete in accordance with the final design and monitoring and maintenance program established (related to ENV_39, ENV_43, ENV_64, ECON_08 and CTF_16).	Within 4-7 Years

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
BE_46	Shoalhaven Heads	Design and implement a living shoreline solution along the foreshore adjacent to the caravan park at Shoalhaven Heads	The shorelines at Shoalhaven Heads are a dynamic environment. To support resilience of this area to coastal processes, sea level rise and human usage, this action seeks to restore the intertidal habitat and formalise and improve public access. Benefits to the community include: • Improved foreshore protection and water quality • Enhanced access to mangrove areas • Improved amenity and opportunities for recreational activities • Enriched estuarine habitats • Improved habitat for fish and other marine biodiversity • Increased carbon sequestration and storage. 'Living' shorelines provide a natural approach to coastal protection by using plants and other natural elements to prevent erosion, rather than traditional methods such as rock walls. The design and implementation would consider both the Australian guide to nature-based methods for reducing risk from coastal hazards (ESCC Hub, 2021) and the NSW Coastal Design Guidelines (2023), as well as drawing on existing examples such as the award winning Wagonga Inlet Living Shoreline in Narooma. The proposed outcome is an innovative solution to coastal management to protect this valuable section of the inlet, long-term. A similar concept used at Wagonga is illustrated in **Figure 3-10**. The design of the living shoreline would be undertaken in consultation with the community, but could include elements such as: • Intertidal habitat of existing and improved mangroves and saltmarsh • Intertidal shellfish reef habitat • Terrestrial planting between the existing path and intertidal zone • Birdlife perches • Formal access (boardwalk, jetty, viewing platforms, pontoons or swim areas). Key elements of the action include: • develop a detailed design in consultation with key stakeholders including State Government agencies, community groups, recreational fishers and Traditional Owners • obtain all necessary approvals and permits • construct works • ongoing monitoring and maintenance. The works associated with this action are categorised as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation. *This action is included in the Shoalhaven Heads location overview in **Section 3.2.5** and **Appendix D**.*	Environmental values	Active Intervention	SCC	DPIRD Fisheries LLS TOs/Jerrinja LALC Jerrinja Tribal Group TfNSW DPHI - Crown Lands Oyster farmers	Living shoreline works complete and monitoring and maintenance program established (related to ENV_39, ENV_43, ENV_64, ECON_08 and CTF_16).	Within 1-3 Years
BOAT_37	Whole Study Area	Boat Ramp and Facilities Consolidation and Rationalisation Plan	This action involves the development of a 'Boat Ramp and Facilities Consolidation and Rationalisation Plan' and aligns with a similar broader LGA-wide action as well as Action BOAT_38. A detailed description of this action (in combination with BOAT_38) is discussed in **Section 3.2.4** and provided in **Appendix C.** It includes information about considerations for the plan including: • A review of existing boat ramp conditions, facilities, usage, and distribution. • Increased efficiency through reduced maintenance cost and logistical complexity. • Opportunities arising from repurposing of decommissioned ramps, such as new uses for vacated public space. • Enhancing amenity and capacity of remaining ramps, including security, parking, ramp lanes and pontoons. • Reduced need for dredging to access decommissioned ramps. • The potential provision of suitable passive vessel launch sites, suitable vessel pumpout facilities, fuelling facilities, and slipway facilities.	Boating and associated waterway and foreshore usage	Active Intervention	SCC	TfNSW Marine Rescue	Boat Ramp and Facilities Consolidation and Rationalisation Plan developed and clear direction for future management of the assets is established.	Within 1-3 Years

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
BOAT_38	Whole Study Area	Develop and implement a comprehensive boat ramp facility upgrade and asset management program	This action aims to provide a holistic approach towards managing and maintaining Council-managed boat ramp facilities, drawing from insights gathered from the Stage 2 Boating Demand Study and associated community engagement. A detailed description of this action (in combination with BOAT_37) is discussed in **Section 3.2.4** and provided in **Appendix C.** It includes information about considerations for the plan including: Alignment with Council's Asset Management Systems and Plans; and action CTF_16 • A framework to regularly conduct thorough condition assessments at boat ramps. • The frequency of cleaning and debris monitoring and removal especially following significant flooding events. • Monitoring of boat ramp approaches and navigational channels with maintenance dredging as needed (noting that beneficial re-use of dredged material should be undertaken if feasible); • Upgrading facilities and amenities. • Parking and traffic management. • Security and anti-social behaviour. • Community engagement and education.	Boating and associated waterway and foreshore usage	Active Intervention	SCC	TfNSW Marine Rescue	Boating facilities are incorporated into an effective asset management program, and boat ramp upgrades and decommissions are complete.	Year 1 and Ongoing
BOAT_40	Whole Study Area	Support and promote LGA-wide boating education measures targeting both local and visiting recreational boaters	This action involves enhancing the existing education and awareness programs for boaters in the area. This would include promotion of existing educational materials and additional signage regarding the importance of checking in with Marine Rescue, environmental and safety concerns related to boat wakes, need to avoid damage to seagrasses when anchoring and motoring, and being mindful of the conditions and the dangers of navigating the entrance bar at Crookhaven Heads. Particular attention will be given to education and awareness of the impacts of boat wakes on bank erosion and appropriate boating behaviour to minimise this impact. Activities would include Council providing links on their website, and other forms of online communication methods, to existing TfNSW educational material on boating, and promotion of/support for existing education activities undertaken by TfNSW Boating Safety Officers and Boating Education Officers, targeting both local and visiting recreational boaters. Other activities may involve the installation of signage at boat ramp locations promoting responsible boating and fishing etiquette. TfNSW will continue to enforce boating rules and restrictions, manage navigational aids and signage and undertake community education within the Lower Shoalhaven River estuary to ensure the safety of boat users and reduce impacts to the environment. This action is aligned with *ENV_62: Develop and deliver an estuary management and ecosystem education/communications program.*	Boating and associated waterway and foreshore usage	Alert	SCC	TfNSW	Council website updated with latest education materials. Signage installed at strategic locations. Enhanced community understanding of responsible boating, etiquette and how to minimise environmental impacts.	Year 1 and Ongoing
BOAT_43	Whole Study Area	Management of Watercraft Storage	This action will involve the implementation of a removal program for ad hoc stored watercraft (e.g. dinghies, canoes, kayaks etc.) that are abandoned, derelict or illegally stored in public foreshore areas accordance with Council's Foreshore Reserves Policy (POL19/76). This will be undertaken in conjunction with the development and implementation of formalised watercraft storage systems (e.g. dinghy/kayak racks, tie-up points, permitting system) in various foreshore areas around the estuary. Ongoing monitoring and policing would be required to prevent re-occurrence of ad hoc watercraft storage. Locations identified for the implementation of formalised watercraft storage systems include, but are not limited to: • Shoalhaven Heads • Greenwell Point • Orient Point • Upper River	Boating and associated waterway and foreshore usage	Active Intervention	SCC	TfNSW NPWS DPHI-Crown Lands	Watercraft storage facilities installed and non-compliant watercraft removed appropriately.	Year 1 and Ongoing

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
CS_12	Whole Study Area	Develop and execute a communications plan for Stage 5 of the CMP	Present information on Council's website and in community engagement activities that shows: • The purpose of the CMP. • The CMP background, and an overview of the NSW Coastal Management Framework. • Key CMP information, including reports available for public consumption. • The Status of CMP Actions, with details of the actions and recent updates/progress. • Information pertaining to upcoming community consultation events, and avenues for engagement; and • Links to relevant materials such as the NSW Coastal Management Framework, and the Marine Estate Management Strategy. • How coastal zone systems function and how integrated management responses benefit Council and local communities.	Integrated and collaborative management	Alert	SCC		Plan developed and implemented.	Year 1 and Ongoing
CS_13	LGA	Undertake a LGA wide coastal zone Aboriginal Cultural Heritage Survey, and development of local protection/management plans	This action involves engaging with the relevant Local Aboriginal Land Councils, Traditional Owners, custodians and knowledge holders, and an archaeologist to undertake an updated cultural heritage survey of the coastal zone - and in doing so: • Fill existing information gaps within the estuary wide Aboriginal Cultural Heritage Mapping and update the Aboriginal Heritage Information Management System (AHIMS). • There would likely be a publicly available GIS layer and private layer with sensitive information/ details to refer to knowledge holder for more information. It is anticipated that there would be three main tasks for this action: • Consultation with the relevant Local Aboriginal Land Councils and Traditional Owners and knowledge holders. • An Aboriginal cultural heritage assessment, which should include survey field work, and recording of cultural heritage sites (such as midden sites) and detailed documentation of findings. This would consider tangible and intangible values. • The development and prioritisation of local, site-specific management plans for protection and preservation of these sites. These would be developed in partnership with the Aboriginal community and culturally appropriate representatives.	Aboriginal values	Avoid Future Impact	SCC	Jerrinja LALC Jerrinja Tribal Group Nowra LALC NPWS	Consultation conducted, survey undertaken, and plan developed.	Within 1-3 Years
CS_14	Whole Study Area	Engage with relevant Local Aboriginal Land Councils and local Traditional Owner Groups to develop a cultural educational and awareness program	This action involves engaging with relevant Local Aboriginal Land Councils and local Traditional Owners, custodians, and knowledge holders to develop and roll out a cultural educational and awareness program - related to the Aboriginal Cultural Heritage (ACH) - specific to the estuary. Design of the program should be led by either relevant Local Aboriginal Land Councils or local Traditional Owner groups. The program could involve educational methods such as: • School programs including planting days, stewardship sites and hands on activities. • Signage at local sites (including the use of QR codes that includes elders speaking about the history of the area). • Brochures and information provided to tourists at caravan parks and information centres. • Cultural tours to provide greater awareness of ACH values to both the local community and to the large population of seasonal visitors.	Aboriginal values	Alert	SCC	Jerrinja LALC Jerrinja Tribal Group Nowra LALC DPIRD-Fisheries	Program developed and being implemented.	Year 1 and Ongoing
CS_15	Whole Study Area	Provide opportunities and help build capacity to local Aboriginal Ranger Programs, to enhance their role in management of Sea Country	This action involves working with relevant Local Aboriginal Land Councils and local Traditional Owner Groups to bolster existing ranger programs and facilitate a greater role for these programs in coastal management across the Shoalhaven LGA. This will involve working with and supporting the ranger team coalition to help enhance/ boost their capacity and awareness of coastal management. Utilise Aboriginal ranger teams, alongside other qualified contractors, to undertake on ground works associated with dune restoration and monitoring programs. Work collaboratively to help develop the next generation of junior rangers to be a part of future coastal management across the Shoalhaven LGA. This action is consistent with Initiative #4 of the NSW Marine Estate Management Strategy which aims to: 'Increase Aboriginal participation in Sea Country management, planning and monitoring through employment and training of Aboriginal people at a regional and local level'.	Aboriginal values	Alert	SCC	Jerrinja LALC Jerrinja Tribal Group Nowra LALC DPIRD-Fisheries NPWS	Capacity of local ranger teams increased. Increased role for TO Groups in coastal management across the LGA.	Year 1 and Ongoing

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
CS_16	Crookhaven Heads	Protection of Midden at Crookhaven Heads	A site of great cultural significance to the Jerrinja People has been identified consisting of an extensive midden that is currently being impacted on by erosion, inundation and shoreline recession due to coastal processes occurring at the mouth of the Crookhaven River. This action involves the protection and preservation of this site in consultation and partnership with Traditional Owners. The works associated with this action are categorised as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation. A detailed description of this action is discussed in **Section 3.2.4** and provided in **Appendix C** and includes information about: • Interpretative signage to be installed at the site. Interim 'soft works' to provide a short term solution to coastal hazard impacts on the site, which would include a combination of sand bagging, large woody debris and onsite cobble. • Design of longer term solution in consultation with Traditional Owners and state government agencies. • Alignment with action CS_13.	Aboriginal values	Active Intervention	SCC	Jerrinja LALC Jerrinja Tribal Group DPIRD Fisheries DCCEEW	Interpretive signage installed at site. Interim works completed. Longer term protection action designed and ready to be constructed. Maintenance program established (related to ECON_08, CTF_16 and CS_13).	Within 1-3 Years
CTF_08	Greenwell Point	Prepare a climate change adaptation strategy for Greenwell Point	This action involves preparing a climate change adaptation strategy for Greenwell Point in consultation with the local community and key stakeholders. Greenwell Point faces significant future risks from sea level rise, including increased frequency and severity of inundation events. Key results from the Stage 2 risk assessment highlight that vital assets, such as residential properties, critical infrastructure, and commercial areas, are at risk of flooding. The output of the strategy will be an agreed and costed adaptation pathway that identifies thresholds and triggers for action. *This action is included in the Greenwell Point location overview in **Section 3.2.5** and **Appendix D**.*	Coastal Hazards (inundation)	Planning for Change	SCC	DPIRD Agriculture LLS TfNSW DPHI Planning DPHI Crown Lands NSW Reconstruction Authority	Adaptation strategy developed.	Within 4-7 Years
CTF_09	LGA	Maintain planning controls to reduce future coastal hazard impacts	Implement and maintain planning controls in: • The Shoalhaven Local Environmental Plan (LEP) 2014: Maintain appropriate zoning in the LEP to protect estuarine intertidal ecosystems and enhance resilience to coastal hazards. • Shoalhaven Development Control Plan (DCP) 2014 G6 Coastal Management Areas, which require specific information and assessment for proposed development in coastal hazard areas. Future review of local planning controls must ensure consistency with the Coastal Management Program (CMP) and CVA (see action CTF_13). Update and maintain notation to Section 10.7 Planning Certificates for properties affected by coastal hazards consistent with NSW Government legislation using CMP hazard information. Wherever possible, use zoning and planning controls to maintain open spaces where mangrove and saltmarsh communities can migrate in response to climate change and sea level rise.	Land use planning	Avoid Future Impact	SCC	DPHI Planning	LEP 2014 and DCP 2014 maintained. Future revisions of these plan contain equivalent planning controls.	Year 1 and Ongoing
CTF_13	LGA	Undertake a Planning Proposal to adopt a CVA and update CWLRA (pending further information)	This involves the preparation of a planning proposal to seek formal inclusion of a Coastal Vulnerability Area (CVA) into the RH SEPP. Council is to investigate if Coastal Wetland or Littoral Rainforest Areas (CWLRA) need adjustment based on information obtained through action ENV_32. A *planning proposal to include a CVA may also include amendments to the LEP.* .	Land use planning	Avoid Future Impact	SCC	DPHI Planning	Future successful planning proposal for CVA mapping, and updated CWLRA (if deemed necessary).	Within 1-3 Years
CTF_14	Whole Study Area	Implement the Lower Shoalhaven River Coastal Zone Emergency Action Subplan (CZEAS)	This action would involve the implementation of the CZEAS for the Lower Shoalhaven River in the event that it is activated by a coastal emergency. The CZEAS is included as **Appendix E** and discussed in **Section 6**. This will primarily address emergency response to relevant coastal hazards as defined in the Coastal Management Act 2016 and will need to be consistent with the Shoalhaven City Local Flood Emergency Sub Plan 2014.	Coastal Hazards (inundation)	Emergency Response	SCC	NSW SES	Plan activated and implemented in a timely manner when needed.	Year 1 and Ongoing

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
CTF_16	Whole Study Area	Review and update all asset management plans (AMPs), relevant to the coastal zone within the CMP study area	Include an asset management approach to provide for replacement, relocation or retrofitting of public assets that are currently in coastal risk areas – including boat ramps, wharves, jetties, water and wastewater infrastructure, stormwater drainage infrastructure, foreshore protection infrastructure, roads and access tracks. The update of AMPs should be prepared considering current and future coastal hazard impacts, including the impacts of coastal and tidal inundation, and should outline plans and mitigation strategies to reduce the risk from such hazards. The Stage 2 Detailed Risk Assessment (Rhelm, 2023b), Tidal and Coastal Inundation Assessment (Stantec, 2023), Bank and Riparian Condition Assessment (Rhelm, 2023f) and the Stage 2 Synthesis Report (Rhelm, 2023a) should be used to inform the update of AMPs to account for coastal hazard impacts. AMPs by asset type will be updated by the relevant asset custodian. Key elements of this action will consider: • Engagement with Council assets teams to discuss the high risk Council assets. • Identify assets that should be upgraded, removed, or relocated. • Design and implement asset risk reduction works. AMPs are to be aligned with the emergency action sub-plan. A detailed description of this action (in combination with CTF_16a and ECON_08) is discussed in **Section 3.2.4** and provided in **Appendix C.**	Coastal Hazards (inundation)	Planning for Change	SCC		Plans updated, fit for purpose and being actively implemented enabling effective asset management, repairs and upgrades.	Year 1 and Ongoing
CTF_16a	Whole Study Area	Review and update floodgate and associated drainage infrastructure asset management plans (AMPs)	This action is aligned with CTF_16 with a specific focus on floodgates. The purpose of this action is to undertake systematic inspection and repair of end-of-line floodgates. This will feed into a critical review of Council's asset management program to determine which floodgates need upgrading or removal. This critical review should be informed by the recommendations in the Shoalhaven River Floodplain Prioritisation Study (WRL, 2023), which indicated when individual floodgates may lose functionality with sea level rise. This may involve modifications to these assets and associated drainage systems to optimise their ability to support estuary health including mitigating the risk of Acid Sulfate Soils while either supporting current land-uses through minimising tidal impacts on private land or identifying opportunities for land-use change such as coastal wetland restoration and Blue Carbon production. This action is to be aligned with: ENV_58 Support multi-stakeholder projects to implement actions in priority subcatchments identified in the Shoalhaven River Floodplain Prioritisation Study (WRL 2023) and NSW Blue Carbon Strategy. A detailed description of this action (in combination with CTF_16 and ECON_08) is discussed in **Section 3.2.4** and provided in **Appendix C.**	Coastal Hazards (inundation)	Planning for Change	SCC	DPIRD Fisheries	Same as for CTF_16. Opportunities identified for forward looking adaptation for floodgates and associated drainage infrastructure that will lose functionality due to sea level rise.	Year 1 and Ongoing
CTF_20	Shoalhaven Heads	Implement updated Entrance Management Policy and undertake additional review	Implement the updated Entrance Management Policy (EMP) in accordance with the associated Review of Environmental Factors (REF)both of which are being drafted and updated concurrently and separate to the CMP. A Review of Environmental Factors (REF) will need to be prepared to support the implementation of the EMP prior to final agency sign-off and approval of the EMP. The primary driver for entrance management is the reducing of risk associated with flooding. The EMP will be implemented in accordance with the principles and procedures set out within that document which reflect Council's responsibility for managing the Shoalhaven Heads entrance for flood mitigation purposes. The key activities to be undertaken in implementing the EMP will include the mechanical excavation of a pilot channel, mechanical berm lowering and maintenance of a dry notch based on the relevant triggers and decision framework within the EMP. A detailed description of this action is discussed in **Section 3.2.4** and provided in **Appendix C.** *This action is included in the Shoalhaven Heads location overview in **Section 3.2.5** and **Appendix D**.*	Coastal Hazards (inundation)	Alert	SCC	DCCEEW Crown Lands DPIRD Fisheries	Entrance policy updated and implemented in a timely manner when needed.	Year 1 and Ongoing

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
ECON_04	Whole Study Area	Establish a CMP Governance Framework	This action involves establishing a CMP Governance Framework including the following elements: • Establish a CMP working group. • Clearly define its purpose, objectives, and functions. • Define its roles and responsibilities of its members. • Execute the function of the Working Group. • Meet regularly to implement CMP and track progress.	Integrated and collaborative management	Planning for Change	SCC	DCCEEW DPIRD Fisheries DPIRD Agriculture LLS TfNSW NPWS LALCs Community and industry representatives	Working group established and functioning.	Year 1 and Ongoing
ECON_05	LGA	Establish one new Full Time Equivalent (FTE) Coast & Estuary Officer role within Council	Establish one new FTE Coast & Estuary Officer role within Council - in order to oversee the implementation of Council's Lower Shoalhaven River CMP, (including long-term funding options) and build Council's capacity to respond to emerging issues.	Integrated and collaborative management	Planning for Change	SCC		Roles established and maintained for 10 year CMP duration.	Year 1 and Ongoing
ECON_06	Whole Study Area	Review Council's coastal management planning policies every 10 years	Review Council's coastal management and planning policies for the 10 year CMP implementation lifecycle. This should include consideration of the latest environmental data, observed coastal hazard impacts, and state government policies. This process could be initiated earlier if coastal change (either related to the implementation of the CMP or for reasons outside of the CMP) has reached a threshold where the strategic management approach needs to be reviewed.	Integrated and collaborative management	Planning for Change	SCC	DCCEEW	Review completed.	Within 8-10 Years
ECON_08	Whole Study Area	Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure	This action involves the development and implementation of a monitoring program designed to assess and track the condition of various assets and infrastructure, including: • Foreshore protection structures (revetments). • Bank stabilisation works and other coastal defences. • Recreational assets including viewing platforms and foreshore access tracks. • Maritime and boating infrastructure (i.e. jetties, boat ramps) and related ancillary infrastructure (i.e. fish cleaning tables). • Gross pollutant traps and stormwater infrastructure. • Stormwater outlets. • Floodgates. • Sewer and water infrastructure. The program should be integrated into Council's broader asset management program (Actions BOAT_38, CTF_16 and CTF16a). A detailed description of this action (in combination with CTF_16 and CTF_16a) is discussed in **Section 3.2.4** and provided in **Appendix C.**	Integrated and collaborative management	Avoid Future Impact	SCC		Plan developed and implemented with regular collection of data undertaken.	Year 1 and Ongoing
ECON_11	Whole Study Area	Review water sharing plans in the light of climate change and increasing population	Upon its review Council will provide advice to State Government on consistency of the water sharing plan with the CMP and supporting and enhancing coastal values. This highlights the interplay between water sharing plans and estuary health to inform future water management. Key elements include: • Build on and consider the Assessment of the Impacts of Water Extractions and Tallowa Dam Discharges on Salinity Dynamics in the Shoalhaven River Estuary (2021). • Identify areas of concern where water sharing arrangements may be contributing to adverse environmental conditions within the estuary in light of climate change and increasing population. • Collate and analyse existing data on water flows, quality, and estuary health in conjunction with water sharing plan provisions. • Facilitate stakeholder discussions to understand different perspectives and to garner support for sustainable water management practices that prioritise estuary health. • Develop a set of recommendations based on the findings to improve water sharing arrangements, with an emphasis on enhancing the health and resilience of the Lower Shoalhaven River estuary. • Prepare and disseminate a comprehensive report to relevant stakeholders, including local councils, water management authorities, and the community, outlining the findings and recommendations for future action.	Environmental values	Planning for Change	SCC	DCCEEW Universities	Completion of a report outlining the findings from data analysis, stakeholder discussions, and recommendations for improved water sharing arrangements aligning water sharing plans with estuary health and resilience goals for the Lower Shoalhaven River estuary.	Within 8-10 Years

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
ECON_14	Whole Study Area	Continue ongoing collaboration with state government agencies and research institutions	Continue to collaborate with State and Federal government agencies, universities and other stakeholders on projects and research that focuses on: • Climate change impacts on coastal and estuarine processes and landforms, including new data on sea level rise, storm behaviour, sediment transport processes, water quality, entrance management and stability and coastal and estuarine monitoring. • Impact of sea level rise on estuarine macrophytes and supratidal forests. • Coastal lake entrance behaviour (sediment budget, morphology, opening and closing regimes) with sea level rise and other aspects of climate change and climate variability. • Impact of private moorings on seagrasses, and impacts of unattended vessels on bank stability. • Ecological services and functions of estuarine species and most effective vegetation structure to enhance foreshore resilience. • Boating safety and navigation. • Management of foreshore erosion. • The protection of threatened and migratory shorebirds (i.e. through the South Coast Shorebird Recovery Project).	Integrated and collaborative management	Alert	SCC	LLS TfNSW DPIRD Fisheries DPIRD Agriculture NPWS Universities DCCEEW	Collaboration with government agencies and research institutions is successfully arranged.	Year 1 and Ongoing
ENV_09	Shoalhaven Heads, Greenwell Point, Nowra	Inclusion of additional Beachwatch sites	In response to community concerns about water quality and the impacts on public health and safety, and based on the findings in the Stage 2 Water quality and monitoring program assessment (Rhelm, 2023d), several locations are to be included as regular Beachwatch sites, with regular water quality monitoring and reporting to communicate the safety of recreational activities to the broader public. These sites include: • Shoalhaven Heads • Greenwell Point • The Grotto (Nowra) A detailed description of this action (in combination with Action ENV_43) is discussed in **Section 3.2.4** and provided in **Appendix C.**	Water Quality	Active Intervention	SCC	DCCEEW	Sites added to the Beachwatch list and regular updates provided to the community.	Year 1 and Ongoing
ENV_21	Whole Study Area	Update Council Plans of Management (POMs) for locations in the coastal zone to support objectives of the CMP	Update the relevant Plans of Management (POMs) to the CMP study area and coastal zone for consistency with the *Coastal Management Act 2016*, *State Environmental Planning Policy (Resilience and Hazards) 2021* and the objectives of the CMP. This update should consider outcomes of the Stage 2 Technical Studies, and the implementation management actions identified in this CMP to complement future land use and character. Updates should account for: • Allowing for conservation and restoration of saltmarsh (blue carbon). • Bank stabilisation works. • Environmental protection works (EPW) (as defined in the SEPP). • Sea level rise, as it may impact on assets. • Minimising grazing access. Existing Council PoMs to be updated include: • Greenwell Point • Crookhaven Heads • The Grotto and Greys Beach • Nowra Showground • Generic Council Managed Crown lands x3 (Natural Area, Parks, Community Use)	Land use planning	Planning for Change	SCC		POMs updated.	Within 1-3 Years

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
ENV_31	Whole Study Area	Enact the CMP's Monitoring, Evaluation and Reporting (MER) Program to track progress and report on outcomes	This will include: • Ongoing monitoring of CMP Actions. • Annual review of actions to ensure they are appropriate and current, with completed actions documented. • Ongoing reporting of progress. • Documentation of the effectiveness of the proposed strategies and actions will be reported as part of Council's Annual Report (which is part of the IP&R framework), including progress towards or full achievement of the performance targets included for each action.	Integrated and collaborative management	Alert	SCC		Annual reviews completed.	Year 1 and Ongoing
ENV_32	Whole Study Area	Continue Council's program of mapping threatened ecological communities (TECs) across coastal reserves	Carry out surveys to ground-truth and map the distribution and condition of TECs in the coastal zone using the Biodiversity Conservation Act, Biodiversity Assessment Methodology. This mapping will be used to update Council's LEP Terrestrial Biodiversity Map, inform the Biodiversity Values Map, and provide further education for the public on the Council website. It should be noted that the outcomes of this work may be used to inform future amendments to the Coastal Wetlands and Littoral Rainforests Area mapping under the RH SEPP, which could be undertaken through a planning proposal (Action CTF_13).	Land use planning	Planning for Change	SCC	DCCEEW DPHI-Planning	Mapping complete and planning instruments updated.	Within 1-3 Years

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
ENV_39	Whole Study Area	Implement environmental protection works to enhance ecological communities and cultural values in coastal and estuarine reserves within the CMP Study Area	This action will involve a range of measures and environmental protection works (EPW) to ensure the protection of existing riparian and estuarine vegetation, as well as rehabilitation of currently impacted areas. Maps series RG-01-10 identifies public land within the Coastal Wetlands and Littoral Rainforests Area (CWLRA) where EPW described in this action are to occur. Appropriate approval pathways will be used during the implementation of EPW associated with this action. This action supports EPW in all coastal and estuarine reserves, whether or not they are mapped as CWLRA. Works under this action would consider the following aspects: • Available mapping resources including data from the Stage 2 Bank Condition and Riparian Assessment Study. • Encourage implementation of buffers and land management practices to allow for spatial migration of vegetation/habitat under sea level rise. This would require consultation with private landholders and installation of informative signage and fencing in key areas to protect vegetation and habitats. For public lands, Council is to consider rezoning identified wetland migration areas for conservation purposes when updating the LEP (refer Action CTF_09). • Council support of volunteer based rehabilitation initiatives such as Bushcare/Parkcare/Dunecare, community-based revegetation campaigns, and other community "ownership" projects. Natural areas requiring restoration and EPW will also be identified through cultural engagement and cultural surveys (Actions CS_13 and CS_14). Where culturally sensitive restoration sites are identified, the engagement of Aboriginal rangers and contractors will be prioritised. • Continuation of existing Council programs for pest control (e.g. foxes, rabbits, Indian Mynas) and weed management and biosecurity. • Enforcement of existing policies/controls on access restrictions to sensitive areas (e.g. migratory shorebird foraging, roosting and nesting areas including restricting boating and pedestrian access). • Installation of informative signage and fencing in key areas to protect vegetation and habitats. • Undertake rehabilitation works in damaged vegetated areas and ongoing implementation of ecological restoration and EPW in Council-managed coastal reserves with reference to the objectives of the associated coastal management areas. These works would be informed by ground-truthing surveys (refer Action ENV_32) and should support the ecological restoration of identified Threatened Ecological Communities (TECs) based on Council's 2023 report Assessment of Endangered Ecological Communities in Coastal Hazard Areas: Shoalhaven LGA Tidal Inundation and Coastal Erosion Study Sites (Ecoplanning, 2023). Prioritisation will be given to areas that comprise areas of Coastal Wetland and Littoral Rainforest and/or house other TECs, and targeted weed species control works. • Restoration of riparian vegetation areas and *EPW* to enhance ecological communities in coastal and estuarine reserves. • Continued estuarine macrophyte mapping for the waterbody and foreshores as part of a Marine Estate Management Strategy project. • Establish a monitoring and evaluation framework to assess the effectiveness of vegetation restoration and control measures, ensuring alignment with environmental goals and continuous improvement. This should be included within the Shoalhaven Integrated Environmental Monitoring Program.	Environmental values	Active Intervention	SCC	LLS	Implementation of restoration and protection works complete across identified riparian and estuarine areas.	Year 1 and Ongoing
ENV_41[9]	**Whole Study Area**	**Support implementation of the Domestic Waterfront Structures Landowners Consent Strategy Shoalhaven River and Crookhaven River Estuaries (DPI, 2022)**	DPIRD Fisheries (2022) released the Domestic Waterfront Structures Landowners Consent Strategy (DWS) for the Shoalhaven and Crookhaven River Estuaries. The DWS provides a streamlined approach to assessing and granting landowner consent for domestic waterfront structures, using a 'traffic light' system to categorise the suitability of different locations. This action supports the implementation of the DWS and aims to increase community awareness about riparian and marine vegetation, the importance of maintaining it, and the requirements for obtaining consent for waterfront structures. These efforts will be delivered through community education programs and agency websites. Targeted education will be crucial in reinforcing compliance and protecting the estuarine environment (refer Action ENV_62).	Environmental values	Avoid Future Impact	Various as listed below in sub actions	Various as listed below in sub actions	Various as listed below in sub actions	Year 1 and Ongoing

[9] *Note that Action ENV_41 is in both **Table 3-7 & Table 3-8** due to a shared lead agency role with DPIRD Fisheries.*

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
ENV_41a	Whole Study Area	Removal of derelict domestic waterfront structures	This sub-action focuses on the identification and removal of derelict or unauthorised domestic waterfront structures. Where opportunities arise, SSC and Crown Lands will jointly lead efforts to remove these structures, ensuring that activities align with the objectives of the DWS and contribute to estuary health. DPIRD Fisheries will provide support as required, particularly where structures may impact marine habitats. Where this activity occurs in mapped Coastal Wetlands or Littoral Rainforest areas, it may be classified as 'environmental protection works', enabling a more streamlined approval pathway under the RH SEPP. Noting that appropriate approval pathways will still be used during action implementation. This action is subject to resource availability and funding.	Environmental values	Avoid Future Impact	DPHI Crown Lands SCC	DPIRD Fisheries	Removal of 80% of identified derelict waterfront structures within mapped priority areas, ensuring compliance with DWS objectives.	Year 1 and Ongoing
ENV_41b	Whole Study Area	Continued compliance action for unauthorised vegetation harm and waterfront works	This sub-action addresses the prevention of illegal clearing or harm to riparian and marine vegetation, focusing on unauthorised activities associated with waterfront structures, private access, or other amenity developments. Given the different heads of power across agencies, compliance actions will be conducted jointly by SSC, Crown Lands, and DPIRD Fisheries. These agencies will collaborate to ensure enforcement for a range of offences, depending on jurisdiction. These compliance actions will be supported by ongoing community education efforts and targeted campaigns, emphasising the legal requirements for riparian and marine vegetation protection. This action is subject to funding and resource availability.	Environmental values	Avoid Future Impact	DPIRD Fisheries DPHI Crown Lands SCC		Successful enforcement of compliance actions for reported cases of unauthorised vegetation harm, supported by community education and aerial surveillance, with a focus on high-priority areas.	Year 1 and Ongoing
ENV_42	**Various**	**Enhance urban stormwater runoff treatment through infrastructure development and Water Sensitive Urban Design (WSUD) in urban areas of the Lower Shoalhaven River coastal zone**	Water Sensitive Urban Design (WSUD) is an approach to urban planning and design that integrates the water into the urban landscape to minimise environmental degradation and improve water quality. This management action involves the implementation of infrastructure improvements such as gross pollutant traps (GPTs), constructed wetlands, and bioretention basins to enhance urban runoff treatment. It is comprised of three sub-actions, ENV_42a,b &c. A detailed description of this action (and sub-actions) based on the findings of the Urban Runoff Assessment and Treatment Options Stage 2 Study (Rhelm, 2023e) is discussed in **Section 3.2.4** and provided in **Appendix C.** It includes information about the location, design, costs and benefits of proposed works .	Water Quality	Active Intervention	SCC		Various as described in sub actions.	Various as described in sub actions.
ENV_42a	Terara	Undertake necessary detailed designs for establishment of a wetland at Terara (site UWQ_03 from Stage 2 Study)	The proposed wetland at Terara (UWQ_03) aims to enhance the effectiveness of existing and future on-site measures for managing urban runoff. Although the wetland may not significantly reduce pollutant loads as a percentage within the Shoalhaven River, it is expected to improve overall water quality management. The recommended configuration is an offline wetland with an inlet pond and trash rack, which promotes a healthier wetland environment compared to configurations without these treatment train features. Details of the exact location and configuration of the design are flexible and to be determined as part of this action. This action involves undertaking required investigations and detailed design to have a shovel-ready project. The construction phase is not included as part of the action in the CMP, however if council obtains funding, then it could proceed with this next stage. See detailed description as discussed in **Section 3.2.4** and provided in **Appendix C.**	Water Quality	Active Intervention	SCC		Detailed design developed.	Within 4-7 Years
ENV_42b	Shoalhaven Heads	Undertake necessary detailed designs and construct a trash rack at Shoalhaven Heads (site UWQ_04 from Stage 2 Study)	Trash racks are WSUD measures designed to reduce gross pollutant loads entering receiving waterways. Trash racks may take a few forms including nets, or metal bars which prevent debris from flowing into receiving waterbodies. This action involves detailed design and construction of a trash rack at Shoalhaven Heads (site UWQ_04 from Urban Runoff Assessment and Treatment Options Stage 2 Study (Rhelm, 2023e)). See detailed description as discussed in **Section 3.2.4** and provided in **Appendix C.** *This action is included in the Shoalhaven Heads location overview in **Section 3.2.5** and **Appendix D**.*	Water Quality	Active Intervention	SCC		Trash rack installed and effective asset management program in progress.	Within 1-3 Years
ENV_42c	Bomaderry	Undertake necessary detailed designs and construct a trash rack at Bomaderry (site UWQ_05 from Stage 2 Study)	Trash racks are WSUD measures designed to reduce gross pollutant loads entering receiving waterways. Trash racks may take a few forms including nets, or metal bars which prevent debris from flowing into receiving waterbodies. This action involves detailed design and construction of a trash rack at Bomaderry (site UWQ_05 from Urban Runoff Assessment and Treatment Options Stage 2 Study (Rhelm, 2023e)). See detailed description as discussed in **Section 3.2.4** and provided in **Appendix C.**	Water Quality	Active Intervention	SCC		Trash rack installed and effective asset management program in progress.	Within 1-3 Years

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
ENV_43	Whole Study Area	Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River	A review of available water quality datasets and reports was undertaken during Stage 2 of the CMP to evaluate the current monitoring and reporting activities in the context of their objectives or aims (Rhelm, 2023d). This report provides a range of recommendations to improve water quality and estuarine health data collection, quality control and reporting. A detailed description (in combination with Action ENV_09) of the revised water quality monitoring framework is discussed in **Section 3.2.4** and provided in **Appendix C.** It includes: • Monitoring program objectives • Monitoring parameters for ecosystem health and recreational water quality • Sampling procedure • Quality assurance and control • Data analysis and reporting.	Water Quality	Avoid Future Impact	SCC	DCCEEW	Monitoring program underway, annual reporting completed.	Year 1 and Ongoing
ENV_44	Whole Study Area	Continue septic system performance assessments and regulation	Council's Environmental Health Team conducts performance assessments of onsite septic systems. Private landholders (including government system owners) are responsible to fix their own septic system if it is not performing up to standard. Regulatory tools are available to enforce compliance from property owners. This action involves the continuation of this program within Council.	Water Quality	Active Intervention	SCC		Effective identification and remediation of non-functioning septic systems.	Year 1 and Ongoing
ENV_51	Whole Study Area	Develop and implement water quality controls into future development	This action involves a review and update of the water quality development and planning controls within the Shoalhaven Local Environmental Plan (LEP) 2014 and Shoalhaven Development Control Plan (SDCP) 2014 that apply to new development within the Shoalhaven River catchment area. This review would consider the following aspects: • Pollutant reduction targets for future development within the Shoalhaven and Crookhaven River estuaries catchment to be based on Neutral or Beneficial Effect (NorBE) for all greenfield development. • Possible future application of the "Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land use Planning Decisions" (OEH, 2017) for Shoalhaven and Crookhaven River. • Avoiding land use intensification in high risk areas as per mapping in “Shoalhaven Local Government Area Estuary Health Diffuse Source Pollution Risk Assessment Mapping” (DPIE, 2020). • Inclusion of a range of Stormwater Quality Improvement Devices (SQIDs) to meet NorBE outcomes including incorporating wetlands and raingardens in private and public development.	Land use planning	Avoid Future Impact	SCC		LEP 2014 and DCP 2014 reviewed. Future revisions of these plans reflect best practice water quality planning controls.	Year 1 and Ongoing
ENV_58	Whole Study Area	Support multi-stakeholder projects to implement actions in priority subcatchments identified in the Shoalhaven River Floodplain Prioritisation Study (WRL 2023) and NSW Blue Carbon Strategy	The purpose of this action is for Council to provide support to multi-stakeholder projects to implement actions in priority subcatchments in the Shoalhaven River Floodplain Prioritisation Study (WRL 2023) as funding opportunities arise and supported by these and other relevant strategies and studies. Key elements include: • Supporting and participating in stakeholder consultation and engagement. • Promoting educational materials in line with action ENV_62. • Serving as the consent authority on relevant projects In the course of these projects, the State Government or Council can also consider acquisition and protection of key locations, notably Coastal Wetlands and Littoral Rainforests areas, and working with landholders to investigate options for modified land management or conservation agreements, voluntary acquisition based on incentives and funding such as Blue Carbon where future funding sources may be available. The Shoalhaven River Floodplain Prioritisation Study (WRL 2023) identifies subcatchments that pose the biggest threat to estuary health due to their capacity to produce acid-sulfate soil (ASS) and blackwater discharge (deoxygenated water pulses). It also identifies management options to modify existing drainage systems to mitigate these threats. The NSW Blue Carbon Strategy provides a roadmap to support blue carbon projects in New South Wales which restore coastal and marine biodiversity and ecosystems, while working towards our Net Zero goals. It aims to provide the catalyst for action, increase participation in the emerging blue carbon market and leverage the many co-benefits of blue carbon projects, such as improved water quality, coastal protection and enhanced habitat for fish and birds. There is also an Intertidal Marine Vegetation Strategy that will be prepared by DPRID Fisheries for the Shoalhaven/Crookhaven system.	Water Quality	Active Intervention	SCC	DCCEEW TOs NPWS DPIRD Fisheries DPIRD Agriculture LLS Private Landowners	Successful implementation of management actions in priority subcatchments identified in the Shoalhaven River Floodplain Prioritisation Study, with Council actively participating in stakeholder engagement, promoting educational materials, and serving as the consent authority for relevant projects.	Year 1 and Ongoing

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Strategic Approach	Lead Agency	Partners	Performance Measures	Timing
ENV_62	Whole Study Area	Develop and deliver an estuary management and ecosystem education/communications program	The purpose of this action is to increase public awareness and capacity related to estuary management. It involves developing and delivering a multi-channel education/communications program that utilises Council resources to share information to the broader community. Importantly, material will be developed in consultation with relevant stakeholders (i.e. Aboriginal community representatives for cultural heritage). Topics to be covered include: • Responsible boating related to public safety, water quality, and bank erosion • Cultural heritage • Estuarine ecosystems • Entrance management • Coastal planning • Oyster reef restoration • Blue Carbon/SLR • Private landholder conservation • Bank erosion and restoration • ASS and Blackwater. A detailed description of this action is discussed in **Section 3.2.4** and provided in **Appendix C.** It includes: • Key messaging for each topic • Information about relevant stakeholders • Details on different delivery methods (i.e. locations for educational signage) • Cost breakdown.	Integrated and collaborative management	Alert	SCC	DCCEEW TOs DPIRD Fisheries DPIRD Agriculture LLS TfNSW	Communication education material developed for all topics with consultation and collaboration with identified supporting partners. Education program developed and being delivered.	Year 1 and Ongoing
ENV_63	Whole Study Area	Investigate opportunities and support implementation of oyster reef restoration activities within the estuary	The purpose of this action is to determine opportunities to incorporate oyster reef restoration into estuary management in the Shoalhaven River estuary. This may be alongside bank restoration/stabilisation works or other habitat enhancement works. This action will incorporate Indigenous knowledge and support Sea Country values. It is aligned with several Marine Estate Management Strategy (MEMS) initiatives including: (1) Improving Water Quality and Reducing Litter; (2) Delivering Healthy Coastal Habitats with Sustainable Use and Development; (6) Ensuring Sustainable Fishing and Aquaculture; and (8) Enhancing social, cultural and economic benefits. The action involves planning, stakeholder engagement, design, construction and monitoring (aligned with ENV_64 – which is a deferred management action. See Appendix F for more details) and is subject to obtaining appropriate funding which may be sourced from various grants programs relevant to the marine estate. Council would serve as the lead for this action during planning and approvals with support from DPIRD Fisheries during the implementation phase.	Environmental values	Active Intervention	SCC	DPIRD Fisheries	Completion of planning and stakeholder engagement for oyster reef restoration in the Shoalhaven River estuary, with successful acquisition of funding and initiation of at least one restoration project, ensuring alignment with MEMS initiatives and incorporation of Indigenous knowledge and Sea Country values	Year 1 and Ongoing
REC_03	Whole Study Area	Keep foreshore recreational areas cleared from post-flood debris and maintained for tourism purposes, including Shoalhaven Heads, Greenwell Point, and Orient Point.	Access to foreshore areas for recreational purposes is deemed to be high value and highly essential by the community and visitors to the area. This action involves the removal of post-flood debris from key recreational areas. Removal activity will be subject to available resources and occur when Council determines there is a risk to public safety and recreational amenity and will need to comply with Council and DPIRD Fisheries policy, with permits to be obtained where/when required.	Environmental values	Active Intervention	SCC	DPIRD Fisheries	Debris clearance implemented in a timely manner when needed.	Year 1 and Ongoing
REC_04	Whole Study Area	Improve public foreshore access to include all-ability access	Council will initiate a comprehensive assessment to identify and enhance public access points along the foreshore, with a special focus on improving all-ability access. This will involve evaluating existing pathways, ramps, and facilities, and identifying gaps in current access provisions. Targeted community consultation will be used to inform recommendations. Recommendations will include the installation of wheelchair-friendly pathways, accessible ramps, and other facilities to ensure equitable access. Council will engage with disability advocacy groups and accessibility experts to ensure that improvements meet the needs of all community members. This initiative aims to promote inclusive enjoyment of the foreshore while respecting environmental sensitivities and local ecological balance. This action also includes site selection, design and construction of priority accessways, subject to funding.	Land use planning	Active Intervention	SCC		Completion of an all-ability access assessment for public access points along the foreshore, with at least 50% of identified gaps addressed through the design and construction of wheelchair-friendly pathways and ramps, subject to available funding and stakeholder engagement.	Within 1-3 Years

3.2.3 Actions to be Implemented by Public Authorities

Public authorities have been identified to support Shoalhaven City Council to implement the majority of the management actions in the CMP, predominately through the provision of technical or project management support. However, there are also several actions for which a public authority has been identified as the lead agency.

Of the 58 actions, there are 5 identified for implementation by public authorities, including:

- Three (3) actions that support environmental values;
- One (1) action that addresses coastal hazard inundation threats; and
- One (1) action that supports integrated and collaborative management.

These actions are presented in **Table 3-8**.

2 actions found "feasible", "viable" and "acceptable" throughout the Stage 3 options evaluation stage, have been deferred from the Lower Shoalhaven River CMP. These actions were omitted due to uncertainty regarding securing a funding source, thus, making it challenging for agencies to commit to their implementation. Although not formally included in the CMP Business Plan, these actions are documented in Appendix F for future consideration, as the risk assessment process identified them as important for addressing key priority issues.Table 3-8 CMP Actions to be Implemented by Public Authorities

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Lead Agency	Partners	Performance Measures	Timing
ECON_10	Whole Study Area	Support agricultural sector productivity, resilience and adaptation	DPIRD Agriculture is a NSW Government Agency tasked with supporting research and development know-how to increase productivity and resilience across NSW agriculture sectors and environment. Their work is relevant to coastal management, specifically as it relates to coastal hazard resilience, climate change adaptation and on-farm practices to protect estuarine ecological health. This action commits DPIRD Agriculture to continue developing and implementing targeted programs and information resources to achieve their directive of increased productivity and resilience across NSW agriculture sectors and environment, and to support sustainable adaptation to the effects of climate change such as sea level rise. Supporting partners such as Council, DPIRD Fisheries, and DCCEEW will: • Support ongoing DPIRD Agriculture programs that assist dairy farms in preparing and recovering from natural hazards such as coastal inundation, including by sharing information and supporting communication/education programs. • Support engagement with stakeholders including local communities, farmers, policymakers, and relevant organisations to gather insights and prioritise concerns. • Collaborate with the DPIRD Agriculture, landowners, and established groups such as Dairy NSW for adaptation planning and to discuss potential impacts of future SLR. • Explore opportunities for achieving co-benefits, such as promoting local biodiversity, enhancing recreational spaces, and supporting local economies. • Explore opportunities to diversify production systems or alternative income streams that consider climate change impacts where typical production means become less viable (e.g. Blue Carbon or other environmental/biodiversity land management incentives on low-lying land impacted by tidal inundation).	Coastal Hazards (inundation)	DPIRD Agriculture	SCC DPIRD Fisheries DCCEEW	Development and implementation of targeted adaptation programs and information resources by DPIRD Agriculture, with increases in stakeholder engagement and resilience strategies across NSW agricultural sectors, particularly addressing coastal hazard resilience and climate change adaptation.	Year 1 and Ongoing
ECON_13	Crookhaven Heads	Monitor existing breakwall infrastructure at Crookhaven Heads	This is a Transport for NSW (Marine Infrastructure Delivery Office) (MIDO) led action. Monitoring will be based on the findings in: • Dwyer PG and Dengate C (2021) An audit of trained river entrances, armoured harbours and groynes and their multi–use and eco-features in NSW: Shellharbour to the Victorian border (illustrated volume III). NSW Government	Integrated and collaborative management	TFNSW	SCC	Regular monitoring and condition assessments undertaken.	Year 1 and Ongoing
ENV_19	Saltwater Swamp and Brundee Swamp	Minimise vehicle access to floodplain wetland areas in Nature Reserves	Recreational vehicles such as trail bikes and 4WDs can seriously damage sensitive wetland habitats, and reducing their access to core wetland areas helps maintain estuary health. While some vehicle access may be essential for fire management, the purpose of this action is to minimise vehicle access via softer means such as signage and education, and with moderate access management structures such as fencing and bollards.	Environmental values	NPWS	SCC	Access control assets installed and maintained. Degraded wetland habitat recovery.	Year 1 and Ongoing

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Lead Agency	Partners	Performance Measures	Timing
ENV_41[10]	Whole Study Area	Support implementation of the Domestic Waterfront Structures Landowners Consent Strategy Shoalhaven River and Crookhaven River Estuaries (DPI, 2022)	DPIRD Fisheries (2022) released the Domestic Waterfront Structures Landowners Consent Strategy (DWS) for the Shoalhaven and Crookhaven River Estuaries. The DWS provides a streamlined approach to assessing and granting landowner consent for domestic waterfront structures, using a 'traffic light' system to categorise the suitability of different locations. This action supports the implementation of the DWS and aims to increase community awareness about riparian and marine vegetation, the importance of maintaining it, and the requirements for obtaining consent for waterfront structures. These efforts will be delivered through community education programs and agency websites. Targeted education will be crucial in reinforcing compliance and protecting the estuarine environment (refer Action ENV_62 in **Table 3-7**).	Environmental values	Various, as described in sub actions.	Various, as described in sub actions.	Various, as described in sub actions.	Year 1 and Ongoing
ENV_41a	Whole Study Area	Removal of derelict domestic waterfront structures	This sub-action focuses on the identification and removal of derelict or unauthorised domestic waterfront structures. Where opportunities arise, SSC and Crown Lands will jointly lead efforts to remove these structures, ensuring that activities align with the objectives of the DWS and contribute to estuary health. DPIRD Fisheries will provide support as required, particularly where structures may impact marine habitats. Where this activity occurs in mapped Coastal Wetlands or Littoral Rainforest areas, it may be classified as 'environmental protection works', enabling a more streamlined approval pathway under the RH SEPP. Noting that appropriate approval pathways will still be used during action implementation. This action is subject to resource availability and funding.	Environmental values	DPHI Crown Lands SCC	DPIRD Fisheries	Removal of 80% of identified derelict waterfront structures within mapped priority areas, ensuring compliance with DWS objectives.	Year 1 and Ongoing
ENV_41b	Whole Study Area	Continued compliance action for unauthorised vegetation harm and waterfront works	This sub-action addresses the prevention of illegal clearing or harm to riparian and marine vegetation, focusing on unauthorised activities associated with waterfront structures, private access, or other amenity developments. Given the different heads of power across agencies, compliance actions will be conducted jointly by SSC, Crown Lands, and DPIRD Fisheries. These agencies will collaborate to ensure enforcement for a range of offences, depending on jurisdiction. These compliance actions will be supported by ongoing community education efforts and targeted campaigns, emphasising the legal requirements for riparian and marine vegetation protection. This action is subject to funding and resource availability.	Environmental values	DPIRD Fisheries DPHI Crown Lands SCC		Successful enforcement of compliance actions for reported cases of unauthorised vegetation harm, supported by community education and aerial surveillance, with a focus on high-priority areas.	Year 1 and Ongoing

[10] *Note that Action ENV_41 is in both **Table 3-7 & Table 3-8** due to a shared lead agency role with SCC.*

3.2.4 Detailed Description of Complex Actions

There are several actions that benefit from a more detailed description to provide guidance on their funding and implementation. These detailed descriptions are provided in **Appendix C**. Detailed descriptions are provided for the following actions:

- **BE_43** – Environmental bank management, foreshore protection and riparian restoration on high-priority public foreshores;
- A combined description for **BOAT_37** – Boat ramp consolidation/ optimisation & **BOAT_38** – Develop and implement a comprehensive boat ramp facility upgrade and asset management program;
- **CS_16** – Protection of Midden at Crookhaven Heads;
- **CTF_20** – Implement the Entrance Management Policy and undertake review;
- A combined description for **ECON_08** – Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure & **CTF_16** - Review and update all asset management plans (AMPs), relevant to the coastal zone within the CMP study area & **CTF_16a** – Review and update floodgate asset management plans (AMPs);
- A combined description for **ENV_09** – Inclusion of additional Beachwatch sites & **ENV_43** – Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River;
- **ENV_42** – Enhance urban runoff treatment through infrastructure development and Water Sensitive Urban Design (WSUD) in urban areas of the Lower Shoalhaven River coastal zone; and
- **ENV_62** – Develop and deliver an estuary management and ecosystem education/communications program

3.2.5 Key Location Overviews

There are also key location overviews that provide a detailed description of the suite of actions that apply to certain areas of the Lower Shoalhaven. These overviews will illustrate how multiple actions work together to address key management issues in an integrated fashion. Key location overviews are provided in **Appendix D**. The following areas are covered by the key location overviews:

Shoalhaven Heads including an overview of:

- **BE_43e** – Beach nourishment near Hay Avenue west of the existing rock revetment
- **BE_44** – Beach nourishment along the toe of the existing rock revetment
- **BE_46** – Design and implement a living shoreline solution along the foreshore adjacent to the caravan park at Shoalhaven Heads
- **BOAT_37, BOAT_38 & BOAT_43–** Boat ramp rationalisation, upgrade/maintenance program and installation of watercraft storage facilities
- **CTF_16 & CTF_16a –** asset management plans and maintenance
- **ENV_09** – Inclusion of Shoalhaven Heads as a Beachwatch site
- **ENV_42b** – Undertake necessary detailed designs and construct a trash rack at Shoalhaven Heads
- **REC_04** – Enhance public access points along the foreshore, with a special focus on improving accessibility for people with disabilities.

Greenwell Point including an overview of:

- **BE_17** – Monitor and maintain the existing foreshore protection structures at Greenwell Point
- **BE_42** – Develop an adaptation strategy for land loss along Berry's Canal
- **BE_43f –** Monitoring and maintenance of foreshore protection and intertidal habitat works
- **BOAT_37, BOAT_38 & BOAT_43–** Boat ramp rationalisation, upgrade/maintenance program and installation of watercraft storage facilities
- **CTF_08** – Prepare a climate change adaptation strategy for Greenwell Point
- **CTF_16 & CTF_16a –** asset management plans and maintenance
- **ECON_10** – Support agricultural sector climate change adaptation
- **ENV_09** – Inclusion of Greenwell Point as a Beachwatch site
- **ENV_46** – Cost-benefit analysis and feasibility study(ies) of alternative floodplain land use options (ENV_46 is a deferred management action, see **Appendix F** for more details)

4 Whether the CMP Identifies Recommended Changes to the relevant Planning Controls, Including any Proposed Maps

This CMP does not propose any amendments to the existing mapping of the CEA, CUA, or CWLRA currently gazetted with the RH SEPP.

Mapping for the CVA has not been provided from the RH SEPP, and no such CVA map yet exists for the Shoalhaven LGA. Subsequently, it is the intent of Council to propose, by way of a planning proposal, the adoption of a map indicating a CVA – which may be comprised of a combination of the following hazards across the study area, which are identified in the CM Act:

- Coastal inundation.
- Tidal inundation.
- Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

This is detailed in Action CTF_13.

Council have mapped tidal and coastal inundation as part of Stage 2 (Stantec, 2023) of the Lower Shoalhaven River CMP, with the intent that this mapping will be used to prepare a CVA. The extent of these hazards is provided in **Map RG-01-06** and **RG-01-07**, respectively.

Other CMPs for specific estuaries across the Shoalhaven LGA are currently being prepared that are also to include mapping of coastal and tidal inundation. The Jervis Bay and Open Coast CMP involved the mapping of additional coastal hazards such as beach erosion, shoreline recession and coastal cliff and slope instability. Once these studies are all complete, Council will likely combine them as part of a single planning proposal (or potentially multiple) to prepare a CVA.

It should be noted that the CM Act requires the consideration of future climate change. As such, all extents used in defining the CVA should be based on a suitable forward planning horizon, which incorporates the projected effects of sea level rise on coastal hazards.

While this CMP does not currently propose amendments to the existing mapping of the CWLRA currently gazetted with the RH SEPP, action CTF_13 allows for the update of the CWLRA if required, following vegetation mapping that is the subject of a supporting action, ENV_32. Similarly, Council is undertaking this action in parallel across multiple CMP areas and will undertake a single planning proposal once all of the relevant information is acquired.

5 A Business Plan

5.1 Intent and Values of Implementing the Lower Shoalhaven River CMP

The Lower Shoalhaven River CMP is a program of physical works, monitoring and investigations, and planning and education initiatives that target the threats to the environmental, social, cultural and economic values of the coastal zone. The CMP also includes actions to target coastal hazards impacting the coastline now and into the future.

Investment in the CMP provides an opportunity to directly preserve and improve the condition of the estuarine ecosystems, cultural spaces, public access and recreational amenity opportunities of the coastal zone, and in doing so, provide benefits to the wellbeing and safety of the community and visitors to the region.

The actions contained within this business plan primarily aim to mitigate coastal risks to public assets and beneficiaries, with consideration of balancing benefits across the range of locations and threats within the Lower Shoalhaven River coastal zone. Where actions involve private landholders (for example BE_38), the primary purpose of these actions is to support coastal processes and estuary health. If required, a memorandum of understanding / funding arrangement would be established with such private landholders during the action implementation.

5.2 Resourcing, Funding and Financing

A business plan has been developed for the CMP which outlines the key components of the funding strategy for the CMP, including the cost of proposed actions, proposed cost-sharing arrangements and other potential funding mechanisms. Delivery of the Lower Shoalhaven River CMP is estimated to cost approximately $24.45 million (2024 dollars) over 10 years. Of that total, approximately $12.08 million is for capital costs, and approximately $12.37 million is for operational and maintenance costs. A breakdown of implementation costs over the CMP timeframe is provided in **Figure 5-1**. The CMP actions are expected to be funded through Shoalhaven City Council and State Government contributions, monetary grants and volunteer works by community members and organisations.

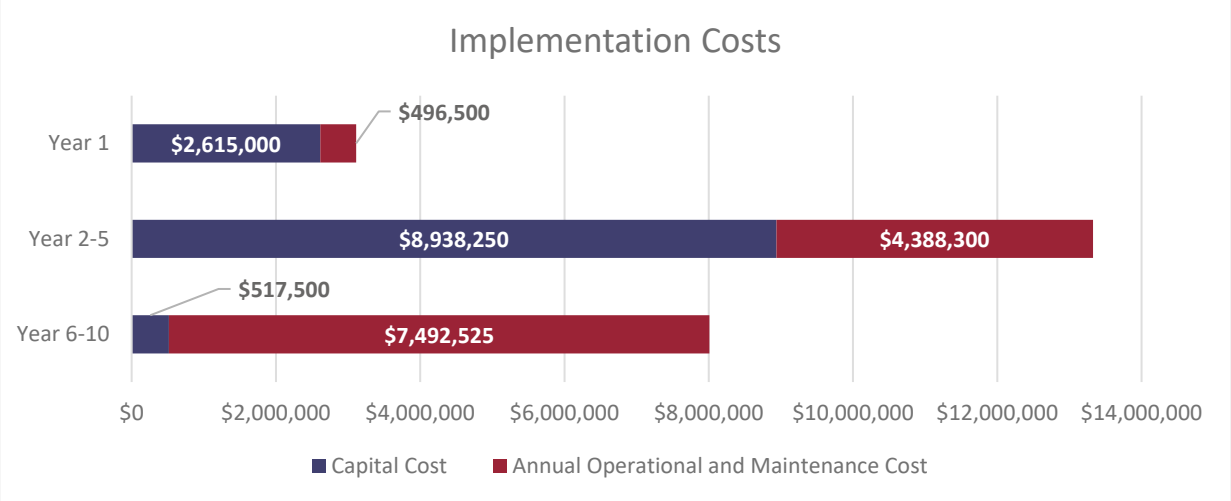

Figure 5-1 Overview of CMP Implementation Costs

For all responsible or supporting organisations, the identified management actions remain subject to the availability of resources, contestable grant program processes (refer **Table 5-1**), funding allocations,

policy and legislation changes, and organisational and/or government priorities. For example, Council's ability to implement numerous CMP actions will depend on successfully obtaining Government grant funding. If Council is unsuccessful in obtaining government grant funding, the program will need to be scaled back, affecting the timing of and/or ability to implement CMP actions. Notwithstanding, the management actions have been included in good faith, that the funds shown in **Table 5-1** are able to be obtained. Furthermore, Council will take advantage of any alternative funding opportunities that become available in the future to implement actions such as those identified for funding under the NSW Coastal and Estuary Grants Program. This could include new State and Federal funding programs and/ or other opportunities, such as philanthropic sponsorship as they become available.

Some actions are funded under Council's normal operating budgets or through existing programs and grants. As identified above it will not be possible for Council to implement all actions identified in this CMP without additional sources of funding. As such, identification of grants and the submission of successful funding applications is an important component of this CMP. For this reason, a new full time equivalent coast and estuary officer position has been included as an action in the CMP which will be essential to supporting CMP implementation.

Potential sources of funding identified for the CMP actions are described in **Table 5-1**, and the potential source of funding for each management action is provided in **Table 5-3**. It is noted that the NSW and Commonwealth Government grant programs referenced below may no longer be available at the time of implementation of any applicable management actions under this CMP. In that case, Council would review the grants available at that time and, if possible, identify an alternative source of State or Federal grant funding that may become available in the future.

Table 5-1 Potential CMP Funding Mechanisms

Funding Source	Details
Council Funding Mechanisms	
Council Ordinary Rates	A key funding mechanism for Council are statutory rates and charges, which can be applied to private landowners and businesses. Under the LG Act, ordinary rates can be applied to all rateable land within an LGA. This money can be used to fund delivery of community assets and services and may also be used to implement coastal management actions.
Special Rates	Specific works, services, facilities or activities that benefit certain parcels of rateable land can be funded (in whole or in part) by Council by applying special rates under the LG Act. Where a coastal management action directly benefits a property owner, special rates provide a mechanism for Council to secure contributions from those landowners over time. Special rates can be implemented in different ways. Council can issue rates over a property or alternatively enter into an arrangement with the owner for payment of a lump-sum amount.
Development Contributions	Developer contributions enabled under the EP&A Act may be used for coastal management in some instances, such as funding capital works to manage the development impacts on the coast or reduce risk to the development from coastal processes. The criteria and ability to use those contributions will be dependent on the relevant Developer Contribution Plan and demonstrated suitability under the NSW local infrastructure contributions framework.
Revenue Generated by Council	Council can also fund coastal management initiatives through revenue they may generate through hire, rental or other commercial partnerships (e.g., surf life saving clubs, Holiday Parks etc).
Federal Funding Mechanisms	
Federal Disaster Ready Fund	The Disaster Ready Fund (DRF) is the Australian Government's key disaster resilience and risk reduction initiative which will deliver projects that support Australians to manage the physical and social impacts of disasters caused by climate change and other natural hazards. The objectives of the DRF are to: 1. increase the understanding of natural hazard disaster impacts, as a first step towards reducing disaster impacts in the future; 2. increase the resilience, adaptive capacity and/or preparedness of governments, community service organisations and affected communities to minimise the potential impact of natural hazards and avert disasters; and 3. reduce the exposure to risk, harm and/or severity of a natural hazard's impacts, including reducing the recovery burden for governments, cohorts at disproportionate disaster risk, and/or affected communities. Up to $1 billion funding has been provided for the DRF over five years, from 1 July 2023.

Funding Source	Details
NSW Government Funding Mechanisms	
NSW Coastal and Estuary Grants Program	Under this program administered by DCCEEW, the NSW Government provides grants to local government to support coastal management planning (e.g., hazards studies, management plans/programs), actions to manage the risks of coastal hazards (e.g., erosion protection), and restore degraded coastal habitats (e.g., wetlands, dunes). The program supports coastal and estuary planning projects, and the implementation of works identified in certified CMPs. Funding is available under 6 funding streams: • A planning stream: for planning and studies including investigation, design and cost-benefit analyses for infrastructure works recommended in a certified CMP. • Four implementation streams – one for each of the coastal management areas. The focus of these streams are projects that manage risks from coastal hazards, and improve the health of estuaries, wetlands and littoral rainforests across NSW. • One for undertaking emergency works as identified in a CZEAS. For projects that address a documented action in a certified CMP funding is $2 from the State Government for every $1 provided by Council. Certification of this CMP will facilitate eligibility for funding of many of the actions proposed in this CMP under the program. This grant funding program is contestable, and subject to State government funding priorities and allocations. According to the latest guidelines, contributions to the project from other funding sources (non-council contributions) must be removed from the whole project cost prior to applying the funding ratio.
Marine Estate Management Strategy	A number of management actions in the CMP may be eligible for support via relevant NSW Marine Estate Management Strategy (MEMS) projects. The MEMS provides an overarching, strategic approach to the coordination and management of the marine estate through to 2028. The management of priority threats is grouped into 9 management initiatives that summarise the objectives, benefits, threats, stressors and proposed management actions. An implementation plan (developed by the Authority's member agencies in consultation with key stakeholders) articulates the management actions in more detail. CMPs are key delivery mechanisms for the MEMS.
NSW Floodplain Management Grants Program	The Floodplain Management Program provides financial support to local councils and eligible public land managers to help them manage flood risk in their communities. The program supports the implementation of the NSW Government's Flood Prone Land Policy, which is outlined in the Floodplain Development Manual. Support provided under the programs usually involves $2 from government for every $1 provided by the applicant. Grant funding is contestable and subject to State government funding priorities and allocations. Where a management action to mitigate tidal inundation risk also has a benefit with respect to catchment flood mitigation, there may be opportunity to consider this grant program.

Funding Source	Details
NSW Environmental Trust	The NSW Environmental Trust provides funding to a range of community, government and industry stakeholders to deliver projects that conserve, protect and rehabilitate the NSW environment, or that promote environmental education and sustainability. The Trust provides this funding through a range of contestable grant programs and strategic investments. The Trust administers both long-standing annual programs and one-off, issue-specific programs. The funded programs support: • Action in conserving and restoring natural ecosystems • Protecting threatened species • Undertaking priority environmental research • Building community skills • Knowledge and capacity through education • Promoting cultural awareness • Dealing with pollution.
Crown Reserves Improvement Fund	The Crown Reserves Improvement Fund (CRIF) supports Crown Land Managers by providing funding for repairs, maintenance and improvements on Crown reserves. The funding aims to benefit the community, boost the economy and contribute to the cultural, sporting and recreational life of NSW.
Saving our Species Program	Administered by DCCEEW, the Saving our Species (SoS) program sets out the NSW Government's threatened species management plan. The main objectives of SoS are to increase the number of threatened species that are secure in the wild in NSW and control the key threats facing the states threatened plants and animals.
NSW Heritage Grants Program	The NSW Heritage Grants Program provides grants to heritage owners and custodians, local government and the community, to deliver a broad range of heritage outcomes. The program is supported by the Heritage Council of NSW. Grants are available for: • Emergency works to declared Aboriginal places or State Heritage Register listed items that have been damaged by unexpected events (e.g., a storm) • Aboriginal cultural heritage grants • Activating State heritage grants • Caring for State heritage grants • Local government heritage grants.
Recreational Fishing Trust Grant	All revenue raised by the NSW Recreational Fishing Licence Fee is placed into the Recreational Fishing Trusts. There are two Trusts – one for freshwater and one for saltwater. Grants are provided from the Trusts to deliver a wide range of programs to boost recreational fishing opportunities in NSW. Grants are provided for: • Recreational fishing education • Fishing access and facilities • Research on fish and recreational fishing • Enhancement of recreational fishing.

Funding Source	Details
Habitat Action Grants	The Habitat Action Grants are funded from the Recreational Fishing Trusts which direct revenue generated by the NSW Recreational Fishing Fee towards on ground actions to improve fish habitat and recreational fishing in NSW. Angling clubs, individuals, community groups, local councils and organisations interested in rehabilitating fish habitats in freshwater and saltwater areas throughout NSW can apply for grants of up to $40,000. Habitat rehabilitation projects which may be funded include: • removal or modification of barriers to fish passage • rehabilitation of riparian lands (river banks, wetlands, mangrove forests, saltmarsh) • re-snagging waterways with timber structure • removal of exotic vegetation from waterways and replace with native species • bank stabilisation works.
Flagship Habitat Rehabilitation Grants	The flagship grant program is offering up to $400,000 for projects that significantly enhance fish habitat, water quality and fish passage opportunities within the coastal catchments of NSW. Funds may be used for a broad range of actions required to 'get the job done' including project planning, site assessments and on-ground works. This program seeks to benefit recreational fishing opportunities by enhancing the habitats that fish need to thrive. This program is funded and administered by Department of Primary Industries and Regional Development. Eligibility criteria that must be met include: • Locations at NSW coastal waterways up to their headwaters in the Great Dividing Range. • Experience with the management of large aquatic rehabilitation projects • Clear alignment with enhancement of recreational fishing by improving fish habitat and or fish passage. • Specific and targeted site locations, or a staged approach that develops a prioritisation process for future funding rounds. • Matching in-kind and or cash contributions of at least 1:1. • Where appropriate, alignment with regional and state-based priorities and planning instruments such as the Marine Estate Management Strategy and Coastal Management Reforms. • Projects can be up to 3 years in duration. This includes time required for environmental investigations, community consultation and on-ground works (if proposed). Subsequent funding rounds may be available and enable a staged approach for longer term projects.

Funding Source	Details
Boating Infrastructure and Dredging Scheme	Transport for NSW Maritime will invest $44 million into improving waterway accessibility and safety under its new Boating Infrastructure and Dredging Scheme (BID Scheme). The new funding framework follows an independent review of the Boating Now Program, completed in September 2023. The scheme replaces the previous grants program, providing $28 million in new funding for the development of new and improved public boating infrastructure and enhanced public access to NSW waterways. The scheme consists of five sub-programs: • Boating Infrastructure for Communities Grants Program – improving on the previous Boating Now Program, this program will put greater emphasis on improved access for aging boaters and boaters with disabilities. • Boating Infrastructure Maintenance Grants Program – providing funding to asset owners across NSW to undertake minor repair and maintenance works on public boating infrastructure. • Boating Infrastructure Emergency Repair Pool Scheme – funding support for owners of public boating infrastructure to repair or replace assets impacted by natural disasters and severe weather events. • Priority Dredging Program – funding for the Maritime Infrastructure Delivery Office (MIDO) to deliver new dredging projects at key priority sites critical to boating and safe waterway navigation. • Committed Dredging Projects – committed dredging projects at Swansea, Ettalong, Coffs Harbour and Myall River, and the development of 10-year environmental planning approvals to dredge nine high priority areas.
State Disaster Risk Reduction Stream Grants	Under two funding pathways, Discovery and Scale, the State Risk Reduction stream aims to reduce or enable the reduction of state-level risks, risks of state significance and systemic risks potentially impacting NSW. The Discovery Projects pathway offers funding of up to $500,000, for projects that will test and pilot new approaches to achieve breakthrough disaster risk reduction outcomes. The projects must have potential for state-wide significance or impact. The Scale Projects pathway offers funding of up to $2.5 million, for projects that aim to generate a new product, technology, platform or approach that will have state-wide impact at a scale beyond piloting or testing.
Infrastructure Grants: Disaster Readiness (Clubgrants Category 3)	The objective of the Clubgrants Category 3 Infrastructure Grants program is to fund the costs of construction, alteration, renovation, completion and fit-out of buildings and community infrastructure to deliver outcomes for disadvantaged NSW communities including regional and remote areas, culturally and linguistically diverse, disability and Aboriginal communities. Local council applicants are required to cash-match the funding amount requested.

Funding Source	Details
Other Funding Opportunities	
Landcare Grants	Landcare Australia works with governments, corporate and philanthropic organisations and donors to facilitate funding for good quality, hands on projects and programs that will improve environmental outcomes for the Landcare community.
Coastcare Grants	Coastcare grants support community groups working on projects across Australia. Grants support Landcare and Coastcare groups with projects like dune protection, revegetation of native coastal environments, protection of endangered coastal species habitats, collection and prevention of storm water pollution, weed and non-native plant removal, and control of human access to sensitive and vulnerable areas.

Table 5-2 Legend for Funding Sources in Table 5-3

#	Funding Source
1	SCC Operational and Delivery Plan Process
2	NSW Coasts and Estuary Grants Program
3	NSW Marine Estate Management Strategy
4	NSW Heritage Grants
5	Environmental Trust Grants
6	Landcare/Coastcare Grants
7	TFNSW/ MIDO Grants and/or TfNSW Operating Budget
8	NPWS Operating Budget
9	DPIRD Agriculture/ Fisheries Budget
10	DPI Recreational Fishing Trust Grants, Habitat Action Grants, or Flagship Habitat Rehabilitation Grants
11	NSW Floodplain Management Grants Program
12	Crown Reserves Improvement Fund
13	Saving our Species Program
14	Federal Disaster Ready Fund

5.3 Alignment with the IP&R Framework

To assist with the scheduling of the implementation of actions, a Business Plan is provided in **Table 5-3** and includes the following information

- Action ID and name
- Responsibilities – including lead agency for implementation and any supporting agencies
- Timeframe for delivery
- Forward cost estimate

Budgets have been allocated for each management action for the capital and annually recurrent costs, the latter comprising the operational and/or maintenance costs for the action. Capital costs refer to the costs associated with the initial design, development, construction, and renewal of physical assets or facilities. Maintenance costs have been estimated as 10% of capital works costs. Where the action would only require existing Council staff time, assets and services, these are noted as “CST”.

These costs have been discretised into the Operational and Delivery Program (DP) periods of Council’s IP&R framework. In terms of aligning with Councils IP&R framework, the breakdown is as follows:

- Year 1 will align with current Delivery Program 2022-2026
- Years 2-5 will align with future Delivery Program 2026-2030
- Years 6-9 will align with future Delivery Program 2030-2034
- Year 10 will align with future Delivery Program 2034-2038

While the CMP spans a 10-year period, implementation planning beyond the current Delivery Program cycle is inherently uncertain due to shifting priorities, funding availability, and evolving coastal conditions. Therefore, rather than isolating year 10 as a standalone period, which would be difficult to forecast with confidence, the business plan consolidates actions across two DP cycles (years 6–10) to reflect a more realistic and flexible approach to long-term planning. This ensures that actions remain adaptable while aligning with Council’s broader strategic and financial planning processes.

Table 5-3 CMP Business Plan

ID	Location	Management Action	Lead	Partners	Potential Funding Source	Capital Costs	Operational and Maintenance Costs (annual)	Year 1	Year 2-5	Year 6-10	Total Cost
BE_17	Greenwell Point	Monitor and maintain the existing foreshore protection structures at Greenwell Point	SCC		1	$0	$13,000	$13,000	$52,000	$65,000	**$130,000**
BE_38	Whole Study Area	Support private land bank stabilisation and restoration	SCC	DCCEEW LLS DPIRD Agriculture DPHI - Crown Lands	1, 3, 6	$0	$5,000	$5,000	$20,000	$25,000	**$50,000**
BE_42	Berry's Canal	Develop an adaptation strategy for land loss along Berry's Canal	SCC	NPWS LLS Private Landholders TOs TfNSW DPHI - Crown Lands	1, 2	$120,000	$0	$0	$120,000	$0	**$120,000**
BE_43	**Various**	**Environmental bank management, foreshore protection, and riparian restoration on high-priority public foreshores**									
BE_43a	Watersleigh	Undertake necessary detailed investigations and environmental bank management works at site SR_018 (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW	1, 2, 3, 5	$707,500	$62,250	$707,500	$249,000	$311,250	**$1,267,750**
BE_43b	Watersleigh	Undertake necessary detailed investigations and environmental bank management works at sites SR_061, SR_062, SR_063 & SR_064 (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW	1, 2, 3, 5	$4,065,000	$393,000	$0	$5,244,000	$1,965,000	**$7,209,000**
BE_43c	Longreach	Undertake necessary detailed investigations and environmental bank management works at sites SR_071, SR_073 & SR_082 (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW	1, 2, 3, 5	$1,056,000	$92,100	$0	$1,240,200	$460,500	**$1,700,700**
BE_43d	Bomaderry Creek	Undertake necessary detailed investigations and environmental bank management works at site BOM_11 (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW	1, 2, 3, 5	$451,000	$38,100	$0	$489,100	$190,500	**$679,600**
BE_43e	Shoalhaven Heads	Undertake necessary detailed investigations and foreshore protection works at site SH_02 (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	1, 2, 3, 5	$376,250	$30,625	$0	$376,250	$153,125	**$529,375**
BE_43f	Crookhaven River	Undertake necessary detailed investigations and maintenance works at site CH_19 (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	1, 2, 3, 5	$0	$15,000	$0	$0	$60,000	**$60,000**
BE_43g	Nowra	Undertake necessary detailed investigations and environmental bank management works at sites SR_094 & SR_096 (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	1, 2, 3, 5	$476,500	$40,650	$0	$0	$598,450	**$598,450**
BE_43h	Bomaderry Creek	Undertake necessary detailed investigations and environmental bank management works at site BOM_13 (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	1, 2, 3, 5	$41,000	$2,600	$0	$0	$46,200	**$46,200**

ID	Location	Management Action	Lead	Partners	Potential Funding Source	Capital Costs	Operational and Maintenance Costs (annual)	Year 1	Year 2-5	Year 6-10	Total Cost
BE_43i	Orient Point	Undertake necessary detailed investigations and foreshore protection works at site CH_17 at Orient Point (Site ID and map provided in Detailed Description)	SCC	DPIRD Fisheries LLS TOs TfNSW DPHI - Crown Lands	1, 2, 3, 5, 10	$300,000	$30,000	$370,000	$120,000	$150,000	**$640,000**
BE_44	Shoalhaven Heads	Beach nourishment along the toe of the existing rock revetment at Shoalhaven Heads	SCC	DPIRD Fisheries DPHI -Crown Lands	1, 2	$150,000	$15,000	$0	$150,000	$75,000	**$225,000**
BE_45	Crookhaven Headland	Implement a living shoreline solution along the Crookhaven River shoreline adjacent to Crookhaven Heads	SCC	DPIRD Fisheries TOs/Jerrinja LALC TfNSW DPHI - Crown Lands Oyster farmers	1, 2, 3, 10	$1,500,000	$150,000	$0	$1,650,000	$750,000	**$2,400,000**
BE_46	Shoalhaven Heads	Design and implement a living shoreline solution along the foreshore adjacent to the caravan park at Shoalhaven Heads	SCC	DPIRD Fisheries LLS TOs/Jerrinja LALC TfNSW DPHI - Crown Lands Oyster farmers	1, 2, 3, 10	$560,000	$50,000	$0	$710,000	$250,000	**$960,000**
BOAT_37	Whole Study Area	Boat Ramp and Facilities Consolidation and Rationalisation Plan	SCC	TfNSW Marine Rescue	1, 7	$100,000	$0	$0	$100,000	$0	**$100,000**
BOAT_38	Whole Study Area	Develop and implement a comprehensive boat ramp facility upgrade and asset management program	SCC	TfNSW Marine Rescue	1, 7	$50,000	$100,000	$150,000	$400,000	$500,000	**$1,050,000**
BOAT_40	Whole Study Area	Support and promote LGA-wide boating education measures targeting both local and visiting recreational boaters	SCC	TfNSW	1, 7	$0	$5,000	$5,000	$20,000	$25,000	**$50,000**
BOAT_43	Whole Study Area	Management of Watercraft Storage	SCC	TfNSW NPWS DPHI-Crown Lands	1, 7	$100,000	$0	$100,000	$0	$0	**$100,000**
CS_12	Whole Study Area	Develop and execute a communications plan for Stage 5 of the CMP	SCC		1, 2	$0	$5,000	$5,000	$20,000	$25,000	**$50,000**
CS_13	LGA	Undertake a LGA wide coastal zone Aboriginal Cultural Heritage Survey, and development of local protection/management plans	SCC	Jerrinja LALC Jerrinja Tribal Group Nowra LALC NPWS	1, 2, 3, 4	$60,000	$6,000	$66,000	$24,000	$30,000	**$120,000**
CS_14	Whole Study Area	Engage with relevant Local Aboriginal Land Councils and local Traditional Owner Groups to develop a cultural educational and awareness program	SCC	Jerrinja LALC Jerrinja Tribal Group Nowra LALC DPIRD-Fisheries	1, 2, 3	$17,500	$2,500	$20,000	$10,000	$12,500	**$42,500**
CS_15	Whole Study Area	Provide opportunities and help build capacity to local Aboriginal Ranger Programs, to enhance their role in management of Sea Country	SCC	Jerrinja LALC Jerrinja Tribal Group Nowra LALC DPIRD-Fisheries NPWS	1, 2, 3	CST	CST	CST	CST	CST	CST
CS_16	Crookhaven Heads	Protection of Midden at Crookhaven Heads	SCC	Jerrinja LALC Jerrinja Tribal Group DPIRD Fisheries	1, 2, 3, 4	$250,000	$25,000	$0	$325,000	$125,000	**$450,000**
CTF_08	Greenwell Point	Prepare a climate change adaptation strategy for Greenwell Point	SCC	DPIRD Agriculture LLS TfNSW DPHI Planning DPHI Crown Lands	1, 2	$120,000	$0	$0	$120,000	$0	**$120,000**
CTF_09	LGA	Maintain planning controls to reduce future coastal hazard impacts	SCC	DPHI Planning	1	CST	CST	CST	CST	CST	CST
CTF_13	LGA	Undertake a Planning Proposal to adopt a CVA and update CWLRA (pending further information)	SCC	DPHI Planning	1, 2	$50,000	$0	$50,000	$0	$0	**$50,000**

ID	Location	Management Action	Lead	Partners	Potential Funding Source	Capital Costs	Operational and Maintenance Costs (annual)	Year 1	Year 2-5	Year 6-10	Total Cost
CTF_14	Whole Study Area	Implement the Lower Shoalhaven River Coastal Zone Emergency Action Subplan (CZEAS)	SCC	NSW SES	1, 2	$0	$25,000	$25,000	$100,000	$125,000	**$250,000**
CTF_16	Whole Study Area	Review and update all asset management plans (AMPs), relevant to the coastal zone within the CMP study area	SCC		1	$50,000	$40,000	$90,000	$160,000	$200,000	**$450,000**
CTF_16a	Whole Study Area	Review and update floodgate and associated drainage infrastructure asset management plans (AMPs)	SCC	DPIRD Fisheries	1, 2, 3	$50,000	$15,000	$65,000	$60,000	$75,000	**$200,000**
CTF_20	Shoalhaven Heads	Implement updated Entrance Management Policy and undertake additional review	SCC	DCCEEW DPHI -Crown Lands DPIRD Fisheries	1	$0	$25,000	$25,000	$100,000	$125,000	**$250,000**
ECON_04	Whole Study Area	Establish a CMP Governance Framework	SCC	DCCEEW DPIRD Fisheries DPIRD Agriculture LLS TfNSW NPWS LALCs Community and industry representatives	1	CST	CST	CST	CST	CST	CST
ECON_05	LGA	Establish one new Full Time Equivalent (FTE) Coast & Estuary Officer role within Council	SCC		1	$0	$130,000	$130,000	$520,000	$650,000	**$1,300,000**
ECON_06	Whole Study Area	Review Council's coastal management planning policies every 10 years	SCC	DCCEEW	1	CST	CST	CST	CST	CST	CST
ECON_08	Whole Study Area	Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure	SCC		1, 2	$50,000	$10,000	$60,000	$40,000	$50,000	**$150,000**
ECON_10	Whole Study Area	Support agricultural sector productivity, resilience and adaptation	DPIRD Agriculture	SCC DPIRD Fisheries DCCEEW	9	CST	CST	CST	CST	CST	CST
ECON_11	Whole Study Area	Review water sharing plans in the light of climate change and increasing population	SCC	DCCEEW Universities	1, 2, 3, 5	$50,000	$0	$0	$50,000	$0	**$50,000**
ECON_13	Crookhaven Heads	Monitor existing breakwall infrastructure at Crookhaven Heads	TFNSW	SCC	1, 7	$0	$5,000	$5,000	$20,000	$25,000	**$50,000**
ECON_14	Whole Study Area	Continue ongoing collaboration with state government agencies and research institutions	SCC	LLS TfNSW DPIRD Fisheries DPIRD Agriculture NPWS DCCEEW Universities	1	$0	$5,000	$5,000	$20,000	$25,000	**$50,000**
ENV_09	Shoalhaven Heads, Greenwell Point, Nowra	Inclusion of additional Beachwatch sites	SCC	DCCEEW	1, 3	$0	$10,000	$10,000	$40,000	$50,000	**$100,000**
ENV_19	Saltwater Swamp and Brundee Swamp	Minimise vehicle access to floodplain wetland areas in Nature Reserves	NPWS	SCC	8	$25,000	$2,500	$25,000	$10,000	$12,500	**$47,500**
ENV_21	Whole Study Area	Update Council Plans of Management (POMs) for locations in the coastal zone to support objectives of the CMP	SCC		1	$170,000	$0	$170,000	$0	$0	**$170,000**
ENV_31	Whole Study Area	Enact the CMPs Monitoring, Evaluation and Reporting (MER) Program to track progress and report on outcomes	SCC		1	CST	CST	CST	CST	CST	CST
ENV_32	Whole Study Area	Continue Council's program of mapping threatened ecological communities (TECs) across coastal reserves	SCC	DCCEEW DPHI-Planning	1, 2, 13	$150,000	$0	$150,000	$0	$0	**$150,000**
ENV_39	Whole Study Area	Implement environmental protection works to enhance ecological communities in coastal reserves within the CMP Study Area	SCC	LLS	1, 2, 3, 6, 10, 12	$0	$50,000	$50,000	$200,000	$250,000	**$500,000**

ID	Location	Management Action	Lead	Partners	Potential Funding Source	Capital Costs	Operational and Maintenance Costs (annual)	Year 1	Year 2-5	Year 6-10	Total Cost
ENV_41	**Whole Study Area**	**Support implementation of the Domestic Waterfront Structures Landowners Consent Strategy Shoalhaven River and Crookhaven River Estuaries (DPI, 2022)**									
ENV_41a	Whole Study Area	Removal of derelict domestic waterfront structures	DPHI Crown Lands SCC	DPIRD Fisheries	1, 2, 3	CST	CST	CST	CST	CST	CST
ENV_41b	Whole Study Area	Continued compliance action for unauthorised vegetation harm and waterfront works	DPIRD Fisheries DPHI Crown Lands SCC		1, 9	CST	CST	CST	CST	CST	CST
ENV_42	**Various**	**Enhance urban stormwater runoff treatment through infrastructure development and Water Sensitive Urban Design (WSUD) in urban areas of the Lower Shoalhaven River coastal zone**									
ENV_42a	Terara	Undertake necessary detailed designs for establishment of a wetland at Terara (site UWQ_03 from Stage 2 Study)	SCC		1, 2	$75,000	$0	$0	$75,000	$0	**$75,000**
ENV_42b	Shoalhaven Heads	Undertake necessary detailed designs and construct a trash rack at Shoalhaven Heads (site UWQ_04 from Stage 2 Study)	SCC		1, 2	$65,000	$7,000	$65,000	$28,000	$35,000	**$128,000**
ENV_42c	Bomaderry	Undertake necessary detailed designs and construct a trash rack at Bomaderry (site UWQ_05 from Stage 2 Study)	SCC		1, 2	$65,000	$19,000	$0	$84,000	$95,000	**$179,000**
ENV_43	Whole Study Area	Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River	SCC	DCCEEW	1, 2	$50,000	$30,000	$80,000	$120,000	$150,000	**$350,000**
ENV_44	Whole Study Area	Continue septic system performance assessments and regulation	SCC		1	CST	CST	CST	CST	CST	CST
ENV_51	Whole Study Area	Develop and implement water quality controls into future development	SCC		1	CST	CST	CST	CST	CST	CST
ENV_58	Whole Study Area	Support multi-stakeholder projects to implement actions in priority subcatchments identified in the Shoalhaven River Floodplain Prioritisation Study (WRL 2023) and NSW Blue Carbon Strategy	SCC	DCCEEW TOs NPWS DPIRD Fisheries DPIRD Agriculture LLS Private Landowners	1	$50,000		$50,000			**$50,000**
ENV_62	Whole Study Area	Develop and deliver an estuary management and ecosystem education/communications program	SCC	DCCEEW TOs DPIRD Fisheries DPIRD Agriculture LLS TfNSW	1, 2, 3	$50,000	$5,000	$55,000	$20,000	$25,000	**$100,000**
ENV_63	Whole Study Area	Investigate opportunities and support implementation of oyster reef restoration activities within the estuary	SCC	DPIRD Fisheries	1, 3	CST	CST	CST	CST	CST	CST
REC_03	Whole Study Area	Keep foreshore recreational areas cleared from post-flood debris and maintained for tourism purposes, including Shoalhaven Heads, Greenwell Point, and Orient Point.	SCC	DPIRD Fisheries	1	$0	$10,000	$10,000	$40,000	$50,000	**$100,000**
REC_04	Whole Study Area	Improve public foreshore access to include all-ability access	SCC		1, 2, 7, 12	$550,000	$50,000	$550,000	$200,000	$250,000	**$1,000,000**
							Subtotal	$3,111,500	$13,326,550	$8,010,025	**$24,448,075**

6 Coastal Zone Emergency Action Subplan, if the *Coastal Management Act 2016* Requires that Subplan to be Prepared

Clause 15(1)(e) of the CM Act requires that a Coastal Zone Emergency Action Subplan (CZEAS) be included in the CMP if Council's LGA contains land within the CVA and beach erosion, coastal inundation or cliff instability is occurring on that land due to storm activity or an extreme or irregular event.

Although there is no CVA prepared for the study area, the Lower Shoalhaven River coastal zone is subject to coastal inundation. As such, a CZEAS has been prepared to guide emergency response arrangement to coastal inundation, in accordance with the mandatory requirements specified in the CM Act and accompanying NSW Coastal Management Manual (OEH, 2018b).

The Lower Shoalhaven River CZEAS is contained in **Appendix E**.

Numbaa Island experiencing inundation, August 2020. (Photo – South Coast Register)

7 Monitoring, Evaluation and Reporting Program

7.1 Overview of the Monitoring, Evaluation and Reporting Process

Monitoring, evaluation, and reporting (MER) is a crucial and mandatory part of any CMP under the CM Act. Its purpose is to track progress in implementing coastal management actions and assess how well the CMP achieves its goals and aligns with the Act's objectives.

The MER process should be tailored to focus on the essential information needed to evaluate the status and outcomes of these actions. As outlined in the CM Manual (OEH, 2018b), MER should consider the short, medium, and long-term outcomes the CMP aims to achieve.

The proposed MER program follows a "Program Logic Model," which links activities to outputs, intermediate impacts, and long-term outcomes. This model ensures a systematic and integrated approach to CMP planning, implementation, and evaluation.

There are three components of the MER program for the Lower Shoalhaven River CMP. These are:

Component 1 – Implementation status of CMP actions. The MER should constantly monitor and evaluate the implementation of the management actions – see **Section 7.2**. It aims to answer the question:

> *"Has the program of management actions been implemented in accordance with the implementation plan?"*

Component 2 – Monitor relevant environmental parameters. One of the main goals of the CMP is to improve the environmental and social values of the coastline. Therefore, the MER should also include a component that monitors key environmental parameters – see **Section 7.3**. It aims to answer the question:

> "*Has the implementation of individual management actions, and the integrated CMP more generally, resulted in an improvement in the health of the coastal environment and the social / cultural values of the study area?*".

Component 3 – Performance of the CMP in terms of meeting the objects of the CM Act. This includes a holistic review of the CMP and its performance against its long-term objectives – see **Section 7.4**. It aims to answer the questions – based on the outcomes of Components 1 and 2:

> *"Has the CMP more broadly achieved its intended objectives?"*
> *"How has the CMP made a difference?" and*
> *"Has the level of risk associated with the various stressors and hazards facing the coastline been reduced?".*

An overview of the MER program is provided in **Figure 7-1**. Implementation of the MER program is specifically listed as Action ENV_31 in the CMP

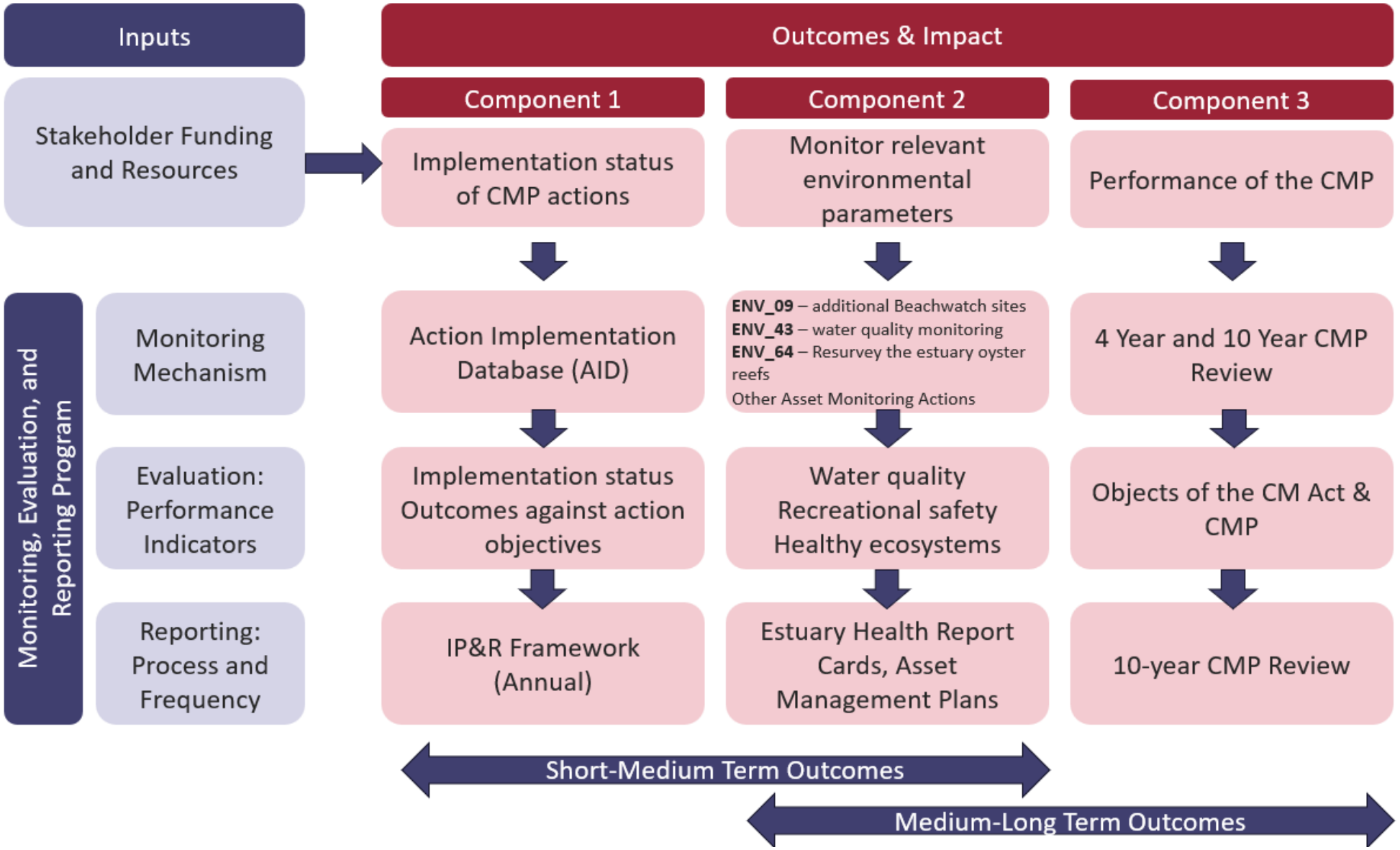

Figure 7-1 **Overview of the Monitoring, Evaluation and Reporting Program for the CMP**

7.2 Component 1 – Implementation Status of CMP Actions

In the first instance, Council will need to monitor the implementation status of the various CMP actions – including which actions have been implemented, the progress of actions, barriers and issues, allocated funding and resources, and timeline of implementation.

It is recommended that an Action Implementation Database (AID) be maintained to monitor the status of the various CMP actions and support the CMP requirements. The fields include information relating to the practical implementation of the works, and the overall status of the action. For each action, a monitoring designation should be provided regarding the current status of that action using one of 5 categories:

- **Completed** – Where discrete (one-off) actions items have been completed and no further actions are required;
- **Implemented and Ongoing** – Where actions have an ongoing component and are currently being implemented;
- **In progress/Incomplete** – This includes actions that are in progress or not yet finalised;
- **Not Yet Commenced/Outstanding** – Where outstanding actions have not yet commenced - but have been marked for future implementation; and
- **No Longer Applicable** – Where actions are no longer applicable due to changed circumstances or superseding actions from other management plans.

Dates of commencement and practical completion should also be monitored and recorded, in addition to other pertinent information, such as supporting documentation.

Each action itemised in this CMP has been assigned a corresponding performance indicator(s) in **Table 3-7** and **Table 3-8**. Each CMP action should be evaluated for its performance in achieving its objectives, using the established indicator(s). These should be recorded in the AID.

The IP&R reporting system (including annual operational reporting and longer interval strategic reporting) provides the opportunity to formally report on monitoring of coastal management and its outcomes. Council delivers an Annual Report to document its progress in implementing its 4 Year Delivery Program and Annual Operational Plan activities over each financial year. This provides for a yearly evaluation of the implementation status of each action in the CMP.

Where actions have not been included in the IP&R Framework, a yearly evaluation of those CMP actions by the officer(s) responsible for facilitating implementation of the CMP is recommended. This may be undertaken through the annual review of the Business Plan, or as a separate process.

7.3 Component 2 – Relevant Environmental Parameters

A key component of the MER process will be to use physical datasets that provide insight into key environmental parameters and track the progress of the CMP in achieving its intended outcomes.

Monitoring of environmental parameters is also critical to informing when triggers and thresholds for action have been reached.

While monitoring environmental indicators is essential to assess the health and condition of the estuary, it may not always reliably indicate the short-term success of individual management actions. This is because the physical and ecological processes within the estuary occur over varying timeframes. In the short term, processes such as inundation from catchment flooding or coastal inundation events and

localised bank erosion can influence the estuary's dynamics. Over the medium term, sediment transport, vegetation changes along the riverbanks, and shifts in water quality due to nutrient inputs can become more apparent. Over the long term, broader ecological responses, such as habitat shifts, changes in species composition, and the impacts of climate change (e.g., sea level rise and altered catchment hydrology), can significantly affect the estuarine environment.

Ecological responses, in particular, can take time to manifest and may depend on cumulative effects from a variety of stressors. For example, changes in water salinity, nutrient levels, and temperature can lead to gradual shifts in estuarine ecosystems, such as the spread of invasive species, loss of native vegetation, or changes in fish and bird populations. These changes may be subtle and take years or decades to fully develop, making it difficult to link them directly to short-term management actions. Furthermore, ecological systems are inherently complex, with feedback loops and interactions between species and their physical environment that add further layers of complexity when assessing the effectiveness of CMP actions.

Because of these factors, environmental and ecological indicators often exhibit variability across short, medium, and long-term cycles that can span from days to decades. The drivers behind this variability may not always be immediately understood or easily detected in short-term datasets. Consequently, attributing specific ecological responses or changes in environmental indicators to individual CMP management actions can be challenging and requires a long-term, integrated monitoring approach.

Nonetheless, monitoring key ecological indicators over time is crucial for assessing the estuary's overall health and the success of the CMP. Long-term data provides the clearest picture of trends and changes in the ecosystem. In the short to medium term, expert technical judgement and an understanding of the estuary's physical and ecological processes are necessary to evaluate outcomes and adjust management actions as needed.

With this in mind, a practical approach to monitoring and evaluation is proposed for the CMP. Several actions in the CMP will generate data that informs the MER process. The primary CMP actions associated with collecting environmental parameters for MER purposes are:

- ***ENV_09*** *– Inclusion of additional Beachwatch sites.* This will assist in understanding if water quality triggers are breached associated with recreation to inform Beachwatch forecasts and star ratings reported to the public.
- **ENV_*43*** *– Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River.* This will assist in understanding if water quality triggers are breached associated with ecological health and recreational use of the estuary.
- **ENV_64** *– Resurvey the estuary in 10 years' time to determine the location, condition, extent and vulnerability of oyster reefs in the estuary.* This will inform the need for action, to be included in the CMP revision. ENV_64 is a deferred management action, see **Appendix F** for more details.

There are also a number of monitoring programs external to the CMP process that can provide physical datasets to support the MER and inform triggers and thresholds associated with CMP actions, including:

- NSW Government Estuary Water Quality and Ecosystem Health Monitoring, Evaluation and Reporting (MER) Program
- Entrance status and berm/ dry notch monitoring

- Various water level, rainfall, and other coastal process data (e.g., MHL and BOM gauges). Of particular note is flood warnings and water levels associated with flooding to trigger entrance opening in accordance with the Entrance Management Policy.

A summary of these environmental parameters may also be reported as part of Council's annual reporting requirements.

The environmental parameters monitored as part of the CMP will also be used as trigger points/thresholds for actions to be initiated. Some relevant examples include:

- monitoring of estuary water levels and entrance berm levels to initiate entrance management actions including dry notch maintenance, mechanical berm lowering, and mechanical opening by excavation of a pilot channel (refer to Council's Entrance Management Policy, noting this is currently being reviewed and updated); and,
- monitoring of estuary and ocean water levels, wave conditions, and Bureau of Meteorology severe weather warnings to initiate the various phases of emergency management (i.e. preparation, response, and recovery phases) within the Lower Shoalhaven River Coastal Zone Emergency Action Subplan (refer **Appendix E**).

The CMP includes actions to monitor the condition and vulnerability of coastal assets, ensuring that infrastructure and natural features are assessed for risks like inundation, riverbank erosion, and sea level rise. This monitoring supports adaptive management and enhances the resilience of these assets over time. These actions are:

- **BE_17** – *Monitor and maintain the existing foreshore protection structures at Greenwell Point.* This action involves identifying thresholds and triggers associated with the need for remedial and replacement work
- **BOAT_38** – *Develop and implement a comprehensive boat ramp facility upgrade and asset management program.* This action involves monitoring to inform triggers for boat ramp maintenance, cleaning of assets (including debris removal), navigation dredging, facility and amenity upgrades, and security measures
- **CTF_08** – *Prepare a climate change adaptation strategy for Greenwell Point.* This action mentions the establishment of inundation thresholds to trigger adaptation actions that are to be determined when preparing the strategy.
- **ECON_08** – *Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure*. This action may trigger the need for upgrade or replacement of coastal assets and infrastructure
- **ECON_13** – *Monitor existing breakwall infrastructure at Crookhaven Heads.* This action may trigger maintenance works.
- **ENV_39 -** *Implement environment protection works to enhance ecological communities in coastal reserves within the CMP Study Area.* This action includes support to establish a monitoring and evaluation framework to assess the effectiveness of vegetation restoration and control measures.

7.4 Component 3 - Performance of the CMP for Meeting the Objects of the CM Act

Generally speaking, the CMP should be viewed as a 'living document' that is reviewed and updated over time. Whilst a review of the performance of the actions within the CMP occur on an annual basis (as per Council's IP&R framework), a key component of the MER process is to undertake a strategic review and stocktake of the CMP at designated timeframes to assess its overall performance.

The CM Act (Section 18(1)) and CM Manual requires Council to ensure that the CMP is reviewed at least once every 10 years. However, it should be noted that it may be reviewed and/or updated sooner for any reason, including if there are significant new circumstances which need to be considered.

The review of the CMP should be undertaken through a formalised process and represents a significant opportunity to assess the overall performance of the CMP in meeting its objectives. At a broad level, the review should consider, as a minimum:

- The extent to which the CMP has achieved its objectives.
- The extent to which the CMP has achieved the objectives of the CM Act.
- The performance of the CMP as an instrument for improving coastal management.

Review of Key Issues

The primary mechanism for gauging whether the CMP has been successful should be the re-evaluation of the threats and risks across the study area through a repeat of the Stage 2 Risk Assessment (Rhelm, 2023b). Controls that assist with managing the threats should be included when assessing the level of risk, particularly those actions that have or are being implemented through the CMP. There are three specific questions to be answered:

- Has the level of risk changed?
- Have the very high or high threats been adequately managed?
- Are there any new or emerging threats that need to be captured?

During this process, particular focus should be given to evolving or emerging risks – including those associated with climate change. These emerging and evolving risks include the impacts of sea level rise on inundation risk, and habitat squeeze and migration.

Assess CMP Performance

Aligning with the IP&R framework, there will be 4-yearly reporting on CMP performance. This will include a formal review of the implemented management strategies. The assessment should include:

- Review of the status of CMP actions, including the extent to which actions proposed to be fully implemented within the 10-year period have been completed, as well as any ongoing actions and commitments beyond this timeframe.
- Identification of successes, highlights, limitations, and barriers to the effective implementation of the CMP, with consideration of any new scientific knowledge or data from monitoring programs.
- Status update on the implementation of management actions, including actual sources of funding used, which may differ from those originally proposed.
- Overview of long-term monitoring activities and key findings or outcomes from the reporting period.
- Consideration of any key events, performance issues, or challenges during the reporting period that have implications for CMP actions or MER activities.

- Review of any updates or amendments to the CMP during the reporting period, or any proposed changes for the upcoming period.
- Exploration of potential avenues to increase the effectiveness of the CMP based on performance and findings.

If the need arises, new actions or items can also be added to the CMP as part of the review process. Any such changes to the CMP would need to be endorsed by stakeholders and relevant government agencies, as well as the communities. The CMP would then need to be re-exhibited and re-certified by the Minister.

The reporting of management action monitoring and evaluation would be facilitated by the implementation of Action ECON_04 – Establish a CMP Governance Framework, Action ENV_31 – Enact the CMPs Monitoring, Evaluation and Reporting (MER) Program to track progress and report on outcomes, and Action CS_12 – Develop and execute a communications plan for Stage 5 of the CMP. Documentation of the effectiveness of the proposed strategies and actions will be reported as part of Council's Annual Report (which is part of the IP&R framework), including progress towards or full achievement of the performance targets included for each action. The status of CMP actions would also be communicated to relevant Council committees and on Council's website.

CMP Review

As per the requirements of the Coastal Management Guidelines, the CMP should be reviewed to ensure its objectives are being achieved and are resulting in the desired outcomes. A 10-year review (or earlier if warranted by legislative or management changes or improved scientific understanding) of the CMP is required to consider:

- Outcomes of the Annual and 4-yearly Reporting,
- Holistic review of status of CMP actions including overall success and any barriers to effective implementation,
- Any new or updated scientific knowledge,
- Data provided by MER actions in this CMP,
- Prevailing community attitudes, government policy and strategic planning status.

Additionally, action ECON_06 explicitly provides for the review of Council's coastal management and planning policies for the 10 year CMP implementation lifecycle. This should include consideration of the latest environmental data, observed coastal hazard impacts, and state government policies.

The 10-year review will ensure that the CMP remains relevant and effective in addressing the dynamic challenges of coastal management. By revisiting the identified risks and incorporating new data and scientific knowledge, the CMP can be adapted to better respond to evolving threats, ensuring sustainable outcomes for the coastal environment and community.

8 Maps

8.1 Overview of Mapping

Maps provided in this CMP include:

- Study area
- Mapping of CMAs, excluding the CVA;
- Coastal sediment compartments;
- Coastal hazard mapping; and
- Mapping of location-specific management actions from this CMP.

The following sections provide information on each of the above maps, which are included in **Appendix A** to this CMP.

8.2 Study Area

The study area for the Lower Shoalhaven River CMP is provided in **Appendix A Map RG-01-01.**

8.3 Coastal Management Areas

As discussed in **Section 1.3.2**, there are four CMAs defined under the CM Act and mapped in the RH SEPP. These include the:

- **Coastal Wetlands and Littoral Rainforests Area (CWLRA)** – The extent of Coastal Wetlands and Littoral Rainforests areas within the study area are shown in **Appendix A Map RG-01-02**;
- **Coastal Vulnerability Area (CVA)** – There is presently no mapping of a CVA for the study area. Land vulnerable to coastal hazards is discussed below in **Section 8.5**;
- **Coastal Environment Area (CEA)** – The extent of the CEA within the study area is mapped in **Map RG-01-03**; and
- **Coastal Use Area (CUA)** – The extent of the CUA within the study area is mapped in **Appendix A Map RG-01-04**.

This CMP proposes adoption of a CVA for the study area (refer **Sections 4 and 8.5**).

8.4 Coastal Sediment Compartments

As discussed in **Section 1.3.3**, the Lower Shoalhaven River CMP study area is entirely contained within the Shoalhaven River secondary sediment compartment which extends from Black Head (Gerroa) to Beecroft Head (refer **Appendix A Map RG-01-05**); this is within the Illawarra Primary Compartment.

8.5 Mapping of the CVA / Land Subject to Coastal Hazards

Under Action CTF_13, Shoalhaven City Council proposes to prepare a planning proposal to adopt a Coastal Vulnerability Area (CVA) for the Shoalhaven LGA under the RH SEPP (refer to **Section 4**). This proposal will incorporate coastal hazard mapping as identified in this CMP and related studies. The mapping will cover a combination of hazards, including coastal and tidal inundation as outlined in the CM Act.

Mapping of tidal and coastal inundation hazards has already been completed as part of Stage 2 of the CMP (Stantec, 2023) and is provided in **Appendix A Maps RG-01-06** and **RG-01-07**. Mapping of additional hazards is provided in **Appendix A Map RG-01-08** (Bank erosion in Berry's Canal) and **RG-01-09** (Bank erosion across the study area).

8.6 Site-specific Management Actions

Some CMP actions are applicable to the whole study area, for example policy and planning changes, others are relevant to specific location, such as bank management works. Maps highlighting the locations of site-specific management actions can be found in **Appendix A** in the map series **RG-01-10 (A-G)**.

Key location overviews comprising of maps and descriptions of the suite of actions that apply to certain areas can be found in **Appendix D**. These key location overviews illustrate how multiple actions work together to address key management issues in an integrated fashion.

Detailed descriptions are provided for several complex actions to provide guidance on their funding and implementation. These detailed descriptions are provided in **Appendix C.**

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Glossary and Abbreviations

Where possible, definitions for terms have been sourced from the Coastal Management Glossary (OEH, 2018a).

Abbreviation / Term	Description
Active intervention	A strategic approach to coastal management that includes coastal management actions that seek to protect assets or accommodate change in any of the coastal management areas, while maintaining current systems and values.
Adaptation	Adjustment in natural or human systems in response to actual or expected climate change or its effect, to moderate harm or to take advantage of beneficial opportunities.
ASS	Acid sulfate soil
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Alert	A strategic approach to coastal management that includes coastal management actions that seek to 'watch and wait' such as monitoring change and setting thresholds, low regret responses and research to improve knowledge.
Average Recurrence Interval (ARI)	The average time between which a threshold is reached or exceeded (e.g. large wave height or high water level) of a given magnitude. Also known as Return Period.
Avoid future impact	A strategic approach to coastal management that includes recommending proactive land use planning and encouraging new development only in locations of low risk.
Bank erosion	Refers to the landward movement of the foreshore or riverbank associated with flood waters, locally generated wind waves, waves generated by watercraft, and influenced by factors such as tide levels and precipitation. Other contributing factors to bank erosion can include unrestricted access, upstream changes in hydrology, and vegetation condition.
Bank restoration	The process of stabilising an estuarine foreshore or riverbank utilising a variety of methods including revegetation, bank reprofiling, and stabilisation using engineered structures.
Beach erosion	A coastal hazard defined in the CM Act. Refers to landward movement of the shoreline and/or a reduction in beach volume, usually associated with storm events or a series of events, which occurs within the beach fluctuation zone. Beach erosion occurs due to one or more process drivers; wind, waves, tides, currents, ocean water level, and downslope movement of material due to gravity.
Beach nourishment	Beach restoration or augmentation using clean dredged or fill sand. Dredged sand is usually hydraulically pumped and placed directly onto an eroded beach or placed in the littoral transport system. When the sand is dredged in combination with constructing, improving, or maintaining a navigation project, beach nourishment is a form of beneficial use of dredged material.
CEA	Coastal Environment Area

Abbreviation / Term	Description
CM Act	NSW *Coastal Management Act 2016*
Coastal hazard	Defined in the CM Act to mean the following: • beach erosion • shoreline recession • coastal lake or watercourse entrance instability • coastal inundation • coastal cliff or slope instability • tidal inundation • erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.
Coastal lake or watercourse entrance instability	A coastal hazard defined in the CM Act. Refers to the variety of potential hazards and risks associated with the dynamic nature of both natural and trained entrances. Coastal lake and watercourse entrances are highly active environments with their shape constantly changing in response to processes such as alongshore sediment transport, tidal flows, storms and catchment flooding.
Coastal inundation	A coastal hazard defined in the CM Act. Flooding of low lying areas by ocean waters, caused by a higher than normal sea level (e.g. due to storm tide).
Coastal Management Area (or CMA)	Any one of four areas that make up the coastal zone as defined in the CM Act. These are the coastal wetlands and littoral rainforests area, coastal vulnerability area, coastal environment area, and the coastal use area.
Coastal Management Program (CMP)	A long-term strategy for the coordinated management of land within the coastal zone, prepared and adopted under Part 3 of the CM Act.
Coastal processes	Coastal processes are the set of mechanisms that operate at the land-water interface. These processes incorporate sediment transport and are governed by factors such as tide, wave and wind energy.
Coastal threat	A process or activity that is putting pressure on or impacting on the health or function of a coastal ecosystem, or on the amenity and social or cultural value of the coastal landscape.
Coastal Zone	The coastal zone, as defined by the CM Act, means the area of land comprised of the following coastal management areas: a) the coastal wetlands and littoral rainforests area, b) the coastal vulnerability area, c) the coastal environment area, d) the coastal use area.
Council	Shoalhaven City Council (SCC)
CUA	Coastal Use Area
CVA	Coastal Vulnerability Area
CWLRA	Coastal Wetlands and Littoral Rainforests Area
CZEAS	Coastal Zone Emergency Action Subplan

Abbreviation / Term	Description
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
Development	As defined in the *Environmental Planning and Assessment Act 1979*. New development refers to development of a completely different nature to that associated with the former land use, e.g. the urban subdivision of an area previously used for rural purposes. New developments involve re-zoning and typically require major extensions of existing urban services, such as roads, water supply, sewerage and electric power. Infill development refers to the development of vacant blocks of land that are generally surrounded by already developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development. Redevelopment refers to rebuilding in an area, e.g., as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either re-zoning or major extensions to urban services.
DPIRD	NSW Department of Primary Industries and Regional Development. Relevant agencies include Local Land Services (LLS), Agriculture and Biosecurity, and Fisheries and Forestry.
Emergency response	A strategic approach to coastal management that includes coastal management actions to address residual risk in emergency situations.
Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters	A coastal hazard defined in the CM Act. See bank erosion
Estuary	CM Act defines as any part of a river, lake, lagoon, or coastal creek whose level is periodically or intermittently affected by coastal tides, up to the highest astronomical tide.
Foreshore	The part of the shore, lying between the crest of the seaward berm (or upper limit of wave wash at high tide) and the ordinary low water mark, that is ordinarily traversed by the uprush and backrush of the waves as the tides rise and fall; or the beach face, the portion of the shore extending from the low water line up to the limit of wave uprush at high tide. The CM Act defines the foreshore as 'the area of land between highest astronomical tide and the lowest astronomical tide'.
Hazard	A process, or activity that affects an asset or value. See also 'coastal hazards' which are the specific hazards defined in the CM Act.

Abbreviation / Term	Description
Large Woody Debris	Often referred to as 'snags', comprises whole trees, limbs, branches or logs located either exposed, submerged, or semi-submerged in a waterway. In the context of bank erosion treatment, large woody debris is deliberately placed into or on the bank of a waterway to stabilise and/or protect a bank from erosion.
LALC	Local Aboriginal Land Council
LGA	Local Government Area
m	Metres
The CM Manual	The NSW Coastal Management Manual (OEH, 2018b).
MEMS	Marine Estate Management Strategy
Multi-criteria analysis (MCA)	A logical and structured decision-making tool for complex problems involving multiple factors or criteria, where a consensus is difficult to achieve. It may involve processes such as ranking, rating (with relative or ordinal scales) or pairwise comparisons. The process allows participants to consider, discuss and test complex trade-offs among alternatives.
NPWS	NSW National Parks & Wildlife Service
NSW IP&R Framework	The NSW Local Government Integrated Planning & Reporting Framework
OCJB CMP	Shoalhaven Open Coast and Jervis Bay Coastal Management Program
OEH	NSW Office of Environment and Heritage (renamed to DCCEEW)
Planning for change	A strategic approach to coastal management that includes coastal management actions that seek to facilitate habitat migration and transformative changes to natural systems. For built areas, this includes planning to relocate or redevelop assets to consider the dynamic and ambulatory nature of the shoreline. It may be timed to commence as opportunities arise or when thresholds of exposure, impact and risk are exceeded.
Plan of Management (POM)	A Plan of Management (PoM) is a strategic document required for public land classified as community land under the *Local Government Act 1993*. This document outlines how the land will be used and managed, setting objectives and performance targets for its management. POMs are also developed under the *Crown Land Management Act 2016* and serve to guide the sustainable management of Crown land.
Resilience	The ability of a system (human or natural) to adapt to changing conditions (including hazards or threats, variability and extremes), and rapidly recover from disruption due to emergencies. Resilient systems or communities have the capacity to 'bounce back' after a disrupting event such as a major storm or an extended heat wave, to moderate potential damages, take advantage of opportunities, maintain or restore function or to cope with the consequences.

Abbreviation / Term	Description
Revetment	A type of coastal protection work which protects assets from coastal erosion by armouring the shore with erosion–resistant material. Large rocks/boulders, concrete or other hard materials are used, depending on the specific design requirements.
Riparian	Pertaining to the banks of a body of water, such as an estuary.
SCC	Shoalhaven City Council
SEPP	State Environmental Planning Policy
Shoreline recession	A coastal hazard defined in the CM Act. Refers to continuing landward movement of the shoreline, that is, a net landward movement of the shoreline, generally assessed over a period of several years. As shoreline recession occurs the beach fluctuation zone is translated landward.
Sea level rise (SLR)	A rise in the level of the sea surface that has occurred or is projected to occur in the future, as measured from a point in time. The rise can be reported as a global mean or as measured at a specific point or estimated for a specific part of the sea or ocean.
Storm surge	The increase in coastal water level caused by the effects of storms. Storm surge consists of two components – the increase in water level caused by the reduction in barometric pressure and the increase in water level caused by the action of wind blowing over the sea surface (wind set-up).
Storm tide	An abnormally high water level that occurs when a storm surge combines with a high astronomical tide. The storm tide must be accurately predicted to determine the extent of coastal inundation.
Threats	In the coastal management context, a threat is a process or activity which puts pressure on one or more coastal assets or values. Threats may include land uses (e.g. urban, recreation), land management, climate change, industrial discharges, stormwater runoff, overfishing, invasive species as well as the pressures from coastal hazards.
Threshold	Can be identified for aspects of coastal systems, to highlight tipping points for irreversible change. An ecological threshold is the point at which there is an abrupt change in the structure, quality, or functioning of an ecosystem or where external changes produce large and persistent responses in an ecosystem. A species threshold may disrupt aspects of the species population, productivity, reproduction, or habitat in response to a stressor. Such 'tipping points' can lead to unwanted changes in ecosystems and may slow the recovery of ecosystems or limit their ability to achieve more resilient states following a disturbance. Similarly, a social or economic threshold of change in a coastal community indicates the point at which the structure, function, social connectedness, equality or economic activity of the community changes beyond recovery. Thresholds can also be defined for coastal water levels as they relate to the resilience of certain types of development.

Abbreviation / Term	Description
Tidal inundation	A coastal hazard defined in the CM Act. The inundation of land by tidal action under average meteorological conditions and the incursion of sea water onto low lying land that is not normally inundated, during a high sea level event such as a king tide or due to longer-term sea level rise.
TO	Traditional Owner
Wind waves	Waves resulting from the action of the wind on the surface of the water.

Appendix A

Compendium of Maps

Appendix B

Communications and Engagement Plan and Summary Report

Appendix C

Detailed Action Descriptions

Appendix D

Key Location Overviews

Appendix E

Coastal Zone Emergency Action Sub-plan (CZEAS)

Appendix F

Deferred Actions

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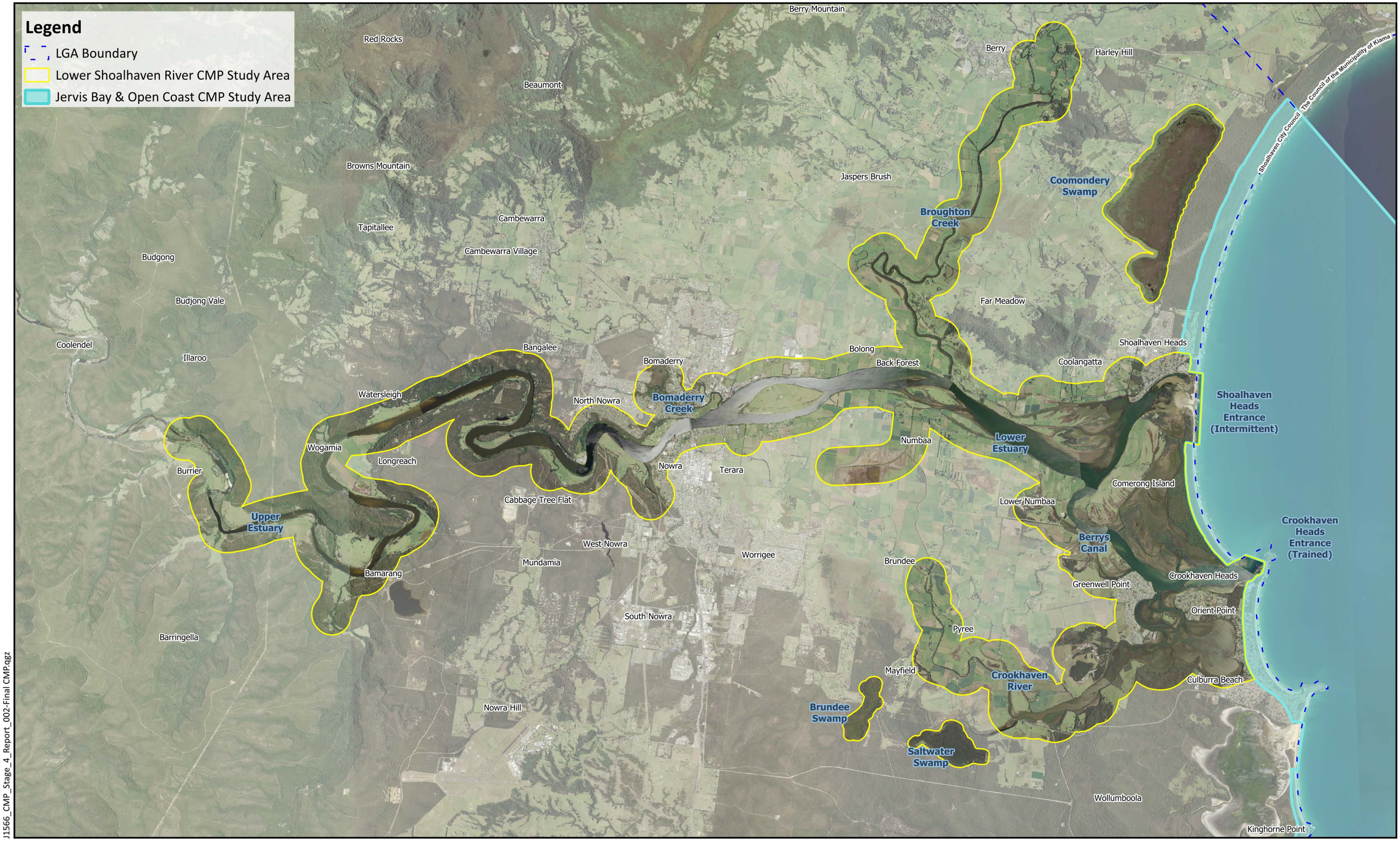
Appendix A

Compendium of Maps



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Revision :	02
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

Lower Shoalhaven River CMP

Study Area

RG-01-01

0 2 4 km

Scale: 1:90000@A3

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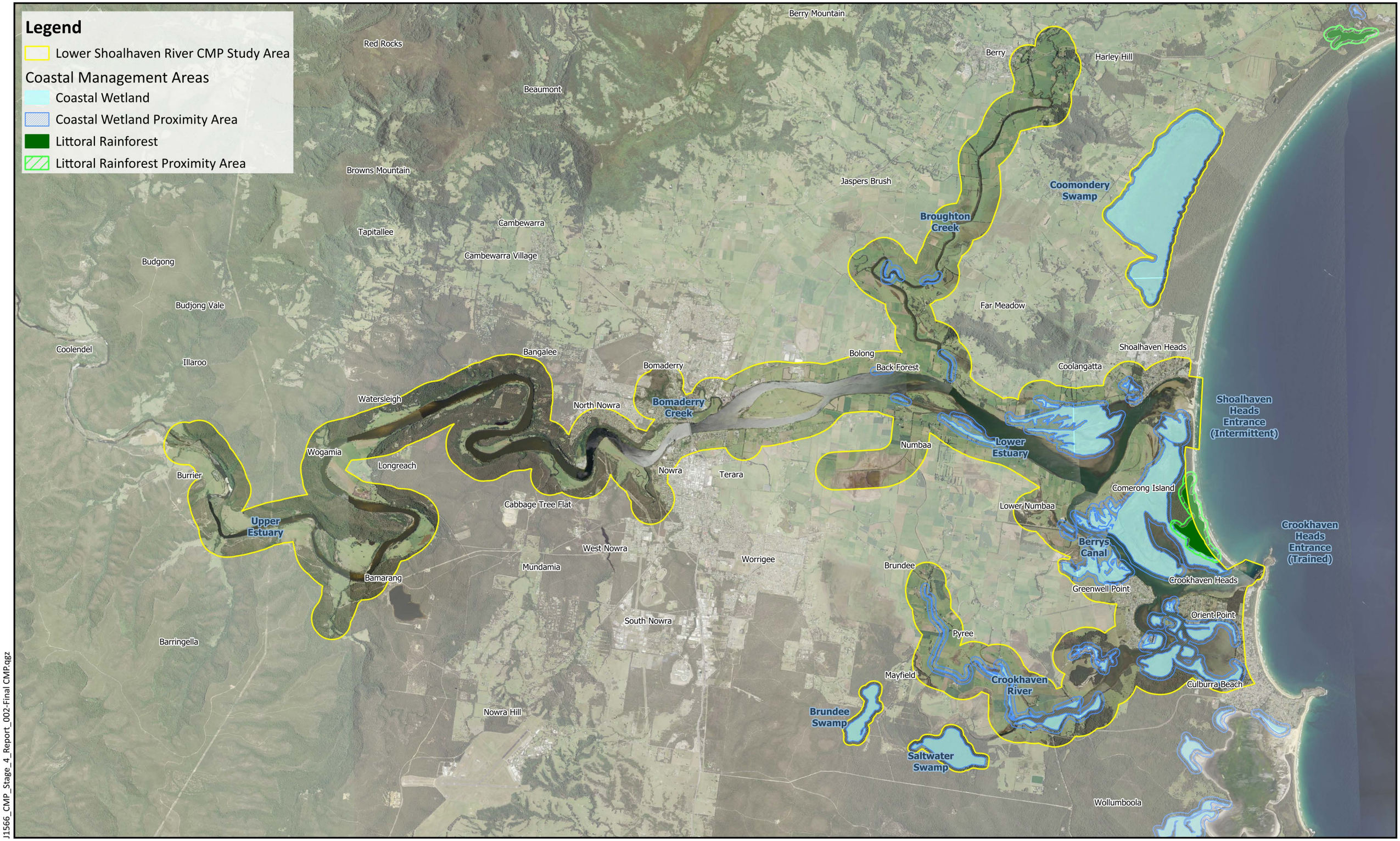

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Date :	12/03/2025
Revision :	02
Created by :	MWR
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Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

Lower Shoalhaven River CMP

Coastal Wetlands and Littoral Rainforest Area

RG-01-02

0 2 4 km

Scale: 1:90000@A3

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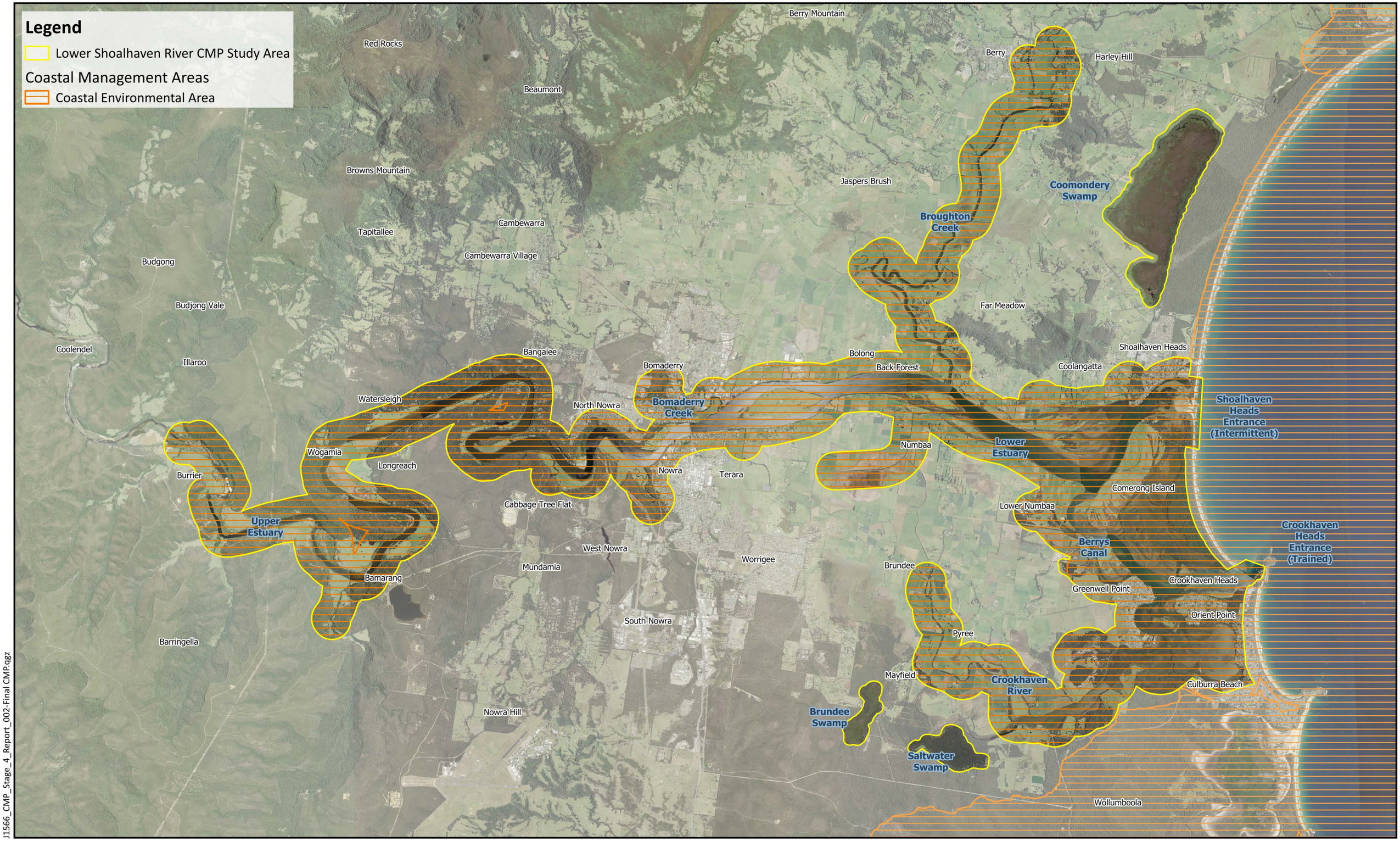

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Coordinate System :	GDA2020 / MGA zone 56
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Lower Shoalhaven River CMP

Coastal Environment Area

RG-01-03

0 2 4 km

Scale: 1:90000@A3

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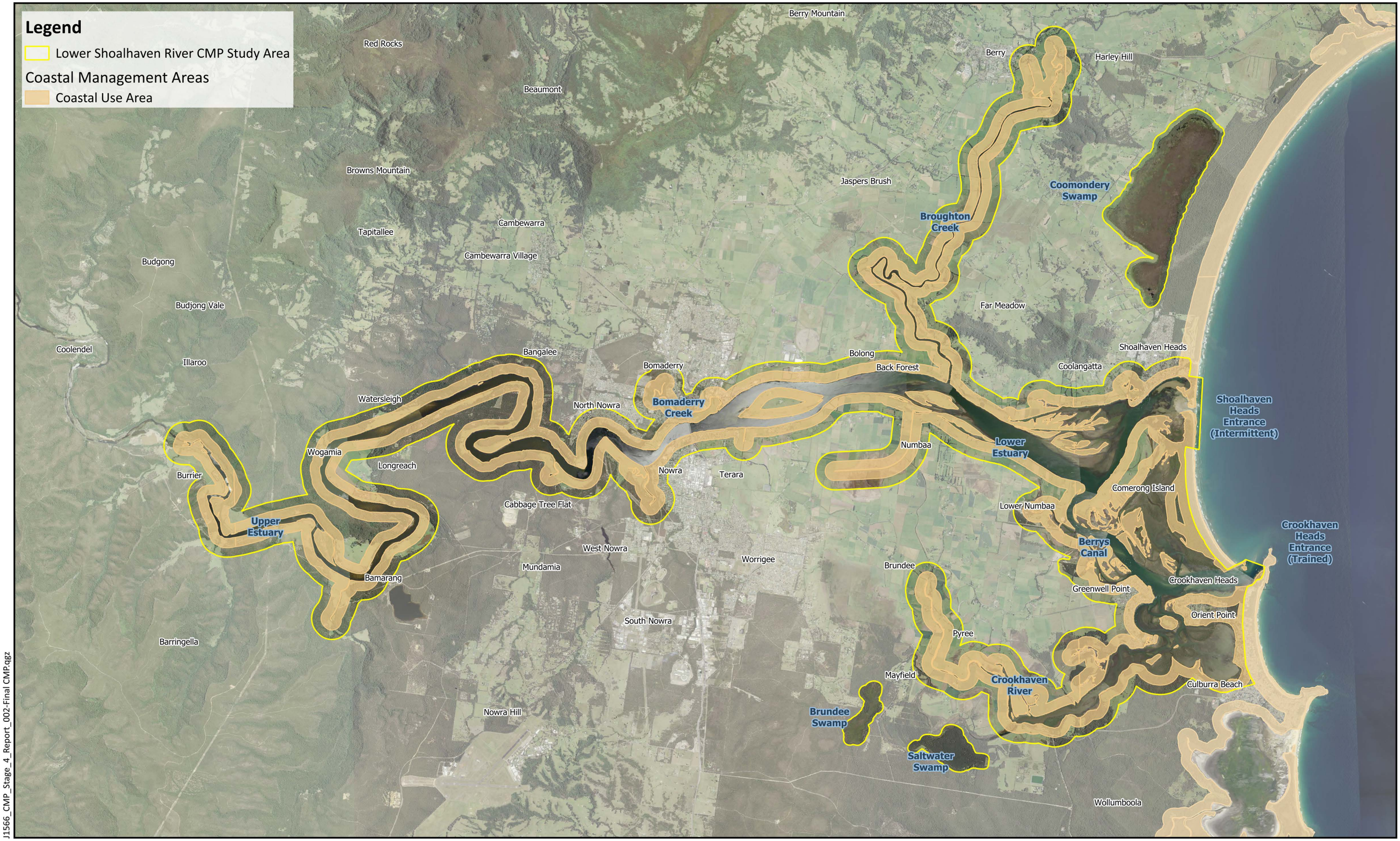

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R h e l m

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Lower Shoalhaven River CMP

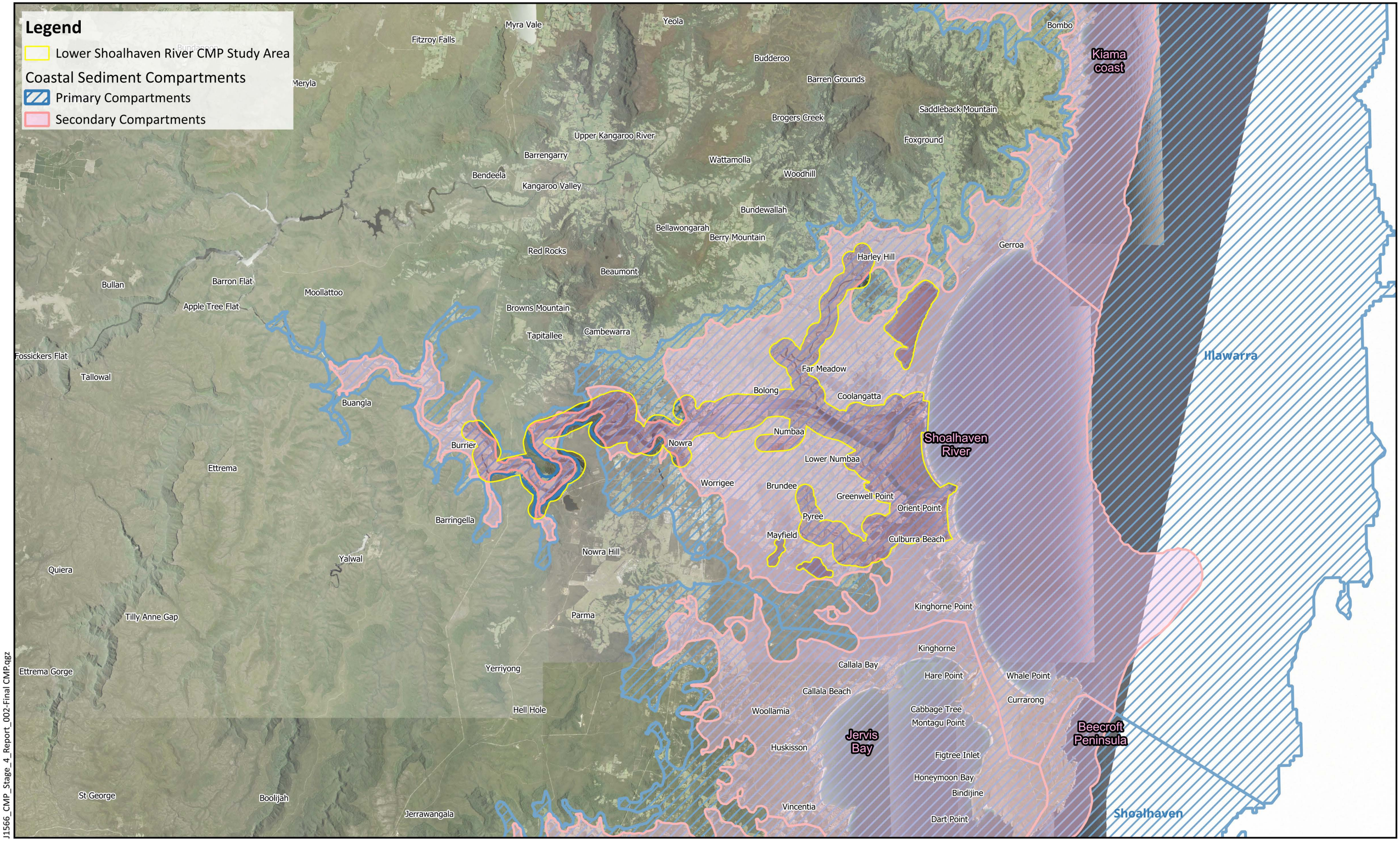
Coastal Use Area

RG-01-04

0 2 4 km

Scale: 1:90000@A3

N



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Lower Shoalhaven River CMP

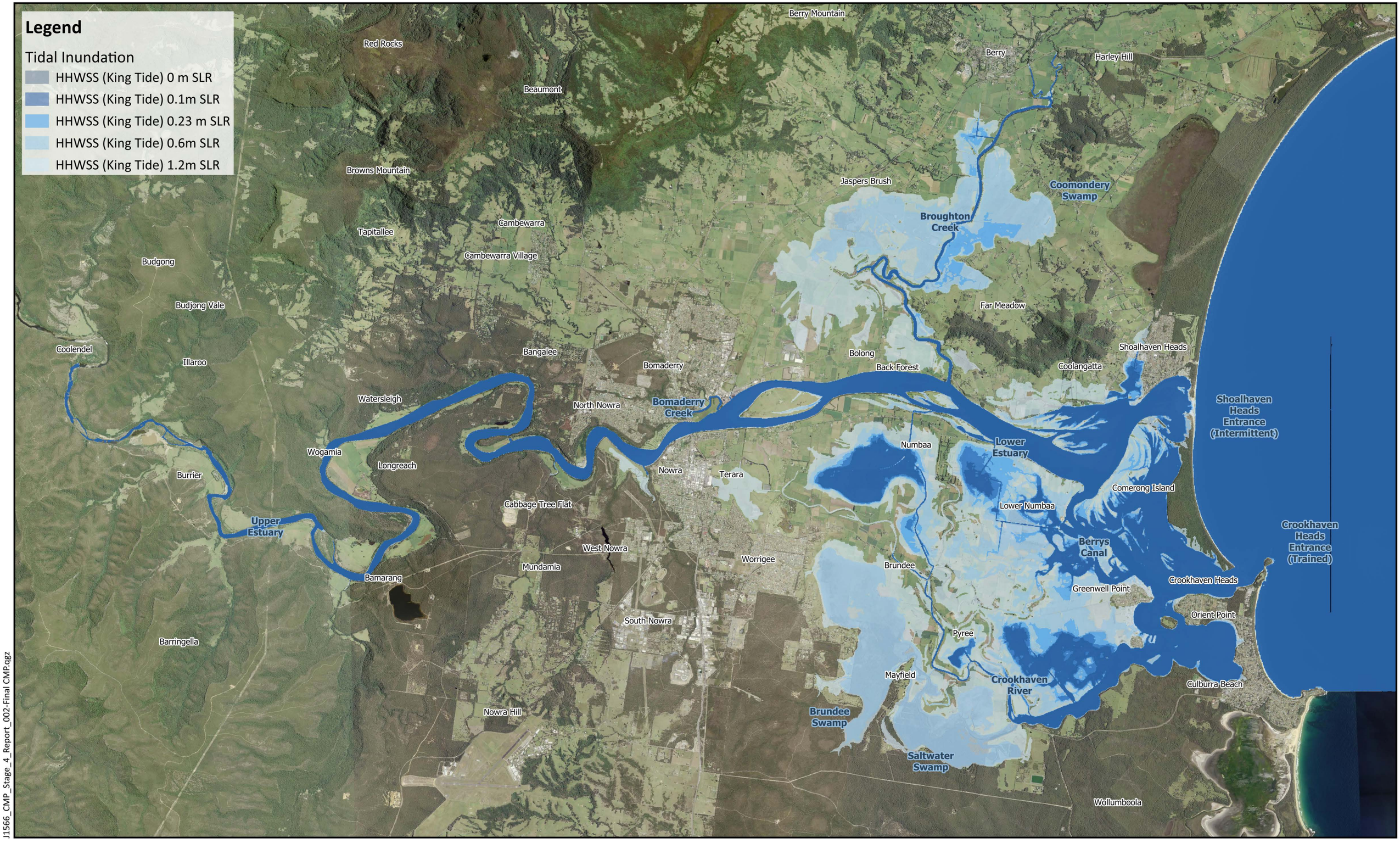
Coastal Sediment Compartments

RG-01-05

0 4 8 km

Scale: 1:200000@A3

N



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Lower Shoalhaven River CMP

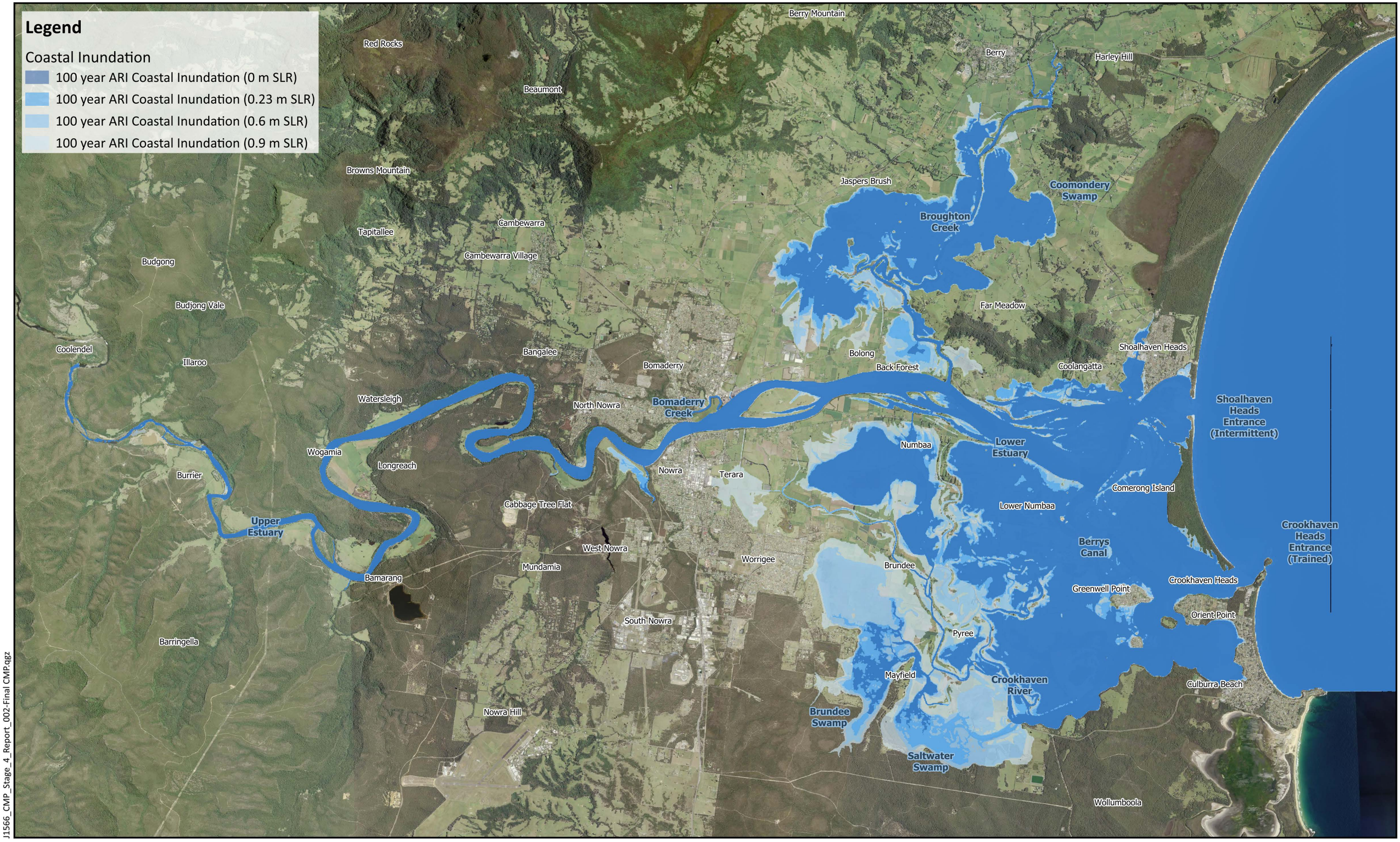
Tidal Inundation with Sea Level Rise

RG-01-06

0 2 4 km

Scale: 1:90000@A3

N



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Lower Shoalhaven River CMP

Coastal Inundation Extents for the 100-year ARI Storm Event

RG-01-07

0 2 4 km

Scale: 1:90000@A3

N

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Imagery Source:	NSW Six Map

Lower Shoalhaven River CMP

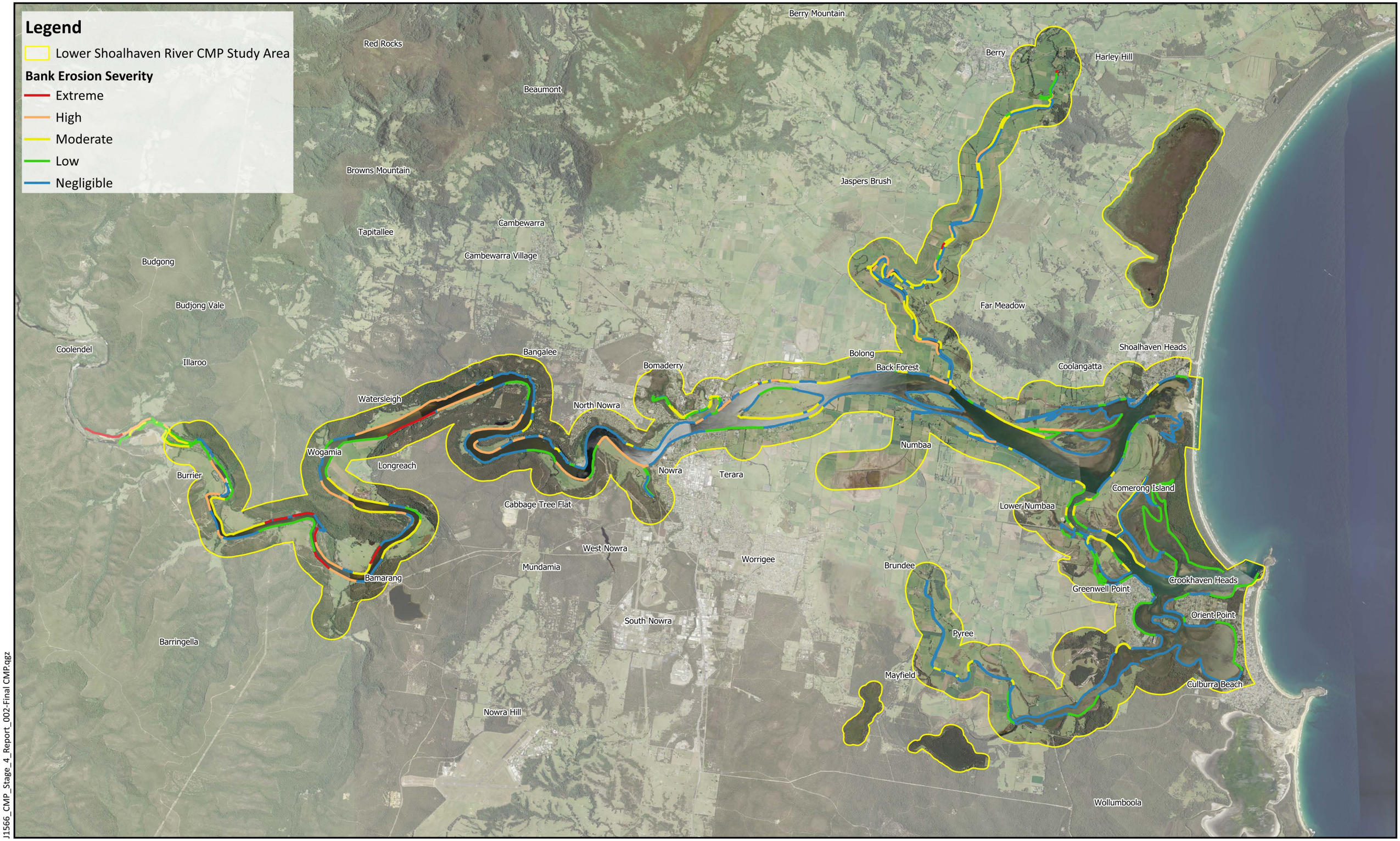
Berry's Canal Projected Shorelines

RG-01-08

0 0.2 0.4 km

Scale: 1:10000@A3

N



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Lower Shoalhaven River CMP

Bank Erosion

RG-01-09

0 2 4 km

Scale: 1:90000@A3

N

Legend

Lower Shoalhaven River CMP Study Area

CMP Actions

- Aboriginal values
- Bank erosion and Berry's Canal adjustment
- Boat ramps and facilities to be considered as part of BOAT_37, BOAT_38 & BOAT_43.
- Coastal Hazards (inundation)
- Environmental values
- Integrated and collaborative management
- Land use planning
- Water Quality

BE_17 - Monitor and maintain the existing foreshore protection structures at Greenwell Point
BE_42 - Develop an adaptation strategy for land loss along Berry's Canal
BE_43 - Environmental bank management, foreshore protection and riparian restoration on high-priority public foreshores
BE_44 - Beach nourishment along the toe of the existing rock revetment at Shoalhaven Heads
BE_45 - Implement a living shoreline solution along the Crookhaven River shoreline adjacent to Crookhaven Heads
BE_46 - Design and implement a living shoreline solution along the foreshore adjacent to the caravan park at Shoalhaven Heads
BOAT_37 - Boat Ramp and Facilities Consolidation and Rationalisation Plan
BOAT_38 - Develop and implement a comprehensive boat ramp facility upgrade and asset management program
BOAT_43 - Management of watercraft storage
CS_16 - Protection of Midden at Crookhaven Heads
CTF_08 - Prepare a climate change adaptation strategy for Greenwell Point
CTF_16a - Review and update floodgate and associated drainage infrastructure asset management plans (AMPs)
CTF_20 - Implement updated Entrance Management Policy and undertake additional review
ECON_13 - Monitor existing breakwall infrastructure at Crookhaven Heads
ENV_09 - Inclusion of additional Beachwatch sites
ENV_19 - Minimise vehicle access to floodplain wetland areas in Nature Reserves
ENV_39 - Implement environment protection works to enhance ecological communities in coastal reserves within the CMP Study Area
ENV_42 - Enhance urban stormwater runoff treatment through infrastructure development and Water Sensitive Urban Design (WSUD) in urban areas of the Lower Shoalhaven River coastal zone
ENV_43 - Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River
REC_04 - Improve public foreshore access to include all-ability access

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R h e l m

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Imagery Source:	NSW Six Map

Lower Shoalhaven River CMP

Site-specific CMP Management Actions

RG-01-10

0 2 4 km

Scale: 1:105000@A3

N

Legend

- Lower Shoalhaven River CMP Study Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area
- Coastal Wetland
- Coastal Wetland Proximity Area

CMP Action Themes
(not all zoomed maps contain actions under all themes)

- Aboriginal values
- Bank erosion and Berry's Canal adjustment
- Coastal Hazards (inundation)
- Environmental values
- Integrated and collaborative management
- Land use planning
- Water Quality
- Boat ramps and facilities to be considered as part of BOAT_37, BOAT_38 & BOAT_43.

ENV_42b - Undertake necessary detailed designs and construct a trash rack at Shoalhaven Heads (site UWQ_04 from Stage 2 Study)

BOAT_43 - Management of Watercraft Storage

REC_04 - Improve public foreshore access to include all-ability access

BE_44 - Beach nourishment along the toe of the existing rock revetment at Shoalhaven Heads (Sand Placement)

CTF_16a - Review and update floodgate asset management plans (AMPs)

BE_43e - Foreshore protection and riparian restoration on high-priority public foreshores

BE_46 - Design and implement a living shoreline solution along the foreshore adjacent to the caravan park at Shoalhaven Heads

BE_44 - Beach nourishment along the toe of the existing rock revetment at Shoalhaven Heads (Sand Source)

ENV_43 - Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River

ENV_09 - Inclusion of additional Beachwatch sites

CTF_20 - Implement updated Entrance Management Policy and undertake additional review

ENV_39 - Implement environment protection works to enhance ecological communities in coastal reserves within the CMP Study Area

0 0.2 0.4 km

Scale: 1:8500@A3

N

J1566_CMP_Stage_4_Report_002-Final CMP.qgz

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Lower Shoalhaven River CMP

CMP Actions - Shoalhaven Heads

RG-01-10A

Legend

- Lower Shoalhaven River CMP Study Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area
- Coastal Wetland
- Coastal Wetland Proximity Area

CMP Action Themes
(not all zoomed maps contain actions under all themes)

- Aboriginal values
- Bank erosion and Berry's Canal adjustment
- Coastal Hazards (inundation)
- Environmental values
- Integrated and collaborative management
- Land use planning
- Water Quality
- Boat ramps and facilities to be considered as part of BOAT_37, BOAT_38 & BOAT_43.

Berry
Harley Hill
Jaspers Brush
Far Meadow
Bolong
Back Forest
Coolangatta
Shoalhaven Heads

CTF_16a - Review and update floodgate asset management plans (AMPs)

ENV_43 - Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River

ENV_39 - Implement environment protection works to enhance ecological communities in coastal reserves within the CMP Study Area

CTF_16a - Review and update floodgate asset management plans (AMPs)

REC_04 - Improve public foreshore access to include all-ability access

CTF_16a - Review and update floodgate asset management plans (AMPs)

0 0.9 1.8 km
Scale: 1:40000@A3
N

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Lower Shoalhaven River CMP

CMP Actions - Broughton Creek

RG-01-10B

Legend

- Lower Shoalhaven River CMP Study Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area
- Coastal Wetland
- Coastal Wetland Proximity Area

CMP Action Themes
(not all zoomed maps contain actions under all themes)

- Aboriginal values
- Bank erosion and Berry's Canal adjustment
- Coastal Hazards (inundation)
- Environmental values
- Integrated and collaborative management
- Land use planning
- Water Quality
- Boat ramps and facilities to be considered as part of BOAT_37, BOAT_38 & BOAT_43.

ENV_42c - Undertake necessary detailed designs and construct a trash rack at Bomaderry (site UWQ_05 from Stage 2 Study)

BE_43h - Bank management and riparian restoration on high-priority public foreshores

BE_43d - Bank management and riparian restoration on high-priority public foreshores

CTF_16a - Review and update floodgate asset management plans (AMPs)

North Nowra

BE_43g - Bank management and riparian restoration on high-priority public foreshores

ENV_09 - Inclusion of additional Beachwatch sites

CTF_16a - Review and update floodgate asset management plans (AMPs)

Nowra

Terara

0 0.2 0.4 km

Scale: 1:12000@A3

N

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Lower Shoalhaven River CMP

CMP Actions - Nowra, Bomaderry

RG-01-10C

Map 3 of 7

Legend

- Lower Shoalhaven River CMP Study Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area
- Coastal Wetland
- Coastal Wetland Proximity Area

CMP Action Themes
(not all zoomed maps contain actions under all themes)

- Aboriginal values
- Bank erosion and Berry's Canal adjustment
- Coastal Hazards (inundation)
- Environmental values
- Integrated and collaborative management
- Land use planning
- Water Quality
- Boat ramps and facilities to be considered as part of BOAT_37, BOAT_38 & BOAT_43.

Budgong
Budjong Vale
Illaroo
Buangla
Burrier
Barringella
Cambewarra Village
Bangalee
Watersleigh
North Nowra
Wogamia
Longreach
Bamarang
Mundamia
West Nowra

BE_43b - Bank management and riparian restoration on high-priority public foreshores
BE_43c - Bank management and riparian restoration on high-priority public foreshores
BE_43a - Bank management and riparian restoration on high-priority public foreshores
BE_43g - Bank management and riparian restoration on high-priority public foreshores
ENV_09 - Inclusion of additional Beachwatch sites
BOAT_43 - Management of Watercraft Storage

0 1 2 km
Scale: 1:45000@A3
N

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Imagery Source:	NSW Six Maps

Lower Shoalhaven River CMP

CMP Actions - Upper Estuary

RG-01-10D

Legend

- Lower Shoalhaven River CMP Study Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area
- Coastal Wetland
- Coastal Wetland Proximity Area

CMP Action Themes
(not all zoomed maps contain actions under all themes)

- Aboriginal values
- Bank erosion and Berry's Canal adjustment
- Coastal Hazards (inundation)
- Environmental values
- Integrated and collaborative management
- Land use planning
- Water Quality
- Boat ramps and facilities to be considered as part of BOAT_37, BOAT_38 & BOAT_43.

CTF_16a - Review and update floodgate asset management plans (AMPs)

BE_17 - Monitor and maintain the existing foreshore protection structures at Greenwell Point

BOAT_43 - Management of Watercraft Storage

ENV_09 - Inclusion of additional Beachwatch sites

Greenwell Point

CTF_08 - Prepare a climate change adaptation strategy for Greenwell Point

ENV

CTF_16a - Review and update floodgate asset management plans (AMPs)

BE_43f - Bank management and riparian restoration on high-priority public foreshores

ENV_39 - Implement environment protection works to enhance ecological communities in coastal reserves within the CMP Study Area

0 0.2 0.4 km

Scale: 1:10000@A3

N

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Lower Shoalhaven River CMP

CMP Actions - Greenwell Point

RG-01-10E

Legend

- Lower Shoalhaven River CMP Study Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area
- Coastal Wetland
- Coastal Wetland Proximity Area

CMP Action Themes
(not all zoomed maps contain actions under all themes)

- Aboriginal values
- Bank erosion and Berry's Canal adjustment
- Coastal Hazards (inundation)
- Environmental values
- Integrated and collaborative management
- Land use planning
- Water Quality
- Boat ramps and facilities to be considered as part of BOAT_37, BOAT_38 & BOAT_43.

BE_17 - Monitor and maintain the existing foreshore protection structures at Greenwell Point

ENV_09 - Inclusion of additional Beachwatch sites

BE_45 - Implement a living shoreline solution along the Crookhaven River shoreline adjacent to Crookhaven Heads

ECON_13 - Monitor existing breakwall infrastructure at Crookhaven Heads

CS_16 - Protection of Midden at Crookhaven Heads

Crookhaven Heads

BOAT_43 - Management of Watercraft Storage

BE_43i - Foreshore protection and riparian restoration

Orient Point

ENV_39 - Implement environment protection works to enhance ecological communities in coastal reserves within the CMP Study Area

ENV_39 - Implement environment protection works to enhance ecological communities in coastal reserves within the CMP Study Area

ENV_39 - Implement environment protection works to enhance ecological communities in coastal reserves within the CMP Study Area

BE_43f - Bank management and riparian restoration on high-priority public foreshores

Culburra Beach

0 0.3 0.6 km

Scale: 1:15000@A3

N

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Lower Shoalhaven River CMP

CMP Actions - Orient Point, Crookhaven Heads

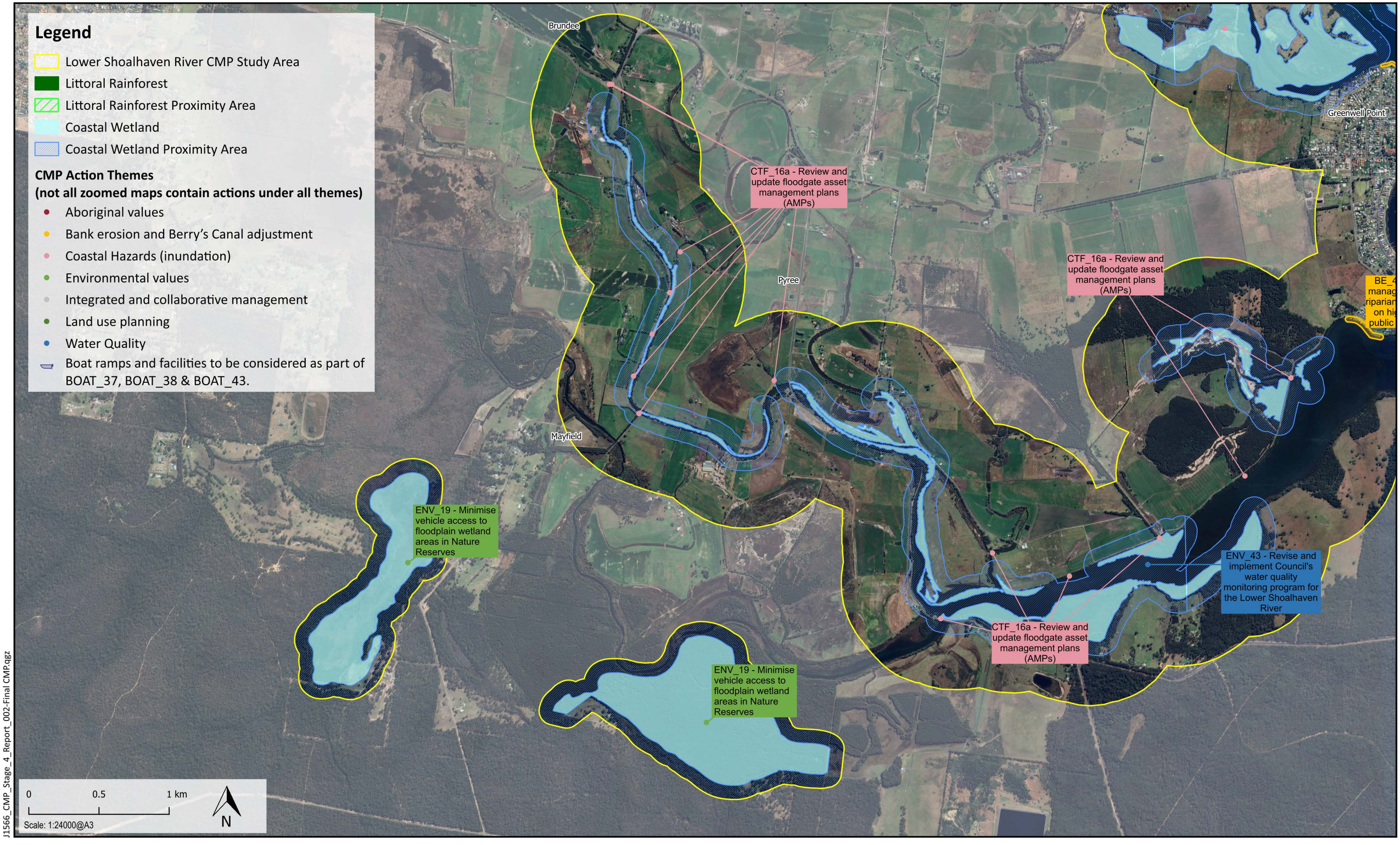
RG-01-10F

Legend

- Lower Shoalhaven River CMP Study Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area
- Coastal Wetland
- Coastal Wetland Proximity Area

CMP Action Themes
(not all zoomed maps contain actions under all themes)

- Aboriginal values
- Bank erosion and Berry's Canal adjustment
- Coastal Hazards (inundation)
- Environmental values
- Integrated and collaborative management
- Land use planning
- Water Quality
- Boat ramps and facilities to be considered as part of BOAT_37, BOAT_38 & BOAT_43.



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Lower Shoalhaven River CMP

CMP Actions - Crookhaven River

RG-01-10G

Appendix B

Communications and Engagement Plan and Summary Report

Lower Shoalhaven River Coastal Management Program

Community and Stakeholder Engagement Plan and Summary Report

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Document Control

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01	May 2023	Updated Draft for Completion of Stage 2	Emma Maratea	
02	September 2024	CSEP to attach to Draft CMP for review	Michael Rosenthal	Emma Maratea
03	October 2024	CSEP to attach to Draft CMP for Public Exhibition	Michael Rosenthal	Emma Maratea
04	March 2025	Final Draft post Public Exhibition for Council Review	Michael Rosenthal	Emma Maratea
05	March 2025	Final Version	Michael Rosenthal	Emma Maratea

Prepared For: Shoalhaven City Council

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Table of Contents

1 Introduction 1
1.1 Context 2
1.2 Previous Community Engagement 2
1.3 Outcomes of CMP Scoping Study 3
2 Purpose and Objectives 5
3 Engagement Principles 6
3.1 International Association for Public Participation – IAP2 6
3.2 Coastal Management Act 2016 and Coastal Management Manual (OEH, 2018b) 7
4 Stakeholder Analysis 8
5 Engagement Methods 12
5.1 Social Media Strategy: 12
6 Changes in response to public exhibition 17
6.1 New Coastal Management Actions 17
6.2 Coastal Management Action Rewording 17
6.3 Other Changes 17
7 Monitoring and Evaluation 18

Tables

Table 1-1 Key issues raised from Scoping Study engagement 4
Table 4-1 IAP2 Spectrum of Public Participation 9
Table 4-2 Stakeholder Matrix 10
Table 5-1 Engagement Methods and Outcomes 13
Table 7-1 Engagement Evaluation 19

Figures

Figure 1-1 The 5 stages of the Coastal Management Program process 1

Attachments

Attachment A – Previous Engagement Summary
Attachment B – Response to Public Exhibition Submissions Report

Preamble

This appendix to the Lower Shoalhaven River CMP contains the Community & Stakeholder Engagement Plan (CSEP) that sets out the strategy and process that was adopted to engage with the community and key stakeholders, as required by the CM Act and CM Manual. An overarching CSEP for the entire Shoalhaven LGA was developed in Stage 1 (Advisian, 2020). This CSEP was updated and localised at the start of Stage 2 of the Lower Shoalhaven River CMP process and used as a living document throughout to guide, inform and track engagement. As such, some sections were developed initially as a guide for engagement and others have become a summary of engagement activities.

Sections 1 – 4 of this appendix remain unchanged from the initial Lower Shoalhaven River CMP CSEP, although government agency names have been updated to the current naming as of CMP public exhibition.

Sections 5,6 and 7, and more specifically **Table 5-1** and **Table 7-1** have been updated as part of the final CMP, and serve as a summary of engagement activities and outcomes.

Attachment A provides a summary of previous engagement undertaken during development of the LGA wide Stage 1 Scoping Study (Advisian, 2020)

Attachment B is the Response to Submissions Report, which provides Council's responses to individual submissions from the public exhibition. This report also highlights what changes have been applied to the Final CMP in response to these submissions.

Site visit at Shoalhaven Heads (Photo: M Rosenthal)

1 Introduction

This Community & Stakeholder Engagement Plan (CSEP) aims to set out our strategy to engage with the broader community and stakeholders as required by the *Coastal Management Act 2016* (CM Act) and the Coastal Management Manual (the Manual; OEH, 2018b), including:

- Government Agencies
- Local and state Government working groups and committees:
    - North Coastal Management Program Advisory Committee (CMPAC)
- Local Aboriginal community:
    - Jerrinja Tribal Group
    - Jerrinja and Nowra Local Aboriginal Land Councils (LALC's)
    - Elders and members of the community who can speak on behalf of Country
- The broader community, facilitated through a range of online and face to face engagement methods.
- A wide range of demographics, contacted through community associations including schools, youth and sports clubs, Landcare and other users of the coast.
- Affected Landholders
- Community associations and business representatives:
    - Shoalhaven Heads Estuary Taskforce
    - Shoalhaven Riverwatch

The CSEP aligns with International Association for Public Participation (IAP2) principles and Shoalhaven City Council's Community Engagement Framework, as well as the requirements of the CM Act and the Manual (**Figure 1-1**). These engagement principles are set out in **Section 2.**

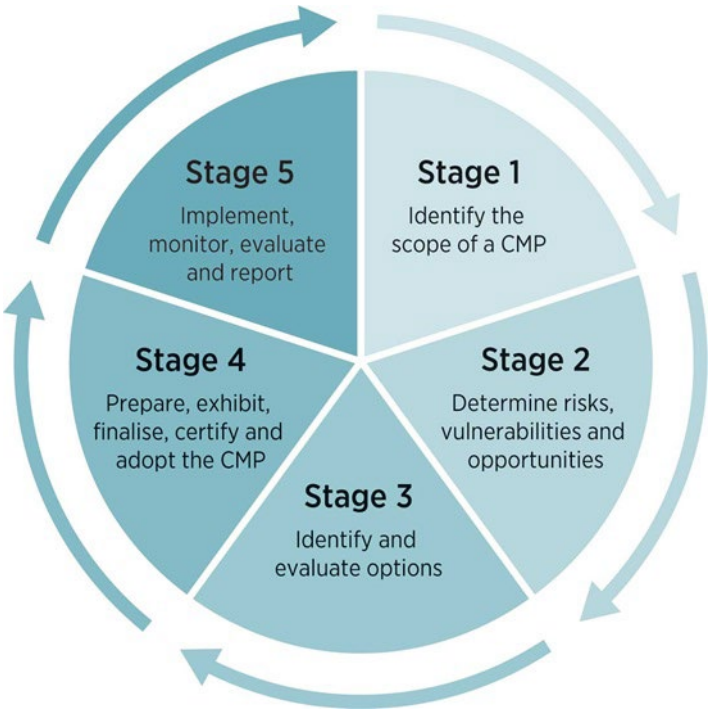

Figure 1-1 The 5 stages of the Coastal Management Program process

1.1 Context

One of the key outcomes of the Lower Shoalhaven River CMP will be the alignment of estuary management activities under the umbrella of the CMP, and integration of activities for which Council is responsible for under the Integrated Planning & Reporting framework. Engagement with Council stakeholders is critical to not only understand what activities are currently being undertaken and what issues they have observed, but also to communicate future risks, and ensure appropriate integration and strategic planning for estuary management.

There is also a range of ongoing and other estuary management activities currently undertaken by other stakeholders, including *State government agencies*, and the CMP will need to consider these and how they interface with the Lower Shoalhaven River CMP. For example, the Department of Primary Industries (DPI) – Fisheries (now Department of Primary Industries and Regional Development – Fisheries & Forestry (DPIRD – Fisheries) is the lead agency for the Marine Estate Management Strategy (MEMS), and they are undertaking a number of projects of relevance to the CMP, some of which are focused on the Lower Shoalhaven River. The bank assessment methodology and decision-support tool proposed for the CMP project has been developed under the MEMS and it is understood learnings from its application in this project may result in refinements of the tool. Further, DPIRD – Fisheries have also been undertaking a Floodplain Prioritisation Study to investigate priority areas that cause estuarine water quality issues from acid drainage and blackwater events with a view to identifying opportunities to modify drainage infrastructure or other projects. It will be important to engage with this stakeholder to understand the interface between the MEMS and the CMP.

The *community* are a very important stakeholder, or perhaps more appropriately, group of stakeholders. They play a key role in implementing estuary management activities through volunteering activities but also as landholders, with many land use practices on private land significantly impacting the estuary (e.g. bank erosion, riparian condition, drainage and water quality). Further, there is a need for community education and improved awareness of key issues and how they will be managed in the future to ensure community buy-in or at least acceptance of the proposed approach. Entrance management for flood mitigation is a key example of such an issue. Community members are also valuable sources of information and intelligence on estuary processes and are the main users of the coastal zone for recreational and economic activity. They, along with the environment, are the key beneficiaries of coastal management.

1.2 Previous Community Engagement

Community engagement has been undertaken as part of Council's management of the Lower Shoalhaven River, as part of the preparation of the *Shoalhaven River Estuary Management Plan (2008)*, *River Road Foreshore Coastal Management Options Assessment (2017)*, and the *Lower Shoalhaven River Drainage Remediation Action Plan (2014)*.

A summary of the community engagement undertaken as part of these previous studies was provided in the Shoalhaven CMP Scoping Study (Advisian, 2020) and is replicated in **Attachment A**. The summary provides an overview of the engagement methods used, values identified by the community and the management issues of most concern to the community.

1.3 Outcomes of CMP Scoping Study

A range of engagement activities were undertaken as part of the CMP Scoping Study (Stage 1) that were relevant to the Lower Shoalhaven River. These included:

- An agency workshop (February 2019) to confirm coastal management activities done to date, roles and responsibilities, and inform the scope of the Shoalhaven CMP. The workshop was attended by:
    - *Shoalhaven City Council*
    - *NSW Department of Planning, Industry and Environment* (DPIE; now Department of Climate Change, Energy, the Environment and Water (DCCEEW), including:
        - *DPIE* (now, DCCEEW) *Environment, Energy and Science (Biodiversity and Conservation Division, SE Water Floodplains and Coast Team)*
        - *National Parks and Wildlife Service* (NPWS)
        - *DPIE Planning and Assessment* (now, Department of Planning, Housing and Infrastructure (DPHI) - Planning
        - *DPIE Housing and Property – Crown Lands* (now, DPHI – Crown Lands)
    - *Department of Regional NSW – NSW Local Land Services (LLS)* (now, DPHI – LLS)
    - *Department of Regional NSW – Department of Primary Industries – Marine Parks*
    - *Department of Regional NSW – Department of Primary Industries – Fisheries* (both Marine Parks and Fisheries are now DPIRD – Fisheries)
    - *Transport for NSW – Roads and Maritime Services*
    - *NSW State Emergency Services*
    - *Australian Defence Force (ADF).*
- Six community workshops and drop-in information sessions were held in September/October 2019 to inform the Scoping Study, including one at Shoalhaven Heads.
- A community survey to provide insight into the community's key values, uses and issues for coastal management.
- Public exhibition of the Scoping Study.

A summary of the key outcomes of the Scoping Study engagement activities, that were relevant to the lower Shoalhaven River, is provided in **Table 1-1**. Further details can be found in the Scoping Study (Advisian, 2020).

Table 1-1 Key issues raised from Scoping Study engagement

Theme	Issues Raised
Tourism	• Need for improved maintenance and enhancement of Shoalhaven Heads for tourism related purposes • 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	• There was a desire for the 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 decisions
Environmental Management	• Need for improved mitigation around storm pipes, due to pipes causing erosion and siltation, in particular around River Road • Comerong Island need the CMP to better protect the diverse range of birds, reptiles and frog species, which include a significant population of the threatened green and golden bell frog.
Key issues identified as part of community survey	• Riverbank erosion • Poor water quality • Flooding • Litter / marine debris • Entrance management • Sand build up / siltation at Shoalhaven Heads

2 Purpose and Objectives

The key objectives of the CSEP are to:

1. Confirm	Confirm that Council have taken on board the community feedback in previous consultation, including the Scoping Study and are now undertaking the additional assessments into boating user conflicts, water quality issues, monitoring and urban runoff treatment to address key concerns.
2. Educate and inform	Educate and inform the community about the coastal management process and the legal requirements behind undertaking a CMP.
3. Ensure	Ensure awareness of the CMP across the whole community and facilitate residents feedback, ideas and concerns about acceptable risk and around how the lower Shoalhaven River is managed in the future.
4. Clarify and deliver	Clarify roles & responsibilities for implementation. Deliver the management program over the next 10 years.

Consultation about management options and the evaluation process will:

- Raise awareness of the strategic and staged approach to management of coastal issues.
- Ensure residents have had an opportunity to inform how the coast is managed in the future.
- Provide council with early feedback about actions and priorities that are acceptable to local communities and the overall population and its visitors. This will facilitate pre exhibition review of the draft CMP and should streamline Stage 4.
- Clarify the agency roles and public authority position on actions that require a collaborative effort.
- Help identify groups that require more targeted engagement in the coming months (in the lead up to and during exhibition) to facilitate conversations and gain feedback on the coastal threats and management options.
- Ensure the management option evaluation process (feasibility, viability (cost benefit) and acceptability) is transparent and well-communicated.
- Build on previous consultation undertaken for the CMP and under the previous studies. Ensure that communities feel that their previous feedback was heard and taken on board.

3 Engagement Principles

This CSEP is aligned with the principles within Council's Community Engagement Policy. These include:

- **Good governance –** Meaningful engagement with the community is at the core of good local government.
- **Informed council –** The elected Council's understanding of the needs and wants of the community are supported so better Council decisions are made, providing equity and confidence in long term aspirations.
- **Integrity –** Demonstrate openness and honesty about the scope and purpose of the engagement.
- **Respect –** Community engagement should involve respectful and civil interactions by Councillors, staff and community members.
- **Deliberation –** The careful consideration of information before decision, where people take note of and question expert opinion and share their personal views in reasoned and respectful discussion, while aiming to find common ground.

3.1 International Association for Public Participation – IAP2

International Association for Public Participation (IAP2) is an organisation advancing the practice of public participation. Their mission is to advance and extend the practice of public participation through professional development, certification, standards of practice, core values, advocacy and key initiatives with strategic partners around the world.

IAP2 Australasia are a member association incorporating individuals, governments, institutions and other entities that affect the public interest throughout the world.

IAP2 has developed tools that are widely used and acknowledged. These include the *Core Values for Public Participation* for use in the development and implementation of public participation processes; and the *IAP2 Public Participation Spectrum* which assists with the selection of the level of participation that defines the public's role in any community engagement program. Additionally, the *Quality Assurance Standard for Community and Stakeholder Engagement*, is recognised as the international standard for public participation practice.

This CSEP has been prepared in consideration of the IAP2 tools and guidelines.

3.2 Coastal Management Act 2016 and Coastal Management Manual (OEH, 2018b)

The CM Act sets out the following consultation requirements for preparing a CMP.

Before adopting a coastal management program, a local council must consult on the draft program with:

- *a) the community, and*
- *b) if the local council's local government area contains:*
  - *(i) land within the coastal vulnerability area, any local council whose local government area contains land within the same coastal sediment compartment (as specified in Schedule 1), and*
  - *(ii) an estuary that is within 2 or more local government areas (as specified in Schedule 1), the other local councils, and*
- *c) other public authorities if the coastal management program:*
  - *(iii) proposes actions or activities to be carried out by that public authority, or*
  - *(iv) proposes specific emergency actions or activities to be carried out by a public authority under the coastal zone emergency action subplan, or*
  - *(v) relates to, affects or impacts on any land or assets owned or managed by that public authority.*

The Manual provides guidance on how to undertake engagement with stakeholders and the community to achieve the requirements of the CM Act. This guidance has been considered in the preparation and implementation of this CSEP.

Community and stakeholder engagement during development of the Lower Shoalhaven River CMP has exceeded the legislative requirements, underlining the Council's commitment to recognising and addressing the community's concerns. This approach aims to ensure that all voices are heard, fostering a sense of shared responsibility and trust in the coastal management process. The Council acknowledges the diverse and significant issues that matter to the community, demonstrating a proactive stance in safeguarding the coastal environment for present and future generations.

4 Stakeholder Analysis

It is important to ensure that all those who need to be involved in coastal management (i.e. those with responsibility for managing the coast, community members who use and enjoy the amenity of the coast, and those with a vested interest in its management, such as property owners) are kept informed and invited to contribute to the process to establish a common understanding of coastal management and how decisions are made.

Stakeholders may tend to make judgements about coastal management based solely on their own perceptions. These perceptions can vary due to differences in values, needs, assumptions, concepts, concerns and degrees of knowledge. Stakeholders' views can have a significant impact on how they interpret the decisions made through the coastal management process, so it is important that differences in their perceptions of risk be identified, recorded and addressed.

A stakeholder matrix has been developed to identify relevant stakeholders, and their relative level of interest, influence and impact on the Coastal Management Program. The outcomes of this analysis identify the suitable level of consultation based on the IAP2 consultation spectrum (**Table 4-1**).

The stakeholder matrix is provided in **Table 4-2**. The matrix also indicates the suggested engagement method selected for each stakeholder based on the outcomes of the stakeholder analysis. Further details on the engagement methods are provided in **Section 5**.

Stakeholder contacts for each of the stakeholder types identified in **Table 4-2** are provided in a separate and confidential file. This contact register will be updated throughout the project.

Table 4-1 IAP2 Spectrum of Public Participation

	Inform	Consult	Involve	Collaborate	Empower
Participation Goal	To provide the stakeholders and community with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain stakeholder and community feedback on analysis, alternatives and/or decisions.	To work directly with the community and stakeholders throughout the process to ensure that their concerns and aspirations are consistently understood and considered.	To partner with the community and stakeholders in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public or stakeholders.
Promise	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how stakeholder and community input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how stakeholder and community input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Table 4-2 Stakeholder Matrix

		Stage 2		Stage 3		Stage 4	
Type	**Organisations**	**IAP2**	**Methods**	**IAP2**	**Methods**	**IAP2**	**Methods**
Government (State and Federal)	Federal and state members of Parliament	Inform	Council / DCCEEW to notify, as required	Inform	Council / DCCEEW to notify, as required	Inform	Council / DCCEEW to notify, as required
Councils	Shoalhaven Council (Project Manager)	Empower	Regular project meetings	Empower	Regular project meetings	Empower	Regular project meetings
	Shoalhaven Council (Councillors)	Empower	Briefing 1	Inform	Media release, FAQs	Inform	Council / DCCEEW to notify, as required
	Shoalhaven Council (other Council Staff)	Involve	Detailed Risk Assessment Workshop Email/phone direct contact to seek input on specific issues, as required	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	Kiama Municipal Council	Inform	Council / DCCEEW to notify, as required	Inform	Media release, FAQs	Inform	Media release and Council's Website
State/ Federal Government Agencies	Department of Planning and Environment **(now DCCEEW)**	Collaborate	Regular project meetings Detailed Risk Assessment Workshop	Collaborate	Regular project meetings Options Workshop	Collaborate	Regular project meetings Briefing 2 & Briefing 3
	Department of Planning and Environment – Crown Lands **(now DPHI – Crown Lands)**	Involve	Email/phone direct contact to seek input on specific issues, as required Detailed Risk Assessment Workshop	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	DPE **(now DCCEEW)** Environment, Energy and Science (Biodiversity and Conservation Division, SE Water Floodplains and Coast Team)	Involve	Email/phone direct contact to seek input on specific issues, as required Detailed Risk Assessment Workshop	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	DPE Planning and Assessment **(now DPHI – Planning)**	Involve	Email/phone direct contact to seek input on specific issues, as required Detailed Risk Assessment Workshop	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	Department of Primary Industries – Fisheries **(now DPIRD – Fisheries)**	Involve	Email/phone direct contact to seek input on specific issues, as required Detailed Risk Assessment Workshop	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	National Parks and Wildlife Services	Involve	Email/phone direct contact to seek input on specific issues, as required Detailed Risk Assessment Workshop	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	Transport for NSW – Road and Rail	Involve	Email/phone direct contact to seek input on specific issues, as required	Involve	Options Workshop (pending draft options)	Inform	Briefing 2 & Briefing 3
	Transport for NSW – Maritime	Involve	Email/phone direct contact to seek input on specific issues, as required	Involve	Options Workshop (pending draft options)	Inform	Briefing 2 & Briefing 3
	Transport for NSW – Maritime Infrastructure Delivery Office	Involve	Email/phone direct contact to seek input on specific issues, as required	Involve	Options Workshop (pending draft options)	Inform	Briefing 2 & Briefing 3
	NSW Environment Protection Authority	Inform	Council / DCCEEW to notify, as required	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	National Parks Association of NSW (NPA)	Inform	Council / DCCEEW to notify, as required	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	NSW Local Land Services	Involve	Email/phone direct contact to seek input on specific issues, as required	Involve	Options Workshop	Inform	Media release and Council's Website
	NSW Police	Inform	Council / DCCEEW to notify, as required	Inform	Media release, FAQs	Inform	Media release and Council's Website
	Australian Defence Force	Inform	Council / DCCEEW to notify, as required	Inform	Media release, FAQs	Inform	Media release and Council's Website
	NSW SES	Inform	Council / DCCEEW to notify, as required	Inform	Media release, FAQs	Inform	Media release and Council's Website
	RFS	Inform	Council / DCCEEW to notify, as required	Inform	Media release, FAQs	Inform	Media release and Council's Website
Advisory Bodies	CMPAP - Northern	Involve	Briefing 1	Involve	Options Workshop	Inform	Briefing 2 & Briefing 3
	Coastal and Estuary Catchment Panel (selected representatives)	Involve	Briefing 1	Inform	Media release, FAQs	Inform	Briefing 2 & Briefing 3
	Biodiversity Advisory Panel	Inform	Council / DCCEEW to notify, as required	Inform	Media release, FAQs	Inform	Media release and Council's Website

		Stage 2		Stage 3		Stage 4	
Type	**Organisations**	**IAP2**	**Methods**	**IAP2**	**Methods**	**IAP2**	**Methods**
Traditional Land Owners	Aboriginal Advisory Committee	Inform	Council / DCCEEW to notify, as required	Involve	Site meeting or phone calls	Involve	Site meeting or phone calls
	Jerrinja LALC	Inform	Council / DCCEEW to notify, as required	Involve	Site meeting or phone calls	Involve	Site meeting or phone calls
	Nowra LALC	Inform	Council / DCCEEW to notify, as required	Involve	Site meeting or phone calls	Involve	Site meeting or phone calls
Community Organisations	Community Organisations within and involved in the study area	Involve	Selected organisations to be interviewed as part of the boating study (demand analysis survey)	Involve	Options Workshop	Involve	Drop-in sessions, scheduled phone calls, virtual meetings
Youth Organisations	*Youth groups to be identified by Council*	Inform	Council / DCCEEW to notify, as required	Involve	Options Workshop	Involve	Online workshop
Private Organisations	Private Organisations within and involved in the study area	Involve	Selected organisations to be interviewed as part of the boating study (demand analysis survey)	Inform	Media release, FAQs	Involve	Drop-in sessions
Individuals	Landowners and residents	NA	NA	Involve	Online survey	Involve	Drop-in sessions
	Community members (registered)	NA	NA	Involve	Options workshop (limited numbers)	Involve	Drop-in sessions, scheduled phone calls, virtual meetings
	Visitors	NA	NA	Inform	Media release, FAQs	Involve	Drop-in sessions

5 Engagement Methods

A range of engagement methods have been developed based on the requirements of the CM Act and CM Manual, the objectives of the consultation (**Section 2**) and the level of consultation identified for each of the stakeholders (**Table 4-2**).

A description of the engagement methods, including a summary of the outcome of each method is provided in **Table 5-1**.

5.1 Social Media Strategy:

Council will reach out to the community throughout the CMP process at key stages using the following social media channels:

- Updates on Council's Lower Shoalhaven Coastal Management Program website landing page (Get Involved)
- Council's Facebook page
- Media Releases
- Relevant Council operated newsletters.

Through these channels, the project team can disseminate updates, access to the surveys and the interactive map, and seek feedback on key aspects of the CMP (for more detail see **Table 5-1**).

Table 5-1 Engagement Methods and Outcomes

Engagement Method	Details	When	Outcomes
State Government Agency Engagement: Email, Phone and Virtual Meetings	A letter of introduction to the project was provided to state government agency representatives seeking feedback or information related to: • The adopted Shoalhaven CMP Scoping Study (August 2020); • The existing management actions and any barriers to implementation in the Lower Shoalhaven River Estuary Management Plan (EMP, 2008); • The existing entrance management approach specified in Shoalhaven Heads Entrance Management Plan (2006); • New information related to flooding, acid sulphate soils, estuarine processes or bank erosion; and • Other relevant risks, vulnerabilities and opportunities within the Lower Shoalhaven River Estuary.	February 2022 (Stage 2)	**Crown Lands –** Provided background information on work undertaken to assess the impacts of water extraction on the estuary. Provided useful references related to fish ecology in the estuary. **DCCEEW –** Provided feedback on the status of EMP actions. **DPIRD (Fisheries) –** Identified key issues with regards to fisheries habitat, fishing and aquaculture. Suggested considerations when evaluating the effectiveness of previous management activities. Suggested engagement with dairy/cattle farmers, market gardeners and oyster farmers. Identified the importance of WSUD for managing urban development run off and incorporation of environmental restoration works within Coastal Wetland areas. Identified a range of MEMS initiatives to be considered. Provided references for considerations (e.g. estuarine habitat mapping). **NPWS –** Letter receipt acknowledged, however, no inputs or feedback provided. **TfNSW & MIDO –** Provided updates on EMP actions, including relevant contact details for each.
Get Involved online platform	Council maintained a 'Get Involved' online platform throughout the project to provide the community with access to information, read Q&A, complete surveys and provide their own comments on estuary management.	Ongoing	16 project updates provided to the community from procurement to the end of Stage 3. Additional updates to be provided until the CMP is certified. Post certification updates will be determined alongside Council's other CMP portfolio.
Boating User Survey	The survey targeted boating usage, issues and conflicts within the Shoalhaven River Estuary. The survey contained 19 questions across six sections with open and fixed multiple-choice responses	An online survey was made publicly available from 31 January to 27 February 2022 (Stage 2)	The survey received 423 responses of which 379 were completed to a level that allowed data analysis to inform the Boating Study completed as part of Stage 2 of the CMP. Full details of the survey responses are provided in the CMP Stage 2 report (Rhelm, 2023d).
Boating users, businesses and community group representatives interviews	Boating users, businesses and community group representatives were interviewed to inform the boating study. Information targeted during interviews included: • boating activity • boat types • seasonality • details of conflicts between boat users groups and the community, • boating ramp usage and capacity • condition of ramp facilities and other boating infrastructure • navigability, and • safety of boating.	31 January – 4 February 2022 (Stage 2)	Interviews were conducted with 23 stakeholders. The information gathered during the interviews informed the Boating Study completed as part of Stage 2 of the CMP. The interview summaries are provided in the CMP Stage 2 report (Rhelm, 2023d).
Interactive map (Council's Webpage)	Council invited the community to provide input to the CMP through an Interactive Map, published on this web page, using categorised marker pins provided to comment on: • issues, problems or concerns in the Lower Shoalhaven River Estuary area • ideas to address the issues.	1 April 2022 – 17 November 2023 (Stage 2 & 3)	48 individual respondents provided 155 responses. Responses were categorised into 7 key issues: • Bank erosion • Boating • Coastal and tidal flooding • Cultural and social values • Economic values • Environmental values • Recreation (other than boating) A detailed overview of responses and how they were incorporated into the CMP is provided in a Closing the Loop document which has been provided on the CMP website.
North CMPAC Briefing 1	Briefing provided on the scope of the CMP (Stages 2 to 4) and tasks completed to date	28 June 2022 (Stage 2)	Provided North CMPAC members an overview of the proposed scope of the CMP (Stages 2 to 4) and an update on the Stage 2 work progress, including the Boating Study, the Water Quality Monitoring Review, and the Bank Condition Assessment. Minutes can be found on Council's website: Minutes of North Coastal Management Program Advisory Committee - Tuesday, 28 June 2022 (infocouncil.biz)

Engagement Method	Details	When	Outcomes
Detailed Risk Assessment Workshop – Council Assets	A workshop was held in Nowra with Council staff representing: • Coastal management • Stormwater asset management • Open space management • Floodplain management • Water supply and sewer management • Land management and natural areas, including biodiversity • Road asset engineers • Environmental health • Strategic Planning. Representatives from DPE also attended. The purpose of the workshop was to: • Review consequence ratings associated with inundation of various asset types • Review outcomes of study area wide inundation risk assessment and confirm high and extreme risk outcomes • Discuss shortlist of asset risks and potential management approaches.	26 September 2022 (Stage 2)	Key outcomes of the workshop included: • No changes to high risk assets were identified • Sewer assets should be included in the risk assessment • Consequences associated with tidal inundation were considered higher than consequences associated with coastal storm inundation • While consequence rating would primarily be driven by the Property & Infrastructure category, reputational and environment risk categories should also be considered where assessing management options.

Detailed Risk Assessment Workshop – State Agencies	A virtual workshop was held with State Government Agency staff representing:
	• Department of Planning and Environment (Water, Floodplain and Coasts Team)
	• Department of Primary Industries (Fisheries and Aquaculture)
	• Transport for NSW (Maritime)
	• Local Land Services
	• Crown Lands
	• National Parks and Wildlife Service.
	The following additional State Government Agencies were invited, but were unable to attend:
	• NSW State Emergency Services
	• NSW Environment Protection Authority
	• Department of Planning and Environment (Flooding).
	The purpose of the workshop was to discuss the risks within the Lower Shoalhaven River within the context of the Stage 2 assessments. Feedback on the outcomes of the Stage 2 assessments was also sought.
		30 November 2022
		(Stage 2)
			Key outcomes of the workshop included:
			• Bank erosion: Soil Conservation Service and Local Land Services have good examples of bank condition improvement works that could be relevant for the Lower Shoalhaven River.
			• Riparian vegetation: review “excellent” riparian condition in Orient Point / Culburra as this area has been impacted by (possibly illegal) clearing.
			• Tidal inundation:
			  ○ Undertake engagement with DPI Agriculture regarding sea level rise impacts on dairy farming
			  ○ Council should look into understanding when each floodgate “fails” as a possible action for the CMP
			  ○ Consider saltmarsh/mangrove potential for Brundee Swamp from Hughes et al. 2022
			  ○ Consider (if available) the Marine Vegetation Management Strategy.
			• Boating:
			  ○ Consider optimising boat ramp usage – potentially through boat ramp strategy
			  ○ Pump out facility to be considered at Greenwell Point
			  ○ Undertake engagement with DPI Fisheries regarding signage near oyster leases
			• Water quality: Improve coordination with NSW Food Authority/Council/DPE water quality data.
			Overall, the outcomes of the Stage 2 assessments and resulting risk outcomes were supported by the workshop attendees.

North CMPAC Briefing 2	Briefing on outcomes of Stage 2 assessments and Stage 2 options identification and evaluation scope, including scope of engagement activities.	Stage 2 Completion – 6 June 2023 (Stage 2)	The CMP progressed to Stage 3, including planned community and agency engagement. Minutes can be found on Council’s website: Minutes of Northern Coastal Management Program Advisory Committee - Tuesday, 6 June 2023 (infocouncil.biz)
Options Workshops (virtual) – State Government Agencies	Review key outcomes of Stage 2 assessments and identify potential options for consideration in the CMP. Included agency representatives from: • DCCEEW • DPIRD Fisheries and Agriculture • Transport for NSW (Maritime) • DPHI - Local Land Services • DPHI - Crown Lands • National Parks and Wildlife Service	26 and 27 June 2023 (Stage 3)	Key discussion topics: • Tidal inundation impacts on estuary management • Erosion issues at Berry's Canal and the need for bank protection works • Riparian condition improvements • Water quality concerns • Riparian condition and the effects of tidal inundation • Boating and waterway usage and their impacts

Engagement Method	Details	When	Outcomes
	• Heritage NSW		Additional information was identified by agencies for consideration during options identification and evaluation during Stage 3. Eight distinct potential management options were identified via the discussion for inclusion in the long list and evaluation during Stage 3. Relevant Stage 2 data was provided to the appropriate agencies.
Options Workshops (in person) – Community Organisations	The project team met with the Lower Shoalhaven Heads Estuary Taskforce and Shoalhaven Riverwatch to discuss coastal management issues, including the outcomes of the Stage 2 studies and potential options for consideration in the CMP.	25 to 26 July 2023 (Stage 3)	Shoalhaven Riverwatch meeting outcomes: • Riverwatch provided Google Maps links and .kmz files to the project team, highlighting previous works and recommended sites for bank stabilisation. These were added to the project folder for review and alignment with the Bank Erosion Study. • A serious concern was raised regarding the increasing impact of wakeboarding on bank erosion, with the group noting a significant increase in damage compared to that caused by water skiers. • Discrepancies were identified between the erosion severity ratings, with some sites marked as low severity experiencing worse conditions, prompting Riverwatch to conduct bank stabilisation works, which have proven effective. • Sand sausages were reported to be more effective than sandbags for bank stabilisation at certain sites. • The group expressed frustration and reluctance to continue restoration efforts, as their works are being undermined and overtopped by larger wakes, reducing their effectiveness. Shoalhaven Heads Estuary Taskforce meeting outcomes: • The community seeks clear water and flood protection, believing a revised entrance management plan can help achieve both. • Frequent entrance openings at lower trigger levels were supported, with flexibility suggested in the design of the dry notch and pilot channel to prevent quick closure. • The group advocated for more flexible operations for each entrance opening to improve safety and effectiveness. • Consolidating boat ramps was discussed as a means to reduce dredging needs. • Concerns were raised about the impact of increased freshwater inflows on oyster farming.
Options Workshops and Drop In Sessions (in person) – Community	Community members attended workshops via a registration process. Workshop attendees considered the outcomes of the Stage 2 studies and collaborated on identifying key issues for management and potential options to address these issues. The sessions were held at the Shoalhaven Heads Community Centre and Shoalhaven Entertainment Centre (Nowra). Both sessions were open to the general public, however one required registration and the other was a drop-in style session	25 to 26 July 2023 (Stage 3)	27 registered attendees at the Shoalhaven Heads session. 18 registered attendees at the Nowra session. Maps depicting the outcomes of the Stage 2 studies were annotated in small groups using markers and sticky notes. Several potential management options and considerations for the evaluation criteria were identified and applied during the Stage 3 evaluation of potential management options. Written feedback forms were provided, and several written submissions were received containing suggestions for potential management options which were incorporated into the long list.
Meet on Country with Traditional Owners	Project team members met with representatives from the Nowra LALC and Jerrinja Tribal Group, some of whom were Traditional Owners with the authority to speak for Country.	26 July 2023 (Stage 3)	Key outcomes from these discussions are provided below: Jerrinja Tribal Group Meeting: • Cultural Protocols – Concern over lack of proper engagement protocols; Traditional Owners should be prioritised in consultation. • Heritage Protection – Priority sites, like the midden near Crookhaven Heads, need protection, serving as a model for cultural preservation. • Community Significance – Middens hold importance for both Aboriginal and broader communities. • Precinct Plan Impact – The Nowra Precinct Plan threatens traditional fishing grounds. • Funding Opportunity – Potential alignment with Aboriginal Fisheries Trust Fund for CMP. Nowra LALC Meeting: • Land and Erosion – LALC is acquiring machinery for bank stabilisation and seeks priority tender for works.

Engagement Method	Details	When	Outcomes
			• Bridge Impact – The Nowra Bridge upgrade has worsened erosion, affecting LALC land. • Pollution Concerns – Erosion and pollution stem from Bomaderry Creek and Manildra. • Consultation Lacking – Nowra Precinct Plan impacts traditional fishing grounds with minimal consultation. • Tourism Plan – LALC aims to launch a River Cat tourism operation with a new wharf. Artefact Exposure – Erosion has exposed Indigenous artefacts, needing protection.
Online sessions with agencies to discuss draft options	The draft CMP actions were presented to each of the State Government Agencies to confirm the action wording and responsibilities prior to their inclusion in the draft CMP.	April and May 2024 (Stage 4)	Feedback on draft management actions was used to fine-tune wording, clarify roles and responsibilities, and obtain in-principal support of proposed actions. Several options were removed from the actions list due to their lack of support from the agencies, or in some cases, due to already being implemented.
North CMPAC Briefing 3	The draft CMP was presented to the North CMPAC.	13 August 2024 (Stage 4)	The committee received the presentation, and the project will progress to public exhibition. Minutes can be found on Council's website: Minutes of Northern Coastal Management Program Advisory Committee - Tuesday, 13 August 2024 (infocouncil.biz)
Draft CMP available on Council's website (Public Exhibition)	To provide the community an opportunity review and provide feedback on the draft CMP.	4 November 2024 – 10 February 2025 (99 days)	The document was made available in the document library on the Get Involved webpage. Community members were asked to provide feedback via an online survey, email, or phone. Public exhibition was extended to allow for the community to have enough time to properly read and review the CMP. Over 990 people visited the project page, 157 people downloaded the CMP and over 50 people completed the survey. Other information from the survey includes: • 78% of respondents were over 55 years; and • 80% of people were local residents, 12% were business owners and 3% were Traditional Owners of the land. Multiple submissions were also received via email, letter, or written submissions collected at the drop in sessions (see below). A Response to Submissions Report is provided in **Attachment B**. It provides Council's responses to individual submissions from the public exhibition. This report also highlights what changes have been applied to the Final CMP in response to these submissions.
Drop-In Sessions (Public Exhibition)	To provide the community an opportunity review and provide feedback on the draft CMP.	**Date**: Wednesday, 20 November 2024 **Where**: Shoalhaven Entertainment Centre, 42 Bridge Road, Nowra **Time**: 4:00-6:00pm **Date**: Thursday, 21 November 2024 **Where**: Shoalhaven Heads Community Centre, 111 Shoalhaven Heads Road, Shoalhaven Heads **Time**: 4:00-6:00pm	Council hosted the information sessions on the draft CMP. The project team who developed the draft CMP were available for discussion. • Approximately 15 attendees were at the Nowra session. • Approximately 20 attendees were at the Shoalhaven Heads session. Several written responses were provided to the project team at the sessions as official submissions on the Draft CMP. Project team members followed up with attendees who were able to provide email submissions based on the discussion at the sessions. A Response to Submissions Report is provided in **Attachment B**. It provides Council's responses to individual submissions from the public exhibition. This report also highlights what changes have been applied to the Final CMP in response to these submissions.
North CMPAC Briefing 4	The Final CMP was presented to the North CMPAC.	17 March 2025	The committee received the presentation, and the project will progress to Council adoption and certification by the Minister. Minutes can be found on Council's website.

6 Changes in response to public exhibition

The public exhibition period provided an opportunity for stakeholders and the community to review and provide feedback on the Draft Coastal Management Program (CMP). Based on the submissions received, several changes have been incorporated into the Final CMP to strengthen the clarity, intent, and feasibility of proposed actions. These changes are outlined below.

6.1 New Coastal Management Actions

Following community feedback and further technical review, several new actions have been introduced to better address key issues raised during the exhibition period. These new actions include:

- **BE_43i** – Undertake necessary detailed investigations and stabilisation works at site CH_17 at Orient Point (Site ID and map provided in the Detailed Description).
- **BOAT_43** – Management of watercraft storage to improve access, safety, and environmental protection at key locations.

6.2 Coastal Management Action Rewording

Several actions have been refined to improve clarity, strengthen their intent, and incorporate feedback from submissions. These revisions ensure a clearer scope of work and alignment with community values and environmental priorities. Key refinements include:

- **Minor revisions to various action descriptions** to clarify their intent, improve linkages between related actions, and enhance alignment with broader management objectives. These changes did not change the intent, scope of costs associated with these actions.
- **BE_45: Implement a living shoreline solution along the Crookhaven River shoreline adjacent to Crookhaven Heads** – Strengthening the focus of this action on intertidal restoration, reflecting a more nature-based approach to stabilising the shoreline in response to stakeholder feedback and feasibility considerations.
- **BE_46: Design and implement a living shoreline solution along the foreshore adjacent to the caravan park at Shoalhaven Heads** – Reduction in scope and cost, with a strengthening of the focus of this action on intertidal restoration, reflecting a more nature-based approach to stabilising the shoreline.

6.3 Other Changes

Beyond the introduction of new actions and refinements to existing ones, additional modifications have been made to improve the structure, usability, and accuracy of the Final CMP. These include:

- **Restructuring of the Business Plan** to align with Council's Integrated Planning & Reporting (IP&R) framework and the four-yearly Delivery Plans, ensuring stronger integration with Council's long-term financial planning and implementation processes.
- **The budget has been refined** in response to public submissions and internal review, ensuring better alignment with realistic funding pathways. Cost estimates for certain actions have been adjusted based on revised scopes, and updated cost assumptions.
- **Map updates** to reflect refined action boundaries, additional sites, and feedback received during the exhibition period.
- **Other minor revisions** to text in the appendices, incorporating updates to technical details, references, and contextual information to enhance clarity and completeness.

7 Monitoring and Evaluation

Evaluation is an integral part of engagement. It provides the opportunity to reflect and review the engagement as it is progressing and enables changes to be made, if necessary, through the engagement (between and within the CMP stages).

The evaluation of the CMP engagement, presented in **Table 7-1**, provides a review of engagement tasks undertaken for each stakeholder and an evaluation of how well they achieved the desired level of engagement identified in the Stakeholder Matrix (**Table 4-2**).

Table 7-1 Engagement Evaluation

Engagement Method	Stakeholders Involved	Level of Engagement	Evaluation
State Government Agency Engagement: Workshops, Email, Phone and Virtual Meetings	All state government agencies listed.	Collaborate	Stage 2 and 3 workshops were intended to allow for collaboration, but primarily ended up being information sessions. Better engagement by Agencies during these sessions should be sought in the future. Stage 4 engagement was approached to address the lack of inputs received by Agencies. Regular and targeted engagement during Stage 4 allowed responsible agencies to directly contribute to the agreed CMP actions.
Boating User Survey	Community members and commercial operators	Consult	High degree of engagement. Inputs directly shaped the CMP.
Boating users, businesses and community group representatives interviews	Community members and commercial operators	Consult	High degree of engagement. Inputs directly shaped the CMP.
Interactive map (Council's Webpage)	Community members and organisations	Consult	High degree of engagement. Inputs directly shaped the CMP.
North CMPAC Briefings	Community and State Government Agency representatives	Involve	Briefings provided adequate time for questions and feedback, which were considered in the development of the CMP.
Detailed Risk Assessment Workshop	Shoalhaven Council (other Council Staff)	Involve	High degree of engagement. Inputs directly shaped the CMP.
Options Workshops (virtual) – State Government Agencies	State Government Agency representatives	Consult	Briefings with agencies, grouped by roles managing related issues allowed for an integrated and collaborative discussion. Information was successfully shared, and inputs directly shaped the CMP.

Engagement Method	Stakeholders Involved	Level of Engagement	Evaluation
Options Workshop – Community Organisations	Community organisations	Consult	Holding separate sessions with each organisation allowed for discussions that targeted issues relevant to each organisation.
Options Workshop - Community	Community members	Consult	Well attended, with engaged participants. Inputs directly shaped the CMP.
Meet on Country with Traditional Owners	LALC and Traditional Owners	Consult	Holding separate sessions with each organisation / Traditional Owners representatives allowed for discussions that targeted issues relevant to each.
Online sessions with agencies to discuss draft options	All state government agencies listed.	Consult	Holding separate sessions with each agency allowed for focused discussion on relevant management actions. Inputs directly shaped the CMP.
Draft CMP available on Council's website (Public Exhibition)	Community members, and state government agencies	Consult	Draft CMP was on public exhibition for 99 days. Submission channels were well used and submission directly led to amendments for the Final CMP including inclusion of additional management actions.
Drop-In Sessions (Public Exhibition)	Community members	Consult	These sessions were well attended, and productive discussions were held between community members and the project team. Several written responses were received at the sessions and follow up emails provided as a result of discussions.

Attachment A

Previous Engagement Summary

Previous community consultation undertaken

A summary of the community engagement undertaken as part of previous studies for the lower Shoalhaven River was provided in the CMP Scoping Study (Advisian, 2020) during Stage 1 and is reproduced here.

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.

The following values and management issues are a snapshot of those identified for the Shoalhaven Estuary through the Estuary Management Plan:

Community Issues and Values Identified
Threats to Biodiversity Values
The community is concerned about the maintenance of support for community based bush care and river care programs. Removal or reduction of numbers of individual species through habitat destruction. Removal or reduction in the area of individual Endangered Ecological Communities (EECs) through land clearing, severe bank erosion or channel change. Change in the balance between habitat types due to changes in sediment loads or sea level rise. Changes to tidal incursion and salinity due to entrance management. Changes to freshwater inflows. Degradation of microhabitats for fish Barriers for fish passage. Acid Sulfate Soils. Stormwater and industrial discharges. Spread of Caulerpa.
Aboriginal Community Values
Aboriginal community values have not previously been fully incorporated into the management of floodplain and estuarine landscapes and local Aboriginal people have a low level of involvement in local natural resource management planning.
European Heritage
Piecemeal documentation and management of European heritage sites located on the Estuary and coastal floodplain.
Recreational usage
The estuary is a major recreational asset for local people and is also a key element of the Shoalhaven tourism strategy. Recreational uses include swimming, kayaking, fishing (upper estuary and lower estuary, plus access to ocean fisheries), shellfishing, seafood restaurants, picnics, camping, walking (bush and waterfront), water skiing and wakeboarding.

Community Issues and Values Identified
There is congestion on boat ramps and the river upstream of Nowra, particularly during peak usage periods.
Potential conflicts between active (high speed) and passive waterway users, particularly upstream of Nowra.
Appropriate locations for local and regional boating facilities in the lower estuary need to be determined, to meet growing demand from the local and visitor population.
Foreshore Erosion
Boat generated waves are causing bank erosion in some sections of the upper estuary.
Foreshore erosion in the lower estuary including at Greenwell Point affects the amenity of foreshore reserves and threatens community infrastructure.
Flooding
Management of the entrance area to alleviate flooding in the Shoalhaven River.

River Road Foreshore, Shoalhaven Heads: Assessment of Coastal Management Options

Community consultation took place during the development of the WRL foreshore management options report via the Shoalhaven Heads Estuary Taskforce and the Shoalhaven Heads Community Forum and at a community drop-in session at the Shoalhaven Heads community centre on Sunday 9 April 2017.

The community identified the need to address stormwater management and retain the visual and recreational amenity of the River Road foreshore in any management options undertaken.

Lower Shoalhaven River Drainage Remediation Action Plan

A Lower Shoalhaven River Drainage Remediation Action Plan has been developed for the lower estuary to manage the impacts of Acid Sulfate Soils, which have been identified as a significant contributor to poor water quality in the Shoalhaven River Estuary. As part of the community consultation for the Lower Shoalhaven River Drainage Remediation 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. The videos feature flood stories of local people together with information from state and local government staff involved in flood planning and management. They outline the history of flooding in the Shoalhaven, explain flood management processes, provide guidance to the community on how to be flood prepared and bust a few common myths. Links to the videos are provided in the May 2017 issue of the Gumboots newsletter and on the Shoalhaven Council website.

engineering | environmental | economics | engagement

Attachment B

Response to Public Exhibition Submissions

Lower Shoalhaven River Coastal Management Program

Response to Submissions Report

Introduction

This Response to Submissions (RTS) report summarises and addresses comments received during the public exhibition period for the Lower Shoalhaven River Coastal Management Program (CMP). The public exhibition period was held from 4 November 2025 to 10 February 2025, providing an essential opportunity for community and stakeholder feedback on the draft CMP.

Legislative Requirements

The Coastal Management Act 2016 (CM Act) requires local councils to consult with the community and stakeholders before adopting a Coastal Management Program (CMP). Section 16 of the CM Act requires that:

(1) Before adopting a coastal management program, a local council must consult on the draft program with—

(a) the community, and

(b) if the local council's local government area contains—

(i) land within the coastal vulnerability area, any local council whose local government area contains land within the same coastal sediment compartment (as specified in Schedule 1), and

(ii) an estuary that is within 2 or more local government areas (as specified in Schedule 1), the other local councils, and

(c) other public authorities if the coastal management program—

(i) proposes actions or activities to be carried out by that public authority, or

(ii) proposes specific emergency actions or activities to be carried out by a public authority under the coastal zone emergency action subplan, or

(iii) relates to, affects or impacts on any land or assets owned or managed by that public authority.

(2) Consultation under this section is to be undertaken in accordance with the relevant provisions of the coastal management manual.

(3) A failure to comply with this section does not invalidate a coastal management program.

Part A of the NSW Coastal Management Manual (CM Manual) includes statutory provisions and mandatory requirements relating to community and stakeholder engagement. These requirements include:

> *A draft CMP must be exhibited for public inspection at the main offices of the councils of all local government areas within the area to which the CMP applies, during the ordinary hours of those offices, for a period of not less than 28 calendar days before it is adopted. This mandatory requirement does not prevent community consultation, or other consultation, in other ways.*

Public Exhibition Details

The Draft CMP was placed on public exhibition from 4 November 2024 to 10 February 2025 – a total of 99 calendar days (over 14 weeks), which is 71 days more than what is legislatively required. The public exhibition process was comprised of:

- Provision of the document electronically on the Shoalhaven City Council Get Involved webpage for the project: https://getinvolved.shoalhaven.nsw.gov.au/lower-shoalhaven-river-cmp, and the Documents on Exhibition section of the Council website. During public exhibition, over 990 people visited the project page, 157 people downloaded the CMP and over 50 people completed the survey.

- Two community information sessions were held within the Shoalhaven Local Government Area (LGA) during November 2024. Approximately 15 attendees were at the Nowra session, and approximately 20 attendees were at the Shoalhaven Heads session.

Additional engagement strategies used during the public exhibition phase included pamphlet distribution, posts and updates on the Get Involved page and social media, direct emails to the Council's community and stakeholder participation lists, and the creation of an "explainer video" that summarised the CMP outcomes.

Submission Methods

Submissions were received through various methods, ensuring comprehensive community engagement. These included:

- Drop-in sessions at local community centres
- Formal written submissions via letters and emails
- Direct communication with council representatives and consultants
- Submission via an online survey on Get Involved or through the 'Documents on Exhibition' on Council's website

Key Topics of Concern and Generalised Responses

Entrance Management and Flood Mitigation

Concern: Numerous submissions highlighted concerns over river entrance management, particularly the need for more frequent or permanent openings and the lowering of trigger levels to manage flooding and water quality issues effectively.

Response: Flood risk is addressed in the Floodplain Risk Management Program and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors (REF) undertaken to support Council's Entrance Management Policy (EMP)). Potential mitigation measures to reduce flood risk are being considered as part of the Lower Shoalhaven River Floodplain Risk Management Study & Plan (FRMSP) which is underway. A review of the EMP trigger levels and preparation of a draft Shoalhaven River EMP and REF was completed in early 2025 separate from the CMP and Floodplain Risk Management program. Water quality issues as minimised as the estuary is flushed twice daily with tides via the permanent Crookhaven Heads entrance.

Foreshore Erosion and Stabilisation

Concern: Foreshore erosion and the effectiveness of existing stabilisation measures were significant concerns, particularly around Berry's Canal and Shoalhaven Heads.

Response: The CMP outlines specific adaptation strategies such as living shoreline projects and bank stabilisation, supported by targeted actions for monitoring, maintaining, and enhancing foreshore protection works. This includes several bank stabilisation projects on Council owned land consisting of engineered bank works that incorporate natural habitat features, as well as some support for maintaining existing foreshore protection works. Submissions received during public exhibition have led to an additional site at Orient Point being included in this suite of actions. Community and private landholder involvement is encouraged, with funding opportunities identified to support these initiatives.

Environmental Protection and Biodiversity

Concern: Several submissions emphasised the importance of protecting coastal wetlands, habitats, and native biodiversity. Concerns were raised about insufficient recognition and conservation of certain highly valued natural areas within the CMP.

Response: The CMP includes various actions supporting environmental protection and enhancement, such as habitat restoration, community education initiatives, and increased ecological monitoring. Within the CMP, the implementation of environmental protection works applies broadly to riparian and estuarine areas within the CMP study area, as well as at key locations such as Coastal Wetlands and Littoral Rainforest areas. The CMP will clarify and strengthen these actions where appropriate, highlighting the value of coastal ecosystems.

Recreational Amenity and Community Access

Concern: Community concerns were raised regarding the condition and accessibility of recreational facilities, including boat ramps and beaches.

Response: The CMP acknowledges these concerns, proposing actions to review and upgrade key recreational infrastructure. Additionally, ongoing maintenance and monitoring programs aim to enhance community access and recreational opportunities along the foreshore.

General Plan Comprehensiveness and Clarity

Concern: Some submissions expressed concerns about the clarity, comprehensiveness, and communication of the CMP objectives and proposed actions.

Response: The CMP has been developed through extensive research and consultation, balancing diverse stakeholder views, legislative requirements, and technical assessments. However, feedback has been valuable, and where necessary, the CMP will be amended to enhance clarity, particularly in describing specific actions and their intended outcomes.

Key Changes to the CMP

Following the public exhibition period, several changes have been made to the CMP. These are described in more detail in the Final CMP, and include:

- **New Action BE_43i** – In response to the comments around bank and stormwater erosion at Orient Point Foreshore Reserve, this site has been included in the suite of bank stabilisation actions for works on public land.
- **New Action BOAT_43** – To assist with the management of boating facility assets, a new action has been added to install and manage small watercraft storage facilities at key locations.
- **Clarifying action descriptions** – several submissions have identified opportunities to make the intention and scope of certain actions clearer in the CMP. This helps to point out connections between related actions, strengthen the intent to better support community values, and ensure that the proposed management responses align with identified risks and priorities. These refinements improve transparency and clarity, making it easier for stakeholders to understand how actions contribute to broader coastal and estuary management objectives, and will support grant applications and funding request in the future.
- **Adjustments to the business plan** – including increasing budget allocated for certain actions.

Conclusion

All submissions have been thoroughly reviewed and considered. Detailed individual responses are included in the submissions register appended to this report. The feedback provided by the community and stakeholders has been instrumental in refining the CMP, ensuring it effectively addresses the challenges and opportunities within the Lower Shoalhaven River coastal zone.

From Submissions		Response	Report Update Status
Comment ID	Comments		
1	Only answer to minimise flooding	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
2	Waterfront properties experience “unnecessary” flooding due to poor trigger levels for opening Shoalhaven Heads. When the heads are eventually opened significant inundation has already occurred. A far better permanent solution (and less expensive in the long term) would be to permanently open the heads.	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
3	In relation to boat_40, it would be useful to mention in signage and educational material the legal responsibility boat users have in regard to other waterway users safety such as swimmers, kayakers and snorkellers. Specifically, users of Jetskis that can travel at over 110kph, go from 0-100kph in 3.5 seconds and weight over 350kg. It would also be useful and potentially act as a deterrent to reckless jetski use, to provide a number that dangerous and illegal behaviour can be reported to.	The CMP includes Action ENV_62, which establishes a comprehensive estuary management and ecosystem education program. This action aims to increase public awareness on key coastal and estuarine issues, covering topics such as bank erosion, water quality, responsible boating, entrance management, and habitat conservation. The program, including educational signage for safe boating, will be developed in consultation with stakeholders to ensure broad community engagement and effective information delivery. It is noted that TfNSW are the authority responsible for marine safety such as regulating navigation along the river.	No update to CMP required.
4	Lower trigger levels and, ideally, a permanent opening of Shoalhaven Heads is crucial for effective flood mitigation and improved water quality for recreational and aquaculture industry users of the river, as well as residents of the LGA. We will continue to advocate for this and work with stakeholders for as long as possible to achieve these goals.	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
5	The opening of Shoalhaven heads would greatly benefit all residents of the surrounding areas and to greatly reduce the effects of flooding and the damages that it can cause to people and their properties.	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
6	I would like to suggest that Shoalhaven Heads be opened the day previously before a weather event when it is safe rather than waiting till it is not safe and then not opening the heads at all ,Until such time that it can be constructed to stay open permanently. The heads being open makes 100mm difference in flood levels at Coraltree Lodge Boat ramp For some Shoalhaven residents this is the difference between flooding or not flooding so wake up and do the right thing	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
7	This is a very long document and takes into account all the different stake holders and many different issues. Well done! However, I feel that there are two issues that have not been addressed sufficiently: 1. Bank stabilisation along the whole waterway. I have read the plans for specific council owned areas to be stabilised, but I think the plan needs to be broader. My particular concern is the Zoo, which is a very important business for our area, but where bank erosion is a serious problem (note that I do not have any stake in the zoo, but I love to go there with my grand-children!). Even with very large trees along the bank, the erosion continues (and some of those trees have collapsed into the water. We want people to be able to enjoy their water skiing and wake-boarding, but we also want our commercial assets to be protected. Is there some way that there could be a joint Council/ Owner agreement and plan to protect those banks from further destruction? At the current rate of erosion, will we even have land left for a zoo by 2050? 2. The CMP talks about public access to the river, but I don't think that it goes far enough. I believe that we should be planning now for a combined bike/pedestrian footpath to be constructed from Bomaderry to Shoalhaven Heads. At strategic sites along the route there could be picnic tables and play equipment so families could enjoy our beautiful river. Even just an occasional park bench to sit and rest and watch the pelicans, would be helpful. I understand that this would be expensive and the Council is broke, but if we don't at least plan, it will never happen and our river will continue to be under-utilised. The river should be a major draw card for tourists, but the number of access points is limited with little opportunity to stay and enjoy the water. Are we really going to ignore this for the next 10 years?	1. The CMP prioritises bank stabilisation, with over $15 million allocated to targeted works across the Lower Shoalhaven. The approach focuses on high-risk sites, using a combination of engineering and nature-based solutions. 2. While the CMP includes actions for Council-managed land, stabilisation on private property typically falls under the responsibility of the landowners. However, Action BE-38 supports collaboration with private landholders, providing guidance on best practices and potential funding opportunities. Council encourages property owners, including the zoo, to engage with agencies such as Local Land Services (LLS) and DPIRD Fisheries for support in implementing bank stabilisation measures. 3. Long-term bank protection will require ongoing coordination between landowners, Council, and relevant agencies to ensure sustainable management. 4. Delivering an active transport link between Bomaderry to Shoalhaven Heads is out of scope for the CMP and is included in Council's Active Transport Strategy. However, the CMP is generally supportive of improving access along and to the coastal zone. This support may be realised by Council collaborating with relevant agencies to ensure that proposed paths in the coastal zone are consistent with coastal hazard risk management, environmental protection, and community needs. This may include providing input on design considerations, and funding opportunities, as well as identifying where additional studies or approvals may be required to address potential environmental or coastal process impacts. While the CMP does not directly facilitate capital works, it will support planning and coordination efforts that enable the delivery of active transport infrastructure in a way that is compatible with the long-term sustainability of the coastal zone. The Shoalhaven Active Transport Strategy (inc. the updates to The Pedestrian Access and Mobility Plan and Bike Plan) has just been finalised (Jan 2025) and details of these plans can be viewed on the GI project page: https://getinvolved.shoalhaven.nsw.gov.au/active-transport-strategy-pamp-bike-plan-update	A Detailed description for CTF_16 has been clarified to include support for active transport links in the coastal zone
8	Birdlife: Given the importance of areas in the Lower Shoalhaven for shorebirds, we believe there is a disappointing lack of reference to them in the draft plan. The draft plan acknowledges that the area includes significant shorebird habitat areas, and these are among areas that are being impacted by a range of activities (Table 2-3 on Key Coastal Management Threats). However, there is no reference to shorebirds in any of the environmental actions. In general, the environmental actions appear to have a strong emphasis on vegetation – e.g. Action ENV-32 and ENV-39. With ENV-32, we recommend this be expanded to include mapping for habitat areas for threatened species, including birds. ENV-39 would be strengthened if the references to restricting access to sensitive areas specifically mentioned migratory shorebird foraging, roosting and nesting areas. Exclusion zones are routinely set up across the Shoalhaven for nesting shorebirds, such as pied oystercatcher, hooded plover and little tern. So specific reference to this in the CMP should not be controversial. We are pleased to see that the CMP supports ongoing Council collaboration in projects and research on shorebirds (Action ECON-14). Finally, we think it is important that the Entrance Management Policy for the Shoalhaven River (CTF-20) recognises the importance of the area for shorebirds and that they need to be taken into account in decision-making for entrance opening works. However, the wording in the draft plan (in Appendix C) is vague and non-specific. Simply saying that decision makers need to 'consider the presence of protected migratory shorebirds' provides little specific guidance. It may be more helpful to indicate that routine maintenance/preparation work should avoid sites/times when migratory birds are present (and nesting in particular). But we also recognise that a balance needs to be struck between environmental considerations and the need to protect life and property, particularly during severe weather events.	The CMP acknowledges the importance of shorebird habitat in the Lower Shoalhaven and supports ongoing collaboration on shorebird conservation through Action ECON-14. While the environmental actions focus on vegetation management, they also aim to protect broader ecological values, including habitat for migratory shorebirds. Shorebird habitat is regularly considered through legal mechanisms such as the BC Act, EP&A Act, and the relevant REFs. In relation to entrance management works, this will be addressed through the associated REF. The CMP balances shorebird conservation with flood risk management and will continue to integrate environmental considerations in decision-making.	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
9	More direction/work needs done on the artificial opening of the Shoalhaven River at Shoalhaven Heads. Early opening of the river avoids flooding of houses and roadway.	Entrance management for flood mitigation, including opening frequency and sediment management, falls within the Floodplain Risk Management Study and Plan, not the CMP. The CMP supports proactive coastal entrance management where it aligns with environmental and coastal processes, but decisions regarding flood mitigation are addressed under the Floodplain Risk Management Framework.	No update to CMP required.
10	Adelaide st Greenwell point. We flood every time we have heavy rain and large tides	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). The CMP acknowledges that flooding at Greenwell Point will worsen over time due to sea level rise. Action CTF_08 includes the development of a climate change adaptation strategy to identify thresholds and triggers for action, ensuring that residential properties, infrastructure, and commercial areas are better prepared for increasing inundation risks. Road closures during coastal flooding events are addressed in Council's Local Emergency Flood Plan and the Coastal Zone Emergency Action Subplan (CZEAS). Adaptation planning will explore strategies to improve resilience in affected areas. Council will continue working with relevant agencies to assess and implement flood management solutions within the broader floodplain risk management framework.	No update to CMP required.
11	It's really not clear on the actions that are proposed by location... lots of detail on the research which is great. But I still have no idea of what will be done to help the flooding of the area. Such as the correct management of the notch at the heads, this has proven time and time again to have lessened the impact, yet minimal council support ahead of a flood.	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
12	Detailed feedback provided on the following: 1) erosion 2) flooding 3) sewerage overflows 4) water quality 5) tourism and amenities 6) miscellaneous items	See response to comments 76.1 – 76.65	
13	The draft CMP document does not address a majority of community concerns and has included quite a number of items that were never discussed at any of the formal CMP committee meetings.	The draft CMP has been developed through an extensive consultation process, incorporating feedback from community engagement sessions, stakeholder meetings, and technical assessments. While not all individual concerns can be fully addressed within the scope of the CMP, the plan prioritises actions based on environmental, social, and economic needs, aligning with legislative requirements. The public exhibition period has provided an opportunity for community feedback to further refine the proposed actions in the CMP. All actions have been informed by technical assessments, stakeholder input, and community consultation. Feedback received during this process is being carefully considered and is shaping how these actions are addressed in the final CMP to ensure they align with community priorities while meeting legislative and environmental requirements.	
14	A written submission from Birdlife Shoalhaven has been emailed to the coastal management team.	See response to comment 8.	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
15	Opening the cut at Shoalhaven Heads permanently will help our oyster farming community immensely.	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). In addition, the CMP includes several actions that may benefit the oyster industry, such as water quality improvement initiatives (ENV_42 and ENV_43), stormwater and catchment management development controls (ENV_51), and septic system performance assessments (ENV_44), all aimed at improving estuarine health and supporting sustainable aquaculture. Other broader scale options that would support the oyster industry include ENV_58 which aims to reduce acid and blackwater runoff from drained floodplain areas.	No update to CMP required.
16	Keeping The Heads open is really important to ensure evenly distributed flow of flood water. Greenwell Point in particular experiences increased flooding when The Heads is closed. With sea levels rising and substantial data to support this as shown by the UOW student who completed his Masters Research project on our local areas a few years ago I think it important to be proactive rather than reactivate.	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). An object of the Coastal Management Act is to consider future risk around climate change, like Sea Level Rise, and this is highly considered within the CMP process and resulting document. Action CTF_08 specifically identifies Greenwell Point as an area where long term adaptation planning is required to ensure a coordinated response to rising sea levels.	No update to CMP required.
17	No comments as yet because we haven't read it as we are away overseas. We will not, unfortunately, be home for the information sessions but are very interested as the river & flooding vitally affects us.	The exhibition period has been extended to provide sufficient time for the public to consider the report and provide informed submissions. Public exhibition was extended 71 days beyond what is legislatively required.	No update to CMP required.
18	The heads should be open permanently, our place floods every time we have heavy rain	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
19	The lower Shoalhaven River is suffering from siltation that is increasing steadily. The only outlet is via the cutting to Greenwell Point. The resulting inadequate flow causing shallowing and the formation of sand bars and sand islands. These islands are an impediment to navigation. If a permanent opening at Shoalhaven Heads were to be created and maintained the ensuing increased tidal flow would lessen siltation and likely increase the general depth and health of the river. A healthier river would enhance recreational fishing and attract more anglers, hence more tourist dollars for the Shire. Permanently opening the river mouth would greatly negate seasonal flooding and therefore millions of dollars would be saved in flood damage to infrastructure, farming and businesses as well as damage to residential property. Although costly this action would return the investment many times over benefiting all INCUDING THE COUNCIL'S financial situation on an ongoing basis. THINK LONG TERM BENEFIT NOT SHORT TERM Band-Aid solutions that have to be constantly repeated.	A permanent entrance at Shoalhaven Heads was not recommended in the CMP due to significant environmental, engineering, and regulatory challenges. Maintaining an open entrance would require continuous dredging and structural intervention, leading to high costs, increased erosion risks, and potential adverse impacts on estuarine health. The CMP supports proactive entrance management for flood mitigation.	No update to CMP required.
20	The email contains images of potential protection design for works at Greenwell Point. The images consist of sandstone blocks, and the note," The simple, inexpensive solution to erosion of Greenwell Point foreshore"	The CMP does not support immediate upgrade of the protection works for most of Greenwell Point in recognition of the current suitability of their design. The CMP supports ongoing maintenance of these current structures, with future upgrades to be considered through actions such as CTF_08. Your preference for sandstone blocks is acknowledged and will be considered in future works.	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
21	A permanent opening of the river to sea. A permanent rock wall out to sea to fix the problem with flooding. I know that it will be very expensive. State and Federal governments funding would be required. Please put this to both state and federal.	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
22	There does not appear to be any plan for flood mitigation for the Shoalhaven river, nor does there appear to be any plan to ensure the river at Shoalhaven Heads remains permanently open to the sea where the river originally flowed to the sea and was artificially closed. Where is the concern for the residents' homes from flooding where these homes adjoin the river front. The current rules that determine when the opening at the Heads is open inadequately protects these homes from floods. These rules must be reviewed and a plan implemented to have the opening at Shoalhaven Heads permanently open. The current plan does not address any of these issues.	However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
23	Endorse fully need to provide restaurants / cafe options / seating areas / toilets / boardwalks/ footpaths, with parking close by. Many country towns we have visited have value added to their river / foreshore locations by providing similar facilities and Shoalhaven River at Nowra has the potential to provide similar facilities but is sadly lacking.	Broader foreshore development initiatives, such as cafes, footpaths, and other visitor infrastructure, fall outside the scope of the CMP. However, feedback on the potential for enhanced public amenities along the Shoalhaven River at Nowra is noted and may be relevant for consideration in future strategic planning or local government initiatives focused on tourism and public space improvements.	No update to CMP required.
24	As a regular kayaker on the lower Shoalhaven river I am acutely aware of the wake created by powerboats especially wakeboarding boats. I strongly support the submission by Shoalhaven Riverwatch, especially the need to regulate powerboat traffic to minimise bank erosion and safety for other users.	Transport for NSW (TfNSW) are the regulatory agency responsible for implementing maritime safety. In this area, TfNSW has indicated that its preferred approach to managing wake impacts is through education and awareness rather than introducing new regulatory controls. In response, the CMP includes actions focused on education and safety campaigns to raise awareness of wake-related erosion and potential risks to other water users. Additionally, the CMP features bank stabilisation works aimed at mitigating the impacts of wave action and erosion in high-risk areas. These combined approaches seek to address concerns while working within the existing regulatory framework.	No update to CMP required.
25	I would like to see Shoalhaven Heads kept open permanently to (a) reduce impacts of flooding on low lying properties and oyster farms, and (b) improve the water quality in the Lower Shoalhaven River by preventing buildup of stagnant algae rich water in Berry's Bay. This has been much requested for at least 20 years but it never happens - just more reports and plans.	A permanent opening at Shoalhaven Heads is not supported in the CMP due to environmental, engineering, and regulatory constraints. Entrance management for flood mitigation is considered within the Floodplain Risk Management Study and Plan, which assesses the effectiveness and impacts of different opening strategies. While the CMP acknowledges the needs of the oyster farming industry, maintaining a permanently open entrance would have significant consequences for estuary health, sediment transport, and habitat stability. Instead, the CMP supports entrance management where it can be demonstrated to provide clear flood mitigation benefits while balancing environmental and coastal process considerations. In addition, the CMP includes several actions that directly support the oyster industry, such as water quality improvement initiatives (ENV_42 and ENV_43), stormwater and catchment management development controls (ENV_51), and septic system performance assessments (ENV_44), all aimed at improving estuarine health and supporting sustainable aquaculture. Other broader scale options that would support the oyster industry include ENV_58 which aims to reduce acid and blackwater runoff from drained floodplain areas.	No update to CMP required.
26	Shoalhaven heads should be left open to reduce the impact of flooding	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
27	Feedback period: Public Exhibition period is during summer which is not ideal for river works as it's their busiest time of year	The exhibition period has been extended to provide sufficient time for the public to consider the report and provide informed submissions. Public exhibition was extended 71 days beyond what is legislatively required.	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
28	Bank erosion: He has a farm and was concerned about bank erosion on his property, in particular a section of bank along Bomaderry Creek near Nowra bridge is eroding. He has previously undertaken projects with LLS, Riverwatch and Landcare. He has done fencing, revegetation and mangrove planting projects in the past. He said that when the new Nowra bridge was built some flows were diverted and sections of creek banks slumped on his property. Apparently, LLS (I think it was Jason) meet him on site and discussed recommendations earlier this year and were going to get back to him if there were any funding opportunities available. He was interested to see if there were any grants he could apply for to do bank rehabilitation works on his property.	The CMP framework does not support providing public funds to private land owners for the purposes of bank protection on private property. However, the CMP acknowledges bank erosion issues on private land and includes Action BE-38, which supports private landholder involvement in bank stabilisation and restoration. This action encourages collaboration with stakeholders such as Local Land Services (LLS), Riverwatch, and Landcare, aligning with ongoing efforts like fencing, revegetation, and sediment management. As part of BE-38, the CMP promotes educational initiatives, funding awareness, and priority restoration works, including areas near Bomaderry Creek and Nowra Bridge. Landholders are encouraged to engage with LLS and other relevant agencies to explore available funding and grant opportunities for rehabilitation projects.	No update to CMP required.
29	Surf club: The entrance needs to be opened more often to mitigate flooding of low lying property. Also, beach scraping in front of the SLSC causes the entrance to close quickly because the sand gets washed south and deposited in the entrance area. Sand bags would be better to keep sand on the beach instead of it migrating into the river. He has observed that sand is moving from north to south. Boating: concrete doesn't go into water far enough for the Shoalhaven Heads boat ramps. Boating infrastructure is not very good. Mangroves: not supportive of BE_46. It's a nice sandy area that would be a shame to ruin. There are so many mangroves around the lower Shoalhaven River that it doesn't need a living shoreline to promote even more. Instead, the existing permit to pull mangroves should be renewed and mangroves should be removed along River Rd and in front of the caravan park.	However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). In terms of the movement of sand here, the dominant alongshore sediment transport direction is from the south to north. The CMP acknowledges concerns about boating infrastructure at Shoalhaven Heads. Action BOAT_37 and BOAT_38 outline a plan for reviewing and upgrading facilities, including improving access where feasible. The CMP's living shoreline approach is based on coastal protection and habitat resilience. It supports a design that will enhance ecological function while also improving recreational amenity by incorporating water access for swimming, soft boating and other recreational activities. While mangrove expansion is a natural process, the action does not promote unrestricted growth but focuses on erosion control and ecological balance. The need for managed mangrove removal will be considered through existing regulatory processes, but removal for amenity alone is not supported under current environmental guidelines.	No update to CMP required.
30	Bank erosion at Orient Point: Long time residents of the area. They have observed increased siltation in Berry's Reserve, along with increased velocity and scouring. The growth of sand bars has been observed over the years as well. Orient Point itself is a high impact, high velocity area on the foreshore. 10m of recession along the foreshore has been observed by the residents and they believe this is increasing. Don't believe the groynes are working that well. They noted accretion and erosion is being observed within each groyne. They are concerned about inundation, however acknowledge that not much can be done about that. They noted that the stormwater drain is cutting into the reserve.	The CMP acknowledges erosion concerns at Orient Point, and Action BE_43i has been included to support bank stabilisation works along the Orient Point Foreshore Reserve near the groynes. This action aims to enhance shoreline stability and upgrade stormwater assets while considering environmental, recreational, and community values.	BE_43i has been added to the CMP to address this issue.
31	A permanent opening of the River at Shoalhaven Heads and the closing of Berries Canal would direct a stronger flow of water towards the main entrance The Shoalhaven River is the only large river system on the East Coast of Australia without a permanent entrance Thank You	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
32	Every time we have heavy rain, my property floods. The drainage system doesn't work. The Heads needs to be opened indefinitely, ready for flash flooding. I have lost 1 car in the 2016 floods, fridges, lawn mowers, washing machines and many other personal items over the years due to floods. Every time it floods my wife and I become very anxious and stress, that we have to go through it again! Our insurances have risen because of it . We don't even have flood insurance cover, as most won't cover us or the prices are way out of our range. We pay rates, but we are not provided with curb and guttering or a safe drainage system. Our road, (Fraser Avenue) is the first to flood in Greenwell pt, and it needs to be closed off at both ends, as people go joy riding for a sticky beak through it, which creates waves, which smash into our yard , creating more damage. Please do something to help the residents of Greenwell pt.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). The CMP acknowledges that flooding at Greenwell Point will worsen over time due to sea level rise. Action CTF_08 includes the development of a climate change adaptation strategy to identify thresholds and triggers for action, ensuring that residential properties, infrastructure, and commercial areas are better prepared for increasing inundation risks. Road closures during coastal flooding events are addressed in Council's Local Emergency Flood Plan and the Coastal Zone Emergency Action Subplan (CZEAS). Adaptation planning will explore strategies to improve resilience in affected areas. Council will continue working with relevant agencies to assess and implement flood management solutions within the broader floodplain risk management framework.	No update to CMP required.
33	The lower river area at Shoalhaven Heads needs to be permanently opened to the sea, using whatever methods deemed appropriate to prevent siltage build-up inside the opening.	The Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
34	The need for a permanent opening to the sea at Shoalhaven Heads needs to be addressed for the health and long term viability of the river. I feel it is a matter of money over common sense especially with the removal of mangroves near River Road boat ramp. Planning to spend $1million dollars on boardwalks etc instead of $250 for a permit to remove new growth is ridiculous.	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). After further consideration, the living shoreline action is being re-crafted as a less expensive option that will still serve to activate the area for multiple benefits including recreational amenity, environmental values, and public access. This cost reduction considers that this site requires less capital works than the Wagonga Inlet project that the draft budget was based on.	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
35	Following up on our conversation last week (or maybe the week before) I just want to touch base with you and make a few comments about consultation processes. I have really enjoyed being part of this committee and being able to see the process unfold. Many years ago (maybe 15 plus) my husband and I went to a coastal management consultation evening conducted by external facilitators at the School of Arts. We encouraged some friends and neighbours to attend also. As the evening progressed and we were asked for input—plenty of butchers paper and post-it-notes—one friend just kept saying "you guys are the experts— you tell us what needs doing". I understood the exercise was about getting priorities from the community etc but for him the process was a waste of time. Maybe its an Australian cultural thing—we are comfortable with relying on government to do what's best for us most of the time. Why ask us? Anyway I've never forgotten my friend's comments. I again attended consultations 5 years ago when the next wave of consultations mandated by the current legislation began and the butcher's paper etc came out again. Same process. New consultants. The attendees were more engaged than the first time maybe because there were a large group from River Watch there (at my table) who had a specific focus and were across the issues. The issues from the point of view of the general community do not always coincide with the issues from the point of view of the professionals: Mainly because the community view is narrow and informed by their own experience and self interest but the professional view is broad and informed presumably by study and the bigger picture. So when I read through the documents produced by the consultants and your team it is hard for me to challenge anything that is being presented. I can see and appreciate the detailed processes that have been followed and the efforts that have been made to consult with the community and take on board community concerns and suggestions. The document is a beautiful work, covering everything it is supposed to do and providing a roadmap for the future management of this part of our coastline. Similarly the plans for the rest of the Shoalhaven coastline which I have also read. You guys have done well. I can see and appreciate you have followed the complex pathway the state government has proscribed at enormous expense to arrive at the plan. There is nothing in the plan that I can constructively comment upon. I look at the costs associated with the implementation of the plan and think to myself that most of this will never happen. Much of it is a wish list repeated up and down the coast. And this no doubt is happening in many areas of governance not just coastal management. Sorry for the long rant.	Your feedback is acknowledged and appreciated.	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
36	In regards to map RG-01-10F BE-45, two areas for bank stabilisation have been identified – one smaller section (identified ARC linkage site) at Orient Point and a larger section extending from near Roseby Park to Crookhaven Heads. Can you please outline what is meant by the ARC linkage as this is a rock outcrop and not in need of bank stabilisation. The identified extent of bank stabilisation seems to miss the main section of shoreline erosion occurring near the groynes located at the public reserve / park in this area. This erosion is occurring resultant form boat wake, flooding and stormwater runoff. How has the area near Roseby Cemetery been identified as requiring shoreline stabilisation? There is no visible sign of shoreline erosion occurring in this section of bank nor any erosion occurring towards Crookhaven Heads, especially given this is all located on rock shelf. Please consider investigating the shoreline erosion occurring at the public reserve at Orient Point.	Reference to the ARC linkage have been removed. These were related to an earlier grant related to enhancing habitat connectivity across the entire area. The CMP acknowledges erosion concerns at Orient Point, and Action BE_43i has been included to support bank stabilisation works along the Orient Point Foreshore Reserve near the groynes. This action aims to enhance shoreline stability while considering environmental, recreational, and community values. The area near Roseby Cemetery is included (action BE_45) as an effort to build on the earlier grant and enhance the habitat connectivity of that stretch of foreshore.	BE_43i has been added to the CMP to address this issue. Reference to ARC linkage site has been removed.
37	Riparian revegetation and mangrove rehabilitation at Greenwell Point: expressed lack of support for the works occurring at Crookhaven Drive Reserve Greenwell Point. Expressed support for the maintenance of the existing rock wall, emphasising that this should be the key focus of the management action. Expressed concern regarding the height the mangroves may reach. Expressed concern with limiting access point to the foreshore through the fencing and riparian reveg works, however also expressed concern for having too many access points to the foreshore. Noted that there is a 'navigation channel' that runs adjacent to the foreshore and is concerned that the mangroves may encroach in to this channel.	The CMP acknowledges foreshore erosion concerns at this site, and Action BE-43f is being updated to reflect ongoing works funded by a DPIRD Fisheries grant. These works are focused on improving fish habitat, water quality, and include nature-based solutions to improve bank stabilisation. The riparian fencing works have been mindful to retain access to the foreshore at strategic locations through formalised access points, while keeping access at the western, sandy end of the foreshore unrestricted. Monitoring of existing controls along the foreshore will be undertaken as part of action BE_43f. Future improvements to the rock wall will depend on monitoring outcomes, determining asset ownership, and funding availability. Maintenance on existing controls is considered as part of this action. Concerns about access, view impacts, and sedimentation have been noted. Following this feedback, riparian fencing heights have been decreased to reduce visual impacts, and low-lying native vegetation will be planted along the foreshore. The informal channel will not be impacted by the mangroves. It is noted that mangroves will only exist in the intertidal zone and as such will not impede on navigation.	No update to CMP required.
38	I am the president of the Nowra Water dragons dragon boat club, we are based in the old Sea Scout Hall in Paringa Park and use the ramp marked Paringa Park Rowing Club Boat Ramp on a regular basis (at least 3 times a week - weather permitting). We are particularly interested in BOAT_37 and BOAT_38. We have worked, often with the Rowing Club, on a number of occasions to clean up the mud and silt deposited on the ramp after flood events - which appear to be occurring more frequently. The gravel of the beach could be topped up - as the wire gabion cages are rusting and protruding and beginning to become a trip hazard. I am unable to attend the information sessions that have just been announced, but do want to remain informed about any proposals that will affect this ramp and the ability of our club to train.	Your feedback is acknowledged and appreciated. Council will ensure your organisation is involved in the implementation of BOAT_37 and BOAT_38.	No update to CMP required.
39	We have resided in the Greenwell point area for over 16 years our house being directly opposite the river on Crookhaven drive. We have witnessed many storm /floods in this time one that did enter our home ...I had contacted the council on many occasions regarding the heads being opened to reduce the flooding in our area and have been told they are monitoring the situation. However this monitoring is always to late to fix the water problem. The heads entrance should be opened permanently to give the residents of Greenwell point and the Nowra community peace of mind when we get inundated with the too often recurring rain systems. There is a definite change in the overall weather now...council you must do everything possible to look after your rate payers and the community.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.

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Comment ID	Comments		
40	Flood risk is a real consideration in this area. I know of people who avoid property in this area for that reason. I feel this prevents the area from thriving. The residents and land owners deserve peace of mind that our properties will not be damaged. I get very anxious with heavy rain events as so many other owners, which could easily be avoided, by taking relatively cheap and easy measures.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
41	We have lived in our residence 50 % of the time for 9 years now in Hay Ave. Our property has flooded 8 times. The difference between the river mouth being opened at the time of the flood is substantial. We have experienced 4 floods ranging from 300mm to 800mm and four floods with less impact from 10mm-200mm. The latter being with the heads open. The higher the rainfall the greater the time it takes to recede. It is evident to me that minimal damage occurs when the heads are open.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
42	as a priority, it needs to achieve a permanent opening of the river. I have experienced eight floods, most of which are not recorded by council. When the entrance is open, the flood impact is significantly lower.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
43	I am appalled at the draft product after 3 years of development. I live in Shoalhaven Heads, and I am very disappointed in the content within the plan for items around Shoalhaven Heads. We have been told via the CCB by councillors that the community needs to let the CMP team know what community items are required. If items are not included within the CMP at the time of publication, those community items will not be included in =budgeting or inclusion in work programs. The Heads community was mobilised to attend community information sessions to provide feedback of items to be included within the CMP. The draft document does not reflect community requests and the document has been 'doctored' by council staff to reduce the amount of works and to change other items to reflect designs that are not welcomed by the community. I am an advocate for boating facilities within the Lower Shoalhaven. There are 14 boat ramps in this area. Most ramps are not compliant with NSW Maritime and NSW Govt Guidelines for the provision of boat ramps. I note with the draft that there are only 3 items relation to boat infrastructure, 2 being studies (more reports!) and 1 education program. The total budget for 10 yrs is $700k. $700k for 14 ramps and installation of new facilities is a joke..... This is very disappointing as the Shoalhaven is the most under resourced waterways in NSW. Being only 2 hrs from Sydney, there is a very big opportunity to expand the tourism attraction for the river and to boast the local business economy. Come on Shoalhaven Council, lift your game!	The CMP has been developed through extensive community consultation and technical studies to ensure a balanced, evidence-based approach to managing coastal issues, including boating infrastructure. Recognising the importance of boating facilities, the CMP includes Action BOAT_37, BOAT_38 and BOAT_40, which provide for: - Review and upgrade of existing boat ramp infrastructure to improve usability and compliance with NSW guidelines. - Assessment of asset condition and resulting improvements where they are most needed. - Boating education programs to support responsible use and navigation safety. While funding is limited, the CMP provides a framework to seek additional investment and ensure that boating infrastructure remains a key consideration in future planning and grant opportunities. The CMP identifies the Boating Infrastructure and Dredging Scheme as a key potential funding source. Funding streams within that scheme include: • Boating Infrastructure for Communities Grants Program • Boating Infrastructure Maintenance Grants Program • Boating Infrastructure Emergency Repair Pool Scheme The CMP does not replace Council's role in maintaining and upgrading boat ramps but ensures a strategic approach to coastal and estuarine asset management. Importantly, the grants can be applied for at any point in time throughout the lifecycle of the CMP, when the funding opportunities are open for application. The competitiveness of applications will rely heavily on the strategy being proposed for these assets holistically across the Shoalhaven, and the suite of CMPs across the LGA are a great supporting document for such grant applications.	The budget for BOAT_38 has been increased.
44	It always was open when I was young	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.

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Comment ID	Comments		
45	1) Coastal Swamp 2) Flood Mitigation Drain exiting near Council Caravan Park 3) Sand fans from numerous storm water and flood mitigation drains along River Road 4) River Road Channel is moving closer to the high bank 5) Clearance of flood debris from the riverfront following floods 6) Maintain public access to the river while keeping a small area free of mangroves 7) Boating 8) Water Quality 9) Dredging of silts at the entrance that are not being scoured by floods 10) Entrance management for flooding (EMP) 11) Enhance public access points along the foreshore 12) River erosion upstream and in Berry's Canal 13) Costings related to Shoalhaven Heads erosion, access, and tourism 14) Stormwater Drains	See response to comments 77.1-77.14	
46	I mentioned it previously many times and also in your community meetings. It seems illogical that the erosion at Burrier is being neglected in this management program as it obviously effects downstream within your area. I've mentioned this many times but seems to be ignored.	Unfortunately, the site at Burrier is not within the mapped coastal zone under the Resilience and Hazards SEPP, and therefore legislatively cannot be considered an action under the CMP. However, based on submissions received, the site is still being referred to in the CMP, highlighting the impact it has on estuary health. This will ensure the CMP supports this action, while noting it is not a formal action in the CMP	The Burrier erosion site has been specifically noted in the CMP – in the detailed description of the suite of bank stabilisation works on public land (BE_43).
47	By the time the water level is currently recorded the river has already rise and flooded our oyster farms and most of Greenwell point houses. We take months to recover from that loosing sales due the river being closed for months.	A permanent opening at Shoalhaven Heads is not supported in the CMP due to environmental, engineering, and regulatory constraints. Entrance management for flood mitigation is considered within the Floodplain Risk Management Study and Plan, which assesses the effectiveness and impacts of different opening strategies. While the CMP acknowledges the needs of the oyster farming industry, maintaining a permanently open entrance would have significant consequences for estuary health, sediment transport, and habitat stability. Instead, the CMP supports entrance management where it can be demonstrated to provide clear benefits while balancing environmental and coastal process considerations. In addition, the CMP includes several actions that directly support the oyster industry, such as water quality improvement initiatives (ENV_42), stormwater and catchment management development controls (ENV_51), and septic system performance assessments (ENV_44), all aimed at improving estuarine health and supporting sustainable aquaculture. Other broader scale options that would support the oyster industry include ENV_58 which aims to reduce acid and blackwater runoff from drained floodplain areas.	No update to CMP required.
48	We need this open to save our homes in Greenwell Point.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). An object of the act is to consider future risk around climate change, like SLR, and this is highly considered within the CMP process and resulting document. Action CTF_08 specifically identifies Greenwell Point as an area where long term adaptation planning is required to ensure a coordinated response to rising sea levels.	No update to CMP required.

From Submissions		Response	Report Update Status
Comment ID	Comments		
49	Please refer to the Riverwatch letter dated 18 August 2024 to The Manager Environmental Services at Shoalhaven City Council outlining our serious concerns about the report on the Lower Shoalhaven River.	The CMP recognises the concerns around bank erosion and the impact of boating activity. Bank restoration is a key focus, with multiple actions dedicated to stabilisation efforts throughout the Lower Shoalhaven. The plan incorporates a range of approaches, including nature-based solutions and engineering interventions, ensuring that restoration efforts are tailored to site-specific conditions. Council has advocated for more restrictive boating rules to mitigate erosion, particularly from wakeboarding activities. Transport for NSW (TfNSW) are the regulatory agency responsible for implementing maritime safety. In this area, , TfNSW has indicated that its preferred approach is to support educational campaigns rather than introduce additional restrictions. Action ENV_62 includes an estuary education program that will target responsible boating behaviour to reduce environmental impacts.	No update to CMP required.
50	Attached is my update for your consideration on the erosion that has occurred on the foreshore of orient point reserve from 29/11/2024 until today 10/2/2025	A new action, BE-43i has been included in the CMP addressing the bank erosion at Orient Point Foreshore Reserve. This action is included in the business plan and a detailed description is provided in Appendix C.	BE_43i has been added to the CMP to address this issue.
51	Bank erosion: Erosion is occurring along the council reserve on the northern side of Orient Point. The residents brought some photos along to show the issue. Erosion is occurring between the groins placed perpendicular to the foreshore. There is also a bare grass stormwater drain running through the site that could also be causing issues. The groins are in poor condition and there is bank erosion in the middle and deposition adjacent to the groins. They mentioned the ongoing issue of erosion of Berry's Canal and siltation downstream in the channel. The foreshore area at Orient Point is opposite Berry's Canal entrance and impacted by high velocity flows. One of the residents has lived in the area since 1960s and has observed ongoing bank erosion over this time with several metres lost. The groins were installed along the foreshore in about 2014/15 by Shoalhaven Council, but this hasn't stopped the erosion, the creek bank has scoured out in the middle section between the groins with erosion still active. They have observed mangroves seedlings starting to grow between the groins, but these are then always washed away by the next flood as velocities are high. They are concerned about ongoing erosion and risk of inundation at the site. There is also a sewer main running through the reserve which could become at risk. They would like the CMP to consider a better engineering solution for the area, with some appropriately designed bank protection rock work. They are concerned that the current rock groins were not well designed and do not seem to be effective. Apparently, the groins were initially meant to be longer but this wasn't possible due to site constraints. They noted that several metres of bank has been lost since the groins were installed. Wake from boats also contributes to erosion in the area. They noted that over the time they have lived in the area, larger boats are becoming more common, and wake can be an issue at high tide. They noted that erosion was more of a risk at this site than other areas where works were proposed in the CMP. Shoalhaven heads entrance management: They would like to see improved management of the entrance opening at Shoalhaven Heads as they believed this impacted on flood water levels. They would like to see entrance management also consider Tallowa dam water levels and whether the dam was going to spill. There should also be improved considerations of weather conditions and modelling of different scenarios. Development: Concerns were raised in general about the impacts of ongoing development and creation of more hard surfaces and the impacts this has on stormwater. They are concerned that there is not appropriate consideration of stormwater and incorporation of detention basins. New DAs need stronger development controls for stormwater management.	Bank erosion: The CMP acknowledges erosion concerns at Orient Point, and Action BE_43i has been included to support bank stabilisation works along the Orient Point Foreshore Reserve near the groynes. This action aims to enhance shoreline stability while considering environmental, recreational, and community values. Shoalhaven heads entrance management: The Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). Development: The CMP includes Action ENV_51, which focuses on improving development controls for water quality and stormwater management. This ensures that future developments incorporate best-practice stormwater treatment to minimise impacts on estuarine health.	BE_43i has been added to the CMP to address this issue.

From Submissions		Response	Report Update Status
Comment ID	Comments		
52	Flooding in the area as the cost of insurance and the state of the river	Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
53	BE.43F: Channel is only about 6 metres wide. At right of map given to residents is a small bay with lots of mangroves but this area is eroding badly and on the corner where on the map is access ways at right are quite steep. Needs another garbage bin at other end of reserve. Fix the rock wall. Mangroves have not helped erosion on right corner in bay. Rock bags would be better.	The CMP acknowledges foreshore erosion concerns at this site, and Action BE-43f is being updated to reflect ongoing works funded by a DPIRD Fisheries grant. These works are focused on improving fish habitat, water quality, and include nature-based solutions to improve bank stabilisation. The riparian fencing works have been mindful to retain access to the foreshore at strategic locations through formalised access points, while keeping access at the western, sandy end of the foreshore unrestricted. Riparian revegetation has been shifted further east to provide additional bank stabilisation support at the corner you have referenced. Future improvements to the rock wall will depend on monitoring outcomes and funding availability. While the rock wall structure appears aged, there is no immediate need for reconstruction. Maintenance on the existing structure is considered as part of this action. While this channel is not a TfNSW recognised navigation channel, the potential impact of the mangroves on this channel will be monitored.	Action BE-43f has been updated to reflect ongoing works funded by a DPIRD Fisheries grant
54	Open the Shoalhaven river, keep it open with 2 concrete block groynes like (lake Illawarra). Not only will the river flourish, people will flock here. Shoalhaven heads is already beautiful, imagine with an open entrance. Lake Illawarra went from a smelly lake to a pristine area that resembles foster/Tuncurry.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
55	CMP process: Felt that the CMP was not taking a holistic approach and that some actions were more like band aid solutions. This was generally related to concerns about changes to the morphology of the river. They mentioned areas of the river where sand bars were getting larger – near Comerong Point and where the sediment drops out after it flows through Berry's canal towards Crookhaven entrance. They thought than instead of rock revetments to protect eroding banks council should consider whether it was feasible to dredge and reuse sand from sand bars within the river. They thought this option could be more effective/less expensive than rock protection works. They suggested nourishment should be considered along the creek bank near Bolong Road as the rock protection works have been failing.	The CMP takes a holistic, evidence-based approach to managing river morphology and erosion. Sediment dynamics, including sand bar formation and deposition near Comerong Point and Crookhaven entrance, are complex and influenced by natural estuarine processes. Rock protection works are suggested for stabilising high-risk erosion areas, but the CMP also includes beach nourishment and nature-based solutions where appropriate.	No update to CMP required.
56	Crookhaven Heads Aboriginal Site: Has lived in the area for a long time and believes that the rock structure at Crookhaven head entrance is an Aboriginal fish trap. Note. This is the area where there is a living shoreline proposed, so if this if correct we would not want to impact on this structure.	This has been brought to the attention of local Aboriginal community leaders and will be investigated as part of the planning for BE_45	Incorporate this information into BE-45 and this submission
57	Water quality and urban run-off: Has oyster leases at Shoalhaven Heads and is concerned over water quality issues from the creek that drains through the urban area at Shoalhaven heads as this impacts on whether she can harvest the oysters. Would like to see mitigation of water quality issues from here. Had previously suggested to council that they could divert some of the flow into another drain that drained into the dunes.	The CMP includes Action ENV_51, which focuses on improving development controls for water quality and stormwater management. This ensures that future developments incorporate best-practice stormwater treatment to minimise impacts on estuarine health.	Shoalwater comment
58	Mangroves: Is supportive of the living shoreline action. Is currently a community member involved in the removal of mangrove saplings from the foreshore, however doesn't think the area is inviting recreationally and is supportive of a living shoreline like the Wagonga Inlet one.	Support for action BE_46 is acknowledged. After further consideration, and based on feedback during public exhibition, the living shoreline action is being re-crafted as a less expensive option that will still serve to activate the area for multiple benefits including recreational amenity, environmental values, and public access. This cost reduction considers that this site requires less capital works than the Wagonga Inlet project that the draft budget was based on.	The budget and scope associated with BE_46 has been reduced based on further consideration of the site and in response to community submissions.

From Submissions		Response	Report Update Status
Comment ID	Comments		
59	Boat ramps: Concern about condition of Hay Avenue boat ramp. At low tide can see erosion around the boat ramp. We discussed there would be a review of all the boat ramps but they felt some immediate maintenance was needed. Need for more education/parking control around peak holiday season. At the boat ramp near the Caravan park at Shoalhaven Heads people are not very considerate of other users and take up greater areas than needed when parking so there's no room for others to park.	The CMP acknowledges concerns about boating infrastructure at Shoalhaven Heads. Action BOAT_37 and BOAT_38 outline a plan for reviewing and upgrading facilities, including improving access where feasible. The CMP includes Action ENV_62, which establishes a comprehensive estuary management and ecosystem education program. This action aims to increase public awareness on key coastal and estuarine issues, covering topics such as bank erosion, water quality, responsible boating, entrance management, and habitat conservation. The program will be developed in consultation with stakeholders to ensure broad community engagement and effective information delivery.	No update to CMP required.
60	Boat ramps: Concern over boating infrastructure including boat ramps. Suggested that the action in the CMP (Boat 48) should include more detail on what is actually going to be done for individual assets.	Additional detail on specific upgrades to existing boat ramps is provided in the Stage 2 Study - Boating Study (Rhelm, 2023) which is referenced in all boating related actions.	No update to CMP required.
61	Boat ramps: Concern over Hay Avenue boat ramp - this one is in poor condition	The CMP acknowledges concerns about boating infrastructure at Shoalhaven Heads. Action BOAT_37 and BOAT_38 outline a plan for reviewing and upgrading facilities, including improving access where feasible.	No update to CMP required.
62	Boat ramps: Discussed that there would be consideration of all boat ramp and upgrades/rationalisation. Wharf Road boat ramp should not be a primary boat ramp as this one is near oyster leases and could have water quality impacts, etc on this.	The CMP acknowledges concerns about boating infrastructure at Shoalhaven Heads. Action BOAT_37 and BOAT_38 outline a plan for reviewing and upgrading facilities, including improving access where feasible, and considering a range of factors including reducing environmental impact of boating infrastructure.	No update to CMP required.
63	Entrance management: Concern over management of the entrance and difficulties in opening before flooding events. Mentioned a flood event in 2020 when there was an attempt to open the entrance but due to tide conditions/ocean conditions it did not scour on first attempt until the following low tide. Understands that its not always safe for staff to open the entrance as it may be night time, etc. but feels that's whether the entrance is open does make a difference to flood levels. Was watching the gauge levels at Shoalhaven Heads and Greenwell Point during this event and said it was 400mm higher at the Heads when the entrance was closed. Suggested that Council should also consider if the dam is overtopping. There was a large rainfall event in 2020...(maybe 400mm in 2 days?) and Tallowa dam was also overtopping. Said there are a lot of low lying properties around Greenwell Point, used to be small holiday homes but people have developed them and added extensions. Was interested to see the study of the property levels as had seen council out surveying. Interested in seeing the information on modelling of different entrance conditions on flood levels when this is completed. We talked about breakwalls and permanent entrances and examples of issues arising from this at Lake Illawarra.	The Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
64	Greenwell Point action: Generally supportive of the actions proposed around Greenwell Point. Felt the climate adaption strategy was probably not an issue during their lifetime but not against the action. Mostly interested in changes to water levels depending on whether or not Shoalhaven Heads are open (see above comment)	Your feedback is acknowledged and appreciated. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
65	Creek/ riparian condition: Concern that the creek that runs through Shoalhaven Heads, under the main road near Tall Timbers, is overgrown with weeds and debris. Suggests this needs maintenance as it over flows onto the road. Discussed that it sounds more like a general maintenance issue rather that a CMP issue.	Maintenance of flood gates and the associated drainage structures is provided for in action CTF_16a. The drain at Shoalhaven Heads has been identified as a priority location of maintenance.	No update to CMP required.
66	Living shoreline at Shoalhaven Heads: Discussed the living shoreline idea and looked at pictures with the boardwalk example from Narooma. Thought this sounded like a good idea for the area.	Support for action BE_46 is acknowledged. After further consideration, the living shoreline action is being re-crafted as a less expensive option that will still serve to activate the area for multiple benefits including recreational amenity, environmental values, and public access. This cost reduction considers that this site requires less capital works than the Wagonga Inlet project that the draft budget was based on.	The budget and scope associated with BE_46 has been reduced based on further consideration of the site and in response to community submissions.

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67	CMP process: 2 residents said they would like an extension to the timeframe for comments. It is a very busy time of year for oyster farmers getting ready for pre xmas harvest and said they would not have time to look through the large CMP document.	The exhibition period has been extended to provide sufficient time for the public to consider the report and provide informed submissions. Public exhibition was extended 71 days beyond what is legislatively required.	No update to CMP required.
68	CMP process: Make sure there are no acronyms on the display materials or that they are explained. There were some acronyms – HHWS, SLR, ARI.	Display materials were for the engagement activities supporting public exhibition. Acronyms in the reports have been explained and summarised in an Acronyms table.	No update to CMP required.
69	Need to consult with Marine Rescue for boat ramp rationalisation - a Marine Rescue Rep attended and mentioned that the helicopter pad is next to Crookhaven entrance and this used for emergency response. This boat ramp should be prioritised and needs improvements so it is accessible at low tide.	The importance of consulting Marine Rescue regarding boat ramp rationalisation is acknowledged. The specific need to ensure accessibility at low tide, particularly for emergency response purposes near the Crookhaven entrance, will be considered further. Coordination with Marine Rescue and relevant agencies will be important to ensure that emergency access requirements are prioritised in future planning and funding opportunities.	Marine Rescue has been added as a supporting agency for action BOAT_37.
70	Moss Vale rezoning for subdivision. Resident had concerns over this development and lack of appropriate evacuation options (the report he read says the area cant be evacuated during a flood) and inadequate storm water controls. He was concerned there was not enough funds raised from developers to support appropriate stormwater controls.	The concerns regarding evacuation options and stormwater controls for the Moss Vale rezoning are noted. Flood evacuation planning is guided by the Floodplain Risk Management Framework, which ensures that development proposals consider flood risk, emergency access, and evacuation feasibility. Any rezoning or subdivision approval must align with these requirements and the recommendations of relevant flood studies. Stormwater management is addressed through development controls that require appropriate drainage infrastructure and mitigation measures to manage runoff. Developer contributions are typically allocated to fund necessary infrastructure upgrades, and Council ensures that stormwater controls meet regulatory standards before approving developments. Feedback on these concerns will be considered as part of ongoing planning processes.	No update to CMP required.
71	Moss Vale rezoning for subdivision: Resident had concerns over this development and lack of appropriate evacuation options (the report he read says the area cant be evacuated during a flood) and inadequate storm water controls. He was concerned there was not enough funds raised from developers to support appropriate stormwater controls.	The CMP includes Action ENV_51, which focuses on improving development controls for water quality and stormwater management. This ensures that future developments incorporate best-practice stormwater treatment to minimise impacts on estuarine health. Concerns about flooding from new developments are best addressed through the Floodplain Risk Management framework, which assesses flood risks and guides appropriate land use planning. Council will continue to apply floodplain management principles to ensure new developments do not worsen flood risk.	No update to CMP required.
72	Supportive of the living shoreline action (BE_46) if it includes options for swimming and soft craft access. Considers the action to be a perfect compromise between some Community members support of the removal of mangroves, and the environmental / recreational values of the area.	Support for action BE_46 is acknowledged and appreciated. After further consideration, and based on feedback during public exhibition, the living shoreline action is being re-crafted as a less expensive option that will still serve to activate the area for multiple benefits including recreational amenity, environmental values, and public access. Options for swimming and soft craft access will be considered in the implementation of the design of this action. This cost reduction considers that this site requires less capital works than the Wagonga Inlet project that the draft budget was based on.	The budget and scope associated with BE_46 has been reduced based on further consideration of the site and in response to community submissions.
73	I support opening the river for environmental flow and flood mitigation	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.

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Comment ID	Comments		
74	as this is the only narrow channel boats can use it would be a hazard to navigation if mangroves are established. Mangroves would also impact on river views. Rockwall needs repair first. Consider mangroves further west where the stormwater drains. Thats where they naturally occurred but got pulled out.	The CMP acknowledges foreshore erosion concerns at this site, and Action BE-43f is being updated to reflect ongoing works funded by a DPIRD Fisheries grant. These works are focused on improving fish habitat, water quality, and include nature-based solutions to improve bank stabilisation. The riparian fencing works have been mindful to retain access to the foreshore at strategic locations through formalised access points, while keeping access at the western, sandy end of the foreshore unrestricted. Future improvements to the rock wall will depend on monitoring outcomes and funding availability. While the rock wall structure appears aged, there is no immediate need for reconstruction. Maintenance on the existing structure is considered as part of this action. Concerns about access, view impacts, and sedimentation have been noted. Following this feedback, riparian fencing heights have been decreased to reduce visual impacts, and low-lying native vegetation will be planted along the foreshore. The informal channel will not be impacted by the mangroves. It is noted that mangroves exist in the intertidal zone and as such will not impede on navigation.	Action BE-43f has been updated to reflect ongoing works funded by a DPIRD Fisheries grant
75	Keep the heads open	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.

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Comment ID	Proposed MGMT Action	Community CMP Rep. Response	ID		
76.1	Monitor/maintain existing foreshore protection structures at Greenwell Point	Regular monitoring and maintenance of these structures may cost more than $11.7k/year especially repairing major flood damage. Not mentioned at any CMP meetings(?)	BE-17	This action was identified to address a recognised need to maintain foreshore protection assets due to the critical role they play in managing erosion and flooding. The allocated budget has been determined with input from experienced coastal engineers and covers routine maintenance, not full replacement or upgrades. Should the structures fail over the life of the CMP, additional funding would be sought in response.	No update to CMP required.
76.2	Support private land stabilisation/restoration	$50k is nowhere near enough to cover all those areas of private land especially when funds of $10.7 million has been allocated to only four (4) Council managed land areas. SCC areas not mentioned at any meetings?	BE-38, BE-43a, BE-43b, BE-43c, Photo	The $50k allocation is funding for Council to support and facilitate small-scale private land stabilisation, for example, where private works align with planned works on Council land. The $10.7M is for Council-managed assets and includes all stages of the action included investigation, design, construction and maintenance. Broader funding remains the responsibility of private landowners, but additional support opportunities are provided in the CMP including working with LLS. SCC areas have been identified in Stage 2 and have been presented to the committee.	No update to CMP required.
76.3	Berry's Canal Adaptation Strategy. Bank stabilization and adaptive plans.	Are we spending $120k to advise all stakeholders that Council wont try do anything besides hold workshops & forums to tell them to adapt because they will continue being subjected to unavoidable land loss? Potential retreat scenarios? It makes sense that reducing the volume of water going down Berry's canal will definitely assist in reducing the current damage. Wouldn't a permanent opening at Shoalhaven Heads mitigate or at the very least reduce erosion at Berry's Canal? Refer to Nittin & Cox 1986 Report for solutions.	BE-42	A permanent opening at Shoalhaven Heads is not recommended in the CMP due to environmental, engineering, and regulatory challenges. Adaptation planning for Berry's Canal is therefore required. This action supports a coordinated approach for both public and private landowners, including assessing land loss risks, developing site-specific adaptation plans, and integrating outcomes into asset management plans. This action includes stakeholder engagement, community education, and long-term strategy development to manage land loss effectively.	No update to CMP required.
76.4	Boating education measures to reduce impacts of bank erosion.	Additional recreational craft boating speed limit signage and compliance by TfNSW may be a better way to spend $50k. In order to obtain a boat licence a person needs to know all about speed limits, signage etc, so all we are doing is giving water craft drivers a refresher course. Council has advised that the Dept. of Transport for NSW is not interested in providing either increased signage or compliance?	Boat-40	This action enhances existing education and awareness programs for boaters, focusing on the impacts of boat wakes on bank erosion and responsible boating behaviour. It includes promoting existing TfNSW educational materials, supporting their Boating Safety Officers' activities, and exploring additional signage at boat ramps. TfNSW remains responsible for enforcement, signage, and navigational aids. The CMP action aligns with their existing programs and does not duplicate compliance efforts.	No update to CMP required.
76.5	Nil inclusion in the CMP	An effective Plan of MGMT needs to be initiated when proposed upstream works may cause excessive flooding and erosion downstream as highlighted by the damage caused by the recent Nowra Bridge works. Not considered for inclusion into the CMP.	CTF-18	For all major works, the environmental legislative approval process requires an assessment of potential erosion and flooding implications, with mitigation measures identified as part of the project's environmental management plan. Any erosion or flooding impacts from the bridge works fall under the responsibility of the project's proponent and relevant approval authorities. Council will continue to monitor downstream conditions and liaise with agencies where required.	No update to CMP required.
76.6	Support private land bank stabilization and restoration	River bank erosion causing bank and vegetation degradation needs to be urgently placed on a higher priority than it currently stands. The community is losing land and vegetation at an alarming rate with extremely little or no action taken except being told to adapt. Maintenance dredging could be used to replenish.	BE-36, BE-38 & 42	The CMP prioritises bank stabilisation and riparian vegetation enhancement, with a significant portion of the budget allocated to these actions. These approaches provide long-term erosion control while maintaining natural estuarine function. Maintenance dredging is not included as a stabilisation measure due to potential unintended consequences, including increased erosion in adjacent areas, disruption to aquatic habitats, and the high cost of ongoing sediment management. However, maintenance dredging in front of boat ramps is noted in action BOAT_38. Additional wording has been added to support beneficial re-use of this sediment if feasible, noting that it is only small volumes.	Additional wording has been added to support beneficial re-use of this sediment if feasible, noting that it is only small volumes.

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76.7	Nil inclusion in the CMP	Shoalhaven Heads River Rd channel is moving closer to the high bank causing erosion and major tree loss. The Council suggested beach nourishment will not solve the issue and be swept away in the next flood. The 2021 'Shoalhaven Heads channel dredging and beach nourishment' report by Royal Haskoning DHV was not carried out by council? Also, the study (pg 47 & 48) suggests that the current channel is suitable under most conditions (i.e., when its calm). What happens when you venture out in calm conditions and a storm hits and you're trying to get back to the boat ramp at low tide with a couple of wet and frightened grandkids in the boat? Public safety? Not considered for inclusion in the CMP but needs to be.	BE-43e/BE-44 recommends beach nourishment only. Pg-47 & 48	The recommended management approach to address the erosion includes beach nourishment, stabilisation, and revegetation, consistent with best practice guidance from WRL (2022, 2017). These actions aim to slow erosion, maintain foreshore stability, and minimise ongoing sediment transport that could impact navigation. The CMP also provides for this nourishment to be completed twice during the 10 year life of the CMP in recognition of the temporary nature of nourishment activities. It is important to note that the Royal HaskoningDHV (RHDHV) report from 2021 was the first step in a staged process to determine the feasibility of dredging the navigation channel adjacent to River Road, Shoalhaven Heads. The work completed by Royal HaskoningDHV considered several factors for the management of this foreshore in a holistic manner, identifying potential benefits, such as improved navigation and foreshore amenity, and concluded that a pre-dredging feasibility study was required to further investigate the possibility of dredging and the relevant environmental approvals pathway. As a result of recommendations from RHDHV (2021), Council engaged Advisian to undertake a coastal and maritime engineering investigation. This involved a more detailed navigation assessment and evaluation of the feasibility of multiple dredging and nourishment options to improve boating safety, access and recreational amenity. The Advisian report (2024) presents a qualitative multicriteria assessment of options for maintaining the channel including maintaining the current channel ('do nothing'), and several scenarios to achieve a deeper channel in some areas, with and without beach nourishment of the foreshore. The assessment determined that in most weather conditions, the channel was safe to use for vessels up to 8m in length, indicating there was no requirement to dredge the channel to improve navigability. The report notes that the current channel would restrict navigation access for 8 m vessels during low tide conditions with an open and scoured entrance, and during a storm with a 20-year return interval, however, navigation would not be impeded on for vessels less than 6 m in length. In the unlikely event that these physical conditions all coincide, and a boat user is recreating on the waterway an 8m vessel could use the nearby Hay Avenue / Wharf Road Boat ramps as alternative safe access points. Furthermore, consultation with NSW State Government agencies during the pre-dredging feasibility study determined that due to the absence of a navigation/safety risk during normal estuarine conditions, the unlikely scenario of an 8m vessel navigating the channel in significant storm conditions, and the negative impacts on the environment (seagrass), these agencies would not support dredging within the Lower Shoalhaven River, adjacent to River Road, Shoalhaven Heads, in line with relevant legislation and associated environmental planning instruments. For these reasons, the "do nothing" option is the recommended approach in the Advisian report (2024), and this recommendation has been carried forward into the CMP. Action BOAT_38 and ECON_14 supports ongoing monitoring of navigation channels, and continued collaboration with the relevant State Government Agencies on boating safety and navigation. Ongoing monitoring will occur throughout the lifecycle of the CMP, and if navigational channels are determined to be unsafe, then the channel may be subject to maintenance dredging.	No update to CMP required.

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76.8	Nil inclusion in the CMP	Sand fans from Council's stormwater drains along S/Heads River Rd are causing erosion and filling the navigation channel. Sand scraping has been recommended by MHL. The community needs this action to be included in the CMP.	Nil	Operationally this isn't supported due to the small amount of sediment that would be recovered, at a relatively significant cost. Additionally, Council has assessed the viability of dredging of the sand fans at the stormwater drainage outlets along the Shoalhaven River through consideration of technical studies and legal permissibility under the relevant NSW legislation, including but not limited to, the Fisheries Management Act 1994 and Crown Land Management Act 2016. As the stormwater outlets along the foreshore are not considered canals and the sediment build-up is not preventing effective discharge from these outlets, dredging of this channel could only be sought for the purposes of navigation Action BOAT_38 supports ongoing monitoring of navigation channels. Ongoing monitoring will occur and if the sand fans encroach upon and impede navigation, then the channel may be subject to maintenance dredging as the justification will be clearer.	No update to CMP required.
76.9	Implement Entrance MGMT Policy at Shoalhaven Heads	The community totally disagrees with the Council/Rhelm version of the EMP and spending $250k on something the community doesn't want sounds a little counterproductive. Both Council and Rhelm have failed to listen to the community who have lived and learned through past events. Trigger levels and securing a workable EMP are the main points of contention. There is no flexibility in the existing plan. Past data demonstrates that an open entrance at the start of flood means lower levels and less damage.	CTF-01, CTF-02, CTF-06, CTF-12, CTF-15, CTF-17	The $250k allocation in the CMP is for the implementation of the updated Entrance Management Policy (EMP), not its development. The updated EMP is still being developed, with details to be confirmed as part of the Floodplain Risk Management Study and Plan. The CMP supports entrance management for flood mitigation, ensuring Council has the resources to open the entrance when trigger levels are met. Without this funding, Council would not be able to respond (operationally) when required. We understand the community's concerns about flooding and the desire for an open entrance at the start of a flood. Past experiences suggest this may help reduce water levels; however, entrance openings must be managed carefully to ensure they are effective and supported by regulatory authorities. The Floodplain Risk Management Study will use best practice flood modelling to assess flood risk and guide decision-making, ensuring that entrance management remains an effective tool for flood mitigation.	No update to CMP required.
76.10	Enhance urban stormwater treatment through infrastructure development and water sensitive urban design.	There are future proposed developments being currently assessed by Council which the community are positive will attribute to increased flooding. According to locals, these developments will require careful reassessment, with one such proposed development being the 'Moss Vale Rd development' which feeds directly into Abernathy's Creek, which in the past has flooded both Manildra and the surrounding properties numerous times.. Also Councils proposed remediation of the concrete culvert at Manildra (Tender 77628E) will reduce flow and possibly increase flooding.	ENV-42, ENV-51, Tender 77628E, CTF-09	The CMP includes Action ENV_51, which focuses on improving development controls for water quality and stormwater management. This ensures that future developments incorporate best-practice stormwater treatment to minimise impacts on estuarine health. Concerns about flooding from new developments are best addressed through the Floodplain Risk Management framework, which assesses flood risks and guides appropriate land use planning. Council will continue to apply floodplain management principles to ensure new developments do not worsen flood risk.	No update to CMP required.
76.11	Nil inclusion in the CMP	The community requests that urgent maintenance works need to be initiated on flood mitigation drains, which in a Council survey were found to be in poor condition and requiring maintenance which has not been carried out by Council's City Services Directorate. This action was brought to Council's attention back in February 2024. Shoalhaven Heads flood mitigation drain is a prime example which failed the Councils survey, with 30% deemed to be poor to very poor with other areas being Coolangatta, Pyree and Numba.	Email to Council, CTF-05 (Should be part of CTF-16a)	The CMP includes Action CTF-16a, which identifies the need to review and maintain floodgates and drainage infrastructure. The Shoalhaven Heads flood mitigation drain is expected to be addressed under this action, with Council assessing and prioritising maintenance needs through asset management planning and systems.	No update to CMP required.
76.12	Climate change adaptation strategy at Greenwell Point	Plan only, no works.	CTF-08	SLR impacts are not yet a pressing issue for Greenwell Point but will become more significant over time. This strategy ensures a proactive approach to future adaptation, guiding long-term management and funding opportunities beyond the CMP's 10-year timeframe.	No update to CMP required.
76.13	Maintain planning controls to reduce future coastal hazard impacts	Implement/maintain planning controls, including appropriate zoning and assessment in proposed developments.	CTF-09	The action description includes "Implement".	No update to CMP required.

From Submission				Response	Report Update Status
Comment ID	Proposed MGMT Action	Community CMP Rep. Response	ID		
76.14	Review/update all asset MGMT Plans	I was led to believe that this action was carried out as part of Council's normal operating procedures? $425k	CTF-16	The budget for this action is initially to support Council to develop/ update the asset management plans, and then to implement it with $40,000 allocated each year. This has been included as an estimate, but by nature, asset maintenance would have variable costs each year. The idea is that this will improve Council's financial planning and lead to better outcomes from the services the assets provide. Budget may be used to engage external resources to support specific works where specialised advice is required.	No update to CMP required.
76.15	Review/update floodgate and associated drainage infrastructure Asset MGMT Plans	I would have thought that this action was covered under CTF-16 which covers ALL assets.	CTF-16a	This is a sub-action, directly related to CTF_16 but with additional asset specific detail to help develop and implement the assets maintenance. An additional $15,000 per year has been allocated specifically for this asset class.	No update to CMP required.
76.16	Develop/implement program for coastal assets/infrastructure monitoring	This one does flood gates as well as other items covered under CTF-16 & CTF-16a? Programming only, no maintenance mentioned.	ECO-08	This is focused on developing a monitoring program to inform the asset management and maintenance.	No update to CMP required.
76.17	Update Council Plans of MGMT for locations in the coastal zone to support the objectives of the CMP	Update relevant Plans of MGMT for seven (7) areas. Why is Shoalhaven Heads not included in this action?	ENV-21	PoMs are developed for Council owned land, or council managed Crown Land. The public land in Shoalhaven Heads is covered under the Generic Council Managed Crown Lands PoM. Hence, Shoalhaven Heads is included.	No update to CMP required.
76.18	Nil inclusion in the CMP	Ensure that all the crossovers between the Floodplain MGMT Plan (still to be delivered) and the Coastal MGMT programs are included into the Lower Shoalhaven CMP. The community is concerned with all the flooding issues affecting Shoalhaven Heads and multiple other areas which are far from resolved. The CMP cannot be finalised until the Flooding issues are resolved and integrated into the CMP	Nil	There are many other issues addressed in the CMP and delaying it to wait for the FRMSP would delay important action. The two plans also address different issues, although there is definitely overlap, especially with entrance management. The CMP is structured to automatically support implementation of the FRMSP Entrance management recommendations, which will be evidenced based and exhibited to the community for comment through a separate public exhibition phase.	No update to CMP required.
76.19	Nil inclusion in the CMP	The flood mitigation drain near the Council caravan park is causing erosion and degradation. The community suggestions were to extend the drain pipes or do regular maintenance. Both actions rejected by Council.	CTF-16a, ENV-58	Regular maintenance will be supported by action CTF_16a. ENV_58 is more for floodplain adaptation via floodgate removal, not likely to be occurring in Shoalhaven Heads.	No update to CMP required.
76.20	Breakwall at Shoalhaven Heads	The community want a permanently open entrance at Shoalhaven Heads. Council and Rhelm have decided to use the Lake Illawarra Entrance Works as an example as to why the entrance at Shoalhaven Heads should not be opened. The reasons are due to the perceived impacts as follows:	CTF-01	Shoalhaven City Council referenced the Lake Illawarra permanent entrance opening as a case study in the Draft CMP specifically to highlight the complex and costly implications associated with establishing and maintaining such a significant intervention. Lake Illawarra's entrance management experience provides relevant insight into potential hydrodynamic and sedimentation issues, infrastructure requirements, ongoing maintenance demands, and associated financial costs. It exemplifies how permanent structural interventions, though beneficial in certain contexts, necessitate considerable and sustained investment, management commitment, and the possibility of unintended environmental impacts. The Water Research Laboratory (WRL) Technical Report (2015) "Management Options for Improving Flows of the Shoalhaven River at Shoalhaven Heads" considered various environmental processes likely impacted by a permanent entrance opening at Shoalhaven Heads. The report thoroughly assessed several critical factors, including tidal and flow regimes, sedimentation and erosion dynamics, ecological habitat implications, and water quality. Key findings from the WRL (2015) report include:	No update to CMP required.
76.21	Alteration of tidal and flow regimes	When Lake Illawarra was closed which was most of the time, there was No tidal or flow regimes and all you could smell was rotting seagrasses, there were no prawns, depleted fish stocks, algal blooms, fish kills swimming wasn't recommended. The Lake Illawarra Authority spent a considerable amount of money removing rotting seagrasses from the shoreline following community complaints.. Also with the Lake closed there were quite a number of flooding issues with the Lake having to be mechanically opened quite a number of times. This has all been turned around since the Lake was permanently opened	-		
76.22	Destruction of valuable estuarine habitat	What habitat are we talking about? When the Lake was closed there was no estuarine habitat with the sand stretching from the Windang Bridge all the way to Windang Island, approximately 800 metres. Now with a permanent entrance with breakwalls you have an enhanced and diverse fish habitat with sea grasses, barnacles, and other marine creatures all the way to Windang Island.	-		

From Submission				Response	Report Update Status
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76.23	Dramatic changes in sedimentation and erosion trends, threatening navigation and foreshore development	With any open entrance you have the possibility of erosion and sedimentation; however, this can be managed with a comprehensive maintenance program. It is now possible to navigate through the entrance, and foreshore development has thrived with playgrounds, fishing jetties, groynes, picnic shelters, bike paths, and car parks, etc. The Lake Illawarra Entrance is a favourite tourist destination. The difference between Lake Illawarra and the Shoalhaven is the marked difference in water levels and the ocean. These being +0.073m at Windang and -0.091m at Greenwell Point (at 8:15pm 19/1/2025). The difference in water levels between Lake Illawarra and the ocean results in fast flowing tidal water which results in sediment transport and erosion again fixed with regular maintenance. An open entrance at Shoalhaven Heads wouldn't have the same tidal exchange. Also Lake Illawarra has only one (1) entrance whereas the Shoalhaven would have the flow shared between two openings. It's pretty obvious that an open entrance at Shoalhaven Heads would be a win-win for both the environment (Council) and the community. With increased tidal exchange resulting in clean water as well as the added bonus of a reduced flow and therefore reduced erosion at Berry's canal.	-	• Hydrodynamic complexity: Shoalhaven Heads differs significantly from Lake Illawarra due to the presence of Berry's Canal, which significantly diverts river flow to the Crookhaven River. This diversion means maintaining a permanently open entrance at Shoalhaven Heads would be particularly challenging without substantial ongoing management. • Sedimentation and erosion: Establishing a permanent opening would lead to altered sediment transport processes, necessitating extensive and ongoing dredging programs, training walls, or groynes. Previous investigations and estimates provided by WRL identified these interventions as highly costly, with estimates exceeding $33 million in initial infrastructure alone, excluding ongoing maintenance. • Ecological habitat impacts: The WRL report identified that the natural variability of intermittent entrance openings supports a robust estuarine ecosystem at Shoalhaven Heads. Permanent opening could disrupt existing habitats, negatively impacting biodiversity and ecological resilience. • Water quality considerations: The report evaluated water quality dynamics, concluding that existing tidal flushing regimes at Shoalhaven Heads generally provide acceptable water quality, with limited benefit from increased tidal exchange that a permanent opening would offer. Overall, the WRL (2015) assessment concluded clearly that establishing a permanently open entrance at Shoalhaven Heads is not a feasible or sustainable management response, given the substantial costs, ongoing maintenance commitments, and potential ecological disruptions involved. Instead, an adaptive and strategic approach to entrance management that balances flood mitigation, ecological health, and water quality was recommended as the most prudent long-term strategy. This is currently being addressed by Council through its Entrance Management Policy review.	
76.24	Suggested Man Made Drain Remediation	It's unclear as to the exact time the drain was constructed; however, it was initially designed to drain the water from Coolangatta Mountain and Coomonderry Swamp so the township of Shoalhaven Heads could be developed. Obviously, the township has developed into a bustling community and is now a lot larger than the drain was originally designed to deal with.	-	Flooding Flood risk is generally addressed in the Floodplain Risk Management Framework and is outside the scope of the CMP. Water Quality Considerations The drain lacks stormwater treatment infrastructure (e.g., Gross Pollutant Traps), but most adjacent land is privately owned, making large-scale interventions challenging. Reports of dark water, odours, and oily films may be caused by natural processes (e.g., hydrogen sulfide and bacterial activity) rather than pollution. Sewerage and Stormwater Management There have been no recorded sewage overflows from the Shoalhaven Heads Sewage Treatment Plant in the past two years. However, flooding near Hay Avenue has caused occasional inundation of the sewage network. This, alongside potential for sewerage overflows, will continue to be managed by Shoalhaven Water through their licence requirements with the EPA and their Regulatory and Assurance Framework from DCCEEW. Shoalhaven Water also works with their regulators to identify and manage risks to sewer overflows. With these systems and processes in place Shoalhaven Water aims to have nil sewer overflows during dry weather and to minimise sewer overflow during wet weather events. Shoalhaven Water has several programs aimed at minimising sewer overflow including sewer relining, emergency storage, pump replacement program and improvements to their major treatment facilities. These programs are all aimed at ensuring sewer overflows are minimised. In addition, Shoalhaven Water has completed hydraulic modelling to inform strategic improvements to the network	No update to CMP required.
76.25	Suggested Man Made Drain Remediation	Compounding the problem, the drain is being overrun and choked with vegetation, causing its cross-sectional area to be greatly diminished.	-		
76.26	Suggested Man Made Drain Remediation	The current situation is that besides the flooding issues, it's a source of poor water quality within the estuary. Stormwater from Scott St, Jerry Bailey Rd, and several caravan parks flow into the drain without any water quality infrastructure such as GPTs in place.	-		
76.27	Suggested Man Made Drain Remediation	There have also been a couple of documented sewerage overflows from the Shoalhaven Water Sewerage treatment plant, which has been built adjacent to the drain.	-		
76.28	Suggested Man Made Drain Remediation	The flooding from sustained rain events causes issues with Jerry Bailey Rd, Shoalhaven Heads Rd, several caravan parks, Bolong Rd, and the large paddock on the corner of Bolong and Shoalhaven Heads Roads. The road closures due to the flooding are more prolonged than in the past, and it took 4-5 months for the paddock to drain.	-		
76.29	Suggested Man Made Drain Remediation	The recently completed drainage repair works in Scott St also highlight the amount of sediment present in our drains, which will eventually end up in the drain, compounding the problems.	-		
76.30	Suggested Man Made Drain Remediation	During a recent flooding event, the water draining through the flood gates was observed to be very dark, if not black in colour, had an effluent smell, and there was evidence of grease and oils.	-		

From Submission				Response	Report Update Status
Comment ID	Proposed MGMT Action	Community CMP Rep. Response	ID		
76.31	Suggested Man Made Drain Remediation	As you are aware, there isn't a great amount of water circulation at Shoalhaven Heads, so a lot of the pollution tends to stick around.	-	however in large rainfall events the system becomes overloaded and, in some areas, completely inundated due to high water levels from flooding particularly in coastal areas. This will continue to be managed by Shoalhaven Water. Asset Maintenance Action CTF_16a in the CMP supports ongoing maintenance of the flood gates and associated drainage, ensuring this site remains a priority in Council's broader maintenance programs. A recent Public Works Authority (PWA) audit and on-ground inspections (Feb 2024) confirmed: • Some restrictions exist, but the drain is not entirely choked with vegetation. • Tidal gates are functioning as designed and are not contributing to drainage delays. • Prolonged flooding in 2022 resulted from exceptional rainfall, not major blockages. Next Steps • Continued ongoing monitoring and maintenance of the 3.3 km of Shoalhaven Heads drains as part of Council's broader flood mitigation program will occur. • Budget bids for drainage improvements based on PWA audit findings • Advocacy will take place for improved stormwater management on private land where feasible. • Implementation of CTF_16a within the CMP will support drainage system maintenance, such as this drain.	
76.32	Suggested Man Made Drain Remediation	To cut a long story short, the water is not discharging in a timely manner and is causing pollution worries for the Shoalhaven Heads Community, which is highly dependent on tourism.	-		
76.33	Suggested Man Made Drain Remediation	Obviously, a study of the situation is required so that an effort can be made to rectify the current problems.	-		
76.34	Suggested Man Made Drain Remediation	There are possibly a few sources of funding, with one being identified from DPI as follows: 'www.dpi.nsw.gov.au/fishing/habitat/rehabilitation/ahr-grants-program'. Look under 'Habitat Action Grants'. I believe this program has closed for 2023.	-		
76.35	Suggested Man Made Drain Remediation	I would greatly appreciate someone from Council getting back to me on the status of this project, which means a great deal to the people of Shoalhaven Heads.	-		
76.36	Nil inclusion	Investigations and a plan to implement changes is urgently required to resolve all the **Sewerage overflows from Shoalhaven Water infrastructure** into the Shoalhaven River, especially causing unacceptable levels of pollution especially during high rainfall events.	Photos	ENV_44 provides for continued implementation of Council's septic performance assessment and regulation. Sewerage overflows will continue to be managed by Shoalhaven Water through their licence requirements with the EPA and their Regulatory and Assurance Framework from DCCEEW. Shoalhaven Water also works with their regulators to identify and manage risks to sewer overflows. With these systems and processes in place Shoalhaven Water aims to have nil sewer overflows during dry weather and to minimise sewer overflow during wet weather events. Shoalhaven Water has several programs aimed at minimising sewer overflow including sewer relining, emergency storage, pump replacement program and improvements to their major treatment facilities. These programs are all aimed at ensuring sewer overflows are minimised. In addition, Shoalhaven Water has completed hydraulic modelling to inform strategic improvements to the network however in large rainfall events the system becomes overloaded and, in some areas, completely inundated due to high water levels from flooding particularly in coastal areas. This will continue to be managed by Shoalhaven Water.	No update to CMP required.
76.37	Continue septic system performance assessments and regulation	A study is required to investigate and manage sewerage flows from septic tanks directly into the Shoalhaven River at Shoalhaven Heads.	ENV-44	See comment above for response from Shoalwater.	No update to CMP required.
76.38	Nil inclusion	Substandard water quality events, which are frequently causing the shutting down of the local oyster industry, indicate that the current status quo regarding sewerage overflows and other pollutants need to change and urgently requires review and intervention. **This action has not been included in the CMP.**	Nil	See comment above for response from Shoalwater.	No update to CMP required.

From Submission				Response	Report Update Status
Comment ID	Proposed MGMT Action	Community CMP Rep. Response	ID		
76.39	Use (ONLY) available resources, including financial and human, considering what is reasonable, feasible, and achievable within resource constraints. Also supplementing from other programs.	**This is one of the most important items affecting the entire community.** Far fewer sites proposed ”reduced from 35+ down to five sites. No objectives based on existing/potential high-risk inflow points. Appears Council/Rhelm are aiming for **bare minimum** to meet State Government requirements. **Industrial discharges are NOT adequately covered** or not covered at all. Council sampling frequency is seasonal, with DCCEEW picking up the all-important Summer sampling ”reporting issues? (signs etc). Will DCCEEW advise the public when results dictate, i.e., signage etc.? One parameter for sampling should be >10mm for rainfall event-based sampling. Enact CMPs MER program $000 allowed. Out of 35+ sampling sites, there are only 20 sites with data five (5) of these sites have readings well above allowable limits. One is 38x the limit for Faecal Coliforms; 129x for Enterococcus, and 3x for Thermotolerant Coliforms.	ENV-43 Pg. C47-51, Photos - sewerage	The proposed study has been designed to track relevant parameters related to estuary health and public safety. The 35+ sites that have data on the Aqua Portal are not consistently monitored, with some sites not having been visited for many years. Industrial discharges are licensed by the EPA with associated monitoring requirements. Additionally, oyster leases are also subject to strict monitoring requirements for food safety reasons. Council's role is to fill the gaps related to estuary health and recreational safety at key locations. It is also important to consider the numerous other waterways that council is responsible for, and to design the monitoring program accordingly to ensure it is actually implemented consistently to best achieve useful outcomes.	No update to CMP required.
76.40	Additional Water Quality Actions	The Hay Ave illegal boat maintenance facility requires signage/policing. No commitment to finding an alternative area. Pollution directly impacts oyster leases.	Councils Aqua Data, Photos	Boat_37 and BOAT_38 will look at alternative areas for boat maintenance and provide a program to upgrade the network of boat ramps in the Shoalhaven and throughout the LGA. Immediate action can be to install signage at this area about enforcement against illegal boat maintenance and the negative water quality impacts.	No update to CMP required.
76.41	Install one trash rack at Shoalhaven Heads Coastal Swamp near Holiday Haven	Only one additional trash rack for Shoalhaven Heads is not sufficient considering the number of stormwater outlets. Also, it appears that the location has been misunderstood by the consultant, with the community requesting a MGMT plan including weed removal and protection.	ENV-42b	The location of this trash rack was determined using a comprehensive constraints analysis to ascertain appropriate sites. The ecological and tourism value of the Coastal Swamp north of the Holiday Haven Caravan Park is acknowledged. The CMP seeks to support these values through action ENV_39 which allows for environmental protection works such as weed management (including supporting community groups). Additionally, action ENV_21 can support these values by ensuring the PoMs support these works in the Council Managed Crown Land such as the parcel where the Holiday Park and Coastal Swamp are.	Wording of ENV_21 has been amended to more clearly to support environmental protection works on Council Managed Crown Lands, such as the coastal swamp near Holiday Haven.
76.42	Inclusion of additional Beachwatch sites	These are Shoalhaven Heads, Greenwell Point “ $100k.	ENV-09	And at The Grotto near Nowra.	No update to CMP required.
76.43	Nil inclusion	There is nothing mentioned in the CMP about addressing the current sewerage spillages from the Shoalhaven Water infrastructure. There needs to be a study, assessment, and implementation in order to reduce spills. Action by Shoal Water.	Nil mention, Photos		No update to CMP required.
76.44	Continue septic system assessments/regulation	Action involves continuation of program $000?	ENV-44	This is considered standard operations and therefore no additional budget has been allocated beyond Council Staff Time.	No update to CMP required.
76.45	Develop/implement water quality controls into future development	Features pollutant reduction targets for future developments, inclusion of stormwater quality improvement devices (SQUIDS) $000?	ENV-51	This is considered standard operations and therefore no additional budget has been allocated beyond Council Staff Time.	No update to CMP required.
76.46	Wetland at Terara	**Investigation/design only “ $75k.** What about other areas of the Coastal Zone, such as Shoalhaven Heads, Bomaderry Creek, etc.? The community has been discussing the possibility of a wetland at Shoalhaven Heads to assist with water quality issues.	ENV-42a	This site was based on an extensive constraints analysis which is described in the Stage 2 report.	No update to CMP required.
76.47	Support multi-stakeholder projects to implement actions in priority subcatchments	Consultation/engagement including educational materials $000?	ENV-58	These large scale, multi stakeholder, private landholder projects are a focus of State Government initiatives. Council's role in supporting these projects is outlined in the project description. Inclusion in the CMP demonstrates council's support of the adaptation planning in the floodplain to support environmental benefits and a coordinated economic transition in response to SLR.	No update to CMP required.
76.48	Beach nourishment at rock wall Shoalhaven Heads	There is $225k allocated for this action but it fails to advise on the timing regarding commencement. It also makes a lot of sense to potentially save a lot of money in cartage and utilize the sand scrapings from the adjacent sand fans?	BE-44	The business plan indicates that this action is to be implemented within 4-7 years, or earlier in response to a large erosion event.	No update to CMP required.
76.49	Install living shoreline at Crookhaven Heads	Not discussed at any official CMP meeting “ $2.4m	BE-45	This was included to build on an existing grant for works in the area.	No update to CMP required.

From Submission				Response	Report Update Status
Comment ID	Proposed MGMT Action	Community CMP Rep. Response	ID		
76.50	Install living shoreline at Shoalhaven Heads	Shoreline cancelled? 5-year permit application approved for mangrove removal. **The community request for the permit to be embedded into CMP.**	BE-46, CS-03	The CMP process does not support the removal of mangroves. After further consideration, the living shoreline action is being re-crafted as a less expensive option that will still serve to activate the area for multiple benefits including recreational amenity, environmental values, and public access. This cost reduction considers that this site requires less capital works than the Wagonga Inlet project that the draft budget was based on.	The budget and scope associated with BE_46 has been reduced based on further consideration of the site and in response to community submissions.
76.51	Develop program for regular monitoring of coastal assets	Program only.	Econ-08	Yes, responsive action to monitoring outcomes is covered in CTF_16 and CTF_16a	No update to CMP required.
76.52	Implementation of the Domestic Waterfront Structures strategy	Community education $000?	ENV-41	This is considered standard operations and therefore no additional budget has been allocated beyond Council/Agency Staff Time.	No update to CMP required.
76.53	Removal of derelict domestic structures	Nil $000 allocated.	ENV-41a	This is considered standard operations and therefore no additional budget has been allocated beyond Council/Agency Staff Time.	No update to CMP required.
76.54	Continued compliance with unauthorized vegetation harm/waterfront works	**Aren't these normal Council operations? $000 allocated.**	ENV-41b	This is considered standard operations and therefore no additional budget has been allocated beyond Council/Agency Staff Time.	No update to CMP required.
76.55	Clear flood debris from Shoalhaven Heads, Greenwell Point, and Orient Point	Debris removal continues to be frustrating for communities and subject to managing to obtain permits, only being deemed necessary at council's discretion, also based on public safety and recreational amenity. Why isn't floating debris a public safety concern when a watercraft can hit partially submerged debris at 4 knots and sustain damage that could sink the watercraft? **Action on this is taking way too long. Only $100k/10 years for the whole estuary?**	REC-03	This action has been crafted to balance the requirements of Fisheries policy and regulation with the public health and safety and community goals.	No update to CMP required.
76.56	Improve public foreshore access to include all ability levels	Subject to funding. $285K allocated over 10 years. Which areas are going to be targeted? Assessment cost and how much will be left for actual works?	REC-04	Targeted areas will be determined during the assessment stage of this action in consultation with relevant stakeholders.	The budget allocated to this action has been increased in recognition of the extent of capital works that would be associated with improving access at identified locations. .
76.57	Boat ramp and facilities consolidation	Review and enhancing existing facilities only.	Boat-37	This action could potentially support new boat ramps, but more likely upgrading of existing assets.	No update to CMP required.
76.58	Boat ramp facility upgrade and asset MGMT program	**Program will only deliver $55k/year spread over all the boat ramps.** Mentions maintenance dredging and facilities upgrade **funding is insufficient.**	Boat-38		The budget allocated to this action has been increased in recognition of the extent of associated capital works.
76.59	Boating education program	Enhancing existing programs $50k.	Boat-40	Yes	No update to CMP required.
76.60	Oyster reef restoration	Suggested bank restoration/stabilization works and habitat enhancement work. So much can happen following floods etc., so isn't waiting 10 years for a review a little too long? How about an event-based review? **There are $000 against this action?**	ENV-63, ENV-64	This action is supported by Fisheries as the lead agency and is in line with Marine Estate Management Strategy. Monitoring of bank works undertaken under the CMP will be subject to the monitoring supported by actions ENV_39, ENV_43and ENV_64.	No update to CMP required.

From Submission				Response	Report Update Status
Comment ID	Proposed MGMT Action	Community CMP Rep. Response	ID		
76.61	Review Councils coastal MGMT planning policies every 10 years	The community would like to see the CMP reviewed intermittently as required and certainly within 5 years. **Floods can cause major changes in a relatively short time.** Should there be any changes required in the CMP, a plan should be in place to adjust the program to suit. $000?	ECON-06	CMP reviews will be undertaken regularly as part of ENV_31. This action notes 10 year CMP review as a minimum. The CM Act (Section 18(1)) and CM Manual requires Council to ensure that the CMP is reviewed at least once every 10 years. However, it should be noted that it may be reviewed and/or updated sooner for any reason, including if there are significant new circumstances which need to be considered.	No update to CMP required.
76.62	Nil inclusion in the CMP	Council will need to develop a **Program of Works** for all proposed works with the process being transparent to allow communities to plan their growth accordingly.	Nil	The CMP is essentially this. When integrated into Council's operational plan and broader IP&R framework, more specific details will be available to the community. This is also supported by action ENV_31, which enables the CMP monitoring, evaluation and reporting program.	No update to CMP required.
76.63	Nil inclusion in the CMP	Maintenance dredging at Shoalhaven Heads, which the community wants and as required in other parts of the estuary.	Nil	Maintenance dredging near boat ramps and in navigational channels is considered in BOAT_38.	No update to CMP required.
76.64	Implement environmental protection works to enhance ecological communities.	The action describes **acquisition and protection of key locations**, support of volunteer-based rehabilitation initiatives, continuation of existing council programs for pest control and weed management, installation of interpretive signage, rehabilitation works in damaged vegetated areas, restoration of riparian vegetation areas, continued estuarine macrophyte mapping, and establishment of a monitoring and evaluation framework. **How is $500k going to cover all that, especially the acquisition part?**	ENV-39	This element of action ENV_39 (acquisition and protection of key locations) has been moved to ENV_58. This is a more appropriate action to address potential acquisition of land as it is related to multi-stakeholder, long term floodplain adaptation.	This element of action ENV_39 has been moved to ENV_58.
76.65	Nil inclusion in the CMP	The community wants the Coastal Swamp at Shoalhaven Heads to have a Maintenance Management Plan for weed removal and the protection of the ecological communities.	Nil	This location is on Council Managed Crown Land and is addressed in the relevant Plan of Management. The wording of ENV_21 has been revised to clearly support incorporating environmental protection works into forthcoming PoM updates.	ENV_21 has been amended to more clearly support environmental protection works on Council Managed Crown Lands, such as the coastal swamp near Holiday Haven.

From Submission					Response	Report Update Status
Comment ID	Item	Inclusion in CMP	Response from CMP	Comment		
77.1	Coastal Swamp This is a sensitive and important ecological environment near Council Caravan Park – Holiday Haven	Deficient	One “Trash Rack” ENV_ 42b to stop rubbish from the street drainage system	Location not understood by consultant. Required for this location: 1)Management Plan for the site to include removal of weeds and protection (can be done by dune care volunteers) 2) Potential for tourism overlooked – this is a bird attracting site (funds from the living shoreline may be redirected to a boardwalk around the coastal swamp)	The location of this trash rack was determined using a comprehensive constraints analysis to ascertain appropriate sites. The ecological and tourism value of the Coastal Swamp north of the Holiday Haven Caravan Park is acknowledged. The CMP seeks to support these values through action ENV_39 which allows for environmental protection works such as weed management (including supporting community groups). Additionally, action ENV_21 can support these values by ensuring the PoMs support these works in the Council Managed Crown Land such as the parcel where the Holiday Park and Coastal Swamp are.	ENV_21 has been amended to more clearly to support environmental protection works on Council Managed Crown Lands, such as the coastal swamp near Holiday Haven.
77.2	Flood Mitigation Drain exiting near Council Caravan Park – Holiday Haven – causing erosion and degraded – suggested options were to extend the drain or do maintenance at regular interval e.g. sand scaping of the sand. Both suggestions rejected.	No	“it is unfeasible to extend the stormwater outlets into the channel while maintaining the hydraulic gradient needed to facilitate drainage”.	No other option offered – ongoing issue thrown into the too hard basket. The recent near flood has eroded Councils sand and plantings approach. The River Road channel continues to erode as the channel is too close to the riverbank with no natural build up process and dredging ruled out by Council.	The location of this drain is within the footprint that is subject to beach nourishment. Asset condition will be investigated and documented as part of ECON_08, CTF_16a supports regular maintenance and upgrade (if needed) of this asset. Risk assessments undertaken through the CMP process have indicated that this asset is not particularly vulnerable to SLR.	No update to CMP required.
77.3	Sand fans from numerous storm water and flood mitigation drains along River Road – causing erosion and filling the navigation channel	No	“review and update all asset management plans (AMPs), relevant to the coastal zone within the CMP study area”	This matter has been raised numerous times at the SHET with the suggestion of Sand Scraping to remove the excess sand and restore the erosion. The response in the CMP is another review and another plan.	Operationally this isn’t supported due to the small amount of sediment we would recover. Additionally, Council has assessed the viability of dredging of the sand fans at the stormwater drainage outlets along the Shoalhaven River through consideration of technical studies and legal permissibility under the relevant NSW legislation, including but not limited to, the Fisheries Management Act 1994 and Crown Land Management Act 2016. As the stormwater outlets along the foreshore are not considered canals and the sediment build-up is not preventing effective discharge from these outlets, dredging of this channel could only be sought for the purposes of navigation Action BOAT_38 supports ongoing monitoring of navigation channels. Ongoing monitoring will occur, and if the sand fans encroach upon and impede navigation, then the channel may be subject to maintenance dredging.	No update to CMP required.

From Submission					Response	Report Update Status
Comment ID	Item	Inclusion in CMP	Response from CMP	Comment		
77. 4	River Road Channel is moving closer to the high bank causing erosion and serious tree loss. This will result in riverbank slump with near future floods. There is no natural sand build up process (2021 report Royal HaskoningDV)	Deficient Beach nourishment from sand brought in from the beach will not solve this issue.	"moving the channel at the expense of impacting seagrass will not be supported by agencies. It is also unlikely to reduce the risk posed by erosion and flooding along River Road" BE_43e and BE_44 recommend beach nourishment from sand taken from the beach.	The current response means the trees along riverbank (46 trees were lost in one flood) are being sacrificed while the bank is eroding. There is now no low bank left, and the steep bank will be the next to go. This will result in high cost to repair and asset loss to Council. The statement "will not be supported by agencies" is inappropriate when the risk profile of the unstable bank is factored in. The 2021 "Shoalhaven Heads Channel Dredging and Beach Nourishment" by Royal HaskoningDHV was largely ignored by Council and another report sought which focused solely on navigation of boats.	There are several actions, which when implemented concurrently seek to address this concern. Firstly, the nourishment actions (BE_43e and BE_44) will provide medium term erosion protection. The temporary nature of nourishment is addressed by budgeting for 2 rounds of nourishment within the 10 year CMP lifecycle. BOAT_37 provides for maintenance dredging near boat ramps and in existing navigation channels. This action can be used to address potential channel infilling that may impeded on safe navigation. The small volume of sediment that might be won from this could be used for nourishment (subject to detailed investigation) It is noted that the Lower Shoalhaven River Dredging Feasibility and Navigation Assessment (Advisian, 2023) was developed as a recommendation of the RHDHV 2021 report which set the scope for additional investigation to determine the viability of dredging the channel.	No update to CMP required.
77.5	Clearance of flood debris from the riverfront following floods	Yes	Rec_03 Removal activity will occur when Council determines there is a risk to public safety and recreational amenity and will need to comply with Council and DPIRD Fisheries policy, with permits to be obtained where/when required.	The recent experience, following the June 2024 flood gives little confidence that this action will be done in a timely manner. The debris from the June 2024 flood is still on the riverfront in December 2024. The estimate of cost over the 10 years of $100k is a small cost to maintain recreation and tourism amenity.	This action has been crafted to balance the requirements of Fisheries policy and regulation with public health and safety, and community goals.	No update to CMP required.
77.6	Maintain public access to the river by keeping a small area free of mangroves to allow shallow water access for all ability. Many aspects of the Living Shoreline are already in place at the location e.g. pontoon, pathway etc. the Jetty and bird posts were planned as part of the upgrade to the parking near the toilet block at the end of River Road, with the jetty coming off the park. The project ran out of funds and the jetty and bird posts were not installed.	No	BE_46 The CMP proposed spending $1.96m to deliver a "living shoreline" which would deny safe water access by allowing the mangroves to grow.	The permit to remove the mangroves should be included in the CMP. This is an activity which has been carried out over the past 5 years by volunteers at little cost to council (Bushcare supervision only). Removal of the mangroves is supported by Riverwatch and the Native Botanic Garden. Council is now applying for the permit outside the CMP process.	The CMP process does not support the removal of mangroves. After further consideration, the living shoreline action is being re-crafted as a less expensive option that will still serve to activate the area for multiple benefits including recreational amenity, environmental values, and public access. This cost reduction considers that this site requires less capital works than the Wagonga Inlet project that the draft budget was based on.	The budget and scope associated with BE_46 has been reduced based on further consideration of the site and in response to community submissions.
77.7	Boating	Deficient	Boat_37 Boat_38 Develop a plan	A spend of $450k on this very important activity does not compare to the $1.96m on the project "living shoreline" disregards the communities demonstrated use of the river.	After further consideration, the living shoreline action is being re-crafted as a less expensive option that will still serve to activate the area for multiple benefits including recreational amenity, environmental values, and public access. This cost reduction considers that this site requires less capital works than the Wagonga Inlet project that the draft budget was based on.	The budget and scope associated with BE_46 has been reduced based on further consideration of the site and in response to community submissions.

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77.8	Water Quality	Deficient	ENV_43 ENV_09- beachwatch In response to community concerns about water quality and the impacts on public health and safety, and based on the findings in the Stage 2 Water quality and monitoring program assessment (Rhelm, 2023d), several locations are to be included as regular Beachwatch sites, with regular water quality monitoring and reporting to communicate the safety of recreational activities to the broader public. These sites include: • Shoalhaven Heads • Greenwell Point • The Grotto (Nowra) A detailed description of this action (in combination with Action ENV_43) will be provided in the CMP.	This issue has been a main concern for the community and is not sufficient addressed in the CMP response. $350k to revise and implement plans is inadequate.	The budget allocated for these actions is based on current costs for similar actions across NSW. It has been reviewed and confirmed by Council and DCCEEW.	No update to CMP required.
77.9	Dredging of silts at the entrance that are not being scoured by floods	No	This action is considered unfeasible as it contradicts government policy regarding dredging. Siltation in channels is part of the natural process and is important for habitat formation in the estuary. Dredging for flood impacts is considered in the Floodplain Risk Management framework.	The Lake Conjola Coastal Management Plan includes a reference to dredging where sands come into the entrance and need to be removed to ensure a workable entrance in times of flooding. The reference to government policy is vague and dismissive.	Dredging at Lake Conjola is recommended as a contingency measure to support entrance management. The contingency measure involves ebb tide channel dredging in the scenario when excavation of a pilot channel directly through the northern spit zone to link with a stranded ebb tide channel is not operationally practicable for emergency response to flooding. This would be impractical due to the significant time required for excavation. The Shoalhaven River system is different. The presence of the permanent entrance at Crookhaven, results in a weak ebb tide at Shoalhaven Heads when open. This means the flood tide and wave energy deposits sand more efficiently. As such, ebb tide dredging would not be effective at retaining an open entrance, as it would in Lake Conjola which only has one entrance.	No update to CMP required.
77.10	Entrance management for flooding (EMP)	Deficient	The current entrance management arrangements were reviewed as part of Stage 2 of the CMP. The review concluded that entrance management for the purpose of flood risk reduction was appropriate and should Continue CTF-20	The EMP is redundant and ineffective in times of flooding. The trigger levels guarantee that the floodplain will flood and stay flooded for an extended period. The consultants' pre-emptive comments before a detailed analysis are of deep concern. "More intensive approaches such as diverting river flow and constructing a permanently trained entrance are not considered feasible because of the widespread and uncertain unintended consequences that would arise throughout the estuary if they were implemented. Other factors such as costs and engineering complexity have also been considered."	A permanent entrance would only be supported by an extensive cost benefit analysis which could be justified if there were enough economic, navigation, and flooding benefits to offset the significant cost, and other associated environmental impacts. The FPRMSP is investigating the flooding implications of a permanent entrance. Pending the outcomes of this study, there may be future scope for additional analysis, however, based on the assessment criteria guided by the CM Act, a permanent entrance is not recommended in the CMP. This may be revisited in light of new information when the CMP is reviewed in approximately 10 years (or sooner, if needed).	No update to CMP required.

From Submission					Response	Report Update Status
Comment ID	Item	Inclusion in CMP	Response from CMP	Comment		
77.11	Enhance public access points along the foreshore	Yes	REC_04	This is a positive action to improve the amenity for the community. $285k has been estimated, which includes a "comprehensive assessment" so funds for actual works are yet to be identified. This action should be community driven.	Noted.	Wording in the action description has been added highlighting that community consultation will be undertaken during the implementation of this action.
77.12	River erosion upstream and in Berry's canal.	Yes	Various – bank stabilisation and "adaptive" plans	Over $15million in bank stabilisation works have been included for the river with no funds allocated to removing the silts which are causing much of the erosion. Refer to the report on Berry's canal which notes that despite rock walling the canal will double in size if the Shoalhaven River continues to flood through it. Adaptive plans i.e. "live with it" are not going to address the flooding issues which are demonstrated to have solutions from the 75+ reports on the river.	The bank stabilisation works are intended to, among multiple other benefits, reduce the amount of sediment being washed into the river. Removal of sediments from near the entrance is not considered appropriate nor required.	No update to CMP required.
77.13	Costings The items included which are of direct benefit to Shoalhaven Heads in addressing erosion, access and tourism amount to less than $.5m even bringing in some benefit from plans and strategies. The major project of the Narooma idea of a living shoreline was not requested by the community and is a force fit on a very small area of the village riverfront.	Deficient		Many items have zero as the cost. Plans and strategies amount to approx. $3m, Bank Stabilisation $15.3m, Staffing $1.5m.	The actions in the CMP that are directly relevant to Shoalhaven Heads (BE_43e, BE_44, CTF_20, ENV_09, ENV_42b), not including the living shoreline action amount to approximately $1,232,375. The scope and budget for the living shoreline action (BE_46) has been revised in acknowledgement of the difference in scale compared to the Wagonga Inlet project. The intention of this action is to provide multiple benefits to the Shoalhaven Heads community and environment. It will incorporate both ecological and recreational/access features and activate the space for more sustainable recreation. Feedback on this action has been both against and in favour. This has resulted in the action to be kept in the program with the reduced scope and budget. Items with zero cost are considered to be within the normal operating procedure of the lead agency for these actions and are included to show support for the important issues they address and a commitment to continue to implement them.	The budget and scope associated with BE_46 has been reduced based on further consideration of the site and in response to community submissions.
77.14	Stormwater Drains	Deficient	"review and update all asset management plans (AMPs), relevant to the coastal zone within the CMP study area"	This is another area of major concern for the village – the stormwater and flood mitigation systems need urgent attention as they are allowed to erode, flood and pollute the estuary.	The flood mitigation drains in Shoalhaven Heads have been identified as priority sites in the detailed description of action CTF_16a. Council is aware of the poor condition and are prioritising maintenance and repair of these assets (along with others throughout the estuary that are in a similar poor condition).	No update to CMP required.

From Submission		Response	Report Update Status
Comment ID	Comment		
78.1	**Coastal Swamp:** I would like to see a Management Plan developed for the **Coastal Swamp** at Shoalhaven Heads (located near the Holiday Haven Caravan Park). This is a sensitive and important ecological environment. It is an important water source for local birds and wildlife. A management plan should include protection measures and removal of weeds.	The ecological and tourism value of the Coastal Swamp north of the Holiday Haven Caravan Park is acknowledged. The CMP seeks to support these values through action ENV_39 which allows for environmental protection works such as weed management (including supporting community groups). Additionally, action ENV_21 can support these values by ensuring the PoMs support these works in the Council Managed Crown Land such as the parcel where the Holiday Park and Coastal Swamp are.	ENV_21 has been amended to more clearly support environmental protection works on Council Managed Crown Lands, such as the coastal swamp near Holiday Haven.
78.2	**Greater recognition of environmental values and enhanced protection of natural areas at Shoalhaven Heads:** Shoalhaven Heads is home to endangered ecological communities (e.g. Bangalay Sand Forest) and many endangered species – including migratory birds such as Eastern Curlews & Godwits, Glossy Black Cockatoos, Greater Gliders and many more. I would like to see greater protection of our environment and more proactive measures to protect it for the future.	The primary action designed to recognise and enhance the environmental values and natural areas at Shoalhaven Heads is BE-46. This action would incorporate habitat features along with recreational and access features to improve the extent and connectivity of foreshore estuarine habitat. Terrestrial biodiversity is supported through action ENV_39 which supports environmental protection works in natural areas including revegetation using native species.	No update to CMP required.
78.3	**Planting of more food & habitat trees for our endangered birds** (such as casuarinas for the Glossy Blacks – their only food source – these birds lost habitat during the fires & creation of local food sources is important for their future survival). Replacing many of the banksias and other trees that appear to be dying in the area behind the Dunes Track – revitalising this area as it is important for our local birds & wildlife.	Terrestrial biodiversity is supported through action ENV_39 which supports environmental protection works in natural areas including revegetation using native species.	No update to CMP required.
78.4	**Restriction of dogs to on-lead only on the beach and in the bush areas around Shoalhaven Heads** (including the area surrounding the Dunes Track and Golf Course). Too often I see out of control dogs on the beach and in the bush areas chasing birds and wildlife (including our local Swamp Wallabies). Currently there is a short section on our beach allowing for dogs off leash, but almost everyone ignores this rule and dogs are seen **everywhere** north of the Surf Club. Many dogs are out of control, and the owners don't seem to be concerned by this. Some out of control dogs have caused injuries to people and other dogs at times including stress to wildlife.	Review and management of responsible pet ownership is a Council process external to the CMP process.	No update to CMP required.
78.5	**Restriction of cats to indoors at night (no free roaming cats at night)** to protect our wildlife – such as lizards, bandicoots, birds and other wildlife.	Review and management of responsible pet ownership is a Council process external to the CMP process.	No update required
78.6	**Protection and recognition of our mudflats and the important habitat and food source they provide to birds including the endangered migratory birds** – perhaps including restrictions on the collection of bait by fishermen, harsher penalties for dogs and horses in these areas	ENV_62 supports the protection and recognition of important habitats by provided targeted educational material throughout the estuary.	No update to CMP required.
78.7	**Entrance Management for flooding (EMP) -** The EMP is redundant and ineffective in times of flooding. The trigger levels guarantee that the floodplain will flood and stay flooded for an extended period. The consultants' pre-emptive comments before a detailed analysis are concerning. A revision of the trigger levels is needed.	The ongoing Floodplain Risk Management Study is undertaking a review of trigger levels with the aim to understand the benefits of lower threshold. This will feed into an updated EMP. The CMP is designed to support the recommendations from that process, and enable proactive entrance management from the coastal management framework perspective.	No update to CMP required.

From Submission		Response	Report Update Status
Comment ID	Comment		
79.1	1. With respect, the draft CMP appears to be a 300 page tome of many words and pretty pictures prepared by Rhelm Pty Ltd on behalf of Council but with little or no substance. I can only assume that the costs associated with the preparation of the draft CMP and associated documents may exceed many hundreds of thousands of dollars - and with no concrete results.	The draft CMP is a comprehensive document developed to meet NSW Government requirements for coastal management planning. It provides an evidence-based framework to address key coastal issues, ensuring strategic decision-making and access to State funding for implementation. The CMP process includes technical studies, community consultation, and collaboration with State agencies, which are necessary for developing effective management actions. The investment in the CMP supports long-term coastal resilience and sustainable management, leading to concrete outcomes over time.	No update to CMP required.
79.2	2. In particular, very little is said in the draft CMP about the critical matters of correct flood management including the dredging and permanent opening of the head of the River at the Heads or, in the alternative, the adoption of more sensible and flexible trigger levels (currently 3m at Nowra Bridge and 2m at Shoalhaven Heads) and the maintenance of a dry notch of more sensible height and width at the head of the River at the Heads. Flexibility would be dependent upon high/king tides, weather forecasts and rainfall, river flows etc. Each of these matters are critical to flooding which itself is critical to the health and proper maintenance of the entire area adjacent the River, including not only Shoalhaven Heads but also Greenwell Point etc.	Flood management, including entrance trigger levels, dredging, and flood response, falls under the Floodplain Risk Management framework, which is the appropriate process for assessing and refining flood mitigation strategies. The CMP supports proactive entrance management from a coastal perspective, considering that on balance, it achieves the objectives of the Coastal Management Act. Any changes to entrance management for flood risk reduction will need to be assessed through the Floodplain Risk Management Study and Plan.	No update to CMP required.
79.3	3. It has been indicated that the latter matters are to be dealt with in the Entrance Management Plan (EMP), also to be prepared by Rhelm Pty Ltd. The various and amended draft versions of the EMP as only recently disclosed by Council reveal that the above matters have been also inadequately dealt with in that paper. In any event, the above matters should be dealt with in the CMP as they are integral to the issues the subject of the CMP. To release the draft CMP and presumedly that plan in final form before the final form of the EMP is released puts, as it were, the cart before the horse. Put simply, the CMP should deal with the issues of proper flood management of the River and its entrance at the Heads, instead of being the subject of the separate and later EMP.	Flood management, including entrance trigger levels, dredging, and flood response, falls under the Floodplain Risk Management framework, which is the appropriate process for assessing and refining flood mitigation strategies. The CMP supports proactive entrance management from a coastal perspective, considering that on balance, it achieves the objectives of the Coastal Management Act. Any changes to entrance management for flood risk reduction will need to be assessed through the Floodplain Risk Management Study and Plan.	No update to CMP required.
79.4	4. As is reflected in the draft CMP, the current course of the Shoalhaven River is, after the digging of the Berry Canal, artificial. The natural course of that meandering river was through regular openings of the Heads which has been interrupted by the Berry Canal, which itself has been significantly enlarged by river erosion. The problems of Shoalhaven River have been further exacerbated by significant additional run-off from new developments both adjacent the river and from upstream catchment areas.	The artificial nature of the Shoalhaven River is noted and recognised throughout the CMP. Action BE_42 supports the development of a long term adaptation plan in anticipation of continued widening of Berry's Canal. Action ENV_51 focuses on improving development controls for water quality and stormwater management. This ensures that future developments incorporate best-practice stormwater treatment to minimise impacts on estuarine health.	No update to CMP required.
79.5	5. The long term closure of the River at the Heads has had clearly significant adverse effects on the health of the river including reduced river flow, riverbank erosion, flooding, poor water quality, flood wood debris etc. I would add that these adverse effects are not limited to Shoalhaven Heads but include many other lower areas of the river including Greenwell Point etc. They also have a significant adverse economic effects on tourism, oyster farming, boating etc, each of which is vital to the economic and social wellbeing of the wider area.	The CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
79.6	6. As is evident when the River is open at the Heads, the above adverse effects are almost entirely mitigated (reference is made to the attached table published in the Heads News of November 2024 recording flooding events when the entrance was closed or open etc) and, particular, when the River is open at the Heads (as it was for many months approximately two years ago) the water quality is much improved and floating wood debris is markedly reduced. As a boatowner, I can certainly attest to the latter where much of the wood debris presently floating in the river is partially or wholly hidden and often large in size, causing significant damage to watercraft. In my opinion, it is only a matter of time before a serious boating accident occurs and Council is on clearly notice as to that possibility.	The CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). It is noted that the table published in the Heads News of November 2024 fails to recognise other contributing factors to water levels during flood events such as the volume and distribution of rainfall on the catchment.	No update to CMP required.

From Submission		Response	Report Update Status
Comment ID	Comment		
79.7	The attached table in the Heads News clearly evidences that when the Heads are open and the River can discharge directly into the sea, flood events are significantly less frequent and reduced in height and in duration on the rare occasions when occurring.	The CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy). It is noted that the table published in the Heads News of November 2024 fails to recognise other contributing factors to water levels during flood events such as the volume and distribution of rainfall on the catchment.	No update to CMP required.
79.8	8. Flooding of the River does not just cause damage and cost to private and public structures (not to mention, in practical terms flood insurance being almost unobtainable), but also public health. During the latest 2024 threatened flood, the warning light alarm at the Hay Ave sewage facility was engaged for at least two days, as I understand it signifying the raw sewage was discharging directly into the River.	Sewerage overflows will continue to be managed by Shoalhaven Water through their licence requirements with the EPA and their Regulatory and Assurance Framework from DCCEEW. Shoalhaven Water also works with their regulators to identify and manage risks to sewer overflows. With these systems and processes in place Shoalhaven Water aims to have nil sewer overflows during dry weather and to minimise sewer overflow during wet weather events. Shoalhaven Water has several programs aimed at minimising sewer overflow including sewer relining, emergency storage, pump replacement program and improvements to their major treatment facilities. These programs are all aimed at ensuring sewer overflows are minimised. In addition, Shoalhaven Water has completed hydraulic modelling to inform strategic improvements to the network however in large rainfall events the system becomes overloaded and, in some areas, completely inundated due to high water levels from flooding particularly in coastal areas. This will continue to be managed by Shoalhaven Water.	No update to CMP required.
79.9	9. Primarily I endorse the permanent opening of the River at the Heads but, in the alternative I also endorse the adoption by Council of sensible trigger levels and the adoption and regular maintenance of sensible height and width of the dry notch at the head of the River. As to the latter, I also endorse the Motion by Robyn Flack, seconded by Phil Guy to mitigate flood damage presented to the Community Forum (as reported in the Heads News dated August 2024), being the adoption of a trigger level at Shoalhaven Heads of 1.5m AHD for mechanical river entrance opening and the maintenance of the dry notch at 1.5m AHD, each for a trial period of five years or three flooding events. Apart from relatively limited costs associated with this option (and which may well be minimal compared to the significant costs to ratepayers of the protracted efforts by Council to prepare the CMP and EMP), the question arises as to why these options would not be tried for the limited time identified in order to assess their efficacy.	Flood management, including entrance trigger levels, dredging, and flood response, falls under the Floodplain Risk Management framework, which is the appropriate process for assessing and refining flood mitigation strategies. The CMP supports proactive entrance management from a coastal perspective, considering that on balance, it achieves the objectives of the Coastal Management Act. Any changes to entrance management for flood risk reduction will need to be assessed through the Floodplain Risk Management Study and Plan.	No update to CMP required.
79.10	10. Reflecting my above comments, I also endorse the comments of Robyn Flack dated 13/12/24 and, in particular Claude Domio dated 5/2/25 to address the manifold problems of the Shoalhaven River.	These submissions have also been considered and responses provided.	No update to CMP required.

From Submission		Response	Report Update Status
Comment ID	Comment		
80.1	My expectation for the Lower Shoalhaven CMP was that it would provide an integrated and long-term strategic approach to estuary management. It seems we have developed a similar plan to what we have in the past with site-specific and reactive coastal management. The uncertainty around funding has reduced the capacity to solve strategic issues with integrated holistic planning.	The Lower Shoalhaven River CMP has been developed through a comprehensive and strategic planning process, aligning with the objectives of the NSW Coastal Management Act and the best available scientific assessments. The CMP is not intended to be a static document but provides a framework for ongoing adaptive management that considers environmental, social, and economic values while remaining responsive to new data, funding opportunities, and stakeholder priorities.	No update to CMP required.
80.2	The lack of holistic planning reflects the lack of interconnectedness within the plan of bio-physical forces, such as build up of siltation causing entrance shoaling and the narrowing of channels resulting in bank erosion, hydraulic inefficiency, and a decrease in water quality. Addressing the issue of siltation goes beyond improving navigation, water quality and flood risks, but supports the integrity of the system as a whole including economic, recreational and aesthetic public values.	The CMP recognises the interconnectedness of estuarine processes, including sediment transport, bank erosion, and water quality. While large-scale sediment redistribution or dredging is not included due to feasibility, cost, and environmental considerations, the CMP incorporates multiple actions addressing erosion control, sediment stabilisation, and foreshore rehabilitation. These efforts will contribute to system-wide stability and resilience.	No update to CMP required.
80.3	I feel that the uncertainties around funding have resulted in a programme that does not resolve long term strategic management issues. For example, opportunities for blue carbon initiatives on private and public land to target poor water quality contributors and mitigate risk from undetermined climate drivers have not been adequately considered. Identifying blue carbon opportunities and developing shovel ready projects regardless of the financial implications should be integral to the CMP. Potentially inviting opportunities for philanthropic stakeholders to engage in local and state government partnerships to achieve positive environmental outcomes.	The CMP identifies strategic actions and priorities to guide future investment in estuary management. While immediate funding for all actions is not available at the time of adoption, the CMP provides a structured pathway to leverage state and federal grant programs, private sector partnerships, and other potential sources of funding over the plan's implementation period.	Philanthropic funding opportunities have been mentioned in the Business Plan section of the CMP.
80.4	State government should be accountable for the disconnect between local government coastal zone management planning, financing and state agency priorities. The lack of pro-activity from local Council and State Government to priorities and align strategies is disappointing.	Collaboration across government agencies is fundamental to the CMP. While Council leads the plan's implementation, state and federal agencies, including NSW DPI and TfNSW, have roles in supporting estuarine management. The CMP aligns with existing state planning frameworks, and the actions outlined will facilitate better coordination between different levels of government.	No update to CMP required.
80.5	Given the significance of boating, the need for 'further' investigations as a key management action when implications from boating activities have estuary wide impacts, demonstrates a lack of integrated strategic planning.	The CMP recognises the importance of boating in the Lower Shoalhaven and includes actions such as BOAT_37 and BOAT_38 to improve boating infrastructure and management. However, Council is responsible for managing multiple waterways across the region, and similar boating management actions are also being implemented in other coastal and estuarine areas. While the budget allocation may not meet all expectations, these actions will ensure that boating infrastructure improvements are prioritised strategically across Council's entire waterway network.	No update to CMP required.
80.6	Similarly DPI Safefoods have huge water quality data sets across multiple zones in the lower Shoalhaven. Partnerships with the oysters farmers quality assurance programme could help develop a comprehensive water quality monitoring programme.	The water quality monitoring program as described in action ENV_43 is designed in recognition of Council's role in a network of monitoring programs with different objectives. Council's program, supported by DCCEEW is designed to monitor recreational safety and estuarine health. Other programs, such as the DPI Safefoods program, monitor for potential impacts on food safety. Together these programs provide a more comprehensive understanding then in isolation. Over time, this information will be useful in determining WQ trends, and measuring the impact of development and management.	No update to CMP required.
80.7	Coolangatta Road and Berry Sewerage Plant are missing from the CZEAS 'Key Locations of Risk' this raises concern as to how thorough the consultants engaged were in their investigation.	These assets are not within the hazard extent of the coastal hazards. The CZEAS is strictly limited to addressing only coastal hazards. While these assets maybe impacted by other hazards such as catchment flooding, the Shoalhaven City Flood Emergency Subplan is the appropriate response plan.	No update to CMP required.
80.8	The struggle of not being able to neatly define the Lower Shoalhaven River into one of the four defined social-ecological 'estuary contexts' (ICOL, River Floodplain or coastal lake) means a unique management approach is required.	The CMP acknowledges the unique characteristics of the Lower Shoalhaven River and the associated management challenges. The approach taken in the CMP is tailored to the specific environmental, social, and economic values of the system, ensuring that management actions address the key risks and pressures identified through technical studies and community engagement. The CMP applies a place-based strategy that considers local dynamics, site-specific vulnerabilities, and long-term adaptation needs to support sustainable estuary management.	No update to CMP required.

From Submission		Response	Report Update Status
Comment ID	Comment		
80.9	The placement of the living shoreline at Shoalhaven Heads raises questions with regards to the stakeholder engagement process given the feedback from the community identifying this area as a valued recreational space. A holistic approach that identified and categorised the available recreational public access spaces along the Shoalhaven River would have identified Shoalhaven Heads as a key location requiring a unique planning approach.	After further consideration, the living shoreline action is being re-crafted as a less expensive option that will still serve to activate the area for multiple benefits including recreational amenity, environmental values, and public access. This cost reduction considers that this site requires less capital works than the Wagonga Inlet project that the draft budget was based on.	The budget and scope associated with BE_46 has been reduced based on further consideration of the site and in response to community submissions.
80.10	While the CMP captures potential environmental risks, it fails to capture stakeholders day to day lived experience and is inconsistent with the communities' values.	The CMP has been shaped by multiple rounds of stakeholder engagement, technical studies, and agency collaboration. While not all community priorities can be directly incorporated, the plan is designed to provide an adaptive management framework that can respond to emerging issues over time. Ongoing engagement with stakeholders will be a key part of its implementation.	No update to CMP required.
80.11	The unique and complex bio-physical nature of the lower Shoalhaven River requires an integrated long term strategic planning approach which the CMP process has failed to achieve. Shoalhaven City Council should not adopt the lower Shoalhaven River CMP and refer it to the NSW Coastal Council for review.	The CMP is a critical step toward a more strategic and coordinated approach to estuary management. Rather than delaying action, its adoption will allow for structured implementation, refinement based on new data, and continued stakeholder engagement to address the long-term sustainability of the Lower Shoalhaven River. Ministerial review supported by the NSW Coastal Council will determine if the CMP can be certified in accordance with the CM Act.	No update to CMP required.
80.12	In addition to those comments, I'd like to add that I feel the Lower Shoalhaven CMP framework is fundamentally flawed. Given the risk of flooding to the lower Shoalhaven it would seem logical that a flood management strategy would have defining factors in the development of CMP management actions, although neither a flood nor entrance management plan were finalised within a timeframe that could adequately inform outcomes for the CMP.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
80.13	The CMP document is far from user-friendly. I also question the scoring system used to identify areas at risk and public value, as well as how these were presented within the plan. A mapping system (similar to the LEP) showing overlays of the risks and public values, colour coded by priority, would allow the public to better understand the implementation priorities and where the investment is being made and why. Stakeholder engagement in the scoring system may have given it more credibility; as there seems to be inconsistencies when identifying risk.	The CMP has been developed using a structured, evidence-based approach to assess risks and prioritise management actions. The scoring system used to identify areas at risk and public value is based on best-practice coastal and estuarine management frameworks and was informed by technical assessments, agency input, and community feedback. While a mapping system similar to the LEP was not included in the draft CMP, spatial data has been used throughout the process to guide decision-making. The suggestion to improve the visual representation of risk and priority actions through mapping is noted and will be considered for future refinements. Stakeholder engagement has played a key role in shaping the CMP, and all feedback received during the exhibition period is informing the finalisation of the plan.	No update to CMP required.

From Submission		Response	Report Update Status
Comment ID	Comment		
81.1	Approvals for land development and major infrastructure projects do not appear to place sufficient emphasis on the impact of climate change and stormwater management. Such future projects will need far greater consideration of the extent of hard surface rainwater run-off collection areas involved in the development and the significant stormwater retention or detention basins that will be needed to minimise the run-off to the Shoalhaven River systems. An example would be the construction of the Gerringong to Nowra freeway. Whilst this is a great piece of roadwork, it has substantially greater stormwater runoff than the old highway. Yet, I am only aware of two small retention basins that were included in this project. Similar issues can be seen with the residential subdivisions and estates that are being developed and planned within the Shoalhaven Regional area.	Large scale approvals and conditions to mitigate impacts are not in scope of the CMP. There are several actions that related to updating Council's planning policies to address water quality (including stormwater) and coastal hazards such as ENV_51 and CTF_09.	No update to CMP required.
81.2	The process, modelling, and management of the Tallowa Dam level and the opening of the Shoalhaven River at Shoalhaven Heads in relation to forecast severe weather events raise several concerns: - The BOM weather forecasts are not used early enough for discharging water from the Tallowa Dam, thereby increasing its ability to hold back water generated by a major weather event. - The river level set point for opening Shoalhaven Heads may be too high. I suggest there may be insufficient consideration of tide levels and storm surge, particularly if a major rainfall event occurs as part of an east coast low weather system. A good example is the April 2016 East Coast low, where, despite heavy rainfall in the Shoalhaven area, river flooding was exacerbated by the storm surge and tides holding back river flow, inundating several low-lying areas, including the Orient Point waterfront reserve. Photos supporting this are shown below.	Flood risk is generally addressed in the Floodplain Risk Management Framework, and is outside the scope of the CMP. However, the Lower Shoalhaven River CMP considers entrance management to be an appropriate action within the coastal zone, where the flood benefits can be adequately shown to be achieved, and the environmental impacts mitigated sufficiently (this is assessed in the Review of Environmental Factors undertaken to support Council's Entrance Management Policy).	No update to CMP required.
81.3	The current rate of riverbank erosion is my greatest concern. Here are a few more points and associated photos in relation to bank erosion: At the western end of the waterfront reserve, where it meets the wetland area, there is an unsealed council service road that provides servicing access to both the waterfront reserve and the sewer pumping station. The riverbank in this area has been completely eroded, and being a very low point, it floods with the slightest increase in the river level. See the photo below, which indicates the level of bank erosion. To prevent further bank erosion in this area, it is suggested that a parking barrier be placed at the end of this road to prevent vehicles from driving onto the bank edge and using the area as a boat ramp for small boat trailers.	Thank you for your submission regarding the ongoing foreshore erosion at the waterfront reserve. We acknowledge the concerns raised about the rapid erosion of the riverbank, the impacts of past engineering works, and the need for a sustainable solution to protect this section of the shoreline. In response to your submission and several others received on this issue, a new action (BE_43i) has been added to the CMP to specifically address foreshore erosion at this location. The detailed information and insights provided in these submissions will be used to inform both the wording of this action and its implementation. We appreciate the time and effort taken to document these issues and provide photographic evidence, and we look forward to working with the community to develop an effective and sustainable solution.	Action (BE_43i) has been added to the CMP to specifically address foreshore erosion at this location
81.4	In front of my house, the reserve rises to the river, a distance of 20 metres. With the current rate of erosion, this hump at the riverbank will be gone in 3–4 years, increasing the risk of flooding substantially. Five (5) metres off my boundary and 15 metres set back from the riverbank is a sewer inspection port for the council sewer line. This is a main sewer line that runs the full length of the Orient Point waterfront reserve and serves as the primary sewer line for most of Orient Point. This sewer line already experiences stormwater ingress, leading to poor toilet flushing and backflow through floor wastes. Many residents along the waterfront reserve have reported these issues, prompting calls to Council’s sewerage department during recent heavy rain events in 2024. This council-owned asset is at risk due to the ongoing erosion of the riverbank and inundation from water flowing into the reserve area.		

From Submission		Response	Report Update Status
Comment ID	Comment		
81.5	Groins were constructed along the riverfront reserve in July 2015 using sand, rocks, and geotextile to strengthen the riverbanks. - The following photos show the method used to construct the groins and bank protection. These photos were taken around 22–27 July 2015. During construction, the natural riverbank was destroyed in an attempt to create a sloped beach design. - The rocks used in the bank protection area, as shown in the photos, were small and composed of a clayey/shale-type material. The geotextile was laid, rocks placed on top, and then overlaid with sand. The groins were then constructed at selected locations along the foreshore. - This section of the Orient Point waterfront reserve is a high-velocity impact point for the discharge of floodwaters flowing down the river through the Berry Canal. - While I would like to see the hydrodynamic calculations and design for this riverbank protection scheme, I suspect that they were never completed. The entire design and construction method appears inappropriate, particularly for the high-speed erosion floodwaters that impact the bank. One month after construction was completed (26–27 August 2015), an east coast low and flood occurred. - According to data I obtained, the area experienced approximately 300 mm of rainfall. However, the Greenwell Point Peak River level during this event was 1.30 m AHD, somewhat lower than expected. [See hyperlink below for the report on this flood.](https://s3-ap-southeast-2.amazonaws.com/wwwdata.manly.hydraulics.works/www/publications/floodreport/2015/mhl2397%20NSW%20SOUTH%20COAST%20FLOOD%20SUMMARY%20AUGUST%202015_final.pdf) - The following photos show how the new structure withstood this event. It is evident from the impact of the floods that the design was inadequate. - The floodwaters topped the beach, inclined banks, and caused serious erosion around the groins. Interestingly, as I will discuss later, there was significant riverbank damage midway between the groins. In 2016, one year after the construction of the groins and bank protection work, the NSW coast experienced another east coast low. The following photos show the same area of the riverfront reserve after the peak of the 2016 storm: - The driftwood deposition height relative to the properties. - The water level at the council access road. - The receding riverbank from the 2015 construction works. Whilst there has been a small amount of sand aggregation in the corners of the groins, the riverbank sections between the groins have been heavily eroded—faster than ever before. The consequence of this is that the bank is now up to 4–5 metres further back from the works completed in 2015. This is most evident in the photo showing the geotextile applied in 2015, still embedded in the sand, some 4–5 metres forward of the present riverbank position. The following photos, taken in the last week, demonstrate the current state of the riverbank face along the waterfront reserve and in front of Steve Woolley's and my properties. Given the current rate of erosion, it is expected that over the next three months, there will be a collapse and further loss of approximately 500–700 mm of the bank. Immediate action should be taken to address this ongoing erosion. Whilst the groins have worn down due to the use of an incorrect type of stone, the smaller stones used in the bank protection have largely disappeared, leaving the geo-fabric exposed and lying in the sand.	Thank you for your submission regarding the ongoing foreshore erosion at the waterfront reserve. We acknowledge the concerns raised about the rapid erosion of the riverbank, the impacts of past engineering works, and the need for a sustainable solution to protect this section of the shoreline. In response to your submission and several others received on this issue, a new action (BE_43i) has been added to the CMP to specifically address foreshore erosion at this location. The detailed information and insights provided in these submissions will be used to inform both the wording of this action and its implementation. We appreciate the time and effort taken to document these issues and provide photographic evidence, and we look forward to working with the community to develop an effective and sustainable solution.	

From Submission		Response	Report Update Status
Comment ID	Comment		
81.6	Another notable change in the river since 2015 is the rapid growth of sandbars. While the Berry Canal is scouring, the downstream section of the river is becoming shallower. The impact of a shallower river is that the water spreads further, exposing the banks to wake, wind waves, and tide action for longer periods. In addition, the groins are being overtopped more frequently, and the resulting foreshore turbulence is generating increased erosion just beyond the groins. My investigations suggest that research into the effectiveness of groins in similar applications indicates that their length, spacing, height, and construction material must be determined through a comprehensive understanding of the site's specific river and sea hydrodynamics. Furthermore, it has generally been found that groins should be constructed in conjunction with an appropriately designed foreshore (or, in this case, riverbank) protection system. This design must account for flows, wave impacts, and water velocities. The mid-groin erosion that is now so evident is frequently noted in international studies where groins have been incorrectly sized and spaced, and where the banks or seashores have lacked adequate structural protection from scour.	Thank you for your submission regarding the ongoing foreshore erosion at the waterfront reserve. We acknowledge the concerns raised about the rapid erosion of the riverbank, the impacts of past engineering works, and the need for a sustainable solution to protect this section of the shoreline. In response to your submission and several others received on this issue, a new action (BE_43i) has been added to the CMP to specifically address foreshore erosion at this location. The detailed information and insights provided in these submissions will be used to inform both the wording of this action and its implementation. We appreciate the time and effort taken to document these issues and provide photographic evidence, and we look forward to working with the community to develop an effective and sustainable solution.	
81.7	The following photos show the stormwater drain running from Orama Crescent through the children's park and playground area, discharging into the river. The design of this drain's discharge point is inadequate, resulting in significant erosion of the riverfront bank. During flooding events, similar to the council access road at the western end of the reserve, this drain discharge area has become a low point where floodwaters enter the waterfront reserve. Immediate action is required to design a sustainable discharge structure for this drain, fill the eroded areas, and rebuild the riverbank.		
81.8	In closing, it is clear from our recent discussions and the photos presented here that immediate action is required to address the rapid bank erosion caused by poorly designed engineering work undertaken by Shoalhaven Council. A professionally engineered design, tailored specifically for this section of the waterfront reserve, is necessary to remedy the riverbank and stormwater drain issues outlined above.		
81.9	In our discussion at the CMP forum, we talked about the creation of a new living bank structure. While I do not fully understand the detailed design of such a system, I would like to make the following comments: a) I expect that the majority of residents along this lower section of the waterfront reserve would support a sustainable approach to halting riverbank erosion. Community support for such an initiative could serve as a role model example of Council and the community working together to engineer a solution that is innovative, long-lasting, and effective. b) This area of the reserve is a high-velocity flood zone, and any riverbank structure designed to address the rapid erosion must be capable of withstanding the impact of fast-flowing waters. Simply planting vegetation or stacking driftwood will not be sufficient. c) Given the current rate of erosion and the fact that it is a direct consequence of poor design and engineering works undertaken by the Council, immediate action is required to address the problem.		

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Appendix C

Detailed Action Descriptions

C. Overview

This appendix provides additional detail for complex management actions from the Lower Shoalhaven River CMP. The following actions are contained herein:

Action ID	Description	Page number and Link
BE_43	Environmental bank management, foreshore protection, and riparian restoration on high-priority public foreshores.	**C-2**
BOAT_37, BOAT_38 & BOAT_43	Boat ramp consolidation/optimisation, develop and implement a comprehensive boat ramp facility upgrade and asset management program, and management of watercraft storage	**C-18**
CS_16	Protection of Midden at Crookhaven Heads.	**C-25**
CTF_20	Implement updated Entrance Management Policy and undertake additional review.	**C-30**
ECON_08 & CTF_16 & CTF_16a	Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure, review and update all asset management plans (AMPs) relevant to the coastal zone within the CMP study area, and review and update floodgate and associated drainage infrastructure AMPs.	**C-35**
ENV_42	Enhance urban runoff treatment through infrastructure development and capacity building in urban areas of the Lower Shoalhaven River coastal zone.	**C-44**
ENV_09 & ENV_43	Inclusion of additional Beachwatch sites and revise and implement Council's water quality monitoring program for the Lower Shoalhaven River.	**C-52**
ENV_62	Develop and deliver an estuary management and ecosystem education/communications program	**C-57**

BE_43 a-i	Bank stabilisation and riparian restoration on high-priority public foreshores

Location(s): Nine locations across the Shoalhaven River, Crookhaven River and Bomaderry Creek

Coastal threat(s) to be addressed: Bank Erosion

Management objectives supported: Environmental Values; Social and Cultural Values; Coastal Processes; Land Use Planning; Coastal Hazards

Costs: The total cost estimate for implementation of all foreshore protection and environmental bank management works is $12,811,075. This includes construction costs and ongoing maintenance for the 10 year CMP timeframe. Estimated construction costs for each individual site are provided in the corresponding summary page. These construction costs range between $26,000 and $3,930,000 per site. Additional common cost items across each site include detailed site investigations and designs, community consultation, obtaining required approvals and licenses, and ongoing monitoring and maintenance.

Option Type:

☐ Alert	☐ Avoid future impact	☒ **Active intervention**
☐ Planning for change	☐ Emergency response	

Timing: It is not expected that remediation at all sites would be undertaken concurrently. The business plan assumes the works to span the 10-year timeframe of the CMP with site implementation undertaken opportunistically as funding becomes available. Additional timing considerations include optimising alignment with adjacent works on non-Council owned/managed land, response to increased erosion (e.g. from a flood), or a changing risk profile.

Action Description

This action aims to provide a structured, coordinated, and community-inclusive approach to bank management at priority Council owned and managed sites along the Lower Shoalhaven River, aligning with the insights from the Stage 2 Bank Erosion Study (Rhelm, 2023c). Council's role is to lead the implementation of these works with support from multiple stakeholders including LLS, community groups and Traditional Owners.

Key elements of this action include:

- **Site Assessment and Detailed Investigations** – conduct comprehensive assessments and investigations at identified high and very high priority sites as per the Bank Erosion Study, to ascertain the most suitable foreshore protection and bank management techniques considering erosion severity, site geomorphology, site access, community use, and ecological factors.
- **Consent, Licences, Permissions, Notifications and Authorisations –** the approval and consent process for bank treatment works in estuaries is outlined in a series of flow charts provided in Part E of the Development and Validation of a Decision Support Tool for Bank Erosion Management in NSW Estuaries Report Series (Hydrosphere, 2020). Key considerations include determining whether development consent is required under Part 4 or approval under Part 5 of the Environmental Planning and Assessment Act 1979, based on whether the works are classified as coastal protection works (under the RH SEPP) or waterway and foreshore management activities (under the Transport and Infrastructure (TI) SEPP). An appropriate planning pathway for implementation will be identified for each action. Additionally, obtaining any necessary concurrent approvals, which may include a construction certificate for structural works, Crown Lands approval, or approvals for works affecting public utilities or assets, works impacting water flow or involving excavation or deposition in or near

the estuary, works affecting fish, estuarine vegetation, or terrestrial habitat, and an Environment Protection Licence if applicable.

- **Implementation of Foreshore Protection and Environmental Bank Management** – primarily employ Large Woody Debris (LWD) revetments where suitable, to provide bank and channel stability while enhancing aquatic habitat. Consider alternative or supplementary stabilisation techniques such as Rock Revetments (RR), Rock Fillets (RF), Groynes (G), Geotextile Sand Containers (GSC), and Management of Existing Control (MEC) based on site-specific conditions and feasibility. Explore innovative solutions like the Shoalhaven Sand Sausage for specific sites requiring unique interventions.
- **Riparian Vegetation Management** – integrate riparian vegetation management with engineered works to reduce erosion, improve bank stability, and enhance biodiversity. Consider site-specific revegetation and maintenance plans, particularly where existing riparian vegetation is in reasonable condition.
- **Community Engagement and Consultation** – engage with the community, especially in high use areas for towed water sports or other recreational activities, to inform and involve them in the stabilisation and restoration process. Ensure that any restrictions or changes to community use of areas are communicated well in advance and are undertaken with community understanding and support.
- **Collaboration and Coordination** – foster collaboration with Local Land Services, Traditional Owner groups, and other relevant stakeholders for integrated and effective bank stabilisation and riparian restoration along the Lower Shoalhaven River. Coordinate with adjacent private landowners and agency landowners to extend the benefits of stabilisation and restoration works beyond Council owned or managed lands where possible and appropriate.

The Stage 2 Report (Rhelm, 2023c) identified Burrier Bank as a very high priority segment requiring bank management. While this site lies outside the mapped coastal zone, its stabilisation would benefit the coastal zone by reducing sediment load and providing habitat. Although Burrier was assessed during the Stage 2 Study and is included in this detailed description for reference, it is not included as an action in the CMP or in the business plan.

The site locations are shown in **Figure C-1**. More detail for each site is provided on the attached site maps.

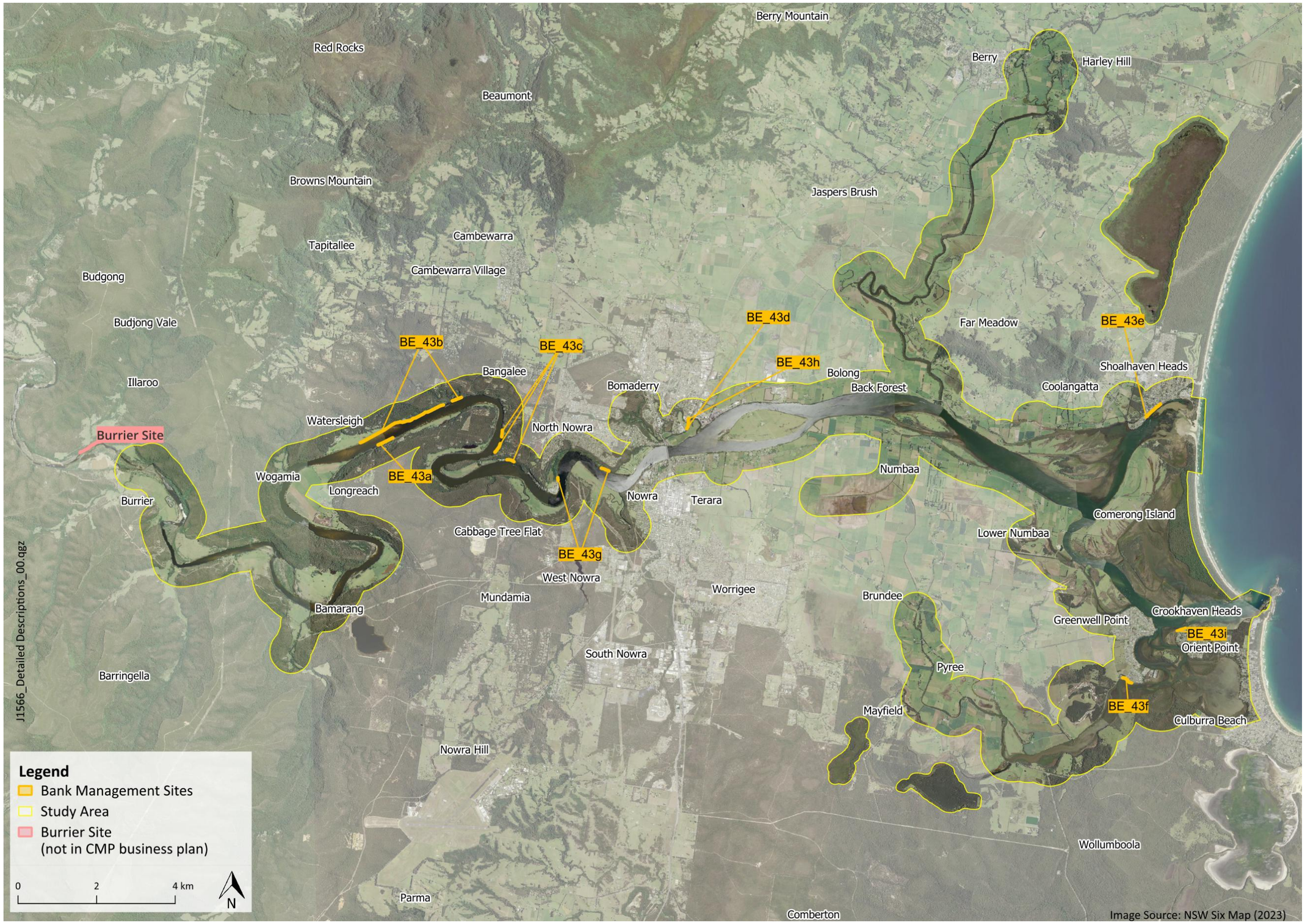


Figure C-1 Overview of BE_43 Bank Stabilisation Sites

Site-appropriate bank management methods were determined based on the erosion severity and risk ratings using the Department of Primary Industries (DPI) Fisheries (now Department of Primary Industries and Regional Development (DPRID) – Fisheries & Forestry) Decision Support Tool (DST) (Hydrosphere Consulting. 2020). The DST proposes methods with a preference for nature-based solutions, where possible. These offer both protection from erosion and enhance environmental values by providing habitat for estuarine ecosystems and biodiversity.

The Lower Shoalhaven River is a dynamic environment, and the riverbanks can be subject to rapid changes, particularly following flood events. Potential bank management works need to be flexible and consider changing river conditions, availability of materials and preference of landowners and the community. It is likely that within each reach, multiple methods will be required.

Large woody debris is identified as the most appropriate bank management action for the majority of erosion sites. Large woody debris is often referred to as 'snags', and comprises whole trees, limbs, branches or logs located either exposed, submerged, or semi-submerged in a waterway. In the context of bank erosion treatment, large woody debris is deliberately placed into or on the bank of a waterway to stabilise and/or protect a bank from erosion.

Potential methods range from hard engineered structures to softer vegetation focused and are illustrated in **Table C-1**.

Individual site summaries are provided in the maps below. These show details of each site including:

- Estimate extent of works
- Land tenure
- Indicative areas of estuarine macrophytes such as saltmarsh, mangroves, or seagrass
- Indicative locations of oyster reefs
- Foreshore assets such as boat ramps and wharves
- Photos of the bank condition (taken in May, June and September 2022 during field mapping during Stage 2).

Additional considerations for each site are also provided to guide implementation. This includes details for:

- Erosion severity (as observed during field mapping during Stage 2)
- Riparian condition (as observed during field mapping during Stage 2)
- Primary stabilisation technique recommendation
- Alternative stabilisation techniques
- Estimated length
- Estimated construction cost
- Additional costs
- Other site-specific considerations.

Table C-1 Potential Bank Stabilisation Methods

Method	Example Location	Example
Large Woody Debris	Hunter River NSW.	Source: Jenny Weingott (Hunter Local Land Services)
Cobble Beach	Nords Wharf Reserve, Lake Macquarie	(Hydrosphere Consulting, 2020)
Rock Revetment	Greenwell Point, NSW	(Rhelm, 2023f)
Rock Fillets	Shoalhaven River – Bolong Road	(Shoalhaven Riverwatch, 2022)
Sand Sausage	Shoalhaven River	(Shoalhaven Riverwatch, 2021)

Method	Example Location	Example
Oyster Reef	United States	(Hydrosphere Consulting, 2020)
Renourishment	Shoalhaven Heads	(Hydrosphere Consulting, 2020)
Groynes	Shaws Bay, Richmond River	(Hydrosphere Consulting, 2020)

BE_43a

Location: Watersleigh (Right Bank); Segment SR_018

Erosion Severity: Extreme

Riparian Condition: Moderate to Good

Primary Recommendation: Large Woody Debris/Rock Protection with complementary Riparian Vegetation Management

Estimated Length: 415 m

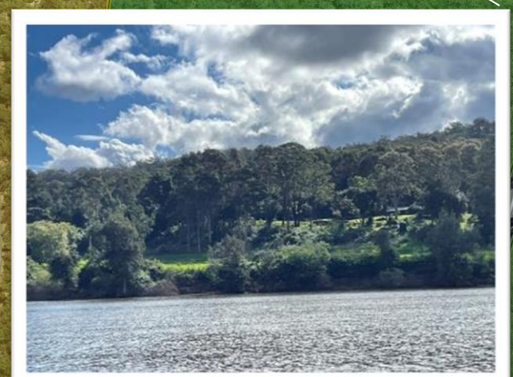
Estimated Construction Cost: $622,500

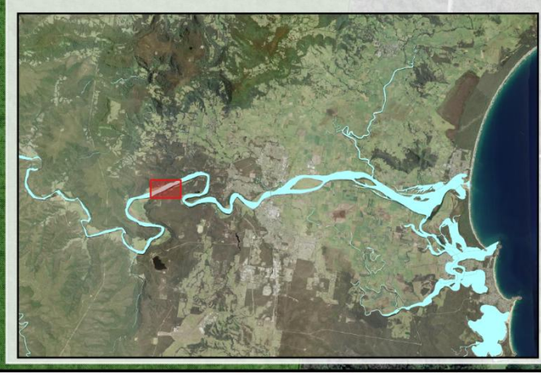
Additional Costs: Detailed site investigation and design ($50,000); REF ($35,000); Monitoring and maintenance (est. $62,250/year).

Other Considerations: This is a high use area for towed water sports and works should be designed accordingly. LLS has undertaken bank stabilisation on adjacent private lands, funded by the Bushfire Recovery Grant (2022).

The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.

Example of primary recommendation: Large Woody Debris





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SR_061 SR_062 SR_063 SR_064 SR_018 BE_43a Bangalee Nature Reserve Binnaburra Park Road Koloona Drive

Legend

- Bank Management Sites
- Public Wharf

Estuarine Macrophytes

- Zostera

Land Tenure

- National Parks & Wildlife Service
- Crown
- Shoalhaven City Council
- SCC as Trust Manager
- Private (Wildlife Refuge)
- Roads

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Rhelm

Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

BE_43a - Shoalhaven River. Watersleigh (Right Bank)

BE_43b

Location: Watersleigh (Left Bank); Segments SR_061, SR_062, SR_063, SR_064, SR_066

Erosion Severity: High

Riparian Condition: Moderate to Good

Primary Recommendation: Large Woody Debris/Rock Protection with complementary Riparian Vegetation Management

Estimated Length: 2,620 m

Estimated Construction Cost: $3,930,000

Additional Costs: Detailed site investigation and design ($100,000); REF ($35,000); Monitoring and maintenance (est. $393,000/year).

Other Considerations: This is a high use area for towed water sports and works should be designed accordingly. Bangalee Nature Reserve Wharf is within the site area and must be considered during works. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.

Example of primary recommendation: Large Woody Debris

Legend

- Bank Management Sites
- Public Wharf

Estuarine Macrophytes
- Zostera

Land Tenure
- National Parks & Wildlife Service
- Crown
- Shoalhaven City Council
- SCC as Trust Manager
- Private (Wildlife Refuge)
- Roads

J1566_Detailed Descriptions_00.qgz

Rhelm

Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

BE_43b - Shoalhaven River. Watersleigh (Left Bank)

BE_43c

Location: Between Ski Park and Long Reach; Segments SR_071, SR_073, SR_082

Erosion Severity: Moderate to High

Riparian Condition: Good

Primary Recommendation: Large Woody Debris/Rock Protection

Estimated Length: 170 m (SR_071), 256 m (SR_073), and 188 m (SR_082)

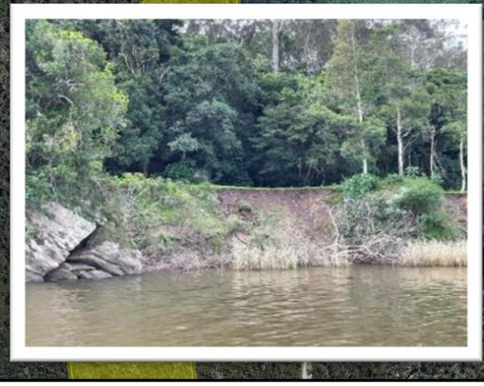
Estimated Construction Cost: $921,000

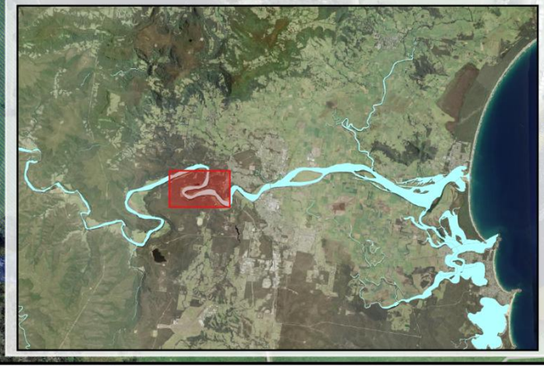
Additional Costs: Detailed site investigation and design ($100,000); REF ($35,000); Monitoring and maintenance (est. $92,100/year).

Other Considerations: This is a high use area for towed water sports and works should be designed accordingly. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.

SR_064
SR_062
Bangalee Nature Reserve
Longreach Road
Crams Road
Pitt Street
Geary Place
McMahons Road
Dowell Avenue
Hoskin Street
Lucas Street
Coorong Road
SR_071
SR_073
SR_082

Example of primary recommendation: Large Woody Debris





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Scale: 1:415700@A3

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Legend

- Bank Management Sites

Estuarine Macrophytes
- Zostera

Land Tenure
- National Parks & Wildlife Service
- Crown
- Shoalhaven City Council
- SCC as Trust Manager
- Private (Wildlife Refuge)
- Roads

J1566_Detailed Descriptions_00.qgz

Rhelm

Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

BE_43c - Shoalhaven River. Between Longreach and Ski Park

BE_43d

Location: Bomaderry Oval; Segment BOM_11

Erosion Severity: Moderate

Riparian Condition: Moderate

Primary Recommendation: Large Woody Debris/Rock Protection with complementary geotextile sand containers and riparian vegetation management

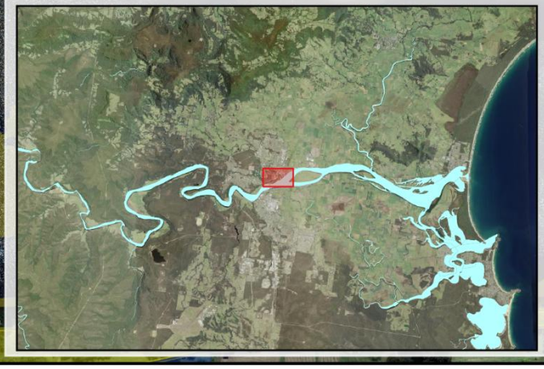
Estimated Length: 254 m

Estimated Construction Cost: $381,000

Additional Costs: Detailed site investigation and design ($50,000); REF ($20,000); Monitoring and maintenance (est. $38,100/year).

Other Considerations: The Lions Park Boat ramp is downstream of this site and must be considered during works. Site BOM_13 corresponds with Action BE_43h, which is to maintain the existing control. There is an opportunity to align both actions to achieve cost efficiency. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.

Example of primary recommendation: Large Woody Debris



0 200 400 m

Scale: 1:415700@A3

N

Tarawara Street
Dalwah Street
Coomea Street
Meroo Street
Railway Street
Bolong Road
Nundah Street
Maleen Street
Brinawarr Street
Bowen Street
Linda Street
Matles Way
Princes Highway
BOM_13
BOM_11
Lions Park
BE_43d

Legend

- Bank Management Sites
- Public Boat Ramp
- Public Wharf

Estuarine Macrophytes

- Mangrove
- Zostera

Land Tenure

- Crown
- Shoalhaven City Council
- SCC as Trust Manager
- Roads

J1566_Detailed Descriptions_00.qgz

Rhelm

Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

BE_43d - Bomaderry Creek. Bomaderry Oval

BE_43e

Location: Shoalhaven Heads River Road Foreshore; Segment SH_02

Erosion Severity: Moderate

Riparian Condition: Reasonable

Primary Recommendation: Beach nourishment with complementary revegetation and sediment control

Estimated Length: 500 m

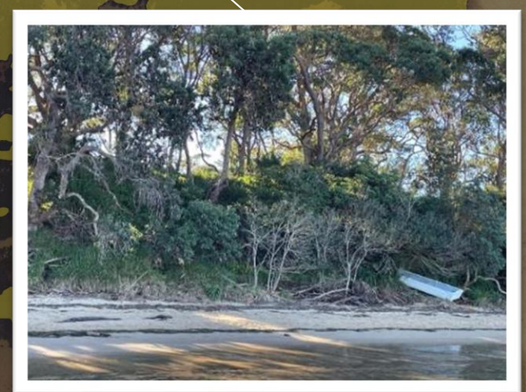
Estimated Construction Cost: $306,250

Additional Costs: Detailed site investigation and design ($50,000); REF ($20,000); Monitoring and maintenance (est. $30,625/year).

Other Considerations:

The works associated with this action are foreshore protection works categorised as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation. Action BE_44 also involves nourishment over the toe of the existing rock revetment. These actions should be aligned to achieve cost efficiencies. See Shoalhaven Heads Key Location Overview for details. Map RG-01-10A shows an indicative location for sourcing sand near the entrance at Shoalhaven Heads Beach.

Example of primary recommendation: Beach Nourishment



Bramall Road
Davenport Road
Mathews Street
Bolt Street
McIntosh Street
Lloyd Street
Ravenscliffe Road
Golden Hill Avenue
River Road
Shoalhaven Heads - River Rd
Renown Avenue
Celia Parade
Bailey Road
SH_02
Wharf (River Road)
Hay Avenue
Wharf Road
Shoalhaven Heads - Wharf Rd

0 200 400 m

Scale: 1:415700@A3

N

Legend

- Bank Management Sites
- Public Boat Ramp
- Public Wharf

Estuarine Macrophytes

- Mangrove
- Mangrove/Saltmarsh
- Saltmarsh
- Zostera

Land Tenure

- National Parks & Wildlife Service
- Crown
- Shoalhaven City Council
- SCC as Trust Manager
- Roads

J1566_Detailed Descriptions_00.qgz

Rhelm

Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

BE_43e - Shoalhaven Heads. River Road Foreshore

BE_43f

Location: Crookhaven Drive; Segment CH_19

Erosion Severity: Moderate

Riparian Condition: Poor

Primary Recommendation: Maintenance on existing controls, including foreshore protection structures and riparian vegetation and intertidal habitat

Estimated Length: 278 m

Estimated Construction Cost: $0 (no additional construction proposed)

Additional Costs: Monitoring and maintenance (est. $15,000/year).

Other Considerations: This action focuses on maintaining the existing foreshore protection structures and recently installed intertidal and riparian habitat. Monitoring will be essential to assess the ongoing performance of the existing controls and habitat features. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.

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Rhelm

Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

BE_43f - Orient Point Foreshore Reserve

BE_43g

Location: Shoalhaven River Between Ski Park and Golf Course: Segments SR_094, SR_096

Erosion Severity: Moderate to High

Riparian Condition: Moderate

Primary Recommendation: Large Woody Debris/Rock protection with complementary Shoalhaven Sand Sausage (one long continuous sandbag filled on site with mud and sand, installed along toe of the bank) installed downstream at the golf course.

Estimated Length: 65 m (SR-094), 206 m (SR_096)

Estimated Construction Cost: $406,500

Additional Costs: Detailed site investigation and design ($50,000); REF ($20,000); Monitoring and maintenance (est. $40,650/year).

Other Considerations: This is a high use area for towed water sports and works should be designed accordingly. There may be an opportunity to align works with adjacent private land subject to landholder agreement. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.

Example of primary recommendation:
Large Woody Debris

Legend

- Bank Management Sites
- Private Boat Ramp

Estuarine Macrophytes

- Zostera

Land Tenure

- Crown
- Shoalhaven City Council
- SCC as Care Control Manager
- SCC as Trust Manager
- Roads

J1566_Detailed Descriptions_00.qgz

Rhelm

Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

BE_43g - Shoalhaven River. Between Ski Park and Golf Course

BE_43h

Location: Bomaderry Oval; Segment BOM_13
Erosion Severity: Moderate
Riparian Condition: Moderate
Primary Recommendation: Maintain existing controls
Estimated Length: 52 m
Estimated Construction Cost: $26,000
Additional Costs: Detailed site investigation and design ($15,000); Monitoring and maintenance (est. $2,600/year).
Other Considerations: The Lions Park Boat ramp is upstream of this site and must be considered during works. Riparian revegetation should be considered as a complementary strategy. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.

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Rhelm

Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

BE_43h - Bomaderry Creek. Bomaderry Oval

BE_43i

Location: Orient Point Foreshore Reserve; Segment CR_017

Erosion Severity: Moderate (upgraded from Stage 2 Study in light of information obtained during public exhibition)

Riparian Condition: Low

Primary Recommendation: Rock Fillet or other hybrid revetment stabilising method that incorporates habitat features such as estuarine vegetation and riparian vegetation. The stormwater drain is to be upgraded through revegetation and rock lining.

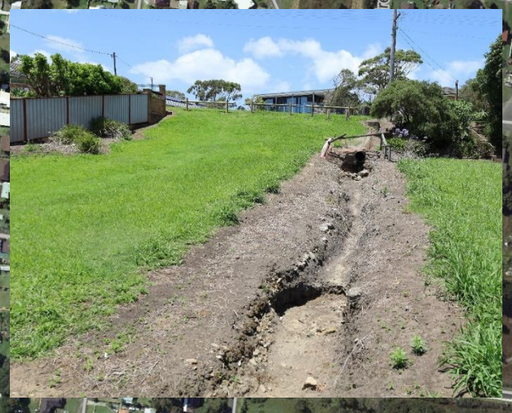
Estimated Length: 200 m

Estimated Construction Cost: $300,000

Additional Costs: Detailed site investigation and design ($50,000); REF ($20,000); Monitoring and maintenance (est. $30,000/year)

Other Considerations: This option was not identified as high priority in the Stage 2 study however, site specific information provided during the public exhibition period led to a better understanding of the bank erosion severity, and hence the risk outcome. When this were considered, the site was identified as higher priority and included as a recommended action in the CMP.

Existing rock groynes installed in 2015 are not an effective solution for this site due to minimal alongshore sediment transport. Additionally, old geofabric within the water is deteriorating and should be removed. In addition to foreshore erosion, an unvegetated and highly degraded stormwater drain was identified at Orama Crescent. The drain is contributing sediment and other materials to the estuary, with visible scour holes at both the pipe outlet and estuary entry point. Remediation works for this drain should be incorporated into the bank stabilisation works. The foreshore protection works associated with this action are categorised as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation.



CR_017

Orama Crescent

Ormonde Crescent

Orient Avenue

Otway Street

Orontes Street

First Street

Seagull Street

Wren Street

Jay Street

Tern Street

Flora Street

Park Row

Crookhaven Heads

0 200 400 m

Scale: 1:415700@A3

N

Legend

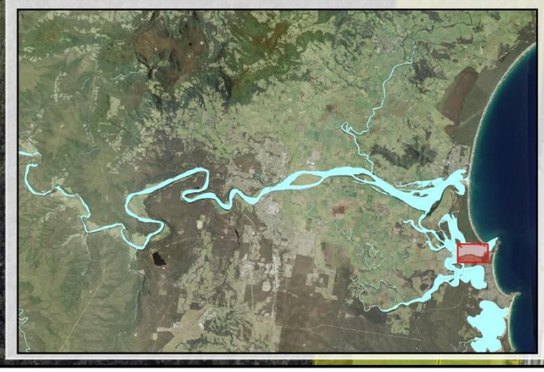
- Bank Stabilisation Sites
- Public Boat Ramp
- Public Wharf

Estuarine Macrophytes

- Mangrove
- Saltmarsh
- Zostera
- Oyster Reefs

Land Tenure

- National Parks & Wildlife Service
- Crown
- Shoalhaven City Council
- SCC as Care Control Manager
- SCC as Trust Manager
- Roads



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Date :	11/03/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Stabilisation on Public Land

BE_43i - Crookhaven River. Crookhaven Drive

Burrier Site (not included in the CMP management actions or business plan)

Location: Upper Shoalhaven River, segment uSR_10 & uSR_09

Erosion Severity: High

Riparian Condition: Low

Primary Recommendation: Large Woody Debris/Rock Protection with complementary Riparian Vegetation Management

Estimated Length: 800 m

Estimated Construction Cost: $1,000,000

Additional Costs: Detailed site investigation and design ($50,000); REF ($20,000); Monitoring and maintenance (est. $100,000/year)

Other Considerations: These sites are located along the Shoalhaven River, downstream of Burrier Weir. Access to the sites may be difficult, and LWD may not be suitable on the coarse sand/ gravel reaches.

This site is not within the mapped coastal zone, however, bank stabilisation works would prevent substantial sediment from washing into the coastal zone and help to mitigate associated environmental damage. The works associated with this action are categorised as waterway or foreshore management activities under the TI SEPP and appropriate planning pathways will be used during action implementation.

uSR_09

uSR_10

Example of primary recommendation:
Large Woody Debris

0 200 400 m

Scale: 1:415700@A3

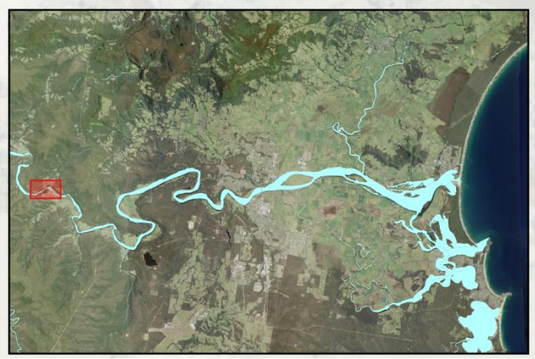
N

Legend

- Bank Management Sites

Land Tenure

- Crown
- Shoalhaven City Council
- Roads



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Date :	16/04/2025
Revision :	01
Created by :	MWR
Reviewed by :	ERM
Coordinate System :	GDA2020 / MGA zone 56
Imagery Source:	NSW Six Map

BE_43 - Bank Management on Public Land

Burrier Site - Upper Shoalhaven River

Improving Boat Access and Facilities	
BOAT_37	**Boat Ramp Consolidation / Optimisation Plan**
BOAT_38	**Develop and implement a comprehensive boat ramp facility upgrade and asset management program**
BOAT_43	**Management of Watercraft Storage**

Location(s): Whole Study Area

Coastal threat(s) to be addressed: Impacts of recreational boating; Insufficient estuary access

Management objectives supported: Social and Cultural Values; Coastal Economies; Land Use Planning

Costs: Cost for BOAT_37 are only for investigation and development of the Boat Ramp Consolidation / Optimisation Plan, not for construction, demolition, decommissioning, or upgrading works that arise from the Plan. Plan development will include external specialist support and targeted community consultation, aligning with similar CMP actions occurring across the Local Government Area (LGA).

- Plan development - $100,000 (ex GST)

BOAT_38 consists of several components which are described in more detail below. A breakdown of costs for each component includes:

- Program development - $50,000 (ex GST)
- Resulting maintenance and upgrades ($50,000 ex GST/year)

BOAT-43 consists of installing and maintaining small watercraft storage facilities at strategic location around the estuary. Cost components include:

- Installation - $25,000 (ex GST)
- Ongoing maintenance - $10,000 ex GST/year

Action Type:

☐ Alert ☐ Avoid future impact ☒ Active intervention

☒ **Planning for change** ☐ Emergency response

Timing: BOAT_38 and BOAT_43 is programmed to commence in Year 1. Action BOAT_37 is programmed to commence in Year 3 of the CMP, aligning with the broader LGA program of similar works. Works to implement boat ramp decommissioning and upgrading are not specifically included in this action and would be undertaken opportunistically as funding becomes available with additional consideration for the broader LGA program of similar works. Once the program of works identified in BOAT 37 is undertaken, the asset management program from BOAT_38 will be updated to reflect the new boating infrastructure configuration in the study area.

Action Description

Due to relatedness and interdependencies, this detailed description covers three CMP actions;

- BOAT_37 – Boat ramp consolidation/ optimisation plan; and
- BOAT_38 – Develop and implement a comprehensive boat ramp facility upgrade and asset management program.
- BOAT_43 - Management of Watercraft Storage

The Stage 2 Boating Study (Rhelm, 2023c) provides useful information that will be used to guide development of these actions. A map showing the boating zones of the study area (numbered 1-8) and detailing the location of boat ramps and wharves throughout the Lower Shoalhaven River is shown in **Figure C-2**. followed by a summary of key information from the boating study relating to boating usage and distribution in **Figure C-3**.

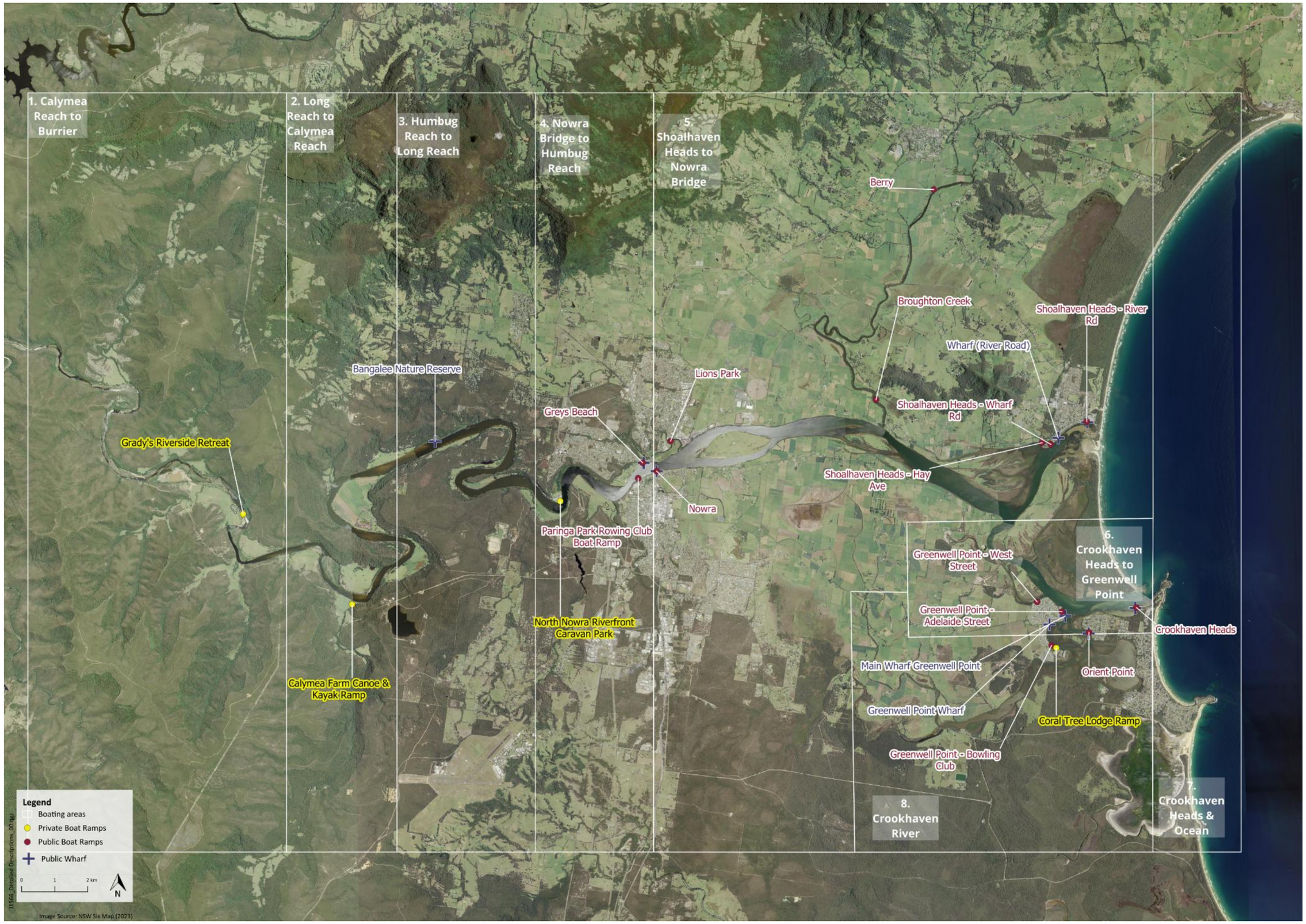
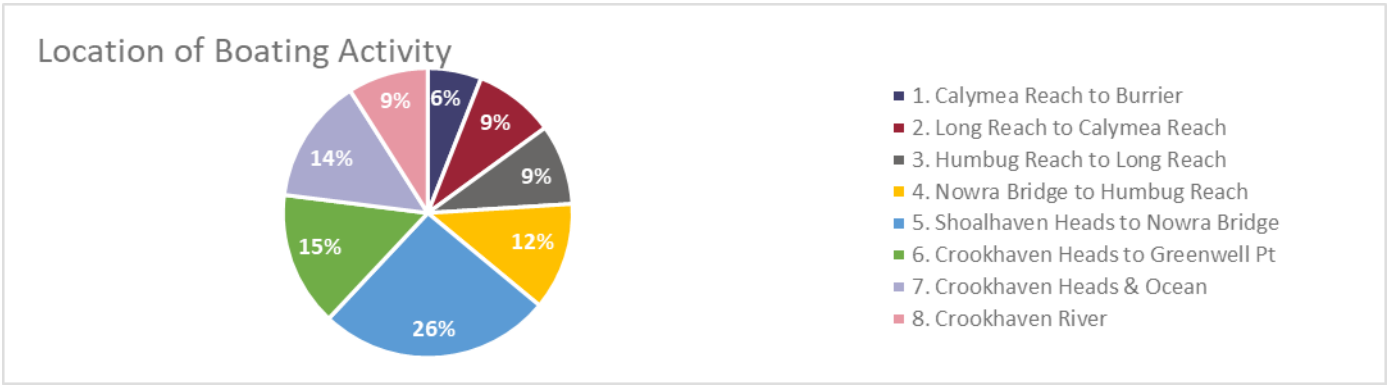
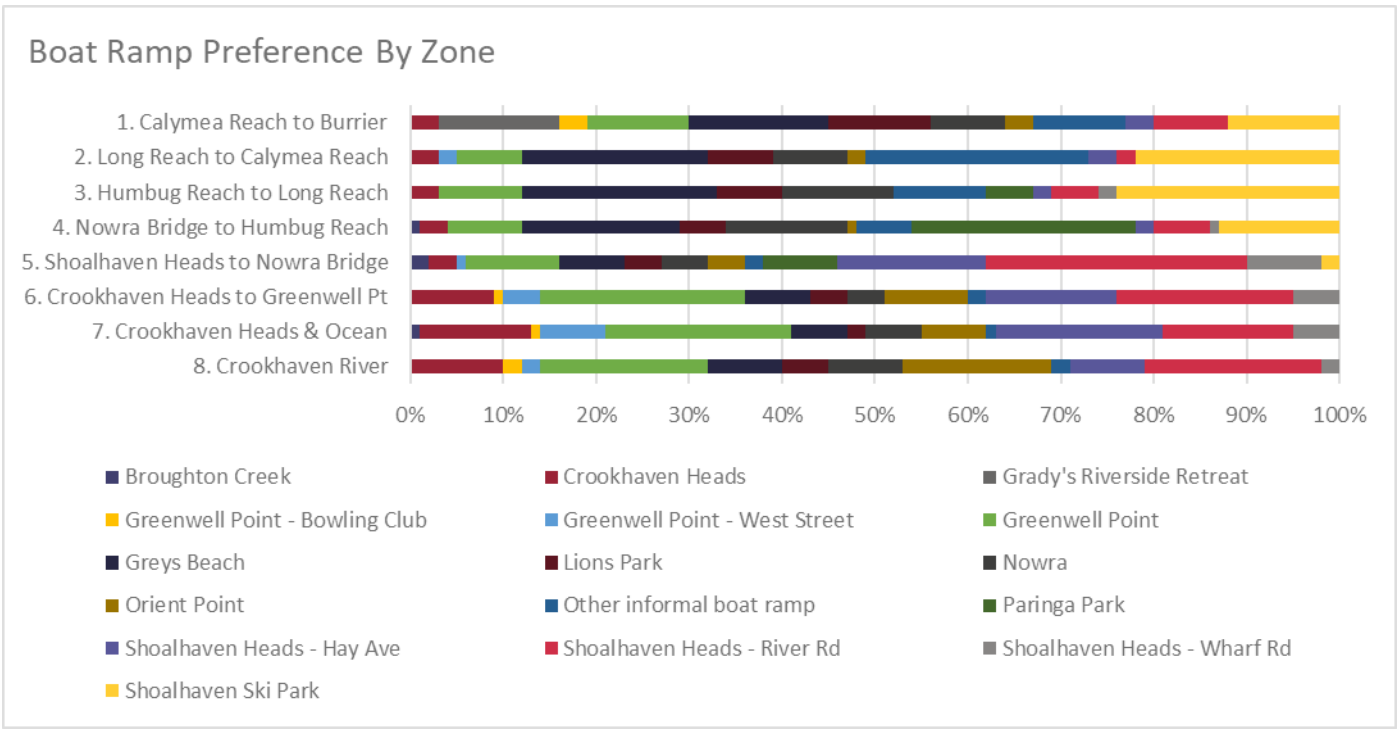


Figure C-2 Location of Boating Zones, Boat Ramps and Wharves Throughout the Lower Shoalhaven River





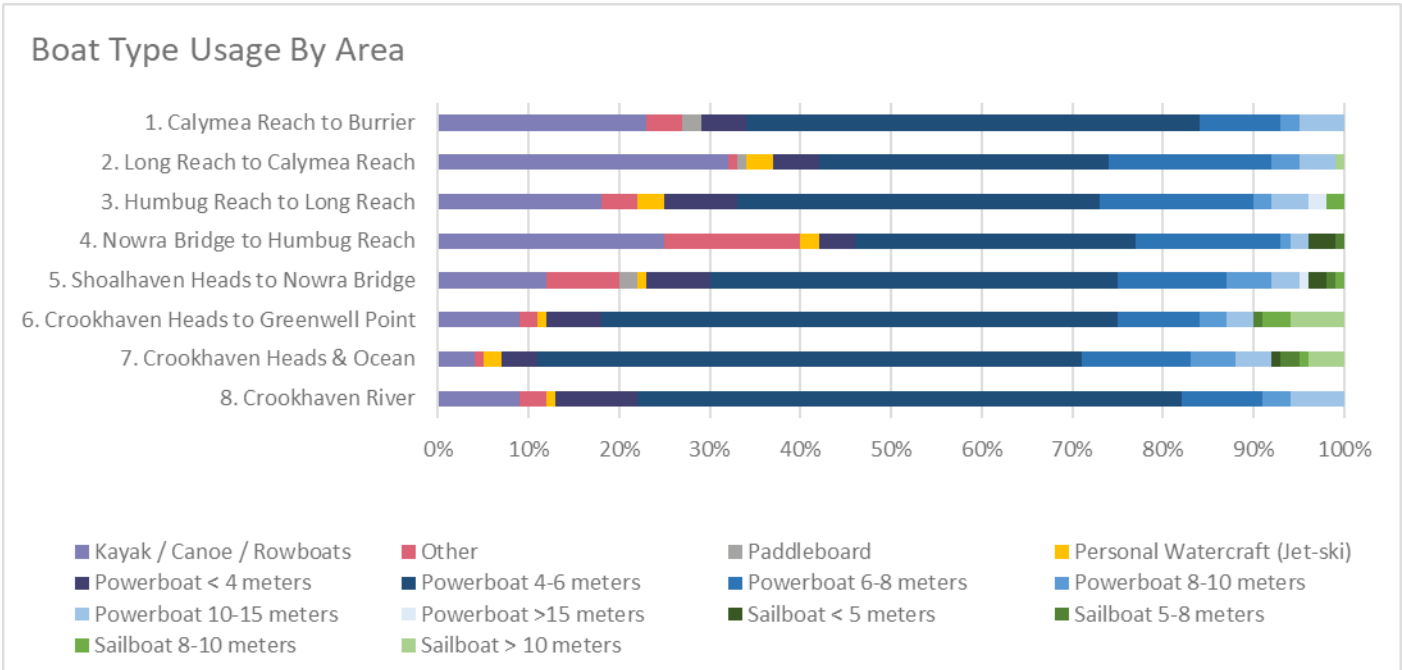


Figure C-3 Summary of Key Information from the Boating Study Relating to Boating Usage and Distribution

BOAT_37 – Boat Ramp Consolidation / Optimisation Plan

This action involves the development of a boat ramp and facilities consolidation / rationalisation plan and aligns with a similar broader LGA-wide action that has been identified in other Shoalhaven City Council CMPs. The plan will involve the review of existing boat ramp conditions, facilities, usage, and distribution. It will identify boat ramps that are to be decommissioned, and those to be upgraded. For those that are to be decommissioned, the plan will identify suitable replacement uses for the location. The consolidation / rationalisation of Council-managed boat ramps provides an opportunity for significant financial savings, environmental stewardship, and improved user experience.

Community engagement will be a core part of the assessment to understand user needs and gaining public support. While there may be initial concerns from regular users about the potential reduction in available ramps, the benefits of having fewer but superior facilities, in the long run, is considered to offset these concerns.

Considerations for this plan will include:

- **Concentration and Distribution of Ramps** – evaluating the spatial distribution of existing ramps to ensure optimal coverage and accessibility across the region, avoiding redundancy and underutilisation.
- **Existing Boat Ramp Preference** – understanding user preferences and usage patterns to prioritise the ramps that are most frequently and effectively used by the community.
- **Boating Activity Location** – analysing which type of boating activities and where they predominantly occur to align the location of upgraded facilities with areas of high demand and usage.
- **Boat Type Usage** – considering the types of boats commonly used in different areas to ensure the facilities can accommodate various sizes and types of boats, from small recreational vessels to larger craft.
- **Environmental, Economic, and Community Constraints and Opportunities** – assessing the environmental impact, economic feasibility, and community benefits associated with ramp upgrades and decommissioning. This includes evaluating potential environmental restoration projects, cost savings, and enhanced community spaces resulting from decommissioned ramp sites. The DPIRD Fisheries Policy and Guidelines for Fish Habitat Conservation and Management will play a critical role in shaping the development of the study.

Additional considerations for the plan will include identifying opportunities for the provision of sufficient boating infrastructure throughout the estuary such as improved parking and trailer access, passive vessel launch sites, vessel pump out facilities, fuelling facilities, and slipway facilities.

BOAT_38 – Develop and implement a comprehensive boat ramp facility upgrade and asset management program

This action is designed to enhance the management and maintenance of Council-managed boat ramp facilities, guided by findings from the Stage 2 Boating Demand Study (Rhelm, 2023c) and feedback from community engagement undertaken during that study. It encompasses a variety of improvements aimed at ensuring the safety and functionality of these facilities.

This action involves the preparation of an asset management program and framework to direct and coordinate upgrades and the ongoing evaluation and management of boat ramp facilities. The program would include requirements for evaluation of the condition and functionality of the boat ramp facilities to ensure they continuously meet safety standards and user expectations. The program will address

concerns raised by the community during the development of the Boating Study related to maintenance components such as:

- **Increased Cleaning Frequencies** – focusing on pressure washing to keep ramp surfaces safe and establishing protocols for debris monitoring and removal, particularly after flooding events.
- **Asset Repair** – assets such as fish cleaning and waste management facilities will be frequently inspected and repaired as needed, improving the overall user experience.
- **Maintenance Dredging** – frequently monitoring approaches to boat ramps and navigation channels and undertaking maintenance dredging to ensure uninterrupted access to ramps by appropriate boat types.
- **Safety and Security** – measures will be bolstered through the installation of CCTV cameras and improved lighting, aiming to deter anti-social behaviour and ensure safe access for all users.
- **User Education** – new signage will be installed to promote responsible use of boat ramp facilities, boating, and fishing etiquette.

BOAT_43 – Management of Watercraft Storage

Effective watercraft storage is a critical aspect of managing recreational boating access and ensuring sustainable use of estuarine environments. This action aims to establish formal, well-designed watercraft storage facilities at strategic locations throughout the Lower Shoalhaven River, supporting a more organised and environmentally responsible approach to vessel management.

Informal watercraft storage, such as kayaks, dinghies, and small boats left on foreshores and in sensitive riparian areas, has led to vegetation damage, erosion, and access conflicts in multiple locations. By providing dedicated, purpose-built facilities, this action seeks to minimise environmental impact while improving accessibility for boat users. The design and placement of these facilities will consider user needs, environmental constraints, and integration with broader boating infrastructure improvements under BOAT_37 and BOAT_38.

Four locations have been identified for the installation of dedicated watercraft storage facilities. (Locations depicted in the CMP actions map RG-10 series are indicative potential locations only):

- Greenwell Point;
- Orient Point;
- Shoalhaven Heads; and
- Calymea Creek.

During detailed investigations for this action, formal watercraft storage locations may need to be refined.

The design and installation of watercraft storage facilities will take into account:

- **Capacity and Accessibility** – Ensuring storage racks accommodate various vessel sizes and are positioned for easy access while avoiding conflicts with pedestrians and other users.
- **Environmental Protection** – Locating storage away from sensitive vegetation and erosion-prone areas to minimise ecological impacts.
- **Community Consultation** – Engaging with local boating groups, councils, and residents to align storage solutions with user needs and preferences.
- **Security Measures** – Implementing features such as locking mechanisms or designated storage areas to enhance safety and prevent theft or vandalism.

- **Integration with Other Boating Infrastructure** – Aligning with broader improvements under BOAT_37 (boat ramp consolidation) and BOAT_38 (boat ramp maintenance and upgrades) to ensure a cohesive approach to boating facility management.

CS_16	Protection of Midden at Crookhaven Heads

Location(s): Crookhaven Heads

Coastal threat(s) to be addressed: Bank Erosion

Management objectives supported: Environmental Values; Social and Cultural Values

Costs: The cost for each action over the life of the CMP is:

- Interim Soft Works Construction Cost - $150,000 (ex GST)
- Design of Long Term Protection - $50,000 (ex GST)
- Consultation with TO's - $15,000 (ex GST)
- Development of a Protocol for Protecting and Managing Other Culturally Significant Sites – $35,000 (ex GST)

Total Cost – $250,000 plus $25,000/ year maintenance

Option Type:

☐ Alert ☐ Avoid future impact ☒ **Active intervention**

☐ Planning for change ☐ Emergency response

Timing: This action is programmed for Year 2 of the CMP with ongoing maintenance continuing throughout the 10-year timespan.

Action Description

This action addresses the protection and preservation of a culturally significant site to the Jerrinja People, located on the Crookhaven Headland. This site, identified as an extensive midden, is currently threatened by erosion and shoreline recession due to coastal processes (**Figure C-4)**. The management action will be developed in consultation and partnership with the Traditional Owners, ensuring their cultural heritage is preserved while also implementing sustainable coastal management practices.

At the time of European contact, Aboriginal people were present on both sides of the Shoalhaven/Crookhaven Estuary, and their close association with the area continues to this day. The Crookhaven Headland holds significant cultural importance for the Jerrinja People, evidenced by the discovery of a shell midden on the northern shoreline of Orient Point, which dates back up to 2,000 years. The headland provided a rich source of food, including fish, shellfish, and sea birds, sustaining the local Aboriginal population for millennia. In more recent history, part of the headland was established as the Roseby Park Aboriginal Reserve in 1902. This land was granted to the Jerrinja LALC under State Land Rights legislation some 84 years later. The Crookhaven and Orient Point area is of importance to contemporary local Aboriginal people who regard the area as being central to their cultural identity through their continuing physical association with the land and its traditional and contemporary Aboriginal sites.

The Crookhaven Headland area includes various significant sites, such as traditional burial sites, bora grounds, ceremonial sites, shell middens, and other natural features of cultural importance. These sites underscore the Jerrinja People's deep spiritual and physical connection to the land, which continues to this day. The importance of the area is further reflected in the community's ongoing involvement in site projects, such as the creation of interpretive timber poles and a bush tucker garden. An overview of the cultural elements of the Crookhaven headland is shown in **Figure C-5**.

Figure C-4 Photo of the Exposed Culturally Significant Midden Site (Photo: Shoalhaven City Council)

Figure C-5 Cultural Overview of Crookhaven Headland

The works associated with this action are categorised as coastal protection works under the RH SEPP and appropriate planning pathways will be used during action implementation. Key elements of this action include:

- **Interim 'Soft Works'** – as a short-term measure to protect the midden from coastal hazards, interim 'soft works' will be implemented. This includes using locally sourced large woody debris to dissipate wave and tide energy. Sandbags, additional vegetation planting, and incorporation of existing shoreline cobble will also be considered to provide further protection. These measures aim to stabilise the shoreline and prevent further erosion, safeguarding the midden while more permanent solutions are developed. An example is show in **Figure C-6**.

Figure C-6 Example of Interim 'Soft Works' in the Form of Temporary Geotextile Sand Containers. Photo Sourced from Mulcahey et al (2023)

- **Long-Term Solution Design** – In collaboration with the Jerrinja Aboriginal community and relevant state government agencies, a long-term solution involving the creation of a living shoreline will be investigated. This solution will incorporate natural elements to create a sustainable and resilient coastal environment that protects the cultural site. The design will consider future sea level rise and other climate change impacts to ensure the longevity and effectiveness of the protection measures. The involvement of the Jerrinja People in this process will be crucial to ensure the design respects and integrates their cultural heritage and traditional knowledge. A diagram that shows the component and benefits of a long-term protection solution is provided in **Figure C-7**.

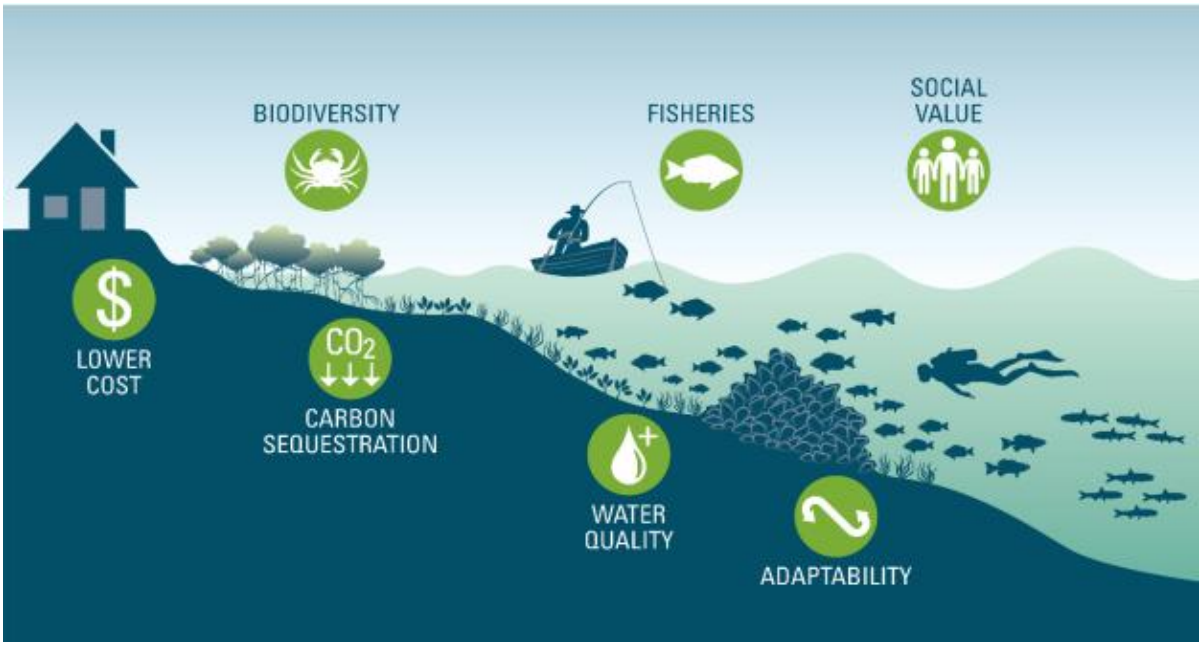


Figure C-7 Component and Benefits of a Long-Term Protection Solution

- **Community Engagement and Consultation** – continuous engagement with the Jerrinja People and the wider community will be a cornerstone of this action. Regular consultations will be held to gather input and ensure the community's needs and concerns are addressed. This approach will help build public support for the project and ensure that the management strategies are culturally appropriate and effective.
- **Development of a Protocol for Protecting and Managing Other Culturally Significant Sites** – using the experience and insights gained from this project, a protocol will be developed for protecting and managing other culturally significant sites within the Shoalhaven region. This aligns with *Action CS_13: Undertake a LGA wide coastal zone Aboriginal Cultural Heritage Survey, and development of local protection/management plans.* This protocol will establish guidelines for identifying, assessing, and preserving cultural heritage sites, ensuring that they are managed in partnership with Traditional Owners and other stakeholders. The protocol will aim to create a consistent, respectful, and effective approach to cultural heritage management across the region.

CTF_20	Implement the Entrance Management Policy and undertake review
Location(s): Shoalhaven Heads	
Coastal threat(s) to be addressed: Changes in catchment flooding and freshwater flows **Management objectives supported:** Environmental values; Social and cultural values; Coastal processes; Coastal economies; Land use planning; Coastal hazards; Integrated and collaborative management	
Costs: Operational costs (per year): Frequent monitoring of dry notch and berm height, mobilisation of equipment for manual entrance opening, stockpiling sand from dry notch ($25,000)	
Action Type: ☐ Alert ☐ Avoid future impact ☒ **Active intervention** ☐ Planning for change ☐ Emergency response	
Timing: This action is programmed to span the 10-year timeframe of the CMP. Entrance openings will be undertaken in accordance with the Entrance Management Policy and the associated Review of Environmental Factors.	

Action Description

The current entrance management arrangements were reviewed as part of Stage 2 of the CMP. The review concluded that entrance management for the purpose of flood risk reduction was appropriate and should continue.

Based on this review, the CMP identifies that the 2006 Entrance Management Policy (EMP) should be updated in accordance with current legislation and policy, as well as to provide improvements to operational aspects of entrance management. However, no recommendations for changes to trigger levels or dry notch management were made in the CMP. The CMP also identifies the need for further review of the EMP in consideration of:

- Floor level survey data capture of low lying properties, and
- Modelling of a range of trigger levels as part of the Lower Shoalhaven Floodplain Risk Management Study and Plan (FRMSP).

Concurrently to this process an updated Review of Environmental Factors (REF) should be undertaken to support the ongoing implementation of the EMP. This will include consultation with relevant agencies. The full process for updating the EMP is illustrated in **Figure C-8**.

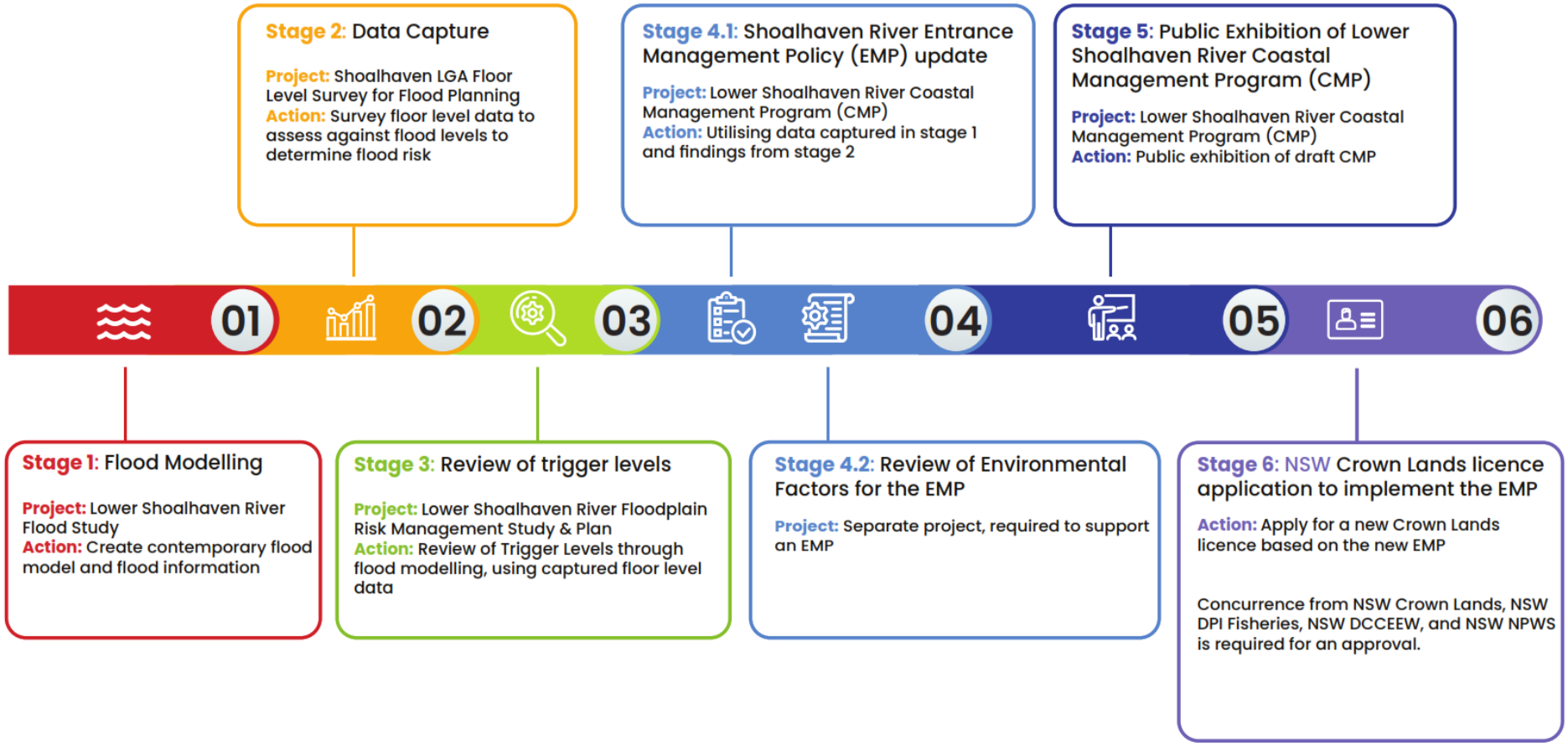


Figure C-8 **Full process of updating the Shoalhaven River Entrance Management Policy.**

Approach to Entrance Management

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

Following the construction of Berry's Canal in 1822, the Shoalhaven River entrance at Shoalhaven Heads became intermittently open, with normal flows reaching the sea at Crookhaven Heads via Berry's Canal. The Shoalhaven River entrance is opened by floods and subject to closure by natural onshore coastal processes (**Figure C-9**). In smaller flood events with a closed entrance, floodwater can discharge to the sea via Berry's Canal and Crookhaven Heads without adverse impacts.

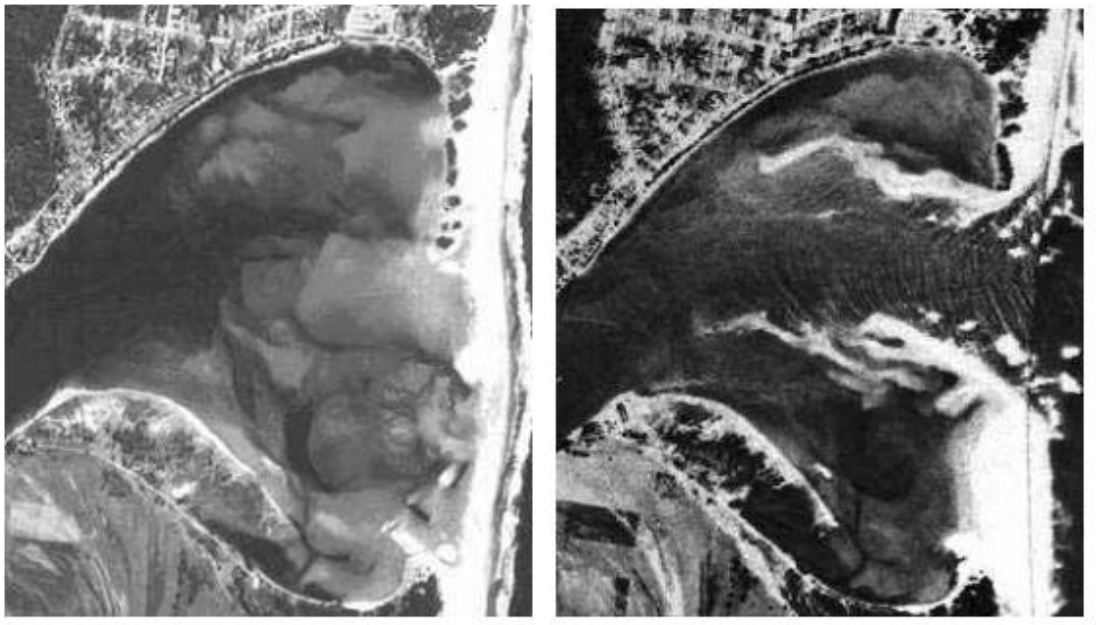


Figure C-9 Closed and Open Entrance (EMP, 2006)

If the entrance of the Shoalhaven River at Shoalhaven Heads were to remain closed during a flood, water levels may be higher for longer in some parts of the river's floodplain. This could result in greater impacts on the Shoalhaven community, especially at the village of Shoalhaven Heads, in terms of inundation of existing low-lying houses and other property, and impacts on access roads.

The Shoalhaven River entrance is located on land owned by NSW Crown Lands. Council can artificially open the Shoalhaven River to the sea at Shoalhaven Heads with machinery, however, are only permitted to do so in accordance with the trigger levels and conditions specified within an Entrance Management Policy and a NSW Crown Lands licence.

The mechanical opening of the Shoalhaven River entrance will not prevent flooding of houses within the entirety of the catchment. Even if the entrance is fully open at the start of a large flood (i.e., it has recently been scoured by a preceding flood) there are existing houses that can still be flooded. Accordingly, the EMP aims to reduce (where possible), not eliminate, the impacts of flooding.

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

Under the Shoalhaven River EMP review, trigger levels have remained the same. As such, the Shoalhaven River entrance can be mechanically opened when the following conditions have been met:

- Water level at or exceeding 3.0m AHD at the Nowra gauge (Wharf Rd) initiates an immediate entrance opening; or
- Water level at or exceeding 2.0m AHD at the Shoalhaven Heads gauge (Hay Av) initiates an immediate entrance opening; or
- If either of the above trigger levels are expected to be reached based on a Flood Warning from the Bureau of Meteorology (the Bureau), a pre-emptive entrance opening can be undertaken.

Other factors that need to be considered as part of any entrance opening, include oceanic water level and tidal behaviour, wash over from the sea, the presence of protected migratory shorebirds, and the safety of machinery operators and other staff.

The core approach for management of the entrance of the Shoalhaven River is maintenance of a dry notch, and excavation of a pilot channel when water level triggers are met. When closed, Council conducts a monthly survey of the dune crest / entrance berm and dry notch to understand current conditions. The dry notch is designed to restrict the level of sand immediately behind the main beach berm to lower than 2.0m AHD. This reduces the quantity of sand requiring movement in an emergency opening of the entrance.

Figure C-10 shows a cross section of the Shoalhaven River entrance at Shoalhaven Heads and illustrates the dry notch area (green) and the dune crest / entrance berm (red). Council currently maintains a 10-20m wide dune crest / entrance berm in accordance with the *Review of Environmental Factors (REF) Shoalhaven River Dry Notch*. This helps to prevent wash over that could cause further shoaling of the dry notch and to reduce the length of excavation required should a mechanical opening be needed. Council does not have approval for entrance berm lowering works at the Shoalhaven River entrance.

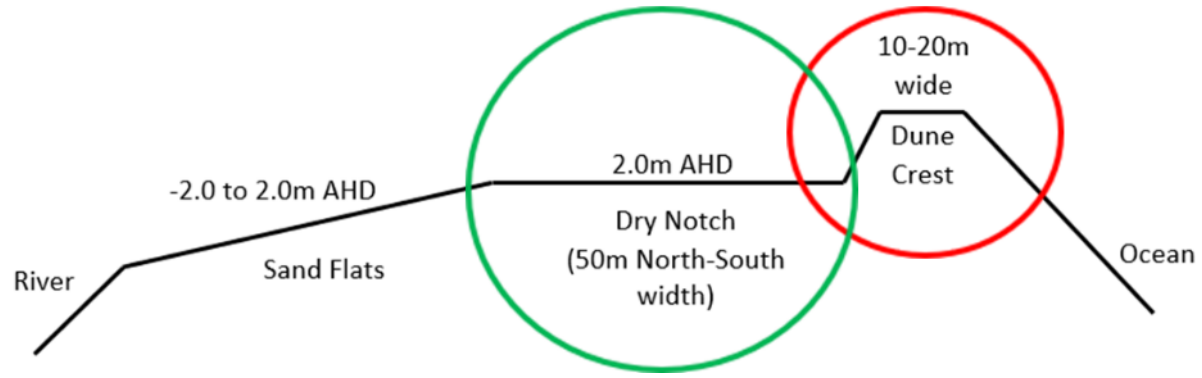


Figure C-10 Cross SECTION of Shoalhaven River Entrance at Shoalhaven Heads

Future Review of the EMP

The Entrance Management Policy will undergo regular review by Council:

- to incorporate new information (for example in relation to sea level change), new legislation and the community's changing needs as required.
- at no less than 5-year intervals, providing an opportunity to ensure staff and community understand the principles of entrance management.
- after each flood and or mechanical opening event, if Council staff, the community and/or any Government Agency suggest that any part of the procedure is inappropriate.
- in light of changing flood patterns and/or other flood protection strategies.

Figure C-11 Shoalhaven River Entrance in Flood (South Coast Register, 2017)

Asset Management in the Coastal Zone	
ECON_08	**Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure**
CTF_16	**Review and update all asset management plans (AMPs), relevant to the coastal zone within the CMP study area**
CTF_16a	**Review and update floodgate and associated drainage infrastructure asset management plans (AMPs)**

Location(s): Whole Study Area

Coastal threat(s) to be addressed: Changes in tidal inundation as a result of sea level rise; Coastal inundation (from coastal storms and extreme tides); Changes in catchment flooding and freshwater flows; Boating and associated waterway and foreshore usage

Management objectives supported: Environmental values; Social and cultural values; Coastal processes; Coastal economies; Land use planning; Coastal hazards; Integrated and collaborative management

Costs:

ECON_08 – Development of asset monitoring program ($50,000); ongoing monitoring of all asset classes ($10,000/year)

CTF_16 & CTF_16a - Review and update AMPs for all asset classes ($100,000)

Ongoing operation of revised AMPs for all asset classes ($55,000/year)

Action Type:

☐ Alert ☒ **Avoid future impact** ☐ Active intervention

☐ Planning for change ☐ Emergency response

Timing: This action is programmed to span the 10-year timeframe of the CMP. Initial development of the monitoring and revised AMPs is programmed for year 1.

Action Description

This detailed description addresses multiple CMP actions related to asset management across the coastal zone of the Lower Shoalhaven River. In all, these actions serve to update and implement general asset management operations with the aim to supporting the objectives of the CMP and ensuring coordinated and efficient management of the coastal assets. These actions will enhance coastal values by:

- Maintaining and improving the condition and functionality of the existing assets, such as foreshore access tracks, seawalls, groynes, and revetments, that protect public and private infrastructure, natural features, and cultural heritage from coastal hazards.
- Reducing the maintenance costs and environmental impacts of the assets by adopting best practices and adaptive management approaches that consider present and emerging environmental conditions.
- Identifying and prioritising the needs and opportunities for new or upgraded assets that can enhance the resilience, amenity, and accessibility of the coastal zone.

These actions are interconnected and intended to be implemented with a staged approach, as illustrated in **Figure C-12**.

- **ECON_08 (Asset Monitoring)** initiates the process by developing and implementing a regular monitoring program for these assets. The data gathered from this monitoring feeds into subsequent actions, ensuring that decisions are based on current and accurate information about asset conditions.
- **CTF_16 (Asset Management)** focuses on reviewing and updating AMPs for the coastal zone, with particular attention to assets at risk from coastal and tidal inundation and erosion. This step leverages the information from the monitoring program to guide decisions on upgrading, relocating, or retrofitting assets, ensuring resilience against coastal hazards.
- **CTF_16a (Floodgate Asset Management Planning)** is a more focused iteration of CTF_16 concentrating specifically on floodgates and associated coastal floodplain drainage infrastructure, which are essential for maintaining productive agricultural land. However the viability of this land for agriculture is diminishing with the predicted impacts of sea level rise on coastal floodplains. This element will be informed by the recommendations in the Shoalhaven River Floodplain Prioritisation Study (WRL, 2023), which indicated when individual floodgates may lose functionality with sea level rise . This may involve modifications to these assets and associated drainage systems to optimise their ability to support estuary health including mitigating the risk of Acid Sulfate Soils while either supporting current land-uses through minimising tidal impacts on private land or identifying opportunities for land-use change such as through coastal wetland restoration and Blue Carbon production.

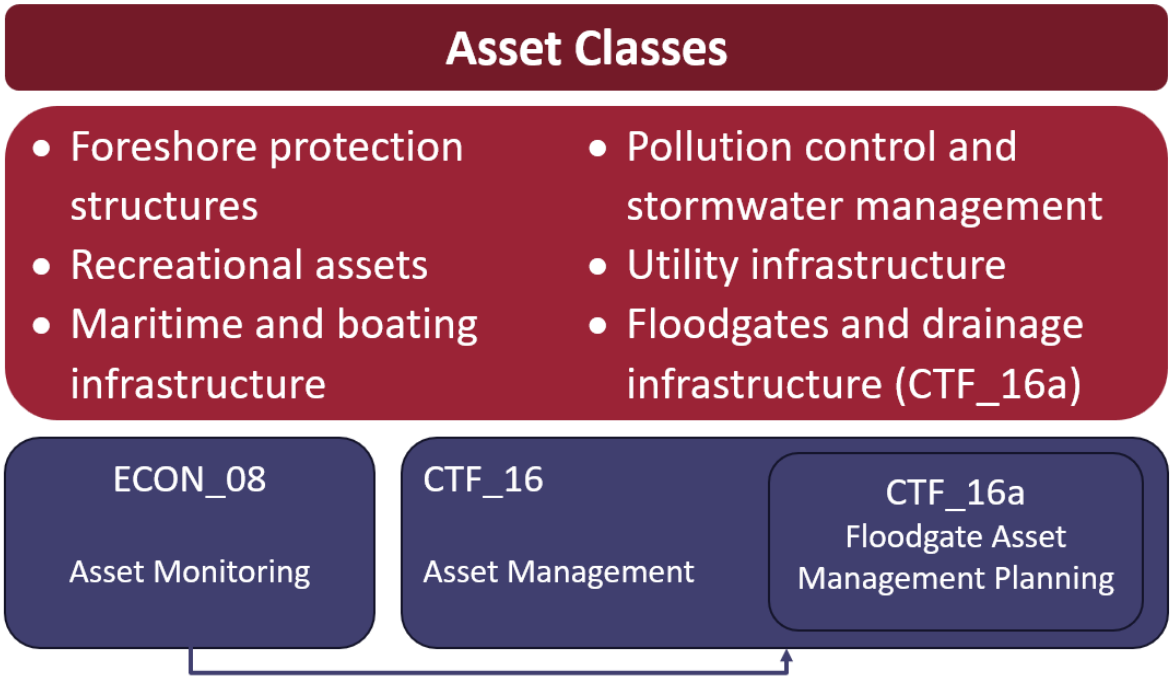


Figure C-12 Diagram Illustrating the Implementation Logic of Asset Management Actions (ECON_08, CTF_16 and CTF_16a).

ECON_08 – Develop and implement a program for regular and ongoing monitoring of coastal assets and infrastructure

This action involves the development and implementation of a comprehensive monitoring program designed to assess and track the condition and performance of various coastal assets and infrastructure across the CMP study area. This applies to a range of asset classes, each with important considerations that will shape details of their management. Asset classes and associated monitoring considerations are provided in **Table C-2**.

Table C-2 Overview of Asset Classes

Asset Class	Monitoring Considerations
Foreshore protection structures	Regular assessments of revetments, seawalls, bank stabilisation works, and other coastal defences to ensure they continue to provide adequate protection against erosion and storm events.
Recreational assets	Ongoing monitoring of public amenities, including viewing platforms, foreshore access tracks, active transport links, and other recreational facilities, to maintain safety, accessibility, and amenity.
Maritime and boating infrastructure	Evaluation of jetties, boat ramps, and ancillary infrastructure such as fish cleaning tables, ensuring these facilities meet current usage demands and safety standards. Note that BOAT_37 and 38 will inform/address AMPs related to this asset class.

Asset Class	Monitoring Considerations
Pollution control and stormwater management	Monitoring gross pollutant traps, stormwater outlets, and related infrastructure to manage pollution effectively and protect the ecological health of coastal environments.

Floodgates and drainage infrastructure	Systematic assessment of floodgates and drainage infrastructure to ensure they function correctly during high tide and storm events, mitigating flood risk to nearby communities.

Utility infrastructure	Monitoring sewer and water infrastructure in coastal areas to prevent contamination and ensure reliable service delivery.

Key elements of this action include:

- **Internal collaboration and engagement at Council** – collaboration with Council's asset teams and subject matter experts will be essential to design effective monitoring and operational protocols. This engagement will also help align the updated AMPs with other Council initiatives and community needs.
- **Determine Service Levels, Performance Metrics, and Monitoring Criteria** – establish clear service levels for coastal assets to ensure they meet community expectations and regulatory requirements. Develop specific, measurable performance metrics to monitor the effectiveness of these assets in providing essential services, such as coastal protection and public access. Additionally, define monitoring criteria and indicators to assess the condition and performance of each asset type, including structural integrity, safety, environmental impact, and usage levels, ensuring alignment with the Council's strategic objectives.

- **Establish Frequency and Timing** – Determine the frequency of monitoring activities (e.g., quarterly, annually) and timing considerations, such as post-storm or flood assessments.
- **Choose Monitoring Techniques** – Identify appropriate methods for data collection, such as visual inspections, remote sensing, drones, or real-time sensors.
- **Establish Data Protocols** – Set up a structured system for data collection, storage, and analysis. Ensure that data is stored securely and is easily accessible for analysis and reporting.

CTF_16 – Review and update all asset management plans (AMPs), relevant to the coastal zone within the CMP study area

This action focuses on reviewing and updating all AMPs relevant to the coastal zone within the CMP study area, with particular attention to the impacts of coastal and tidal inundation. It will embed an asset management approach into Council operations to provide for replacement, relocation or retrofitting of public assets that are currently or eventually will be in coastal risk areas. AMPs will ensure alignment with the monitoring procedures from ECON_08, identify high-risk assets and determine appropriate interventions.

The update of AMPs should be prepared considering current and future coastal hazard impacts, including the impacts of coastal and tidal inundation, and should outline plans and mitigation strategies to reduce the risk from such hazards.

This action provides an opportunity for Council to update their asset management framework to align with industry best practice. Guidance from peak bodies such as Local Government NSW and Infrastructure NSW should be applied. The asset management framework will be supported by the following:

- **Asset Management System** – this includes asset management software, asset registers, condition assessments, lifecycle cost analysis, and predictive modelling. The system ensures that assets are managed systematically, with a focus on improving performance and managing risks.
- **Strategic Asset Management Plan (SAMP)** – the SAMP is mandated by the Integrated Planning and Reporting (IP&R) legislation. It outlines critical assets, risk management strategies, and actions to enhance asset management capability.
- **Asset Management Plans** – these plans cover specific asset classes, defining service levels, and projecting costs for maintenance, rehabilitation, and replacement. The plans are reviewed regularly to incorporate new data from revaluations and condition assessments which are to be informed by the monitoring program described in action ECON_08.

Key elements of this action include:

- **Alignment with Strategic and Legislative Frameworks** – the review of AMPs will ensure they align with the IP&R framework mandated by the *NSW Local Government Act 1993*. The plans should also comply with ISO 55001 standards for asset management, ensuring consistency with international best practices. The SAMP must be updated to reflect the specific needs of coastal assets, linking them to the broader Community Strategic Plan and Delivery Program.
- **Invest in Technology** – necessary tools and technologies, such as GIS systems, data loggers, and software for data analysis and reporting will form the asset management system. Dedicated asset management software can centralise all data related to the assets, from maintenance schedules to condition assessments, allowing for efficient management and planning. It can track the entire lifecycle of assets, from acquisition to disposal, ensuring timely maintenance and upgrades. It can also automate work orders for asset inspections, repairs, and upgrades, ensuring that tasks are completed efficiently. It can also support monitoring and analysis of the costs associated with asset management, helping to identify opportunities for cost savings and efficiency improvements.

- **Asset Portfolio Description and Inventory** – AMPs will need to provide a detailed description of the coastal assets within the study area, including asset types, their location, and their condition. A detailed assessment of all assets and infrastructure will be used to establish a baseline condition. This will provide an overview of the current state of assets, allowing for more informed decision-making. This will also include an estimation of asset values and the remaining useful life of each asset, which can serve as valuable information for financial planning and risk management.
- **Risk Management and Resilience** – each AMP must include a thorough risk assessment that identifies vulnerabilities due to climate change, sea level rise, storm surges, and other natural hazards. In particular, the Stage 2 Detailed Risk Assessment (Rhelm, 2023b), Tidal and Coastal Inundation Assessment (Stantec, 2023), Bank and Riparian Condition Assessment (Rhelm, 2023f) and the Stage 2 Synthesis Report (Rhelm, 2023a) should be used to inform the update of AMPs to account for coastal hazard impacts.
- **Developing Mitigation Strategies** – mitigation strategies should be incorporated to enhance the resilience of coastal infrastructure, considering solutions that are both asset-based (such as asset repair, upgrade and protection) and non-asset-based (such as relocation, emergency preparedness and response). These should be informed by the risk assessment and incorporated into emergency plans (such as the CZEAS) where appropriate.
- **Sustainability and Environmental Considerations** – the AMPs will integrate sustainability principles, ensuring that economic, social, and environmental factors are considered in decision-making. Coastal assets must be managed to support long-term environmental outcomes, such as maintaining biodiversity, protecting water quality, and promoting the natural regeneration of coastal habitats in response to sea level rise.
- **Scenario Planning and Financial Projections** – AMPs will include scenario planning to account for different funding levels and their impact on asset management outcomes. This will involve developing capital and recurrent expenditure projections for maintaining and enhancing coastal assets under various budget scenarios. The plans will also outline strategies for addressing funding shortfalls, such as prioritising critical assets or seeking external funding sources.
- **Stakeholder Engagement and Community Expectations** – the review process will involve extensive stakeholder engagement to ensure that the updated AMPs reflect the needs and expectations of Council and the community. Surveys and consultations will help quantify customer levels of service and identify priorities for future investment in coastal infrastructure. There should also be an established system for community reporting of assets that do not meet expected service levels that integrates this information into the asset management system.
- **Continuous Improvement and Monitoring** – a framework for continuous improvement will be established, ensuring that AMPs are regularly reviewed and updated in response to new data, emerging risks, and changing community needs. This will involve setting up a monitoring regime to track asset performance, financial sustainability, and risk management outcomes. Regular audits and reviews will ensure that the plans remain relevant and effective over time.

CTF_16a – Review and update floodgate and associated drainage infrastructure asset management plans (AMPs)

Aligned with Action CTF_16, this action focuses specifically on the review and update of floodgate asset management plans. Floodgates play a critical role in controlling tidal flows and preventing inundation in low-lying areas. They also present opportunities for a renewed approach to asset management that can achieve adaptable and sustainable benefits, particularly in response to sea levels rise . Key components of this action include:

- **Systematic Inspection and Repair** – this action will begin with a thorough inspection and repair of end-of-line floodgates to ensure they are functioning as intended. This will form the basis for a broader critical review of the council's floodgate management program. Repairs should preferably be low scale maintenance type activities and not full gate upgrades.
- **Critical Review Based on Floodplain Prioritisation** – the review will be informed by the Shoalhaven River Floodplain Prioritisation Study (WRL, 2023), which identified when and where individual floodgates are likely to lose functionality due to sea level rise. This critical review will determine which floodgates and associated drainage infrastructure need upgrading, modification or removal to maintain their effectiveness and/or support enhanced environmental outcomes.
- **Optimisation of Drainage Systems for Estuary Health** – in some cases, modifications to floodgates and / or associated drainage infrastructure may be necessary to optimise their ability to support estuary health including mitigating the risk of Acid Sulfate Soils and blackwater generation. Modifications to optimise support of estuary health may be in contrast to minimising tidal impacts on private land. In this scenario, alternative land-use opportunities for coastal floodplain land-use such as coastal wetland restoration and Blue Carbon generation will be identified. This aligns with broader environmental objectives and adaptation planning which seeks consider the impacts of climate change such as sea level rise and to enhance coastal ecosystems through multi-stakeholder collaboration. Forward planning and communication with effected stakeholders are critical.
- **Collaboration with Environmental Initiatives** – this action will also align with ENV_58, supporting multi-stakeholder projects that implement actions in priority sub catchments identified in the Shoalhaven River Floodplain Prioritisation Study (WRL, 2023). This alignment ensures that floodgate management is part of a cohesive strategy to address both flood risks and environmental conservation goals.

This action is aimed at all of the Council owned floodgates and their associated drainage infrastructure in the study area, however, during the development of the CMP, specific assets were identified as high priority. The reason they have been prioritised is due to one or more of several factors including:

- Poor condition (as per WRL, 2023)
- Vulnerability to present day tidal inundation(as per WRL, 2023)
- Location within the Coastal Wetland and Littoral Rainforest Area (or proximity area).

These are listed in **Table C-3**. A map of all floodgates, with only high priority assets labelled is provided in **Figure C-13**.

Table C-3 Overview of High Priority Floodgate Assets

ID	Condition)	SLR* Risk (Historical)	SLR Risk (Present Day)	SLR Risk (Near Future°)	SLR Risk (Far Future°)	CWLRA#
CULRD2	Fair	Least Vulnerable	Least Vulnerable	Least Vulnerable	Least Vulnerable	Coastal Wetlands Prox
CULRD1	Poor	Least Vulnerable	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	Coastal Wetlands Prox
MAYRD1	N/A	Least Vulnerable	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	Coastal Wetlands Prox
P10G1	Good	Least Vulnerable	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	Coastal Wetlands Prox
P13G10	N/A	Least Vulnerable	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	
P13G12	Poor	Least Vulnerable	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	
P13G3	N/A	Least Vulnerable	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	
P13G1	Poor	Least Vulnerable	Least Vulnerable	Least Vulnerable	Most Vulnerable	
P6D7G1	Poor	Least Vulnerable	Least Vulnerable	Least Vulnerable	Most Vulnerable	
P9G1	Good	Least Vulnerable	Least Vulnerable	Least Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P13G8	Good	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P13G9	Fair	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands
P13G9	Fair	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands
P2G2	N/A	Least Vulnerable	Least Vulnerable	Moderately Vulnerable	Most Vulnerable	
P7G1D2	Good	Least Vulnerable	Moderately Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P8D2G1	Fair	Least Vulnerable	Moderately Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands
P3D5G1	Good	Moderately Vulnerable	Moderately Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P5D3G1	N/A	Moderately Vulnerable	Moderately Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands
P8G1	Fair	Moderately Vulnerable	Moderately Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P8G3D1	Poor	Moderately Vulnerable	Moderately Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P8G4	Fair	Moderately Vulnerable	Moderately Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P9G2	Good	Moderately Vulnerable	Moderately Vulnerable	Moderately Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P6D6G1	Fair	Moderately Vulnerable	Most Vulnerable	Most Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P9D1G1	Fair	Moderately Vulnerable	Most Vulnerable	Most Vulnerable	Most Vulnerable	Coastal Wetlands Prox
P9D2AG1	Poor	Moderately Vulnerable	Most Vulnerable	Most Vulnerable	Most Vulnerable	
GPINV1	N/A	Most Vulnerable	Most Vulnerable	Most Vulnerable	Most Vulnerable	
P13G7	Fair	Most Vulnerable	Most Vulnerable	Most Vulnerable	Most Vulnerable	
P6D2G2	Fair	Most Vulnerable	Most Vulnerable	Most Vulnerable	Most Vulnerable	
P8G1D1	Poor	Most Vulnerable	Most Vulnerable	Most Vulnerable	Most Vulnerable	

**SLR – Sea level rise; #CWLRA – Coastal Wetlands and Littoral Rainforest Area (from the Resilience and Hazards SEPP 2021)*

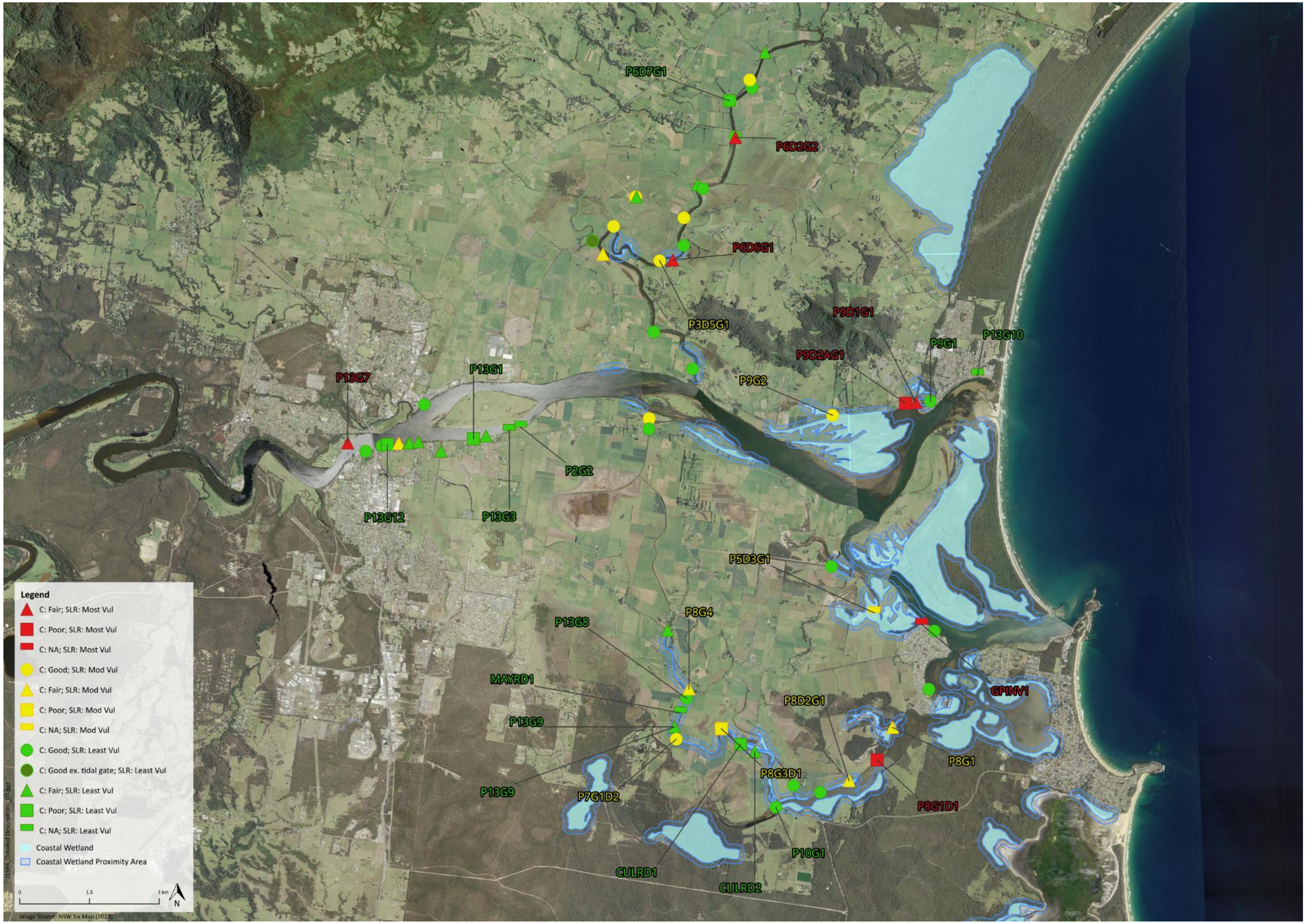


Figure C-13 Map of Floodgate Assets, with Condition and SLR Vulnerability. High Priority Assets have Labels.

ENV_42 a-c	Enhance urban stormwater runoff treatment through infrastructure development and Water Sensitive Urban Design (WSUD) in urban areas of the Lower Shoalhaven River coastal zone

Location(s): Terara, Shoalhaven Heads, Bomaderry

Coastal threat(s) to be addressed: Land Clearing and Development

Management objectives supported: Environmental Values; Social and Cultural Values

Costs: The cost for each action over the life of the CMP is:

ENV_42a - Undertake necessary detailed designs for establishment of a wetland at Terara (site UWQ_03 from Stage 2 Study)

- Detailed investigations and design ($75,000)

ENV_42b - Undertake necessary detailed designs and construct a trash rack at Shoalhaven Heads (site UWQ_04 from Stage 2 Study)

- Trash rack design and construction ($65,000)
- Annual maintenance ($7,000)

ENV_42c - Undertake necessary detailed designs and construct a trash rack at Bomaderry (site UWQ_05 from Stage 2 Study)

- Trash rack design and construction ($65,000)
- Annual maintenance ($19,000)

Option Type:

☐ Alert ☐ Avoid future impact ☒ **Active intervention**

☐ Planning for change ☐ Emergency response

Timing: This action is programmed to span the 10-year timeframe of the CMP with site implementation undertaken opportunistically as funding becomes available.

Action Description

Urban stormwater runoff is a source of pollution and sedimentation that affects the health and function of estuaries. It can carry nutrients, metals, pathogens, organic matter, litter and other contaminants into the waterways, causing eutrophication, algal blooms, fish kills, reduced biodiversity, altered hydrology and increased erosion.

Urban runoff treatment actions aim to reduce the quantity and improve the quality of stormwater before it reaches the estuary, by using natural or engineered systems such as wetlands, swales, raingardens, infiltration basins or gross pollutant traps. These actions can provide multiple benefits for the environment and the community, such as enhancing habitat and improving amenity. Implementing urban runoff treatment options in strategic locations of the catchment can help protect and restore the estuarine ecosystem and its values.

The Stage 2 Urban Runoff Treatment Study (Rhelm, 2023e) identified three locations for urban runoff treatment opportunities which have been included as actions in the CMP (**Table C-4**). Details for the proposed works at each location are provided below, with the locations shown in **Figure C-14**.

Table C-4 Location of Sub-Actions

Option Number	Location	Action Description
ENV_42a	8 – 80 Terara Rd, Terara	Undertake necessary detailed designs for establishment of a constructed wetland runoff treatment system at Terara (site UWQ_03 from Stage 2 Study).
ENV_42b	64 McIntosh St, Shoalhaven Heads	Undertake necessary detailed designs and construct a trash rack at Shoalhaven Heads (site UWQ_04 from Stage 2 Study).
ENV_42c	43 – 51 Bolong Rd, Bomaderry	Undertake necessary detailed designs and construct a trash rack at Bomaderry (site UWQ_05 from Stage 2 Study).

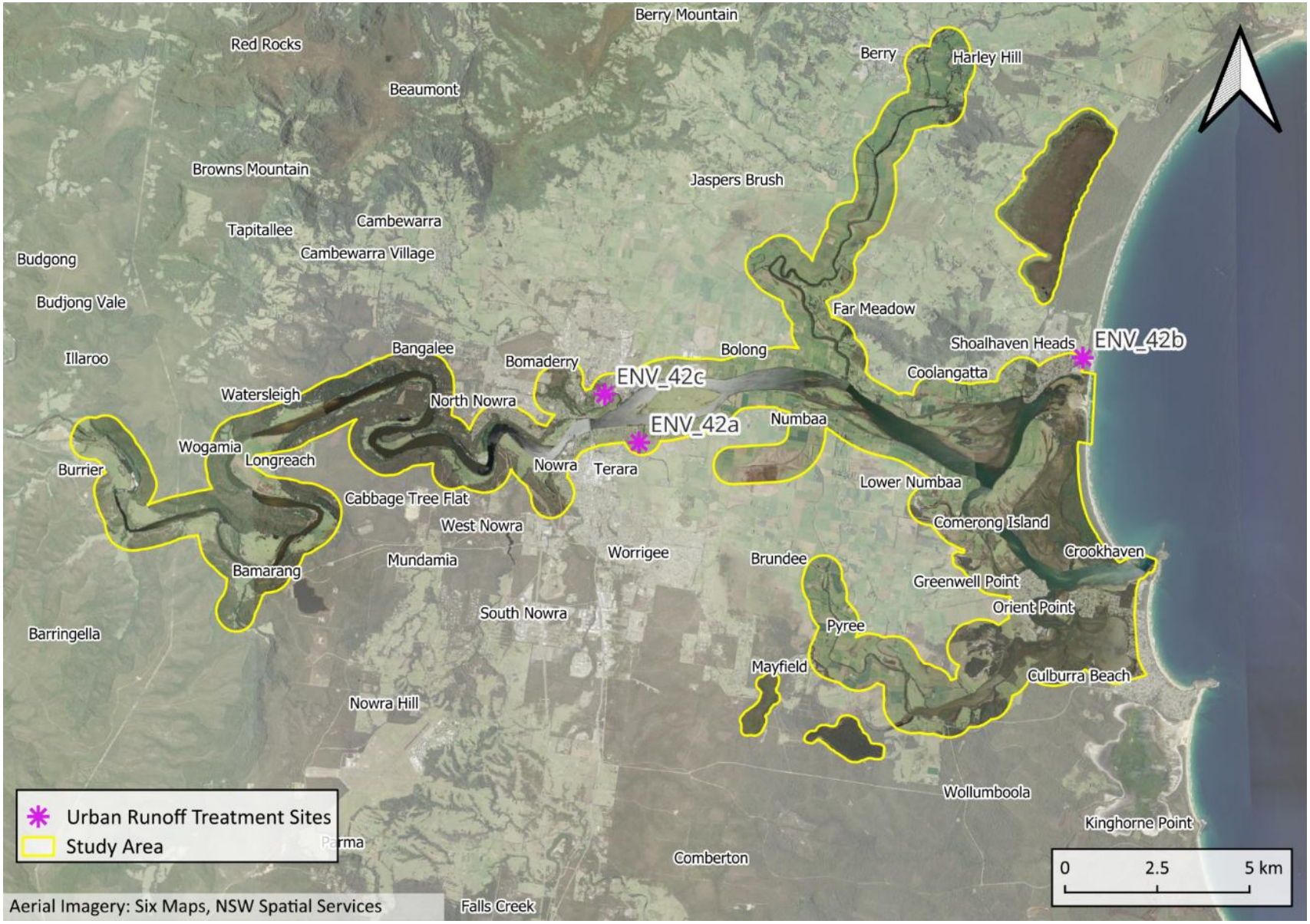


Figure C-14 Locations of Sub-Actions

Trash racks

Due to their smaller size and ability to be installed offline next to existing pipe infrastructure, trash racks are considered at all three locations. Trash racks are WSUD measures designed to reduce gross pollutant loads entering receiving waterways. Trash racks may take a few forms including nets, or metal bars which prevent debris from flowing into receiving waterbodies.

An illustrated rendering of a trash rack that could be installed at the three identified locations is provided in **Figure C-15**. This type of trash rack reduces gross pollutant loads significantly (93% reduction excluding considerations for a high flow bypass) but does not reduce other finer pollutants such as total suspended solids (sediments), phosphorus and nitrogen loads (nutrients). This type of trash rack also requires regular maintenance to clear accumulated rubbish and ensure continued functionality.

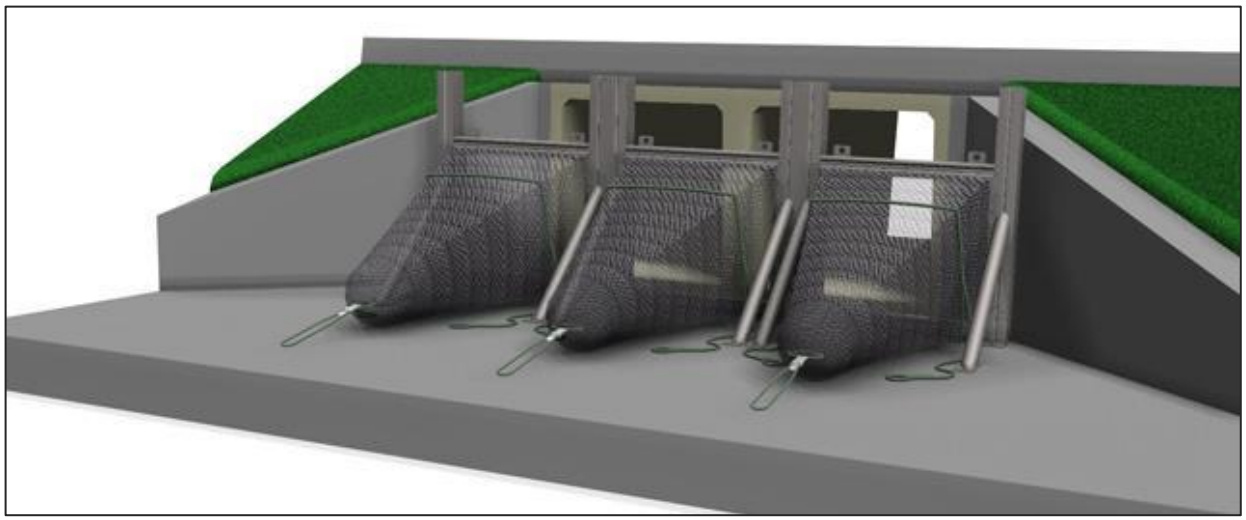


Figure C-15 Netted Trash Rack System Schematic (Urban Asset Solutions Pty Ltd, 2022)

Details on the proposed sites for trash rack installation as part of the CMP are shown in **Figure C-16** (Shoalhaven Heads, ENV_42b) and **Figure C-17** (Bomaderry, ENV_42c). A trash rack is also recommended as a component of the design for ENV_42a.

A breakdown of costs to construct and maintain these trash racks is provided in **Table C-5**. Trash rack design and construction costs are estimated at $56,000. This includes an 80% contingency to account for unknown site constraints and increases in construction and supply costs. The relatively large contingency also reduces the risk of underestimating the option in Council's future capital budgets. There are also maintenance costs which are estimated based on catchment size, reflecting the potential volume of rubbish that would be collected by each rack.

Table C-5 Cost Breakdown for Trash Racks

Parameter	Shoalhaven Heads, ENV_42b	Bomaderry, ENV_42c
GPT Type	Trash Rack	Trash Rack
Volume (m^3)	96.3	96.3
Life Cycle (yrs)	25	25
Total Construction* Cost	$56,000	$56,000
Typical Annual Maintenance Cost	$7,000	$19,000

Figure C-16 Shoalhaven Heads Site Location ENV_42b

Figure C-17 Bomaderry Site Location ENV_42c

Constructed Wetland

Wetlands are WSUD measures that can filter stormwater by slowly passing the stormwater flow through a specifically designed depth, surface area, vegetation and soil composition to optimise the pollutant removal benefits. Wetlands consist of an inlet pond to remove coarser sediment, and a macrophyte zone (the main part of the wetland) to remove fine particles and dissolved pollutants. To maintain the health of a wetland, trash racks are often placed upstream of wetlands, preventing larger debris from entering the system.

A constructed wetland has been identified as a suitable solution for the Terara location as it receives runoff from urban catchments (425 ha) and rural catchments (180 ha). This area is large enough to contain a trash rack and a wetland and is shown in **Figure C-18**. An indicative diagram of a potential wetland layout at the site is shown in **Figure C-19**. While a larger wetland area would be ideal for greater pollutant reduction, the site is constrained by several features including a road to the Nowra treatment plant, underground utility pipelines, and an existing watercourse flowing from the west. Due to site constraints, alternative locations for the constructed wetland may need to be considered in the detailed investigations for this action. In addition, the proposed footprint of the basin has been limited to the area within the Coastal Environment Area boundary, to align with the requirements of the CMP actions to lie within the coastal zone. However, additional wetland areas could be considered as part of the design process and suitable funding arrangements sourced for any works outside of the coastal zone.

Modelling of the proposed treatment train including the constructed wetland and trash rack indicates a gross pollutant load reduction of 97%, total suspended solids (TSS) reduction of 45%, total phosphorus (TP) reduction of 31% and total nitrogen (TN) reduction of 10% (Rhelm, 2023e). While the wetland would likely not improve pollutant loads significantly in terms of a percentage reduction within the Shoalhaven River, a wetland at Terara would increase the efficacy of pre-existing and future at-site measures. Adopting an offline wetland with an inlet pond and trash rack is recommended as it allows for a wetland that is healthier than wetland configurations that omit treatment train features to manage stormwater quality.

A cost breakdown for construction and maintenance of the wetland is provided in **Table C-6**. Due to the high cost, the CMP *only recommends undertaking the detailed investigations and design* to have a shovel ready project when appropriate funding opportunities arise. The cost for this is estimated to be $75,000.

Table C-6 Cost Breakdown for ENV_42a - Constructed Wetland and Associated Water Treatment Train

Treatment Train Component	Parameter	Value
Trash Rack	***GPT Type***	Trash Rack
	Volume (m^3)	96.3
	Life Cycle (yrs)	50
	Total Construction* Cost	$56,000
	Typical Annual Maintenance Cost	$40,000
Offline Wetland (Pond)	***Life Cycle (yrs)***	50
	Total Construction* Cost	$3,403,000
	Annual Maintenance Cost	$33,000
Offline Wetland (Sedimentation Basin)	***Life Cycle (yrs)***	50
	Total Construction* Cost	$846,000
	Annual Maintenance Cost	$11,000

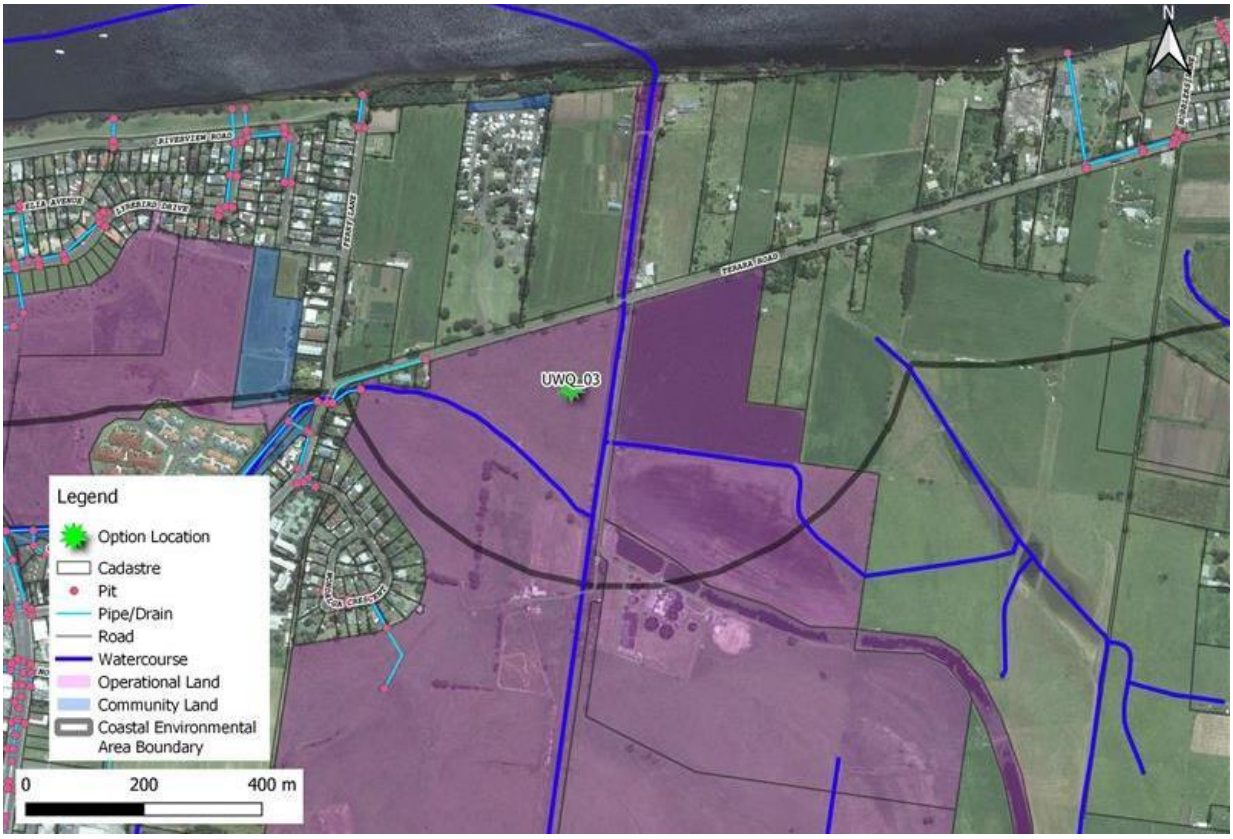


Figure C-18 **Terara Site Location ENV_42a**

Figure C-19 **Terara Wetland Schematic (Example Only)**

Additional Considerations

Additional considerations with regards to the future plans for urban runoff treatment in the Shoalhaven region include:

- Steps should be undertaken to increase the access of maintenance equipment. For instance, a suitable truck that can clean proprietary GPTs would allow proprietary GPTs to be considered instead of trash racks. These have the benefit of reducing TSS, TP and TN loads in addition to a substantial decrease in gross pollutant loads. Increased access of maintenance equipment could be achieved through the internal purchase of the required equipment, or through the outsourcing of necessary maintenance.
- Council could also consider implementing smaller-scale treatment trains at-site for older developments. These could incorporate WSUD measures like bioretention basins that are shown to provide a large reduction in TP and TN loads.

Water Quality and Estuary Health Monitoring	
ENV_09	**Inclusion of additional Beachwatch sites**
ENV_43	**Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River**

Location(s): Whole Estuary

Coastal threat(s) to be addressed: Changes in catchment flooding and freshwater flows; Land clearing and urban development; Acid Sulphate Soils and drainage structures; Boating and associated waterway and foreshore usage

Management objectives supported: Environmental Values; Social and Cultural Values; Coastal Economies; Public Participation; Integrated and Collaborative Management

Costs:

Develop a water quality monitoring program, sampling manuals, and database protocols ($50,000)

Annual operational costs including sampling, testing, data entry and Quality Assurance checks, and reporting ($30,000)

Option Type:

☐ Alert ☒ **Avoid future impact** ☐ Active intervention

☐ Planning for change ☐ Emergency response

Timing: This action is programmed to span the 10-year timeframe of the CMP.

Action Description

Due to relatedness and interdependencies, this detailed description covers two CMP actions;

- ENV_09 – Inclusion of additional Beachwatch sites, and
- ENV_43 – Revise and implement Council's water quality monitoring program for the Lower Shoalhaven River.

The Shoalhaven Region is heavily reliant on the health of local estuaries and their tributaries, as well as safe and welcoming water conditions. Water quality in the Lower Shoalhaven River estuary is a key concern to the community and estuary-dependent businesses and is therefore critical to the social, environmental, and economic values of the region.

A review of available water quality datasets and reports was undertaken during Stage 2 of the CMP to evaluate the current monitoring and reporting activities (Rhelm, 2023d). For the past 20 years, water quality in the Lower Shoalhaven River was generally graded from “fair” to “good” when compared to other estuaries in NSW. However, turbidity values are generally poorer when compared to other estuaries in NSW. Despite frequently high nutrient levels, Chlorophyll-a concentrations are generally within the ‘healthy’ range throughout the estuary. Acidity, measured by pH levels, indicate more acidic than normal water conditions in some locations, particularly those downstream of floodgates. This is likely related to floodplain drainage and exposed acid sulfate soils. An estuary health report card showing these indicators throughout the estuary for the year 2021 is provided in **Figure C-20**. Results across the estuary for the years 1990 – 2021 are provided in the Stage 2 report (Rhelm, 2023d).

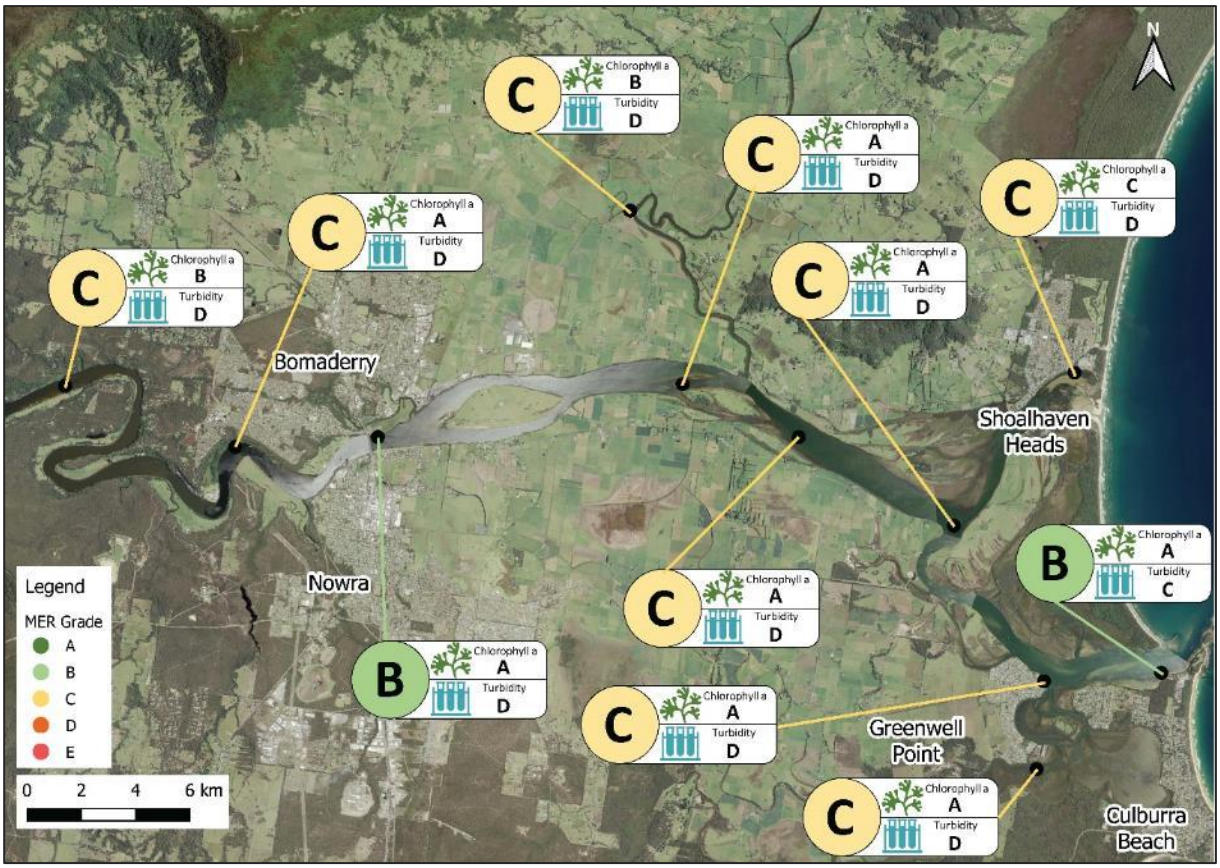


Figure C-20 Estuary Health Grades (Chlorophyl-a and Turbidity) for 2021

Recreational water quality is generally within acceptable ranges; however, trigger levels have been exceeded on a number of occasions throughout the estuary. Importantly, the worst rated sites correspond to locations unlikely to be used for recreational swimming. Sites more typically associated with swimming are generally rated "A" or "B", such as those at Shoalhaven Heads, Crookhaven Heads and Greenwell Point.

The review of Council's existing water quality monitoring program identified that a revised water quality and estuarine health monitoring program is needed to better understand trends and impacts of CMP management actions and provide useful information to the public who rely on the estuary for recreation and business. This also involves the inclusion of additional sites in the ongoing Beachwatch program at popular recreational swimming locations. Details on the revised monitoring program are provided in this detailed description.

These actions describe recommendations from the Stage 2 study undertaken for this CMP (Rhelm, 2023d), and as such will need further refinement and alignment with council's other water quality monitoring programs being designed and undertaken across the LGA.

Water Quality and Estuary Health Monitoring Program Objectives

The program will focus on the Lower Shoalhaven River, being the estuarine portion of the river extending from the entrances at Shoalhaven Heads and Crookhaven Heads and up to the limit of tidal influence. The monitoring program will consider the following factors:

- Available resources (financial and human), considering what is reasonable, feasible and achievable within the resource's constraints;
- Supplementing and avoiding duplication with existing water quality monitoring programs or studies (e.g., oyster growers Shellfish Quality Assurance Monitoring Program and NSW Estuary MER Program, operating under the Marine Estate Management Strategy);

- Using available support where possible (e.g., from DCCEEW – Water Science Team); and
- A clear understanding of corporate risk and Council's roles and responsibilities.

The objectives of the water quality monitoring program are to:

- Report on the ecosystem health of the Lower Shoalhaven River estuary;
- Report on recreational water quality and provide alerts when needed; and
- Track progress on relevant management actions in the CMP.

The questions the program will seek to answer are:

- What is the current ecosystem health status of the Lower Shoalhaven River?
- What is the trend in ecosystem health over time?
- How does ecosystem health vary spatially and in relation to key events (such as droughts, floods, bushfires)?
- Is the ecosystem health, as measured by water quality monitoring, being maintained?
- Does it appear the estuarine ecosystem health status has changed in response to implementation of key relevant actions in the CMP and other catchment management strategies?

Monitoring Parameters

Ecosystem Health

The ecosystem health indicators to be monitored will provide information related to environmental values and be responsive to changes in catchment and in-estuary water quality processes. Consistent with the NSW Estuary MER Program, the primary indicators to be monitored are:

- Turbidity (NTU);
- Chlorophyll-a; and
- Nutrients (Ammonia, Phosphate, Oxidised Nitrogen, Dissolved P, Dissolved N, Total Nitrogen, Total Phosphorus).

Additional in-situ physico-chemical data will be collected via a water quality probe on each sampling run to assist with data interpretation, including:

- pH;
- Salinity / Conductivity;
- Temperature; and
- Dissolved Oxygen (DO).

Sampling frequency will be seasonal, with sampling undertaken by Council in Autumn, Winter and Spring for turbidity, chlorophyll-a, nutrients and physico-chemical parameters, and continued summer sampling undertaken by DCCEEW as part of the ongoing NSW Estuary Monitoring, Evaluating and Reporting (MER) Program. Event based sampling (e.g., following floods, algal blooms, bushfires) will also supplement routine sampling, triggered on an as needed basis (e.g. on exceedance of a threshold noted during routine monitoring).

Recreational Water Quality (Beachwatch Program)

The recreational water quality indicators to be monitored will provide information related to the safety of primary and secondary water contact activities at key recreational sites in the estuary. The primary indicator to be monitored is Enterococci. Sampling will be undertaken by Council and the frequency will be:

- weekly in December and January;

- fortnightly in November, February and March; and
- 1 week before Easter public holidays.

Sampling Procedure

Sampling locations are shown in **Figure C-21**. Site ID numbers are reflective of an existing monitoring program and referenced in the Stage 2 study (Rhelm, 2023d). Monitoring locations include:

- In-situ sampling for estuary ecosystem health at E-375 and E-453 (**Figure C-21**).
- Transect (or 'underway') sampling within the three zones, as shown in **Figure C-21**. The zones represent a portion of the estuary rather than a specific location. Transect 1 would focus on the reach between Shoalhaven Heads and Berry's Canal. Transects 2 and Transect 3 would aim to replicate the salinity zone transects currently sampled through the NSW Estuary MER Program.
- Sites E-275, E-342 and E-777 should be used for recreational water quality monitoring and included as sites in the Beachwatch Program.

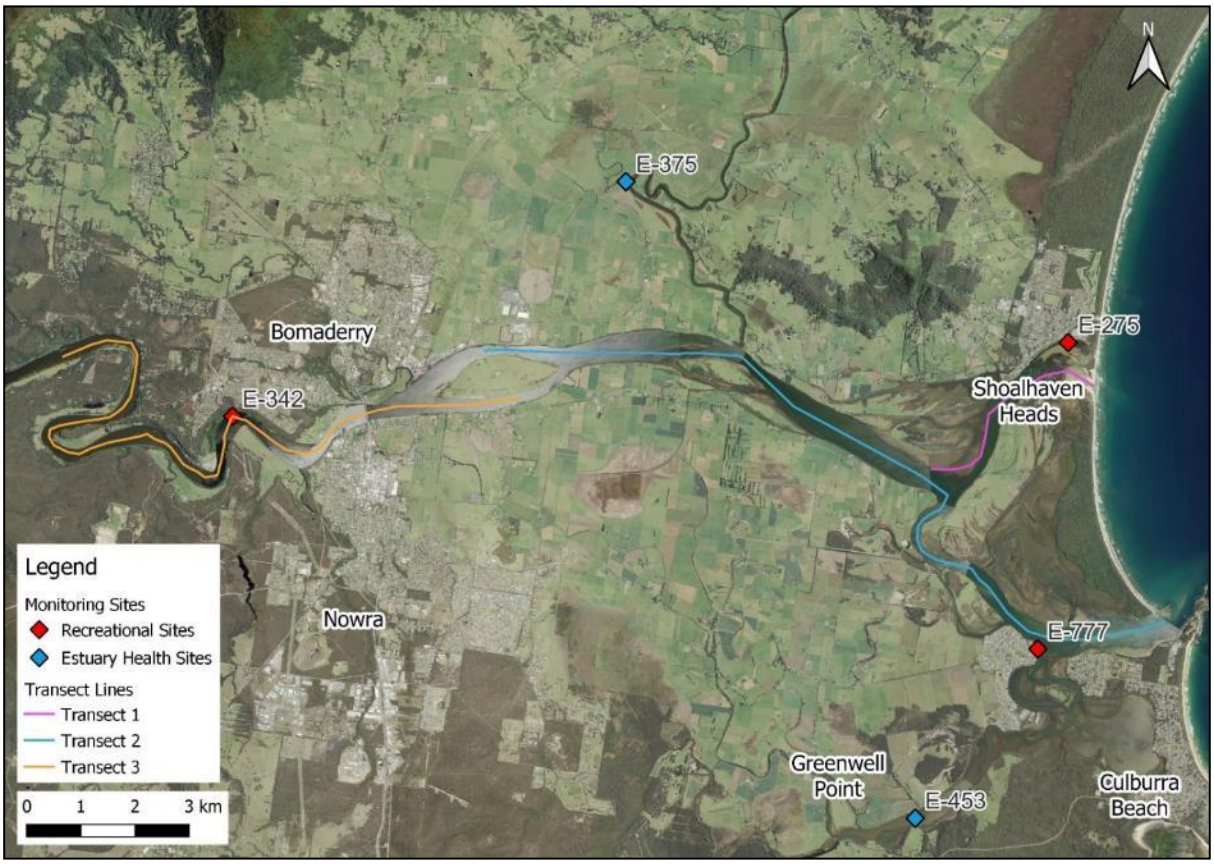


Figure C-21 Beachwatch Program Sites and Estuary Health Sites and Transects

Samples are to be taken in accordance with the NSW Estuary MER Program, and Beachwatch Program protocols which are described in full in NSW Government (2016) and DPIE (2020), respectively.

Quality assurance and quality control

Quality assurance and quality control (QA/QC) is an important aspect of any water quality monitoring program to ensure that the data are accurate and interpretable. In developing a new water quality monitoring program through the CMP, there is opportunity to ensure best practice QA/QC processes for the sampling, data management and analyses are adopted. These will be aligned with relevant State Government guidelines.

Sampling manuals will be developed and maintained, to include instrument calibration and field data quality controls. A short induction training program will be developed for staff undertaking sampling. The manuals will also describe data entry processes. Opportunities for automating this process should be explored and applied where possible, ensuring manual QA checks are still applied.

The QA/QC protocols will extend to the data analysis and reporting.

Data Analysis & Reporting

The data analyses will be consistent with those adopted in the NSW Estuary MER Program, as described in NSW Government (2016), and for the Beachwatch Program described in DPIE (2020). For recreational water quality, alerts should be based on the ANZECC (2000) guidelines for primary and secondary contact. Reporting should apply the NHMRC (2008) grades. The relationship between rainfall and bacterial levels can be used to generate advisory statements by determining the minimum amount of rainfall that causes elevated bacterial levels at a swimming site. Future sampling would improve the 95th percentile estimation and help better inform advisory statements.

Trigger values are to be used to identify conditions that are not within an acceptable range with respect to ecosystem health. The relevant trigger levels adopted shall be consistent with the NSW MER Program (refer NSW Government, 2020).

Reporting will be used to convey the findings of the monitoring program to the general public. Key elements of the reporting include:

- Brief monthly summary report of data analyses to key internal stakeholders within Council.
- Brief, plain English annual Lower Shoalhaven River Estuary ecosystem health report card to be published on Council's webpage.
- Accompanying annual technical report for the Lower Shoalhaven River Estuary ecosystem health report card that documents the full methodology and results.
- For recreational water quality, regular inclusion of Beachwatch sites on the website including daily predictions and weekly star ratings.
- Advisory alerts should be issued immediately, with a larger dataset allowing for more accurate forecasting of the relationship between rainfall and water quality.
- Annual reporting should apply the NHMRC (2008) grades.

ENV_62	Develop and deliver an estuary management and ecosystem education/communications program

Location(s): Whole Estuary

Coastal threat(s) to be addressed: Bank erosion and Berry's Canal adjustment; Changes in tidal inundation as a result of sea level rise; Coastal inundation (from coastal storms and extreme tides); Changes in catchment flooding and freshwater flows; Land clearing and development (urban and rural); Acid Sulphate Soils and drainage structures; Boating and associated waterway and foreshore usage; Commercial and recreational fishing

Management objectives supported: Environmental values; Social and cultural values; Aboriginal values; Coastal processes; Coastal economies; Land use planning; Coastal hazards; Integrated and collaborative management; Public participation

Costs:

Development of educational material including stakeholder consultation ($35,000)

Production and installation of signage ($15,000)

Operational costs (annual): website updates, event attendance, digital media campaign, etc. ($5,000)

Option Type:

☒ **Alert** ☐ Avoid future impact ☐ Active intervention

☐ Planning for change ☐ Emergency response

Timing: This action is programmed to span the 10-year timeframe of the CMP.

Action Description

The purpose of this action is to increase public awareness and capacity related to estuary management, with a specific focus on the Lower Shoalhaven River. It involves developing and delivering a multi-channel education/communications program that utilises Council resources to disseminate information to the broader community. Importantly, material will be developed in consultation with relevant stakeholders (i.e. Aboriginal community representatives for cultural heritage, State Government agencies).

Topics to be covered in the program, associated key messaging, and relevant partner stakeholders are provided in **Table C-7**. Details about different delivery methods for the education program are provided in **Table C-8**.

Table C-7 Key Messaging and Relevant Stakeholders for Collaboration on Each Topic

Topic	Relevant stakeholders for collaboration	Key messaging for the community
Responsible Boating	TfNSW (MIDO) DPIRD Fisheries Oyster Farmers	• Promote public safety by adhering to speed limits, respecting other waterway users, and navigating carefully to avoid accidents. • Emphasise the importance of reducing boat wake, especially at high tide, to minimise bank erosion. • Advocate for the proper disposal of waste and pollutants to prevent water contamination.
Aboriginal Cultural Heritage	Traditional Owners LALCs	• Acknowledge and respect the cultural significance of estuarine areas to the Aboriginal community. • Share stories, traditions, and historical and continued traditional uses of the estuary.
Estuarine Ecosystems	DPIRD Fisheries DCCEEW	• Explain the role of estuarine ecosystems in supporting diverse plant and animal life. • Highlight the importance of maintaining healthy water quality for ecosystem sustainability. • Discuss the benefits of estuarine habitats, such as nursery grounds for fish and other marine life. • Raise awareness about the threats to estuarine ecosystems, including pollution, habitat loss and climate change. • Encourage community involvement in conservation and monitoring efforts. • Educating on the impact of illegal clearing of estuarine vegetation
Entrance Management	DCCEEW DPIRD Fisheries DPHI Crown Lands	• Explain the natural processes involved in estuary entrance dynamics. • Discuss the benefits and challenges of managing estuary entrances. • Highlight the impact of entrance management on water quality, flood risk, and habitat health. • Promote sustainable entrance management practices to balance ecological and community needs. • Educate the community on the importance of maintaining natural entrance processes where possible.
Coastal Landuse Planning	DPHI Planning	• Provide information on regulations and guidelines for coastal development. • Highlight the benefits of integrating climate change adaptation into coastal planning. • Encourage collaboration between government agencies, planners, and the community.
Oyster Reef Restoration	DPIRD Fisheries Oyster Farmers	• Highlight the ecological benefits of oyster reefs, including water filtration and habitat creation. • Discuss the role of oyster reefs in protecting shorelines from erosion. • Encourage community participation in oyster reef restoration projects. • Provide information on the methods and benefits of restoring oyster populations. • Raise awareness about the historical decline of oyster reefs and the importance of their recovery.

Topic	Relevant stakeholders for collaboration	Key messaging for the community
Floodplain Adaptation	DPIRD Fisheries DPIRD Agriculture DCCEEW	• Explain the concept of blue carbon, the role of estuaries in carbon sequestration, and the opportunities arising due to sea level rise on estuarine environments. • Explain the risks associated with ASS and blackwater events and provide guidance on management practices to mitigate these risks. • Discuss the implications of sea level rise on land use and industry in low lying areas, and potential adaptation actions.
Private Landholder Conservation	DCCEEW LLS	• Promote best practices for landholders to protect and enhance estuarine environments on private properties. • Provide guidance on managing vegetation, reducing impacts from runoff, and preventing erosion. • Highlight the benefits of voluntary conservation agreements and other government incentive programs for landholders. • Encourage collaboration between landholders and conservation organisations.
Bank Erosion and Restoration	DPIRD Fisheries DPIRD Agriculture DCCEEW LLS	• Educate on the causes and consequences of bank erosion in estuarine environments. • Discuss restoration techniques to stabilise and restore eroded banks. • Highlight successful case studies of bank restoration projects. • Encourage community involvement in monitoring and reporting erosion issues. • Provide information on funding and support available for bank restoration initiatives.

Table C-8 Details on Different Delivery Methods

Delivery Method	Description	Examples
Educational Signage	Install informative signs at strategic locations around the estuary.	Boat ramps, wetlands, fishing spots, walking trails, parks
Digital Media	Utilise websites, social media, and email newsletters to reach a broader audience.	Council website, Facebook, Instagram, email campaigns
Printed Materials	Develop brochures, fact sheets, and newsletters for distribution.	Visitor centres, council offices, local businesses
Workshops & Seminars	Attend events to provide in-depth information and hands-on learning opportunities. Look to align with existing events hosted by other agencies.	Community centres, schools, council chambers.
Community Events	Host and participate in festivals, clean-up days, and restoration projects to engage the community.	Farmers markets, festivals, sporting events

Appendix D

Key Location Overviews

Introduction

This appendix provides detailed overviews of key locations within the Lower Shoalhaven, focusing on the management actions applied to address critical coastal and estuarine issues. These location-specific overviews illustrate how multiple actions work together in an integrated manner to solve complex environmental, social, and economic challenges within each area.

Each overview outlines the suite of actions for specific locations and showcases how these measures support the broader objectives of the Lower Shoalhaven Coastal Management Program (CMP). An accompanying map illustrates the suite of management actions proposed for these key locations as part of the CMP. Each action is spatially represented to provide a clear overview of how they address key issues. The maps include photographs, descriptions, and locations of the actions to help visualise how they work together to enhance the environmental, social, and recreational values of the area.

Shoalhaven Heads and **Greenwell Point** are covered in this Appendix.

Shoalhaven Heads

Shoalhaven Heads is a valuable area for both residents and visitors, known for its tourism appeal and recreational opportunities. The beach and waterways are frequently used for activities such as walking, swimming, and boating. As a popular tourist destination, Shoalhaven Heads plays an important role in supporting the local economy, particularly during peak holiday periods. The estuary also holds significant environmental value, providing important habitats for various species and contributing to the ecological health of the region.

Shoalhaven Heads faces several ongoing challenges related to threats to the coastal zone, namely:

- Bank erosion along the foreshore threatens infrastructure, natural habitats, and public access to the foreshore.
- Amenity and recreational value of this foreshore is valuable to the community and visitors alike.
- The water quality assessment identified that Shoalhaven Heads generally scores well for recreational water quality, indicating that swimming conditions are mostly safe. However, there are some occasions where swimming is not recommended.
- Management of the estuary entrance at Shoalhaven Heads, which is primarily aimed at helping to reduce flood risk associated with rainfall on the catchment (rather than ocean inundation associated with elevated ocean levels). Entrance management also needs to consider environmental sensitivities on balance with effective flood mitigation.

To address these key issues, a suite of actions has been identified in the Lower Shoalhaven River CMP that will provide benefit to the Shoalhaven Heads area. These include:

- **BE_43e & BE_44 –** Beach nourishment from near Hay Avenue to the end of the existing rock revetment.
- **BE_46** – Design and implement a living shoreline solution along the foreshore adjacent to the caravan park at Shoalhaven Heads.
- **BOAT_37, BOAT_38 & BOAT_43** – Boat Ramp and Facilities Consolidation and Rationalisation Plan, develop and implement a comprehensive boat ramp facility upgrade and asset management program, and management of watercraft storage.
- **CTF_16 & CTF_16a** - Review and update all asset management plans (AMPs), relevant to the coastal zone within the CMP study area (including floodgates and drainage channels) and undertake maintenance and/or upgrades.
- **CTF_20** – Implement updated Entrance Management Policy and undertake additional review.
- **ENV_09** – Inclusion of Shoalhaven Heads as a Beachwatch site.
- **ENV_42b** – Undertake necessary detailed designs and construct a trash rack at Shoalhaven Heads.
- **REC_03** – Keep foreshore recreational areas cleared from post-flood debris and maintained for tourism purposes.
- **REC_04** – Enhance public access points along the foreshore, with a special focus on improving accessibility for people with disabilities.

The suite of actions proposed for Shoalhaven Heads is designed to work in tandem, addressing key issues such as bank erosion, public access and recreational amenity, water quality, and flood risk. These actions not only mitigate specific risks but also aim to enhance the overall environmental, social, and economic values of the area. This holistic approach ensures that both the community and the environment benefit from a well-integrated management program. Each action reinforces the others,

creating a comprehensive strategy for sustaining the values of Shoalhaven Heads for the long term, as per the objectives of the Coastal Management Act (2016).

Addressing Bank Erosion and Foreshore Stability

The combination of beach nourishment (BE_43e and BE_44) and the innovative living shoreline project (BE_46) provides both immediate protection through sand nourishment and long-term resilience through nature based solutions including the establishment of habitats such as mangroves, saltmarsh and oyster reefs. By improving the structural integrity of the shoreline, these actions reduce erosion risks while enhancing habitat diversity and the aesthetic value of the area.

Enhancing Public Access and Recreation

The living shoreline action (BE_46) includes formalising access with pathways or boardwalks, while the foreshore access improvement action (REC_04) expands this by specifically focusing on all-ability access. Together, these actions ensure that public access is both environmentally sensitive and inclusive, promoting recreational use of the foreshore and enhancing its amenity. Post flood debris removal, as per action REC_03, ties into the broader goal of ensuring the area remains usable and attractive for recreation and tourism after flood events.

Improving Boating Access and Facilities

A boat ramp rationalisation plan (BOAT_37), asset management program (BOAT_38), and installation and management of watercraft storage facilities (BOAT_43) focus on improving boat ramp facilities across the Shoalhaven Heads area and the study area. Together, these actions aim to streamline the management of boat ramp infrastructure, ensuring that facilities meet community needs while reducing maintenance costs and environmental impacts. BOAT_37 proposes a consolidation plan that includes repurposing decommissioned boat ramps, improving the amenity and capacity of remaining ramps, and reducing the need for dredging. This action also considers providing appropriate passive vessel launch sites and associated facilities such as pump out and fuelling stations.

Water Quality and Environmental Health

Beachwatch monitoring (ENV_09) and the construction of a trash rack at MacIntosh Street (ENV_42b) directly contribute to monitoring, improving and maintaining water quality in the area. The regular water quality monitoring through Beachwatch addresses community concerns about public health, while the installation of a trash rack prevents pollutants from entering the waterways. These measures ensure that the estuary remains a safe and healthy environment for both human use and ecological functions.

Flood Risk and Entrance Management

Implementing the Entrance Management Policy (CTF_20) focuses on managing the opening of the Shoalhaven River entrance at Shoalhaven Heads to help reduce flood risks. While the primary goal is flood mitigation, the controlled opening also contributes to flushing the estuary, which complements water quality actions like Beachwatch monitoring and the trash rack installation.

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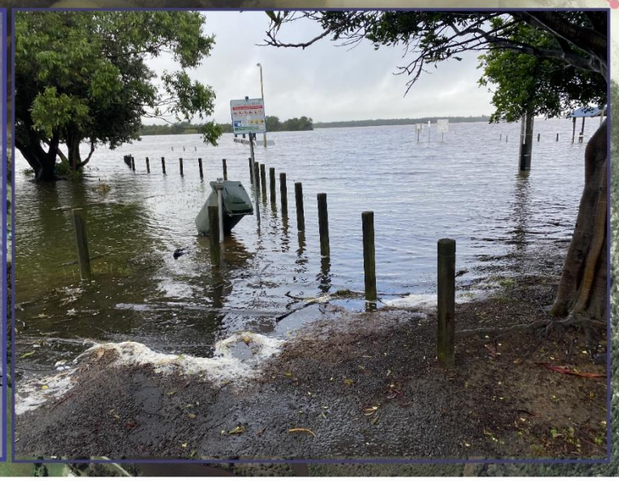
Improving Boating Access and Facilities

A boat ramp rationalisation plan (BOAT_37), asset management program (BOAT_38), and installation and management of watercraft storage facilities (BOAT_43) focus on improving boat ramps and other boating facilities across the Shoalhaven Heads area and the study area. Together, these actions aim to streamline the management of boating infrastructure, ensuring that facilities meet community needs while reducing maintenance costs and environmental impacts. BOAT_37 proposes a consolidation plan that includes repurposing decommissioned boat ramps, improving the amenity and capacity of remaining ramps, and reducing the need for dredging. This action also considers providing appropriate passive vessel launch sites and associated facilities such as pump out and fuelling stations.



Flood Risk and Entrance Management

Implementing the Entrance Management Policy (CTF_20) focuses on managing the opening of the Shoalhaven River entrance at Shoalhaven Heads to help reduce flood risks.

While the primary goal is flood mitigation, the controlled opening also contributes to flushing the estuary, which complements water quality actions like Beachwatch monitoring and the trash rack installation.

Lower Shoalhaven River CMP

Shoalhaven Heads Key Location Overview

0 200 400 m

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Greenwell Point

Greenwell Point serves as a vital access point to the broader Shoalhaven River for residents, visitors, and commercial vessels alike. Its strategic location supports recreational boating, fishing, and tourism, while also being an important hub for the region's commercial activities. The surrounding area is home to a significant portion of NSW dairy industry and a thriving oyster-growing industry, both of which depend on the health and sustainability of the floodplain and estuary.

Across Berry's Canal lies Comerong Island, a protected National Park that offers critical habitat and supports a variety of ecosystems integral to the broader estuary's health. The interactions between these industries, communities, and ecosystems make Greenwell Point a focal point for both economic activity and environmental stewardship.

Greenwell Point faces several significant challenges. Sea level rise (SLR) is increasing the risk of inundation, particularly for low-lying residential areas, the agricultural lands that underpin the region's dairy industry, and land that supports oyster industry operations, such as the processing and fleet storage area. The increased frequency and severity of tidal flooding threatens infrastructure, productivity, and the livelihoods of those who rely on the floodplain.

Foreshore erosion and the ongoing widening of Berry's Canal is also an issue. The ongoing erosion is expected to continue until a hydraulic equilibrium is achieved, encroaching on both private and public land, including the National Park on Comerong Island. Foreshore erosion also threatens the long-term viability of Greenwell Point as an important access point to the estuary, and as a valued recreational area.

Boaters have also identified opportunities to improve the access and quality of boating amenities such as higher capacity boat ramps, pump-out stations, and slipways.

To address these key issues, a suite of actions has been identified in the Lower Shoalhaven River CMP that will provide benefit to the Greenwell Point area. These include:

- **BE_17** – Monitor and maintain the existing foreshore protection structures at Greenwell Point
- **BE_42** – Develop an adaptation strategy for land loss along Berry's Canal
- **BE_43f** – Maintenance of existing foreshore protection works
- **BOAT_37, BOAT_38 & BOAT_43** – Boat Ramp and Facilities Consolidation and Rationalisation Plan, develop and implement a comprehensive boat ramp facility upgrade and asset management program, and management of watercraft storage.
- **CTF_08** – Prepare a climate change adaptation strategy for Greenwell Point
- **ECON_10** – Support agricultural sector climate change adaptation
- **ENV_09 –** Inclusion of Greenwell Point as a Beachwatch site
- **ENV_46** – Cost-benefit analysis and feasibility study(ies) of alternative floodplain land use options.

The actions proposed for the Greenwell Point area are designed to guide adaptation to evolving threats, particularly those arising from SLR, foreshore erosion, and the ongoing pressures from climate change. Together, they form a cohesive strategy aimed at ensuring the resilience of the environment, local industries, and the community in the face of these changes. These actions work together to maintain and adapt infrastructure, support agricultural resilience, or plan for future inundation risks and land loss, ensuring that Greenwell Point can adapt appropriately to emerging threats.

Managing Foreshore Erosion

Monitoring and maintaining foreshore protection structures (BE_17), as well as bank management, foreshore protection, and revegetation works along the Crookhaven River (BE_43f) and at Orient Point (BE_43i), will help address ongoing erosion affecting the foreshores of Greenwell Point and Orient Point, and the Crookhaven River. These actions focus on the regular monitoring, maintenance, and stabilisation of existing structures such as revetments and groynes. By adapting to the evolving shoreline due to natural processes and sea level rise (SLR), these actions ensure that public foreshore areas and infrastructure remain protected and usable for recreation and commercial activities. This proactive approach helps Greenwell Point manage the risks of erosion and continue serving its vital functions.

Adaptation Planning for the Future

Several actions focus on helping Greenwell Point adapt to the long-term impacts of climate change, particularly SLR and increased flooding. A climate change adaptation strategy for Greenwell Point and the surrounding floodplain (CTF_08) outlines a forward-looking approach to managing increased flood risks associated with sea level rise by identifying critical assets at risk, such as residential properties and commercial infrastructure, and setting out clear adaptation triggers.

Developing an adaptation strategy for land loss along Berry's Canal (BE_42) addresses the inevitability of land loss due to erosion, supporting the community and landowners in preparing for this change. The adaptation strategy will include site-specific plans and proactive engagement with stakeholders to ensure effective long-term decision-making.

In addition, supporting agricultural sector productivity and resilience (ECON_10) and conducting alternative floodplain land use studies (ENV_46) support the adaptation of Greenwell Point's agricultural lands, including its dairy and oyster-growing industries. These actions focus on maintaining agricultural productivity while exploring alternative land uses and diversification to adapt to changing environmental conditions, such as increased inundation. Collectively, these actions ensure that the agricultural sector can adapt to climate change while also exploring opportunities such as carbon sequestration and land use diversification, supporting both economic and environmental sustainability.

Improving Boating Access and Facilities

A boat ramp rationalisation plan (BOAT_37), asset management program (BOAT_38) and installation and management of watercraft storage facilities (BOAT_43) focus on improving boat ramp and other boating facilities across the Greenwell Point area and the study area. Together, these actions aim to streamline the management of boating infrastructure, ensuring that facilities meet community needs while reducing maintenance costs and environmental impacts. BOAT_37 proposes a consolidation plan that includes repurposing decommissioned boat ramps, improving the amenity and capacity of remaining ramps, and reducing the need for dredging. This action also considers providing appropriate passive vessel launch sites and associated facilities such as pump out, slipway and fuelling stations.

Fostering Community and Cross-Sector Collaboration for Adaptation

Many of these actions involve strong collaboration between government agencies, local authorities, industries, and the community. This is particularly important where adaptation strategies require input from multiple stakeholders to ensure long-term effectiveness. By fostering collaboration, these actions ensure that Greenwell Point is well-positioned to implement adaptive management practices that protect both environmental and economic interests.

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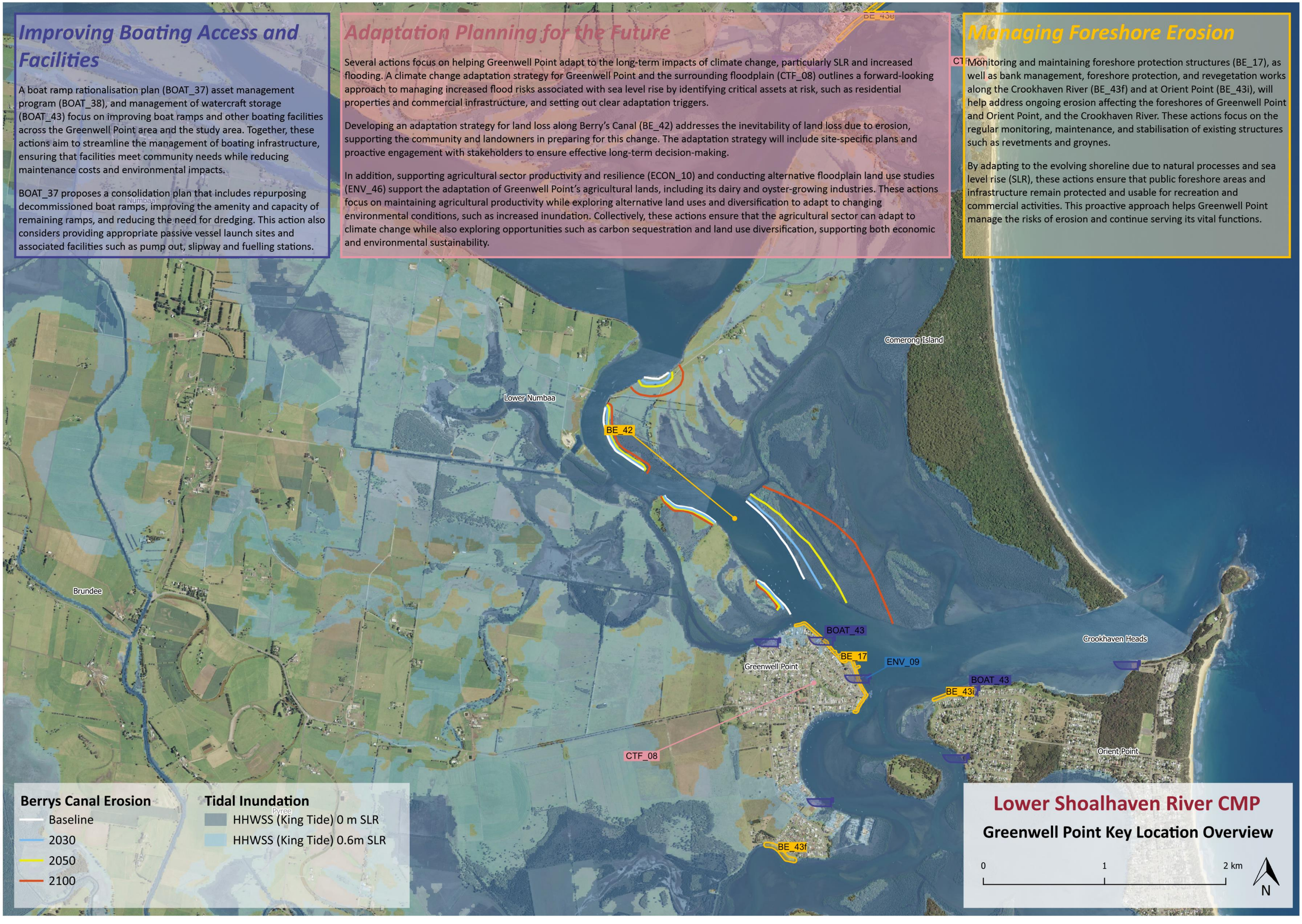

Appendix E

Coastal Zone Emergency Action Sub-plan (CZEAS)

Lower Shoalhaven River Coastal Management Program

Coastal Zone Emergency Action Subplan

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Document Control

Ver	Effective Date	Description of Revision	Prepared by:	Reviewed by:
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01	September 2024	Draft for Public Exhibition	MR	EM
02	October 2024	Minor updates for Public Exhibition	MR	EM
03	February 2025	Final Draft CZEAS for Council Review	MR	EM
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Prepared For: Shoalhaven City Council

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Acknowledgement of Country

Walawaani (welcome),

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

Walawaani njindiwan (safe journey to you all)

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

Acknowledgement of Financial Assistance

Shoalhaven City Council has prepared this document with financial assistance from the NSW Government through its Coastal and Estuary Grants Program. This document does not necessarily represent the opinions of the NSW Government or the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW).

Acknowledgement of Supporting Work

This document adopts the approach of the previous work done by Advisian on behalf of Council for the St Georges Basin/Sussex Inlet, Swan Lake and Berrara Creek Coastal Zone Emergency Action Subplans (CZEAS). Some of the content from the Advisian report has been reproduced in this document for consistency and coherence across the Council's CZEASs.

Table of Contents

1 Introduction 1

1.1 Purpose and Objectives 1

1.2 Study Area 1

1.3 Scope 3

1.4 Legislative Framework 3

1.5 Hazards Addressed by this CZEAS 4

1.6 Consultation 5

2 Coastal Emergency Event Triggers 6

2.1 Coastal Emergency Event Definition 6

2.2 Other Trigger Considerations 6

2.3 CZEAS Action Initiation 7

3 Roles and Responsibilities 9

3.1 CZEAS Relationship to other State Emergency Plans 9

3.1.1 The State Emergency Management Plan (EMPLAN) 9

3.1.2 Illawarra South Coast Regional Emergency Management Plan 9

3.1.3 NSW State Storm Plan and NSW State Flood Plan 10

3.1.4 Shoalhaven City Local EMPLAN 10

3.1.5 Shoalhaven City Flood Emergency Subplan 11

3.2 CZEAS Operations 11

4 Locations and Assets at Risk 14

5 Communication Protocol for Coastal Emergency Events 17

6 Emergency Management Measures 20

7 Conclusion 33

8 References 35

Glossary and Abbreviations 36

Attachment A – Compendium of Maps

Attachment B – Asset Risk Tables

Figures

Figure 1-1 Emergency response in the coastal management context (from DPIE, 2019) 1
Figure 1-2 Area Subject to this CZEAS 2
Figure 1-3 Statutory framework for emergency management in NSW and its relationship with the *Coastal Management Act 2016* (adapted from DPIE, 2019) 4
Figure 2-1 Trigger conditions for Preparedness, Response and Recovery Phases of the CZEAS 8
Figure 6-1 Emergency response in the coastal management context (from DPIE, 2019) 20

Tables

Table 1-1 Coastal Hazards covered by this CZEAS 5
Table 2-1 Available sources of data for coastal hazard monitoring 7
Table 3-1 Roles and responsibilites 11
Table 4-1 Key Locations at Risk from Coastal Inundation in a 100 year ARI event 15
Table 5-1 Communications protocol for this CZEAS 17
Table 6-1 Prevention phase actions for CZEAS for Lower Shoalhaven River CMP 21
Table 6-2 Preparedness Phase actions for CZEAS for Lower Shoalhaven River CMP 24
Table 6-3 Response Phase actions for CZEAS for Lower Shoalhaven River CMP 26
Table 6-4 Recovery Phase actions for CZEAS for Lower Shoalhaven River CMP 30
Table B-1 Asset Risk Table for Shoalhaven Heads Area (See Map RG-02-01) 42
Table B-2 Asset Risk Table for Bolong Road Area (See Map RG-02-02) 44
Table B-3 Asset Risk Table for Broughton Creek Area (See Map RG-02-03) 45
Table B-4 Asset Risk Table for Nowra/Bomaderry Area (See Map RG-02-04) 46
Table B-5 Asset Risk Table for Upper Estuary Area (See Map RG-02-05) 47
Table B-6 Asset Risk Table for Greenwell Point Area (See Map RG-02-06) 48
Table B-7 Asset Risk Table for Orient Point/ Crookhaven Heads Area (See Map RG-02-07) 55
Table B-8 Asset Risk Table for Crookhaven River Area (See Map RG-02-08) 58
Table B-9 Asset Risk Table for Numbaa Area (See Map RG-02-09) 59

1 Introduction

Shoalhaven City Council (Council), with the assistance of NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), have prepared this Coastal Zone Emergency Action Subplan (CZEAS) as part of the Lower Shoalhaven River Coastal Management Program (CMP) (Rhelm, 2024).

This CZEAS has been prepared in accordance with:

- The NSW Coastal Management Act 2016 (CM Act);
- The NSW *Coastal Management Manual* (the Manual) (OEH, 2018b); and
- The NSW Guideline for preparing a coastal zone emergency action subplan (the Guideline) (DPIE, 2019).

1.1 Purpose and Objectives

In accordance with the Guideline (DPIE, 2019), the purpose of this CZEAS is to identify and facilitate the implementation of appropriate emergency response actions in order to:

- protect human life and public safety;
- minimise damage to Council property and assets;
- minimise impacts on social environmental and economic values of the coastal zone; and
- not create additional hazards or risk.

The NSW *State Emergency and Rescue Management Act 1989* (SERM Act) and the Manual (OEH, 2018b) outline a four-stage emergency management approach illustrated in **Figure 1-1.**

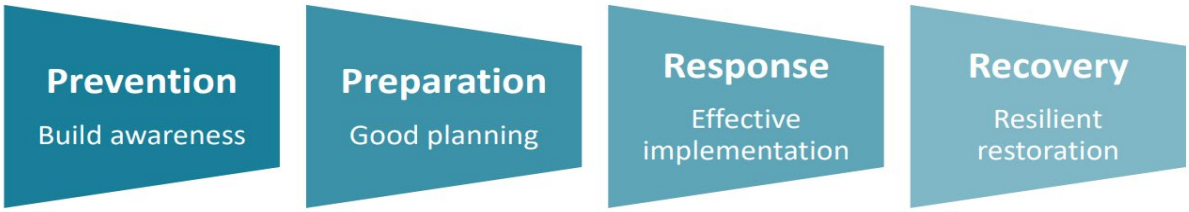

Figure 1-1 Emergency response in the coastal management context (from DPIE, 2019)

1.2 Study Area

The area subject to this CZEAS is shown in **Figure 1-2**. This is the area impacted by coastal inundation in the Lower Shoalhaven River. The extent of coastal inundation shown as shaded in light blue in **Figure 1-2** is for a present day, 1 in 100 year event. More detailed maps illustrating inundation depth and assets at risk for key areas are provided in **Attachment A**.

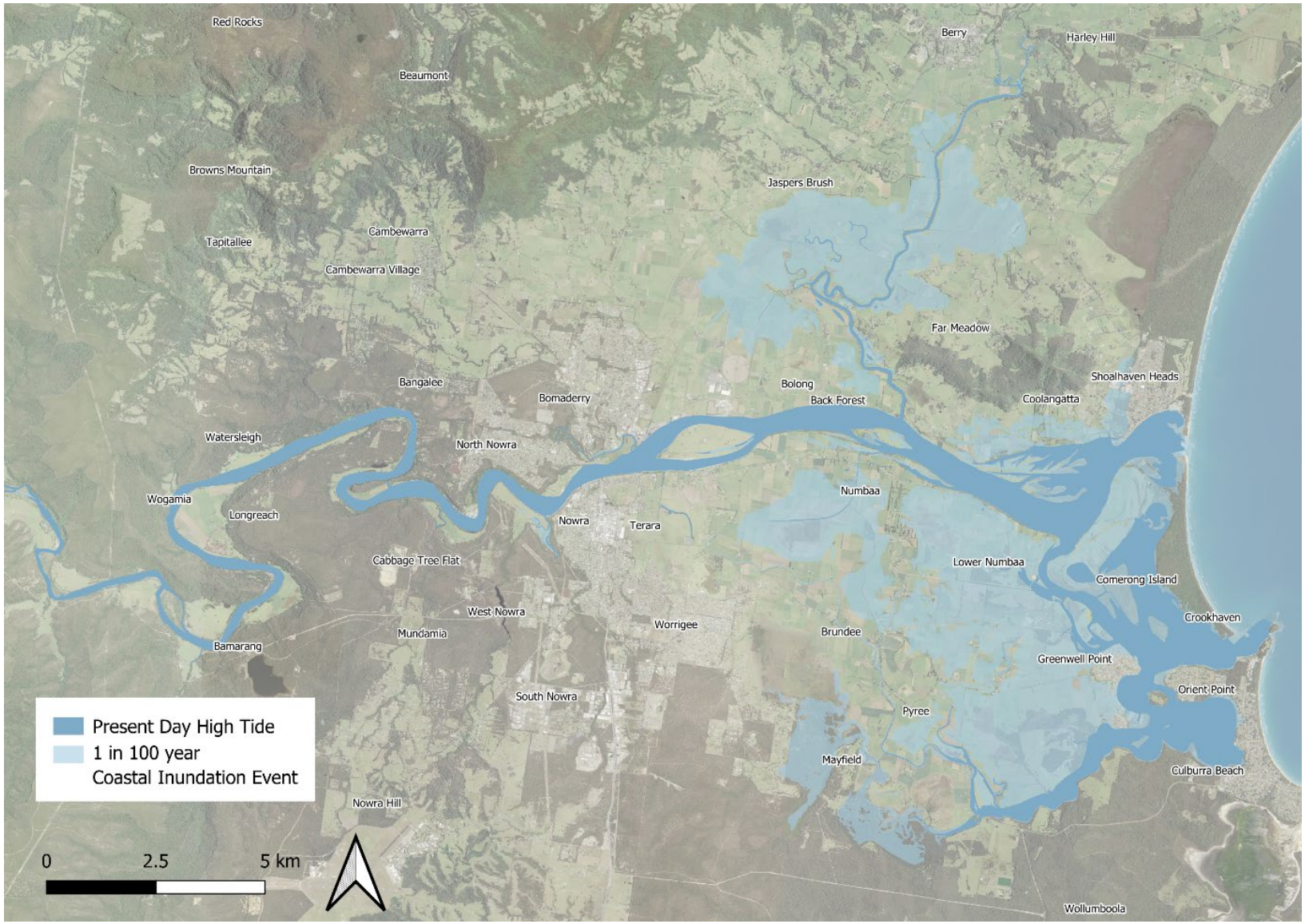

Figure 1-2 Area Subject to this CZEAS

1.3 Scope

As required by Clause 15(3) of the CM Act and detailed in the Guideline (DPIE, 2019), this CZEAS:

- defines *coastal emergency event triggers* for emergency response actions (**Section 2**);
- outlines the *roles and responsibilities* of all public authorities, including Council, and coordinates their response to emergencies immediately preceding or during periods of coastal inundation (**Section 3**);
- identifies the *locations and assets at risk* that may be affected by coastal inundation that would constitute a coastal emergency (**Section 4**);
- describes the *communication protocol* for coastal emergency events (**Section 5**); and
- outlines *emergency management measures* to be undertaken in the four phases of emergency management (**Section 6**).

1.4 Legislative Framework

The CZEAS operates within a statutory framework set primarily by the *Coastal Management Act 2016* and the *State Emergency and Rescue Management Act 1989* (SERM Act), which outline the requirements for emergency management in New South Wales. The CM Act highlights specific considerations for coastal emergency management, while the SERM Act provides the overarching emergency management framework, including the establishment of emergency management committees and plans (EMPLANs) at various levels of government.

The NSW State Emergency Management Plan (State EMPLAN) (NSW SES, 2023a) and specific subplans including the State Storm Plan, State Flood Plan, and State Tsunami Plan, are prepared by the NSW State Emergency Service (SES) as the designated combat agency. These plans emphasise the importance of non-duplication and clarity in emergency response planning. Therefore, it is important to ensure the CZEAS aligns with broader emergency management provisions without overlapping with existing EMPLANs, as illustrated in **Figure 1-3.**

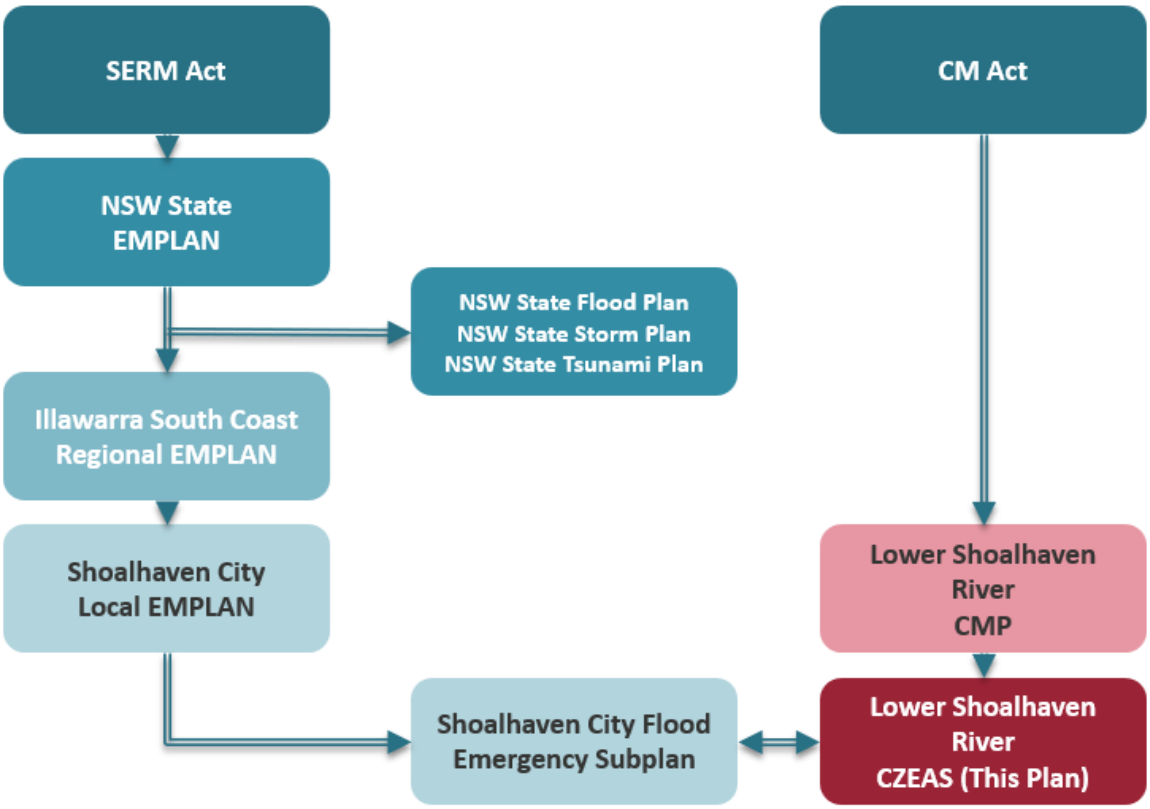

Figure 1-3 Statutory framework for emergency management in NSW and its relationship with the *Coastal Management Act 2016* (adapted from DPIE, 2019)

Specific triggers and instances for local council activation are detailed in the State and Local plans ensuring no overlap between the CZEAS and other emergency management plans. This framework emphasises coordination among public authorities in responding to coastal emergencies, with a clear delineation of roles and responsibilities. Details for these related plans are provided in **Section 3.**

1.5 Hazards Addressed by this CZEAS

As specified in the CM Act, a CZEAS outlines the roles and responsibilities of all public authorities (including Council) in response to coastal emergency events. These are events relating to storm activity or an extreme or irregular event that causes:

- beach erosion;
- coastal inundation; or
- cliff instability.

The coastal hazards to be considered in a CZEAS are defined in **Table 1-1**. Of these, the coastal hazard relevant to the study area and therefore covered by this CZEAS is coastal inundation. *Coastal inundation* is defined in the NSW Coastal Management Manual Part B (OEH, 2018b) as occurring when a combination of marine and atmospheric processes raises ocean water levels above normal elevations, inundating low-lying areas. It is often associated with storms resulting in elevated still water levels (storm surge), wave setup, wave runup and wave overwash flows. In estuaries, this type of inundation is the result of water levels at the estuary entrance being elevated above normal levels due to coastal

storms, with the elevated water levels propagating inside the estuary. Ocean waves can have an impact on the inundation level due to *wave setup*, which is the elevation of the nearshore still water level resulting from breaking waves. *Wind setup* can further cause an increase in oceanic water levels, due to ocean water "piling up" against the coastline caused by wind stress.

Note that the NSW State Flood Plan under the *State Emergency and Rescue Management Act 1989* covers emergency actions at the state level for floods, which include "…***coastal inundation*** resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences" (NSW SES, 2021).

Table 1-1 Coastal Hazards Covered by this CZEAS

Hazard	Rationale
Coastal Inundation	**Covered in this CZEAS** – This CZEAS covers coastal inundation in the study area. For the study area, this type of inundation is the result of water levels at the estuary entrances being elevated above normal levels due to coastal storms, with the elevated water levels propagating inside the estuary.
Beach Erosion	**Not covered in this CZEAS** – this CZEAS covers the Lower Shoalhaven River estuary and does not cover the open coast beaches adjacent to the study area. Those beaches are covered in the CZEAS for the Open Coast and Jervis Bay CMP.
Cliff Instability	**Not covered in this CZEAS** – this CZEAS covers the Lower Shoalhaven River estuary and does not cover the open coast beaches adjacent to the study area. Cliff instability is covered in the CZEAS for the Open Coast and Jervis Bay CMP.

The study area is subject to other coastal hazards, including foreshore erosion and tidal inundation. These coastal hazards are considered to be periodic in nature (tidal inundation) or occurring at a gradual, ongoing rate (foreshore erosion) for which specific actions are being planned separately within the CMP and hence are outside the scope of this CZEAS. This CZEAS also does not cover coastal erosion or cliff and slope instability at the open coast beaches in the vicinity of the study area – these are covered by a separate CZEAS developed under the Open Coast and Jervis Bay CMP for the beaches and coastline of the Shoalhaven.

"Catchment flooding" refers to flooding driven by heavy rainfall in the catchment area of the estuary and subsequent freshwater inflows. This type of flooding is often associated with the same weather systems as coastal inundation events, which are typically driven by low pressure systems, usually accompanied by intense rainfall. This CZEAS does not cover emergency actions triggered by catchment flooding, which are covered under the *Shoalhaven City Flood Emergency Subplan* and the *Lower Shoalhaven River Floodplain Risk Management Plan*.

As such, this CZEAS details arrangements for the four phases of emergency events (prevention, preparation, response, and recovery) relating to **coastal inundation** for the Lower Shoalhaven River.

1.6 Consultation

Agencies other than Council involved in the implementation of this CZEAS were provided a copy of the draft CZEAS. Feedback from these agencies and any other feedback received during the public exhibition has been considered in the finalisation of the CZEAS.

2 Coastal Emergency Event Triggers

This section defines a coastal emergency and triggers for emergency response actions.

2.1 Coastal Emergency Event Definition

A "coastal emergency" in the context of this CZEAS is defined as an actual or imminent occurrence of a coastal inundation event which "endangers, or threatens to endanger, the safety or health of persons or animals" or "destroys or damages, or threatens to destroy or damage, any property, being an emergency which requires a significant and co-ordinated response."

The actions contained within this CZEAS are triggered during a coastal emergency event within the Lower Shoalhaven River when one or more of the below are realised:

- **Coastal Hazard Warning Trigger** – when the Bureau of Meteorology (Bureau) has issued a Coastal Hazard Warning for the Shoalhaven Illawarra Region. These are issued for abnormally high tides or storm tides that:
    - may be higher than the highest astronomical tide, and
    - could flood low lying coastal areas.

  They are also issued for damaging or unusually large surf ("Hazardous Surf Warning") that may damage beaches and coastal infrastructure. Large surf causes beach erosion, which is not addressed in this CZEAS, but it can also contribute to coastal inundation with wave set up and propagation through the entrance.
- **Predicted/Actual Water Level Trigger** – elevated water levels associated with a coastal storm (including wave run-up, wave overtopping) is occurring or is expected to occur at key locations identified as being at risk of coastal inundation in **Section 4**, with potential to impact (or already impacting) public safety and access and/or public or private assets.

The Bureau of Meteorology issues Coastal Hazard Warnings whenever a coastal hazard is happening in an area or is expected to develop or move into an area. The lead time depends on the weather situation and can extend from an hour to 36 hours. A Coastal Hazard Warning includes:

- a list of all potential phenomena, coastal forecast districts and locations that may be affected;
- a description of the threat and the area likely to be affected (the threat area);
- the time the warning was issued and what time the next warning will be issued;
- a description of the weather pattern, including forecast developments of significant weather systems;
- a technical summary of all potential phenomena, their timing and likelihood;
- confirmed observations and reports; and
- recommended actions.

NSW SES response operations may begin prior to, during or following impact of a storm not covered by a formal warning (clause 5.1.1, page 16, NSW State Storm Emergency Sub Plan (NSW SES, 2023b)).

2.2 Other Trigger Considerations

While this CZEAS is primarily activated by Coastal Hazard Warnings issued by the Bureau of Meteorology and location-based triggers, it is critical to also monitor local coastal environmental conditions to enhance decision-making.

The necessity for Council to utilise additional forecasting and knowledge to prepare for coastal emergency events is important, potentially extending the early warning lead time beyond Bureau warnings. Access to forecasts and real-time data on wave conditions and tide levels offers invaluable insight into coastal inundation days before an event, providing a crucial window for emergency response implementation.

Forecasting coastal inundation involves navigating the complex interplay of several factors including:

- **Waves** – offshore wave height and direction,
- **Ocean Tide** – astronomical tide cycle,
- **Surge** – storm surge timing and magnitude,

Data sources listed in **Table 2-1** can assist Council in actively monitoring ocean wave and tide forecasts, despite the limitations in real-time data availability.

Table 2-1 Available sources of data for coastal hazard monitoring

Parameter	Forecast Source	Forecast Window	Real-time information
Waves	Bureau Interactive Weather and Wave Forecast	7 days	MHL NSW Ocean Wave Data Collection Program
	The NSW Nearshore Wave Forecast	5 days	
Ocean Tide	MHL NSW Tide Charts	1 year	MHL NSW Ocean Tide Data Collection Program
	Bureau New South Wales Tide Tables	1 year	

Further influencing the severity of coastal hazard events are:

- cumulative impacts of storm clustering,
- physical orientation of the shoreline,
- intensity and path of East Coast Lows (ECLs),
- tidal and sea-level factors, and
- human activities along the coast.

These elements highlight the complexity of managing coastal hazards and underscore the necessity for a comprehensive approach that includes continuous monitoring, community engagement, and adaptive management strategies. By integrating this understanding with proactive planning and response measures, Council can enhance its preparedness and resilience against the multifaceted threats posed by coastal hazards.

2.3 CZEAS Action Initiation

Once a coastal emergency event is triggered, Council will proceed to implement the actions detailed in the Response Phase of this CZEAS (**Section 6**). A decision tree for triggering the Preparedness, Response and Recovery phases of the CZEAS is presented in **Figure 2-1**.

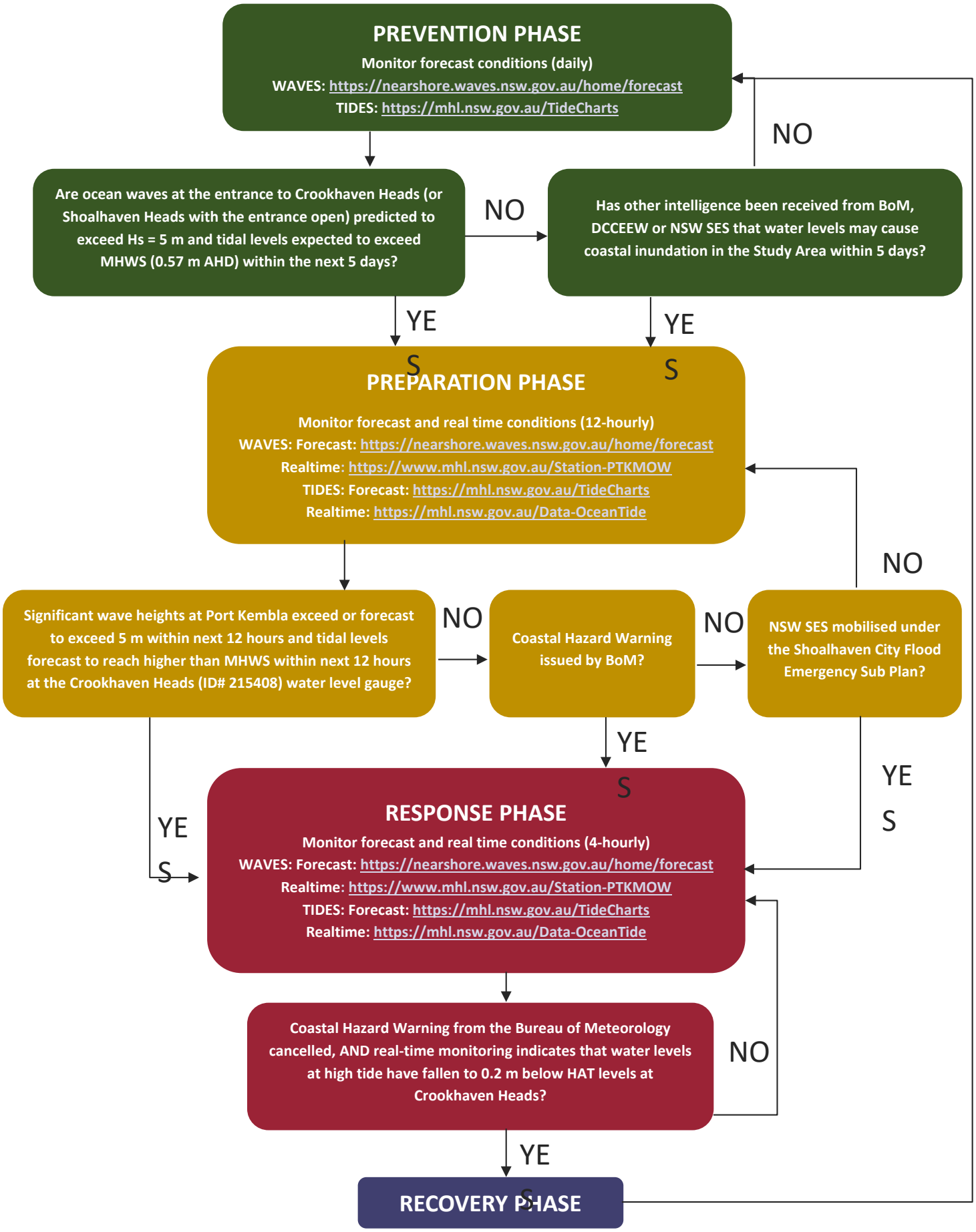

Figure 2-1 Trigger Conditions for Preparedness, Response and Recovery Phases of the CZEAS

3 Roles and Responsibilities

This section outlines the roles and responsibilities of all public authorities including Council and coordinates their response to coastal emergency events preceding, during and after periods of coastal inundation.

3.1 CZEAS Relationship to other State Emergency Plans

The relationship of this CZEAS to other State Emergency Plans is illustrated in **Figure 1-3**. A brief overview of these Plans, which are made under the SERM Act, is described below. As noted in **Section 1**, a CZEAS must not include matters dealt with in any plan made under the SERM Act and no such duplication of material (or change in defined roles and responsibilities) has been included herein.

3.1.1 The State Emergency Management Plan (EMPLAN)

The State Emergency Management Plan (SEOCON & SEMC, 2018) describes the New South Wales approach to emergency management, the governance and coordination arrangements and roles and responsibilities of agencies. The EMPLAN is supported by hazard specific sub plans and functional area supporting plans.

The objectives of the EMPLAN are to:

a) provide clarity as to command and control, roles and coordination of functions in emergency management across all levels;
b) emphasise risk management across the full spectrum of prevention, preparation, response and recovery;
c) emphasise community engagement in the development and exercise of plans as well as in their operational employment; and
d) ensure that the capability and resourcing requirements of these responsibilities are understood.

3.1.2 Illawarra South Coast Regional Emergency Management Plan

The Illawarra South Coast Regional Emergency Management Plan (REOCON & REMC, 2019) details arrangements for, prevention of, preparation for, response to and recovery from emergencies within the Illawarra South Coast Emergency Management Region.

It encompasses arrangements for:

- emergencies controlled by combat agencies;
- emergencies controlled by combat agencies and supported by the Regional Emergency Operations Controller (REOCON);
- emergency operations for which there is no combat agency;
- circumstances where a combat agency has passed control to the REOCON; and
- demobilisation and transition of control from response to recovery.

The objectives of the Regional Emergency Management Plan are to:

- support Local Emergency Management Plans (EMPLANs) and augment them when required;
- identify trigger points for regional level activation, escalation and demobilisation;
- define participating organisation and Functional Area roles and responsibilities in preparation for, response to and recovery from emergencies;
- set out the control, co-ordination, support and liaison arrangements at the Regional level;

- detail activation and alerting arrangements for involved agencies at the Regional level; and
- detail arrangements for the acquisition and co-ordination of resources at the Regional level.

3.1.3 NSW State Storm Plan and NSW State Flood Plan

The State Flood Plan (NSW SES, 2021) sets out the state level multi-agency arrangements for the emergency management of flooding in NSW, and is a sub plan to the NSW EMPLAN. It sets out the state level emergency management arrangements for prevention, preparation, response, and initial recovery for flooding at the strategic level.

The State Flood Plan defines a flood as a relatively high-water level which overtops the natural or artificial banks in any part of a stream, river, estuary, lake, or dam, and/or local overland flooding associated with drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences. In this context, coastal inundation within the Lower Shoalhaven River and Crookhaven River estuaries is covered by the NSW Flood Plan.

Coastal erosion is not covered by this CZEAS or the NSW Flood Plan but is covered under the NSW State Storm Plan (NSW SES, 2023b).

The NSW State Storm Plan, a sub-plan to the NSW State EMPLAN, outlines a comprehensive approach for preparing for and responding to severe storms in NSW, including the management of coastal erosion caused by storm activity, which is allocated to a CZEAS prepared under the CM Act. It specifies that coastal erosion not caused by storms falls under the responsibility of the Local Emergency Operations Controller (LEOCON), ensuring a clear demarcation of duties. This plan also indicates when local Councils should activate their CZEAS, preventing overlap between emergency planning documents. Section 1.4.4 of the State Storm Plan (NSW SES, 2023b) states that the arrangements for the emergency management of flooding are dealt with in the NSW Flood Plan (NSW SES, 2021).

3.1.4 Shoalhaven City Local EMPLAN

The Shoalhaven Local EMPLAN (Shoalhaven Local Emergency Management Committee, 2021) details arrangements for the prevention of, preparation for, response to and recovery from emergencies within the Shoalhaven Local Government Area.

It encompasses arrangements for:

- emergencies controlled by combat agencies;
- emergencies controlled by combat agencies and supported by the Local Emergency Operations Controller (LEOCON);
- emergency operations for which there is no combat agency; and
- circumstances where a combat agency has passed control to the LEOCON.

The objectives of the Local EMPLAN are to:

- define participating organisation and Functional Area roles and responsibilities in preparation for, response to and recovery from emergencies;
- set out the control, co-ordination and liaison arrangements at the Local level;
- detail activation and alerting arrangements for involved agencies; and
- detail arrangements for the acquisition and co-ordination of resources.

3.1.5 Shoalhaven City Flood Emergency Subplan

The purpose of the Shoalhaven City Flood Emergency Subplan (NSW SES ,2022) is to set out the multi-agency arrangements for the emergency management of flooding in the Shoalhaven LGA. It covers floods and coastal inundation within the estuaries of the Shoalhaven LGA, including Lower Shoalhaven River and Crookhaven River.

The roles of Council are articulated, and actions are identified under the four phases of emergency management:

- Prevention/Mitigation;
- Preparation;
- Response; and
- Recovery.

The CZEAS can be triggered independently of the Shoalhaven City Emergency Flood Subplan. The triggers in the CZEAS for the estuaries can outline coastal inundation conditions which may trigger the application of the CZEAS and not necessarily the Flood Subplan, particularly in relation to mitigation and preparation actions. Council will need to fulfil its required responsibilities and undertake actions under the Flood Subplan in conjunction with the actions outlined in this CZEAS.

Council's role under the Shoalhaven City Flood Emergency Subplan is defined in the Plan, and includes actions relating to each of the four phases of emergency management. Council's role includes provision of relevant flood information to NSW SES, contributing to community engagement on emergency management, and assisting NSW SES with flood operations subject to availability of resources.

3.2 CZEAS Operations

Table 3-1 describes the roles and responsibilities of the relevant agencies and personnel under this CZEAS.

Table 3-1 Roles and Responsibilites

Agency	
NSW State Emergency Service	NSW State Emergency Service (SES) is responsible for the protection of persons from danger to their safety and health, and to protect property from destruction or damage arising from storms (SES Act, 1989). The NSW SES's role is only activated as a result of storm activity. The NSW SES is the designated combat agency for management of floods, tsunami, and storms, including severe storms which cause coastal inundation. The NSW SES prepares the State Storm Plan, State Flood Plan and State Tsunami Plan, which are subplans to the NSW State EMPLAN 2023. The role of the NSW SES in coastal inundation emergencies is essentially warning and evacuation of residents at risk, sandbagging to minimise entry of water into buildings and lifting and/or relocating readily moveable household goods and commercial stock and equipment. These activities would be carried out in accordance with the NSW SES Local Flood Sub Plan. The NSW State Storm Emergency Subplan (2023b) outlines specific roles for the SES for storm activity likely to result in or actually causing coastal inundation.

Agency	
Shoalhaven City Council	Council is the designated coastal authority with responsibility for care of public land within its care, control and management. The carrying out (or authorising and co-ordinating) of coastal emergency protective works to protect public assets from coastal erosion and inundation is Council's role, if it chooses to undertake such measures. Council could choose to undertake physical protection measures to protect public assets from coastal erosion and inundation if considered to be appropriate (assuming adequate environmental assessment had been carried out). However, works would not be practical or appropriate for the protection of property against coastal inundation within the study area, due to the scale of the inundation and large number of properties affected. If a "Coastal Hazard Warning" had been released or NSW SES was mobilised in some other manner, Council would assist NSW SES as required under the State Storm Plan and Local Flood Plan and where resources permit. At the local level, The Local Emergency Operations Controller (LEOCON) is responsible, when requested by a combat agency (NSW SES), to coordinate the provision of resources support. EOCONs would not normally assume control from a combat agency unless the situation can no longer be contained. Where necessary, this should only be done after consultation with the Regional Emergency Operations Controller (REOCON) and agreement of the combat agency and the appropriate level of control (Shoalhaven EMPLAN 2021). In practice, typical tasks that Council may undertake (where required) before, during and after a coastal inundation event (besides considering the need for and potentially implementing protective works on public land) would be as discussed in **Sections 5 and 6**. Council has consulted with the NSW SES prior to finalising this CZEAS to ensure compatibility with NSW SES Subplans.
NSW Department of Climate Change, Energy, the Environment and Water	The Department of Climate Change, Energy, the Environment and Water (DCCEEW) is the NSW government authority responsible for advising on coastal zone management. The role of DCCEEW is defined in the NSW State Storm Plan (2023b) as: • Oversee the delivery of the NSW Coastal legislation including financial support through the Coastal Management Program and technical advice to Local Government Councils and state agencies including assistance with the identification of risks in areas which are subject to coastal erosion, the preparation and implementation of management plans and programs and associated mitigation and management actions. • Advise the NSW SES about conditions which may lead to coastal erosion. • Provide storm damage response teams to assist the NSW SES and National Parks and Wildlife Service (NPWS). • Provide related advice on coastal hazards to the NSW SES on request. • Support recovery committees as required.
Bureau of Meteorology	The release of a Coastal Hazard Warning by the Bureau of Meteorology is the trigger adopted by NSW SES for involvement in a coastal inundation episode. A Coastal Hazard Warning is issued for abnormally high tides or storm tides that: • may be higher than the highest astronomical tide, and • could flood low lying coastal areas. They are also issued for damaging or unusually large surf that may damage beaches and coastal infrastructure. Large surf causes beach erosion, which is not addressed in this CZEAS, but it can also contribute to coastal inundation with wave set up and propagation through the entrance.

Agency	
NSW Police	The NSW Police Force is the agency responsible for: • law enforcement and search and rescue; and • controlling and coordinating the evacuation of victims from the area affected by the emergency. Some members of the NSW Police may also be appointed as Emergency Operations Controllers. Police would typically become involved in a coastal erosion or inundation event as follows: • assisting NSW SES where required (for example controlling and coordinating evacuation) when NSW SES was acting in its Combat Agency role or • if NSW SES was not mobilised, police may undertake or coordinate activities such as evacuation, barricading, removal of the contents of buildings and the like. The NSW Storm Emergency Subplan specifies that the NSW Police Force is not responsible for controlling, coordinating or mitigating any physical mitigation works to protect properties or structures at risk from coastal erosion or inundation, either during or outside the period of storm activity.
Fire and Rescue NSW	Fire and Rescue NSW has a Mutual Aid Agreement with the NSW SES and would have a support role assisting the SES during a coastal emergency. In particular, Fire and Rescue NSW would become involved during a coastal emergency in the following ways: • assist the NSW SES in monitoring / reconnaissance of areas potentially damaged by storms; • provide storm damage response teams to assist the NSW SES, including strike teams when requested, to assist the NSW SES; • assist with the evacuation of at-risk communities; and • provide staff to support a spatial information group established by the NSW SES.
Other Agencies	Other agencies with a role in Emergency Management include: • NSW Ambulance; • Department of Justice, Office of Emergency Management; • Housing NSW; • Marine Rescue NSW; • National Parks and Wildlife Service; • NSW Rural Fire Service; • NSW Volunteer Rescue Association; • Transport for NSW; and • Reconstruction Authority • Surf Lifesaving NSW Full details of the role of these Agencies are described in the NSW Storm Emergency Subplan (NSW SES, 2023) and the NSW Recovery Plan (NSW Reconstruction Authority, 2023).

4 Locations and Assets at Risk

This section identifies the locations and assets that may be affected by coastal inundation that would occur during a coastal emergency event. Through this CZEAS, Council actions are focused on managing and protecting public assets, not private property.

Key locations where coastal inundation threatens infrastructure, are tabulated in **Table 4-1** and mapped for the present day 100 year Average Recurrence Interval (ARI) event in **Attachment A**. The inundation hazard information is from the Lower Shoalhaven River CMP Stage 2 tidal and coastal inundation assessment (Stantec, 2023). It should be noted that these coastal inundation impacts do not include additional impacts that may be expected under catchment-derived flooding, which can occur during the same weather systems that cause coastal inundation. Additional areas would be impacted under future sea level rise projections, but these are not considered in this CZEAS.

Primarily due to the temporary nature of coastal inundation, and the low likelihood of an inundation event, all assets are generally considered low risk. However, as this CZEAS is activated in the case where an unlikely event occurs, the consequence described in the table can be expected to occur. Long-term actions identified in the Lower Shoalhaven Floodplain Management Plan (in preparation at the time this CZEAS was written) may also be relevant for addressing the risk to these assets from coastal inundation.

Key public assets at risk from coastal inundation in the present day, as identified in the Stage 2 – Detailed risk assessment (Rhelm, 2023b), are tabulated in **Attachment B**. These are also included in the maps in **Attachment A**. A table for each key location provides information about the location, asset type, asset ID (if available), consequence of inundation, and inundation depth at the point representing the asset (for a 20 year ARI and 100 year ARI event).

Inundation depths reported in the maps in **Attachment A** and the tables in **Attachment B** are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.

Roads potentially impacted by coastal inundation are shown as red in the maps in **Attachment A**. Points indicating the low points on inundated roads are also presented in the maps as red points labelled with modelled inundation depth for a 100 year ARI event.

Locations for temporary road closures will rely on close monitoring during a storm event but the roads and surrounding lots where coastal inundation is possible in a coastal emergency include:

- Addison Road
- Back Forest Road
- Berrys Bay Road
- Bolong Road
- Bournes Lane
- Church Street
- Comerong Island Road
- Greenwell Point Road
- Hay Avenue
- Lidbretter Road
- Pyree Lane
- Raglan Street
- Ryans Lane
- Shoalhaven Heads Road
- Smiths Lane
- Swamp Road
- West Street
- Wharf Road

For some of these areas alternative access is not available in the event of a road closure, and there is risk of isolation of residential areas in a major event. Council has investigated flood-free access routes for these areas through the Flood Evacuation Capability Assessment (Water Technology, 2024). The Lower Shoalhaven Floodplain Risk Management Study and Plan will consider how management options can improve the evacuation capability in the area (in preparation). Council should ensure that the flood-free access routes are accessible and trafficable to vehicles prior to a coastal emergency.

Council has no intention to protect private property from coastal inundation hazards before or during an emergency event, and intends only to undertake the actions identified in **Section 6** of this CZEAS, which focus on managing and protecting public assets. Due to the nature of the coastal inundation events that may impact the study area, including the depth, area impacted, and large number of properties potentially affected, it is not considered practical for Council or private property owners to install emergency coastal protection works that would be capable of protecting property from coastal inundation.

Table 4-1 Key Locations at Risk from Coastal Inundation in a 100 year ARI event

Location (Map in Attachment A)	Impacts
Shoalhaven Heads (Map RG-02-01)	Inundation of the foreshore and low lying areas including: • Hay Avenue boat ramp area, adjacent footpaths, and the southern end of Hay Avenue; • Wharf Street boat ramp; • Public Jetty at Carters Corner and adjacent footpaths; • River Road boat ramp area, adjacent footpaths; and • Shoalhaven Heads Road where it spans the drainage channel, potentially requiring a detour via Scott Street to Bolong Road.
Bolong Road (Map RG-02-02)	Inundation of the foreshore and low lying areas including: • Bolong Road where it curves to the west at Berrys Bay Road; • Bolong Road where it spans the drainage channel near Bevan Creek; and • A fishing platform west of the confluence with Broughton Creek.
Broughton Creek (Map RG-02-03)	Inundation of the foreshore and low lying areas including: • Near the intersection of Back Forest Road and Lidbretter Road and the surrounding lots; • Swamp Road, both to the east and west of Broughton Creek; and • Jaspers Brush Airfield.
Nowra / Bomaderry (Map RG-02-04)	Inundation of the foreshore areas including: • Bolong Road south of the roundabout intersection with Meroo Street; • Lions Park Boat Ramp and surrounding area; • The Nowra boat ramp at Riverbank Reserve adjacent to the golf course; and • The Nowra public wharf and boat ramp just east of the Nowra Bridge.
Upper Estuary (Map RG-02-05)	Inundation of the foreshore areas including: • At the end of Coorong Road; • Watersleigh; and • Long Reach.
Greenwell Point (Map RG-02-06)	Inundation of the foreshore and low lying areas including: • Greenwell Point Road as the sole access road to the area;

Location (Map in Attachment A)	Impacts
	• West Street as it approaches the boat ramp area; • Church Street as it approaches the foreshore; • A sewer pump station at the intersection of Church and Adelaide Streets; • Adelaide Street from West Street to Albert Street and the surrounding lots; • Foreshore recreational areas and footpaths at Greenwell Point Foreshore Reserve and other public reserves; • The Greenwell Point boat ramps and jetties at Adelaide Street and Main Wharf; • The Marine Rescue Building; • Roads and lots between Greens Road and Haiser Road spanning from Marlin Drive to Keith Avenue; and • The commercial oystering area at the end of the peninsula including a sewer pump station.
Orient Point / Crookhaven Heads (Map RG-02-07)	Inundation of the foreshore and low lying areas including: • The Crookhaven Heads boat ramp and the surrounding area; • The Orient Point boat ramp and the surrounding area; • Raglan Street as it approaches Curleys Bay; • Addison Road cul-de-sacs between Sunshine and Belgrave Street and the adjacent sewer pump station; and • Foreshore recreational areas and reserves along Curleys Bay.
Crookhaven River (Map RG-02-08)	Inundation of the foreshore and low lying areas including: • Pyree Lane as it approaches Culburra Road; • Bournes Lane south of Greenwell Point Road; and • Greenwell Point Road from Ryans Road and east to the river.
Numbaa (Map RG-02-09)	Inundation of the foreshore and low lying areas including: • Greenwell Point Road at the intersection of Mayfield Road and Jindy Andy Lane; • Ryans Lane and Smiths Land north of Greenwell Point Road; • Comerong Island Road where it spans the drainage canal across from Numbaa Island; • Wharf Road where it joins to Comerong Island Road; • Comerong Island Road from Jindy Andy Lane to the Ferry; • The Ferry and the associated buildings; and • Substantial areas of private lots including paddocks with recycled water reuse systems.

5 Communication Protocol for Coastal Emergency Events

As part of the CZEAS, the Guidelines for Preparing a Coastal Zone Emergency Action Subplan (NSW DPIE 2019) stipulate that a communication protocol to be used before, during and after a coastal emergency will need to be prepared. The protocol is to outline procedures to:

- engage with landholders in the coastal vulnerability area to raise awareness of coastal emergency events and the dangers these conditions may present;
- inform landholders of actions council will take during an emergency, what actions a landholder may need to take and any assistance that may be available to them;
- issue safety advice to landowners and the community of the likelihood of an impending emergency that would initiate actions under the CZEAS; and
- advise council staff of all emergency management procedures and ensure they have the capacity to respond.

A communications protocol is presented in **Table 5-1**.

Table 5-1 Communications Protocol for this CZEAS

Emergency Phase	Communications
Prevention (sunny-day preparedness)	• Share information with NSW SES for incorporation into coastal inundation planning and intelligence for the study area. Specifically, this includes this CZEAS and the results of the Lower Shoalhaven River CMP Stage 2 - Tidal and coastal inundation assessment (Stantec, 2023) to assist them in their forward planning for emergency management. • Make a copy of the CZEAS available through Council's existing Emergency website https://www.shoalhaven.nsw.gov.au/Emergencies • Provide practical emergency management information to the community through Council's website and in the form of signage and brochures at local community centres. • Inform the community of Council's intended emergency responses under this CZEAS to improve readiness for emergency events so that residents: ○ Know what to do, where to go and who to contact for assistance in a coastal emergency. ○ Are educated and empowered to maintain the foreshore under their control as required to reduce the risk to their property. ○ maintain preparedness for a coastal inundation event, including maintaining and preparing a home FloodSafe Plan through the NSW SES website. • Contribute to emergency management-related community engagement activities coordinated by the NSW SES through the LEMC. • Through the LEMC, provide routine emergency management briefings to communicate the strategy outlined in this plan including coastal emergency triggers, areas at risk, roles and responsibilities and response action plan. • Integrate emergency management into Council's standard operating procedures, which includes internal operational protocol and procedures for all coastal inundation scenarios in the study area for LEMO, Council's coastal officers and works crews and communications staff.

Emergency Phase	Communications
	• Consult through the LEMC with NSW SES, DCCEEW, Local Police, LEOCON, FRNSW to ensure this CZEAS remains consistent with the relevant local, regional, and state-based emergency management plans.
Preparation (before a storm)	• Initiate updates to Council's emergency website that provides essential information to the community at https://www.shoalhaven.nsw.gov.au/Emergencies. The website includes links to community information hubs, emergency contacts, live traffic updates including a map of full and partial road closures due to weather or emergency events, links to real-time water level and wave information, and a Disaster Dashboard at https://shoalhaven.disasterdashboards.com/dashboard/overview covering bushfires and flood events. Advise affected landholders through the website to activate their home FloodSafe Plan if they have this in place. • Alert affected land managers about access requirements to enable freedom of movement for personnel, plant and equipment during the emergency. Enact any procedures or approvals required to make access ways available, e.g. keys for locked gates, or landowner's consent from NSW Department of Planning, Housing and Infrastructure (DPHI) - Crown Lands. • Seek advice from NSW SES, BoM or coastal experts from DCCEEW to assess potential for occurrence of a coastal emergency and, subject to availability of resources, offer assistance that may be requested by NSW SES. • Liaise with Shoalhaven Water to inform them of areas where assets may be impacted during an emergency. • Contact authorised personnel responsible for emergency plant and equipment to ensure personnel are on stand-by and sufficient sandbags, sand stockpiles, warning signage and road closure barricades/tape are available for use if required. • Document records of decisions made and the reasoning in making those decisions (before, during and after coastal inundation emergencies).
Response (during a storm)	• If a coastal emergency is as a result of storm/flood/tsunami - NSW SES as the combat agency will coordinate all public information during the response phase. If not, council is responsible for public information. • In consultation with the NSW SES and BoM, provide public information about approaching coastal emergencies where possible through digital means. This would involve updates to Council's emergency website at https://www.shoalhaven.nsw.gov.au/Emergencies and Disaster Dashboard at https://shoalhaven.disasterdashboards.com/dashboard/overview keeping messaging consistent with the national approach outlined in the Australian Warning System Framework (AIDR, 2021); i.e. Advice (yellow), Watch and Act (orange), Emergency Warning (red). • Co-ordinate the release of information to the media through the NSW SES Incident Control Centre in accordance with the arrangements in Section 5.2.2b of the Shoalhaven City Emergency Flood Plan (NSW SES, 2022). • Inform the NSW SES of any intelligence on unforeseen impacts of coastal inundation gathered during the emergency. • Liaise with other agencies (e.g. Transport for NSW, NSW DPHI - Crown Lands, National Parks and Wildlife Service) if debris from coastal inundation creates a safety hazard in adjoining areas (or liaise with road owners to enable closure).

Emergency Phase	Communications
	• Accurately record and report information relevant to Council emergency response activities and any real time coastal inundation information (including road closure information) to the NSW SES Incident Controller. This may be in the form of a combined Emergency Operations Centre (EOC) report, or direct from agencies where an EOC has not been established. • Liaise with authorised personnel responsible for emergency plant and equipment to ensure personnel are deployed or on stand-by and sufficient sandbags, sand stockpiles, warning signage and road closure barricades/tape are available for use if required. • Liaise with NSW SES to assess, close and where possible restore essential utility services under Council control (water supply and sewerage operations). • Subject to availability of resources, offer assistance that may be requested by NSW SES. • Document records of decisions made and the reasoning in making those decisions (before, during and after coastal inundation emergencies).
Recovery (after a storm)	• Share intelligence gathered/work with the NSW SES, Reconstruction NSW and NSW DCCEEW. • Determine potential actions available under the State Recovery Plan (Reconstruction NSW, 2023). • Document records of decisions made and the reasoning in making those decisions (before, during and after coastal inundation emergencies). • Participate in post-event community engagement coordinated by NSW SES e.g. community forums, workshops, or other opportunities to provide communities a chance to provide feedback, address any concerns and provide input into the recovery process. • Undertake After Action critical review of the CZEAS in conjunction with NSW SES, DCCEEW, Reconstruction NSW and LEMC to assess its effectiveness. • Liaise with property owners as required to ensure any private and/or public structures do not pose a risk to the public.

6 Emergency Management Measures

The emergency management measures described in this CZEAS have been formulated to cover the four phases of emergency management as described in the NSW Coastal Management Manual (OEH, 2018) and the SERM Act, and shown in **Figure 6-1**:

Figure 6-1 Emergency Response in the Coastal Management Context (from DPIE, 2019)

The following tables provide a list of actions for the CZEAS including:

- triggers for implementation of the CZEAS; and
- the identification of actions that Council should undertake before, during and after a coastal inundation emergency.

Note that the CZEAS is independent of the Shoalhaven City Emergency Flood Subplan but would be triggered at the same time as this CZEAS. Council will need to fulfil its required responsibilities and undertake actions under that Plan in conjunction with the actions outlined in this CZEAS.

Table 6-1 Prevention Phase Actions for CZEAS for Lower Shoalhaven River CMP

Action	Trigger	Timing	Location	Responsibility
1.1 Make this CZEAS available to all relevant Stakeholders identified in the CZEAS.	Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency.	Immediate	Estuary-wide	Council
1.2 Share information with NSW SES for incorporation into coastal inundation planning and intelligence for the study area. Specifically, this includes the results of the Lower Shoalhaven River CMP Stage 2 - Tidal and coastal inundation assessment (Stantec, 2023) to NSW SES to assist them in their forward planning for emergency management.	At LEMC meetings and through consultation with NSW SES. Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency.	Immediate	Estuary-wide	Council, NSW SES
1.3 Inform the community regarding the risk of coastal inundation in the study area and informing the community of the Council's intended emergency responses under the CZEAS. In some areas, private property is within the immediate coastal hazard area and is at risk from coastal inundation. For those areas, it is important that local landowners: • Know what to do, where to go and who to contact for assistance in a coastal emergency. • Are educated and empowered to maintain the foreshore under their control as required to reduce the risk to their property. Council can encourage foreshore residents to maintain preparedness for a coastal inundation event, including maintaining and preparing a home FloodSafe Plan through the NSW SES website. Though the Lower Shoalhaven Flood Study (Cardno, 2022a), Council has developed a FloodSafe Guide for the Lower Shoalhaven River, which contains practical information for residents affected by flooding and is relevant for residents affected by coastal inundation also. These can be distributed to residents in the affected areas, and are available at Floodsafe_lower_shoalhaven_march_2022-low-res.pdf (nsw.gov.au) Through Council's website, provide advice to the community, landholders and the NSW SES about the potential for a coastal emergency from coastal inundation, and the types of responses that are permitted and not permitted. Contribute to emergency management-related community engagement activities coordinated by the NSW SES through the LEMC.	Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency.	Ongoing	Estuary-wide	Council, NSW SES, BoM
1.4 Undertake works and management actions in the CMP aimed at reducing coastal hazard risk to local infrastructure, public safety and the environment. The CMP includes actions to be undertaken in the medium to long term to reduce the risk from coastal hazards in the study area. Implementation of these works would reduce the risk to the study area posed by future coastal emergencies. Opportunities for preventative works	Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency.	As per CMP	Estuary-wide	Council

Action	Trigger	Timing	Location	Responsibility
within the study area to reduce the immediate risks to public assets at specific areas have been outlined in the CMP, together with engineering advice regarding their implementation. Undertake necessary environmental assessments and any development approval processes, where necessary, to facilitate these works. Further, the Lower Shoalhaven Floodplain Risk Management Study (Cardno, 2022b) describes potential management actions to address flooding in the study area, with those actions being relevant to reducing risk from coastal inundation also.				
1.5 Implement development controls for new developments in areas identified as being at risk from coastal inundation. The CMP includes an action to develop CVA mapping for the study area, which will formally identify land in the study area subject to coastal inundation. Through development of a Planning Proposal to update Council's DCP and LEP to include mapping of the CVA, Council can reduce the risk to new developments by applying development controls on floor levels and stipulating special conditions for building foundations. This is relevant for those areas where lots are subject to coastal inundation. Council can also apply existing development controls for new developments for areas identified as flood-prone land, which will be relevant to reducing the risk from coastal inundation also.	Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency	As per CMP	Estuary-wide	Council
1.6 Maintain a plant and equipment resource list for equipment necessary to enact the actions in this CZEAS. This would include maintaining details of equipment location, standard operating procedures for its use, authorised personnel responsible and contact details for the proper use of the plant and equipment. Liaise with NSW SES to identify sources of materials potentially held by NSW SES Community Action Teams and where they can be stored. This may include sand and sandbags, and signage manage access.	Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency	Initiate list as soon as possible and update every six months	Estuary-wide	Council, NSW SES
1.7 Develop a communications protocol to be used before during and after a coastal emergency. The communications protocol would formalise operational activities between Council, NSW SES and LEOCON where there is no Emergency Operations Centre established.	Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency	Initiate as soon as possible and update every six months	Estuary-wide	Council, DCCEEW, NSW SES

Action	Trigger	Timing	Location	Responsibility
If a coastal emergency is as a result of storm/flood/tsunami - NSW SES as the combat agency will coordinate all Public Information during the response phase. If not, council is responsible for public information.				
1.8 Through the Local Emergency Management Committee (LEMC), consult with NSW SES, DCCEEW, Local Police, LEOCON, FRNSW to ensure this CZEAS remains consistent with the relevant local, regional, and state-based emergency management plans.	At LEMC meetings Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency.	Upon finalisation of CZEAS, and with review annually	Estuary-wide	Council, LEMC
1.9 Review and update this CZEAS in line with any future CVA mapping or CMP implementation.	On development of CVA mapping.	During CMP preparation and review	Estuary-wide	Council, Supporting role: *DCCEEW*
1.10 Establish internal operational protocol and procedures for all coastal inundation scenarios in the study area for LEMO, Council's coastal officers and works crews and communications staff. This would include up-to-date personal contact details for key council staff involved in coordinating actions under the CZEAS (include responsibilities of staff who prepare for, manage and coordinate recovery from an inundation emergency event) and individuals the council may need advice from, such as DCCEEW staff, or to integrate with personnel from other emergency sectors. The procedure would detail resourcing, internal training, testing and periodic review requirements.	Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal emergency	Upon finalisation of CZEAS, and with review annually	Estuary-wide	Council, LEMC
1.11 Monitoring of physical environmental conditions to assess potential for occurrence of coastal emergency and seeking appropriate advice when required. This would include: • weather conditions (measurements, warnings and forecasts) • wave forecasts (height and direction) • water level (tidal) predictions • seeking advice from NSW SES, BoM or coastal experts from DCCEEW to assess potential for occurrence of coastal emergency. Wave forecasts are available at https://nearshore.waves.nsw.gov.au/home/forecast Tidal predictions are available at https://mhl.nsw.gov.au/TideCharts	If ocean waves at the entrance to Crookhaven Heads (or an open Shoalhaven Heads) are predicted to exceed Hs = 5 m (according to https://nearshore.waves.nsw.gov.au/home/forecast), and tidal levels are expected to exceed MHWS (0.57 m AHD) according to tidal prediction charts (https://mhl.nsw.gov.au/TideCharts) within the next 5 days, or other intelligence is received from BoM, DCCEEW or NSW SES that water levels may cause coastal inundation in the Study Area within 5 days, this will trigger the Preparedness Phase of the CZEAS.	Daily to assess potential for emergency event to occur within next 5 days	Estuary-wide	Council, NSW SES, BoM, DCCEEW

Table 6-2 Preparedness Phase Actions for CZEAS for Lower Shoalhaven River CMP

Action	Trigger	Timing	Location	Responsibility

2.1 Monitoring of physical environmental conditions to assess potential for occurrence of coastal emergency and seeking appropriate advice when required.
 	
This would include:
• weather conditions (measurements, warnings and forecasts)
• wave forecasts (height and direction)
• water level (tidal) predictions
• real time wave data (height, period and direction) – monitor real-time wave conditions at the Port Kembla Waverider Buoy via the MHL website https://www.mhl.nsw.gov.au/Station-PTKMOW
• real time water level data (including consideration of elevated water levels due to storm surge) - monitor real-time water level conditions within the Lower Shoalhaven River estuary.
• Seeking advice from NSW SES, BoM or coastal experts from DCCEEW to assess potential for occurrence of coastal emergency.
• Use this information to assess threats to life and property arising from a coastal emergency.
  ○ Wave forecasts are available at: https://nearshore.waves.nsw.gov.au/home/forecast
  ○ Tidal predictions are available at https://mhl.nsw.gov.au/TideCharts
  ○ Realtime tidal data is available at https://mhl.nsw.gov.au/Data-OceanTide
	If ocean waves at the entrance to Crookhaven Heads (or an open Shoalhaven Heads) are predicted to exceed Hs = 5 m (according to https://nearshore.waves.nsw.gov.au/home/forecast), and tidal levels are expected to exceed MHWS (0.57 m AHD) according to tidal prediction charts (https://mhl.nsw.gov.au/TideCharts) within the next 5 days, or other intelligence is received from BoM, DCCEEW or NSW SES that water levels may cause coastal inundation in the Study Area within 5 days, this will trigger the Preparedness Phase of the CZEAS.
	
	A Coastal Hazards Warning would be generally issued by the BoM 24 – 36 hours ahead of the onset of severe weather conditions (BoM Community Services Group, 2024). The issue of this warning, or if the NSW SES is mobilised under the Shoalhaven City Flood Emergency Sub Plan, will trigger the Response Phase of the CZEAS.
		Twice-daily after Preparedness Phase triggered.	Estuary-wide	Council, DCCEEW, NSW SES, BoM

2.2 Consult Council Standard Operating Procedures to access details of plant and equipment required for the impending emergency, including location, instructions for its use, authorised personnel responsible and contact details for the proper use of the plant and equipment. Ensure sufficient sandbags, sand stockpiles, warning signage and road closure barricades/tape are available for use if required (e.g. to close off damaged and potentially dangerous roads or access points). A list of roads and access points to be considered is provided in **Section 4** and are mapped in **Attachment A**.	Once Preparedness Phase triggered	Within 24 hours after Preparedness Phase triggered.	Estuary-wide	Council

Action	Trigger	Timing	Location	Responsibility
2.3 Initiate communications protocol described in this CZEAS to advise the community of the likelihood of an impending coastal inundation emergency that would initiate actions under the CZEAS. This would include consulting with NSW SES and other relevant agencies such as DCCEEW as required. SES would only be communicating Australian Warning System (AWS) products, should community need to be evacuated. Initiate updates to Council's emergency website that provides essential information to the community at https://www.shoalhaven.nsw.gov.au/Emergencies. Advise affected landholders to activate their home FloodSafe Plan if they have this in place.	Once Preparedness Phase triggered	Within 24 hours after Preparedness Phase triggered.	Estuary-wide	Council, NSW SES, DCCEEW
2.4 Liaise with Shoalhaven Water (water, sewerage) to inform them of areas where assets may be impacted during an emergency.	Once Preparedness Phase triggered	Within 24 hours after Preparedness Phase triggered.	Estuary-wide	Council
2.5 Identify those properties which may potentially require evacuation or the movement of readily movable household items during storm events. This would be done with reference to the coastal inundation mapping in this CZEAS. Council would liaise with NSW SES to provide this information. Provide access to emergency materials (e.g. sandbags, sand stockpiles) for land managers and communities to use in order to enact their FloodSafe Plan and enable them to assist NSW SES and Council to protect their properties.	Once Preparedness Phase triggered	Within 48 hours after Preparedness Phase triggered.	Estuary-wide	Council, NSW SES
2.6 Alert affected land managers about access requirements to enable freedom of movement for personnel, plant and equipment during the emergency. Enact any procedures or approvals required to make access ways available, e.g. keys for locked gates, or landowner's consent from NSW DPHI – Crown Lands.	Once Preparedness Phase triggered	Within 48 hours after Preparedness Phase triggered.	Estuary-wide	Council

Table 6-3 Response Phase Actions for CZEAS for Lower Shoalhaven River CMP

Action	Trigger	Timing	Location	Responsibility

3.1 Monitoring of physical environmental conditions to assess whether trigger conditions for response actions in this CZEAS are reached.
 	
This would include:
• weather conditions (measurements, warnings and forecasts)
• wave forecasts (height and direction)
• water level (tidal) predictions
• real time wave data (height, period and direction) - monitor real-time wave conditions at the Port Kembla Waverider Buoy via the MHL website (https://www.mhl.nsw.gov.au/Station-PTKMOW)
• real time water level data (including consideration of elevated water levels due to storm surge) - monitor real-time water level conditions within the Lower Shoalhaven River estuary.
• Seeking advice from NSW SES, BoM or coastal experts from DCCEEW to assess potential for occurrence of coastal emergency.
• Use this information to assess threats to life and property arising from a coastal emergency.
  ○ Wave forecasts are available at: https://nearshore.waves.nsw.gov.au/home/forecast
  ○ Tidal predictions are available at https://mhl.nsw.gov.au/TideCharts
  ○ Realtime tidal data is available at https://mhl.nsw.gov.au/Data-OceanTide
	Response phase of this CZEAS triggered IF
	• Significant wave heights at Port Kembla forecast to exceed 5 m within next 12 hours and tidal levels forecast to reach higher than MHWS within next 12 hours at the Crookhaven Heads gauge; OR
	• if a Coastal Hazard Warning is issued; OR
	• if the NSW SES is mobilised under the Shoalhaven City Flood Emergency Sub Plan.
		4-Hourly monitoring of forecasts and real-time data once Response phase triggered	Port Kembla Waverider Buoy; Crookhaven Heads real-time water level gauges	Council, DCCEEW

3.2 Place appropriate emergency plant and equipment on stand-by and accessible for use. Have authorised personnel ready to access sandbags, sand stockpiles, warning signage and road closure barricades/tape for use where required (e.g. to close off damaged and potentially dangerous roads or access points). Ensure the stockpiles of equipment will be accessible when water levels rise, or sufficient access to equipment is obtained prior to water levels rising. A list of roads and access points to be considered is provided in **Section 4**.	Once Response phase triggered	Within 6 hours of Response Phase being triggered	Council Depots, locally accessible public land outside of the predicted hazard zones	Council

Action	Trigger	Timing	Location	Responsibility
3.3 Initiate removal of movable infrastructure (e.g. bins, signage, fencing), and erection of safety barriers or safety signage across potentially dangerous access points on roads assessed within the CZEAS to be vulnerable to coastal inundation. Refer to the coastal inundation hazard maps and specific locations listed in **Section 4** and **Table 4-1** of this CZEAS as a guide to assess locations where action such as road closures will be required. Throughout the study area there are sections of roadway subject to coastal inundation. These areas are mapped in **Attachment A** and listed in **Table 4.1** of this CZEAS. As the coastal inundation may pose a public safety risk, sections of roadway that may be subject to inundation that pose a high public safety risk should be temporarily closed to public access. This can be done through erection of temporary barricades, cyclone fencing and/or signage. Undertake inspection of these areas where it is safe to do so and inform the NSW SES of any intelligence on unforeseen impacts of coastal inundation gathered during the emergency. In a potential emergency event, the foreshore areas listed in **Table 4-1** should be inspected daily, particularly at high tide, where resources permit. Assist the NSW SES to enact closure of access points that the NSW SES Incident Controller has deemed to be unsafe and that may not have been identified as specific locations of coastal inundation risk within this CZEAS. As per Section 5.6 of the Shoalhaven City Flood Emergency Sub-plan, Shoalhaven City Council will coordinate the closure and reopening of council managed roads once inspections have been carried out by the relevant authority. Accurately record and report information relevant to Council emergency response activities and any real time coastal inundation information (including road closure information) to the NSW SES Incident Controller. This may be in the form of a combined Emergency Operations Centre (EOC) report, or direct from agencies where an EOC has not been established.	Once Response phase triggered Council may consider minor assets at risk, such as access tracks, viewing platforms or picnic facilities, to be not worthy of protection due to the relatively low cost of the works, which can be reconstructed if damaged following a coastal inundation event. It is not appropriate or practical to attempt to protect minor assets such as dune fencing, bins and signage in any emergency. These could be removed to prevent damage, repaired or replaced as required (where appropriate).	Within 6 hours of Response Phase being triggered, inspections every 12 hours during Response Phase.	Estuary-wide	Council
3.4 Install temporary fencing and/or signage on council managed land (e.g. foreshore reserves) affected by coastal inundation resulting from major storm activity or an extreme or irregular event, where this has resulted in unsafe conditions.	Once Response phase triggered	Within 6 hours of Response Phase being triggered	Estuary-wide	Council

Action	Trigger	Timing	Location	Responsibility
3.5 Implement the communication protocol in conjunction with the combat agency (NSW SES) to advise landholders, residents, public authorities and other organisations that a coastal emergency is likely or is occurring and that actions in the CZEAS are to be implemented. This includes updating Council's emergency website that provides essential information to the community at https://www.shoalhaven.nsw.gov.au/Emergencies. The website includes links to community information hubs, emergency contacts, live traffic updates including a map of full and partial road closures due to weather or emergency events as per Section 5.4g of the Shoalhaven City Flood Emergency Subplan, links to realtime water level and wave information, and a Disaster Dashboard at https://shoalhaven.disasterdashboards.com/dashboard/overview covering bushfires and flood events. Co-ordinate the release of information to the media through the NSW SES Incident Control Centre in accordance with the arrangements in Section 5.2.2b of the Shoalhaven City Emergency Flood Plan. Undertake actions as required in the Shoalhaven City Flood Emergency Subplan.	Once Response phase triggered	Within 6 hours of Response Phase being triggered	Estuary-wide	Council
3.6 Provide support to NSW SES as required and where resources allow. Provision of assistance to NSW SES (plant, equipment and personnel where able and requested), specifically assistance with the following (in accordance with the provisions in the Shoalhaven City Emergency Flood Plan: • Property protection tasks including sandbagging. • Warning and/or evacuation of residents and other people in flood liable areas. • Provision of back-up radio communications. • Resupply of isolated properties. • Technical advice on the impacts of coastal inundation. • Assist NSW SES to provide filled sandbags and filling facilities to residents and business in areas which flooding is expected.	Once Response phase triggered	As requested by NSW SES	Estuary-wide	Council
3.7 Liaise with NSW SES to assess, close and where possible restore essential utility services under Council control (water supply and sewerage operations). Provide advice to NSW SES and the Health Services Functional Area during floods about key council managed infrastructure such as sewerage treatment and water supply.	Once Response phase triggered	Within 6 hours of Response Phase being triggered	Estuary-wide	Council (Shoalhaven Water)

Action	Trigger	Timing	Location	Responsibility
3.8 Liaise with other agencies (e.g. Transport for NSW, NSW DPHI – Crown Lands, National Parks and Wildlife Service) if debris from coastal inundation event is posing a safety hazard and requires removal.	Once Response phase triggered and realtime conditions indicate coastal inundation is expected to be occurring.	Within 12 hours of Response Phase being triggered, then in conjunction with 12-hourly inspections from Action 3.3	Estuary-wide	Council
3.9 Work with NSW SES and DCCEEW to collect flood related data during and after coastal inundation events.	Once Response phase triggered and realtime conditions indicate coastal inundation is expected to be occurring,	Within 12 hours of Response Phase being triggered and in conjunction with 12 hourly inspections	Estuary-wide	Council, NSW DCCEEW, NSW SES

Table 6-4 Recovery Phase Actions for CZEAS for Lower Shoalhaven River CMP

Action	Trigger	Timing	Location	Responsibility
4.1 Initiate Recovery phase of CZEAS once waves and water levels have fallen below trigger levels. Continue to monitor waves and water levels throughout the event, and initiate the Recovery Phase of the CZEAS 24 hours after the cancellation of the Coastal Hazard Warning from the Bureau of Meteorology, and once water levels at high tide have fallen to 0.2 m below HAT. Monitor physical environmental conditions to assess whether the trigger conditions to initiate the recovery phase have been reached.	Initiate the Recovery Phase of the CZEAS 24 hours after the cancellation of the Coastal Hazard Warning from the Bureau of Meteorology, AND once real-time monitoring indicates that water levels at high tide have fallen to 0.2 m below HAT.	Once trigger is reached	Estuary-wide	Council
4.2 Remove any threats to public safety, such as debris deposited or exposed in public areas. Council and where required supporting agencies will assist with clean-up operations after coastal inundation events, where possible when resources and personnel permit. SES will support the short term transition to recovery as per the State Recovery Plan and State Flood Plan.	As soon as possible once Recovery Phase has been initiated.	Initiate within 24 hours after Recovery Phase has been triggered	Estuary-wide	Council, NSW SES
4.3 Assess and reopen Council-managed roads and access points once inspections have been carried out by the relevant authority and deemed safe to do so. Maintain temporary safety fencing and associated warning signage, as necessary.	As soon as possible once Recovery Phase has been initiated.	Initiate within 24 hours after Recovery Phase has been triggered	Estuary-wide	Council
4.4 Undertake post-storm reconnaissance of affected areas to gather intelligence including recording of maximum inundation levels, mapping of inundation extents, surveys of debris marks, post-event damage assessments etc. Use the intelligence gathered to improve future CZEAS operations and share resources/work with the NSW SES and DCCEEW to assist in future decision-making. Collate and maintain photographic and written records of events and decision making processes.	As soon as possible once Recovery Phase has been initiated.	Initiate within 24 hours after Recovery Phase has been triggered	Estuary-wide	Council, NSW SES, DCCEEW
4.5 Assess, repair and/or replace any essential Council-owned/managed structures that are damaged as a result of a coastal emergency.	As soon as possible once Recovery Phase has been initiated.	Initiate within 48 hours after Recovery Phase	Estuary-wide	Council

Action	Trigger	Timing	Location	Responsibility
Such structures include Council-owned roads, sewerage and water supply infrastructure, fishing platforms, foreshore accessways, pathways and foreshore erosion protection structures. Assess the structural integrity of unprotected assets affected by or damaged during the emergency event. Geotechnical, structural and/or coastal engineering investigations may be required to understand residual risk following an emergency event. Assess and prioritise structures and access for repair based on public safety, and carry out remedial works to restore safe residential access in accordance with the assessed priority. Under Section 7 of the *NSW Coastal Management Act 2016*, one of the management objectives for the coastal vulnerability area is "to prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency". As it is not possible to provide protection against inundation events for all infrastructure, timely repair and replacement of any essential Council-owned/managed structures that are damaged as a result of a coastal emergency is required. Following a coastal inundation event, roads in the coastal vulnerability area may be subject to damage e.g. potholes, pavement damage and will need to be repaired in a timely manner.		has been triggered		
4.6 Restore safe foreshore access and rehabilitate foreshore vegetation . This may require beach scraping and/or sand nourishment to restore foreshore amenity (may be required at foreshore tidal beaches in the study area following a coastal emergency).	Restoring access as soon as possible once Recovery Phase has been initiated. Rehabilitating foreshore vegetation is a medium to long term action.	Initiate within 72 hours after Recovery Phase has been triggered	Estuary-wide	Council, Supporting role: *NSW DPHI & Crown Lands*
4.7 Replenish any emergency materials and supplies for future emergency events.	After Recovery Phase has been initiated.	Initiate within 1 week after Recovery Phase has been triggered	Estuary-wide	Council, NSW SES
4.8 Participate in post-event community engagement coordinated by Reconstruction NSW e.g. community forums, workshops, or other opportunities to provide communities a chance to provide feedback, address any concerns and provide input into the recovery process.	After Recovery Phase has been initiated.	In accordance with NSW SES schedule	Estuary-wide	Council, Reconstruction NSW, DCCEEW, BoM

Action	Trigger	Timing	Location	Responsibility
Post event recovery community engagement would be coordinated by Reconstruction Authority as the combat agency. These will typically include other agencies such as the Bureau of Meteorology and Welfare Services.				
4.9 Undertake After Action critical review of the CZEAS in conjunction with NSW SES, DCCEEW and LEMC to assess its effectiveness. Update this Subplan as required as part of future CMP preparation and review to improve future coastal inundation emergency management operations. Lessons learnt from the emergency event may be documented and applied back to the prevention and preparedness phases for future coastal inundation emergency events.	After Recovery Phase has been initiated.	Initiate within 2 weeks after Recovery Phase triggered and complete within 6 weeks During CMP preparation and review	Estuary-wide	Council, NSW SES, DCCEEW
4.10 Monitor unauthorised erosion or inundation protection works through Council development compliance process. Liaise with property owners to ensure any private and/or public structures do not pose a risk to the public. Issue orders under the *Local Government Act 1993* and/or the *Environmental Planning and Assessment Act 1979* when properties are deemed structurally unsafe or pose a risk to the public. Ensure premises are fit and safe for reoccupation and assess any need for demolition.	After Recovery Phase has been initiated.	Ongoing	Estuary-wide	Council

7 Conclusion

A CZEAS under the Lower Shoalhaven River CMP has been documented in this report. The CZEAS includes general estuary-wide emergency management measures for Council as well actions that apply to specific areas identified as being at risk from coastal inundation. The study area is subject to other coastal hazards, including foreshore erosion and tidal inundation. These coastal hazards are considered to be periodic in nature (tidal inundation) or occurring at a gradual, ongoing rate (foreshore erosion) for which specific actions are being planned within the CMP and hence are outside the scope of this CZEAS. This CZEAS also does not cover coastal erosion at the open coast beaches in the vicinity of the study area – these are covered by a separate CZEAS developed under the Open Coast and Jervis Bay CMP for the beaches of the Shoalhaven.

This CZEAS has been prepared in accordance with the guidance provided in the Coastal Management Manual (OEH, 2018b) and contains actions covering the four phases of emergency management – Prevention, Preparation, Response and Recovery.

The study area is subject to a high level of risk from coastal inundation events. These areas are also subject to catchment-derived flooding, for which a framework is available for emergency response through the Shoalhaven Local Emergency Flood Plan. Actions from the Flood Plan are relevant for coastal inundation also, but this CZEAS provides actions specific to Council for implementation prior to, during and following a coastal emergency.

Due to the large area of land affected by coastal inundation, it is not possible or practical to provide emergency protection works that would provide protection against coastal inundation. NSW SES is the agency responsible for the coordination of operations to protect property from flood, storm and tsunami, with protection measures described in the Shoalhaven City Flood Emergency Subplan. Those measures include:

- lifting or moving of household furniture.
- lifting or moving commercial stock and equipment.
- sandbagging to minimise entry of water into buildings.

Works to reduce the risk to property in an emergency have been proposed in the Lower Shoalhaven River Floodplain Risk Management Study and Plan (in preparation at the time this CZEAS was written) and are relevant for reducing future risk from coastal inundation events also. Note that authorised coastal emergency protection works as defined in the *Coastal Management Act 2016* under the RH SEPP, including emergency works undertaken by Council to protect roads and stormwater management systems, are limited to "*…the placement of sand, or the placing of sand bags for a period of not more than 90 days, on a beach, or a sand dune adjacent to the beach, to mitigate the effects of coastal hazards on land*" and would not be able to provide protection against coastal inundation at the scale and extent that would be experienced within the study area in a coastal emergency.

Private landholders are responsible for private land. Council has no intention to take particular action to protect private property from coastal inundation events. There is, however, a statutory obligation upon Council to consider any valid development application for coastal protection works which may be lodged by property owners.

Council's intended emergency response actions before, during and after coastal inundation emergencies have been described in **Section 6**. Areas at risk from coastal inundation have been described in **Section 4** and mapped in **Attachment A**.

8 References

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Glossary and Abbreviations[1]

Term / Abbreviation	Description
AHD	Australian Height Datum
Asset	Something of value and may be a natural or built asset of economic, social, recreational or environmental value.
Average Recurrence Interval (ARI)	The long-term average number of years between the occurrence of an event of a specified magnitude. ARI is another way of expressing the likelihood of occurrence of an event.
Bank erosion	Refers to the landward movement of the foreshore or riverbank associated with flood waters, locally generated wind waves, waves generated by watercraft, and influenced by factors such as tide levels and precipitation. Other contributing factors to bank erosion can include unrestricted access, upstream changes in hydrology, and vegetation condition.
Beach erosion	A coastal hazard defined in the CM Act. Landward movement of the shoreline and/or a reduction in beach volume, usually associated with storm events or a series of events, which occurs within the beach fluctuation zone. Beach erosion occurs due to one or more process drivers such as wind, waves, tides, currents, ocean water level, and downslope movement of material due to gravity.
Bureau or BoM	Bureau of Meteorology
CM Act	NSW Coastal Management Act 2016
Coastal hazard	Coastal hazards, as defined in clause 4(1) of the CM Act, include: • Beach erosion • Shoreline recession • Coastal lake or watercourse entrance instability • Coastal inundation • Coastal cliff or slope instability • Tidal inundation • Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.
Coastal inundation	A coastal hazard defined in the CM Act. Flooding of low-lying areas by ocean waters, caused by a higher-than-normal sea level (e.g. due to storm tide). Coastal inundation occurs when marine and atmospheric forces combine and raise water levels at the coast (or inside estuaries) above normal elevations causing dry land to be inundated by seawater. Coastal inundation is often associated with storms and results in elevated still water levels (storm surge), wave set-up, wave runup and over-wash flows. Storm surges and powerful waves can also penetrate estuaries giving rise to strong currents or seiching. This may result in the inundation of roads and low-lying land adjacent to estuaries
Coastal lake or watercourse entrance instability	A coastal hazard defined in the CM Act. Refers to the variety of potential hazards and risks associated with the dynamic nature of both natural and trained entrances. Coastal lake and watercourse entrances are highly active environments with their shape constantly changing in response to processes such as alongshore sediment transport, tidal flows, storms and catchment flooding.
Coastal Management Program (CMP)	A long-term strategy for the coordinated management of land within the coastal zone, prepared and adopted under Part 3 of the CM Act.

[1] Where relevant, definitions have been derived from the Coastal Management Glossary (OEH, 2018a).

Term / Abbreviation	Description
Coastal protection works	In accordance with clause 4(1) of the CM Act and clause 2.16 of the Resilience and Hazards SEPP: beach nourishment activities or works, and activities or works to reduce the impact of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes.
Coastal zone	The coastal zone, as defined in clause 4(1) of the CM Act, means the area of land comprised of the following coastal management areas: • the coastal wetlands and littoral rainforests area, • the coastal vulnerability area, • the coastal environment area, • the coastal use area.
Council	Shoalhaven City Council
CVA	Coastal Vulnerability Area
CZEAS	Coastal Zone Emergency Action Subplan (often referred to as 'this Plan' in this document)
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (formerly DPE)
DPE	Former NSW Department of Planning and the Environment, now DPHI and DCCEEW
DPHI	NSW Department of Planning, Housing and Infrastructure
DPIRD	NSW Department of Primary Industries and Regional Development. Includes agencies such as Fisheries & Forestry, Agriculture & Biosecurity, and Local Land Services.
Emergency response	A strategic approach to coastal management that includes coastal management actions to address residual risk in emergency situations.
EMPLAN	Emergency Management Plan
EOC	Emergency Operations Centre
EP&A Act	NSW Environmental Planning & Assessment Act 1979
Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters	A coastal hazard defined in the CM Act. See bank erosion.
Estuary	Clause 4(1) of the CM Act defines an estuary as any part of a river, lake, lagoon, or coastal creek whose level is periodically or intermittently affected by coastal tides, up to the highest astronomical tide.
Flood	A general and temporary condition of partial or complete inundation of normally dry land areas, including inundation as a result of sea/ocean storms and other coastal processes or catchment flows.
Foreshore	The part of the shore, lying between the crest of the seaward berm (or upper limit of wave wash at high tide) and the ordinary low water mark, that is ordinarily traversed by the uprush and backrush of the waves as the tides rise and fall; or the beach face, the portion of the shore extending from the low water line up to the limit of wave uprush at high tide. The CM Act defines the foreshore as 'the area of land between highest astronomical tide and the lowest astronomical tide'.

Term / Abbreviation	Description
FRNSW	Fire & Rescue NSW
The Guideline	NSW Guideline for preparing a coastal zone emergency action subplan (DPIE, 2019).
High tide	The maximum height reached by a rising tide. The high water is due to the periodic tidal forces and the effects of meteorological, hydrologic, and/or oceanographic conditions.
Highest astronomical tide (HAT)	The highest level which can be predicted to occur under average meteorological conditions and any combination of astronomical conditions.
King tides	Any high-water level that is well above the average, commonly applied to two spring tides that are the highest for the year, one during summer and one in winter.
LEMC	Local Emergency Management Committee
LEMO	Local Emergency Management Officer
LEOCON	Local Emergency Operations Controller
LG Act	NSW Local Government Act 1993
LGA	Local Government Area
Manual	The NSW Coastal Management Manual (OEH, 2018b).
Mean High Water Mark (MHWM)	The line of the medium high tide between the highest tide each lunar month (the springs) and the lowest tide each lunar month (the neap) averaged over out over the year.
MHL	Manly Hydraulics Laboratory
MHWM	Mean High Water Mark
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
NSW SES	NSW State Emergency Service
OCJB CMP	Shoalhaven Open Coast and Jervis Bay Coastal Management Program
OEH	Former NSW Office of Environment and Heritage
Resilience and Hazards SEPP	State Environmental Planning Policy (Resilience and Hazards) 2021 (also R&H SEPP)
Riparian	Pertaining to the banks of a body of water, such as an estuary.
Sand container	A form of Emergency Coastal Protection works, being a system of temporarily holding sand (sand bag or geotextile bag).
SCC	Shoalhaven City Council
SEPP	State Environmental Planning Policy
SERM Act	NSW State Emergency and Rescue Management Act 1989
Severe Weather Warning	A warning issued by the Bureau of Meteorology for potentially hazardous or dangerous weather, being: • sustained winds of gale force (63 km/h) or more, • wind gusts of 90 km/h or more, • very heavy rain that may lead to flash flooding, • abnormally high tides (or storm tides) expected to exceed Highest Astronomical Tide • unusually large surf waves expected to cause dangerous conditions on the coast.
Shoreline	The intersection between the sea and the land. The line delineating the shoreline is often approximated as the Mean High Water Mark (MHWM), however, the definition can vary depending on the application.

Term / Abbreviation	Description
SLR	Sea Level Rise
Storm surge	The increase in coastal water level caused by the effects of storms. Storm surge consists of two components – the increase in water level caused by the reduction in barometric pressure and the increase in water level caused by the action of wind blowing over the sea surface (wind set-up).
Storm tide	An abnormally high water level that occurs when a storm surge combines with a high astronomical tide. The storm tide must be accurately predicted to determine the extent of coastal inundation.
Swell waves	Ocean waves that travel beyond the area where they are generated.
SWW	Severe Weather Warning
TfNSW	Transport for NSW
Tidal inundation	A coastal hazard defined in the CM Act. The inundation of land by tidal action under average meteorological conditions and the incursion of sea water onto low lying land that is not normally inundated, during a high sea level event such as a king tide or due to longer-term sea level rise.
TO	Traditional Owner
Trigger	Pre-negotiated decision-making points and commitments, so that action on coastal risks is taken when necessary, and when it is most convenient and affordable for the affected community.
Wave overtopping	Occurs when water from waves wash over the dune berm or foreshore structure causing flooding, damage to coastal defences, erosion behind structures, and can pose risks to public safety.
Wave run-up	The vertical distance above mean water level reached by the uprush of water from waves across a beach or up a structure.
Wave set-up	The rise in the water level above the still water level when a wave reaches the coast. It can be very important during storm events as it results in further increases in water level above the tide and surge levels.
Wind waves	Ocean waves resulting from the action of the wind on the surface of the water.

Attachment A

Compendium of Maps

Attachment B

Asset Risk Tables

Table B-1 Asset Risk Table for Shoalhaven Heads Area (See Map RG-02-01)

Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
292686.295100000	6140172.425600000	Building	Public Amenity		14889	75		Significant loss with temporary disruption of services		0.25
294113.793900000	6140703.438800000	Building	Public Amenity - Accessible		149	76		Significant loss with temporary disruption of services		0.29
294123.788339116	6140661.115504280	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations	0.83	1.32
292974.796700516	6140311.507602400	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations	0.80	1.29
292731.938456250	6141507.976400810	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations	0.33	0.67
293862.368152307	6140785.280849020	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	1.86	2.36
293837.520292967	6140799.923337560	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	1.28	1.78
293358.903192817	6140676.423560480	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	0.41	0.92
292639.054791573	6140146.151014650	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	0.39	0.85
292836.913000000	6140889.868000000	PumpStation	PumpStation	4156763				Significant loss with temporary disruption of services		0.67
292683.513000000	6140186.892000000	PumpStation	PumpStation	4156759				Significant loss with temporary disruption of services		0.56
292844.287785455	6141654.401127550	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.61
292749.673100863	6141530.224343340	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.44
292606.7233135209	6141415.1363709318	Road	Bream Street				559527620	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.13
292806.4579675339	6141217.1403814889	Road	Cockatoo Street				4953280	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.41	0.88
292494.0939449134	6140124.7225084705	Road	Hay Avenue				4927717	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.47	0.93
292604.8224735864	6141397.5000011120	Road	Kingfisher Street				4953281	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.15
292491.1303360997	6141315.3861053558	Road	residential				559527626	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.25
294075.0046679144	6140732.1445183177	Road	River Road				4927731	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.69	1.19
292656.1462094380	6141489.6972983349	Road	Salmon Street				559527631	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.18
293854.1542918141	6140783.2458985727	Road	service				4953157	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.95	2.44
292504.6796220484	6140142.7050570175	Road	service				240120527	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.04	1.51
294086.2792581120	6140722.4360109139	Road	service				830141747	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.61	1.10
292586.0025225410	6140128.7339389483	Road	service				240120522	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.38	0.85
292731.5421975722	6141513.7257678267	Road	Shoalhaven Heads Road				4927665	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.32	0.65
292681.0321016478	6141408.2048378699	Road	Tuna Crescent				559527632	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.45
292767.1881369383	6140093.2755036214	Road	Wharf Road				4927716	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.70
292634.3658421723	6141421.4705618937	Road	Yellowtail Street				559527630	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.16
292721.952000000	6140111.691000000	Sewer	DeadEnd					Significant loss with temporary disruption of services		0.51
292868.015000000	6140986.360000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.66
292524.784687500	6140100.216500000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.62
292590.188187500	6140106.454187500	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.58
292733.906625000	6140129.521625000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.53
292658.545687500	6140122.906500000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.49
292846.536875000	6140306.499500000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.42
292705.096875000	6140163.380187500	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.26
292879.877312500	6140366.928625000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.08
293370.979100000	6140670.783000000	Stormwater	Grate					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.71	1.21
293372.657800000	6140668.784600000	Stormwater	Headwall<=450 dia					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.28	1.78

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
292734.798900000	6141521.827500000	Stormwater	Headwall<=450 dia	354957				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.19	0.52
292979.200500000	6140339.385900000	Stormwater	Headwall<=450 dia	356862				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.54
293423.101300000	6140698.326700000	Stormwater	Pipe End					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.21	1.71
293324.169500000	6140647.163900000	Stormwater	Pipe End	355421				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.55	1.05
292814.689500000	6140702.723900000	Stormwater	Pipe End	357497				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.57
292878.060700000	6141022.359500000	Stormwater	Pipe End	354933				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.54
292898.116900000	6141097.177900000	Stormwater	Pipe End	354934				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.38
293857.350500000	6140765.222600000	Waterway Fac ility	Waterway Facilities Other			54166		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.69	3.18
292771.296300000	6140087.916200000	Waterway Facility	Boat Ramp			48215		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.51	2.99
293853.773500000	6140779.899800000	Waterway Facility	Boat Ramp			48216		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.95	2.44
292501.974700000	6140140.900300000	Waterway Facility	Boat Ramp			48214		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.04	1.51
292491.580000000	6140140.542100000	Waterway Facility	Fish Cleaning Table			54614		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.66	1.12
292987.184800000	6140300.232400000	Waterway Facility	Jetty / Wharf			48267		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.99	2.47
292994.062000000	6140293.533200000	Waterway Facility	Waterway Fish Cleaning Table			54613		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.51	2.99
293840.052300000	6140805.440700000	Waterway Facility	Waterway Fish Cleaning Table			54612		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.05	1.54

Table B-2 Asset Risk Table for Bolong Road Area (See Map RG-02-02)

Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
291971.693312500	6140199.577187500	Pumpstation	SimplexPumpUnit	4166494				Significant loss with temporary disruption of services		0.54
291834.638875000	6140101.813437500	Pumpstation	SimplexPumpUnit	4166493				Significant loss with temporary disruption of services		0.45
291811.342250000	6140103.440625000	Pumpstation	SimplexPumpUnit	4166491				Significant loss with temporary disruption of services		0.38
291817.573187500	6140105.914500000	Pumpstation	SimplexPumpUnit	4166492				Significant loss with temporary disruption of services		0.38
291793.720937500	6140100.583125000	Pumpstation	SimplexPumpUnit	416649				Significant loss with temporary disruption of services		0.35
291774.300500000	6140104.181500000	Pumpstation	SimplexPumpUnit	4166489				Significant loss with temporary disruption of services		0.31
291731.041062500	6140109.605437500	Pumpstation	SimplexPumpUnit	4166487				Significant loss with temporary disruption of services		0.29
291697.227250000	6140112.145437500	Pumpstation	SimplexPumpUnit	4166485				Significant loss with temporary disruption of services		0.21
291687.115949770	6140030.764228310	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.30	1.76
291921.9797383540	6140434.8601511531	Road	Alexander Berry Drive				899119021	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.23
291859.8444255352	6140106.9604588486	Road	Berrys Bay Road				89772604	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.22	0.69
291783.9101478384	6140171.9973859619	Road	Berrys Bay Road				89772598	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.54
291837.8804739887	6140209.7709717974	Road	Bolong Road				4958287	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.59	1.13
291845.2230601757	6140216.3077668399	Road	Bolong Road				4958287	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.59	1.13
289325.7709476144	6140132.6672525695	Road	service				899119009	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.92
288946.6579362856	6140099.2223398201	Road	service				367036777	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.62
291832.7650914083	6140154.6338588949	Road	service				908442458	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.52
291727.9351201637	6140129.4678428881	Road	service				908442417	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.35
291705.5782896956	6140129.4936902225	Road	service				908442428	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.24
291266.4009489802	6140288.3994638398	Road	unclassified				367036775	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.70	1.24
291809.129700000	6140155.888000000	Stormwater	Drainage-Pipe End	518815				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
291812.952800000	6140146.713000000	Stormwater	Drainage-Pipe End	518816				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.46
291913.710400000	6140430.996000000	Stormwater	Drain-Headwall <=450 dia	518791				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.28
290658.265600000	6139955.789000000	Stormwater	Drain-Headwall >1800 dia	518977				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.79	1.26
290638.063800000	6139981.762000000	Stormwater	Drain-Headwall >1800 dia	518976				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.78	1.37
291888.604900000	6140227.040000000	Stormwater	Drain-Headwall >600 <=900 dia	518975				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.49	0.96
291857.661000000	6140245.606000000	Stormwater	Drain-Headwall >600 <=900 dia	518974				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.91
291794.543600000	6140164.735000000	Stormwater	Drain-Headwall Other	518817				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.29
291794.543600000	6140164.735000000	Stormwater	Drain-Headwall Other	518817				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.29
291781.306400000	6140161.526000000	Stormwater	Drain-Headwall Other	518818				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.26
291781.306400000	6140161.526000000	Stormwater	Drain-Headwall Other	518818				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.26

Table B-3 Asset Risk Table for Broughton Creek Area (See Map RG-02-03)

Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
287457.4171439143	6141698.6903282385	Road	Back Forest Road				4903346	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.59
285104.5601263005	6143394.0972832851	Road	Jennings Lane				322837883	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.18
287941.8996000029	6143198.8244425906	Road	Lidbetter Road				4903487	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.33	0.57
287161.3599329652	6144344.5146616064	Road	service				488847727	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.15	1.00
286463.2583506711	6144963.3285009982	Road	service				488847736	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.86
286443.3152954057	6144939.8099808870	Road	service				488847738	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.82
285483.1038219014	6143698.1084410157	Road	Sopers Road				4903269	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.61	1.95
286477.2032028443	6145137.0411500670	Road	Swamp Road				488847722	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.02
290149.5689256795	6145603.0227356078	Road	Swamp Road				4903534	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.33
288062.769100000	6143760.581000000	Stormwater	Drain-Headwall <=450 dia	51872				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.80	1.04
288025.353300000	6143641.133000000	Stormwater	Drain-Headwall <=450 dia	51874				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.76	1.00
288040.432800000	6143637.902000000	Stormwater	Drain-Headwall <=450 dia	51875				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.70	0.93
288076.884500000	6143757.244000000	Stormwater	Drain-Headwall <=450 dia	51873				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.63	0.87
287964.750300000	6143178.799000000	Stormwater	Drain-Headwall <=450 dia	518711				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.27	0.51
287959.059500000	6143174.192000000	Stormwater	Drain-Headwall <=450 dia	51871				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.27	0.51
287915.538500000	6143248.357000000	Stormwater	Drain-Headwall <=450 dia	51878				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
287898.944300000	6143244.935000000	Stormwater	Drain-Headwall <=450 dia	51879				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.15
287558.923300000	6143030.597000000	Stormwater	Drain-Headwall >450 <=600 dia	518721				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.33
286261.920900000	6141352.545000000	Stormwater	Drain-Headwall >450 <=600 dia	51899				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.06
287982.304900000	6143505.814000000	Stormwater	Drain-Headwall >600 <=900 dia	51876				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.79	1.03
287995.687900000	6143500.948000000	Stormwater	Drain-Headwall >600 <=900 dia	51877				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.72	0.96
287202.942300000	6140803.469200000	Waterway Facility	Fishing Platform			44267		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	4.10	4.56

Table B-4 Asset Risk Table for Nowra/Bomaderry Area (See Map RG-02-04)

Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
280891.970456599	6139305.834866780	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations		2.15
280610.971487766	6139596.262710810	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	2.17	2.65
281278.461899686	6140260.203428540	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	1.27	1.82
278041.426224706	6139212.400988250	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.90	2.39
279685.953566143	6137632.924897180	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		2.16
278979.380635395	6139038.930987290	Recreational	Yurunga Drive Reserv					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	3.62	4.11
280277.6749999436	6139048.7002320047	Road	service				5295062	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	3.66	4.15
283526.9529867505	6139605.8639614340	Road	service				23260617	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.97	3.45
280312.1039717346	6139476.4062829185	Road	service				23260622	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
281267.6749925451	6140187.5410888549	Road	service				280181969	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		
280895.478000000	6139871.664000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	2.14	2.62
282939.224900000	6139461.773700000	Stormwater	Floodflap 750 dia	368946				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.27	1.75
280474.701300000	6139150.735700000	Stormwater	Headwall<=450 dia	35796				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		2.32
280701.549500000	6139240.476900000	Stormwater	Headwall<=450 dia	35798				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		2.04
281269.591800000	6140190.450300000	Waterway Facility	Boat Ramp			4827		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.29	2.77
280430.753100000	6139533.551700000	Waterway Facility	Boat Ramp			4826		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.74	2.22
280400.880300000	6139516.627900000	Waterway Facility	Fish Cleaning Table			41492		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.44	2.93
281279.088200000	6140176.751600000	Waterway Facility	Fish Cleaning Table			41765		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.29	2.77
283333.223600000	6139550.457200000	Waterway Facility	Fishing Platform			44265		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.67	3.15
280422.927858475	6139518.796034740	Waterway Facility	Jetty / Wharf			48281		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.99	3.48
280882.185000000	6139314.376900000	Waterway Facility	Jetty / Wharf			41359		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.65	3.13
280434.296500000	6139524.275400000	Waterway Facility	Jetty / Wharf			585526		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.61	3.09
280440.647400000	6139536.627400000	Waterway Facility	Jetty / Wharf			48282		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.30	2.78
281287.058800000	6140196.696600000	Waterway Facility	Jetty / Wharf			483		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.29	2.77
279797.140500000	6137549.447800000	Waterway Facility	Jetty / Wharf			48294		Minor loss with limited downtime; short term impact; mostly repairable through normal operations		2.56

Table B-5 Asset Risk Table for Upper Estuary Area (See Map RG-02-05)

Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
276688.836201961	6139204.335690950	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.98	3.47
273628.254203255	6139686.005823200	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.06	2.59
266251.812622739	6139626.507728350	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.62	2.11
276554.634943594	6139921.882714750	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.58	2.08
273101.497736915	6139724.349039870	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.67
274152.431600000	6140182.602100000	Waterway Facility	Jetty / Wharf			4828		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	3.36	3.87

Table B-6 Asset Risk Table for Greenwell Point Area (See Map RG-02-06)

Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
292560.389400000	6133933.034700000	Building	Building		416398	2757		Significant loss with temporary disruption of services		0.42
292710.634900000	6134667.287200000	Building	Marine Rescue		14375	277		Significant loss with temporary disruption of services	1.06	1.50
292708.717540080	6134678.216872510	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations	0.67	1.12
293034.401982147	6135189.446788050	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations		2.74
292848.190941020	6135297.564556960	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations		1.25
292998.165520610	6135159.866003120	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations		0.49
293080.695910561	6135058.551814740	Paths	Footpath					Isolated or minimal loss; short term impact; repairable through normal operations		0.44
292664.790074461	6135479.264528390	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	4.02	4.31
292837.837666295	6135330.473180190	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	3.50	3.95
292740.295027992	6135409.453875950	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	3.08	3.45
292608.438679171	6134342.696819460	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	1.18	1.62
293109.241368017	6134990.146249590	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	0.82	1.28
293087.425539132	6134762.226301710	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations		1.63
292639.387575403	6134171.091290890	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations		1.05
293059.127187500	6133798.993687500	PumpStation	PrivatePumpStation					Significant loss with temporary disruption of services		0.48
292935.764937500	6133853.894812500	PumpStation	PrivatePumpStation					Significant loss with temporary disruption of services		0.23
293160.661250000	6133761.621187500	PumpStation	PrivatePumpStation					Significant loss with temporary disruption of services		0.21
292584.732000000	6135403.420000000	PumpStation	PumpStation	4156782				Significant loss with temporary disruption of services		0.48
292559.086000000	6133928.539000000	PumpStation	PumpStation	4156817				Significant loss with temporary disruption of services		0.43
292284.378000000	6134986.789000000	PumpStation	PumpStation	4156872				Significant loss with temporary disruption of services		0.34
292497.573000000	6134327.412000000	PumpStation	PumpStation	4156814				Significant loss with temporary disruption of services		0.11
292413.192210261	6134528.058358930	Recreational	Active Recreational Areas					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.22
292733.224675083	6135422.438455800	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	3.14	3.81
293173.596161260	6133331.290600030	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.32	1.73
292609.468637811	6134365.355637430	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.25	1.69
292464.006960916	6133608.360299620	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.24	1.65
292225.507599097	6135008.992805640	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
293072.455935403	6134997.762794150	Recreational	Parksland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.30
292507.1370332063	6135348.1113304496	Road	Adelaide Street				4994333	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.56
292789.9647541928	6135245.3833402433	Road	Albert Street				4994325	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.40
292442.2488996967	6133669.4778217040	Road	Bailey Avenue				4994876	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.31
292643.1941063789	6133898.0121416394	Road	Bartlett Drive				4994877	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.43
292831.3629303173	6133824.8649740294	Road	Bream Road				4994886	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
292579.4502148627	6135437.1912428010	Road	Church Street				173303672	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
292557.0921984926	6135219.3708834993	Road	Comarong Street				4994327	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.20
292406.2312150264	6133685.5187267633	Road	Crookhaven Drive				4994880	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.34
293010.4492719784	6133887.4774903720	Road	Dory Drive				4994884	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.30	0.73
292837.9734711363	6133826.2955587711	Road	Flathead Close				395791664	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
292845.7207303394	6133820.5469166664	Road	Flathead Close				395791664	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
292885.0019161378	6133882.7473153556	Road	Flounder Place				4994889	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.08	0.52

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
292570.8735998135	6134134.9121103007	Road	Fraser Avenue				4994869	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.44
292427.2934964774	6134087.3279893780	Road	Greens Road				4994868	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.48
290862.2221009752	6134560.0009630900	Road	Greenwell Point Road				331330138	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.61
292681.4749259500	6134039.4352312367	Road	Haiser Road				4994872	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.48
292551.0591818362	6134367.5834431015	Road	Hume Street				4994874	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.28
292701.2460011305	6134676.6415359955	Road	Jervis Street				173303695	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.58
292538.8742423111	6134284.8747803681	Road	Keith Avenue				4994870	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.30
292422.1061084032	6134129.3300843835	Road	Leonore Avenue				4994873	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.45
292884.4205572981	6133765.0317824222	Road	Marlin Drive				4994885	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.28
292503.0196705525	6133739.2006090991	Road	Morrissey Way				4994879	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.23
292963.8685462213	6133632.6849075453	Road	residential				4994934	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.60	1.02
292931.1287554055	6133933.4828571659	Road	service				4994890	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.72	1.16
293114.2236357917	6133667.4807246178	Road	service				4994935	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.50	0.92
292220.6777716059	6135268.5765782259	Road	service				4994597	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.31	0.76
293067.0523884432	6133819.8418881139	Road	service				4994936	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.15	0.59
293165.9188183155	6134899.4982069414	Road	service				4994339	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.29
293131.8041821949	6133678.7531288490	Road	service				4994937	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.55
293097.0167625870	6135027.8348872028	Road	service				4994644	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.53
292641.4520335899	6133915.6088446528	Road	service				4994875	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.39
292266.5757032299	6135268.5934218233	Road	service				4994601	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.25
292871.1756349376	6133864.6154302293	Road	Snapper Street				4994888	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.49
292696.2325519452	6134671.4837554963	Road	South Street				4994871	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.30
292362.0867344470	6135339.9023943581	Road	West Street				4994319	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.15	1.60
292847.1033077076	6133845.0260166544	Road	Whiting Way				4994887	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.14	0.58
293066.8882953034	6134991.4995974805	Road	Wilson Way				4994334	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.32
292563.953000000	6135415.831000000	Sewer	DeadEnd					Significant loss with temporary disruption of services		0.47
292704.746000000	6134028.324000000	Sewer	DeadEnd					Significant loss with temporary disruption of services		0.43
292541.342000000	6134078.864000000	Sewer	DeadEnd					Significant loss with temporary disruption of services		0.40
292565.256000000	6135343.398000000	Sewer	DeadEnd					Significant loss with temporary disruption of services		0.31
292454.160000000	6134122.450000000	Sewer	DeadEnd					Significant loss with temporary disruption of services		0.30
292439.209000000	6134235.485000000	Sewer	DeadEnd					Significant loss with temporary disruption of services		0.27
292447.411000000	6133715.606000000	Sewer	DeadEnd					Significant loss with temporary disruption of services		0.08
292699.509000000	6134666.958000000	Sewer	LampHole					Significant loss with temporary disruption of services		1.09
292685.939000000	6133882.414000000	Sewer	LampHole					Significant loss with temporary disruption of services		0.41
292474.494000000	6134222.346000000	Sewer	LampHole					Significant loss with temporary disruption of services		0.19
292427.606000000	6134428.422000000	Sewer	LampHole					Significant loss with temporary disruption of services		0.09
292345.776000000	6135299.639000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.06	0.52
292633.565000000	6134183.407000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.79
292602.613000000	6134318.390000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.79
292654.023000000	6133987.793000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.69
292617.929000000	6133541.098000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.66
292599.198000000	6134268.014000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.66
292598.051000000	6134367.945000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.65

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
292606.591000000	6134029.892000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.58
292610.172000000	6134223.677000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.57
292495.601000000	6135358.246000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.55
293063.037000000	6134776.722000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.53
292684.145000000	6134041.691000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.48
292584.846000000	6135390.965000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.47
292681.471000000	6134019.178000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.47
292644.439000000	6135388.904000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.46
292570.245000000	6135384.899000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.46
292282.973000000	6134989.356000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.45
292562.430000000	6134063.580000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.44
292597.680000000	6133924.475000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.44
292446.345000000	6135326.492000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.43
292638.589000000	6133891.822000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.43
292395.024000000	6135292.165000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.43
292584.193000000	6133934.901000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.43
292567.054000000	6135308.420000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.41
292624.711000000	6135306.440000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.41
292570.428000000	6134072.845000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.41
292600.252000000	6134131.975000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.41
292652.005000000	6134076.721000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.39
292679.096000000	6133861.501000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.39
292542.044000000	6133861.271000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.37
292748.004000000	6135326.632000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.36
292469.402000000	6134110.862000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.36
292756.443000000	6135221.882000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.36
292786.917000000	6135288.715000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.35
292567.461000000	6135273.012000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.33
292483.937000000	6133793.977000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.33
292532.801000000	6134145.591000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.33
292475.257000000	6135234.434000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.32
292545.995000000	6134099.950000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.31
292586.132000000	6135310.198000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.30
292511.757000000	6135272.972000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.30
292674.231000000	6135296.515000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.29
292624.556000000	6133952.882000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.29
292849.042000000	6135287.926000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.29
292602.002000000	6134452.036000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.28
292544.628000000	6134305.356000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.27
292708.836000000	6135260.014000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.27
292701.811000000	6135371.643000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.26
292450.726000000	6134173.838000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.26
292541.640000000	6134363.389000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.25

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
292694.510000000	6133850.964000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.23
292507.767000000	6133742.642000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.23
293038.318000000	6135027.117000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.22
292458.271000000	6134211.414000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.21
293055.823000000	6134992.286000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.20
292967.065000000	6135159.772000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.19
292418.943000000	6134300.067000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.18
292526.348000000	6134183.432000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.18
292429.053000000	6133731.265000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.17
292803.289000000	6135184.257000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.17
292574.591000000	6134529.971000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.17
292502.266000000	6134366.602000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.17
292472.222000000	6133702.834000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.16
292510.219000000	6134234.001000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.15
292691.952000000	6134682.514000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.15
292516.562000000	6134193.654000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.14
292988.363000000	6135021.548000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.14
292510.659000000	6134275.678000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.14
292587.596000000	6134568.267000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.13
292457.981000000	6134431.185000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.12
292477.015000000	6134318.943000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.11
292451.241000000	6134310.238000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.09
292581.115100000	6135435.370700000	Stormwater	Grate					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
292580.567700000	6135422.741100000	Stormwater	Grate					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.49
292688.795200000	6134037.076100000	Stormwater	Grate	35994				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.48
292571.936500000	6135391.252300000	Stormwater	Grate	359561				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.47
292688.081000000	6134021.494100000	Stormwater	Grate	35996				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.47
292673.105900000	6134035.420800000	Stormwater	Grate	35995				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.44
292613.379900000	6133936.828300000	Stormwater	Grate	35999				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.44
292683.159500000	6134015.665700000	Stormwater	Grate	359912				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
293073.162900000	6134986.303700000	Stormwater	Grate	359749				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.31
292135.471700000	6135024.979800000	Stormwater	Headwall Other	558844				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.48
292144.320200000	6135023.819300000	Stormwater	Headwall Other	558843				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.45
292295.793300000	6134992.640400000	Stormwater	Headwall Other					Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.28
292458.434300000	6133606.909100000	Stormwater	Headwall<=450 dia	35944				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.24	1.65
292570.319100000	6135462.091700000	Stormwater	Headwall<=450 dia	359576				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.99	1.46
292605.344500000	6134372.441100000	Stormwater	Headwall<=450 dia	359581				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.70	1.15
292038.755700000	6135198.092200000	Stormwater	Headwall<=450 dia					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.19	0.65
292037.894800000	6135192.735700000	Stormwater	Headwall<=450 dia					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.14	0.59
292702.344600000	6134665.681200000	Stormwater	Headwall<=450 dia	35979				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.09
292644.862700000	6134172.683900000	Stormwater	Headwall<=450 dia	359815				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.05
292606.024700000	6134300.350300000	Stormwater	Headwall<=450 dia	359674				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.79
292422.666900000	6134065.655400000	Stormwater	Headwall<=450 dia	359438				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.47

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
292412.431900000	6134127.904800000	Stormwater	Headwall<=450 dia	359544				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.46
292539.194700000	6133972.921300000	Stormwater	Headwall<=450 dia	35982				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.46
292550.988300000	6135377.591700000	Stormwater	Headwall<=450 dia	359575				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.36
292387.135500000	6134310.224100000	Stormwater	Headwall<=450 dia	359543				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.34
292372.122600000	6134422.000000000	Stormwater	Headwall<=450 dia	359542				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.26
292811.095100000	6133810.173500000	Stormwater	Headwall<=450 dia	359821				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.12
293169.897500000	6134892.120700000	Stormwater	Headwall>450<=600 dia	359756				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.70	2.15
292418.473200000	6133635.830100000	Stormwater	Headwall>450<=600 dia	359439				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.35	1.76
292566.261500000	6133524.369900000	Stormwater	Headwall>450<=600 dia	359894				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.19	1.60
293117.236300000	6135005.341300000	Stormwater	Headwall>450<=600 dia	359753				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.05	1.51
292614.456300000	6134434.909000000	Stormwater	Headwall>450<=600 dia	35958				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.08
292612.264000000	6134246.089700000	Stormwater	Headwall>450<=600 dia	359814				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.01
292683.946000000	6134016.647200000	Stormwater	Headwall>450<=600 dia	359911				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
292724.759800000	6134062.551100000	Stormwater	Headwall>600<=900 dia	359816				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.65	1.10
292602.028200000	6134436.476300000	Stormwater	Junction	35957				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.53
292572.283300000	6135371.035500000	Stormwater	Junction	359578				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.44
292652.597700000	6134058.185900000	Stormwater	Kerb Inlet	35986				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
292589.155100000	6134143.662100000	Stormwater	Kerb Inlet	35981				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.41
292633.421400000	6133888.986800000	Stormwater	Kerb Inlet	35988				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.35
292440.109700000	6133681.483600000	Stormwater	Kerb Inlet	359541				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.29
292451.229800000	6133668.348600000	Stormwater	Kerb Inlet	359435				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.29
292554.419300000	6134295.035300000	Stormwater	Kerb Inlet	359571				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.29
292543.114500000	6134298.945000000	Stormwater	Kerb Inlet	359673				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.27
292550.699900000	6134200.301600000	Stormwater	Kerb Inlet	359796				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.25
292557.037400000	6134201.004200000	Stormwater	Kerb Inlet	359795				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.25
292554.279500000	6134215.579900000	Stormwater	Kerb Inlet	359891				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.25
292563.733400000	6134219.411200000	Stormwater	Kerb Inlet	359794				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.24
292510.412000000	6133736.307700000	Stormwater	Kerb Inlet	359896				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.19
292487.118000000	6133735.040500000	Stormwater	Kerb Inlet	359898				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.18
292693.140800000	6134685.336500000	Stormwater	Kerb Inlet	35971				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.15
292570.715400000	6135434.985500000	Stormwater	Letterbox	359562				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
292697.657300000	6134030.951100000	Stormwater	Letterbox	359914				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.48
292424.341800000	6134121.419400000	Stormwater	Letterbox	359437				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.45
292420.034300000	6134147.802700000	Stormwater	Letterbox	359436				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.44
292585.401100000	6133954.206300000	Stormwater	Letterbox	35989				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.44
292573.214600000	6134136.490900000	Stormwater	Letterbox	359893				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.44
292567.566700000	6134144.616000000	Stormwater	Letterbox	359792				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
292565.280100000	6135382.778100000	Stormwater	Letterbox	359454				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
292547.240300000	6133982.503700000	Stormwater	Letterbox	359886				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
292440.843800000	6134073.523000000	Stormwater	Letterbox	359545				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.42
292430.752600000	6134076.740600000	Stormwater	Letterbox	359546				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.41
292503.766300000	6134108.494900000	Stormwater	Letterbox	359791				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.41
292511.833200000	6134102.332200000	Stormwater	Letterbox	35979				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.41

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
292791.346100000	6135250.482300000	Stormwater	Letterbox	359638				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.39
292783.889300000	6135255.486300000	Stormwater	Letterbox	35975				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.39
292572.396100000	6135364.435300000	Stormwater	Letterbox	359457				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.38
292798.540500000	6135277.385100000	Stormwater	Letterbox	359637				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.38
292573.683100000	6135306.834100000	Stormwater	Letterbox	359572				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.38
292447.781800000	6134066.614100000	Stormwater	Letterbox	359433				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.37
292806.261700000	6135254.533700000	Stormwater	Letterbox	359639				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.37
292432.473300000	6133666.931400000	Stormwater	Letterbox	359536				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.35
292397.190600000	6134313.543100000	Stormwater	Letterbox	359535				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.33
293063.124100000	6134982.550900000	Stormwater	Letterbox	35974				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.31
292697.744600000	6134672.803800000	Stormwater	Letterbox	359693				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.30
292542.605500000	6134284.251000000	Stormwater	Letterbox	359458				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.30
292554.280300000	6134374.826900000	Stormwater	Letterbox	359452				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.28
292544.253300000	6134377.688500000	Stormwater	Letterbox	359453				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.26
293025.404300000	6135000.350100000	Stormwater	Letterbox	359742				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.25
292574.043500000	6135250.796100000	Stormwater	Letterbox	359574				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.24
292534.476700000	6134375.488500000	Stormwater	Letterbox	35945				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.23
292550.425000000	6134439.555900000	Stormwater	Letterbox	359563				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.21
292559.139400000	6134440.517500000	Stormwater	Letterbox	359564				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.21
292382.748500000	6134423.423500000	Stormwater	Letterbox	359534				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.21
292533.868700000	6134366.263700000	Stormwater	Letterbox	359451				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.21
293056.329300000	6134998.130900000	Stormwater	Letterbox	359646				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.20
292574.246100000	6134534.013800000	Stormwater	Letterbox	359459				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.17
292566.133700000	6134536.422700000	Stormwater	Letterbox	35946				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.14
292593.394300000	6135243.765100000	Stormwater	Letterbox	359573				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.06
292601.406600000	6133923.752000000	Stormwater	Lintel Grate	35991				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.45
292645.087700000	6133890.337100000	Stormwater	Lintel Grate	35984				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.43
292681.618000000	6133861.879200000	Stormwater	Lintel Grate	35987				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.39
292625.113200000	6133906.496900000	Stormwater	Lintel Grate	35997				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.33
292626.877200000	6133894.512700000	Stormwater	Lintel Grate	35985				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.27
292449.528500000	6133680.112700000	Stormwater	Lintel Grate	359434				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.26
292504.880700000	6133729.959700000	Stormwater	Lintel Grate	359897				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.23
292492.638600000	6133729.187500000	Stormwater	Lintel Grate	359899				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.23
292900.599800000	6133946.903600000	Stormwater	Open Drain End	359822				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.72	1.16
292841.758700000	6135322.752500000	Stormwater	Pipe End	359636				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.97	3.43
292716.033300000	6134661.084700000	Waterway Facility	Boat Ramp			156158		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.06	1.50
292351.325200000	6135337.936900000	Waterway Facility	Boat Ramp			4829		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.99	1.44
293102.652700000	6135038.952700000	Waterway Facility	Boat Ramp			48269		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.93	1.38
292360.714100000	6135329.976000000	Waterway Facility	Boat Ramp			48273		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.60	1.05
292841.818200000	6135332.791400000	Waterway Facility	Fishing Platform			44257		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	4.25	4.70
293042.122800000	6135199.427000000	Waterway Facility	Fishing Platform			44258		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	4.20	4.65
292664.707600000	6135483.053900000	Waterway Facility	Fishing Platform			44256		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	4.02	4.31
293203.046800000	6134907.816700000	Waterway Facility	Jetty / Wharf			15717		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	3.00	3.45

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
293135.363400000	6135043.183500000	Waterway Facility	Jetty / Wharf			38929		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.60	3.06
292326.501200000	6135332.887200000	Waterway Facility	Jetty / Wharf			434		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.83	2.29
292344.661700000	6135348.067100000	Waterway Facility	Jetty / Wharf			48272		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.79	2.24
292727.076900000	6134654.319700000	Waterway Facility	Jetty / Wharf			4832		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.58	2.02
292360.422900000	6135325.375900000	Waterway Facility	Waterways facility		14459	631		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.18	0.64

Table B-7 Asset Risk Table for Orient Point/ Crookhaven Heads Area (See Map RG-02-07)

Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
295337.321552832	6135190.851875330	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations	3.39	3.84
295544.424023315	6132737.569477260	Paths	Shared Path					Isolated or minimal loss; short term impact; repairable through normal operations		0.26
295227.928000000	6134157.627000000	PumpStation	PumpStation	4156816				Significant loss with temporary disruption of services	0.32	0.75
295352.643000000	6133697.090000000	PumpStation	PumpStation	4156818				Significant loss with temporary disruption of services		0.80
295482.775000000	6132798.698000000	PumpStation	PumpStation	4156819				Significant loss with temporary disruption of services		0.39
293734.888000000	6134802.986000000	PumpStation	PumpStation	4156849				Significant loss with temporary disruption of services		0.35
293795.395365974	6133612.554089220	Recreational	Crow Island					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.96	1.40
293610.379348115	6134575.657870890	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.87	1.31
295460.352906670	6132805.447808660	Recreational	Parkland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.44	0.87
295356.533544627	6133745.986495000	Recreational	Parksland					Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.78	1.21
295425.7560686401	6133751.1134525128	Road	Addison Road				9639695	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.58
295429.3479590234	6133698.3197166044	Road	Addison Road				5124294	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.50
294900.9663423198	6135706.9223578647	Road	Coal Wharf Road				43928836	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.67	1.12
293747.0522145785	6134849.7470468935	Road	Orama Crescent				719335214	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.69	1.14
293757.1740124783	6134757.5000005355	Road	Orama Crescent				5119945	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.12
295546.9806745426	6132727.5000003539	Road	Prince Edward Avenue				5119921	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.26
295233.7382764333	6134152.3190914597	Road	Raglan Street				5123740	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.70
295343.8958115118	6135160.9940289073	Road	service				5119949	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.57	2.02
295356.6858653861	6135120.3838597257	Road	service				5119948	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.01	1.46
293937.6749995018	6134406.4590161769	Road	service				5119941	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.34
293928.5485331969	6134405.9349516816	Road	service				5119941	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.34
295475.0544635764	6132791.6835616250	Road	service				5130687	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.58
295357.1063438853	6133945.6632532226	Road	Sunshine Street				719335212	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.37
294900.9663423198	6135706.9223578647	Road	Coal Wharf Road				43928836	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.67	1.12
295372.358000000	6133931.296000000	Sewer	LampHole					Significant loss with temporary disruption of services		0.16
295368.958000000	6133975.150000000	Sewer	LampHole					Significant loss with temporary disruption of services		0.13
295330.948000000	6133919.403000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.56	0.99
295500.856000000	6132879.440000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.46	0.90
294887.985812500	6134268.440937500	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.39	0.82
295334.753000000	6133969.002000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.35	0.78
295352.679000000	6133872.154000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.35	0.77
295383.669000000	6132690.321000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.32	0.76
295359.110000000	6133647.345000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.24	0.67
295285.716000000	6133180.930000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.23	0.67
295345.252000000	6133929.492000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.18	0.61
295532.720000000	6132965.229000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.18	0.61
295438.325000000	6132717.551000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.15	0.59
294992.655000000	6132569.813000000	Sewer	StandardManhole					Significant loss with temporary disruption of services	0.12	0.56
295361.281000000	6133593.572000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.76

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
295360.047000000	6133791.525000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.70
295290.341000000	6134094.534000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.61
295469.212437500	6132794.016000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.58
295048.748000000	6134254.092000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.56
294839.661000000	6134274.621000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.53
295359.723000000	6133697.638000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.51
295473.312000000	6132803.253000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.51
295063.126000000	6132592.844000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.50
295420.052000000	6133702.313000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.49
293753.174000000	6134845.393000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.49
295231.790000000	6134162.228000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.48
295180.384000000	6134222.772000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.47
295125.696000000	6132626.873000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.47
294962.633000000	6134269.255000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.46
295129.193000000	6134242.145000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.45
295505.234000000	6133046.734000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.37
295579.321000000	6132748.783000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.35
295488.847000000	6133707.511000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.35
295330.773000000	6134040.765000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.30
293740.461000000	6134803.643000000	Sewer	StandardManhole					Significant loss with temporary disruption of services		0.26
293932.758700000	6134408.163300000	Stormwater	Grate	35974				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.34
295544.806300000	6132735.200900000	Stormwater	Headwall Other	3632				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.26
295555.416100000	6132730.854300000	Stormwater	Headwall Other	3631				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.16
295321.778900000	6133484.808100000	Stormwater	Headwall<=450 dia	359839				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.89	1.32
295411.229100000	6133079.859400000	Stormwater	Headwall<=450 dia	3626				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.26	0.69
295043.546500000	6132592.311100000	Stormwater	Headwall<=450 dia	359987				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.18	0.61
293928.037900000	6134403.708300000	Stormwater	Headwall<=450 dia	359612				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.84
295560.539900000	6132728.753900000	Stormwater	Junction	36128				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.24
293648.208300000	6134839.189100000	Stormwater	Open Drain End	35966				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.27	1.73
295346.739100000	6133723.473300000	Stormwater	Open Drain End	359957				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.93	1.36
293942.171300000	6134925.343900000	Stormwater	Open Drain End	359661				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.78	1.24
295325.007900000	6133945.626500000	Stormwater	Open Drain End	359959				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.76	1.19
294852.839900000	6132655.785900000	Stormwater	Open Drain End	3633				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.66	1.09
295047.303100000	6134232.422900000	Stormwater	Open Drain End	359925				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.47	0.90
295225.608900000	6134140.556900000	Stormwater	Open Drain End	359856				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.43	0.86
295457.070300000	6132769.532900000	Stormwater	Open Drain End	3636				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.39	0.83
295522.184100000	6132955.371300000	Stormwater	Open Drain End	36129				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.35	0.78
295120.764500000	6132641.414500000	Stormwater	Open Drain End	3634				Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.71
295225.459000000	6134162.621800000	Stormwater	Other Nodes	359823				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.24	0.67
295296.268300000	6133259.868900000	Stormwater	Pipe End	359946				Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.74	1.18
295389.530300000	6135168.946400000	Waterway Facility	Boat Ramp			48266		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.94	1.40
295349.086400000	6135160.503600000	Waterway Facility	Boat Ramp			48218		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.86	1.32
293918.650500000	6134404.126500000	Waterway Facility	Boat Ramp			48219		Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.84

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
293929.546700000	6134404.836700000	Waterway Facility	Fish Cleaning Table			41499		Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.34
295334.728000000	6135193.993400000	Waterway Facility	Fishing Platform			44487		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	3.39	3.84
293916.927300000	6134394.893000000	Waterway Facility	Jetty / Wharf			157641		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	2.02	2.46
295337.232800000	6135167.440200000	Waterway Facility	Jetty / Wharf			4829		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.83	2.29
295336.394800000	6135154.434800000	Waterway Facility	Jetty / Wharf			48274		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.74	2.19
295383.409700000	6135186.124000000	Waterway Facility	Jetty / Wharf			14619		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.47	1.93

Table B-8 Asset Risk Table for Crookhaven River Area (See Map RG-02-08)

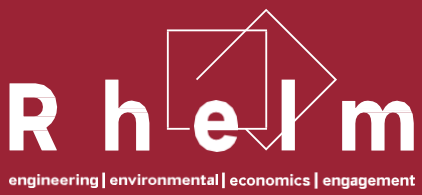
Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
289633.506151796	6134022.646611140	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.72	1.37
290184.590728023	6135469.640277700	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.46	0.93
290852.473410568	6132221.334285860	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.31	0.84
290520.424418910	6134968.798537120	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.15	0.65
288918.471269782	6134324.103625010	REMs	REMs Paddock					Significant loss with temporary disruption of services		0.81
288191.801204777	6133746.575451080	REMs	REMs Paddock					Significant loss with temporary disruption of services		0.42
290990.0691855452	6132093.4666670356	Road	Bournes Lane				4996645	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.31	1.78
288769.1449945238	6132810.4447474573	Road	Culburra Road				4934814	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.51	0.90
289526.5360288560	6134506.4896896593	Road	Greenwell Point Road				4993877	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.61
290862.2221009752	6134560.0009630900	Road	Greenwell Point Road				331330138	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.61
288119.7713760869	6132668.1611985452	Road	Mayfield Road				392061386	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.74	2.19
287212.2396215173	6133072.0222368138	Road	Mayfield Road				77966306	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.47	1.91
287228.5762955031	6134626.0396250170	Road	Mayfield Road				77966358	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.90	1.33
288291.4799192930	6133139.6523184860	Road	Mayfield Road				392061395	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.33
288412.0844247045	6133690.4244952137	Road	Pyree Lane				4960494	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.54
289655.1852797962	6136821.9010188319	Road	Ryans Lane				4996642	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.53	1.07
287147.2952265473	6132793.5343545126	Road	Springbank Road				5179021	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.40
287121.3943178247	6132763.3782028556	Road	Springbank Road				225552815	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.39

Table B-9 Asset Risk Table for Numbaa Area (See Map RG-02-09)

Inundation depths reported in these tables and the maps in **Attachment A are based off ground level. Elevation levels for the assets are not available in the spatial data used to map assets at risk. Individual assets may be above (fish cleaning facilities or road ends on a wharf above deeper water) or below ground level (some sewer or stormwater assets). Therefore, the inundation depth provided for each asset should be used as an indication of where flood waters are expected to reach in a severe coastal inundation event.*

x-coordinate (EPSG:28356)	y-coordinate (EPSG:28356)	Asset Class	Subcategory	Asset ID - ShoalWater	GISID	Legacy ID	OSM ID	Consequence	*20 Year ARI depth max	*100 Year ARI depth max
290785.005500000	6137424.483200000	Building	Commercial Lease		14638	185		Significant loss with temporary disruption of services		0.53
290783.151900000	6137401.903300000	Building	Commercial Operations		14364	156149		Significant loss with temporary disruption of services		0.51
290788.840500000	6137410.105400000	Building	Commercial Operations		14611	156148		Significant loss with temporary disruption of services		0.48
287106.555954856	6135914.950463100	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.89	1.34
286849.524185138	6138101.835993520	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.49	0.97
286289.977657645	6138846.487704970	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.47	0.96
289675.815908128	6138226.781992690	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.31	0.98
285586.278248080	6139129.830427770	REMs	REMs Paddock					Significant loss with temporary disruption of services	0.24	0.73
288009.869252548	6136479.785710140	REMs	REMs Paddock					Significant loss with temporary disruption of services		0.97
288308.153034690	6135620.897656590	REMs	REMs Paddock					Significant loss with temporary disruption of services		0.91
285563.2073043569	6136866.1026477609	Road	Apperleys Lane				392060721	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.94
285923.1264071833	6136947.0746682175	Road	Apperleys Lane				698140793	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.47
290906.8466837743	6137404.5884392280	Road	Comerong Island Road				43928709	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	3.67	3.52
291054.8024093919	6137363.6073425841	Road	Comerong Island Road				43928712	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	4.48	4.93
293373.5140673868	6139243.3435596507	Road	Comerong Island Road				458832157	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.01	1.48
292686.8918669857	6139490.8264189595	Road	Comerong Island Road				458832159	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.20
286704.9367142569	6139657.9310110286	Road	Comerong Island Road				270796507	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.38	1.73
287184.0693808366	6135468.6169496700	Road	Greenwell Point Road				5179018	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		1.39
287962.2860760293	6135358.5661982354	Road	Greenwell Point Road				5179016	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.38
287838.0213941135	6138665.3436918631	Road	Jindy Andy Lane				4934746	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.45
287228.5762955031	6134626.0396250170	Road	Mayfield Road				77966358	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.90	1.33
289655.1852797962	6136821.9010188319	Road	Ryans Lane				4996642	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.53	1.07
289258.8254586132	6136905.6745624747	Road	service				331330129	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.94	1.57
289256.4519943829	6136888.1010805480	Road	service				445453454	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.93	1.56
285533.6221352464	6136861.3389246091	Road	service				392062163	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.93
289634.6761580130	6136833.6149672233	Road	Smiths Lane				331330144	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.27	1.81
288942.1613455119	6136933.6298980657	Road	Smiths Lane				5149550	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	0.78	1.46
287975.4238345739	6135421.3767976491	Road	Stratherick Lane				392061778	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.76
287469.8443194130	6139704.9019935746	Road	Wharf Road				718914987	Minor loss with limited downtime; short term impact; mostly repairable through normal operations		0.58
291063.181010864	6137358.334477830	Waterway Facility	Boat Ramp			373549		Minor loss with limited downtime; short term impact; mostly repairable through normal operations	1.73	2.18



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Appendix F

Deferred Actions

F. Deferred Actions Overview

This appendix outlines management actions to be implemented by public authorities that, while were deemed “feasible”, “viable” and “acceptable” throughout the Stage 3 options evaluation stage, have been deferred from the Lower Shoalhaven River CMP. These actions were omitted due to uncertainty regarding securing a funding source, thus, making it challenging for agencies to commit to their implementation. Although not formally included in the CMP Business Plan, these actions are documented here for future consideration, as the risk assessment process identified them as important for addressing key priority issues.

The following actions are contained herein:

Action ID	Description
ENV_46	Cost-benefit analysis and feasibility study(ies) of alternative floodplain land use options
ENV_64	Resurvey the estuary in 10 years’ time to determine the location, condition, extent and vulnerability of oyster reefs in the estuary

Table 3-1 CMP Actions to be Implemented by Public Authorities

ID	Location	Management Action	Action Description	Key Threat/ Objective Addressed	Lead Agency	Partners	Performance Measures	Timing
ENV_46	Whole Study Area	Cost-benefit analysis and feasibility study(ies) of alternative floodplain land use options	Subject to funding, this action will be led by DPIRD Fisheries with support from DPIRD Agriculture, DCCEEW and SCC. It involves an investigative cost-benefit analysis and feasibility study(s) of alternative floodplain land use options to inform decision making for land holders currently undertaking agriculture on low-lying land that will progressively become more constrained for traditional agricultural uses with rising sea levels and more frequent tidal inundation. It will consider: • Constraints to the functionality of the existing drainage network, as informed by the data presented in the Shoalhaven River Floodplain Prioritisation Study (WRL, 2023), and linking to Action CTF_16a. • Potential fisheries (including aquaculture) values from restoration of natural flows, including reinstatement of tidal exchange and rehabilitation of former wetland and backswamp areas. • Economic evaluations, undertaken for coastal floodplain wetland areas, of current agricultural land uses in light of an increase in sea level over the near (2050) and long (2100) term. • Potential for carbon storage in restored wetlands and backswamps as a future revenue source. • Value of ecosystem services provided by accommodating landward retreat of estuarine vegetation communities. This action supports the ongoing and high value existing agricultural production on the floodplain where feasible and considers that other uses may be more viable in some locations in the future. A particular focus will be on identifying those broad factors (sea level rise, water quality, increased farming risk, engineering limitations of drainage infrastructure) influencing the economically viable and socially acceptable strategies for implementation. The assessment should include broad consideration a range of factors including, but not limited to: • Land ownership scenarios • Potential carbon sequestration benefits • Potential impacts on farm viability and cash flow • Potential funding streams for farmers to undertake hydrological works, e.g. market-based approaches, public-private investment strategies and collective arrangements that promote cooperative action, financial incentives (e.g. grants, price signals and trading mechanisms, which are of particular importance where hydrological works are required to alter drainage patterns), non-financial measures (e.g. Government extension services) and regulatory frameworks (DEWHA, 2009).	Coastal Hazards (inundation)	DPIRD Fisheries	DPIRD Agriculture SCC DCCEEW	Study completed and findings communicated to relevant agencies and stakeholders.	Within 4-7 Years
ENV_64	Whole Study Area	Resurvey the estuary in 10 years' time to determine the location, condition, extent and vulnerability of oyster reefs in the estuary	This action involves resurveying the estuary to determine the success of the works to install/improve oyster reefs. Monitoring and evaluation of oyster recruitment and fish assemblages at proposed restoration sites is required to assess the success of restoration projects in terms of provision of additional fish habitat. In line with DPIRD Fisheries oyster reef survey methodology, it will establish a mapping and reporting program for restored oyster banks and reefs (aligning with ENV_63). Results of the monitoring will be reported in the relevant annual estuary health report card, developed by DPIRD Fisheries. Note that implementation of this action is dependent on DPIRD Fisheries successfully accessing additional funding. Note that regular monitoring of any oyster reef components of bank stabilisation or intertidal restoration works is addressed through environmental monitoring actions ENV_39 and ENV_43, and asset monitoring action ECON_08.	Environmental values	DPIRD Fisheries	SCC	Estuary re-surveyed and results reported in Estuary Health Report Card.	Within 8-10 Years