# Eurobodalla Open Coast Coastal Management Program

Draft

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## Document Control

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| 00 | March 2022 | Preliminary Draft | Sean Garber<br>Luke Evans<br>Courtney Smith<br>Joshua Weston<br>Sarah Parton | Emma Maratea<br>Louise Collier |
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## DISCLAIMER

# Acknowledgements

**Acknowledgement of Traditional Owners**

Eurobodalla Shire Council recognises Aboriginal people as the original inhabitants and custodians of all land and water in the Eurobodalla and respects their enduring cultural and spiritual connection to it.

**Acknowledgment of Financial Assistance**

Eurobodalla Shire 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 Planning and Environment (DPE).

# Executive Summary

Eurobodalla Shire Council, with the assistance of the NSW Government, has prepared this Coastal Management Program (CMP) for the Eurobodalla Coastline, in accordance with the provisions of the NSW Coastal Management Act 2016 (CM Act).

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
- preserve habitats and cultural uses
- encourage sustainable agricultural, economic and built development in the coastal zone
- maintain or improve recreational amenity and resilience
- adapt to emerging issues such as population growth and climate change.

The NSW Coastal Management Manual specifies five stages of preparing a CMP (**Figure E-1**).

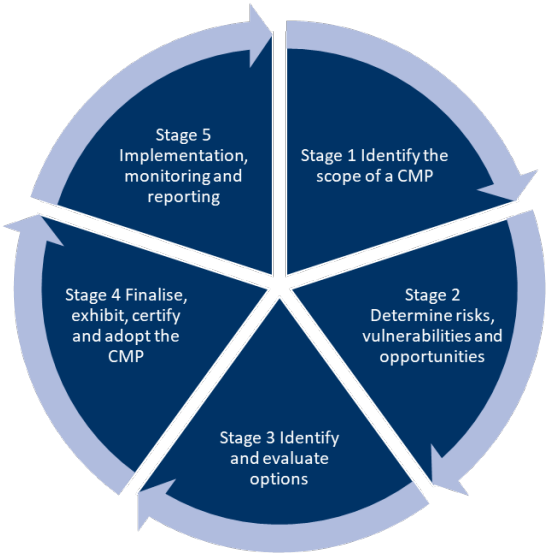



**Figure E-1 The Five Stages of a CMP (Adapted from OEH, 2018)**

## CMP Study Area

The study area covers the full extent of the coastline within the Eurobodalla Shire Council LGA, extending from the South Durras headland in the north to the entrance of Wallaga Lake in the south. The study area for the Eurobodalla Open Coast CMP is shown on **Figure E-2**.

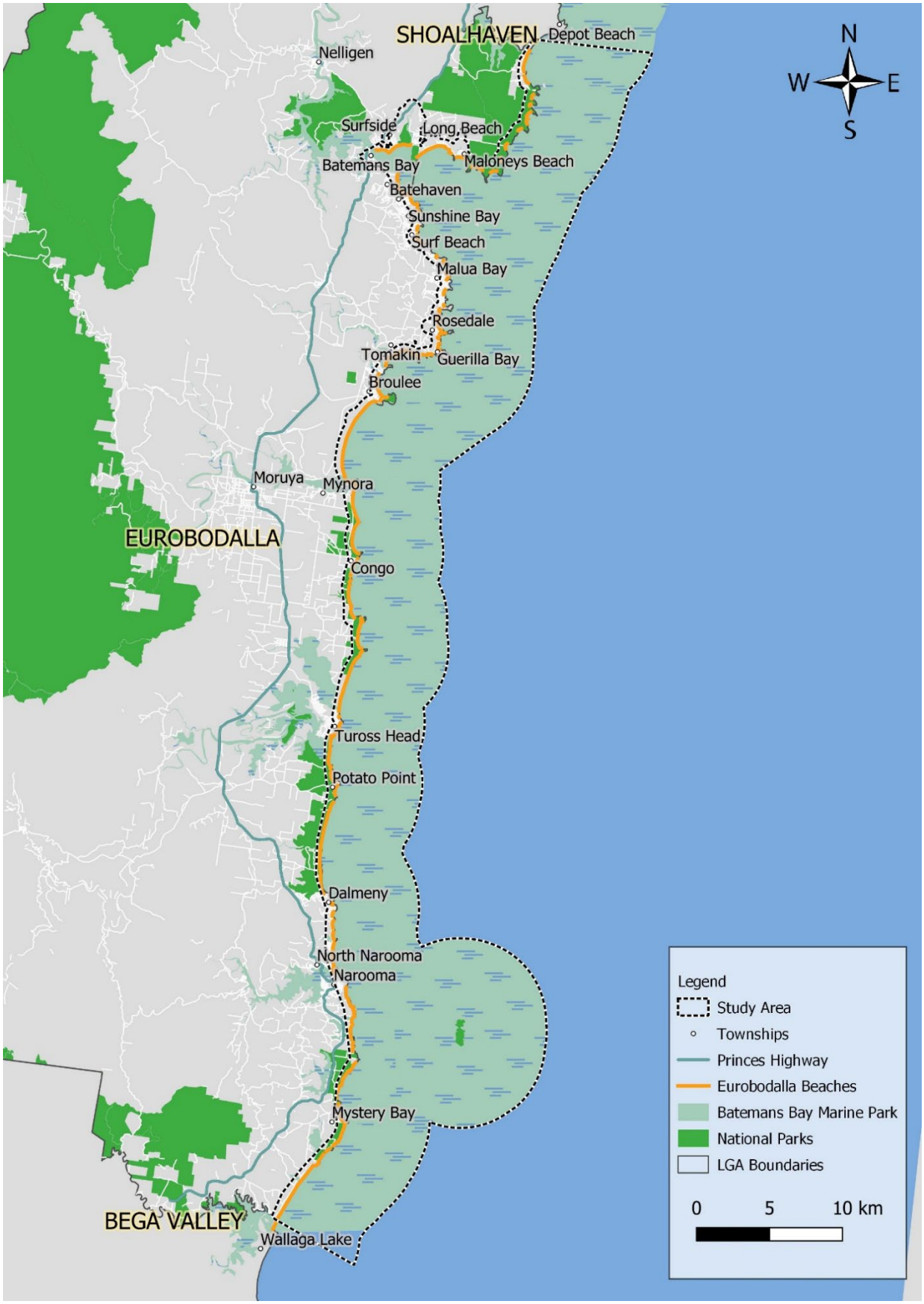



**Figure E-2 Study Area**

## Purpose, Vision, Objectives and Strategic Direction

The purpose of the CMP, as defined in the CM Act, is to set the long-term strategy for the coordinated management of land within the coastal zone with a focus on achieving the objectives 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 allow Council to access State Government funding to implement coastal management actions on a priorities basis for the coastline, estuaries and catchments of the study area.

The vision established for coastal management of the Eurobodalla open coast is:

> *A healthy and resilient open coast for Eurobodalla, managed in flexible, adaptive and innovative ways to the benefit of all locals, visitors, and traditional owners of the land, now and into the future. The significant Aboriginal cultural, economic, recreational and natural values of the Eurobodalla open coast are recognized and considered in a holistic approach to managing existing and emerging coastal threats.*

Supporting the vision are a series of coastal management objectives which have been developed to align with those in the CM Act, as further detailed in **Section 1.3**.

## Values of and Threats to the Study Area

A key outcome of the Stage 1 Scoping Study was understanding how the community value the coastal zone. A list of 13 key values was identified through review of previous community consultation undertaken within the coastal zone and across the LGA, as shown in **Table E-2**.

The coastal management threats (also referred to as issues) to the study area are shown in **Table E-3** and include 24 priority threats. The current and future risk ratings are also shown in **Table E-3**.

**Table E-2 Priority Values of the Study Area**

| Theme | | Values |
|---|---|---|
|  | **Healthy environment** | Natural character and geodiversity<br>Biodiversity and ecosystem integrity<br>Clean waters, beaches and coastal environment |
|  | **Recreational and social values** | Accessibility, property protection and safety<br>Amenity and recreation<br>Public space to gather, socialise and participate in community activities<br>Education / scientific<br>Non-Aboriginal heritage |
|  | **Aboriginal cultural heritage and use** | Aboriginal cultural heritage and use |
|  | **Economic values** | Tourism<br>Fishing (recreational, cultural, commercial)<br>Agriculture and urban lands<br>Support for aged care and assisted living |

**Table E-3 Threats to the Eurobodalla Open Coast and Risk Assessment Results**

| ID | Threat | Current Risk (2022) | Future Risk (100 years) |
|---|---|---|---|
| CH Threat 1 | Beach erosion | High | Extreme |
| CH Threat 2 | Shoreline recession | Medium | Extreme |
| CH Threat 3 | Coastal inundation | High | Extreme |
| CH Threat 4 | Tidal inundation | Low | High |
| CH Threat 5 | Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters | Not assessed for open coast | |
| CH Threat 6 | Coastal watercourse entrance instability | High | High |
| CH Threat 7 | Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLs) | Medium | High |
| CH Threat 8 | Dune slope instability | Low | Medium |
| CH Threat 9 | Coastal cliff instability | Low | Medium |
| RA Threat 1 | Conflict over resource access and use (e.g. beach users and dog walkers) | Low | Medium |
| RA Threat 2 | Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc) | Medium | High |
| RA Threat 3 | Poorly located, poorly maintained and/or inappropriate access and supporting facilities | Medium | Medium |
| RA Threat 4 | Anti-social behaviour and unsafe practices | Low | Medium |
| RA Threat 5 | Passive recreational use (swimming, surfing, bush walking, etc) | Low | Medium |
| RA Threat 6 | Active recreational use (recreational boating, motorised watercraft, camping etc) - recreational activities needing associated infrastructure | Medium | High |
| RA Threat 7 | Commercial and recreational fishing | Medium | High |
| CD Threat 1 | Coastal development resulting in loss of plant and animal species (habitat disturbance or loss) | Medium | High |
| CD Threat 2 | Water pollution from urban stormwater and treated effluent discharge | Low | Medium |
| CD Threat 3 | Pollution of water, beach sand and other habitat areas with litter, solid waste, marine debris and microplastics | Low | Medium |
| CD Threat 4 | Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts | Medium | High |
| EGC Threat 1 | Lack of compliance with regulations (by users) or lack of compliance resources (by agencies) | Medium | High |
| EGC Threat 2 | Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment | Medium | High |
| EGC Threat 3 | Insufficient or inappropriate governance and management of the coastal environment | Medium | High |
| EGC Threat 4 | Insufficient involvement of Traditional Owners in the management of cultural heritage and use within the coastal environment | High | Extreme |

CH – Coastal Hazard, RA – Recreational Activity, CD – Coastal Development, EGC – Engagement, Governance and Compliance

The first pass risk assessment undertaken during the Stage 1 Scoping Study as well as the results of the Stage 2 Vulnerability Assessments was used to determine the risk ratings as shown in **Table E-3**.

The Stage 2 CMP document (Rhelm, 2022b) along with the previous coastal vulnerability assessments (WRL, 2017 and SMEC, 2011) and engagement with the community and stakeholders assisted Council and community to understand the complexity of the issues and risks affecting the environmental, social and economic assets and values in each coastal management area.

## Evaluation of Coastal Management Options

This CMP provides a management framework that aims to protect the social, ecological and cultural values associated with the Eurobodalla coastline and to manage the largely conflicting desires for the protection of ecological values and enhancing recreational opportunities. The approach is consistent with the long-term vision, the management objectives and community values. The CMP recognises that the coastal zone has suffered impacts from past and current human use and faces current and future pressures including population increases and natural influences such as erosion, flooding, sea level rise and climate change.

There are many aspects of the management of the Eurobodalla coastline that can be targeted through the coastal management framework and there are some aspects that are beyond the reach of this process. Development of management actions was focused on those mechanisms that are available through the CMP process and 10 year delivery timeframe.

A total of 139 potential actions were compiled from an audit of previous management plans and studies, engagement with the community and agency stakeholders, and direct outcomes of the Stage 2 CMP vulnerability assessments.

Initially, a feasibility assessment was undertaken to 'rule out' any options that did not address an existing or future risk to the coast, to consolidate overlapping options, or to identify options that were not feasible through engagement with relevant agency staff.

A viability assessment was then undertaken either through:

- a simple economic analysis and a multicriteria assessment for options that have low risk, impact and complexity; or
- a detailed cost-benefit analysis, preliminary design and viability analysis (e.g. modelling) as well as the use of the multicriteria assessment for options that have high risks, impacts and complexities.

## Recommended Coastal Management Actions

The CMP provides a suite of coastal planning and management actions that have been developed and prioritised based on the assessed risk of the threats to the study area.

Actions consist of a combination of studies, investigations and on-ground works and were selected to address the key risks. Actions are based on professional consideration of the legal, technical and engineering feasibility, the economic viability and the acceptability of actions to the community and stakeholders.

The CMP includes 71 actions that have been grouped according to the key threat addressed by each action, although it is acknowledged that many actions address multiple threats and provide multiple opportunities.

The outcome being:

- 6 actions that address coastal development threats
- 35 actions that address coastal hazard threats
- 8 actions that address recreational activity threats
- 16 actions that address engagement and governance threats
- 1 action that addresses an opportunity rather than a threat
- 5 actions that relate to the monitoring and evaluation of the CMP implementation.

The major structural actions to mitigate coastal hazards in and around Batemans Bay are shown on **Figure E-3**.

The CMP includes the preparation of a planning proposal (Action CHA_A) to incorporate the proposed Coastal Vulnerability Area (**Section 8.2.1**) into the *Resilience and Hazards SEPP*. The CMP Stage 2 technical studies will support the submission of a planning proposal.

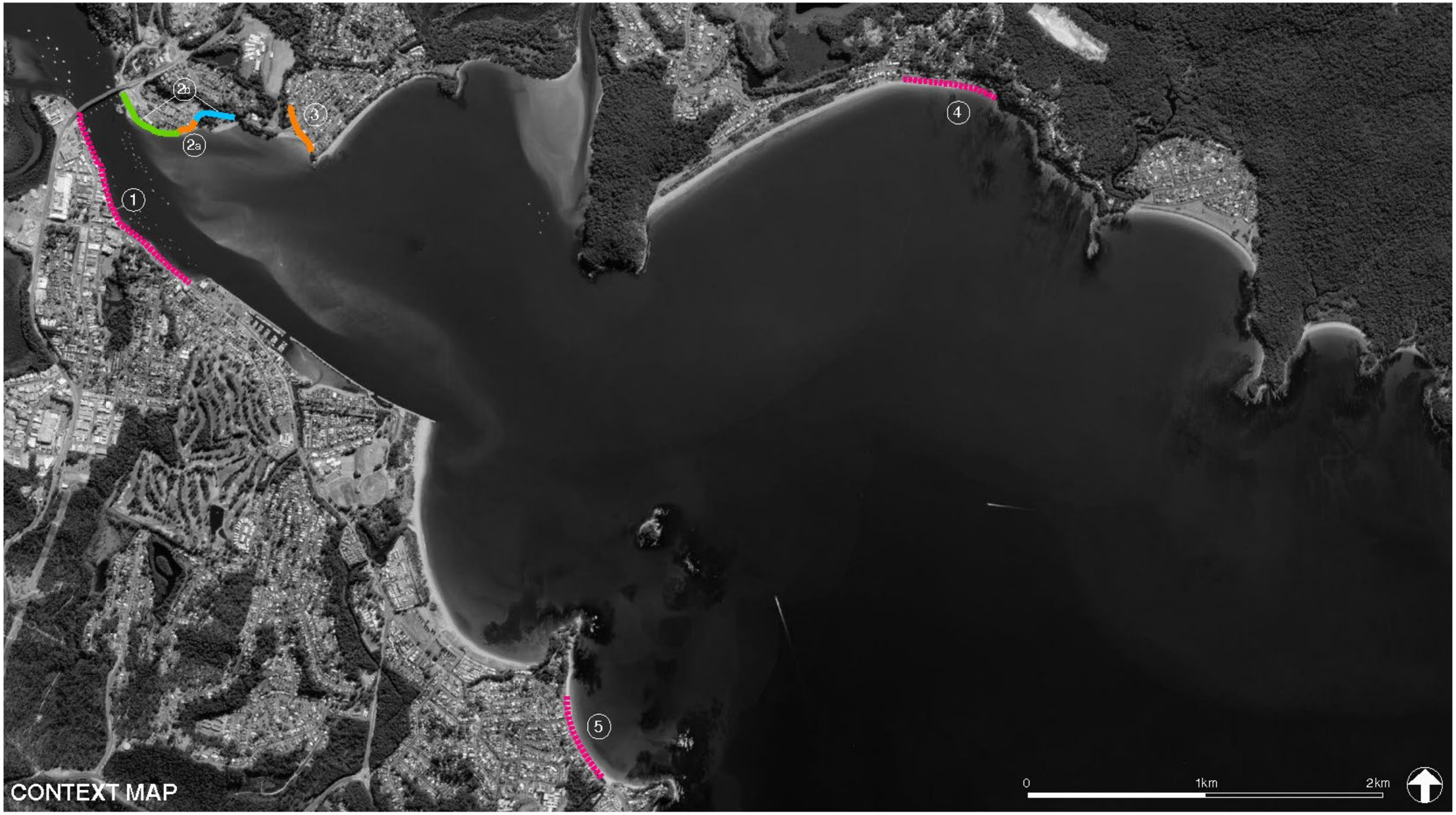
A Business Plan has been developed for the CMP which outlines the key components of the funding strategy for the CMP, including the cost of proposed actions, proposed cost-sharing arrangements, beneficiaries, and other potential funding mechanisms. Delivery of the Eurobodalla Open Coast CMP is estimated to cost approximately $47 Million in capital and operational expenses over the 10 year CMP implementation period.

The CMP actions are expected to be funded through Eurobodalla Shire Council and State Government contributions, monetary grants and volunteer works by community members and organisations. Eurobodalla Shire Council contribution is costed to be $13.3 Million over 10 years, with anticipated State Government contributions of $33.7 Million over 10 years.

Once the program is certified, Eurobodalla Shire Council will be responsible for facilitating through its governance and budgetary processes the implementation of the plan, using both specific staff resources and using existing elements of the NSW Integrated Planning and Reporting (IP&R) Framework of Council to undertake, track and measure the success of actions in the CMP.

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

This CMP and the progress of the management actions will be reviewed periodically to ensure the actions remain relevant and the implementation of the plan is being achieved.




(1) **Batemans Bay to Batehaven -** (CH4_K)
Seawall Raising and Wave Return Barriers

(2a) **Wharf Road, North Batemans Bay -** (CH1_Ka)
Wharf Road Protection Stage 1: Erosion protection, remediation and public use

(2b) **Wharf Road, North Batemans Bay -** (CH1_Kb)
Wharf Road Protection Stage 2: Inundation protection

(3) **Surfside -** (CH4_D)
Surfside Flood Levee

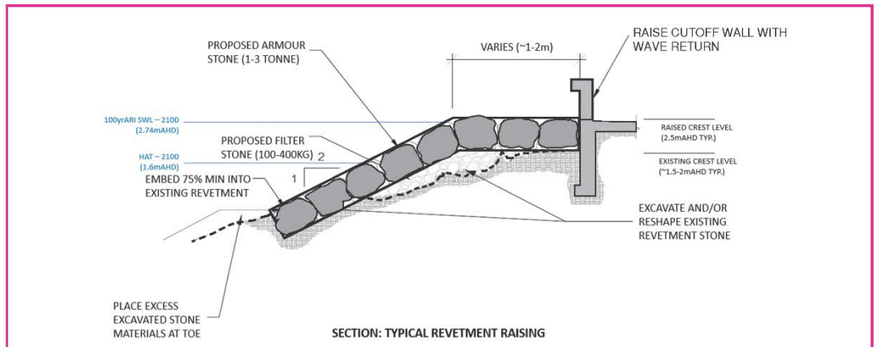
(4) **Long Beach -** (CH1_D and CH1_E)
Low crested rock revetment to protect Bay Road

(5) **Caseys Beach -** (CH1_P)
Casey Beach Seawall

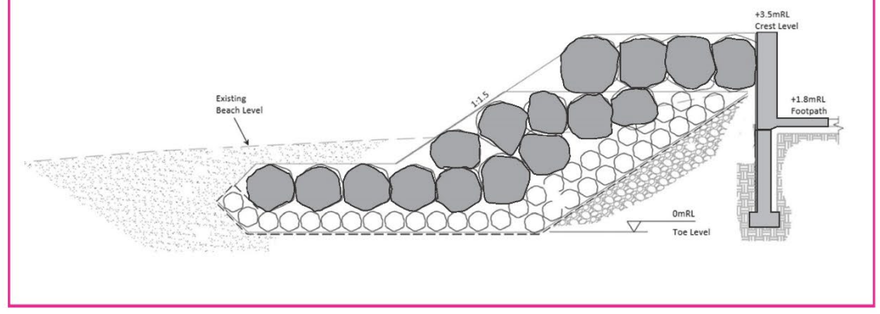
**Figure E-3a** **Batemans Bay Structural Coastal Management Actions**

## SECTIONS

## PRECEDENT IMAGERY

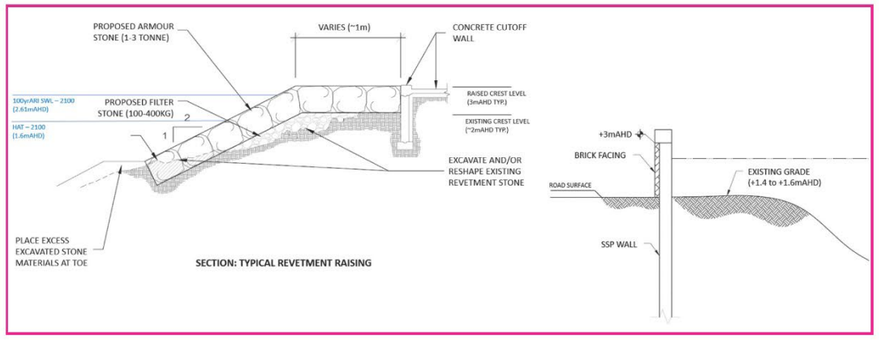













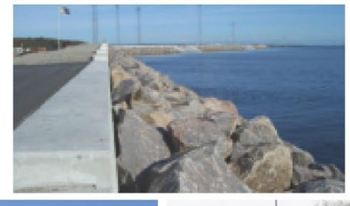
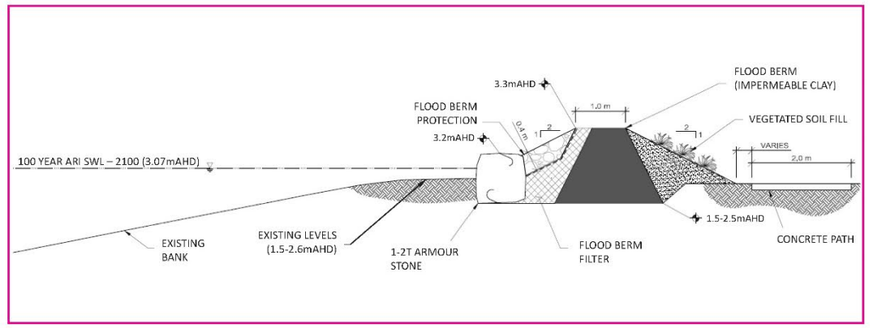



**Figure E-3b Batemans Bay Structural Coastal Management Actions**

## SECTIONS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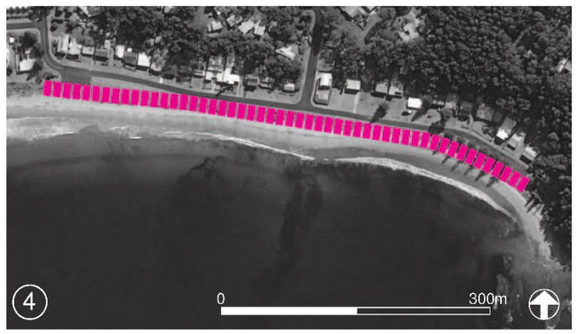
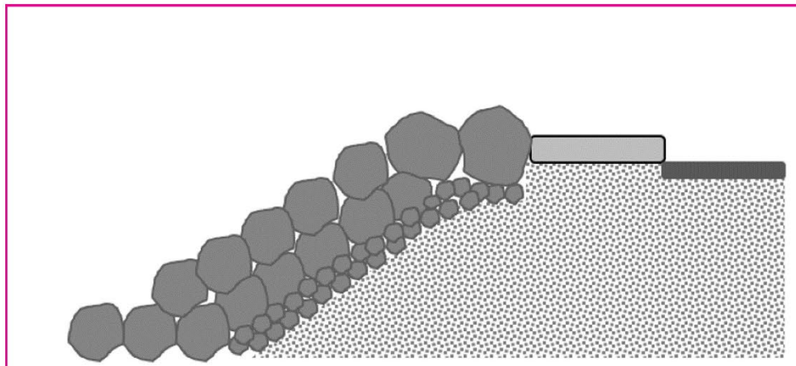
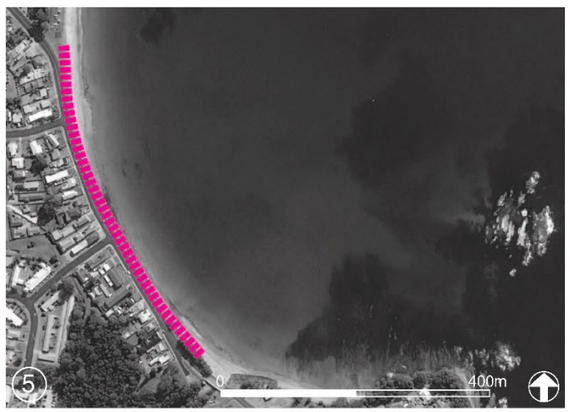


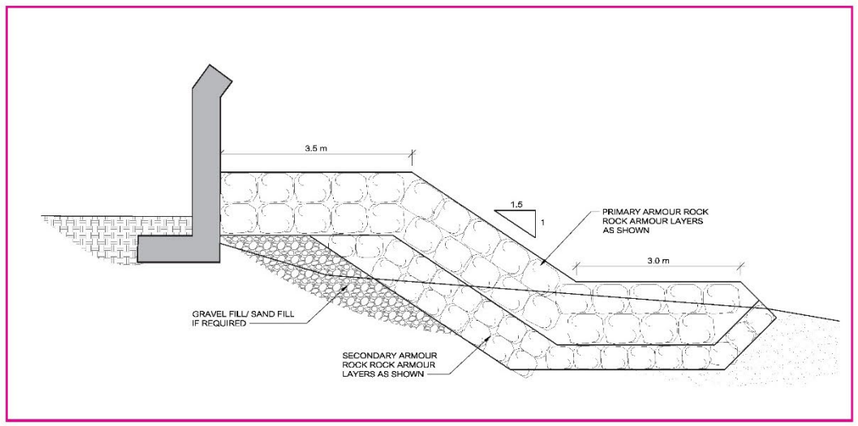




**Figure E-3c Batemans Bay Structural Coastal Management Actions**

# Table of Contents

## Appendices



## Tables

## Figures



## Maps

# 1 Introduction

Eurobodalla Shire Council (Council) with the assistance of NSW Government Agencies resolved to prepare this Coastal Management Program (CMP) to provide strategic direction and specific actions to address threats to the coast and to maintain the ecological, social and economic values of the coast.

The Eurobodalla Open Coast 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, 2018).

A CMP is prepared in five stages as discussed in **Section 1.5**. Previous stages that have been completed and support this CMP include:

- Stage 1 Scoping Study for the Eurobodalla Open Coast Coastal Management Program (Rhelm, 2022a), which set the context and scope for the CMP
- Stage 2 Vulnerability Assessments for the Eurobodalla Open Coast Coastal Management Program (Rhelm, 2022b), which included additional erosion, geotechnical and coastal inundation assessments to fill existing knowledge gaps.

This CMP document constitutes Stages 3 and 4 of the CMP process for the open coast area of the Eurobodalla Local Government Area (LGA) including 140km of beaches, headlands and shorelines and will be publicly exhibited prior to adoption and implementation.

## 1.1 Purpose of the Eurobodalla Open Coast CMP

This CMP outlines the strategic aims for the coordinated management of the Eurobodalla coastal zone and identifies specific actions to mitigate the threats and issues identified for the coast that are to be implemented over the next 10 years. Clear details for how actions will be implemented, funded, monitored, and reviewed are given in this CMP. The CMP is an operational document for the community and government to take action to manage, preserve, improve, promote and rehabilitate the coast.

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
- preserve habitats and cultural uses
- encourage sustainable agricultural, economic and built development in the coastal zone
- maintain or improve recreational amenity and resilience
- adapt to emerging issues such as population growth and climate change.

## 1.2 Area covered by this CMP

To ensure a consistent management approach across the entire LGA open coast, the study area of this CMP covers the full extent of the coastline within the Eurobodalla Shire Council LGA, extending from the South Durras headland in the north to the entrance of Wallaga Lake in the south. This CMP only applies to areas within the mapped coastal zone. The study area for the Eurobodalla Open Coast CMP is shown on **Map RG-01-01**.

This CMP applies to part of the coastal zone within the Eurobodalla LGA. The study area incorporates the open coast and the entrances to estuaries within the LGA. The study area only extends into the estuaries where coastal inundation risk has been identified. This is captured as part of the proposed coastal vulnerability area (**Section 8.2.1**).

A separate Estuary Coastal Management Plan covers the estuary / intermittently closed and open lakes and lagoons (ICOLLs) of the Moruya River, Mummuga Lake and Wagonga Inlet (Salients, 2022). The study area is shown in **Figure 1-1** and this CMP does not apply to the area covered by the estuary CMP. The management of the remaining estuaries and ICOLLs is split across multiple smaller plans of management, an update to these will be addressed in future Estuary Coastal Management Programs.

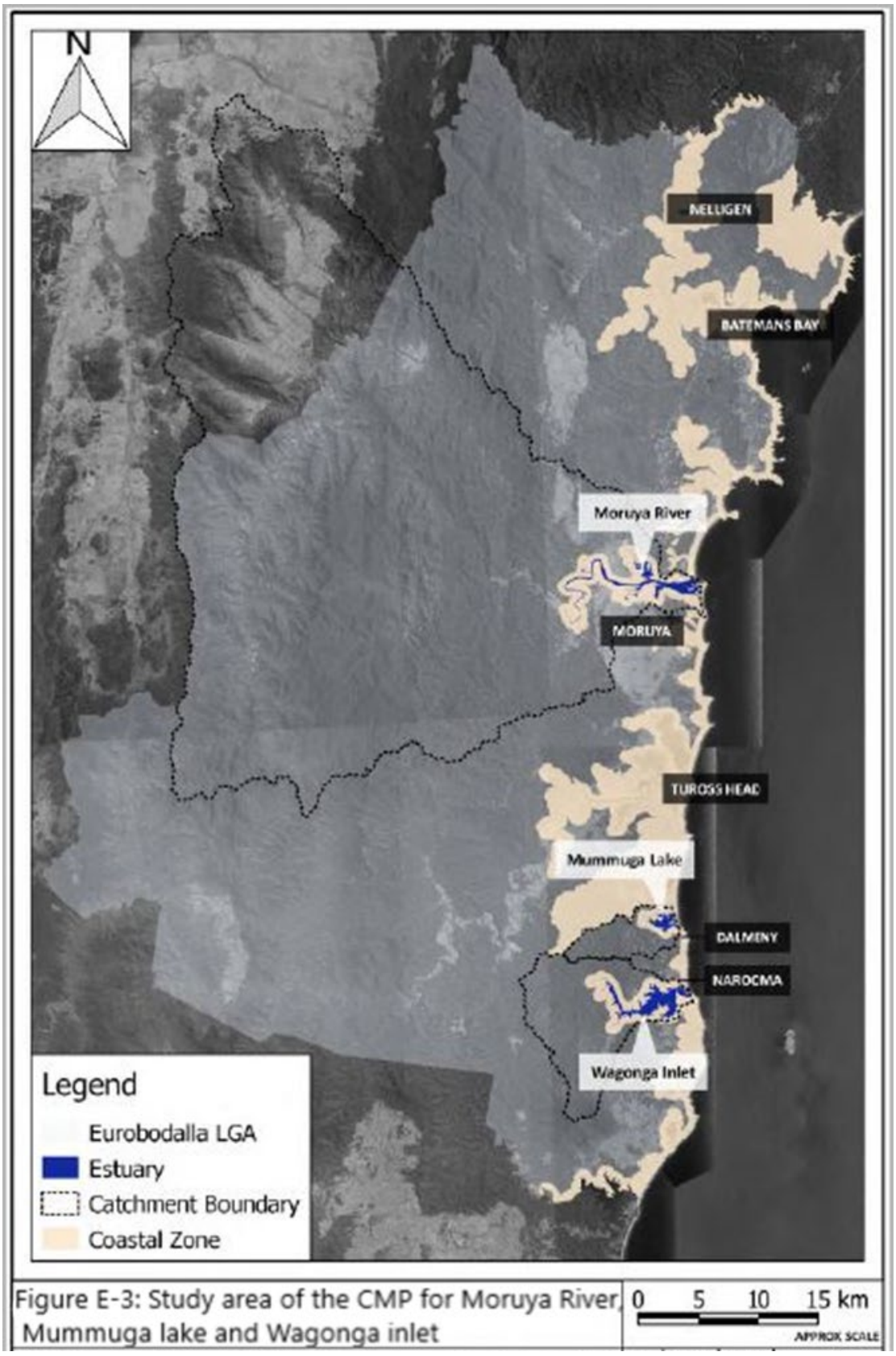



**Figure 1-1 Study Area of the CMP for Moruya River, Mummuga Lake and Wogonga Inlet (from Salients, 2022)**

### 1.2.1 Coastal Management Areas Included in the CMP

There are four coastal management areas as defined by the CM Act and *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP). All four coastal management areas have been included in the scope of this CMP, being:

- **Coastal Wetlands and Littoral Rainforests** – The study area includes Coastal Wetlands and small areas of Littoral Rainforest Proximity Area that extend into the study area.
- **Coastal Vulnerability Area (CVA)** – The study area has a range of vulnerabilities. There is presently no mapping for the CVA within the Resilience and Hazards SEPP. This CMP includes draft mapping of a CVA in **Section 8.2**, suitable for a planning proposal to update the Resilience and Hazards SEPP mapping
- **Coastal Use Area** – The study area has a range of existing uses and a series of planned future uses
- **Coastal Environment Area** – The coastal environment area maps natural features of the coast such as coastal waters of NSW, estuaries, beaches, dunes, coastal lakes and lagoons and undeveloped coastal headlands and rock platforms.

**Map RG-01-01** presents all the coastal management areas along with the proposed Coastal Vulnerability Area. The Coastal Vulnerability Area mapping is discussed in further detail in **Section 8.2** and shown on a separate series of maps **Map RG-07-01**.

### 1.2.2 Coastal Sediment Compartments

Eurobodalla Shire is identified within two primary coastal sediment compartments and six secondary sediment compartments, as listed below and shown on **Map RG-05-02**:

- Beecroft Head to Wasp Head (South Durras)
    - Lake Tabourie coast – Warden Head to Wasp Head (Durras Beach is at the far southern end of this secondary compartment)
- Wasp Head to Cape Howe
    - Murramarang – Wasp Head to Three Islet Point
    - Batemans Bay – Three Islet Point to South Head (Mosquito Bay)
    - Moruya River – South head (Mosquito Bay) to Bingie Bingie Point
    - Eurobodalla coast – Bingie Bingie Point to Cape Dromedary
    - Mount Gulaga (Dromedary) Coast – Cape Dromedary to Goalen Head (noting that most of this compartment is in the Bega Valley Shire).

Eurobodalla Shire Council share primary coastal sediment compartments with Shoalhaven City Council to the north and Bega Valley Shire Council to the south and consultation has been undertaken with these councils.

## 1.3 Vision, Objectives and Strategic Direction

The vision established for coastal management of the Eurobodalla open coast, consistent with the state's vision and community input, is as follows:

*A healthy and resilient open coast for Eurobodalla, managed in flexible, adaptive and innovative ways to the benefit of all locals, visitors, and traditional owners of the land, now and into the future. The significant Aboriginal cultural, economic, recreational and*

*natural values of the Eurobodalla open coast is recognized and considered in a holistic approach to managing existing and emerging coastal threats.*

Supporting the vision are a series of local coastal management objectives which have been developed to align with the state's objectives for the NSW coastal zone in the CM Act. The five key coastal management objectives for the study area are:

- *sustain the natural coastal environment*
- *maintain public access, amenity, use and safety on the coast and the lifestyle enjoyed by local people*
- *help build the local coast-dependent economy*
- *improve council and community resilience to coastal change*
- *support community involvement in looking after the coast and decisions about its management.*

A review of how this CMP supports the objects of the CM Act, and objectives for each coastal management area of the *Resilience and Hazards SEPP* is provided in **Table 1-1**. In addition, the risks to the objectives of the CM Act have been identified through the evaluation of the threats described in **Table 2-2** and consideration given in addressing these risks and threats through the development of specific management actions as outlined in **Table 1-1**.

The strategic direction for the study area has been formulated through acknowledging existing visions, strategies and directives outlined in existing documentation by state, regional and local strategic planning documents, which have also shaped development of Council's vision and coastal management objectives. the strategic direction for the study area is discussed further in **Section 3.1.1**. The vision, objectives and strategic direction of the CMP consider the objects and objectives of the CM Act of which management actions subsequently consider

**Table 1-1 Objects of the CM Act and the Coastal Management Area Objectives**

| **Section 3 - Objects of the CM Act and Objectives of the Resilience and Hazards SEPP** | **How this is addressed in this CMP** |
|---|---|
| **The objects of the CM 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 | Management options (Section 3) were identified that address the threats (Section 2.2) to the values of the coastal zone (Section 2.1). |
| (b) to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety, and | Management options (Section 3) were identified that address the threats (Section 2.2) to the values of the coastal zone (Section 2.1). |
| (c) to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone, and | Extensive engagement with Traditional Owners has been undertaken as part of the preparation of this CMP |

| Section 3 - Objects of the CM Act and Objectives of the Resilience and Hazards SEPP | How this is addressed in this CMP |
|---|---|
| | (Appendix A) and has informed specific management actions in Section 3. |
| (d) to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies, and | Management options (Section 3) were identified that address the threats (Section 2.2) to the values of the coastal zone (Section 2.1). |
| (e) to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making, and | Management options (Section 3) were identified that address the threats (Section 2.2) to the values of the coastal zone (Section 2.1). Specifically coastal development threat (CD) options. |
| (f) to mitigate current and future risks from coastal hazards, taking into account the effects of climate change, and | Current future coastal hazards were assessed in the Stage 2 Study. Options addressing coastal hazards have IDs starting with CH (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 | Local and regional coastal processes were assessed in the Stage 2 study. Recommendations regarding planning controls in these areas are provided in Section 4. |
| (h) to promote integrated and co-ordinated coastal planning, management and reporting, and | Section 1.4, 5 and 7 |
| (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 | Stage 2 – Vulnerability Study Section 3.2 |
| (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 CMP<br>Appendix A<br>Letters of support from Agencies |
| (k) to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions, and | Appendix A |
| (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 | Action CH1_M |

| Section 3 - Objects of the CM Act and Objectives of the Resilience and Hazards SEPP | How this is addressed in this CMP |
|---|---|
| (m) to support the objects of the Marine Estate Management Act 2014. | Section 1.5<br>Actions that address the following threats: RA Threat 2, CD Threat 2, CD Threat 3, CD Threat 4, EGC Threat 1, EGC Threat 3 |
| **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, | Section 1.2.1<br>Table 2-2<br><br>Risk to the objectives have been identified through threats: RA Threat 2, CD Threat 4, CH Threat 8, EGC Threat 1, EGC Threat 3<br>Consideration given in addressing these risks and threats though the development of specific management actions such as CH8_B, EGC2_A, CD3_C, CD8_C. |
| (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. | |
| The management objectives for the coastal vulnerability area are as follows— | |
| (a) to ensure public safety and prevent risks to human life, | Section 1.2.1<br>Table 2-2<br><br>Risk to the objectives have been identified through Coastal Hazard threats.<br>Consideration given in addressing these risks and threats though the development of specific management actions such as all actions with an ID starting with CD. |
| (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, | |
| (d) to maintain public access, amenity and use of beaches and foreshores, | |
| (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 | |

| Section 3 - Objects of the CM Act and Objectives of the Resilience and Hazards SEPP | How this is addressed in this CMP |
|---|---|
| (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. | |
| **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, | Section 1.2.1<br>Table 2-2<br><br>Risk to the objectives have been identified through threats: RA Threat 2, RA Threat 5, CD Threat 1, CD Threat 3, All EGC Threats.<br>Consideration given in addressing these risks and threats though the development of specific management actions such as CD3_B, CD3_C, RA2_B, RA2_E, RA2_F, RA2_G, and all actions with IDs EGC. |
| (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, | |
| (d) to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons, | |
| (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. | |
| The management objectives for the coastal use area are as follows— | |
| (a) to protect and enhance the scenic, social and cultural values of the coast by ensuring that— | Section 1.2.1<br>Table 2-2<br><br>Risk to the objectives have been identified through threats: All RA Threats, CD Threat 2, EGC Threat 1, EGC Threat 3, EGC Threat 4. |
| (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 | |

| Section 3 - Objects of the CM Act and Objectives of the Resilience and Hazards SEPP | How this is addressed in this CMP |
|---|---|
| (iv) adequate public open space is provided, including for recreational activities and associated infrastructure, and | Consideration given in addressing these risks and threats though the development of specific management actions such as CD2_A, EGC3_B, EGC3_D, EGC4_A, EGC4_B, and all actions with IDs RA. |
| (v) the use of the surf zone is considered, | |
| (b) to accommodate both urbanised and natural stretches of coastline. | |

## 1.4 Key Stakeholders, their Interests and Issues

Federal, State and Local level organisations are involved in governing the coastal zone with their governance role largely tied to land tenure and Native Title (under the EPBC Act). The study area comprises a mixture of land tenure and land management arrangements including private freehold land, Council public land (community and operational land), Crown (unreserved), Crown Land that is reserved or dedicated (called Crown Reserves and Crown Dedications), state conservation areas / national parks / nature reserves / Aboriginal Areas, marine park, road reserve, and railway lands.

A Community and Stakeholder Engagement Plan for this CMP has been prepared, and is provided in **Appendix A**. The Engagement Plan sets out the strategy to engage with the broader community and stakeholders, as required by the CM Act and the CM Manual.

Council has undertaken a range of community engagement and consultation processes as part of developing this CMP, as summarised in **Table 1-2**, including further community and stakeholder engagement that will be undertaken as part of the public exhibition of the CMP (Stage 4).

As part of the preparation of this CMP Council has engagement with Bega Valley Shire Council regarding the Cape Dromedary-Goalen Head sediment compartment, and with Shoalhaven City Council regarding the Warden head to Beagle Bay compartment. There only management action proposed within the CMP that requires cross-boundary collaboration, is the review of the South Durras ICOL Entrance Management Policy. Shoalhaven City Council is a support agency for this action (CH8_B).

Public authorities in which implementation of the CMP will affect have been consulted regarding the coastal zone management issues and actions contained in this CMP, as documented in **Appendix A** and **Table 1-2** below

**Table 1-2 Summary of Engagement Activities undertaken during each CMP Stage**

| Stage | Engagement Activities |
|---|---|
| Stage 1 | • Detailed investigation of previous coastal community engagement activities to identify values and management issues associated with the study area<br>• Community interest registration (via Council's website)<br>• Presentations to the Eurobodalla Shire Council's Coastal and Environment Management Advisory Committee |

| Stage | Engagement Activities |
|---|---|
| | • Presentations to the Batemans Bay Coastal Agency Taskforce<br>• Meeting with Aboriginal community representatives on Country to scope the CMP, discuss cultural values and management issues<br>• NSW government agency and adjoining Council discussions<br>• Updates on progress on Council's website (first newsletter) |
| Stage 2 | • Series of online workshops with community representatives in August 2021 to present the draft findings of the Stage 2 assessments and obtain input into identifying coastal management issues for consideration in the CMP<br>• Coastal & Environment Management Advisory Committee (CEMAC) Briefing<br>• Batemans Bay Taskforce Briefing<br>• Updates on progress on Council's website (second newsletter) |
| Stage 3 | • Aboriginal engagement co-design workshop to identify approach for Stage 4 Aboriginal Engagement<br>• CEMAC workshop to present the draft findings of the Stage 2 assessments and obtain input into identifying coastal management issues for consideration in the CMP<br>• Batemans Bay Taskforce Briefing |
| Stage 4 | • Aboriginal engagement sessions<br>• Targeted Agency engagement of recommended CMP actions<br>• Community working groups undertake review of CMP recommendations in workshop environment<br>• Coastal & Environment Management Advisory Committee (CEMAC) Briefing<br>• Batemans Bay Taskforce Briefing<br>• Public exhibition of this draft CMP<br>• Public drop-in sessions and online submissions during draft CMP exhibition<br>• Updates on progress on Council's website |

Potential governance and management arrangements for the CMP are outline in **Table 1-3**. Many of these key stakeholders have direct land ownership and management responsibilities in the CMP study area.

**Table 1-3 Potential CMP Governance and Management**

| Entity | Responsibility |
|---|---|
| Eurobodalla Shire Council | Lead agency for development, coordination and implementation of CMP |
| **State Agencies/Land Managers**<br>NSW Department of Planning and Environment (DPE) – Environment and Heritage Group (EHG)<br>DPE – Water<br>DPE – Planning<br>DPE – Crown Lands | Support on CMP recommendations, collaboration and action(s) implementation (as defined) |

| Entity | Responsibility |
|---|---|
| DPE - Heritage<br>NSW Department of Primary Industries (DPI) Fisheries<br>Local Aboriginal Land Councils (LALCs)<br>Local Land Services (LLS)<br>National Parks and Wildlife Service (NPWS)<br>Transport for NSW<br>Maritime Infrastructure Delivery Office (MIDO)<br>NSW State Emergency Service (SES) | |
| **Coastal & Environment Management Advisory Committee (CEMAC)**<br>Eurobodalla Shire Council<br>Agencies (above who have direct land ownership and management responsibilities in the CMP study area)<br>Regional Bodies (LLS, Regional Development Australia, LALCs, etc)<br>NSW Rural Fire Service and NSW State Emergency Service<br>Selected community and user group(s) | Non-statutory committee to assist facilitating local community and stakeholder involvement and oversight of the planning and implementation process(es).<br><br>Advisory only, potentially a committee of council under S355 of the *Local Government Act 1993.* |

## 1.5 Planning Framework

Local Councils in NSW are to undertake management of their coastal areas in accordance with the coastal management framework (**Figure 1-2**), underpinned by the CM Act and Resilience and Hazards SEPP. To achieve this, Councils are required to develop CMPs. The NSW Coastal Management Manual (OEH, 2018) provides information and guidance to Councils in preparing their CMPs.


**Figure 1-2** **Coastal Management Framework (Adapted from OEH, 2018)**

A CMP is prepared in five stages, as shown in **Figure 1-3**. A Stage 1 Scoping Study for the Eurobodalla Open Coast was prepared by Rhelm and Baird (2022a). Subsequently Stage 2 Vulnerability Assessments were undertaken by Rhelm and Baird (2022b). This CMP document constitutes Stages 3 and 4 of the CMP process.

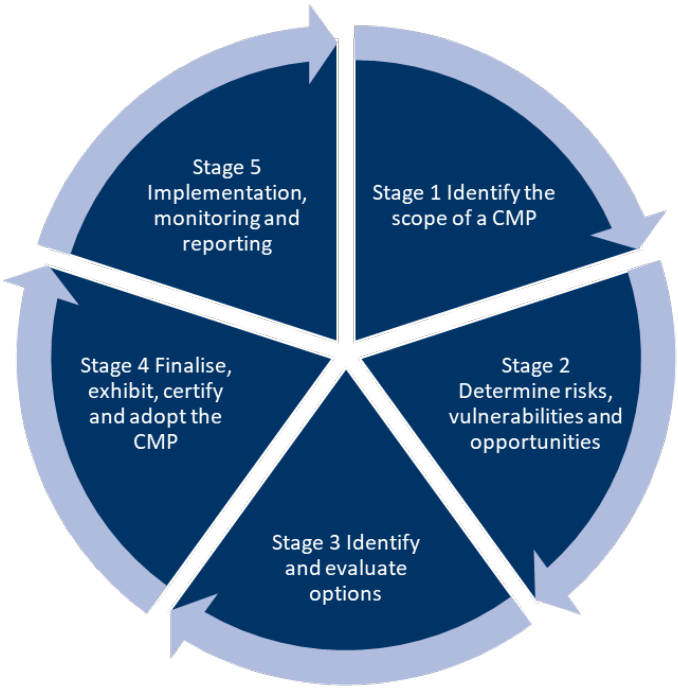



**Figure 1-3 The Five Stages of a CMP (Adapted from OEH, 2018)**

## 1.6 Review of Existing Information and Management Arrangements

An assessment of the adequacy of existing information and management arrangements for the study area was completed during the CMP Scoping Study (Rhelm, 2022a).

A first pass risk assessment was completed during the preparation of the CMP Scoping Study (Rhelm, 2022a). Coastal risks were identified through a combined review of background information, site inspections and prior community consultation.

During the preparation of the CMP, the risk assessment was amended to reflect the outcomes of CMP stages 2 and 3 as detailed in **Section 2.4**, **Appendix B** Stage 2 Vulnerability Assessments (Rhelm, 2022b) and updated threats to the study area outlined in **Section 2.2**.

CMP Stage 2 studies identified as necessary for completion within the Scoping Study are detailed in **Appendix B**.

Coastal management opportunities have been identified during CMP Stage 3 as management actions, to address priority risks documented within **Appendix C and D**.

# 2 A Snapshot of Issues

The Eurobodalla Open Coast study area includes 140km of spectacular beaches, headlands and shorelines. The pristine coastline includes many popular beaches such as Surf Beach, Malua Bay Beach and Broulee Beach near Batemans Bay and also Moruya Beach, Congo and Bingie further south.

The Stage 1 Scoping Study describes in detail the environmental, social and cultural, economic and future context for coastal management planning for the Eurobodalla Open Coast. This context sets the scope for the CMP and fed heavily into the understanding of the values of and priority threats to the study area.

The outcomes of engagement activities undertaken prior to the preparation of the CMP (see **Appendix A**) were a key input to identifying the values and threats in the coastal zone. In addition, engagement undertaken in Stages 1, 2 and 3 of the CMP further informed the understanding of coastal values and threats. Details of the engagement activities are provided in **Appendix A**, and included:

- Meeting on Country with Traditional Owners (Stages 1 and 3)
- Community working groups (Stage 2 and 3)
- Ongoing liaison with Council staff, Councillors, adjoining councils, and State Government Agencies.

**Sections 2.1** and **2.2** provide a summary of the values of the study area and the priority threats to the study area, as developed in consultation with key stakeholders and based on feedback from the community, during the Stage 1 Scoping Study and Stage 2 Vulnerability Study.

**Section 2.3** identifies the key issues for each of the coastal management areas, drawing in relevant environmental/social/cultural/economic/future context details from the Stage 1 Scoping Study, as well as key locations at risk, to provide context for the coastal management options developed and included in this CMP.

## 2.1 Values of the Study Area

A key outcome of the Stage 1 Scoping Study was understanding how the community value the coastal zone. A list of 13 key values was identified through review of previous community consultation undertaken within the coastal zone and across the LGA, as shown in **Table 2-1**.

**Table 2-1 Priority Values of the Study Area**

| Theme | | Values |
|---|---|---|
|  | **Healthy environment** | Natural character and geodiversity<br>Biodiversity and ecosystem integrity<br>Clean waters, beaches and coastal environment |
|  | **Recreational and social values** | Accessibility, property protection and safety<br>Amenity and recreation<br>Public space to gather, socialise and participate in community activities<br>Education / scientific |

| Theme | | Values |
|---|---|---|
| | | Non-Aboriginal heritage |
|  | **Aboriginal cultural heritage and use** | Aboriginal cultural heritage and use |
|  | **Economic values** | Tourism<br>Fishing (recreational, cultural, commercial)<br>Agriculture and urban lands<br>Support for aged care and assisted living |

## 2.2 Threats to the Study Area

There are a number of coastal hazards and threats to the Eurobodalla Open Coast, its coastal ecosystems and values. A key outcome of the Stage 1 Scoping Study was to understand and prioritise the threats to the coastal zone, which were considered across a range of planning timeframes and pathways and developed from a range of sources of information, including community and stakeholder feedback.

The coastal management threats (also referred to as issues) to the study area are shown in **Figure 2-1** and include 24 priority threats, under four themes.

In developing these threats to the study area and undertaking the risk assessments as discussed in **Section 2.4**, the CMP has considered the following matters, which are discussed in detail in the Stage 1 Scoping Study:

- current and future risks, at timeframes of immediate, 20 years, 50 years, 100 years
- the effects of climate change
- the local and regional-scale effects of coastal processes
- the ambulatory and dynamic nature of the shoreline
- population growth and demographic changes
- projected use of the coastal zone.

**Coastal Hazards**

- CH Threat 1 – Beach erosion
- CH Threat 2 – Shoreline recession
- CH Threat 4 – Coastal inundation
- CH Threat 5 – Tidal inundation
- CH Threat 6 – Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters
- CH Threat 7 – Coastal watercourse entrance instability
- CH Threat 8 – Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLs)
- CH Threat 9 – Dune slope instability
- CH Threat 10 – Coastal cliff instability

**Recreational Activities**

- RA Threat 1 – Conflict over resource access and use
- RA Threat 2 – Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc.)
- RA Threat 3 – Poorly located, poorly maintained and/or inappropriate access and supporting facilities
- RA Threat 4 – Anti-social behavior and unsafe practices
- RA Threat 5 – Passive recreational use (swimming, surfing, bush walking, etc)
- RA Threat 6 – Active recreational use (recreational boating, motorised watercraft, camping etc) - recreational activities needing associated infrastructure
- RA Threat 7 – Commercial and recreational fishing

**Coastal Development**

- CD Threat 1 – Coastal development resulting in loss of plant and animal species (habitat disturbance or loss)
- CD Threat 2 – Water pollution from urban stormwater and treated effluent discharge
- CD Threat 3 – Pollution of water, beach sand and other habitat areas with litter, solid waste, marine debris and microplastics
- CD Threat 4 – Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts

**Engagement and Governance and Compliance**

- EGC Threat 1 – Lack of compliance with regulations (by users) or lack of compliance resources (by agencies)
- EGC Threat 2 – Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment
- EGC Threat 3 – Insufficient or inappropriate governance and management of the coastal environment
- EGC Threat 4 – Insufficient involvement of Traditional Owners in the management of cultural heritage and use within the coastal environment

**Figure 2-1 Priority Coastal Management Threats in the Study Area**

### 2.2.1 Threats Refined by Stage 2 Vulnerability Assessments

Following identification of the threats and data gaps and the first pass risk assessment in the Stage 1 Scoping Study (discussed further in **Section 2.4**), Stage 2 Vulnerability Assessments were undertaken (Rhelm, 2022b).

The Stage 2 Vulnerability Assessments report, which is contained in **Appendix B**, addresses and fills knowledge gaps identified in the Stage 1 Scoping Study, and in doing so builds upon on the coastal vulnerability information for the Eurobodalla coastline.

The Stage 2 additional studies completed and presented in the Stage 2 Vulnerability Assessments report are:

- Erosion assessments at key risk locations identified in Stage 1
- Geotechnical assessments at key locations identified in Stage 1
- Coastal inundation assessments at key risk locations identified in Stage 1
- Conceptual sediment transport analysis of Batemans Bay.

The outcomes of these vulnerability assessments further informed the locations and severity of several threats to the study area, as discussed in **Section 2.3**.

## 2.3 Snapshot of Issues for each Coastal Management Area

**Table 2-2** identifies the coastal management issues that arise within each of the four coastal management areas, recognising that some issues may affect more than one area.

Table 2-2 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** | RA Threat 2<br>CD Threat 4<br>CH Threat 8<br>EGC Threat 1<br>EGC Threat 3 | The study area includes Coastal Wetlands and small areas of Littoral Rainforest Proximity Area that extend into the study area.<br>The identified threats present a risk to the health, biodiversity, resilience and integrity of these Littoral Rainforests areas. | Key areas of existing Littoral Rainforest are shown on **Map RG-01-01**. Some of these extents are currently at risk of degradation, being threatened by land-use pressures and climate change into the future. |
| **Coastal Vulnerability Area (CVA)** | ALL CH Threats<br>All EGC Threats | The ambulatory and dynamic nature of the shoreline has been considered in the CMP through using the understanding of coastal processes to inform management response, including how coastal hazards will be exacerbated with climate change.<br>Of the coastal hazard threats the key ones are:<br>• Beach erosion<br>• Shoreline recession<br>• Coastal inundation<br>• Tidal inundation<br>• Coastal watercourse entrance instability<br>• Coastal watercourse entrance modifications.<br>The above-listed coastal hazards present a risk to public safety and risk to life, as well as a risk to property and public assets.<br>The erosion of beaches through cross shore sediment transport under coastal storm conditions is a key coastal process that affects all beaches within the study area and is considered within the concept of sediment compartments.<br>The engagement, governance and compliance threats may have an impact on natural features of the coastline such as beaches and dunes, including public access, use and amenity of these features. These threats may also have an impact on Aboriginal cultural heritage and management of the coastal environment may not be optimised without all relevant parties and the community on board. | The highest priority locations where the beach erosion and coastal inundation are occurring and impacting on properties and critical infrastructure, based on Stage 2 vulnerability assessments, are as follows:<br>• Shoreline recession and beach erosion: Maloneys Beach, Long Beach, Surfside, Wharf Road, Caseys Beach, Sunshine Bay, Malua Bay, Guerilla Bay (south), Barlings Beach, Tomakin Cove, and Broulee.<br>• Coastal and tidal inundation: Durras Beach (south), Cookies Beach, Maloneys Beach, Long Beach, Surfside, Wharf Road, Batemans Bay CBD, Boat Harbour, Corrigans Beach, Caseys Beach, Malua Bay, Guerilla Bay, Barlings Beach, and Broulee.<br>• Cliff instability was identified as a risk at Corrigans Headland, Sunshine Bay, Caseys Beach Headland and Long Beach Headland.<br>• Dune instability was identified as a risk at Murramarang Nature Resort, beach reserves at Maloneys Beach, Long Beach, Surfside, Corrigans (include Clyde View Holiday Park) and Malua Bay.<br>• ICOLL entrances with entrances that require intervention and management (i.e. have current entrance management plans): South Durras, Surfside, Joes Creek, Short Beach, Wimbie Beach, Kianga, Little Lake (Narooma), Nangudga Lake, Congo, Potato Point, Lake Brou, Corunna Lake. |

| Coastal Management Area (CMA) | Threats within CMA | Context for Threats | Key Locations for Threats |
|---|---|---|---|
| **Coastal Use Area** | All RA Threats<br>CD Threat 2<br>EGC Threat 1<br>EGC Threat 3<br>EGC Threat 4 | The Coastal Use Area encompasses much of the Eurobodalla Open Coastline. The threats identified to this area risk the scenic, recreational, social and cultural values of the open coast.<br>The current population of the Eurobodalla Shire is approximately 38,000 people. Whilst the population is growing very slowly, it is ageing rapidly. Tourism is also a major part of the social and cultural context of the study area. Coupled with the influx of tourists, the region's population balloons in the summer months from 38,000 to over 110,000. This highly variable and non-permanent population is a key driver of many aspects of the Eurobodalla social and cultural context.<br>Insufficient involvement of traditional owners in the management of cultural heritage and use within the coastal environment is an ongoing issue. Effective coastal management cannot occur without the involvement of the Traditional Owners. | Some of the key locations where conflicts over resource access and use are occurring are:<br>• The Bingie Dreaming Track<br>• Beach access issues (such as dune trampling) at South Durras, Rosedale Beach and Broulee among other locations.<br>Inappropriate access and supporting facilities have been identified at key high use coastal areas by previous plans and by the community working groups, including:<br>• Lack of connecting coastal walks and cycleways at Batemans Bay,<br>• Lack of promotion, maintenance and use of existing walking tracks such as coastal walks in Murramarang National Park, Broulee Island, Bingie Dreaming, Mystery Bay to 1080 Beach, Mangrove walk at Cullendulla Creek, Durras discovery and Banksia Walk at Burrewarra Point, Mill Bay Board walk at Narooma.<br>• Lack of and poorly maintained facilities at high use beaches, such as Corrigans Beach, Malua Bay, McKenzies Beach, One Tree Beach<br>• Lack of appropriate parking and safe access to parking at McKenzies Beach<br>• Unsafe or inappropriate beach access (particularly lack of disability inclusive access to beaches).<br>The high usage of bike tracks between Broulee Head and Moruya Heads is impacting on vegetation and increased volumes of little have been reported in these sensitive environmental and cultural areas.<br>Lack of cultural access for Traditional Owners has been identified at numerous locations along the coast. Some specific examples include access for fishing and collection of traditional diet, and access to healing sites. In addition, there is dissatisfaction by Traditional Owners in the current management arrangements for some culturally significant locations, including at Broulee Island and Barlings Beach. |
| **Coastal Environment Area** | RA Threat 2<br>RA Threat 5<br>CD Threat 1<br>CD Threat 3<br>All EGC Threats | The Coastal Environment Area encompasses much of the Eurobodalla Open Coast.<br>The identified threats, such as recreational activities and coastal development threats, are impacting coastal ecosystems, biological diversity, ecosystem integrity and water quality (to a lesser extent) along the open coast.<br>Dune vegetation management is key in the coastal environment area to mitigate erosion risk to properties and assets such as roads located behind the dune systems.<br>Weeds impact significant areas along the coast, including weeds of national significance. | Some of the key locations where dune vegetation is being impacted by pedestrian and vehicle access are:<br>• South Durras<br>• Rosedale Beach<br>• Tomakin Beach (spit)<br>• Broulee<br>Shorebird nesting sites have been impacted by pest species and inappropriate use and access of nesting sites.<br>The penguins local to Batemans Bay are found only on islands, where there were no cats, foxes, dogs or humans. About 15 percent of this population live on Snapper Island. Council's sustainability team and Landcare volunteers undertake work on Snapper Island, clearing environmental weeds and plastic pollution and providing additional nesting opportunities for the Little Penguins.<br>Potato Point was identified by Council as a key location for weed management.<br>Water quality issues have been identified by the community (through the community working groups) and by Mogo LALC. It was suspected that the issues were a result of landfill leachate / runoff, stormwater or sewer overflow. |

## 2.4 Risk Assessment

A first pass risk assessment process was applied during the Stage 1 Scoping Study to better understand the severity of known threats in the study area, at present and in the future and to help inform the scope of the CMP. The goal was to identify what values and assets might be at risk and then establish whether the risk is large enough to warrant a more detailed assessment / further assessed in subsequent stages of the CMP (OEH, 2018).

The results of the first pass risk assessment and the methodology for the risk assessment process are described in the Stage 1 Scoping Study (Rhelm, 2022a).

Following this the Stage 2 Vulnerability Assessments (Rhelm, 2022b) were undertaken where the first pass risk assessment had indicated further assessment was required. The outcomes of each of the vulnerability assessments undertaken in the Stage 2 Vulnerability Assessments were categorised against three levels of risk as per the CM Manual to provide the framework and approach for Stage 3. The results of the Stage 2 Risk Assessment are shown in Table 7-1 in the Stage 2 Vulnerability Assessments report in **Appendix B**.

Note that the risk assessment methodology to assess coastal hazard threats in the Stage 1 Scoping Study was undertaken differently to the other threats. Locations at risk of coastal hazards were identified and a risk rating applied at individual locations, rather than an overall risk rating applied to the entire open coast. Information from CMP Stages 1 and 2 has been used to determine the coastal hazards risk ratings in **Table 2-3**, conservatively based on the highest risk rating identified across all locations at risk for each coastal hazard. In some instances, there may only be one location at high risk (i.e. only Tomakin Beach is at high risk of coastal watercourse entrance instability currently and into the future, while all other locations assessed were at low risk currently and into the future). Even in instances like this the most conservative risk rating has still been applied to the entire open coast in **Table 2-3** (i.e. see high risk rating for Coastal Hazard Threat 6).

As part of this stage of the CMP process the First Pass Risk Assessment was revised, incorporating the Stage 2 Vulnerability Assessments results. The threats were reviewed with respect to the coastal management area extents and their objectives, in light of the additional information.

Threats to the Eurobodalla Open Coast study area and corresponding risk levels identified by the revised risk assessment are summarised in **Table 2-3** as current and future risk (20 year, 50 year and 100 year). High consequence, low probability events that affect all relevant areas have been considered by assessing 100 Year ARI coastal events under the above current a future risk time-frames.

It is noted that a decision was made in the scoping study due to the suitability of coastal hazard assessment and associated mapping completed for present day, 2050, 2065 and 2100, including Councils adopted Sea level Rise and Policy Framework that the timeframes were adequate for coastal management planning and previous studies would allow for fast tracking of Stage 2 at most locations. Additional analysis under the same timeframes i.e. present day, 2050, 2065 and 2100 were undertaken and analysed to fill gaps and this was undertaken in Stage 2. This forms the basis of the risk and management option analysis.

Table 2-3 Risk Assessment Results for Eurobodalla Open Coast Threats

| ID | Threat | Current Risk (2022) | Future Risk (20 years) | Future Risk (50 years) | Future Risk (100 years) |
|---|---|---|---|---|---|
| **Coastal Hazards Threats** | | | | | |
| CH Threat 1 | Beach erosion | **High** | **High** | **High** | **Extreme** |
| CH Threat 2 | Shoreline recession | **Medium** | **Medium** | **High** | **Extreme** |
| CH Threat 3 | Coastal inundation | **High** | **High** | **High** | **Extreme** |
| CH Threat 4 | Tidal inundation | **Low** | **Medium** | **Medium** | **High** |
| CH Threat 5 | Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters | Not assessed for the open coast | | | |
| CH Threat 6 | Coastal watercourse entrance instability | **High** | **High** | **High** | **High** |
| CH Threat 7 | Coastal watercourse entrance modifications (interventions in natural opening regimes for ICOLLs) | **Medium** | **Medium** | **High** | **High** |
| CH Threat 8 | Dune slope instability | **Low** | **Low** | **Medium** | **Medium** |
| CH Threat 9 | Coastal cliff instability | **Low** | **Low** | **Medium** | **Medium** |
| **Recreational Activities Threats** | | | | | |
| RA Threat 1 | Conflict over resource access and use (e.g. beach users and dog walkers) | **Low** | **Low** | **Medium** | **Medium** |
| RA Threat 2 | Habitat (physical) and wildlife disturbance (e.g. from overuse, overcrowding, foreshore development, commercial and recreational fishing methods, etc) | **Medium** | **Medium** | **High** | **High** |
| RA Threat 3 | Poorly located, poorly maintained and/or inappropriate access and supporting facilities | **Medium** | **Medium** | **Medium** | **Medium** |
| RA Threat 4 | Anti-social behaviour and unsafe practices | **Low** | **Low** | **Medium** | **Medium** |
| RA Threat 5 | Passive recreational use (swimming, surfing, bush walking, etc) | **Low** | **Low** | **Medium** | **Medium** |
| RA Threat 6 | Active recreational use (recreational boating, motorised watercraft, camping etc) - recreational activities needing associated infrastructure | **Medium** | **Medium** | **High** | **High** |
| RA Threat 7 | Commercial and recreational fishing | **Medium** | **Medium** | **High** | **High** |
| **Coastal Development Threats** | | | | | |
| CD Threat 1 | Coastal development resulting in loss of plant and animal species (habitat disturbance or loss) | **Medium** | **Medium** | **High** | **High** |
| CD Threat 2 | Water pollution from urban stormwater and treated effluent discharge | **Low** | **Low** | **Medium** | **Medium** |

| ID | Threat | Current Risk (2022) | Future Risk (20 years) | Future Risk (50 years) | Future Risk (100 years) |
|---|---|---|---|---|---|
| CD Threat 3 | Pollution of water, beach sand and other habitat areas with litter, solid waste, marine debris and microplastics | **Low** | **Low** | **Medium** | **Medium** |
| CD Threat 4 | Coastal development encroaching onto natural coastal processes to exacerbate hazard impacts | **Medium** | **Medium** | **High** | **High** |
| **Engagement and Governance and Compliance Threats** | | | | | |
| EGC Threat 1 | Lack of compliance with regulations (by users) or lack of compliance resources (by agencies) | **Medium** | **Medium** | **High** | **High** |
| EGC Threat 2 | Insufficient community and visitor awareness of the values and threats to the coastal environment, and lack of engagement with managing this environment | **Medium** | **Medium** | **High** | **High** |
| EGC Threat 3 | Insufficient or inappropriate governance and management of the coastal environment | **Medium** | **Medium** | **High** | **High** |
| EGC Threat 4 | Insufficient involvement of Traditional Owners in the management of cultural heritage and use within the coastal environment | **High** | **High** | **Extreme** | **Extreme** |

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

## 3.1 Evaluation of coastal management options

The coastal management program (CMP) process involves councils identifying coastal management issues affecting the areas to which the CMP is to apply and identifying coastal management actions required to address those coastal management issues in an integrated and strategic manner. The aim is to develop strategies and identify coastal management actions that address coastal management issues, reduce exposure to coastal hazards, and to take advantage of opportunities, consistent with provisions in Section 14 and 15 of the CM Act. Councils also decide the priority of identified coastal management actions and propose integrated and strategic delivery pathways.

Stages 1 and 2 of this CMP (including the engagement activities undertaken) developed an understanding of the coastal management issues, including an analysis of the risks, vulnerabilities and opportunities in their local area. This information is summarised in **Section 2** and helps to determine what coastal management actions may be identified in a CMP to address coastal management issues in an integrated and strategic manner.

Stage 3 of the CMP identified and evaluated management options to select preferred coastal management actions with a focus on achieving the objects of the CM Act. This process was undertaken in accordance with the four steps outlined in the Manual, summarised in **Figure 3-1**.

Community and stakeholder engagement informed this process through the identification of options at the community working groups and meetings on Country with Traditional Owners.

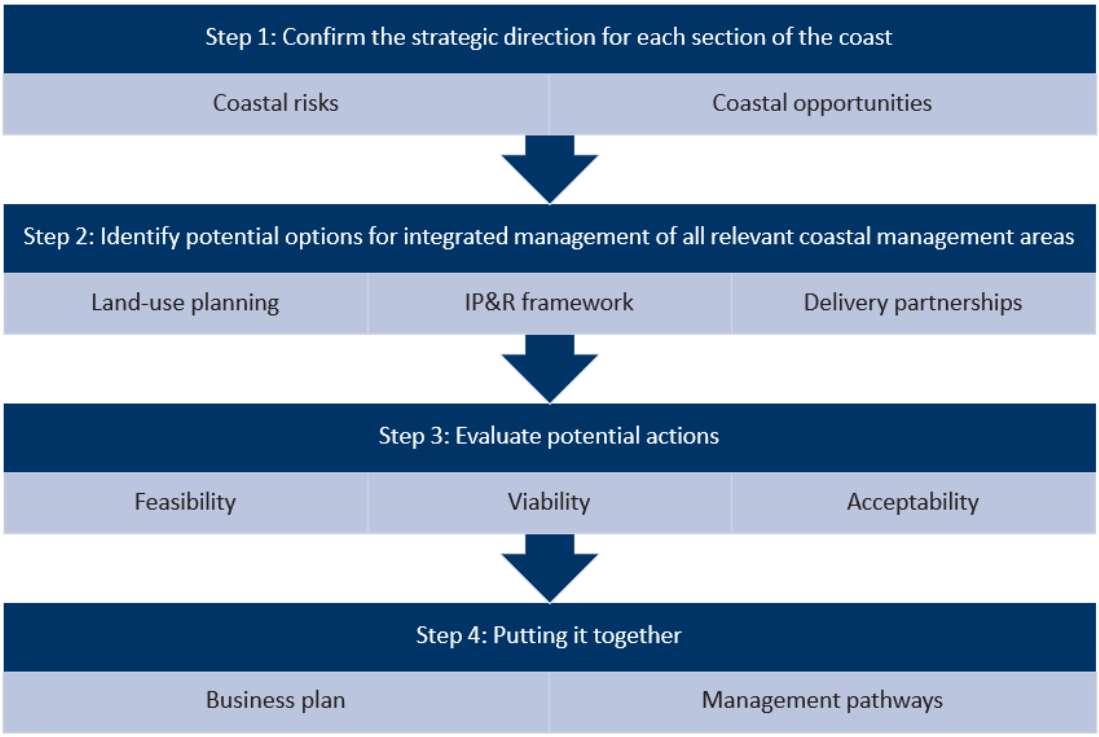



**Figure 3-1 Four steps in action identification and evaluation (adapted from CM Manual)**

### 3.1.1 Confirm Strategic Direction

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 Eurobodalla LGA Open Coast is encapsulated by the vision that has been developed for the coast along with the local coastal management objectives (**Section 1.3**), aligned with the CM Act.

The strategic context for coastal management in the Eurobodalla open coast is defined in detail in the Stage 1 Scoping Study to set the environmental, social/cultural, economic and legal/planning context for coastal management. This includes consideration of population and demographics, housing and settlement patterns, regional strategic planning, tourism, recreation, conservation and Aboriginal cultural and how these will likely change over time. All these aspects have been considered by Council in the development of this CMP including threats and its long term strategy including delivery actions such as CH1_M and CH4.

### 3.1.2 Identifying Options

A total of 139 potential actions were compiled from the audit of the previous management plans for the coast (Wharf Road CZMP, 2009 and Geotechnical Slope Instability Risk Assessment, 2012), the Draft Scoping Study (Umwelt, 2018), outcomes of the Stage 2 vulnerability assessments and engagement with the community and traditional owners.

A list of the options identified, and how they were identified (i.e. the source of the options) is provided in **Appendix C**. For each option, the following information is also provided:

- An option ID to allow for tracking through the options evaluation process
- An option description
- The coastal threat the option addresses
- The coastal management area to which the option applies
- The type of management action proposed (i.e. alert, avoid risk, active intervention, ).

### 3.1.3 Evaluating Options

Councils are advised in the CM Manual to undertake a structured and transparent evaluation process to select and adopt the most appropriate coastal management actions. It is recommended that proposed coastal management actions be evaluated in relation to feasibility, viability and acceptability. This approach has been adopted in this CMP. An overview of the options assessment process is shown in **Figure 3-2**.

The long list of 139 options identified in Stage 3 of the CMP were subject to varying degrees of assessment for feasibility, viability and acceptability, depending on the complexity and magnitude of the options.

Initially, a feasibility assessment was undertaken to ‘rule out’ any options that did not address an existing or future risk to the coast, to consolidate overlapping options, or to identify options that were not feasible through engagement with relevant agency staff. The outcome was 85 options for further assessment.

A viability assessment was then undertaken either through:

- a simple economic analysis and a multicriteria assessment for options that have low risk, impact and complexity; or
- a detailed cost-benefit analysis, preliminary design and viability analysis (e.g. modelling) as well as the use of the multicriteria assessment for options that have high risks, impacts and complexities.

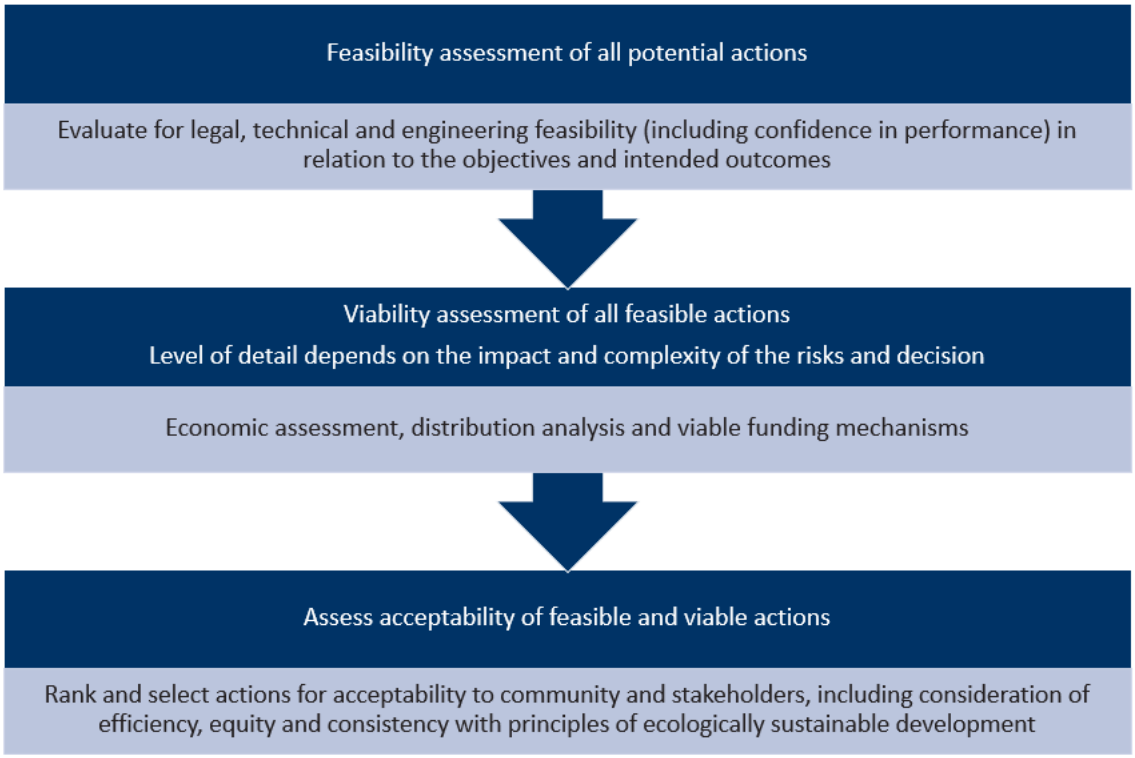



**Figure 3-2 Staged option evaluation process**

#### *3.1.3.1 Feasibility Assessment*

The feasibility of the options was assessed using the guidance in the CM Manual, by assessing the options against the criteria shown in **Table 3-1**.

**Table 3-1 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 |
| | Comply with statutory and policy requirements at local, state and Commonwealth levels |
| | Are environmentally acceptable and consistent with Ecologically Sustainable Development (ESD) principles |
| 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 |

| Feasibility Criteria | CM Manual Guidance |
|---|---|
| Reduces risk | Can address the identified issues, mitigating risks or enhancing opportunities, based on previous experience |
| | Are likely to contribute new knowledge about effective management; for instance, a response that is structured as a carefully controlled trial of new technology |
| Adaptive | Are adaptive and can transition to alternative approaches when circumstances change |

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

- the timeframe over which the effectiveness of an action can be maintained
- evidence from application of the action in similar situations
- the limits to effectiveness (e.g. a threshold event in which a response will fail)
- the potential for any unintended or unanticipated negative consequences (sometimes referred to as perverse outcomes)
- the irreversibility of some actions that predetermines the future action or pathway
- the level of expertise required to evaluate the design, implementation, monitoring and review of actions
- whether the selection of a strategy allows for adaptive management.

The feasibility assessment is provided in **Appendix C**. The feasibility assessment identified 85 options to progress to the viability assessment.

#### *3.1.3.2 Viability Assessment*

The viability of coastal management options was assessed through a range of processes, depending on the risk, impact and complexity associated with the option. Viability assessment involved a multicriteria assessment in all cases and a cost benefit analysis for selected options.

A range of details associated with the options were produced to inform the viability assessments, including costs (capital and recurrent), design, and impacts (e.g. hydraulic and coastal modelling). For the majority of options, these details are provided in simple format in **Appendix D**. For options addressing higher risks or involving high costs and complexities, more comprehensive option details are provided in **Appendix E**, with details of cost estimates provided in **Appendix F**.

##### 3.1.3.2.1 Multi-criteria assessment

The 91 options identified through the feasibility assessment were assessed for their viability using a multi-criteria assessment (MCA) to confirm consistency with the CM Act. The MCA involved assessment of:

- **Threat mitigation score (effectiveness)** comprised on the scoring of the option to address each of the threats listed in **Section 2.2**. Scores were applied in accordance with **Table 3-2**.
- **Social and environmental score (benefits)** assessed the options benefits. Scores were applied in accordance with **Table 3-2**.

- **Acceptability score (community)** estimated the likely community acceptance of the options. This score will be updated as an outcome of the Stage 4 community engagement activities, where required. Scores were applied in accordance with **Table 3-3**.
- **Cost Score (financial)** was applied to the MCA as a weighting, in accordance with **Table 3-4**.

A CMP must consider projected population growth and demographic changes. However, as detailed in the Scoping Study (Rhelm, 2022a), the population of the Eurobodalla region is relatively stable and therefore did not require inclusion in the criterion used to assess management options. Although there is a shift in demographics towards an increase in the proportion of the population in the over 65 years age group, changing demographics was also not considered suitable for inclusion in the multi-criteria assessment. Current and future population has been considered in the cost benefit analysis (see **Section 3.1.3.2.2**).

**Table 3-2 Threat mitigation and Social/Environmental benefits scoring system**

| Influence | Score |
|---|---|
| Direct Positive | 2 |
| Indirect Positive | 1 |
| No Influence | 0 |
| Indirect Negative | -1 |
| Direct Negative | -2 |

**Table 3-3 Community acceptability scoring system**

| Likely community acceptance | Score |
|---|---|
| Strong support | 2 |
| Moderate support | 1 |
| Neither support nor oppose | 0 |
| Moderate opposition | -1 |
| Strong opposition | -2 |

**Table 3-4 Cost scoring system**

| Cost | Adjustment / weighting |
|---|---|
| <$10000 | 1 |
| $10,000 < $100,000 | 2 |
| $100,000 < $1000,000 | 3 |
| >$1,000,000 | 4 |

Options with a cost-adjusted MCA score of 5 or more were recommended for action as an outcome of this CMP. Selected options with lower cost-adjusted scores, but high unadjusted scores were recommended for action, if the detailed Cost Benefit Analysis identified their economic viability.

#### 3.1.3.2.2 Cost Benefit Analysis

Economic assessment can help decision-makers better understand the socioeconomic implications of adopting different management actions and help them to make choices about prioritisation of actions to maximise net benefits to the community. Such information was used to also assist in developing the business plan and determining cost-sharing arrangements.

The scope and level of detail included in an economic assessment should be proportionate to the nature and scale of the coastal issue(s) being addressed. Detailed cost-benefit analysis (CBA) is not warranted for projects that are only expected to have minor costs and/or benefits and for which a real-world net benefit realisation is well understood. Where there is uncertainty or complexity as to whether a project has economic merit or not, economic assessment through cost benefit analysis is the NSW Government's recommended approach to analysis.

Coastal management actions which will operate over relatively long timeframes, including engineering works with long design lives, and can represent such complex investment opportunities. Coastal management actions may affect a range of stakeholders (some positively, some negatively) and generate potentially large direct and indirect costs and benefits. A detailed CBA for such large-scale or long-lasting actions was undertaken to determine whether the benefits outweigh the costs.

The following 13 options were identified as requiring a detailed CBA to fully assess their viability:

- **CH1_B:** This option involves the upgrading of Northcove Road at Maloneys Beach. This would include raising the road with the additional support of a seawall and culvert cells. These upgrades seek to provide resilience from waves and catchment inundation, flooding and coastal erosion.
- **CH1_D and CH1_E:** This option involves the construction of a low revetment along Bay Road at Long Beach to protect public infrastructure from beach erosion. The two stages of these works have been assessed separately.
- **CH1_Ka:** This option involves the protection of Wharf Road from coastal erosion and inundation risk including construction of coastal protection works and rehabilitating the beach.
- **CH1_Kb:** This option involves the protection of Wharf Road and surrounding properties from coastal inundation through upgrading the existing seawall across the waterfront and constructing a new seawall along Wharf Road.
- **CH1_L:** This option involves the undertaking of sand nourishment at Northern Batemans Bay beaches (wherever need is greatest) when dredging is undertaken in Batemans Bay and Clyde River.
- **CH1_M:** This option includes the purchase of private properties at Wharf Road to assure current and future generations have public access to the foreshore and beaches.

- **CH1_Pa and CH1_Pb:** This upgrade of existing seawall at Caseys Beach reduces the likelihood of damages from wave overtopping during storm events. Two options for the approach to the seawall were assessed.
- **CH1_V:** This option includes the purchase of private properties at risk from coastal erosion at the North end of Broulee.
- **CH4_D** This option involves the implementation of a Coastal Inundation Levee to protect against storm surge inundation from creek / estuary (Surfside Creek and Cullendulla).
- **CH4_Ka and CH4_Kb:** This option involves raising the seawall and install wave return barriers on the sea wall protecting the Batemans Bay foreshore. A CBA was undertaken for completing these works in a single (Ka) or a two staged process (Kb).
- **CH1_ZA** This option involves the combined nourishment and construction of a groyne at Surfside Beach West (Dog Beach / Mcleods Beach), Surfside.

**Approach**

The economic assessment was undertaken by cost benefit analysis and considers the comparative net costs and benefits of each of the 13 management options (including variations therein) against a base case scenario. Where the net benefits of a management option (relative to the base case) exceed the net costs (relative to the base case) of the option, the option is considered to be economically viable. The key metrics by which this viability is expressed are:

- Net Present Value (NPV): The present value of net benefits minus present value of net costs (a positive NPV indicates an economically viable project)
- Benefit Cost Ratio (BCR): The present value of net benefits divided by the present value of net costs (a BCR greater than one indicates an economically viable project).

As both cost and benefits of an option are assessed relative to a base case comparator, adoption of the base case is critical to the analysis. The base case should represent the most likely scenario that would be realised into the future if the proposed options was not implemented. For each location at which the management options assessed are to be implemented the base case was considered to be a Do Minimum scenario in which the on-going and gradual realisation of erosion and inundation in accordance with the hazard mapping and associated loss of assets at risk was assumed to occur. It also assumes the continuation of any actions (and associated expenditure) included in the Eurobodalla Open Coast Coastal Zone Emergency Action Subplan (**Appendix H**).

Reflecting the nature of the coastal hazards of which the 13 proposed management actions aim to ameliorate, the key benefits incorporated within the benefit analysis (CBA) assessment were in the form of:

- Maintained beach area and amenity and associated non-use and use values.
- Reduced loss and damage of property and land to both private landowner and public assets.

**Economic Model assumptions**

For the purpose of this assessment several assumptions have been made to facilitate evaluation of project performance through the CBA, these include:

- A discount rate of seven per cent per annum has been applied.

- The initial works for all options has been assumed to be undertaken by 2025, with representing the first full year of operation and benefits.
- Options with a multiple stage structural works were assumed to be undertaken in the years of 2035 or 2050 or 2065 (as relevant)
- A benefit evaluation period of 50 years from the first full year of operation was adopted. Longer assessment periods are unlikely to generate material benefits due to the effects of the assumed seven per cent discount rate per annum
- Population growth for study areas is held constant at 0.86% growth per year
- The base year of assessment was assumed to be 2022 and all values are in 2022 dollars.

The following sections outline the derivation of project cost and benefits, as well as any further specific assumptions adopted.

**Capital costs**

The assumed capital costs for each option are summarised in **Table 3-5**. Further details on how the costs were derived are provided in **Appendix F**. The base case capital costs are $- for all option locations.

Table 3-5 Capital Costs

| Option | Vertical structure types | Vertical Structures Length (m) | Cost ($M) | Other Capital Cost | Other Costs ($M) | Total Cost NPV (7%) ($M) |
|---|---|---|---|---|---|---|
| **Base Case** | N/A | N/A | 0.0 | N/A | 0.0 | 0.00 |
| **CH1_B** | Revetment | 250 | 1.9 | | | 1.55 |
| **CH1_D** | Revetment | 530 | 6.6 | | | 2.52 |
| **CH1_Ka** | Seawall | 100 | 2.1 | | | 1.71 |
| **CH1_Kb** | Seawall | 690 | 5.9 | | | 4.82 |
| **CH1_L** | N/A | N/A | N/A | Sand nourishment costs assessed as ongoing costs not capital costs | N/A | 0.00 |
| **CH1_M** | N/A | N/A | N/A | Private land acquisition | 4.0 | 3.27 |
| **CH1_Pa** | Seawall and revetment | 535 | 7.9 | | | 6.45 |
| **CH1_Pb** | Seawall and revetment | 1070 | 10 | | | 6.80 |
| **CH1_V** | N/A | N/A | N/A | Private land acquisition | 4.8 | 3.92 |
| **CH4_D** | Coastal Inundation Levee | 1240 | 13.3 | | | 4.49 |
| **CH4_Ka** | Seawall and wave return structure | 650 | 15.5 | | | 12.65 |
| **CH4_Kb** | Seawall and wave return structure | 650 | 16.5 | | | 9.80 |
| **CH1_Za** | Culvert Extension and Groyne | 90 | 3.6 | | | 2.94 |

**Operational and maintenance costs**

For ten of the thirteen management options there is a requirement for on-going periodic maintenance of vertical structures in order to maintain functionality and ensure the protection of public and private assets from inundation events. The assumed maintenance works, frequencies and associated costs are summarised in **Table 3-6**. The table also outlines the resultant as well as the associated Present Value of future (7%) maintenance works under each option.

Table 3-6 Operational and Maintenance Costs

| Project case | Operational and maintenance Costs | Maintenance Regularity | Project Lifespan (economically assessed) | Total Cost NPV (7%) ($M) |
|---|---|---|---|---|
| **Base Case** | 0 | N/A | N/A | 0.00 |
| **CH1_B** | $19,000 | Annually | 50 years | 0.23 |
| **CH1_D** | $66,000 | Annually | 50 years | 0.80 |
| **CH1_Ka** | $21,000 | Annually | 50 years | 0.25 |
| **CH1_Kb** | $40,000 | Annually | 50 years | 0.48 |
| **CH1_L** | $7500 | Annually | 50 years | 0.26 |
| **CH1_M** | 0 | N/A | N/A | 0.00 |
| **CH1_Pa** | $79,000 | Annually | 50 years | 0.95 |
| **CH1_Pb** | $100,000 | Annually | 50 years | 1.21 |
| **CH1_V** | N/A | N/A | N/A | 0.06 |
| **CH4_D** | $133,000 | Annually | 50 years | 1.50 |
| **CH4_Ka** | $155,000 | Annually | 50 years | 1.87 |
| **CH4_Kb** | $165,000 | Annually | 50 years | 1.99 |
| **CH1_Za** | $72,000 | Annually | 50 years | 0.87 |

**Quantified Benefits**

For the purposes of the CBA and given the magnitude of the costs identified the analysis has focussed upon quantification of the major benefit streams. The following benefits were estimated:

- Beach amenity (use and non-use values)
- Avoided private property damage
- Avoided public road resurfacing by erosion and inundation events
- Avoided access issues arising from inundation events leading to community severance.

The following sections details the derivation of the each of the benefits identified.

*Beach Amenity*

Beach amenity is a broad term that can capture a wide range of beach values to both active and non-active beach users. For the purposes of this economic assessment, beach amenity is defined to be the collective use and non-use values ascribed to the presence and extent of the beach of relevance to the option. In the absence of site-specific information regarding usage of the various

beaches and associated foreshore areas of the study area, a Benefit Transfer approach was adopted. A literature review was undertaken to identify potential benefit values derived from more detailed studies in other locations which could then be applied as representative of beach use and non-use values of the beach in question.

A number of studies have been completed recently which attempt to place high level order of magnitude values to both beach:

- Use values - the values humans derive from the beach through some form of interaction with it; this may be direct (e.g. visitation) or indirect (e.g. ecosystem services provide by the beach that support fisheries)
- Non-use values - the intrinsic value assigned by individuals to the beach that it should continue to exist, independent of personal use.

A notable study was conducted by Pascoe et al. (2017) and Pascoe and Doshi (2018). Pascoe's work represents a state-wide investigation (considering both Sydney and regional locations) to estimate use and non-use values per hectare of beach area. The studies provide a use and non-use value for the Eurobodalla Shire Council area and more specifically for Batemans Bay. This paper's methodology combines a range of techniques (revealed and stated preference, choice experiments and analytic hierarchy processes), based on a single survey. While the resultant valuations are highly influenced by LGA populations and there are numerous caveats to its implementation, for the purposes of this CBA the valuations are potentially representative of a lower valuation range and represent the most current data set available in terms of beach utilisation.

Based on the estimated current annual beach visitation rates (Pascoe and Doshi (2018)), population and household size within the areas of Surfside, Batemans Bay and Batehaven, and the current beach area, an estimated of beach value per square metre of beach area was estimated[1] :

- Beach Use per $m^2$ per year: $29.75 (variable rates dependent on demographic and local population)
- Beach Non-use per $m^2$ year: $7.89 - $13.09 (variable rates dependent on demographic and local population)
- Dune value per $m^2$ per year: $5.83
- Scrubland value per $m^2$ per year: $5.83.

These values are at the lower end of the estimates derived from other similar projects (e.g. Stockton Beach, Newcastle estimates a beach use value of $40.28 and a non-use value of $14.37 per square metre).

It is recognised that the local community have strongly expressed their concern for protection of the beach and the preservation of connectivity, supporting an elevated level of beach value. However, a limitation of the utilisation of per square metre metrics is that it does not recognise the variation that may arise in valuation between circumstances in which there is little or a lot of additional beach area and how this may vary over time. In particular, in non-use values are likely

[1] For use values 90%:10% was applied to Pascoe et al (2017), Deloitte (2016) For non-use values 90%:10% was applied to Pascoe et al (2017). For non-use values for features other than beaches, there Pascoe valuation are solely used.

to be relatively inelastic to changes in beach areas, while beach use is typically more elastic. For the purposes of the assessment, non-use values were only considered in options in which the entire beach area was assumed to be at risk, with the assessment focusing on lost/gained usage value associate with options protecting or enhancing the available beach area and associated activities able to be undertaken.

*Avoided Property Damage*

Property damage includes residential and commercial areas which are affected by coastal inundation events. An Average Annual Damage (AAD) was calculated based on riverine flooding damage curves provided by DPE (2022) and shown in **Figure 3-3**. The damages analysis was not based on property survey but instead it assumed that all residential buildings were single storey, slab on ground with floor levels 0.3m above a ground level obtained at the dwelling. While there are differences associated with the type of damages incurred from coastal inundation in comparison to riverine inundation, for the purposes of this assessment, the damage curves were considered of sufficient alignment to estimate damage costs under the base case and project case scenarios assessed.

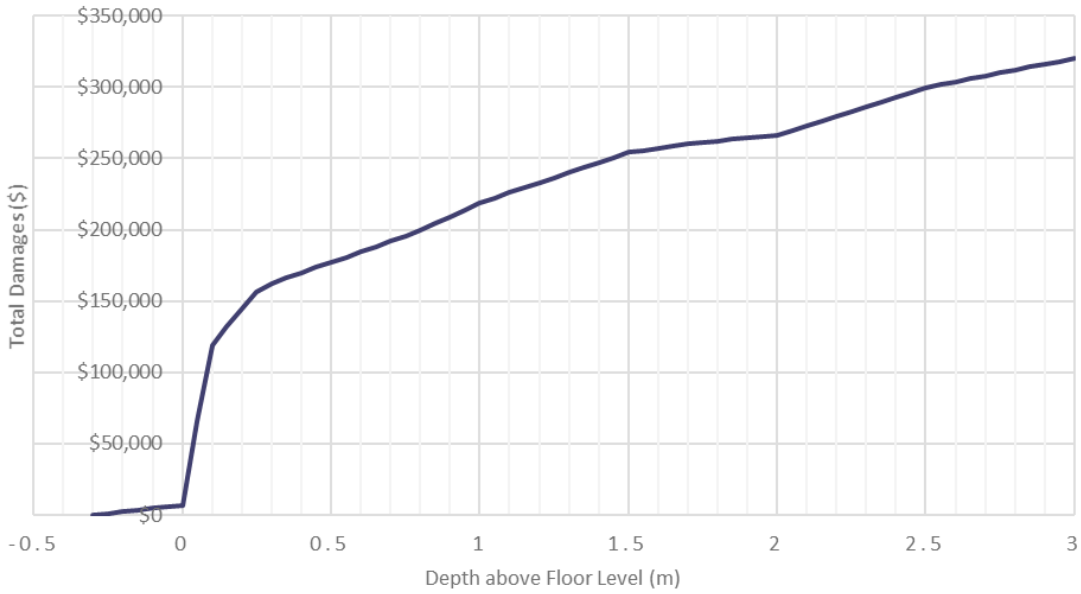



**Figure 3-3 Residential Damage Curves (DPE, 2022)**

Commercial property damages commercial damages were assessed on a per square metre basis, in line with the damage curve presented in **Figure 3-4**. Based on the current and future year inundation hazard extents and depths of 1% and 5% AEP events, both now and out to 2100, where relevant, estimates of expected annual average damages to affected residences and commercial properties were developed.

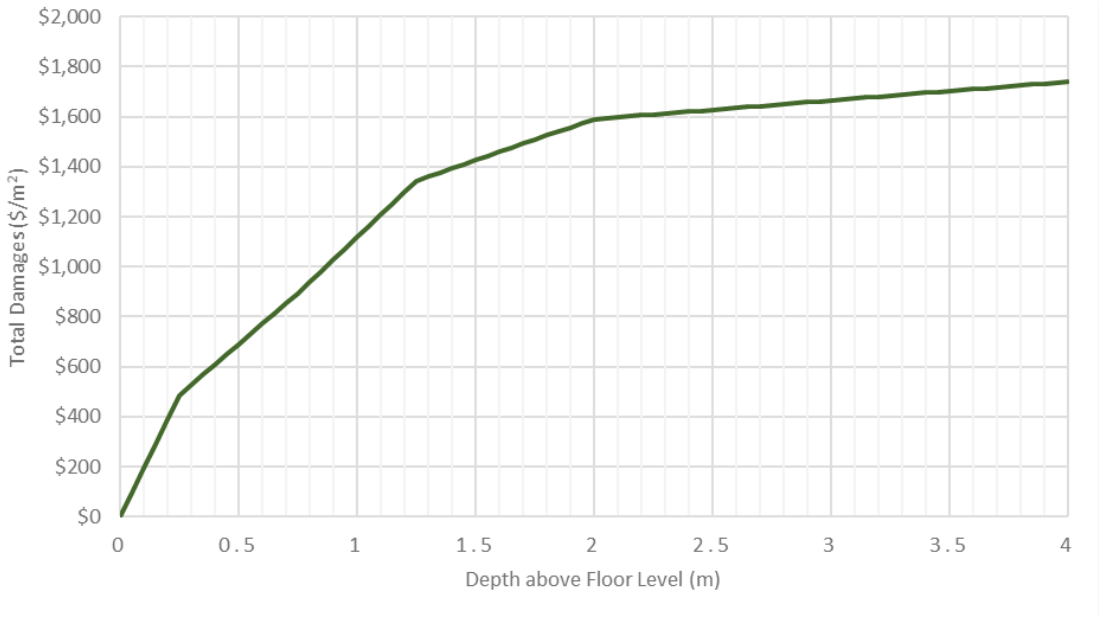



**Figure 3-4 Commercial Damage Curves (DPE, 2022)**

*Avoided resurfacing/repair costs*

A significant benefit in the economic analysis for each option was valuing the costings of resurfacing and replacing public infrastructure, including beach front carparks, pathways and roads. Similar to private residential or commercial properties, where such infrastructure is affected damage and repair costs are incurred ("resurfacing costs"). Transport for NSW (TfNSW, 2020 – Economic Parameter Values) provides standard repair costs associated with such damage and loss:

- Carpark space loss = $8,853
- Road replacement cost per $m^2$ = $3,429
- Road and pavement resurfacing cost per $m^2$ = $143

In conjunction with replacement repair works, a temporary road installation cost was implemented to account for the required access of roads to residents and visitors. This was estimated through a survey of local construction and hire companies advertised costings for metal temporary 2.4 m x 1.2 m sheeting. Replacement works for the purpose of this plan are averagely estimated to be two weeks. This is estimated to cost $269 per metre in length for a replacement road over the two-week period. This valuation task into account the cost of hiring a temporary sheeting for each side of the road and an added 0.10-0.20 metres of overlapping per sheeting to maintain structural integrity.

As with property damage, based on the expected frequency of coastal inundation events (1%, 5%) out to 2100, estimates of the annual average resurfacing cost for all base case and project case scenarios were derived.

*Preserved accessibility*

Accessibility is a key issue in when inundation events occur. The inability of waterfront residents to safely enter and exit residential areas via vehicle during and after an inundation event occur

is a cost to the residents. This accessibility cost value includes the considerations of inability of vehicle access to property and to emergency services along with the cost of isolation per household. This cost was estimated in three ways:

- The likelihood of the inability to access emergency response/services during a period of isolation driven by a coastal inundation event
- The opportunity cost for individuals to undertake their normal everyday activities (e.g. purchasing goods and services etc.) and make standard trips (e.g. travel to shops, commute to work).
- The cost of the effects on the mental health issues and overall productivity on individual affected by isolation periods.

Based on the population size of affected communities, the average frequency of emergency health incidents in the region, the averagely weekly spend per household for Eurobodalla and the average daily trips per household it was possible to make the following assumptions:

- Estimated no. of daily trips per household = 0.90
- Estimated no. of emergency events per person per year = 0.0011
- Cost per trip = $40.54
- Cost per household isolation for 1 day = $77.50
- Fatalities and Injury Costs per year = $316.35
- Cost of productivity losses and mental health impacts per person = $71.43.

**Unquantified Benefits**

There are a range of other intangible benefits and non-quantified benefits that were not assessed as part of the economic assessment. As such, the economic evaluation for this project should be seen as a conservative appraisal.

Other benefits arising from the Project are likely to include:

- Damage/ loss of utilities from both erosion and inundation events (where affected)
- Avoided loss of tourist and tourism expenditure due to Holiday Park/other related tourist accommodation impacts and broader economic activity.

**Results**

The relative costs and benefits of each option (Project Cases) was compared to the 'do minimum' scenario (Base Case) through a Cost Benefit Analysis (CBA). The results of this economic assessment are provided in **Table 3-7**. A positive Net Present Value (NPV) (Present Value Benefit – Present Value Cost) and Benefit-Cost Ratio (BCR) greater than one support a claim for the project to be considered as economically feasible.

Of the 13 available options, 4 have positive NPVs, with BCRs greater than 1. However, it is important to note that the BCR is only one element of assessing the viability of an option, and a BCR less than 1 does not preclude it from being included in the CMP actions, nor does a BCR greater than 1 guarantee its inclusion.

The breakdown of how costs and benefits were assessed can be found in each option description in **Appendix E and F**.

Table 3-7 Cost Benefit Analysis Results (7%)

| Option | Option Description | Present Value Cost | Present Value Benefit | Net Present Value | Benefit Cost Ratio |
|---|---|---|---|---|---|
| CH1_B | Northcove Road (Maloneys Beach) erosion and inundation protection | $1,780,521 | $1,341,657 | -$438,864 | **0.75** |
| CH1_D | Long Beach seawall | $3,099,776$3,854,331 | $1,374,634 | -$2,479,698 | **0.36** |
| CH1_Ka | Wharf Road Protection Stage 1 (seawall erosion protection works) | $1,967,362 | $68,572 | -$1,898,790 | **0.03** |
| CH1_Kb | Wharf Road protection Stage 2 (seawall and flood barrier inundation protection works) | $5,299,430 | $4,029,264 | -$1,270,166 | **0.76** |
| CH1_L | Sand nourishment at Surfside, Long Beach and Maloneys Beach | $97,134 | $60,604 | -$36,531 | **0.62** |
| CH1_M | Wharf Road private property acquisition | $3,265,192 | $2,040,368 | -$1,224,824 | **0.62** |
| CH1_Pa | Caseys Beach Seawall (present day risk) | $6,184,966 | $1,081,233 | -$6,321,984 | **0.15** |
| CH1_Pb | Caseys Beach Seawall (2065 risk) | $8,006,627 | $1,081,233 | -$6,925,394 | **0.14** |
| CH1_V | Broulee private property acquisition | $3,978,639 | $137,221 | -$3,841,417 | **0.03** |
| CH4_D | Surfside Coastal Inundation Levee | $5,117,931 | $7,219,966 | $2,102,035 | **1.24** |
| CH4_Ka | Batemans Bay CBD seawall raising (2100 risk) | $14,525,299 | $47,460,493 | $32,935,194 | **3.27** |
| CH4_Kb | Batemans Bay CBD seawall raising (2065 risk) | $11,794,117 | $47,460,493 | $35,666,376 | **4.02** |
| CH1_Za | Culvert Extension / Groyne, combined with beach nourishment at Surfside | $3,808,563 | $3,940,978 | $132,414 | **1.03** |

## 3.2 Recommended Management Actions

### 3.2.1 Overview

Management strategies and actions have been developed for a ten-year period.

The management actions have been categorised in terms of the key threats (**Section 2.2**) being addressed.

A timeframe for implementation of the actions is specified, using time that is equivalent with the key Council IP&R documents, as follows:

- Year 1: to match with the Operational Plan (which typically extends for one financial year)
- Year 2 to 4: to match with the Delivery Program which is a four-year program (including the Operational Plan)
- Year 5 to 10: to match with the Resourcing Plan which is a 10 year financial plan
- The term 'ongoing' is used where an action will need to be repeated regularly.

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

All recommended actions that have a specific location associated with them are shown on map series **RG-05-01**. All actions in this CMP only apply to areas within the coastal zone (i.e. within one of the existing CM Areas or the proposed CVA).

The following information is provided for each action:

- Action ID
- Action name and description (detailed descriptions are provided for select options in **Section 3.2.4**)
- Coastal Management Area (Batemans Marine Park also noted, where appropriate)
- Locations
- Indicative costs
- Responsible and supporting organisations (note: DPI Fisheries refers to both Marine Parks and the Coastal Systems Unit)
- Performance measures.

The major structural actions to mitigate coastal hazards in and around Batemans Bay are shown on **Figure E-3** (in the Executive Summary of this document).

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

### 3.2.2 Actions to be implemented by Council

There are 71 actions identified for implementation by Council, including:

- 6 actions that address coastal development threats
- 35 actions that address coastal hazard threats
- 8 actions that address recreational activity threats
- 16 actions that address engagement and governance threats
- 1 action that addresses an opportunity rather than a threat

- 5 actions that relate to the monitoring and evaluation of the CMP implementation.

These actions are presented in **Table 3-8**. Detailed descriptions are provided for complex and high cost actions in **Section 3.2.4**.

Table 3-8 Actions to be implemented by Council

| ID | Management Area | Management Action | Action Details | Location | Lead Agency | Partners | Timing | Performance Measures |
|---|---|---|---|---|---|---|---|---|
| **Actions that address Coastal Development Threats** | | | | | | | | |
| **CD1_A** | Coastal Environment Area, Coastal Use Area Map, Coastal Vulnerability Area, | Continue to implement Snapper Island Penguin monitoring program | The penguins local to Batemans Bay are found only on islands, where there were no cats, foxes, dogs or humans. About 15 percent of this population live on Snapper Island. Council's sustainability team alongside Landcare & youth volunteers undertake work on Snapper Island, clearing environmental weeds and plastic pollution and providing additional nesting opportunities for the little penguins The monitoring program informs the Australian Marine Debris Database and assists in the preparation of educational materials on reducing pollution. Ongoing monitoring of the Penguin colony on Snapper Island to support ongoing viability of the Penguin colony population and habitat is required. | Snapper Island, Batemans Bay | Council | DPE-EHG | Year 1 and ongoing | Annual reporting of monitoring program |
| **CD1_B** | Coastal Environment Area, Coastal Vulnerability Area, | Design and implement dune vegetation management – northern end of Broulee beach | Dune vegetation management to be undertaken to prioritise the northern end of the beach to mitigate erosion risk to the road and private properties. | Broulee | Council | DPE-EHG | Year 2 to 4 and ongoing | Established new vegetation and reduced impact on existing vegetation from pedestrian access across dunes |
| **CD1_C** | Coastal Zone, potentially within Coastal Wetland Area | Continuation of Council's weed management program in coastal areas | Council staff identified significant weed growth along many of the coastal headlands within the LGA. Weed management to be undertaken at hot spots identified by Council. | All | Council | DPE-EHG, DPI-LLS | Year 2 to 4 and ongoing | Increased number of resources (days and or staff numbers) undertaking coastal weed management |
| **CD2_A** | Coastal Environment Area, Coastal Use Area Map, Coastal Vulnerability Area, Batemans Marine Park | Investigate source of water quality issues at Surf Beach | Water quality issues have been identified by the community (through the community working groups) and by Mogo LALC. It was suspected that the issues were a result of landfill leachate / runoff, stormwater or sewer overflow. Examination of the issue is to be continued by Council at Surf Beach. This will include engaging an expert to investigate the issue. | Surf Beach | Council | DPE-EHG, Traditional Owners, DPI-Fisheries | Year 2 to 4 and ongoing | Report outlining source and severity of water quality issues. Management plan prepared, if required from investigations. |
| **CD3_B** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Beach watch monitoring program for water quality at recreational beaches to be continued | The Beachwatch Program, in partnership with DPE, is undertaken every year from the start of November to the end of March, with five samples collected each month from 11 popular beaches. This program is to be continued by Council in partnership with DPE. | Cookies Beach<br>Caseys Beach<br>Surf Beach<br>Malua Bay<br>Broulee North<br>South Broulee Beach<br>Shelley Beach<br>Tuross Main Beach<br>Brou Beach<br>Narooma shark net<br>Narooma Main Beach | Council | DPE-EHG, DPI-Fisheries | Year 1 and ongoing | Ongoing participation by Council Beachwatch Program on an annual basis |

| ID | Management Area | Management Action | Action Details | Location | Lead Agency | Partners | Timing | Performance Measures |
|---|---|---|---|---|---|---|---|---|
| **CD3_C** | Coastal Zone, Coastal Wetland Area | Support DPI-Fisheries in preparing a *Marine Vegetation Strategy* to identify priority areas for the protection of healthy mangrove and saltmarsh areas and rehabilitation of degraded areas. | The community engagement undertaken as part of this CMP identified protection of intertidal macrophyte ecosystems under climate change and urban pressures as a key community issue.<br>The Marine Vegetation Strategy methodology and its estuary specific application, focuses on increasing the resilience of intertidal macrophyte systems to sea-level rise and other threats and risks in ways that maintain, and maximise, the social, cultural and economic values these systems provide to the community well-being. DPI Fisheries is expecting to commence a strategy for Eurobodalla in mid-2022.<br>Council will assist DPI in the preparation of this strategy through provision of Council information. | All | Council | DPI, DPE | Year 1 | All data and inputs requested by DPI are provided to them by Council |
| **Actions that address Coastal Hazard Threats** | | | | | | | | |
| **CHA_A** | Coastal Vulnerability Area | Update Property Development Planning Controls and undertake Planning Proposal to adopt CVA | A Draft Coastal Hazards Code (Appendix G) is to be adopted until such time that the DCP and LEP can be updated to include coastal hazard controls.<br>A Planning Proposal will be submitted to adopt the proposed CVA map as part of the SEPP. The CMP Stage 2 technical studies will support the submission of a planning proposal.<br>See Section 4 of CMP for details of proposed planning controls and Section 8.2.1 for details of proposed CVA mapping. | Coastal Vulnerability Area | Council | DPE-EHG, DPE-Planning | Year 2 to 4 | Adoption of updated Coastal Hazard Code<br>Future update of LEP and DCP<br>Future successful planning proposal for CVA mapping |
| **CH1_B** | Coastal Environment Area, Coastal Use Area Map, | Maloney Beach Erosion Protection Stage 1: Undertake investigation and design for Northcove Road erosion protection and flood proofing | The analysis undertaken of the full implementation of the works as part of the CMP identified that the existing risk was not significant, and as a result the coast benefit analysis did not support the implementation of erosion and flood proofing within the CMP 10 year plan. However, a future need for these works was identified, as a result the investigation and design works will be undertaken as part of the CMP. Further details can be found in **Section 3.2.4**. | Maloneys Beach | Council | DPE-EHG, , DPI-Fisheries | Year 2 to 4 | Investigation and design complete |
| **CH1_D Phase 1** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Long Beach Erosion Protection: Low crested revetment to protect Bay Road – Phase 1: Undertake investigation and design report | Undertake an investigation and design report including environmental assessment to construct a low crested revetment to protect Bay Road from coastal erosion impacts under present day and future sea level rise scenarios. The intention of this option to preserve the foundation of Bay Road under severe coastal storm events. Further details can be found in **Section 3.2.4**. | Long Beach | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries, DPI-Fisheries | Year 1 | Investigation and design complete |
| **CH1_D Phase 2** | Coastal Environment Area, Coastal Use Area Map, | Long Beach Erosion Protection: Low crested revetment to protect Bay Road – Phase 2: Construct a ≈ 250m low crested revetment and beach nourishment | Construct ≈ 250m of low crested revetment to protect Bay Road from coastal erosion impacts that has been investigated and designed under through action CH1_D. The intention of this option to preserve the foundation of Bay Road under severe coastal storm events targeting the location of immediate risk. Beach nourishment to ensure amenity and beach use is maintained will also likely be required pending outcomes of phase 1 investigation and design. Further details can be found in Section 3.2.4. | Long Beach | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Year 2 to 4 | Completed works |
| **CH1_D Phase 3** | Coastal Environment Area, Coastal Use Area Map, | Long Beach Erosion Protection: Low crested revetment to protect Bay Road – Phase 3: Maintenance of constructed revetment structure and nourishment of beach | Undertake maintenance of constructed revetment structure and beach nourishment as required to ensure public beach use is preserved. | Long Beach | Council | DPE-Crown Lands, DPI-Fisheries | Year 5 to 10 | Use of the beach in front of structure is preserved and structure maintained |
| **CH1_Ka Phase 1** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Wharf Road Stage 1: Priority coastal protection works, remediation and reinstatement of beach for public use - Phase 1 Site remediation assessment and coastal protection investigation and design | Undertake site remediation assessment to enable public access and use of the beach following private property acquisition (action CH1_M) and complete investigation and design including environmental assessment of coastal protection structure including reuse of onsite materials. Further details can be found in **Section 3.2.4**. | Wharf Road | Council | DPE-EHG, DPE-Planning, DPI-Fisheries | Year 1 | Reports complete |

| ID | Management Area | Management Action | Action Details | Location | Lead Agency | Partners | Timing | Performance Measures |
|---|---|---|---|---|---|---|---|---|
| **CH1_Ka Phase 2** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Wharf Road Stage 1: Priority coastal protection works, remediation and reinstatement of beach for public use- Phase 2 Complete coastal protection works | Complete coastal protection works identified in CH1_Ka phase 1 and rehabilitation of beach to enable public use and access, improve amenity, integrate coastal education opportunities and ecological health restoration outcomes. Opportunity to rename the rehabilitated beach via the Geographic Names Board of NSW following community consultation to be explored. Further details can be found in **Section 3.2.4**. | Wharf Road | Council | DPE-EHG, DPI-Fisheries | Year 2 to 4 | Completed works and renaming of the beach following community consultation outcomes |
| **CH1_Ka Phase 3** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Wharf Road Stage 1: Priority coastal protection works, remediation and reinstatement of beach for public use- Phase 3: Maintain and enhance coastal vegetation and beach for safe public use | Maintain and enhance coastal vegetation and beach for safe public use. This includes continued clean-up of introduced material if exposed, sand nourishment, replanting of suitable coastal vegetation species, amenity and access enhancements and other identified improvements required following private property acquisition and landform changes resulting from removal of illegal structures and coastal processes. Further details can be found in **Section 3.2.4**. | Wharf Road | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Year 5 to 10 | Completed works and safe beach use maintained and environmental enhancement |
| **CH1_Kb** | Coastal Environment Area, Coastal Use Area Map, | Wharf Road Protection Stage 2: Inundation protection to be undertaken | Stage 2 protection of Wharf Road consists of the following:<br>• Raising of the existing seawall that fronts the Holiday Park (440m in length).<br>• Construct a flood wall along the seaward alignment of Wharf Road east of the Wharf Road corner, consisting of a Steel Sheet Pile wall (250m in length).<br>Further details can be found in **Section 3.2.4**. | Wharf Road | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Year 5 to 10 | Completed works |
| **CH1_Kc** | Coastal Environment Area, Coastal Use Area Map, | Raise Wharf Road level as part of routine resurfacing works | Opportunistic raising of Wharf Road to be undertaken as routine road upgrade works are undertaken or funding becomes available to maintain access during inundation events. Road raising to provide resilience against future coastal inundation.<br>Further details can be found in **Section 3.2.4**. | Wharf Road | Council | DPE-EHG | Year 5 to 10 | Completed works |
| **CH1_P** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Upgrade existing coastal protection works at Caseys Beach | Construct rubble mound seawall to address present day risks and retrofit a vertical crest wall in future (approximately 2035). Further details can be found in **Section 3.2.4**. | Batehaven | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Year 2 to 4 | Completed works |
| **CH1_X** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Preparing a Review of Environmental factors to identify preferred options for disposal of sand from maintenance activities at Tuross boat ramp. | Preparing a Review of Environmental factors to identify preferred options for disposal of sand from maintenance activities at Tuross boat ramp. | Tuross Heads | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Year 2 to 4 | REF complete |
| **CH1_Y** | Coastal Environment Area, Coastal Use Area Map, | Sewage pump stations and reticulation infrastructure at risk to be include in future works plans | Council maintains a network of reticulation and sewer infrastructure, with a number of assets located along the coastline. The CMP identified which assets are at risk (both existing and future) of damage during erosion events (Appendix E). At-risk assets should be included in future works plans to incorporate management and/or protection measures when undertaking works (maintenance, upgrades, replacements, etc) on these assets. | Long Beach<br>Malua Bay<br>Broulee | Council | NA | Year 1 and ongoing | Erosion and inundation risk to assets recorded within Council asset documentation to allow for relocation or protection to be incorporated into any future planned works. |
| **CH1_Z** | Coastal Environment Area, Coastal Use Area Map, | Monitor stormwater assets in erosion areas | The CMP identified which stormwater outlets are at risk (both existing and future) of damage during erosion events (Appendix E). At-risk assets should be included in future works plans to incorporate management and/or protection measures when undertaking works (maintenance, upgrades, replacements, etc) on these assets. | All | Council | NA | Year 1 and ongoing | Erosion and inundation risk to assets recorded within Council asset documentation to allow for relocation or protection to be incorporated into any future planned works. |

| ID | Management Area | Management Action | Action Details | Location | Lead Agency | Partners | Timing | Performance Measures |
|---|---|---|---|---|---|---|---|---|
| **CH1_ZB** | Coastal Environment Area, Coastal Use Area Map, | Implement Open Coast Coastal Zone Emergency Action Subplan | The Coastal Zone Emergency Action Subplan (CZEAS) which forms part of this CMP identifies a list of actions Council has responsibility to implement if resources and safety permits in preparation, response and recovery of a coastal emergency event at identified locations. This action supports implementation of these responsibilities including provision of signage, sand containers and sand nourishment works. | All | Council | NSW SES, Heritage NSW, DPE-EHG | Year 1 and ongoing | CZEAS implemented when triggers reached. |
| **CH1_ZC** | Coastal Environment Area, Coastal Use Area Map, | Design and construct a coastal erosion structure to protect Wharf Road at Surfside Beach West (Dog Beach/Mcleods Beach) against coastal erosion | A rock revetment protecting the undermined bank adjacent to Wharf Road creek culvert will be constructed to tie into natural rock to the west. A concrete extension of the wing wall to the east will provide increased erosion protection to the road and resilience to the culvert. | Surfside | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Year 1 | Completed works |
| **CH10_C** | Coastal Environment Area, Coastal Use Area Map, | Conduct periodic inspections of the slopes of the cliffs and bluffs | Respond to incoming customer requests regarding the stability of cliffs and bluffs at Corrigans Headland, Sunshine Bay, Caseys Beach Headland and Long Beach Headland to identify evidence of instability, such as loose rock, mantle creep, stormwater incision, tension cracks or leaning or fallen trees. | Corrigans Headland, Sunshine Bay, Caseys Beach Headland and Long Beach Headland | Council | NA | Year 1 and ongoing | Inspections undertaken and recorded |
| **CH10_E** | Coastal Environment Area, Coastal Use Area Map, | Maintain or improve native vegetation cover on steep slopes on coastal cliffs and bluffs | Maintain or improve native vegetation cover on steep slopes on coastal cliffs and bluffs. This may also involve weed management and use of matting/geotextile to protect the surface from erosion as well as control weeds. | Priority to those affected by geotechnical hazards, and accessible | Council | DPE-EHG, DPE-Crown Lands | Year 1 and ongoing | Increased native vegetation cover at high risk locations |
| **CH10_G** | Coastal Environment Area, Coastal Use Area Map, | Install safety and warning signs relating to cliff instability | - Install general warning signs along the base of the headlands at Corrigans, Caseys and Long Beaches to warn walkers of the potential hazards.<br>- Fences and warning signs be installed along the top of steep slopes where a risk exists of persons falling over the edge. | All | Council | DPE-EHG | Year 1 and ongoing | Signage installed |
| **CH10_I** | Coastal Zone | Install and maintain surface dish drains at priority slope instability sites | Install and maintain a surface dish drain at the top of slopes (identified as high priority locations in ACT Geotechnical Engineers Pty Ltd, 2012) to divert water away from slopes that are being eroded or have the potential to be so causing environmental impacts. | All | Council | DPE-EHG | Year 5 to 10 | Completed works |
| **CH9_A** | Coastal Environment Area, Coastal Use Area Map, | Prepare frontal dune management plans | Prepare frontal dune management plan for dunes seaward of caravan parks and camping grounds, and foreshore reserves to optimise resilience of the dunes as protection for temporary land uses and enhance ecological connectivity. Target locations to include beach reserves at Maloneys Beach, Long Beach, Surfside, Corrigans (include Clyde View Holiday Park) and Malua Bay Reserve. The locations do not include Coastal Wetland Areas. | Beach reserves at Maloneys Beach, Long Beach, Surfside, Corrigans (include Clyde View Holiday Park) and Malua Bay | Council | DPE-EHG, DPE-Crown Lands | Year 2 to 4 | Management plans prepared, adopted and in use |
| **CH4_D Phase 1** | Coastal Environment Area, Coastal Use Area Map, | Investigate, design and construct a coastal inundation levee to protect against storm surge inundation from creek / estuary (Surf Side Creek) - Phase 1 | Construct a flood berm to protect the low-lying residential precinct of Surfside adjacent to the bay to protect the region from inundation in an existing 100-year ARI ocean storm.<br>Construct section seaward of Wharf Road and undertake dune management to ensure the dune provide adequate protection from coastal inundation.<br>Further details can be found in **Section 3.2.4**. | Surfside | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Year 1 to 2 | Stage 1 Phase 1 works completed |
| **CH4_D Phase 2** | Coastal Environment Area, Coastal Use Area Map, | Investigate, design and construct a coastal inundation levee to protect against storm surge inundation from creek / estuary (Surf Side Creek) – Phase 2 | Construct a flood berm to protect the low-lying residential precinct of Surfside adjacent to the bay to protect the region from inundation in an existing 100-year ARI ocean storm.<br>Refine design of Phase 2 section of levee through the Floodplain Risk Management Study and construct.<br>Further details can be found in **Section 3.2.4**. | Surfside | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Year 2 to 4 | Stage 1 works completed |
| **CH4_G** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Installation of flood gates on priority outlets | Low-lying areas of land, while protected by adjacent coastal protection structures or dunes, can experience inundation as a result of surcharge from the local pit network when adjacent bay / ocean levels are high. Investigate and construct flood gates on selected pipes to prevent this surcharge. Priority locations are identified in Appendix E. | Wharf Road Batemans Bay to Batehaven | Council | DPE-EHG, DPI-Fisheries | Year 5 to 10 | Installation complete |

| ID | Management Area | Management Action | Action Details | Location | Lead Agency | Partners | Timing | Performance Measures |
|---|---|---|---|---|---|---|---|---|
| **CH4_K** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Investigate, design and construct seawall raising and wave return barriers in Batemans Bay | Raise seawall protecting the Batemans Bay foreshore, to reduce impact of wave overtopping in the short to medium term.<br>Further details can be found in **Section 3.2.4**. | Batemans Bay to Batehaven | Council | DPE-EHG, DPI-Fisheries, DPE-Crown Lands | Year 5 to 10 | Completed works |
| **CH4_M** | Coastal Environment Area, Coastal Use Area Map, | Undertake an adaptation plan for low lying areas to be impacted by tidal inundation under sea level rise | Adaptation planning will be undertaken for low lying areas around Batemans Bay that have existing exposure to large ocean storms and will increasingly be at risk under sea level rise. Adaptation planning will look to identify suitable approaches to continue to viability of this land. The planning will investigate a combination of rezoning land, landform adaptation through filling and raising of assets and roads, and property development controls. Further details can be found in **Section 3.2.4**. | Batemans Bay, North Batemans Bay and Surfside | Council | DPE-EHG | Year 2 to 4 | Adaptation plan completed, providing recommendations for changes to planning controls and land use zoning, as required. |
| **CH4_V** | Coastal Environment Area, | Undertake access road raising to provide resilience to coastal inundation risk – Beachcomber Holiday Park | There is a low lying section of the access road to Beachcomber Holiday Park. Road levels should be raised at this location to match adjoining levels to improve access and evacuation access during a coastal storm event. | Potato Point | Council | DPE-EHG | Year 2 to 4 | Completed works |
| **CH8_B** | Coastal Environment Area, Coastal Use Area Map, Coastal Wetland, Batemans Marine Park | Undertake a review of ICOLL EMPs | Council to review its existing Estuary Entrance Management Plans, in accordance with relevant state government policies and guidelines regarding ICOLL entrance openings. Consultation with local stakeholders and Traditional knowledge holders is to occur as part of this process. The EMPs will need to consider impacts of entrance management on Coastal Wetland Areas | South Durras, Surfside, Joes Creek, Short Beach, Wimbie Beach, Kianga, Little Lake (Narooma), Nangudga Lake | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries, Shoalhaven City Council | Year 2 to 4 | ICOLL EMPs updated, adopted and in use |
| **CH9_B** | Coastal Environment Area, Coastal Use Area Map, Coastal Vulnerability Area, | Erosion management to be undertaken on dunes a Knowlman Road, Rosedale | Erosion management of dune caused by stormwater runoff, access and possibly wave impacts at the end of Knowlman Road. This will likely include soft coastal protection works such as coir logs and revegetation. Erosion management to be undertaken to manage wave impacts, limit pedestrian access and support vegetation. | Rosedale Beach | Council | DPE-EHG | Year 1 | Completed works |
| **CH14_B** | Coastal Environment Area, Coastal Use Area Map, | Educate Malua Bay SLSC on the erosion hazard risk at the site | Of the Surf Clubs and Surf Life Saving Clubs along the Eurobodalla Shire coastline, only the Surf Life Saving Club at Malua Bay was found to at risk of erosion. It is presently beyond the erosion hazard line under existing conditions, but is at risk in the 2100 event, as shown in the figure below. The SLSC will be informed of this finding. It is noted that the risk is not immediate, but advance warning of future risks will allow the club to plan for future management options including when renewal or upgrades are undertaken. | Malua Bay | Council | NA | Year 2 to 4 | Malua Bay SLSC advised of future coastal hazard risk to enable suitable planning |
| **CHO_B** | Coastal Zone | Undertake a community event to promote tourism opportunities | Undertake a Council coast event/festival to promote tourism opportunities, specifically linked to coastal values. This may integrate with existing festivals such as Narooma Oyster Festival, River of Art and Bay Paddle Challenge | All | Council | Tourism NSW, DPI Fisheries | Year 2 to 4 | Event undertaken. Increased awareness of coastal management issues (could be evaluated through a pre and post event survey) |
| **Actions that address Recreational Activities Threats** | | | | | | | | |
| **RA1_A** | Coastal Environment Area, Coastal Use Area Map, Coastal Vulnerability Area, | Manage user conflicts at Bingie Dreaming Track and Shark Bay / Broulee Island track | The community reported conflicts between pedestrian and cycle users of and around the Bingie Dreaming Track. Council, NPWS and local Aboriginal Knowledge Holders to identify key issues and develop management approaches. This will consider the recommendations of the Draft Tuross and Coila Lakes Estuaries CMP (installation of bollards, formalisation of a carpark to limit vehicle access, and retaining the existing Bingie Dreaming Track as a walking track only). | Congo | Council | NPWS, Traditional Owners | Year 2 to 4 | To be confirmed through engagement with Traditional Owners as part of action |

| ID | Management Area | Management Action | Action Details | Location | Lead Agency | Partners | Timing | Performance Measures |
|---|---|---|---|---|---|---|---|---|
| **RA2_B** | Coastal Environment Area, Coastal Use Area Map, Coastal Vulnerability Area, | Undertake dune vegetation management and minimise unregulated pedestrian access | The dune vegetation at Rosedale Beach is being impacted by unregulated pedestrian access and in some cases illegal clearing of vegetation. An annual strategy will be undertaken to target these actions, replace vegetation, where possible, and install barriers and / or signage.<br>The community identified that pedestrian access occurs across the dunes at numerous locations at Broulee. Access to be consolidated through clearly marked and structured access points, and barriers to close off those access locations no longer to be used. | Rosedale Beach, Broulee | Council | DPE-EHG | Year 2 to 4 and ongoing | Increased cover of dune vegetation |
| **RA2_E** | Coastal Zone | Undertake shorebird management across Eurobodalla coastal zone | Target shorebird nesting sites for pest control. Monitoring and education programs to be undertaken to protect shorebirds. Continued implementation of Save Our Shorebirds Program. | All | Council / NPWS | DPE-EHG,DPI-LLS | Year 1 and ongoing | Reduction in pest species threatening shore birds nesting sites |
| **RA2_F** | Coastal Zone, potentially within Coastal Wetland Area | Support Coastcare/Landcare projects. | Provide direction, funding and support for community involvement in on ground works along the Council coast – through Coastcare/Landcare projects. | All | Council | NPWS | Year 1 and ongoing | Support of at least one Coastcare / Landcare project per year |
| **RA2_G** | Coastal Zone, potentially within Coastal Wetland Area | Management of weeds of National Significance in coastal reserves | Conduct follow up work on weeds of National Significance in coastal reserves. Undertake engagement of adjoining landholders to reduce weed impacts on reserves. | All | Council | NPWS | Year 1 and ongoing | Reduction of weeds in coastal reserves. Engagement with adjoining property owners undertaken. |
| **RA3_J** | Coastal Environment Area, Coastal Use Area Map, | Investigate improved access at McKenzies Beach | Illegal parking and crowding along the road edge at McKenzies Beach is a safety and environmental issue. An investigation to be undertaken to improve access. | McKenzies Beach | Council | DPE-EHG, TfNSW | Year 2 to 4 and ongoing | Completed works |
| **RA3_O** | Coastal Zone | Continue to promote existing coastal walks | Continue to promote existing coastal walks such as coastal walks in Murramarang National Park, Broulee Island, Bingie Dreaming, Mystery Bay to 1080 Beach, Mangrove walk at Cullendulla Creek, Durras discovery and Banksia Walk at Burrewarra Point, Mill Bay Board walk at Narooma. | All | Council | DPE, NPWS | Year 1 | Preparation of promotion materials (may be online or hard copies) |
| **RA6_A** | Coastal Use Area Map, Coastal Vulnerability Area, | Engagement and management of impacts of bike track usage between Broulee Head and Moruya Heads | Engage with local Aboriginal Knowledge Holders to understand sensitive locations and impacts of high usage of bike tracks on area between Broulee Head and Moruya Heads. Implement appropriate management measures as a result of this engagement. | Bengello Beach | Council | DPE-EHG, NPWS, Traditional Owners | Year 1 and ongoing | Identify key location and monitoring undertaken at these locations |
| **Actions that address Engagement and Governance Threats** | | | | | | | | |
| **EGC2_A** | Coastal Zone, Coastal Wetlands, Batemans Marine Park | Install coastal protection signage strategy to reduce illegal ICOLL openings | It is illegal to open an ICOLL without appropriate approval from State Givernment. High priority coastal protection signage strategy to be implemented: where illegal ICOLL openings are occurring, where shorebird habitat is being disturbed, erosion hotspots. | All | Council | DPE, DPI-Fisheries | Year 1 and ongoing | Signage installed |
| **EGC2_B** | Coastal Zone | Identify opportunities to promote, support and undertake citizen science and research initiatives with the coastal zone | Opportunities exist to promote, support and undertake citizen science and research opportunities within the Eurobodalla Open Coast coastal management areas covered by the CMP. Examples include promotion of Councils existing CoastSnap program; use of drones and citizen scientists to survey and analyse beach change, support research endeavours such as university honours, doctorate and post doctorate investigations within the Eurobodalla coastal zone. | All | Council | DPE-EHG, | Year 1 and ongoing | Citizen science and research initiatives undertaken |
| **EGC3_B** | Coastal Zone | Work with relevant State Agencies to strengthen shared and consistent management of coastal land | Ensure ongoing function of CEMAC, and ongoing representation of all Agencies listed as responsible or supporting CMP Actions | All | Council | –DPE-EHG, DPE-Crown Lands, DPE-Planning, NPWS, DPI-LLS, SES DPI-Fisheries | Year 1 and ongoing | CEMAC have met at least once per year |
| **EGC3_D** | Coastal Zone | Update PoM for reserve lands to address coastal risk | Use the CMP information to update plans of management for the reserved lands and highlight assets (natural or built) within the reserves that need changed management to mitigate coastal risks. | All | Council | NA | Year 1 and ongoing | POMs updated |

| ID | Management Area | Management Action | Action Details | Location | Lead Agency | Partners | Timing | Performance Measures |
|---|---|---|---|---|---|---|---|---|
| **EGC4_A** | Coastal Zone, potentially within Coastal Wetland Area | Identify opportunities for and undertake cultural burning in the coastal zone | Identify opportunities for and undertake cultural burning in the coastal zone, particularly headlands to improve natural resilience to coastal threats. Work closely with local Aboriginal Community to develop implement appropriately. | All | Council | NPWS, DPE-EHG, DPI-LLS, Traditional Owners | Year 1 and ongoing | One cultural burn undertaken every two years |
| **EGC4_C** | Coastal Zone | Support Aboriginal cultural tourism opportunities in the coastal zone to protect Aboriginal heritage | Provide support to Aboriginal individuals or groups seeking to implement business opportunities to increase local and tourist awareness of Aboriginal culture in the Eurobodalla coastal area to protect Aboriginal heritage | All | Council | Traditional Owners, DPE-EHG, NPWS, DPI-Fisheries | Year 1 and ongoing | $30k in grant funding awarded per year |
| **EGC4_D** | Coastal Zone | Embed traditional Aboriginal knowledge, wisdom and culture in strategic planning by providing knowledge consulting fees to knowledge holders involved in coastal management to protect Aboriginal heritage in the coastal zone | Protect Aboriginal heritage in the coastal zone by involving Knowledge Holders and Elders in coastal management activities. Suitable remuneration should be paid for their time. | All | Council | Traditional Owners, DPE-EHG, NPWS | Year 1 and ongoing | Method for reimbursing Traditional Owners established and on average $10,000 per year paid |
| **EGC4_E** | Coastal Zone, potentially within Coastal Wetland Area | Support local Aboriginal Communities manage cultural heritage from coastal hazards and sea level rise and other coastal threats | Work with Traditional Owners to protect special Aboriginal cultural values and sites from the impacts of foreshore and riparian development, erosion, climate change, four wheel driving, domestic dogs and pedestrians.<br>Education, infrastructure, rules and spatial management can protect important sites from specific threats where and when needed.<br>Costs include remuneration of Traditional Owners ($20k/year) and costs of works from year 2 ($50k/year). | All | Council | Traditional Owners, DPE-EHG, DPI-Fisheries, NPWS | Year 1 and ongoing | To be confirmed through engagement with Traditional Owners as part of action |
| **EGC4_F** | Coastal Zone | Improve access to Country in the coastal zone through the establishment of an Access to Country Plan | Council and state agencies to work with Traditional Land Owners to establish an Access to Country Plan or Agreement, which would identify key locations on Country where access need to be retained or established. Implementation of this plan may require minor on ground works, which have been allowed for in the option costing. Environmental assessment of impacts of works or access to be undertaken. Safety to the environment and users would also need to be considered. | All | Council | Traditional Owners, NPWS, DPE-EHG, State Forest, Crown Lands | Year 2 to 4 and ongoing | Access to Country agreement established |
| **EGC4_G** | Coastal Zone | Identify and use Aboriginal place names | Work with Traditional Owners to identify traditional Aboriginal names for key locations in the coastal area and include local Aboriginal language in coastal education material and signage. | All | Council | Traditional Owners, NPWS, DPE-EHG, DPE-Planning, DPI-Fisheries, NSW Geographic names board | Year 2 to 4 | Inclusion of Aboriginal place names used in Council materials and communications |
| **EGC4_H** | Coastal Environment Area, Coastal Use Area Map, | Review, update and implement PoM for Aboriginal Place at Barlings Beach | Engagement with Mogo LALC identified that the PoM is not being implemented as it is intended to protect coastal vegetation and Aboriginal heritage, and the land is not being managed properly. | Barlings Beach | Council | Traditional Owners, DPE-EHG, DPE-Crown Lands | Year 1 and ongoing | PoM updated and in use |
| **EGC4_I** | Coastal Zone | Prepare an Aboriginal Seasonal Calendar | Collaborate with the Local Aboriginal Community to prepare an Aboriginal Seasonal Calendar to showcase traditional land management, food & medicine practices and deeper understanding of the land & climate. | All | Council | Traditional Owners | 1 | Seasonal Calendar Produced |

### 3.2.3 Actions recommended for public authorities

Public authorities have been identified for the majority of options to support Eurobodalla Shire Council to implement the action, predominately through the provision of technical or project management support. However, there are also several actions for which a public authority has been identified at the lead agency.

There are 15 actions identified for implementation by public authorities, including:

- 7 actions that address coastal hazard threats
- 3 actions that address recreational activity threats
- 5 actions that address engagement and governance threats.

These actions are presented in **Table 3-9**. Additional details for each option can be found in **Appendix D**, with detailed descriptions provided for complex and high cost options in **Section3.2.4**.

Table 3-9 Actions to be implemented by public authorities

| ID | Management Area | Management Action | Action Details | Location | Lead Agency | Partners | Timing | Performance Measures |
|---|---|---|---|---|---|---|---|---|
| **CH1_L** | Coastal Environment Area, Coastal Use Area Map, Batemans Marine Park | Subject to environmental planning approvals, undertake nourishment at Northern Batemans Bay beaches when dredging is undertaken in Batemans Bay / Clyde River as required for navigational purposes | Protection of the existing Northern Batemans Bay shorelines by increasing the sub-areal beach volume through beach nourishment. Regular maintenance dredging of navigable areas of Batemans Bay produces a volume dredged material that will be used for beach nourishment on adjacent shoreline areas. | Surfside / Wharf Road | TfNSW-MIDO | Council, DPE-EHG, DPE-Crown Lands, DPI- Fisheries | Once every 4 years | Observable contribution towards beach sand presence as a result of sand nourishment, subject to environmental planning approvals and suitability of dredged material. |
| **CH1_M** | Coastal Environment Area, Coastal Use Area Map, | Purchase private properties at Wharf Road to assure current and future generations have public access to the foreshore and beaches | NSW Government to purchase private property at Wharf Road and return the areas of beach and the beach access to public ownership. Further details provided in **Section3.2.4**. | Wharf Road | DPE-Planning | Council | Year 1 to 3 | Private property purchase complete and site remediation complete |
| **CH4_S** | Coastal Environment Area, | Emergency Response Plan | In partnership with SES, prepare an Emergency Response Plan to address flood risk to Big4 Batemans Bay Beach Resort from coastal storm inundation. | Big4 Batemans Bay Beach Resort, Beachcomber Holiday Park | NSW SES | Council, DPE-EHG | Year 1 and ongoing | ERP prepared and in use |
| **CH8_C** | Coastal Environment Area, Coastal Vulnerability Area, Coastal Wetlands, Batemans Marine Park | ICOLL Entrance Management Policy – engagement and finalisation | Draft Estuary Management Plans to be put through consultation with relevant agencies and community before finalisation and adoption by NPWS. | Congo, Potato Point, Lake Brou, Corunna Lake | NPWS | DPE-EHG, Council, DPE-Crown Lands DPI-Fisheries | Year 1 | ICOLL EMP engagement complete and EMP adopted and in use |
| **CHALL_A** | Coastal Zone | NPWS Coastal Hazard Assessment | NPWS to undertake targeted coastal risk assessments to better understand coastal risks identified in the CMP Scoping Study first pass risk assessment | National Parks | NPWS | Council | Year 5 to 10 | Coastal hazard assessment complete |
| **EGC3_E** | Coastal Zone | Incorporate coastal hazard risks into PoM as part of scheduled updates | As part of updating plans of management for coastal national parks, include a review of current arrangements for access, interactions between national parks and adjoining lands for recreation and tourism (include maintenance of access infrastructure), weed species; address or foreshadow when necessary any coastal hazard risks. | National Parks | NPWS | Council, DPE-EHG | Year 1 and ongoing | POMs updated |
| **EGC3_F** | Coastal Zone | Undertaken maintenance of State Agency owned coastal assets to engineering and safety standards | Several state agency owned assets require condition assessment and appropriate maintenance as an outcome of exposure to the coastal environment. Management will be undertaken by state agencies to ensure these assets meet appropriate engineering and safety standards. As part of this process, asset ownership will be investigated and confirmed. | All | MIDO | DPE-Crown Lands | Year 1 and ongoing | Assets achieve appropriate engineering and safety standards |
| **EGC4_B** | Coastal Zone | Support DPI Fisheries with the implementation of MEMS initiative 4 | Support DPI Fisheries with the implementation of Objective 4) To Partner with Aboriginal people for the protection of Aboriginal cultural values and improved marine park management of the NSW Mainland Marine Park Network Management Plan 2022 – 2033 | All | DPI-Fisheries | Traditional Owners, Council, DPE-EHG, NPWS | Year 1 and ongoing | Cultural resource use agreements prepared |
| **EGC4_J** | Coastal Environment Area, Coastal Use Area Map, potentially within Coastal Wetland Area | Manage access issues and erosion at targeted sites of significant value to Aboriginal Community as identified by the LALC's | Traditional owners are not satisfied with the current management of highly significant cultural sites. This option would improve management of these sites in consultation with Traditional Owners to protect Aboriginal Heritage | Tilba Beach, Nangudga, Broulee | NPWS | Traditional Owners, NPWS, DPE-EHG, Crown Lands | 1 | Improved management measures in place |

### 3.2.4 Further Details on Complex Recommended Actions

A number of actions listed in **Sections 3.2.2 and 3.2.3** refer to additional details provided on the following pages. The action included in this section are summarised in **Table** 3-10.

**Table 3-10 Complex actions where further details are provided**

| CMP Action ID | Description of CMP Action |
|---|---|
| **CH1_B** | Undertake investigation and design for Northcove Road erosion protection and flood proofing |
| **CH1_D** | Construct a low crested rock revetment to protect Bay Road, Long Beach (Stage 1) |
| **CH1_K** | Wharf Road Protection Stage 1 (CH1_Ka): Priority works at exposed corner of Wharf Road to be undertaken, remediation of beach and reinstatement of public access<br>Wharf Road Protection Stage 2 (CH1_Kb): Inundation protection to be undertaken<br>Wharf Road Protection Stage 3 (CH1_Kc): Wharf Road Raising |
| **CH1_L** | Undertake nourishment at northern Batemans Bay beaches when dredging is undertaken in Batemans Bay / Clyde River as required for navigational purposes |
| **CH1_M** | Purchase private properties at Wharf Road to assure current and future generations have public access to the foreshore and beaches. |
| **CH1_P** | Upgrade existing coastal protection works at Caseys Beach |
| **CH4_D** | Investigate, design and construct a coastal inundation levee to protect against storm surge inundation from creek / estuary (Surf Side Creek) |
| **CH4_K** | Investigate, design and construct seawall raising and wave return barriers in Batemans Bay |
| **CH4_M** | Undertake an adaptation plan for low lying areas to be impacted by tidal inundation under sea level rise |

| CH1_B | Northcove Road Upgrade |
|---|---|

**Location(s):** Maloneys Beach

**Description**

The Stage 2 Coastal Hazards Assessment determined that Northcove Road was at risk of coastal erosion impacting the road at both the 2017 and 2100 100-year ARI extents. While not identified as being within the direct erosion zone currently, the road runs through the zone of reduce foundation capacity and is therefore at risk of being structurally undermined following a large storm event.

Northcove Road and bridge at the western end of Maloneys Beach can also be inundated at both the 20-year and 100-year ARI, with the potential to cause access issues during severe coastal events. This is due to both coastal inundation, and coincident catchment flooding landwards of Northcove Road, and also wave run-up and overtopping of the roadway.

Consultation with the Maloney's community during the public exhibition of the Batemans Bay Urban Creeks Flood Study (Rhelm 2020) also saw this issue raised, with community suggesting the road needed to be upgraded, or an alternate route be provided.

Wave overtopping also has the potential to impact a significant length of the road, causing access issues during a coastal storm and potential damage to the road surface, requiring maintenance following a storm event.

To address these risks, road raising of a 100m-120m section of Northcove Road along with a vertical retaining structure with a wave return barrier at its crest has been conceptually designed as part of the CMP preparation to protect the public road from erosion and wave damages and to maintain continuous access to Maloneys Beach during severe coastal storms.

The investigations and design for these works will be undertaken as part of the CMP. The construction of the works is not required within the next 10 years, and as such should be considered as part of a future CMP.

**Costs**

Investigation and design cost of $200,000.

**Timing**

The investigation and design will be undertaken in years 2 to 4 of the 10 year CMP Business Plan.

Construction is not included in the current CMP 10 year Business Plan. Construction should be considered as part of any future CMP.

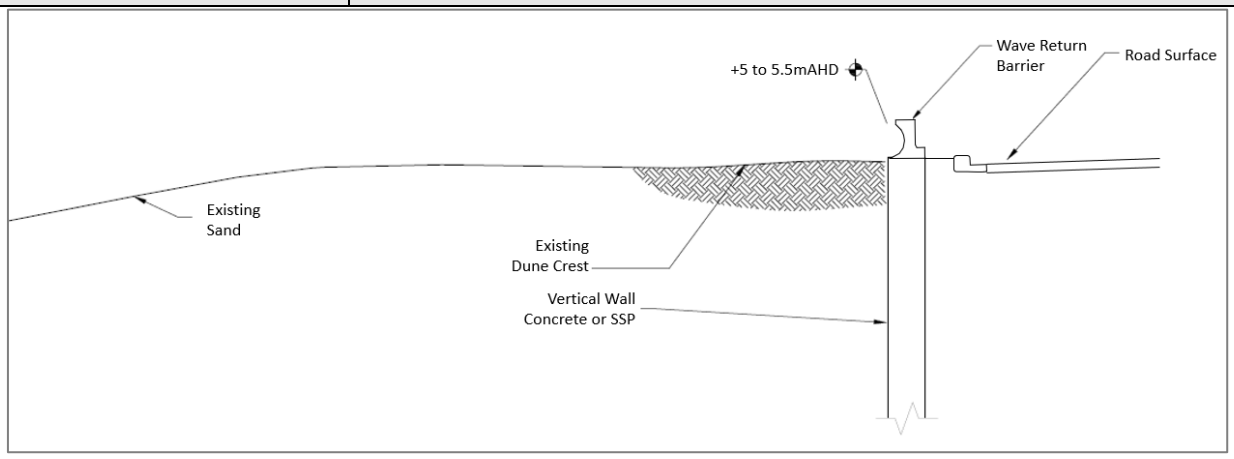
**Design**

The conceptual design of the retaining structure has prioritised the following:

- Ensuring a small footprint so as to minimise the disturbance to the existing beach and dune areas
- Placing the structure outside of the area of direct coastal erosion to remove any influence of the structure on the nature and extent of coastal erosion.

A typical section for the retaining structure is presented on the image below, which includes construction of a vertical wall on the seaward edge of the road alignment. The wall could comprise of reinforced concrete panels or driven sheet pile and would require approximately 5m embedment below the desired crest level, which could be reduced if ground anchoring was adopted. Based on current estimates the retaining wall would not be directly exposed to coastal hazards and hence scour protection is not required. The structure crest would be at a level consistent with the existing road surface (+5 to +5.5mAHD at eastern end) and would comprise a wave return barrier of varying height.

| CH1_B | Northcove Road Upgrade |
|---|---|




*Typical section of a retaining structure with a wave return barrier at the crest*

The concept design assessed as part of the CMP comprises a sheet pile retaining wall of 5m embedment with a concrete wave return barrier of 1.2m height (just East of bridge) reducing in height to the east along the alignment of the wall. The image below provides an indication of the structure form (sheet pile with concrete capping beam), noting that following construction it would buried within the dune and not be at risk of exposure due to coastal erosion from 100year ARI event both now and at 2100.

Road raising could be incorporated into the design to also mitigate inundation associated with catchment flooding, and if undertaken would reduce the required height of the wave return barrier. This design would need to be optimised in consultation with the floodplain risk management program and may include upgrading of the culverts under the bridge.

No detailed design of the retaining structure has been completed, however an assessment of wave runup and overtopping was performed using methods outlined in Eurotop (2018) to test the feasibility of the conceptual design and to ensure adequate protection of the roadway against overtopping, both under present day and future sea level rise scenarios. The following table summarises the results, noting an average overtopping rate of less than 25 L/s/m is targeted to reduce the risk to cars transiting near the crest (Eurotop, 2018).

*Mean Overtopping Rates (q) for the 100year ARI coastal storm under sea level rise scenarios just east of the Northcove Road Bridge (road level of 2.8mAHD)*

| | Present | 2050 | 2065 | 2100 |
|---|---|---|---|---|
| q (L/s/m) | 70 | 150 | 200 | 540 |

The required crest level of the wave return wall to reduce mean wave overtopping to an acceptable rate (i.e. 25 L/s/m) is presented in the table below.

| CH1_B | Northcove Road Upgrade |
|---|---|

*Required Wave Return wall height (m above road level) to reduce risk to cars for the 100year ARI coastal storm under sea level rise scenarios*

| | Present | 2050 | 2065 | 2100 |
|---|---|---|---|---|
| Just East of Bridge (Northcove Road) | 1m | 1.2m | 1.3m | 1.7m |
| Maloneys Drive | 0m | 0.2m | 0.3m | 0.7m |

**Benefits**

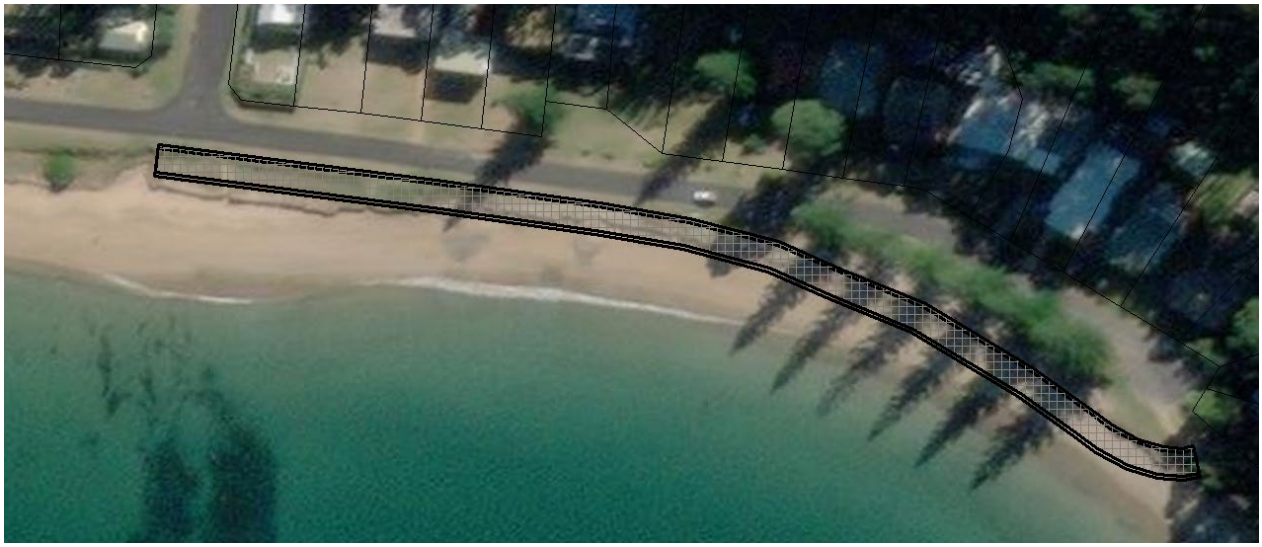
- The retaining structure would provide structural support to road following severe storm erosion of Maloneys Beach and enable continued access to Maloneys Beach.
- If the crest level of the retaining structure is of sufficient height, coastal inundation and overtopping will be reduced to a tolerable level for the safe access of cars and will minimise road surface failures due to coastal processes.
- Road raising of Northcove Road would be required to manage the impact of catchment flooding on the road. This should be considered as part of the floodplain risk management process to attract appropriate funding mechanisms.

| CH1_D | Long beach Erosion Protection: Low crested rock revetment to protect Bay Road |
|---|---|

**Location:** Long Beach

**Description**

An approximately 250m low crested revetment will be constructed to protect Bay Road from coastal erosion impacts under present day and future sea level rise. The intention of this option to preserve the foundation of Bay Road under severe coastal storm events targeting the location under immediate risk.



CH1_D *conceptual revetment alignment at Long Beach (250m)*

**Costs**

- CH1_D Phase 1: Investigation and design including environmental assessment for coastal erosion structure: $60,000
- CH1_D Phase 2: Construction of ≈ 250m coastal protection works and beach nourishment: $3,100,000
- CH1_D Phase 3: Maintenance and nourishment of beach: 1% of capital costs over life of structure

**Timing**

Phase 1 Investigation and design to occur in 2023, with Phase 2 construction estimated to occur in 2024 (upon completion of the investigation and design).

**Coastal Threats Addressed**

Deterministic calculation of coastal erosion extents based on storm demand identified that approximately 250m of Bay Road was at risk of erosion as a result of a 100year ARI storm event under present day sea levels. Under future projected sea level rise, the full length of Bay Road adjacent to the Long Beach foreshore (~530m in length) is at risk of erosion.

Whilst coastal inundation does not pose a risk to the area under current sea levels, Bay Road and approximately 15 properties become increasing at risk of inundation from a 100 Year ARI storm as sea level rise.

**Design**

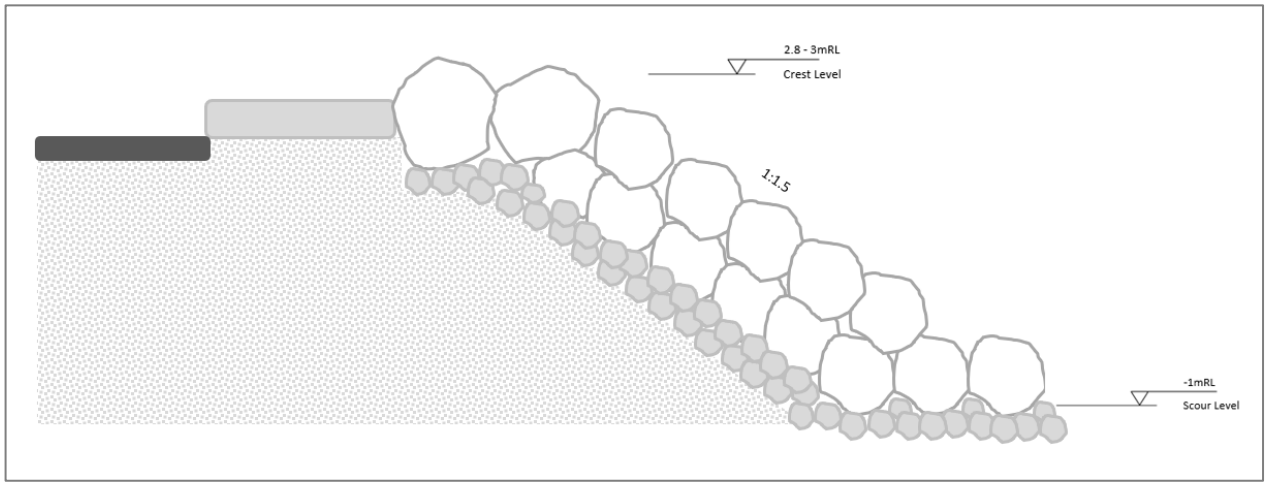
A low crested revetment has been conceptually designed to protect the public road from being impacted by coastal erosion. The conceptual design has prioritised the following:

- Minimising the crest level to not disturb the visual amenity and beach access currently experienced at Long Beach.

| CH1_D | Long beach Erosion Protection: Low crested rock revetment to protect Bay Road |
|---|---|

- Considering community preference regarding design.
- Minimising the footprint of the rock revetment so as to minimise the disturbance to the existing beach and dune areas.

A typical section for the revetment design is provided below which includes construction of a rock structure on the seaward edge of the road alignment that would remain buried below the dune system. The structure crest would be at a level consistent with the existing road surface (+2.8 to +3.2mAHD) with a concrete footpath running along its length between the structure crest and the road. The design would accommodate the existing culvert outlet (located in front Fauna Ave).




*Typical cross section for low crested rock revetment at Long Beach*

Additional benefits of the proposed revetment would be a reduction in still water inundation as a result of elevated coastal water levels, with a crest level of +2.9mAHD providing protection for the 100year ARI still water level under sea level rise out to 2100.

Wave runup and overtopping of the revetment crest would occur, as is currently experienced across the dune crest. Under future sea level rise conditions, this may be significant with potential damage to the road surface. Estimates of wave overtopping under present day sea levels, indicate mean overtopping rates remain only marginally above tolerable limits for cars directly behind the crest (Eurotop, 2018). The presence of a concrete footpath that is integrated with the revetment, sets the road back from the revetment crest and will reduce the potential for damage to the road surface in the near term. Longer term wave overtopping would be significant. While wave overtopping hazard would remain, the nature of the road, its limited use and the short duration of the overtopping hazard (at the peak of the tide), the risk does not warrant large scale coastal protection works in the near future, particularly when impacts to user amenity of the beach is considered.

**Benefits**

- Preserves Bay Road from critical damage from erosion and maintains access to the eastern end of Long Beach and for up to 20 foreshore properties.
- Management of coastal inundation of Bay Road.
- Provides opportunity to establish formal and controlled access to the beach across the dunes.

| CH1_Ka, CH1_Kb and CH1_Kc | Wharf Road Erosion and Inundation Protection Stages 1, 2 and 3 |
|---|---|

**Location(s):** Wharf Road, North Batemans Bay

**Description**

Stage 1 Works (CH1_Ka)

The corner of Wharf Road at North Batemans Bay was identified as being at extreme risk of coastal erosion and asset failure under existing conditions due its proximity to the existing shoreline. Conceptual design of a seawall has been developed to address this risk, with the following objectives:

- Provide structural protection to Wharf Road against existing and future coastal erosion risk
- Limit the rate of wave overtopping to the roadway to maximise the duration of safe access along Wharf Road during elevated coastal storm conditions
- Tie in with existing coastal protection to the west, at the Easts Riverside Holiday Park
- Provide formal public access and connection from the Holiday Park to the beach and public open space to the east.

Stage 1 works also involve remediation of the adjacent land being returned to public open space as part of private property acquisition (CH1_M).

Stage 2 Works

The low-lying areas of North Batemans Bay along Wharf Road have been identified as being at risk of coastal inundation under a present day 100yrARI coastal water level, with inundation depth exceeding 1m in some area. Conceptual design of flood barriers along the foreshore and Wharf Road to address this inundation issue involve:

- Raising of the existing seawall that fronts the Holiday Park (≈ 440m in length).
- Construct a flood wall along the seaward alignment of Wharf Road east of the Wharf Road corner, consisting of a Steel Sheet Pile wall with capping (≈ 250m in length).

Stage 3 Works

Opportunistic raising of Wharf Road to be undertaken as routine road upgrade works are undertaken or funding becomes available to maintain access during inundation events. Road raising to provide resilience against future coastal inundation.

**Costs**

The proposed design and cost estimates for Stages 1 and 2 are for the coastal hazard protection purpose of the seawall only. Additional public benefits should be considered and incorporated at the detailed design stage, such as viewing platforms, beach access ramps and stairs, footpath incorporated into the crest of the structure and other amenity details or educational features.

Stage 1: Coastal Protection works, remediation and reinstatement of beach for public use

- Phase 1: Site remediation assessment and I&D for coastal protection structure: $200,000
- Phase 2: Construction of coastal protection works and beach rehabilitation: $2,200,000
- Phase 3: Maintenance and enhancement of beach and coastal vegetation: $60,0000 over 6 years ($10K per annum)
- Seawall Maintenance Costs: 1% of capital costs annually over life of structure

Stage 2: Precinct inundation protection

- Seawall Capital Cost: $3,800,000
- Flood Wall Capital Cost: $2,100,000

| CH1_Ka, CH1_Kb and CH1_Kc | Wharf Road Erosion and Inundation Protection Stages 1, 2 and 3 |
|---|---|

- Seawall Maintenance Costs: 1% of capital costs annually over life of seawall. Negligible maintenance costs for flood wall.

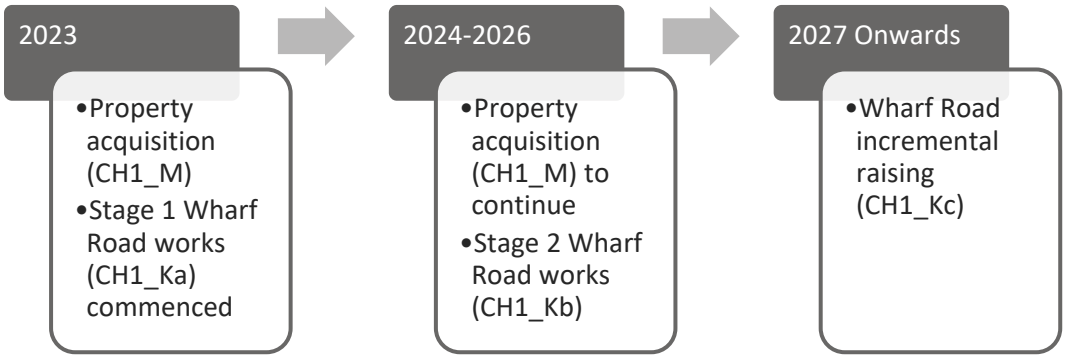
Stage 3 (road raising and drainage improvement)

- $500,000

**Timing**

The Stage 1 works should be implemented as a high priority item to protect against an existing coastal erosion risk, with design and construction to commence in 'Year 1' of the CMP. The seawall, in its initial form, would have a limited lifespan (~20years) and form a foundation for further management works to address coastal inundation across the wider Wharf Road area.

Timing of these works, and associated works is outlined below.




**Design**

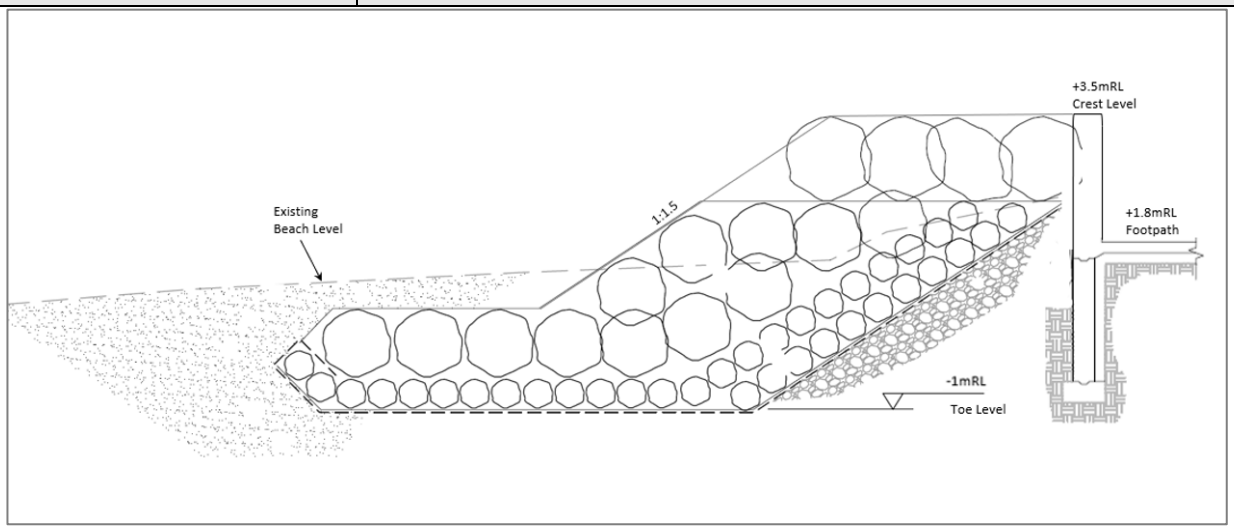
Stage 1

A typical section for the seawall design concept is presented below and includes construction of a 3.0m wide crest at +3.5mAHD and 1 in 1.5 seawall slope that extends down to a toe level of -1mAHD. Behind the crest of the seawall a concrete cut-off wall would reduce the permeability of structure (thereby providing a barrier to still water inundation). A footpath could also be integrated into the structure at detailed design. This footpath could occur at the crest of the structure to facilitate views or at the base of the structure cut-off wall in keeping with the existing road level as depicted in the image below.

A crest level of +3.5mAHD is established to reduce the rate of overtopping of the structure under severe coastal storm conditions. To meet a tolerable overtopping threshold of <50 L/s/m, a threshold for the safety of vehicles behind the crest (i.e. on Wharf Road), a crest elevation of +3.5mAHD with a crest width of 3m is required (based on wave overtopping calculations for rubble mound structures in Eurotop, 2018 under the 2100 scenario). Armour stone sizing of 3-4t is required to ensure stability under design wave conditions (using the empirical stability methods of van der Meer, 1988).

Both the existing ad hoc protection and from the unapproved structure to the east would be removed and armour stones could be reused as material for the new structure.

| CH1_Ka, CH1_Kb and CH1_Kc | Wharf Road Erosion and Inundation Protection Stages 1, 2 and 3 |
|---|---|




*Typical Cross Section of Seawall Concept at Wharf Road Corner.*

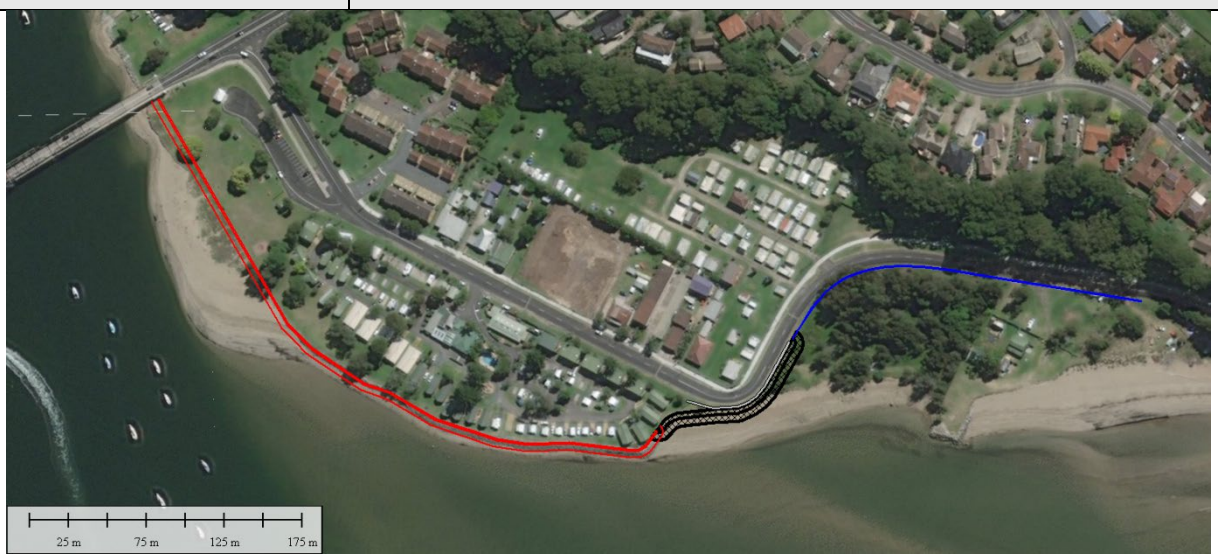
The alignment of the structure would run between the existing seawall that protects Holiday Park to the west and along approximately 85m of Wharf Road (100m in total length), as shown on the adjacent image. Given the alignment of the seawall, the structure would block the natural drainage of the landside area and existing ocean outfall. As such drainage would need to be incorporated into the seawall design and may take the form of a pipe outlet through the structure with non-return value to inhibit the ingress of coastal waters during elevated sea level conditions (noting its limited functionality under rising sea levels).

Stage 2

The alignment and extent of structures is presented below. The flood protection would be constructed to a level that will prevent coastal still water inundation up to the year 2100 (for 100-year ARI immunity – crest level ~3mAHD + freeboard) and will tie into the Stage 1 protection works (Option CH1_Ka). Wave overtopping of the holiday park would be reduced by the seawall raising, however would not be a targeted outcome of the works as focus is coastal inundation protection to the precinct.

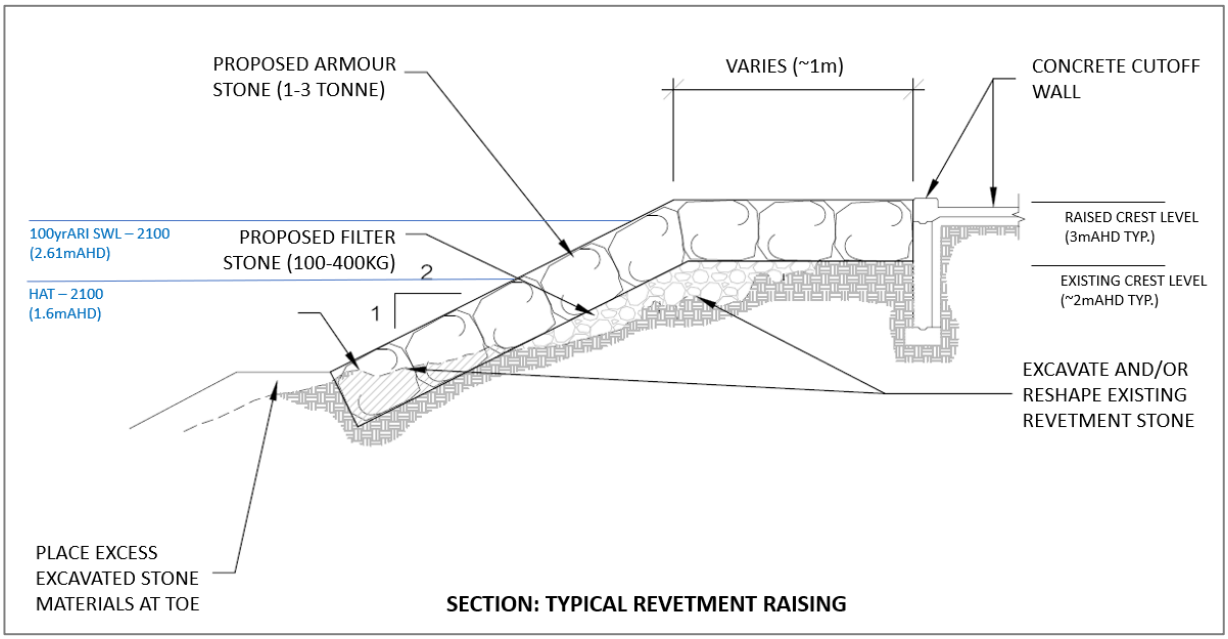
A concept seawall raising option has been designed that would leverage of the existing seawall as a foundation but increase the crest level to +3.0mAHD, above the 100-year ARI Storm Tide level in 2100 + freeboard. A typical section for the seawall raising design is presented below and includes construction of a 1m wide crest and 1 in 2 seawall slope that is placed on top of the existing seawall armour layer (also 1 in 2 slope). At the back of the crest of the raised seawall a concrete cut-off wall would reduce the permeability of structure and neatly tie the seawall into the land behind.

| CH1_Ka, CH1_Kb and CH1_Kc | Wharf Road Erosion and Inundation Protection Stages 1, 2 and 3 |
|---|---|



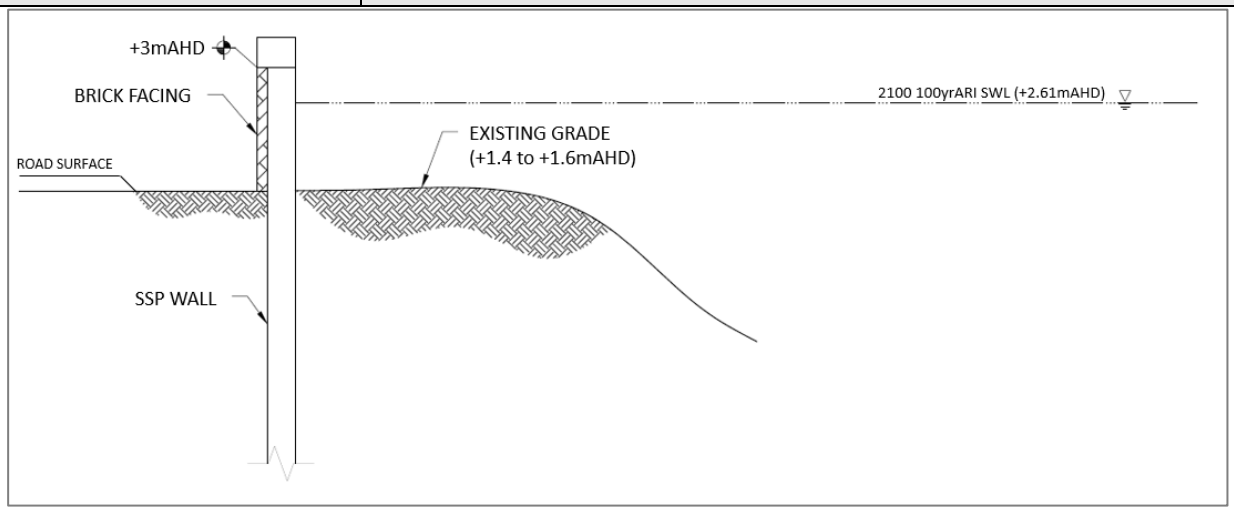

*Alignment and extent of Stage 2 Inundation Protection of Wharf Road*
*(Red: Raising of Seawall, Blue: Vertical SSP)*

A typical section for the flood wall along Wharf Road is presented below which includes installation of a vertical Steel Sheet Pile (SSP) structure on the seaward edge of the road alignment. The SSP panels could be concealed with capping and facia and would also provide structural support for future road raising works.




*Typical cross section for raising of the Seawall fronting the Easts Riverside Holiday Park*

| CH1_Ka, CH1_Kb and CH1_Kc | Wharf Road Erosion and Inundation Protection Stages 1, 2 and 3 |
|---|---|




*Typical cross section for SSP Wall along Wharf Road*

**Benefits**

- Stage 1: The structure will provide protection to Wharf Road and maintain the road as a vital access way for the area. Provides the opportunity to establish formal connection between the existing developments and open space to the east. Note: it is assumed voluntary acquisition of the properties to the east of Wharf Road is completed and the area is returned to public open space (for more information see Action CH1_M).
- Stage 2: The structure will provide protection from coastal inundation to the North Batemans Bay area and maintain Wharf Road as a vital access way for the area during an ocean storm event.
- Stage 3: Resilience against future coastal inundation.

| CH1_L | **Undertake nourishment at northern Batemans Bay beaches when dredging is undertaken in Batemans Bay / Clyde River as required for navigational purposes** |
|---|---|

**Location(s):** Surfside Beach, Surfside Beach West (Dog Beach / Mcleods Beach), North Batemans Bay Beach (Wharf Road), Long Beach

**Description**

Dredging of Batemans Bay and Clyde River has occurred on an infrequent basis since at least the early 1900s, with dredge spoil deposited at Corrigans Beach and Surfside throughout the century. Recent dredging and nourishment campaigns have occurred in 2013, 2016 and 2020. The 2020 campaign deposited sand offshore Surfside Beach, consisting of 10,000 $m^3$ of Clyde River sand. In 1996 12,000 $m^3$ of sand from navigational dredging was deposited on the northern end of Surfside Beach. This management action would redirect all dredged material to the Northern shorelines of Batemans Bay to increase the sub-areal beach volume of Surfside Beach, Surfside Beach West (Dog Beach), North Batemans Bay Beach (Wharf Road) and Long Beach.

Beach nourishment is opportunistic and would occur as and when dredge sediment from Batemans Bay /Clyde River becomes available.

Nourishment and dredging activities are subject to approvals issued by the State Government and suitability of the dredged material.

**Costs**

A capital cost of $250,000 per nourishment campaign, with no ongoing maintenance cost.

**Timing**

Beach nourishment is opportunistic and would occur as and when dredge sediment from Batemans Bay and Clyde River becomes available.

Based on previous dredge campaigns, it is estimated that it will be repeated every 5-10 years (on average).

**Design**

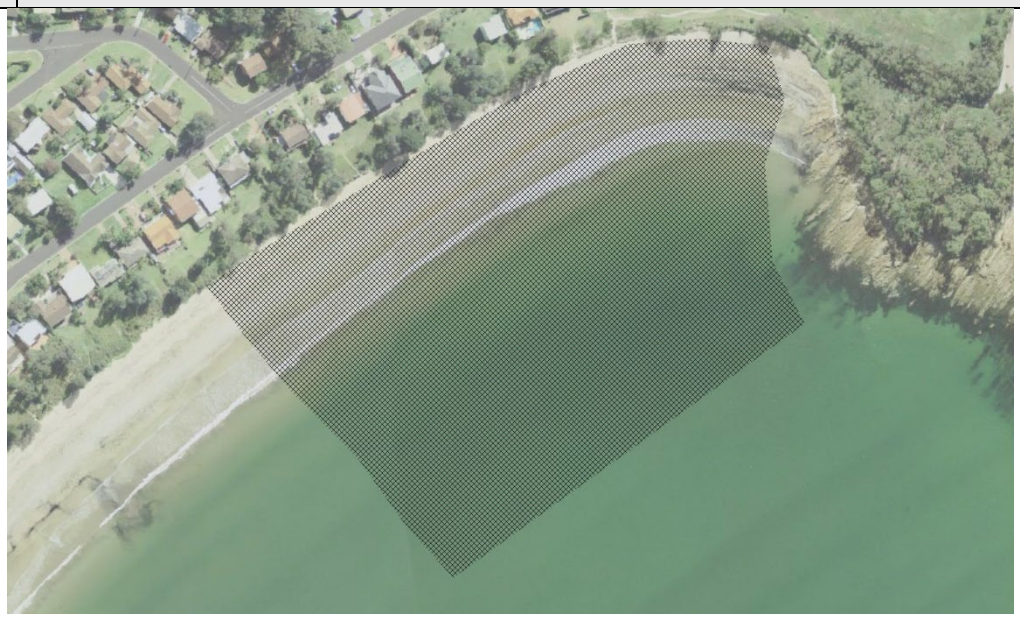
*Surfside Beach Nourishment*

The 100 Year ARI storm demand at Surfside Beach is approximately 55$m^3$/m of beach length. Therefore, the volume of sand required to replace erosion after a 100 Year ARI event for the full 800m length of beach is approximately 50,000$m^3$.

However, if nourishment were to occur in response to navigation dredging within the Clyde River channel, it is estimated that placement of approximately 10,000$m^3$ of sand at the northern end of Surfside Beach (as shown on the image below), would result in approximately a 10m gain in beach width.

It should be noted placement of dredge material directly on the beach or marginally offshore (within 100m of shoreline as per image below) is required to ensure nourishment of the beach is achieved. It has been shown offshore placement may not result in movement of sand to the beach shoreline particularly if it coincides with Clyde river flood flows.

| CH1_L | **Undertake nourishment at northern Batemans Bay beaches when dredging is undertaken in Batemans Bay / Clyde River as required for navigational purposes** |
|---|---|

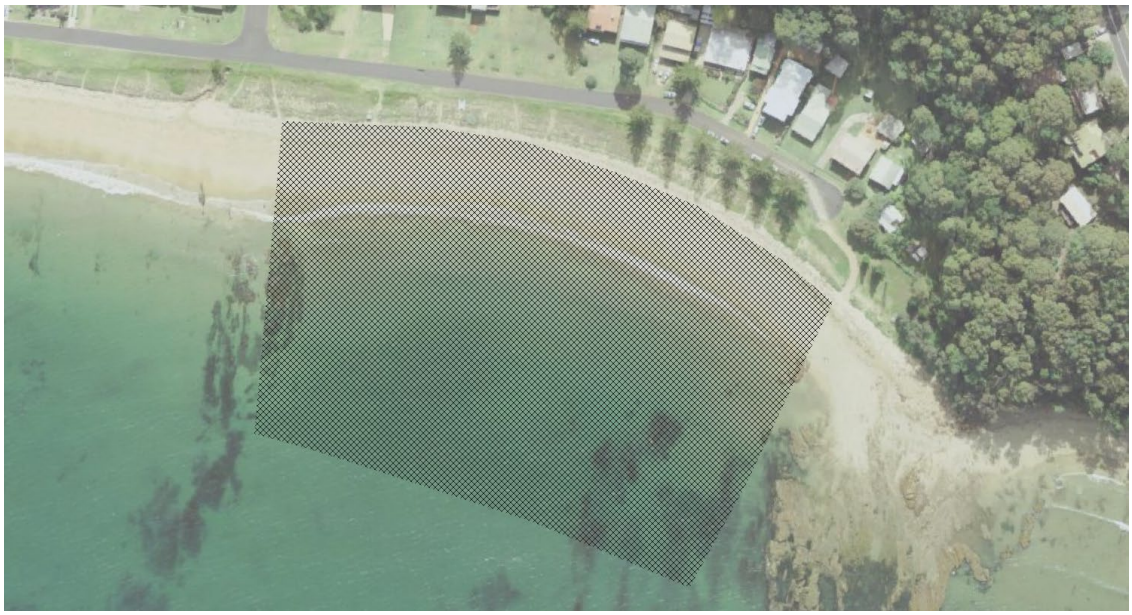


*Long Beach*

The 100 Year ARI storm demand at Long Beach is approximately 90m$^3$/m of beach length. Therefore, the volume of sand required to replace erosion after a 100 Year ARI event for the full 1,000m length of beach is approximately 90,000m$^3$.

However, if nourishment were to occur in response to navigation dredging within the Clyde River channel, it is estimated that placement of approximately 15,000m$^3$ of sand at the eastern end of Long Beach (as shown on the image below), would result in approximately a 15m gain in beach width.

It should be noted placement of dredge material directly on the beach or marginally offshore (within 100m of shoreline) is required to ensure nourishment of the beach is achieved (as per figure below).

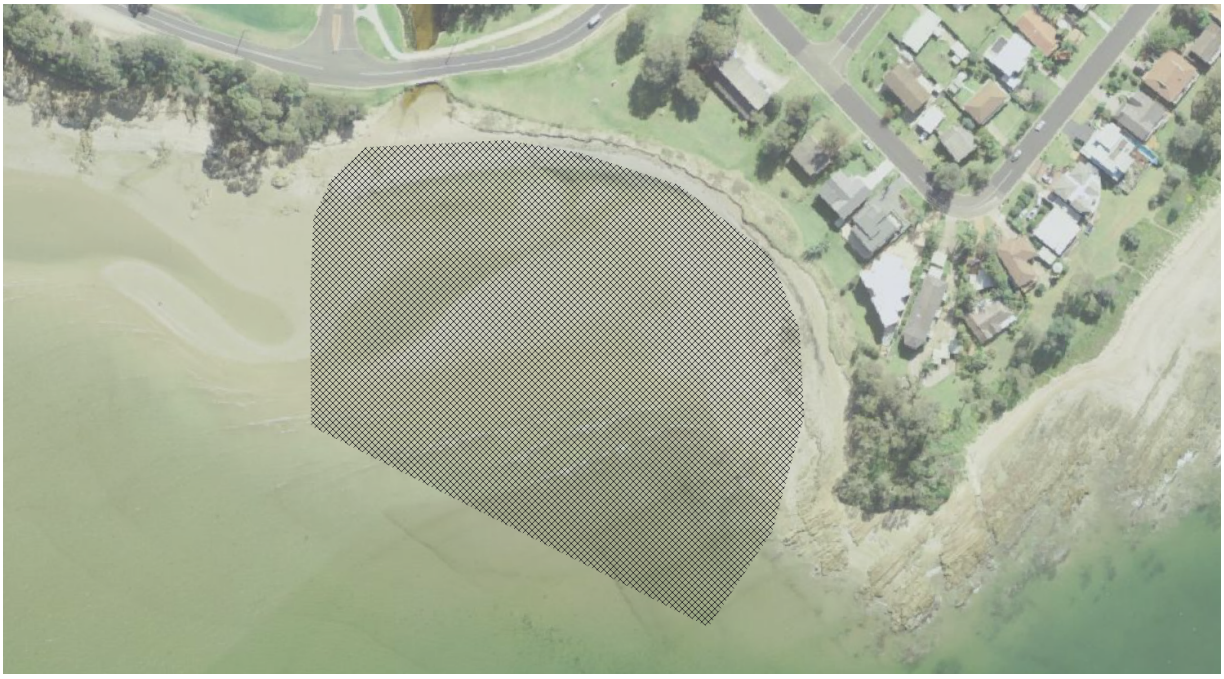


| CH1_L | **Undertake nourishment at northern Batemans Bay beaches when dredging is undertaken in Batemans Bay / Clyde River as required for navigational purposes** |
|---|---|

*Surfside Beach West (Dog Beach / Mcleods Beach)*

Placement of 5,000m$^3$ of sand in response to navigation dredging within the Clyde River channel, would result in a 15m gain in beach width.

It should be noted placement of dredge material directly on the beach or marginally offshore (within 50m of shoreline) is required to ensure nourishment of the beach is achieved (as per figure below). Placement heights if directly on the beach should be graded to ensure the dredge material is at least ½ meter lower than the foredune crest height to minimise sand loss by wind, over the foredune into property and onto the road.



*Dune Nourishment*

If beach width is greater than 30 m at all Northern Batemans Bay beaches when navigation dredging of the Clyde River channel occurs, targeted nourishment of the dune system at Surfside Beach or Surfside Beach West (Dog Beach / Mcleods Beach)) will be undertaken to achieve an elevated dune crest level to protect against coastal inundation under future climate change scenarios.

**Benefits**

- Avoided loss of access.
- Avoided loss of amenity.
- Reduction in erosion risk to foreshore assets
- Reduced need for emergency erosion protection works (as outlined in the CZEAS)

| CH1_M | Property acquisition and restore land to safe public use area |
|---|---|

**Location(s):** Wharf Road, North Batemans Bay

**Description**

Public ownership of beaches has long been a foundation of the coastal management approach in NSW.

Restoring public ownership of the beach at Wharf Road was a priority issue for the Wharf Road CZMP. This would return the areas of beach and the beach access to public ownership. The location of private lots for acquisition is shown in the image below in pink.

Restoring public access to the beach is high priority and an appropriate means to also address the coastal risk affecting Wharf Road.

DPE-Planning will require the land to be free of debris and in an uncontaminated state as part of any condition of purchase. It is noted that given the residual risk of unknown quantities of buried material being unearthed, it is likely that, even if cleaned up by the current owner(s), the sites may still require some remediation to make the land suitable for open space.

Access to the existing and future public reserve should be improved to a safe standard. As part of the site remediation, the illegal foreshore structures should be removed. The use of the rock contained within this structure should be considered for use in the Wharf Road Stage 1 Protection Works (CH1_Ka).

Additional site improvements and opportunities can be explored (such as revegetation, biobanking and a recreational use plan), however, they would be additional to the core aspects of this action included in the CMP and completed under CH1_Ka.

*Properties identified for acquisition*

**Costs**

Property acquisition through the Coastal Lands Protection Scheme amounts to an estimated $4,000,000

**Timing**

Voluntary acquisition of private lots should occur in 2023 – 2026 subject to private landowner decisions.

Remediation of public land should commence immediately, with remediation of future public land to occur following completion of property acquisition process and site contamination and remediation plan.

| CH1_M | Property acquisition and restore land to safe public use area |
|---|---|
| **Benefits**<br>This option derives benefits from anticipated creation of nearly 11,575m$^2$ of public beach and vegetated open space from the purchase of 42 lots from private owners. This will allow for greater access to the beach for the public increasing its use values.<br>Additional non-quantifiable benefits could include improved habitat and connection to Country opportunities. | |

| CH1_P | Casey Beach Seawall |
|---|---|

**Location(s):** Caseys Beach

**Description**

The existing coastal protection works at Caseys Beach will be replaced to protect Beach Road and reduce the likelihood of damage and access impacts from wave overtopping during storm events.

There currently exists a proposed seawall design for Caseys that has been developed and approved by Council. Modification of the existing design would be required to ensure the proposed seawall design meets overtopping estimates under future sea level rise scenarios.

**Costs**

Capital Cost: $7,900,000. Maintenance Costs: 1% of capital costs over life of structure

**Timing**

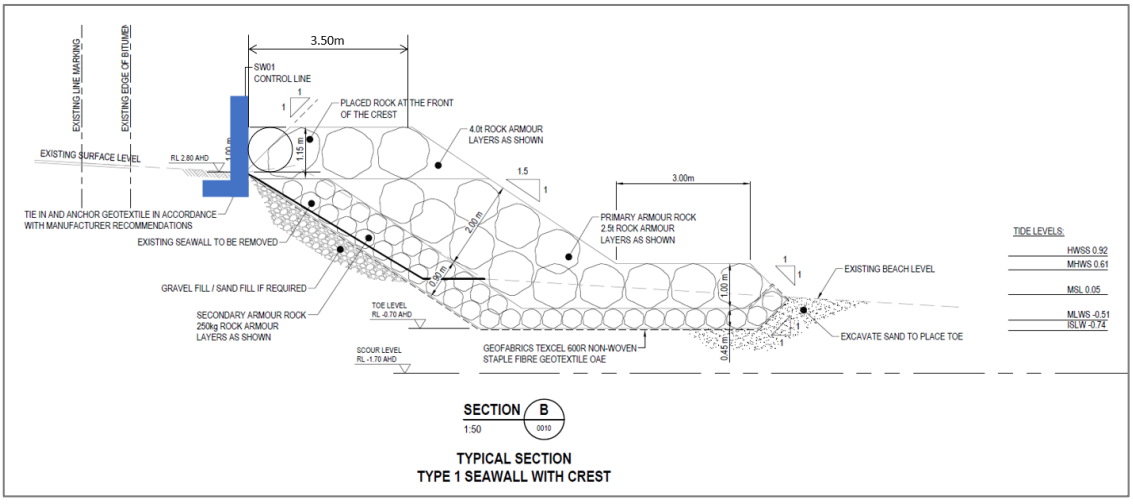
These works will be completed in yeas 2 to 4 of the CMP 10 Year Business Plan.

**Design**

The proposed seawall design shown in the image below (Aurecon, 2019) will provide adequate protection to ensure Beach Road is not impacted by coastal erosion and is adequately designed to withstand extreme coastal conditions.

To manage the risk of future wave overtopping a modification of the seawall design will be required. A possible modification to the seawall design is presented in the image below and incorporates a vertical wall directly behind the structure crest (shown in blue). Modifications to the proposed seawall design would need to subject to detailed design, including physical modelling if deemed required. Further details can be found in Appendix E.

Reprofiling/raising of the road in conjunction with seawall crest raising may be desirable to ensure adequate drainage of the overtopped volume of water. Such works would need to consider access and drainage of private property along Beach Road.




*Seawall with Crest Typical Section*

**Benefits**

This option derives benefits from protection of Beach Road from coastal erosion and inundation (from wave overtopping).

| CH4_D | Surfside Coastal Inundation Levee |
|---|---|
| **Location**: Surfside | |

**Description**

The urban regions of the Surfside subcatchment adjacent to the bay are low lying and at risk of inundation in coastal storm events. Properties and assets are currently affected in the 20-year ARI coastal storm event, and affectation and associated risks increases in the future due to sea level rise exacerbating flood levels.

The locations within Surfside lying below ground levels of 2.1 mAHD are at risk of 100 Year ARI flooding under existing sea levels, and the natural topography does not afford Surfside flood protection from large coastal storms and widespread inundation.

As part of the CMP, a Coastal Inundation Levee will be constructed to increase protection of the low-lying residential precinct including council assets adjacent to the bay from the inundation threat posed by a 100-year ARI storm under existing sea levels including a 0.4m freeboard. As wave runup heights will exceed the structure crest level, the levee will be designed to withstand erosion and overtopping. Future CMPs may consider raising and extending the Coastal Inundation Levee to protect against the increased risk of inundation as a result of sea level rise. This is discussed further in **Appendix E**.

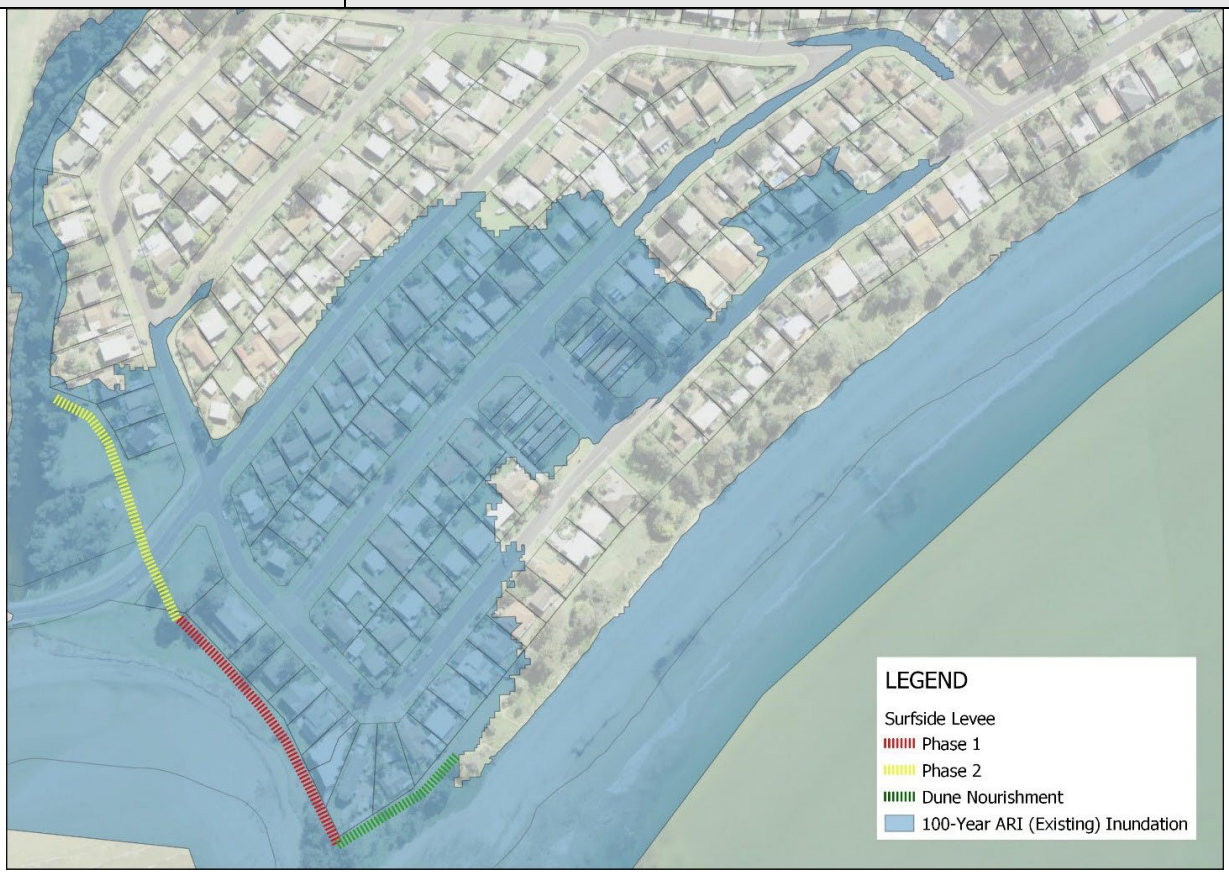
Whilst the Coastal Inundation Levee has been developed in response to ocean flooding, it will also protect the precinct from catchment driven flood events. The phase 2 design should be examined and optimised (including road treatment, levee location and design) as part of a Floodplain Risk Management Study and Plan for the area.

The approximate location of the proposed levee is shown below. It is proposed to construct the levee in two phases:

- Phase 1 (shown in red) comprises the section at Surfside West Beach (Dog Beach) will be undertaken as a high priority task following certification of the CMP.
- Phase 2 (shown in yellow) comprises the remaining sections to be completed under this CMP, with investigation and design to be completed with input from the Floodplain Risk Management Study and Plan.

In addition, the connection of the levee into the surrounding ground levels to ensure flood protection requires the dune at the western end of Myamba Parade to be nourished to ensure the crest of the levee is at or above 2.5mAHD. The stability of the dune should also be ensured through vegetation management and dune building with works and vegetation enhancement particularly focused at the southern location of surfside beach which is identified in green in the image below.

| CH4_D | Surfside Coastal Inundation Levee |
|---|---|




*Approximate Coastal Inundation Levee Location*

**Costs**

Total Capital Cost: $3,100,000

Maintenance Costs: 1% of capital costs over life of structure

Costs to construct Phase 1, Surfside West Beach (Dog Beach) section: $1,500,000

Cost to construct Phase 2 section: $1,500,000

Dune nourishment and vegetation management: $100,000

**Timing**

Investigation and design of Phase 1 to occur in 2023, with construction estimated to occur in 2024 (upon completion of the investigation and design).

Phase 2 design would progress as part of the Floodplain Risk Management Study and Plan, estimated to commence in 2023, with construction estimated to occur in 2025.

**Design**

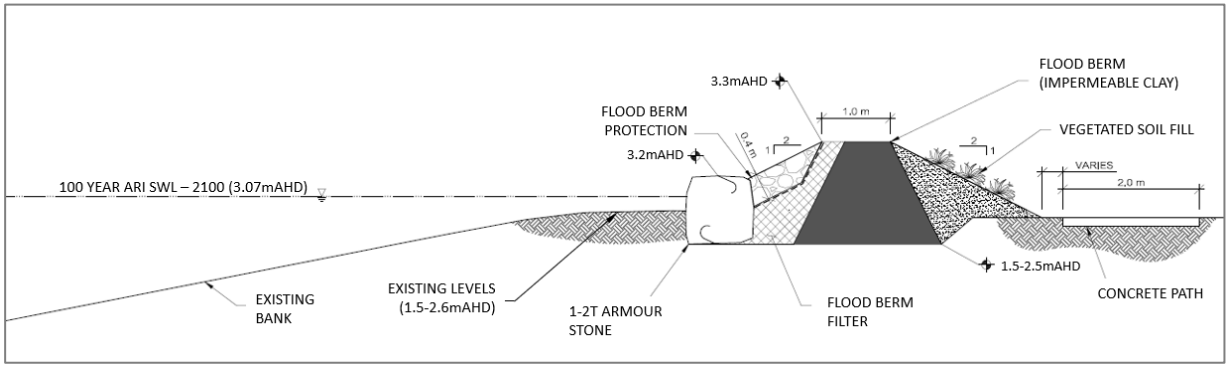
A concept design for Phase 1 and Phase 2 of the Coastal Inundation Levee is presented in the cross-section below.

The design and costs have assumed a berm that consists of an impermeable core with armouring on the flood prone side and a vegetated slope on the protected side. However, the detailed design process will need to consider construction impacts on Aboriginal heritage and could result in the impermeable core

| CH4_D | Surfside Coastal Inundation Levee |
|---|---|

being constructed using sheet piling (rather than impermeable clay as shown on the typical section below).

The horizontal footprint of the Coastal Inundation Levee will be dependent on crest level targeted and existing ground level. Existing ground levels along the first stage of levee vary between 1.5 and 2mAHD, such that a Coastal Inundation Levee with height of 0.5-1m and width (at the base) of 3 to 5m would be required to achieve a crest level of +2.5mAHD.




**Benefits**

- The Coastal Inundation Levee will protect the residential precinct (and the associated infrastructure and Council assets) in events up to and including the 100-year ARI ocean storm under existing sea levels plus 0.5m freeboard.
- Whilst the option has been developed in response to ocean flooding, it will also protect the region from catchment driven flood events.
- The effectiveness of the option will be dependent on the ongoing monitoring and maintenance of the levee and dune works to ensure they remain higher than projected storm levels.
- Climate change will reduce the effectiveness of a given levee level. To address this, the works can be adapted, to lift the height of the levee and extend its length in line with projected increases in ocean flood levels. This would need to be assessed in future CMPs.

| CH4_K | Seawall Raising and wave return barriers |
|---|---|

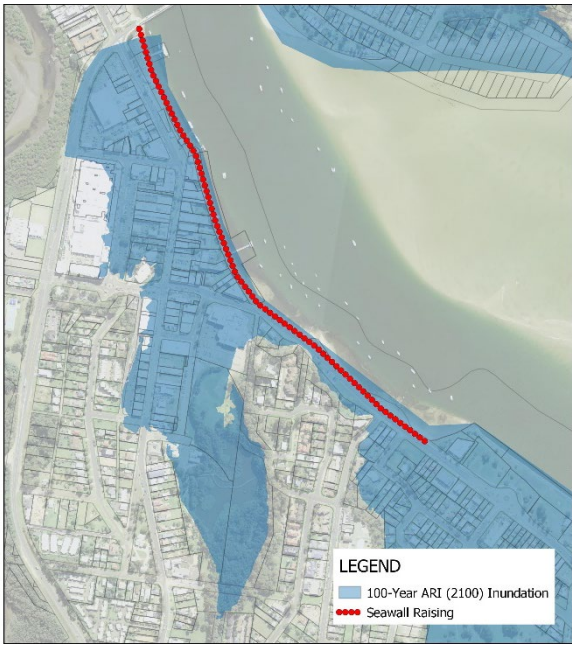
**Location(s):** Batemans Bay to Batehaven

**Description**

An assessment of coastal inundation hazard has identified that significant portions of the CBD seawall are subject to existing risks of wave overtopping. Under future climate scenarios, as sea levels rise, storm tide (still water) inundation and increased wave overtopping will be experienced.

Under current mean sea levels, the existing risk of inundation is predominantly limited to wave overtopping as shown in Figure 1 for the 20-year ARI (infrequent) and 100-year ARI (extreme) event. For the medium term up to 2065, under sea level rise scenarios, the likelihood and extent of inundation only increases, with up to 95% of the seawall length inundated under a 100-year ARI event.

Based on an analysis of the existing crest levels, seawall raising will be undertaken for the 1,200m length of seawall shown on the adjacent image to protect against coastal inundation events up to the 100 Year ARI event at 2100.




**Costs**

The seawall raising estimated costs are:

Capital cost: $10,500,000
Maintenance costs: 1% of capital costs per year over life of structure

**Timing**

The seawall raising will be undertaken in Years 5 to 10 of the CMP Business Plan.

**Coastal Threats Addressed**

The seawall raising will manage risks associated with coastal inundation and wave overtopping.

**Design**

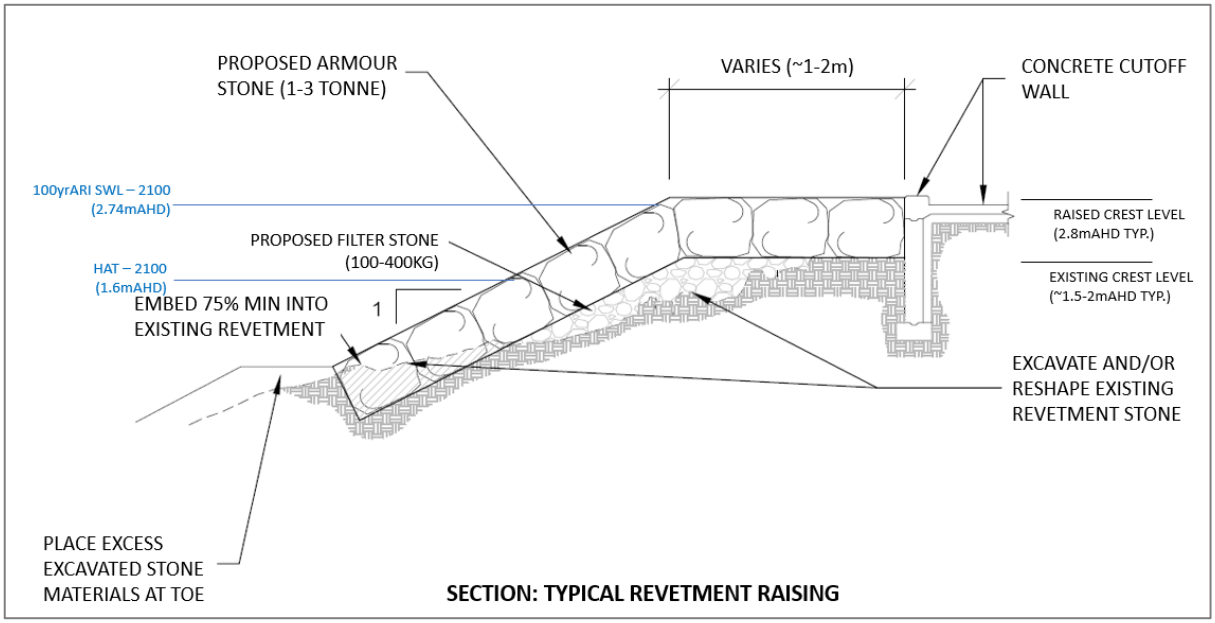
Seawall raising will be undertaken that leverages off the existing seawall as a foundation but increase the crest level to +3.0mAHD, above the 100-year ARI Storm Tide level in 2100. A typical section for the seawall raising design is presented in the image below and includes construction of a 1-2m wide crest and 1 in 2 seawall slope that keys into the existing seawall armour layer. At the back of the crest of the raised seawall a concrete cut-off wall would reduce the permeability of structure and neatly tie the seawall into the promenade behind.

Initial analysis suggests that the proposed crest level and seawall design would be sufficient to ensure pedestrian safety up to the year 2050 (based on a 100-year ARI design storm). Beyond this, overtopping rates become hazardous for people near the crest and additional protection would be required to manage this future risk from wave overtopping. A wave return barrier could be incorporated into the

| CH4_K | Seawall Raising and wave return barriers |
|---|---|

seawall as part of future CMP actions or expeditated if master plan implementation is expediated (further details are provided in Appendix E).

The design of the seawall should be undertaken in a manner to minimise any impacts on fisheries habitat and areas of the Batemans Marine Park. Where possible the works should be contained to the footprint of the existing infrastructure.




*Typical cross section for raising of the CBD*

**Benefits**

A correctly designed and constructed seawall will provide effective protection to both coastal flooding (from elevated storm tides) and foreshore hazard (from wave overtopping) along the length of the CBD and will ensure the safe use of Beach Road and foreshore promenade areas under a greater range of coastal conditions.

Seawall raising would not impact on the sediment dynamics of Batemans Bay, beyond the influence of the existing seawall, as all works would occur at elevations above the active channel bed and margins and would have negligible influence on tidal and flood hydrodynamics along the length of the seawall. As such, no detrimental impacts to shorelines on the northern side of the Bay area expected from raising of the seawall.

| CH4_M | Adaptation plan for low lying areas to be impacted by tidal inundation |
|---|---|

**Location(s):** Batemans Bay

**Description**

There are low lying areas in Batemans Bay that have existing exposure to large ocean storms and will increasingly be at risk under sea level rise.

The coastal vulnerability modelling undertaken in Stage 2 of the CMP identified locations in Batemans that will be inundated several times a year by 2100 (i.e. these areas are below the 2100 HHWS tidal level). Shown in blue hatching on the map below.

The modelling also identified that even greater areas will be impacted on average annually by inundation from ocean storm events. Shown in pink hatching on the map below.

This frequency of inundation is an unacceptable level of risk, and would likely result in these areas being uninhabitable not only due to regular inundation, but sub-ground level impacts on structural foundations, underground assets etc.


Adaptation planning should commence immediately for these areas to identify suitable approaches to continue to viability of this land. This may involve a combination of rezoning land, landform adaptation through filling and raising of assets and roads, and property development controls.

Detailed assessments are required to ensure the effectiveness of the strategy, including consideration of:

- Access to imported fill,
- Design to tie into existing surrounding levels,
- Access to existing properties (e.g. driveways),

| CH4_M | Adaptation plan for low lying areas to be impacted by tidal inundation |
|---|---|

- Land acquisition,
- Management of inter-lot drainage,
- Existing manhole levels/depths,
- Electricity clearance heights,
- Drainage improvements for local rainfall events,
- Sequence of works and timeframe for overall scheme,
- Determine acceptable cumulative impacts on flood behaviour as scheme is implemented,
- Multi stakeholder involvement.

**Costs**

The action for inclusion in the CMP is the preparation of an adaptation plan and associated flood modelling, civil design and community engagement. This has been estimated at a cost of $200,000.

**Timing**

The timing for adaptation planning will be dependent on identifying the “Thresholds” and “Triggers” for continued liveability of the low lying areas of Batemans Bay. These would be established as part of the adaptation planning. However, for the purpose of CMP planning, it can be seen that frequent inundation of the low lying areas of Batemans Bay will likely occur by 2065. This may be considered the threshold where these locations begin to lose their liveability. The trigger point for this threshold requires analysis of the timeline between when the threshold is reached and when a response is required to avoid losing liveability of the area. This analysis would include consideration of a monitoring period, response time, and a safety buffer for uncertainty.

In order to adequately plan, prepare and implement adaptation, the planning will commence as soon as possible. The preparation of an adaptation plan at a concept stage has been included in this CMP and could be completed jointly as part of the floodplain risk management study and plan for this location depending on timing. If the concept stage plan identifies the need for more detailed planning, this would then proceed. This could also include implementing actions from the flood risk management study and plan ensuring joint outcomes for dealing with coastal inundation hazards identified through this CMP.

**Benefits**

- Ongoing viability of low lying urban areas as sea level result in frequent inundation (i.e. tidal inundation)
- Reduce exposure of low lying urban areas to inundation from coastal storms.

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

Land use planning considerations and recommendations are an integral component to managing current and future risk and the coastal environment.

Council currently imposes planning controls related to coastal hazards through its Local Environmental Plan (LEP), Clause 2.12 of the Resilience and Hazards SEPP and an Interim Coastal Hazard Adaptation Code (last updated in 2017). Other planning controls on the coastal environment that are not hazard related are applied through Clauses 2.7 – 2.11 of the Resilience and Hazards SEPP as well as a range of provisions in the Eurobodalla LEP 2012. Coastal protection works are regulated under Section 27 of the CM Act.

This CMP has reviewed the current coastal planning arrangements, with a particular focus on the coastal hazard and vulnerability provisions and made recommendations for changes utilising the coastal hazard/vulnerability information developed as part of this CMP. A proposed Coastal Vulnerability Area (CVA) has been prepared (**Section 8.2.1**) to support a future planning proposal (Action CHA_A). The CMP Stage 2 technical studies will support the submission of a planning proposal.

A summary of Council's current coastal planning arrangements as they relate to coastal hazards is provided in **Table 4-1**.

**Table 4-1 Council's current coastal hazard planning arrangements**

| Environmental Planning Instrument or Relevant Code | Relevant Controls |
|---|---|
| **State Environmental Planning Policy (Resilience and Hazards) 2021** | Clause 2.12 imposes a requirement for consideration of not increasing the coastal hazards on that land or other land (applies to all land under the Resilience and Hazards SEPP). Offers an interim solution and is currently operable. |
| **State Environmental Planning Policy (Exempt and Complying Development Codes) 2008** | Clause 1.19(e) states that complying development is not permitted in environmentally sensitive areas (defined by Coastal wetlands/proximity to coastal wetlands).<br>Clause 1.19(f) states that complying development may not be carried out on land that is identified by an environmental planning instrument, a development control plan or a policy adopted by the council as being or affected by—<br>(i) a coastline hazard, or<br>(ii) a coastal hazard, or<br>(iii) a coastal erosion hazard. |
| **Eurobodalla Local Environmental Plan 2012** | No specific provisions relating to the control of coastal hazards currently operate. Note that there are no LEP Standard Instrument provisions that can be used for coastal hazards as the state relies on the Resilience and Hazards SEPP provisions in this regard. |

| Environmental Planning Instrument or Relevant Code | Relevant Controls |
|---|---|
| | Clause 5.7 deals with the prohibition of building below mean high water as a mandatory clause from the Standard Instrument.<br>There is no current foreshore building line clause in the LEP. |
| **Interim Coastal Hazard Adaptation Code** | Council applies controls using the Interim Code (last updated 2017). The code includes key details/controls derived from Whitehead & Associates (2014) Appendix C recommendations which relate to building design life. The Code identified that it is to be replaced once a CZMP is adopted (now CMP).<br>Council's mapping system shows Sea Level Rise Investigation Areas (these are called up in the Code). Inundation levels are reported in the Code (Schedule 1).<br>Clause 12 of the Code applies to the Beach Road area as an *Area of Critical Utility* and has a merits-based assessment approach due to existing protection works.<br>The interim code contemplates related aspects for development such as:<br>• variations in controls depending on the type/life of development<br>• time limited consents<br>• managed retreat using Section 88B instruments.<br>The Code is applicable until such time as the Eurobodalla Coastal Management Program is completed (this CMP). |
| **Environmental Planning and Assessment Act 1979 Section 10.7 Certificates** | Council's planning certificates (known as a Section 10.7 certificate) identify if the land, or part thereof, is exposed or has potential future exposure to coastal hazards. The Interim Code is currently referred to on certificates issued by Council with regards to restrictions on development. |
| **Local Planning Direction 4.2 Coastal Management** | This direction applies when a planning proposal authority prepares a planning proposal that applies to land that is within the coastal zone, as defined under the *Coastal Management Act 2016* - comprising the coastal wetlands and littoral rainforests area, coastal vulnerability area, coastal environment area and coastal use area - and as identified by chapter 2 of the *State Environmental Planning Policy (Resilience and Hazards) 2021.* |

The current land use planning provisions in **Table 4-1** have been reviewed in the context of establishing more contemporary approaches that reflect the outputs of Stage 2 Vulnerability Assessments to manage current and future coastal hazards.

Recommended changes to the coastal hazard planning arrangements are provided in **Table 4-2**.

Table 4-2 Recommended changes to coastal hazard planning arrangements

| Planning Policy | Recommendations |
|---|---|
| **State Environmental Planning Policy (Resilience and Hazards) 2021** | Prepare a planning proposal to incorporate the CVA (**Section 8.2.1**) into the Resilience and Hazards SEPP. Once the CVA map comes into operation, Clause 2.9 will apply. Clause 2.9 states:<br>*Development consent must not be granted to development on land that is within the area identified as "coastal vulnerability area" on the Coastal Vulnerability Area Map unless the consent authority is satisfied that—*<br>*(a) if the proposed development comprises the erection of a building or works—the building or works are engineered to withstand current and projected coastal hazards for the design life of the building or works, and*<br>*(b) the proposed development—*<br>*(i) is not likely to alter coastal processes to the detriment of the natural environment or other land, and*<br>*(ii) is not likely to reduce the public amenity, access to and use of any beach, foreshore, rock platform or headland adjacent to the proposed development, and*<br>*(iii) incorporates appropriate measures to manage risk to life and public safety from coastal hazards, and*<br>*(c) measures are in place to ensure that there are appropriate responses to, and management of, anticipated coastal processes and current and future coastal hazards.*<br>Note that the design life of the building (2.9(a)) is not formally defined in the Resilience and Hazards SEPP.<br>Using the CVA provisions of the Resilience and Hazards SEPP give greater weight to achieving the objectives as the SEPP provisions will prevail over any other environmental planning instruments (Clause 2.5(1)) where there is inconsistency. |
| **Eurobodalla Local Environmental Plan 2012** | As an alternate to using the CVA provisions in the SEPP, it is noted that the existing LEP could be amended to include Local Provisions (Part 6) for Coastline Risks/Hazards.<br>There is no current foreshore building line (FBL) clause in the LEP. Where detailed CVA mapping is not available or inconsistent with the level of detail in other areas, the use of the foreshore building line clause is a potential way to achieve the outcomes intended under the Interim Code level that is applied to manage climate change risks. The associated mapping to a map using LiDAR data would set a contour for the building line (such as the 4 m AHD contour). This approach would ensure that complying development SEPP provisions cannot be applied to lands below the FBL. |
| **Development Control Plan** | It is recommended that Council create a section in a new LGA-wide Development Control Plan (DCP) to provide coastal hazard development controls to support either the CVA SEPP provisions or the proposed LEP Local Provision amendments.<br>Controls by land use type should ensure for all land use types in the CVA that:<br>• appropriate (coastal inundation compatible) building materials are used below 100 Year ARI coastal inundation levels with climate change (plus a freeboard) |

| Planning Policy | Recommendations |
|---|---|
| | • habitable floor levels are set above 100 Year ARI coastal inundation levels with climate change (plus a freeboard)<br>• below ground level non-habitable areas and covered and bunded carparking facilities have all access, ventilation and any other potential water entry points above the 100 Year ARI coastal inundation levels with climate change (plus a freeboard) and include an inundation free pedestrian evacuation route<br>• all development is designed and constructed to have a low risk of damage and instability due to wave action, inundation, and / or erosion hazards in a 100 Year ARI coastal storm event<br>• all electrical equipment, wiring, fuel lines or any other service pipes and connections are waterproofed to 100 year ARI coastal inundation levels with climate change (plus a freeboard)<br>• new development and major additions to existing development are sited on the landward side of the 2100 reduced foundation capacity line<br>• A safe evacuation route is available from the development in the event of coastal inundation exceeding the habitable floor level.<br><br>Other controls may apply to ensure the safe and appropriate development of the coastal zone. These may express Council's aspirations as they relate to the coastal environment area and the coastal use area (with respect to built-form, landscaping, sustainability views etc).<br><br>Other explicit controls are recommended with respect to specifically addressing post-hazard event recovery. These controls are commonly referred to as 'Build Back Better' type controls, seek to ensure that any existing development in vulnerable areas that has been damaged or destroyed is either not built in the same location or, where appropriate, is built to a contemporary standard to withstand coastal hazards. These types of controls would be activated for use say for up to five years from the date of a hazard event.<br><br>Any coastal protection works that are required to support development will need to be consistent with the provision of Clause 27 of the CM Act and this CMP.<br><br>Further definition will be required around what constitutes major additions in the preparation of the DCP.<br><br>Further consideration will be required around design life and service life of various development types with respect to sea level rise risk. |
| **Coastal Hazard Code** | Recognising that updating Council's DCP may take some time, and with the intention that the *Interim Coastal Hazard Adaptation Code (2017)* to be repealed following adoption of this CMP, a Draft Coastal Hazard Code has been provided in **Appendix G** to consider the outcomes of this CMP and replace the existing *Interim Coastal Hazard Adaptation Code (2017)*. |
| **Section 10.7 Certificates** | Council's planning certificates should continue to identify if the land, or part thereof, that is exposed or has potential future exposure to coastal hazards. If the Resilience and Hazards SEPP (inclusive of CVA Mapping) is in force, then this will be automated. The proposed DCP clauses should be referred to with regards to restrictions on development. Until the DCP clauses are updated, the Coastal Hazard Code should be referenced. |

| Planning Policy | Recommendations |
|---|---|
| **Adaptation Planning** | Low lying areas of Batemans Bay are currently at risk from coastal inundation hazards. In the coming decades, these areas will become increasingly inundated by extreme tides, and eventually will become uninhabitable due to regular tidal inundation.<br><br>Adaptation planning should commence immediately for these areas to identify suitable approaches to continue to viability of this land. This may involve a combination of rezoning land, landform adaptation through filling and raising of assets and roads, and property development controls.<br><br>This is discussed further in action CH4_M (see **Section 3.2.4**). |

# 5 A Business Plan

## 5.1 Intent and Value of Implementing the Eurobodalla Open Coast CMP

The Eurobodalla Open Coast 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 open coast. The CMP also includes actions to target coastal hazards impacting the coastline now and into the future.

Investment in the Eurobodalla Open Coast CMP provides an opportunity to directly improve and preserve the condition of beaches, environmental habitats, cultural spaces and recreational opportunities of the open coast, and in doing so, bring benefits to the public, in particular mitigating the risk to people and property presented by coastal hazards.

The Eurobodalla Open Coast CMP contains 66 actions that aim to manage, preserve, improve, promote and rehabilitate the open coastline. An additional five actions have been recommended to monitor and evaluate the performance of the CMP implementation.

The actions contained within this business plan primarily mitigate coastal risks to public beneficiaries, with consideration of balancing benefits across the range of locations, environments and threats within the Eurobodalla Open Coast. As such, no beneficiary pays models have been allocated to private beneficiaries in the business plan.

## 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 Eurobodalla Open Coast CMP is estimated to cost $47 Million (2022 dollars) over 10 years.

The CMP actions are expected to be funded through Eurobodalla Shire Council and state government contributions, monetary grants and volunteer works by community members and organisations. Eurobodalla Shire Council contribution is costed to be $13.3 Million over 10 years, with anticipated State Government contributions of $33.7 Million over 10 years.

Cost estimates for the complex engineered management options have been based on concept level design sections of each structure type, extrapolated on a unit length basis over the spatial extent of the proposed option. Capital cost estimates adopted unit cost rates (per length of structure) for each structure type, using cost data from similar coastal protection projects adjusted to present day using industry standard benchmarking data. Local site-specific benchmarking of the unit cost rates for rock armoured seawalls was available for the Caseys Seawall, for which a detailed cost estimate was developed in 2019 (Aurecon, 2019). Cost escalation since 2019 was accounted for by considering escalation in labour, materials (quarry stone) and general market conditions (contractor availability), resulting in an escalation of +25% in the capital cost. A summary of the adopted unit cost rates and development of costs for each engineered management option are presented in **Appendix F**. Given the level of design maturity and nature of the cost build-up, the cost estimates should be considered Class 5, with an accuracy of +/-50%. Actual costs will be dependent on engineering refinement during detailed design and market conditions at the time of tendering and construction.

The CMP actions are expected to be funded through Council and state government contributions, monetary grants and volunteer works by community members and organisations. Some actions are funded under Council's normal operating budgets or through existing programs and grants. 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.

Potential sources of funding identified for the CMP actions are described in **Table 5-1**, the potential source of funding for each management action is provided in **Table 5-2**.

**Table 5-1 Local and NSW Goverment 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 *Local Government Act 1993* (LG Act), ordinary rates can be applied to all rateable land within a local government area. 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 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.<br>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.<br>Where a property, or properties, benefit from a coastal protection service, a coastal protection service charge can be applied (see below). |
| **Coastal Protection Service Charge** | The coastal protection service charge can be applied on rateable land where that land benefits from a coastal protection service, such as a seawall, erosion control measure or beach nourishment for example.<br>The charge can be applied where coastal protection works are constructed by, or on behalf of the owner or occupier (current or previous). The charge can also be applied where coastal works are constructed in a joint arrangement between an owner or occupier and a public authority or council.<br>The charge is applied to cover Council costs for construction, maintenance or repair of the works, as well as managing/remediating the impacts caused by the works.<br>Refer to the NSW Coastal Management Manual (OEH, 2018) for further information. |
| **Development Contribution** | Developer contributions enabled under the *Environmental Planning and Assessment Act 1979* 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 hazards. The criteria and |

| Funding Source | Details |
|---|---|
| | ability to use those contributions will be dependent on the relevant Developer Contribution Plan. |
| **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 Savings Clubs, Holiday Parks etc). |
| **NSW Government Funding Mechanisms** | |
| **NSW Coastal and Estuary Grants Program** | Under this program, the NSW Government provides grants to local government to support coastal management planning (e.g. hazards studies, management plans/programs) and actions to manage the risks of coastal hazards (e.g. erosion protection), and restore degraded coastal habitats (e.g. wetlands, dunes).<br>Funding of up to two thirds of a project cost is available to successful applications and the programme is administered by DPE. Grant funding will be prioritised to Council applications associated with certified Plans. |
| **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.<br>Support provided under the programs usually involves $2 from government for every $1 provided by the applicant. |
| **Election commitments** | The election commitment allocated funds of $250,000 to develop an options study and up to $5 million to help find a solution along the Batemans Bay waterfront including Wharf Road, Surfside and Long Beach.<br>The $5 million has been allocated to the following works in this business plan:<br>• Protection of Wharf Road and remediation of adjoining land for public use and access (CH1_Ka Phase 1 and 2).<br>• Protection of Surfside from coastal inundation (CH4_D Phase 1)<br>• Protection of Bay Road, Long Beach from beach erosion (CH1_D Phase 1 and Phase 2). This action will also receive contribution of funds from Council and the NSW Coastal and Estuary Grants Program. |
| **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.<br>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.<br>The funded programs support:<br>• action in conserving and restoring natural ecosystems<br>• protecting threatened species<br>• undertaking priority environmental research<br>• building community skills |

| Funding Source | Details |
|---|---|
| | • knowledge and capacity through education<br>• promoting cultural awareness<br>• dealing with pollution. |
| **Crown Reserves Improvement Fund** | The Crown Reserves Improvement Fund (CRIF) supports Crown land managers (CLMs) by providing funding for repairs, maintenance and improvements on Crown reserves. The funding aims to benefit the community, boost our economy and contribute to the cultural, sporting and recreational life of NSW. |
| **NSW Heritage Grant 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. |
| **Coastal Lands Protection Scheme** | The Coastal Lands Protection Scheme is a long-running NSW Government program that began in 1973.<br>The scheme is used to bring significant coastal lands into public ownership and supports long-term management and care of this land, while improving public access to our coastal environments. The department administers the scheme through an annual budget allocation of $3 million for strategic acquisitions.<br>The scheme operates along the entire NSW coastal zone except for the Greater Sydney metropolitan area.<br>Land acquired under the scheme must meet at least one of three criteria:<br>• Public access - to promote public access to the coastal foreshore.<br>• Scenic quality - to maintain the scenic quality of the NSW coast and to maintain landscape breaks to separate and articulate existing coastal towns and settlements.<br>• Ecological values - to protect ecological sites of regional, state and/or national significance. |
| **Crown Lands Rescuing our Waterways Program** | To improve accessibility to the state's waterways, the NSW Government has developed the Rescuing our Waterways program. The program grants funding to councils on a dollar-for-dollar basis to help deliver better access to local waterways for recreational and commercial waterway boaters and other users. This creates flow-on benefits for tourism and local economies.<br>Coastal councils can apply and are required to make a financial contribution of at least 50% of project costs and be responsible for developing and managing their projects.<br>Dredging projects that may be subsidised under this program include:<br>• Dredging strategies and/or their supporting studies (e.g. sediment hydrodynamics)<br>• Navigation for a range of vessels (recreational, tourism and commercial)<br>• Access to public waterway infrastructures such as boat ramps and wharves<br>• Pre-dredge activities for projects which are eligible and likely to proceed to dredging. for vessel navigation. |

| Funding Source | Details |
|---|---|
| **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.<br>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.<br>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.<br>Local council applicants are required to cash-match the funding amount requested. |
| **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. |
| **Crown Reserves Improvement Fund** | The Crown Reserves Improvement Fund (CRIF) supports Crown land managers (CLMs) by providing funding for repairs, maintenance and improvements on Crown reserves. The funding aims to benefit the community, boost our economy and contribute to the cultural, sporting and recreational life of NSW. |

## 5.3 Alignment with the IP&R Framework

To assist with the scheduling the implementation of actions, a Gantt chart for the actions (timeline and budget) has been included in **Table 5-2**.

Budgets have been allocated for capital and ongoing costs, where the action would only require existing staff time, assets and services, these are noted as “$ST”.

Table 5-2 Business Plan

| ID | Management Action | Location | Lead Agency | Partners | Potential Funding Source | Cost Sharing | CMP Capital Cost | Ongoing Capital Cost and/or Maintenance (Annual) | Total Cost over CMP Business Plan | Council Costs | Stage Governme nt Costs | Year 1 | Year 2 to 4 | Year 5 to 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD1_A | Continue to implement Snapper Island Penguin monitoring program | Snapper Island, Batemans Bay | Council | DPE-EHG | Council, C&E Grants, NSW Environmental Trust | Council (1) : C&E Grant (2) | $9,000 | $9,000 | $90,000 | $30,000 | $60,000 | $9,000 | $27,000 | $54,000 |
| CD1_B | Design and implement dune vegetation management – northern end of Broulee beach | Broulee | Council | DPE-EHG | Council, C&E Grants, NSW Environmental Trust, Coastcare Grants | Council (1) : C&E Grant (2) | $10,000 | $10,000 | $80,000 | $26,667 | $53,333 | $- | $20,000 | $60,000 |
| CD1_C | Continuation of Council's weed management program in coastal areas | All | Council | DPE-EHG, DPI-LLS | Council, C&E Grants, NSW Environmental Trust, Coastcare Grants | Council (1) : C&E Grant (2) | $10,000 | $10,000 | $80,000 | $26,667 | $53,333 | $- | $20,000 | $60,000 |
| CD2_A | Investigate source of water quality issues at Surf Beach | Surf Beach | Council | DPE-EHG, Traditional Owners, DPI-Fisheries | Council, C&E Grants, NSW Environmental Trust | Council (1) : C&E Grant (2) | $30,000 | $- | $30,000 | $10,000 | $20,000 | $- | $30,000 | $- |
| CD3_B | Beach watch monitoring program for water quality at recreational beaches to be continued | Cookies Beach, Caseys Beach, Surf Beach, Malua Bay, Broulee North, South Broulee Beach, Shelley Beach, Tuross Main Beach, Brou Beach, Narooma shark net, Narooma Main Beach | Council | DPE-EHG, DPI-Fisheries | Council | Council | $10,000 | $10,000 | $100,000 | $100,000 | $- | $10,000 | $30,000 | $60,000 |
| CD3_C | Support DPI-Fisheries in preparing a *Marine Vegetation Strategy* to identify priority areas for the protection of healthy mangrove and saltmarsh areas and rehabilitation of degraded areas. | All | Council | DPI, DPE | Council | Council staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| CHA_A | Update Property Development Planning Controls and undertake Planning Proposal to adopt CVA | Coastal Vulnerability Area | Council | DPE-EHG, DPE-Planning | Council | Council (1) : C&E Grant (2) | $100,000 | $- | $100,000 | $33,333 | $66,667 | $- | $100,000 | $- |
| CH1_B | Maloney Beach Erosion Protection Stage 1: Undertake investigation and design for Northcove Road erosion protection and flood proofing | Maloneys Beach | Council | DPE-EHG, , DPI-Fisheries | Council, C&E Grants, Floodplain Management Grants | Council (1) : C&E Grant (2) | $200,000 | $- | $200,000 | $66,667 | $133,333 | $- | $200,000 | $- |

| ID | Management Action | Location | Lead Agency | Partners | Potential Funding Source | Cost Sharing | CMP Capital Cost | Ongoing Capital Cost and/or Maintenance (Annual) | Total Cost over CMP Business Plan | Council Costs | Stage Governme nt Costs | Year 1 | Year 2 to 4 | Year 5 to 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CH1_D Phase 1 | Long Beach Erosion Protection: Undertake investigation and design for a low crested revetment to protect public infrastructure; Bay Road, Long Beach | Long Beach | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Election Commitment | Election Commitment (DPE) | $200,000 | $- | $200,000 | $- | $200,000 | $200,000 | $- | $- |
| CH1_D Phase 2 | Long Beach Erosion Protection: Construct a ≈ 300m low crested revetment to protect public infrastructure-: Bay Road, Long Beach | Long Beach | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Election Commitment, Council, C&E Grants | $900k - Election commitment$2.2M - Council (1) : C&E Grant (2) | $3,100,000 | $- | $3,100,000 | $733,333 | $2,366,667 | $- | $3,100,000 | $- |
| CH1_D Phase 3 | Long Beach Erosion Protection: Low crested revetment to protect Bay Road – Phase 3: Maintenance of constructed revetment structure and nourishment of beach | Long Beach | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Council, C&E Grants | Structure maintenance: Council Beach nourishment: Council (1) : DPE (2) | $41,000 | $41,000 | $246,000 | $206,000 | $40,000 | $- | $- | $246,000 |
| CH1_K a Phase 1 | Wharf Road Stage 1: Priority coastal protection works, remediation and reinstatement of beach for public use - Phase 1 Site remediation assessment and coastal protection investigation and design | Wharf Road | Council | DPE-EHG, DPE-Planning, DPE-Crown Lands, DPI-Fisheries | Election Commitment | Election Commitment (DPE) | $200,000 | $- | $200,000 | $- | $200,000 | $200,000 | $- | $- |
| CH1_K a Phase 2 | Wharf Road Stage 1: Priority coastal protection works, remediation and reinstatement of beach for public use- Phase 2 Complete coastal protection works | Wharf Road | Council | DPE-EHG, DPE-Planning, DPE-Crown Lands, DPI-Fisheries | Election Commitment, Council | Election Commitment (DPE) for construction Council for maintenance. | $2,200,000 | $22,000 | $2,376,000 | $176,000 | $2,200,000 | $- | $2,244,000 | $132,000 |
| CH1_K a Phase 3 | Wharf Road Stage 1: Priority coastal protection works, remediation and reinstatement of beach for public use- Phase 3: Maintain and enhance coastal vegetation and beach for safe public use | Wharf Road | Council | DPE-EHG, DPE-Planning, DPE-Crown Lands, DPI-Fisheries | Council, C&E Grants | Council (1) : C&E Grant (2) | $10,000 | $10,000 | $60,000 | $20,000 | $40,000 | $- | $- | $60,000 |
| CH1_K b | Wharf Road Protection Stage 2: Inundation protection to be undertaken | Wharf Road | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Council, C&E Grants | Construction - Council (1) : C&E Grant (2) Maintenance - Council | $5,900,000 | $59,000 | $6,195,000 | $2,261,667 | $3,933,333 | $- | $- | $6,195,000 |
| CH1_Kc | Raise Wharf Road level as part of routine resurfacing works | Wharf Road | Council | DPE-EHG | Council, C&E Grants | Council (1) : C&E Grant (2) | $500,000 | $- | $500,000 | $166,667 | $333,333 | $- | $- | $500,000 |

| ID | Management Action | Location | Lead Agency | Partners | Potential Funding Source | Cost Sharing | CMP Capital Cost | Ongoing Capital Cost and/or Maintenance (Annual) | Total Cost over CMP Business Plan | Council Costs | Stage Governme nt Costs | Year 1 | Year 2 to 4 | Year 5 to 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CH1_L | Subject to environmental planning approvals, undertake nourishment at Northern Batemans Bay beaches when dredging is undertaken in Batemans Bay / Clyde River as required for navigational purposes | Surfside / Wharf Road | TfNSW-MIDO | Council, DPE-EHG, DPE-Crown Lands, DPI- Fisheries | MIDO | MIDO | $1,000,000 | $- | $1,000,000 | $- | $1,000,000 | $- | $500,000 | $500,000 |
| CH1_M | Purchase private properties at Wharf Road to assure current and future generations have public access to the foreshore and beach | Wharf Road | DPE-Planning | Council | Coastal Lands Protection Scheme | Coastal Lands Protection Scheme | $4,000,000 | $- | $4,000,000 | $- | $4,000,000 | $1,000,000 | $3,000,000 | $- |
| CH1_P | Upgrade existing coastal protection works at Caseys Beach | Batehaven | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Council, C&E Grants | Construction - Council (1) : C&E Grant (2) Maintenance - Council | $7,900,000 | $79,000 | $8,532,000 | $3,265,333 | $5,266,667 | $- | $8,058,000 | $474,000 |
| CH1_X | Preparing a Review of Environmental factors to identify preferred options for disposal of sand from maintenance activities at Tuross boat ramp. | Tuross Heads | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Council, Rescuing our Waterways | Council staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| CH1_Y | Sewage pump stations and reticulation infrastructure at risk to be include in future works plans | Long BeachMalua BayBroulee | Council | NA | Council | Council staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| CH1_Z | Monitor stormwater assets in erosion areas | All | Council | NA | Council | Council staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| CH1_ZB | Implement Open Coast Coastal Zone Emergency Action Subplan | All | Council | NSW SES, Heritage, DPE-EHG | Council, C&E Grants | Council (1) : C&E Grant (2) | $50,000 | $- | $50,000 | $16,666 | $33,333 | $5,000 | $15,000 | $30,000 |
| CH1_ZC | Design and construct a coastal erosion structure to protect Wharf Road at Surfside Beach West (Dog Beach/Mcleods Beach) against coastal erosion | Surfside | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Council, C&E Grants | Construction - Council (1) : C&E Grant (2) Maintenance - Council | $100,000 | $1,000 | $109,000 | $42,333 | $66,666.67 | $100,000 | $3,000 | $6,000 |
| CH10_C | Conduct periodic inspections of the slopes of the cliffs and bluffs | Corrigans Headland, Sunshine Bay, Caseys Beach Headland and Long Beach Headland | Council | NA | Council | Council staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| CH10_E | Maintain or improve native vegetation cover on steep slopes on coastal cliffs and bluffs | Priority to those affected by geotechnical hazards, and accessible | Council | DPE-EHG, DPE-Crown Lands | Council, C&E Grants, NSW Environmental Trust, Coastcare Grants | Council (1) : C&E Grant (2) | $15,000 | $15,000 | $150,000 | $50,000 | $100,000 | $15,000 | $45,000 | $90,000 |
| CH10_G | Install safety and warning signs relating to cliff instability | All | Council | DPE-EHG | Council, C&E Grants | Council (1) : C&E Grant (2) | $10,000 | $10,000 | $100,000 | $33,333 | $66,667 | $10,000 | $30,000 | $60,000 |

| ID | Management Action | Location | Lead Agency | Partners | Potential Funding Source | Cost Sharing | CMP Capital Cost | Ongoing Capital Cost and/or Maintenance (Annual) | Total Cost over CMP Business Plan | Council Costs | Stage Governme nt Costs | Year 1 | Year 2 to 4 | Year 5 to 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CH10_I | Install and maintain a surface dish drain | All | Council | DPE-EHG | Council, C&E Grants | Construction - Council (1) : C&E Grant (2) Maintenance - Council | $20,000 | $1,000 | $25,000 | $11,666 | $13,333 | $- | $- | $25,000 |
| CH9_A | Prepare frontal dune management plans | Beach reserves at Maloneys Beach, Long Beach, Surfside, Corrigans (include Clyde View Holiday Park) and Malua Bay | Council | DPE-EHG, DPE-Crown Lands | Council, C&E Grants, NSW Environmental Trust, Coastcare Grants | Council (1) : C&E Grant (2) for plan preparation and annual implementation costs | $80,000 | $5,000 | $120,000 | $40,000.00 | $80,000.00 | $- | $90,000 | $30,000 |
| CH4_D Phase 1 | Investigate, design and construct a coastal inundation levee to protect against storm surge inundation from creek / estuary (Surf Side Creek) | Surfside | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Council, C&E Grants | Election Commitment for design and construct Council for ongoing maintenance | $1,500,000 | $12,000 | $1,596,000 | $96,000 | $1,500,000 | $300,000 | $1,224,000 | $72,000 |
| CH4_D Phase 2 | Investigate, design and construct a coastal inundation levee to protect against storm surge inundation from creek / estuary (Surf Side Creek and Cullendulla) | Surfside | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries | Floodplain Management Grants | Council (1) : NSW Floodplain Grants (2) | $1,600,000 | $12,000 | $1,684,000 | $617,333 | $1,066,667 | $- | $1,612,000 | $72,000 |
| CH4_G | Installation of flood gates on priority outlets | Wharf RoadBatemans Bay to Batehaven | Council | DPE-EHG, DPI-Fisheries | Council, C&E Grants | Construction - Council (1) : C&E Grant (2)Maintenance - Council | $35,000 | $3,000 | $44,000 | $20,666 | $23,333 | $- | $- | $44,000 |
| CH4_K | Investigate, design and construct seawall raising and wave return barriers in Batemans Bay | Batemans Bay to Batehaven | Council | DPE-EHG, DPI-Fisheries, DPE-Crown Lands | Council, C&E Grants | Construction - Council (1) : C&E Grant (2) Maintenance - Council | $10,500,000 | $105,000 | $11,025,000 | $4,025,000 | $7,000,000 | $- | $- | $11,025,000 |
| CH4_M | Undertake an adaptation plan for low lying areas to be impacted by tidal inundation under sea level rise | Batemans Bay, North Batemans Bay and Surfside | Council | DPE-EHG | Council, C&E Grants | Council (1) : C&E Grant (2) | $150,000 | $- | $150,000 | $50,000.00 | $100,000 | $- | $150,000 | $- |
| CH4_S | Emergency Response Plan | Big4 Batemans Bay Beach Resort Beachcomber Holiday Park | NSW SES | Council, DPE-EHG | Council and SES existing staff resources | SES / Council (staff time) | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| CH4_V | Undertake access road raising to provide resilience to coastal inundation risk - Beachcomber Holiday Park | Potato Point | Council | DPE-EHG | Council, C&E Grants | Council (1) : C&E Grant (2) | $100,000 | $- | $100,000 | $33,333 | $66,666 | $- | $100,000 | $- |

| ID | Management Action | Location | Lead Agency | Partners | Potential Funding Source | Cost Sharing | CMP Capital Cost | Ongoing Capital Cost and/or Maintenance (Annual) | Total Cost over CMP Business Plan | Council Costs | Stage Governme nt Costs | Year 1 | Year 2 to 4 | Year 5 to 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CH8_B | Undertake a review of ICOLL EMPs | South Durras, Surfside, Joes Creek, Short Beach, Wimbie Beach, Kianga, Little Lake (Narooma), Nangudga Lake | Council | DPE-EHG, DPE-Crown Lands, DPI-Fisheries, DPE-Planning | Council, C&E Grants | Council (1) : C&E Grant (2) | $150,000 | $- | $150,000 | $50,000 | $100,000 | $- | $150,000 | $- |
| CH8_C | ICOLL Entrance Management Policy - engagement and finalisation | Congo, Potato Point, Lake Brou, Corunna Lake | NPWS | DPE-EHG, DPE-Crown Lands, DPI-Fisheries, DPE-Planning | NPWS | NPWS | $20,000 | $- | $20,000 | $- | $20,000 | $20,000 | $- | $- |
| CH9_B | Erosion management to be undertaken on dunes a Knowlman Road, Rosedale | Rosedale Beach | Council | DPE-EHG | Council, C&E Grants, NSW Environmental Trust, Coastcare Grants | Council (1) : C&E Grant (2) | $20,000 | $- | $20,000 | $6,666 | $13,333 | $20,000 | $- | $- |
| CHALL_A | NPWS Coastal Hazard Assessment | National Parks | NPWS | Council | NPWS | NPWS | $60,000 | $- | $60,000 | $20,000 | $40,000 | $- | $- | $60,000 |
| CH14_B | Educate Malua Bay SLSC on the erosion hazard risk at the site | Malua Bay | Council | NA | Council | Council | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| CHO_B | Undertake community events to promote tourism opportunities | All | Council | Tourism NSW, DPI Fisheries | Tourism NSW | Council (1) : Tourism NSW (1) | $100,000 | $- | $100,000 | $50,000 | $50,000 | $- | $100,000 | $- |
| RA1_A | Manage user conflicts at Bingie Dreaming Track and Shark Bay / Broulee Island track | Congo | Council | NPWS, Traditional Owners | Council | Council and NPWS staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| RA2_B | Undertake dune vegetation management and minimise unregulated pedestrian access | Rosedale Beach, Broulee | Council | DPE-EHG | Council, C&E Grants, NSW Environmental Trust, Coastcare Grants | Council (1) : C&E Grant (2) | $5,000 | $5,000 | $45,000 | $15,000 | $30,000 | $- | $15,000 | $30,000 |
| RA2_E | Undertake shorebird management across Eurobodalla coastal zone. | All | Council / NPWS | DPE-EHG,DPI-LLS | Council and NPWS existing staff resources | Council and NPWS staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| RA2_F | Support Coastcare/Landcare projects. | All | Council | NPWS | C&E Grant, Landcare Grants, Coastcare Grants | NPWS (supplemented by Landcare and Coastcare Grants, if possible) | $20,000 | $20,000 | $200,000 | $- | $200,000 | $20,000 | $60,000 | $120,000 |
| RA2_G | Management of weeds of National Significance in coastal reserves | All | Council | NPWS | NPWS and Council existing staff resources | NPWS and Council existing staff resources | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| RA3_J | Investigate improved access at McKenzies Beach | McKenzies Beach | Council | DPE-EHG, TfNSW | Council, C&E Grants | Council (1) : C&E Grant (2) | $100,000 | $- | $100,000 | $33,333 | $66,667 | $- | $100,000 | $- |

| ID | Management Action | Location | Lead Agency | Partners | Potential Funding Source | Cost Sharing | CMP Capital Cost | Ongoing Capital Cost and/or Maintenance (Annual) | Total Cost over CMP Business Plan | Council Costs | Stage Governme nt Costs | Year 1 | Year 2 to 4 | Year 5 to 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RA3_O | Continue to promote existing coastal walks | All | Council | DPE, NPWS | Council and NPWS existing staff resources | Council staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| RA6_A | Engagement and management of impacts of bike track usage between Broulee Head and Moruya Heads | Bengello Beach | Council | DPE-EHG, NPWS, Traditional Owners | Council | Council (1) : C&E Grant (2) | $- | $10,000 | $90,000 | $30,000 | $60,000 | $- | $30,000 | $60,000 |
| EGC2_A | Install coastal protection signage strategy to reduce illegal ICOLL openings | All | Council | DPE, DPI-Fisheries | Council, C&E Grants, NSW Environmental Trust | Council (1) : C&E Grant (2) | $20,000 | $- | $20,000 | $6,667 | $13,333 | $20,000 | $- | $- |
| EGC2_B | Identify opportunities to promote, support and undertake citizen science and research initiatives with the coastal zone | All | Council | DPE-EHG, | Council, C&E Grants | Council (1) : C&E Grant (2) | $10,000 | $10,000 | $100,000 | $33,333 | $66,667 | $10,000 | $30,000 | $60,000 |
| EGC3_B | Work with relevant State Agencies to strengthen shared and consistent management of coastal land | All | Council | –DPE-EHG, DPE-Crown Lands, DPE-Planning, NPWS, DPI-LLS, SES DPI-Fisheries | Council | Multi-agency staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| EGC3_D | Update PoM for reserve lands to address coastal risk | All | Council | NA | Council | Council staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| EGC3_E | Incorporate coastal hazard risks into PoM as part of scheduled updates | National Parks | NPWS | Council, DPE-EHG | NPWS | NPWS staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| EGC3_F | Undertaken maintenance of State Agency owned coastal assets to engineering and safety standards | All | DPE-Crown Lands / MIDO | NA | DPE-Crown Lands and MIDO | DPE-Crown Land / MIDO | $100,000 | $100,000 | $1,000,000 | 0 | $1,000,000 | $100,000 | $300,000 | $600,000 |
| EGC4_A | Identify opportunities for and undertake cultural burning in the coastal zone | All | Council | NPWS, DPE-EHG, DPI-LLS, Traditional Owners, Heritage NSW | Council, C&E Grants, NSW Heritage Grant Program | Council (1) : C&E Grant (2) | $50,000 | $25,000 | $250,000 | $83,333 | $166,667 | $50,000 | $50,000 | $150,000 |
| EGC4_B | Support DPI Fisheries with the implementation of MEMS initiative 4 | All | DPI-Fisheries | Traditional Owners, Council, DPE-EHG, NPWS | Council, NSW Heritage Grant Program | DPI, Marine Estate Management Strategy, NSW Heritage Grant Program | $100,000 | $10,000 | $190,000 | $- | $190,000 | $100,000 | $30,000 | $60,000 |
| EGC4_C | Support Aboriginal cultural tourism opportunities in the coastal zone to protect Aboriginal heritage | All | Council | Traditional Owners, DPE-EHG, NPWS, DPI-Fisheries, Heritage NSW | Council, C&E Grants, NSW Heritage Grant Program | Council (1) : C&E Grant (2) | $30,000 | $30,000 | $300,000 | $100,000 | $200,000 | $30,000 | $90,000 | $180,000 |

| ID | Management Action | Location | Lead Agency | Partners | Potential Funding Source | Cost Sharing | CMP Capital Cost | Ongoing Capital Cost and/or Maintenance (Annual) | Total Cost over CMP Business Plan | Council Costs | Stage Governme nt Costs | Year 1 | Year 2 to 4 | Year 5 to 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EGC4_D | Embed traditional Aboriginal knowledge, wisdom and culture in strategic planning by providing knowledge consulting fees to knowledge holders involved in coastal management to protect Aboriginal heritage in the coastal zone | All | Council | Traditional Owners, DPE-EHG, NPWS, Heritage NSW | Council, C&E Grants, NSW Heritage Grant Program | Council (1) : C&E Grant (2) | $10,000 | $10,000 | $100,000 | $33,333 | $66,667 | $10,000 | $30,000 | $60,000 |
| EGC4_E | Support local Aboriginal Communities manage cultural heritage from coastal hazards and sea level rise and other coastal threats | All | Council | Traditional Owners, DPE-EHG, DPI-Fisheries, NPWS, Heritage NSW | Council, C&E Grants, NSW Heritage Grant Program | Council (1) : C&E Grant (2) | $20,000 | $70,000 | $650,000 | $216,667 | $433,333 | $20,000 | $210,000 | $420,000 |
| EGC4_F | Improve access to Country in the coastal zone through the establishment of an Access to Country Plan | All | Council | Traditional Owners, NPWS, DPE-EHG, State Forest, DPE-Crown Lands | Council, C&E Grants, NSW Heritage Grant Program | Council (1) : C&E Grant (2) | $20,000 | $5,000 | $60,000 | $20,000 | $40,000 | $- | $30,000 | $30,000 |
| EGC4_G | Identify and use Aboriginal place names | All | Council | Traditional Owners, NPWS, DPE-EHG, Geographical Names Board | Council, C&E Grants, NSW Heritage Grant Program | Council staff time | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| EGC4_H | Review, update and implement PoM for Aboriginal Place at Barlings Beach | Barlings Beach | Council | Traditional Owners, DPE-EHG, DPE-Crown Lands | Council, C&E Grants, NSW Heritage Grant Program | Council (1) : C&E Grant (2) | $5,000 | $5,000 | $50,000 | $16,667 | $33,333 | $5,000 | $15,000 | $30,000 |
| EGC4_I | Prepare an Aboriginal Seasonal Calendar | All | Council | Traditional Owners | Council, NSW Heritage Grant Program | Council | $15,000 | $- | $15,000 | $15,000 | 0 | $15,000 | $- | $- |
| EGC4_J | Manage access issues and erosion at targeted sites of significant value to Aboriginal Community as identified by the LALC's | Tilba Beach, Nangudga, Broulee | Council | Traditional Owners, NPWS, DPE-EHG, DPE-Crown Lands | Council, C&E Grants | Council (1) : C&E Grant (2) | $15,000 | $- | $15,000 | $5,000 | $10,000 | $15,000 | $- | $- |
| MER1 | Coastal Hazards Monitoring Program | All | Council | DPE – EHG, DPE-Crown Lands | Council, C&E Grants | Council (1) : C&E Grant (2) | $100,000 | $- | $100,000 | $33,333 | $66,667 | $100,000 | $- | $- |
| MER2 | Habitat Condition Monitoring Program | All | Council | DPE – EHG<br>DPI – Fisheries<br>Seek opportunities to engage or partner with universities for this action | Council, C&E Grants | Council (1) : C&E Grant (2) | $150,000 | $33,333 | $450,000 | $150,000 | $300,000 | $150,000 | $150,000 | $150,000 |
| MER3 | Bathymetry survey in Batemans Bay | Batemans Bay | Council | DPE – EHG | Council, C&E Grants | Council (1) : C&E Grant (2) | $160,000 | $20,000 | $320,000 | $106,667 | $213,333 | $- | $160,000 | $160,000 |
| MER4 | Review of CMP progress | All | Council | N/A | Council, C&E Grants | Council (1) : C&E Grant (2) | $ST | $ST | $ST | $ST | $ST | $ST | $ST | $ST |
| MER5 | 10-year review of CMP | All | Council | CEMAC, DPE – EHG | Council, C&E Grants | Council (1) : C&E Grant (2) | $350,000 | $- | $350,000 | $116,667 | $233,333 | $- | $- | $350,000 |

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

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.

The CVA prepared for the Eurobodalla Shire coastline is shown in **Map RG-07-01** and described in **Section 8.2**.

The Eurobodalla Shire open coast is subject to the coastal hazards of beach erosion, coastal inundation and cliff instability within the CVA. As such, a CZEAS has been prepared in accordance with the mandatory requirements for CZEAS' specified in the CM Act and accompanying NSW Coastal Management Manual (OEH, 2018).

The CZEAS for the Eurobodalla Open Coast is contained in **Appendix H**.

# 7 Monitoring, Evaluation and Reporting Program

Management actions have been developed for a Monitoring Evaluation and Reporting (MER) Program for the Eurobodalla Open Coast over a ten-year period, to monitor, evaluate and report on the success of the implementation of this CMP.

This CMP and all progressed actions should be reviewed to ensure the actions remain relevant and the implementation of the CMP is being achieved, through achievement of performance targets. Where performance targets have not been achieved, then remedial actions will be required.

The actions to be implemented as part of the MER Program are listed in **Table 7-1**. Reporting requirements for the program are captured in MER4 and end of implementation period reporting requirements for the program are captured in MER5.

The recommended MER actions in **Table 7-1** have been described in terms of:

- Action ID – code for each action for easy reference
- Description – an outline of the scope of works required
- Lead Organisation – agency responsible for implementation of the action
- Support Organisation(s) – may be required and/or requested to assist in implementation of the action, either through on-ground works, in-kind contributions or as a potential funding or information source.
- Indicative Cost – an estimate of total costs for implementation over the ten-year life of the plan is provided (2022$). Where actions require Council staff resources, actual costs have only been applied where it is expected that implementation will exceed current resourcing levels and additional funding is required.
- Indicative Timeframe – indicative timeframe for implementation and alignment with Council's Delivery Program.
- Performance targets – these can be used to measure the level of success of the plan.

Table 7-1 Monitoring, Evaluation and Reporting (MER) Program

| ID | Action | Description | Lead Organisation | Support Organisation(s) | Indicative Cost (10 Year) | Indicative Timeframe | Performance Targets |
|---|---|---|---|---|---|---|---|
| MER1 | Coastal Hazards Monitoring Program | Design and implement a Coastal Hazards Monitoring Program to underpin Council's adaptive management of coastal risks. The strategy would incorporate:<br>a) Assessment of condition and effectiveness of coastal protection infrastructure, public access, coastal event response etc.<br>b) Determine whether trigger points for changing coastal risk management approaches have been reached.<br>Based on the above determine the need to update existing coastal hazard assessment and mapping or supplement with local scale assessments in high risk areas. | Council | DPE – EHG, DPE-Crown Lands | $100,000 | Ongoing | Design of program complete by Year 2<br>Interim report at Year 5 to report on outcomes and any required works |
| MER2 | Habitat Condition Monitoring Program | Monitor condition of habitats of high ecological and/or conservation value e.g. dune systems and proximity littoral rainforests. Monitoring program to track the health and condition of key habitats. Mapping of condition will form the key output. | Council | DPE – EHG<br>DPI - Fisheries<br>Seek opportunities to engage or partner with universities for this action | $150,000 | Every 3 years starting in Year 1 | Reporting and condition mapping complete in Year 1, Year 4, Year 7 and Year 10 |
| MER3 | Bathymetry survey in Batemans Bay | Undertake bathymetric surveys in Batemans Bay to improve the understanding of sand movement and sand availability in this location for dredging and beach nourishment purposes. Ideally two surveys throughout the 10 year implementation of this CMP would provide adequate data to adjust proposed sand nourishment volumes. Bathymetric surveys at this location may also be triggered by significant coastal erosion or flood events that appear to have significantly changed the offshore sand deposits in Batemans Bay. | Council | DPE – EHG | $160,000 | Every 5 years starting in Year 2 or triggered by significant coastal erosion or flood events | Reporting and bathymetric survey complete in Year 2 and Year 7. |
| MER4 | Review of CMP 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.<br>Where performance targets have not been achieved, then remedial actions will be required, and these remedial actions should also be documented in the Annual Report. The cause of non-compliance should be ascertained i.e. lack of funding, lack of resources and the remedial actions put in place to address the non-compliance i.e. identify additional funding sources, allocate additional resources, etc | Council | N/A | No additional cost (staff time) | Annually (Annual Report) | CMP progress included in Annual Report. |
| MER5 | 10-year review of CMP | The CMP and the specified management actions should be reviewed to ensure they are being achieved and are resulting in the desired outcomes. A ten-year review (or earlier if warranted by legislative or management changes or improved scientific understanding) of the CMP is required to consider:<br>a) Results of the Annual Reporting<br>b) Review of status of CMP actions including overall success and any barriers to effective implementation<br>c) Any new or updated scientific knowledge<br>d) Data provided by MER actions in this CMP<br>e) Prevailing community attitudes, government policy and strategic planning status. | Council | CEMAC, DPE – EHG | $350,000 | Year 10 | Review and reporting undertaken by the end of Year 10.<br>Adoption and certification of the amended CMP as required. |

# 8 Maps

## 8.1 Overview of mapping

Mapping in this CMP includes:

- Coastal management areas (**Section 8.2**) including coastal vulnerability area (**Section 7.2.1**)
- Coastal sediment compartments (**Section 1.2.2** and **Map RG-05-02**)
- Coastal hazard mapping (**Appendix B**)
- Coastal management actions (details on actions provided in **Section 5**).

## 8.2 Coastal Management Areas

As discussed in **Section 1.2.1** the four coastal management areas as defined by the CM Act and Resilience and Hazards SEPP are included in this CMP.

**Map RG-01-01** presents all the coastal management areas including the proposed Coastal Vulnerability Area.

No changes to the mapping of the following coastal management areas is proposed:

- Coastal Wetlands and Littoral Rainforests
- Coastal Use Area
- Coastal Environment Area.

The proposed Coastal Vulnerability Area mapping is discussed in **Section 8.2.1**.

### 8.2.1 Coastal Vulnerability Area

The requirement for the mapping of the CVA is set out in the CM Act. The purpose of the mapping is to ensure the targeted application of coastal management measures to:

- manage safety and risk associated with current and future coastal hazards
- to mitigate current and future risk from coastal hazards
- to maintain the existing ecosystems
- to maintain public amenity
- to encourage land appropriate land use
- to support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency.

The Act does not explicitly define what is to be incorporated into the CVA, but rather than it should cover “land subject to coastal hazards”. The Act does require that future risk and the impacts of climate change be incorporated into the CVA.

Based on the CVA mapping, the Resilience and Hazards SEPP prohibits development within the CVA unless the consent authority is satisfied that:

(a) if the proposed development comprises the erection of a building or works— the building or works are engineered to withstand current and projected coastal hazards for the design life of the building or works, and

(b) the proposed development:

(i) is not likely to alter coastal processes to the detriment of the natural environment or other land, and

(ii) is not likely to reduce the public amenity, access to and use of any beach, foreshore, rock platform or headland adjacent to the proposed development, and

(iii) incorporates appropriate measures to manage risk to life and public safety from coastal hazards, and

(c) measures are in place to ensure that there are appropriate responses to, and management of, anticipated coastal processes and current and future coastal hazards.

The CVA prepared for the Eurobodalla Shire coastline is shown in **Map RG-07-01**.

The extent of the CVA takes into account the full range of coastal hazards identified in the CM Act, namely:

- Beach erosion
- Shoreline recession
- Coastal lake or watercourse 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.

Beach erosion, shoreline recession, coastal inundation and tidal inundation were all assessed as part of the Stage 2 vulnerability assessment. The Stage 2 assessment identified high risks associated with these coastal hazards at a number of locations. The Stage 2 assessment identified that management of these risks was required. The affectation extents of these hazards from the Stage 2 assessment have been used to define the CVA to assist in the appropriate management of the risks associated with the coastal hazards.

Coastal lake or watercourse instability and erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters have not been included explicitly as their assessment was beyond the scope of this CMP. However, the regions where they may be applicable are captured by the extent of coastal inundation, which is the key driver of the CVA extent.

Coastal and cliff instability has been incorporated in Long Beach, Corrigans Beach and Caseys Beach based on the findings of the *Geotechnical Slope Instability Risk Assessment* undertaken as part of the CZMP for Batemans Bay by ACT Geotechnical Engineers (2012). The study identified several discrete locations that were experiencing coastal and cliff instability that required management, and were therefore included in the CVA mapping. For the purposes of the CVA mapping, adjacent areas that exhibited similar landforms were also included.

The Act requires the consideration of future climate change. As such, all extents used in defining the CVA have been based on the 2100 planning horizon, which incorporates the projected effects sea level rise on coastal hazards. The use of the 2100 scenario is required to allow Council to control developments (such as subdivisions) that are expected to have a lifetime out to this planning horizon.

# 9 Reference List

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Whitehead & Associates (2014). South Coast Regional Sea Level Rise Policy and Planning Framework. Report prepared for Eurobodalla Shire and Shoalhaven City Councils, Final, October.

# 10 Acronyms and Abbreviations

| | |
|---|---|
| AAD | Average Annual Damage |
| AHD | Australian Height Datum |
| ARI | Average Recurrence Interval |
| BCR | Benefit-Cost Ratio |
| CBA | Cost-Benefit Analysis |
| CEMAC | Coastal & Environment Management Advisory Committee |
| CM Act | NSW *Coastal Management Act 2016* |
| CM Manual | NSW Coastal Management Manual |
| CMP | Coastal Management Program |
| CVA | Coastal Vulnerability Area |
| CZMP | Coastal Zone Management Plan |
| CZEAS | Coastal Zone Emergency Action Subplan |
| DCP | Development Control Plan |
| DECC | Former NSW Department of Energy and Climate Change |
| DPE | NSW Department of Planning and Environment (formerly DPIE) |
| DPI | NSW Department of Primary Industries |
| DPIE | Former NSW Department of Planning, Industry and Environment (now DPE) |
| ESD | Ecologically Sustainable Development |
| FBL | Foreshore building line |
| FYRR | First Year Rate of Return |
| ICOLL | Intermittently closed and open lake or lagoon |
| IRR | Internal Rate of Return |
| $km^2$ | Square kilometres |
| LALC | Local Aboriginal Land Council |
| LEP | Local Environmental Plan |
| LGA | Local government area |
| LLS | Local Land Services |
| $m^2$ | Square metres |
| $m^3$ | Cubic metres |
| m/s | Metres per second |
| $m^3/s$ | Cubic metres per second |
| MCA | Multi-Criteria Assessment |
| MER | Monitoring, Evaluation and Reporting |
| MIDO | Maritime Infrastructure Delivery Office |
| MSL | Mean Sea Level |

| | |
|---|---|
| NPV | Net Present Value |
| NPVI | Net Present Value of Investment |
| NPWS | National Parks and Wildlife Service |
| NSW | New South Wales |
| OEH | Former NSW Office of Environment and Heritage, now Department of Planning and Environment (DPE) |
| PoM | Plan of Management |
| PV | Present Value |
| SEPP | State Environmental Planning Policy |
| TfNSW | Transport for NSW |
| WRL | Water Research Laboratory |

# 11 Glossary*

| | |
|---|---|
| Average Annual Damage (AAD) | The AAD is the average damage per year that would occur in a particular area from a natural disaster event i.e. flooding, over a very long period of time. In many years there may be no damage, in some years there will be minor damage (i.e. caused by small, relatively frequent flood events) and in some years there will be major damage (i.e. caused by large, rare flood events). AAD provides the basis for comparing the economic effectiveness of different management measures against natural disaster events of all sizes i.e. their ability to reduce the AAD. |
| Australian Height Datum (AHD) | A common national surface level datum approximately corresponding to mean sea level. |
| 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 value. Also known as Return Period. |
| Beach erosion | 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. |
| Benefit-Cost Ratio (BCR) | The ratio of the present value of total incremental benefits over the present value of total incremental costs. A BCR is an indicator showing the relationship between the relative costs and benefits of a proposed project or option. If a project has a BCR greater than 1.0, the project is expected to deliver a positive net present value and can be considered as economically feasible. |
| Cost Analysis | An evaluation of the specific cost elements of a contract or proposal to appraise their statutory compliance, distribution, and reasonableness. |
| Catchment | The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location. |
| Climate change | A process that occurs naturally in response to long-term variables, but often used to describe a change of climate that is directly attributable to human activity that alters the global atmosphere, increasing change beyond natural variability and trends. |

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| Coast | A strip of land of variable width that extends from the shoreline inland to the first significant landform that is not influenced by coastal processes (such as waves, tides and associated currents). |
| Coastal environment area | Land identified in the CM Act as land containing coastal features such as coastal waters of the State, estuaries, coastal lakes, coastal lagoons and land adjoining those features, including headlands and rock platforms. The Resilience and Hazards SEPP maps the extent of the coastal environment area for planning purposes. |
| Coastal hazard | Coastal hazards, as defined by the CM Act, include beach erosion, shoreline recession, coastal lake or watercourse entrance instability, coastal inundation, coastal cliff or slope instability, 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. |
| Coastal inundation | Coastal inundation occurs when a combination of marine and atmospheric processes raises the water level at the coast above normal elevations, causing land that is usually 'dry' to become inundated by sea water. Alternatively, the elevated water level may result in wave run-up and overtopping of natural or built shoreline structures (e.g. dunes, seawalls). In the case of an estuary, coastal inundation may be caused by a combination of processes including high tides, storm surge and wave run-up onto the foreshore. |
| Coastal Management Area | 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 protection works | The CM Act defines coastal protection works as: a) beach nourishment b) 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 use area | Land identified by the CM Act and Resilience and Hazards SEPP as being land adjacent to coastal waters, estuaries, coastal lakes and lagoons where development is or may be carried out (now or in the future). The Resilience and Hazards SEPP maps the extent of the coastal use area for planning purposes. |
| Coastal vulnerability area (CVA) | Defined in the CM Act as land subject to seven coastal hazards. |

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| Coastal Zone | The coastal zone, as defined by the CM Act, means the area of land comprised of the following coastal management areas:<br>(a) the coastal wetlands and littoral rainforests area,<br>(b) the coastal vulnerability area,<br>(c) the coastal environment area,<br>(d) the coastal use area. |
| Development | As defined in the *Environmental Planning and Assessment Act 1979*.<br>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.<br>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.<br>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. |
| Dredging | Maintenance dredging is the recurrent dredging of sediment from a waterway, including existing navigation channels, approaches and berths, to allow safe navigation by commercial or recreational boating traffic. |
| Dune | Coastal dunes are vegetated and unvegetated sand ridges built-up at the back of a beach. They comprise dry beach sand that has been blown landward and trapped by plants or other obstructions. Stable sand dunes act as a buffer against wave damage during storms, protecting the land behind from salt water intrusion, sea spray and strong winds. Coastal dunes also act as a reservoir of sand to replenish and maintain the beach at times of erosion. |
| Economic evaluation | An assessment that helps decision-makers to understand the socioeconomic implications of adopting alternative management options and to make choices that will provide net benefits to the community. Cost-benefit analysis (CBA) is a type of economic evaluation that considers and evaluates a wide range of costs and benefits associated with a proposal, in qualitative or quantitative (monetary) terms (with future costs and benefits reduced to today's prices), compared with a base case. It may be used in conjunction with other criteria (such as technical feasibility, community acceptance or environmental impact) to |

select optimal management responses. A multi-criteria assessment (MCA) is not an economic evaluation but may assist decision-making in other ways.

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| Estuary | 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. |
| Extreme Ocean Water Level | The highest elevation reached by the sea/ocean as recorded by a tide gauge during a given period (after MHL, 2018). |
| Extreme Storm Event | Storm for which characteristics (wave height, period, water level etc.) were derived by statistical 'extreme value' analysis. Typically, these are storms with average recurrence intervals (ARI) ranging from one to 100 years. |
| 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'. |
| 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. |
| Flood risk | Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk is divided into three types, existing, future and continuing risks as described below:<br>Existing flood risk is the risk a community is exposed to as a result of its location on the floodplain.<br>Future flood risk is the risk a community may be exposed to as a result of new development on the floodplain.<br>Residual flood risk is the risk a community is exposed to after floodplain risk management measures have been implemented. |

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| Groyne | A shore protection structure built (usually perpendicular to the shoreline) to trap littoral drift or retard erosion of the shore; or a narrow, roughly shore normal structure built to reduce longshore currents, and/or to trap and retain littoral material. Most groynes are of timber or rock and extend from a seawall, or the backshore, well onto the foreshore and rarely even further offshore. |
| 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. |
| Intermittently closed and open lakes and lagoons (ICOLLs) | Coastal lakes and lagoons where the entrance may be closed to the sea from time to time and for varying periods, by accretion of a berm. ICOLLs have sensitive water quality because they accumulate loads of sediment and nutrients from the catchment and may have poor water circulation and flushing. |
| Managed retreat | For the coastal zone (generally the coastal vulnerability area), managed retreat allows the shoreline to migrate landward unimpeded. It allows an area that was not previously exposed to coastal processes and hazards to become exposed, for instance by removing or breaching coastal protection works. Managed retreat may involve the relocation landward, out of a coastal risk area, of homes and infrastructure under threat from coastal erosion, recession or inundation. It may also involve the deliberate setting back (moving landward) of the existing line of sea defence to obtain engineering or environmental advantages. During a managed retreat process, a new foreshore area or new intertidal habitat may be created. |
| Mean Sea Level (MSL) | MSL is a measure of the average height of the sea or ocean's surface such as the halfway point between the mean high tide and the mean low tide. At present, mean sea level is approximately equivalent to 0 mAHD (reported as 0.03 mAHD in MHL, 2019). |
| Multi-criteria assessment (MCA) | An MCA is 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. |
| Net Present Value (NPV) | The difference between the present value of total incremental benefits and the present value of the total incremental costs in the improved option. |

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| Revetment or seawall | 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. |
| Risk | The chance of something happening that will have an impact on objectives, usually measured in terms of a combination of the consequences of an event and likelihood of occurrence. |
| Sea level rise | 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. |
| Shoreline | The intersection between the sea and the land. The line delineating the shoreline is often approximated as the Mean High Water Mark, however, the definition can vary depending on the application. |
| 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. |
| Tidal inundation | 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. For planning controls, it is defined as the land that is inundated up to the level of Highest Astronomical Tide. |
| 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 | Waves resulting from the action of the wind on the surface of the water. |

*Many of the glossary terms here are derived or adapted from the *Coastal Management Glossary* (OEH, 2018).


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