



Kiama Coastline Coastal Management Program

Stage 4: Coastal Management Program

April 2024

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Acknowledging Country

While this report focusses on the present-day uses and values of the Kiama Coastline and its surrounds, BMT and Kiama Municipal Council acknowledges the traditional custodians of the land, the Dharawal and Wodi Wodi people, who have cared for this land and sea country since time immemorial.

We pay our respects to their elders, past, present and emerging, and commit ourselves to a future with reconciliation and renewal at its heart.

Executive Summary

Statutory Context

The Kiama coastline, within the Kiama local government area (LGA) on the south coast of NSW, extends approximately 34km from the Minnamurra River at the north (where it meets the Shellharbour LGA) to 2km south of Black Head (where it meets the Shoalhaven LGA). The Kiama coastline and its adjacent lands are located within the NSW Coastal Zone and are subject to the provision and objects of the NSW *Coastal Management Act 2016* (CM Act).

In accordance with the requirements of the CM Act, Kiama Municipal Council with technical and financial assistance from the NSW Government resolved to prepare a Coastal Management Program (CMP) for the Kiama Coastline. The CMP will be prepared to extend for a 10-year period from 2024 to 2034, and shall define the long-term strategy for the coordinated, sustainable management of the estuaries and land within the surrounding coastal zone.

Once prepared and endorsed by relevant agencies and stakeholders, the CMP will be provided to the Minister for certification as required by the CM Act. Once certified, relevant actions within the CMP will become eligible for funding under the NSW Coastal and estuary grants Program.

This report fulfils **Stage 4** of the CMP preparation process and builds on all previous CMP Stages, including the Stage 1 report (BMT, 2020), the Stage 2 report (BMT, 2021) and the Stage 3 report (BMT, 2023). Stage 4 of the CMP documents the coastal management actions and provides a business case for their implementation. The Stage 4 CMP document is supported by relevant public authorities, and enables certification of the CMP under the CM Act, therein achieving the Objects of the CM Act.

Objectives for Management

The Vision Statement for the Kiama CMP is:

Kiama's colourful, diverse, beautiful and iconic coastline is managed in a manner consistent with the principles of ecologically sustainable development to ensure that its biodiversity, cultural heritage, scenic landforms and natural beauty are preserved and enhanced for current and future generations. The Kiama coastline maintains its small, connected communities feel and remains easily accessible and freely available for all users.

This overarching vision is supported by seven outcome-based management objectives for the coastline. These objectives were established following a first pass risk assessment conducted as part of the CMP Stage 1 Scoping Study (BMT, 2020) and then a more detailed risk assessment of the threats and hazards impacting the social, cultural, economic and environmental values of the coastline, including climate change (and sea level rise in particular), as documented in the CMP Stage 2 report (BMT, 2021).

CMP Objective 1: Future Development

Objective Outcome: Planning and development decisions made by Council and other authorities recognise the constraints imposed by natural coastal processes, as well as community and environmental values within the coastal zone. Moreover, future development is planned to accommodate future coastal processes, including the natural response to climate change, and sea level rise in particular, without introducing new user conflicts and land use inconsistencies.

CMP Objective 2: Ecosystem Health

Objective Outcome: Natural habitats and ecosystems within coastal lands and waters along the Kiama coastline are rehabilitated, maintained and protected, where necessary, to restore and preserve environmental values of the coastline and to support the community values that are connected to an appreciation of the quality and condition of the natural environment.

CMP Objective 3: Hazards and Climate Resilience

Objective Outcome: Supported by a thorough understanding of local and regional scale coastal processes and an appreciation of the projected impacts of climate change, and sea level rise in particular, natural and built assets within the Kiama coastal areas are planned, designed, modified and managed to cater for existing and future coastal hazards and climate extremes.

CMP Objective 4: Water Quality

Objective Outcome: Pollutant loads from urban and rural sources within Kiama coastal areas will be reduced to enable the water quality within coastal waters to sustain a healthy and productive marine ecosystem, which enhances broader environmental and community values.

CMP Objective 5: Culture

Objective Outcome: The significant cultural heritage of the Kiama coastline, and specifically, the spiritual, social, customary and economic connection with, and use of, the coastal land and waters by the Wodi Wodi and Dharawal peoples is celebrated and preserved for future generations.

CMP Objective 6: Governance and Compliance

Objective Outcome: Management and control of uses and activities within Kiama coastal areas, including delivery and implementation of this CMP, is championed and led by a forum that brings together all relevant stakeholders, including community and user groups, enabling co-ordinated and co-operative planning and decision-making regarding local policies and management activities, as required under relevant legislation including the *Coastal Management Act 2016*.

CMP Objective 7: Community Use and Conflicts

Objective Outcome: Coastal amenity is enjoyed by all, conflicts between users are limited and detrimental impacts on environmental and community values are avoided through rationalising and encouraging more appropriate and ecologically sensitive access along the coast, and the sustainable use of precious coastal resources and facilities.

Consultation

In accordance with the requirements of the CM Act, and as guided by the NSW Coastal Management Manual (OEH, 2018a), Stage 4 of the CMP, along with the preceding stages, incorporated engagement with agencies, relevant stakeholders of the coastline and the broader community.

Acceptance of Management Actions by agencies and stakeholders that are responsible for implementation over the 2024-2034 period is an essential component of the CMP certification process. Letters of support have been provided by public authorities and other relevant stakeholders who are nominated for implementation of the CMP.

Management Actions

A total of 17 Management Actions were developed in consultation with stakeholders. The Management Actions were derived from a longer list of potential options that were formulated and evaluated using a multi-criteria assessment covering the feasibility, viability and acceptability of each potential option.

For each Management Action, a series of sequential and/or concurrent tasks have been defined to guide implementation of the action. Management Actions were prioritised based on the evaluation of the initial options considered as well as consultation and feedback from stakeholders including those that would be responsible for implementing the actions. The methodology adopted to formulate and down-select the Management Actions is detailed in the CMP Stage 3 report (BMT, 2023).

Prioritisation of the Management Actions used the following classification:

- **Very High Priority:** These options are critical for addressing key risks and the long-term effective management of the coastline. These options are fundamental for successful implementation of the CMP;
- **High Priority:** These options are considered of high importance, or high impact, in addressing risks and opportunities; and
- **Medium Priority:** These options, whilst still important, are considered to be moderately effective or impactful in terms of addressing risks and opportunities.

Timing for completion of implementation of Management Actions aligns with Council's Delivery Program (DP) under the NSW Integrated Planning and Reporting (IP&R) Framework covering:

- Short term - within 3 years
- Medium term - within 6 years
- Long term - within 10 years

Responsibilities, costs and potential funding sources have been assigned for each task of each Management Action, as outlined in Section 6, while a detailed Business Plan for implementation of the CMP is provided in Section 7 of this Stage 4 CMP report. Detailed descriptions of each Management Action, with accompanying maps as relevant, are provided in **Annex B**. A summary of the Management Actions is presented in Table 1, along with priorities, timeframes, indicative costs, lead agencies responsible for implementation and the CMP Objectives that they each address.

The total cost for implementation of the CMP over the 10 year period is \$18.6 million, comprising \$13.2 million in capital expenses (capex) and a further \$5.5 million in operational and maintenance expenses (opex). Costs include \$6.8 million associated with construction of interim and permanent CPWs that may not be required during the term of this CMP. Costs can be partially reduced if Council and agency staff can undertake various activities in the CMP rather than engaging consultants.

Table 1. Summary of Management Actions for the Kiama Coastline

| Action Name | Priority | Timeframe for completion | Indicative 10 year Cost | Lead Agency | CMP Objectives met |
|--|-----------|---|-------------------------|-------------|--------------------|
| Preliminaries | | | | | |
| A. Establish a Coastal Management Program (CMP) Operational Working Group (OWG) for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP. | Very High | Short term (within 3 years) Target: Year 1, with | Staff time only | Council | 6 |

| Action Name | Priority | Timeframe for completion | Indicative 10 year Cost | Lead Agency | CMP Objectives met |
|---|-----------|--|-------------------------|-------------|--------------------|
| <p>Task A.1 – Engage with agencies and stakeholders to gauge interest and establish scope of OWG.</p> <p>Task A.2 – Prepare Terms of Reference (ToR) for the OWG</p> <p>Task A.3 – Formally establish the OWG in accordance with the agreed ToR.</p> | | continuity to Year 10 | | | |
| Land use control and management | | | | | |
| <p>B. Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach for future development to adequately manage existing and future coastal risks.</p> <p>Task B.1 – Prepare and submit a Planning Proposal to State Government for mapping the Coastal Vulnerability Area (CVA).</p> <p>Task B.2 – Undertake a thorough review of the LEP and supporting documents for consistency with the Coastal Management Program (CMP) and CVA.</p> <p>Task B.3 – Review options and propose changes to the LEP and other land use planning controls, including a new Coastal Hazards DCP.</p> <p>Task B.4 – Make recommended changes to the LEP and prepare the new DCP following appropriate legislated process, including public consultation.</p> <p>Task B.5 – Update pre-lodgement Development Application (DA) checklist to include key elements of the Coastal Hazards DCP, the updated LEP and the R&H SEPP.</p> <p>Task B.6 – Utilise the use of the pre-lodgement checklist for all coastal infrastructure development proposed within a coastal risk area (being assessed through both Parts 4 and 5 of the <i>Environment Planning & Assessment Act 1979</i>).</p> | Very High | Short term (within 3 years) Target: Years 1 to 3 with continuity to Year 10 | Up to \$650k capex | Council | 1, 3, 7 |
| <p>C. Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA).</p> <p>Task C.1 – Consult with relevant landholders and provide them with information resources regarding existing and future coastal hazards, including the Coastal Zone Emergency Action Subplan (CZEAS), and implications for CVA declaration on land use and future development.</p> <p>Task C.2 – Incentivise and support relevant landholders and lessees of public land in hazard-affected coastal areas to engage with local emergency services including the NSW State Emergency Service (SES), and prepare an appropriate emergency plan that takes into account response to coastal hazards, such as severe storm surge inundation.</p> <p>Task C.3 – Amend Council’s Public Land Management Policy to incorporate a requirement for an appropriate emergency plan into future leasing agreements of public coastal land at risk of coastal hazards.</p> | High | Medium term (within 6 years) Target: Years 2 to 6 | Up to \$60k capex | Council | 3, 7 |
| <p>D. Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area (LGA) coastline.</p> <p>Task D.1 – Consult with private landholders along the coast where new public access is sought.</p> <p>Task D.2 – Identify and prioritise coastal fringe land to be acquired or easements established (depending on suitability).</p> | Medium | Short term (within 3 years) Target: Years 2 to 3 | Up to \$100k capex | Council | 1, 3 |

| Action Name | Priority | Timeframe for completion | Indicative 10 year Cost | Lead Agency | CMP Objectives met |
|---|----------|---|---|-------------------------|--------------------|
| <p>Task D.3 – Prepare and implement a Coastal Land Public Access strategy, guided by Council’s Acquisition and Disposal of Land and Easements Policy.</p> <p>Task D.4 – Incorporate provisions within the proposed Coastal Hazards Development Control Plan (DCP) or other relevant local plans requiring dedication of priority coastal fringe lands for public access if associated lots are developed in the future (e.g. subdivision of land).</p> | | | | | |
| Infrastructure and asset planning and management | | | | | |
| <p>E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values.</p> <p>Task E.1 – Assess the condition of all existing access tracks and other community facilities and amenities on coastal lands.</p> <p>Task E.2 – Review existing Council policies and asset plans, and consult with Council’s Infrastructure and Liveability Advisory Committee, to identify priority works for improving coastal access tracks, amenities and facilities.</p> <p>Task E.3 – Undertake on-ground works to improve coastal access tracks, amenities and facilities.</p> | High | <p>Long term (within 10 years)</p> <p>Target: Year 1, with continuity to Year 10</p> | <p>Up to \$780k capex and \$200k opex + maintenance</p> | Council | 1, 2, 3, 4, 6, 7 |
| <p>F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks.</p> <p>Task F.1 – Guided by the Stage 2 CMP risk assessment, conduct a detailed evaluation of each asset identified as being at risk of coastal hazards.</p> <p>Task F.2 – Modify existing asset management plans and/or develop new plans, where required, to address coastal hazards and risks.</p> <p>Task F.3 – Condition of existing coastal infrastructure and built assets to be monitored by owners/managers.</p> | Medium | <p>Short term (within 3 years)</p> <p>Target: Years 1 to 3 with continuity to Year 10</p> | <p>Up to \$200k capex and \$360k opex incl. maint.</p> | Multiple (asset owners) | 3, 6, 7 |
| <p>G. Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Werri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.</p> <p>Task G.1 – Prepare REF and obtain approval for ‘interim’ coastal protection works (CPWs).</p> <p>Task G.2 – If agreed triggers and thresholds are reached, construct interim coastal protection works (CPWs) without delay at required location(s).</p> <p>Task G.3 – Triggered by the construction of interim coastal protection works (CPWs) at one or more locations (refer Task G.2), undertake site-specific investigations (survey, geotechnical etc), prepare detailed designs, prepare REF and obtain approval of permanent CPWs</p> <p>Task G.4 – Construct permanent coastal protection works (CPWs) at one or more locations to replace interim CPWs established at the same location(s)</p> | Medium | <p>Long term (within 10 years)</p> <p>Target: Year 1 and as-required to Year 10</p> | <p>Nominally \$6.75m capex \$50,000 opex</p> | Council | 1, 3, 7 |
| <p>H. Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline.</p> | High | <p>Medium term (within 6 years)</p> | <p>Up to \$205k capex</p> | Council | 3, 6 |

| Action Name | Priority | Timeframe for completion | Indicative 10 year Cost | Lead Agency | CMP Objectives met |
|---|-----------|--|--|---------------------|--------------------|
| <p>Task H.1 – Undertake additional site specific geotechnical investigations.</p> <p>Task H.2 – Monitor cliff and slope instability at key locations identified within the Stage 2 report.</p> <p>Task H.3 – Undertake a research study into the geodiversity of the Kiama coastline to support future conservation and management of key geological features.</p> <p>Task H.4 - Update mapping the R&H SEPP and/or LEP to incorporate cliff instability hazard based on results of relevant geotechnical studies, including studies done by agencies.</p> | | <p>Target: continuous for Years 1 to 10, with specific works during Years 4 to 6</p> | | | |
| <p>I. Ensure that infrastructure development and future management of Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable.</p> <p>Task I.1 – TfNSW and Council to work collaboratively in delivering specific actions within the Kiama Harbour Revitalisation Plan that are aligned with the objectives and time frame of this CMP subject to approved funding and environmental planning approvals.</p> | Medium | <p>Long term (within 10 years)</p> <p>Target: opportunistic until Year 10.</p> | <p>Nominal \$3.2m capex and \$800k opex incl. maint.</p> | TfNSW Council | 1, 3, 6, 7 |
| Environmental, social and cultural | | | | | |
| <p>J. Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country.</p> <p>Task J.1 – Engage with the local Aboriginal community to understand their preferences for participation in land and sea management along the Kiama coastline.</p> <p>Task J.2 – Invite Traditional Owner (TO) representation onto the CMP Operational Working Group.</p> <p>Task J.3 – Consult with Aboriginal cultural knowledge holders to gain an understanding of the cultural and heritage significance of the coastline and culturally appropriate ways to better acknowledge and share, if appropriate, the indigenous cultural heritage of the Kiama coastline.</p> <p>Task J.4 – Support the existing, and develop additional, Indigenous Rangers groups for the Kiama / Illawarra area under the National Indigenous Australians Agency's National Indigenous Rangers Program and/or any other funding, legislative or hand back arrangements.</p> | Very High | <p>Short term (within 3 years)</p> <p>Target: Years 1 to 3 with continuity to Year 10</p> | <p>Up to \$70k capex and \$225k opex incl. maint.</p> | ILALC JLALC Council | 5, 6 |
| <p>K. Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values.</p> <p>Task K.1 – Prepare a coastal habitat restoration and revegetation works plan that identifies, maps and prioritises specific works locations, along with works details suitable for implementation, such as weeds to be controlled and plants to be used, including species and habitats and locations that have cultural significance to the local community.</p> <p>Task K.2 – Engage field teams, including existing Landcare groups and Aboriginal-led organisations, to implement pest and weed control, revegetation, fencing and habitat restoration works. Where works are identified as Environment Protection Works (EPWs) within Coastal Wetland and Littoral Rainforest Areas (CWLRA), appropriate planning pathways will be used.</p> | Medium | <p>Long term (within 10 years)</p> <p>Target: initial action in Year 1 with continuity to Year 10</p> | <p>Up to \$50k capex and \$2.6m opex incl. maint.</p> | Council | 2, 6 |

| Action Name | Priority | Timeframe for completion | Indicative 10 year Cost | Lead Agency | CMP Objectives met |
|---|----------|--|---|----------------|--------------------|
| Task K.3 – Monitor the success of habitat restoration works and refine coastal habitat restoration and revegetation works plan as required. | | | | | |
| <p>L. Raise community awareness regarding Council’s Public Tree Management Policy to reduce illegal dune vegetation damage and removal.</p> <p>Task L.1 – Install signage at strategic locations regarding value of dune vegetation along with actions and penalties that are enforceable under Council’s Public Tree Management Policy.</p> <p>Task L.2 – As appropriate to the circumstances, pursue one or more elements of Council’s Public Tree Management Policy as a deterrent for on-going dune vegetation damage and removal.</p> | High | <p>Short term (within 3 years)</p> <p>Target: initial action in Year 3 with continuity to Year 10</p> | Up to \$55k capex | Council | 2, 5, 6, 7 |
| <p>M. Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and update culturally appropriate management measures.</p> <p>Task M.1 – Undertake a Kiama coastline Aboriginal cultural values, threats and resilience study.</p> <p>Task M.2 – Explore options to revise relevant aspects of the Local Environmental Plan, to recognise Aboriginal cultural values of the Kiama coastline.</p> <p>Task M.3 - Monitor Aboriginal cultural heritage sites at risk of coastal hazards</p> | High | <p>Long term (within 10 years)</p> <p>Target: Years 5 to 6, subject to funding (could be sooner or later)</p> | Up to \$200k capex and \$200k opex incl. maint. | ILALC JLALC | 5, 6 |
| <p>N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities.</p> <p>Task N.1 – Maintain awareness of potential community engagement programs that relate to coastal lands, such as engagement for future Local Strategic Planning Statements (LSPS).</p> <p>Task N.2 – Where suitable, expand planned community engagement programs to capture community input regarding use and demand of coastal lands, facilities and services, and potential conflicts, including conflicts with the natural environment.</p> | Medium | <p>Long term (within 10 years)</p> <p>Target: continuous for Years 1 to 10</p> | Up to \$20k capex | Council | 3, 6, 7 |
| Operational delivery | | | | | |
| <p>O. Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position.</p> <p>Task O.1 – Advocate and support maintaining automated water level gauges at Werri Lagoon and in the Crooked River.</p> <p>Task O.2 – Work with Department of Primary Industries - Fisheries to investigate removal options, assess potential impacts, seek necessary approvals and conduct public engagement.</p> <p>Task O.3 - Undertake necessary on-ground works to remove the derelict concrete drainage channel located within Werri Lagoon entrance.</p> | High | <p>Long term (within 10 years)</p> <p>Target: continuous for Years 1 to 10, with specific works from Years 5 to 10</p> | Up to \$630k capex | Council | 2, 3, 6 |

| Action Name | Priority | Timeframe for completion | Indicative 10 year Cost | Lead Agency | CMP Objectives met |
|---|----------|---|---|-------------------------|--------------------|
| Task O.4 – Review and update the Werri Lagoon Interim Entrance Management Policy and the Crooked River Entrance Policy Position. | | | | | |
| P. Monitor and assess beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required. Task P.1 – Use CoastSnap, or similar photo point monitoring, to undertake citizen science beach monitoring and to assess beach condition change based on image comparisons. Task P.2 – When beach erosion scarps are high, install temporary fencing / barricades and/or close beach access to reduce dangers to the public from these unstable slopes. Task P.3 – Implement the Coastal Zone Emergency Action Subplan (CZEAS) when erosion events potentially compromise the integrity and safety of the public, public infrastructure and cultural sites. Task P.4 – Prepare REF, obtain permits and approval and undertake beach scraping of Surf Beach following periods of significant erosion, as required | Medium | Short term (within 3 years) Target: continuous for Years 1 to 10, with specific works in Years 1 and 2 | Up to \$200k capex and \$380k opex incl. maint. | Council | 2, 3, 6, 7 |
| Q. Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations). Task Q.1 – Expand the current Illawarra Ocean beaches Beachwatch program to other areas of high primary contact with coastal waters. Task Q.2 – Where deemed inadequate, increase maintenance of stormwater quality improvement devices. Task Q.3 – Sydney Water to provide periodic updates to the Coastal Management Program Operational Working Group on proposed sewer network improvements. | Medium | Short term (within 3 years) Target: continuous for Years 1 to 10, with specific works in Year 1 | Up to \$650k opex incl. maint. | Council Sydney Water | 2, 4, 6 |
| TOTAL | | | \$13.17m capex incl one-off costs \$5.47m opex including maintenance over 10 years | | |

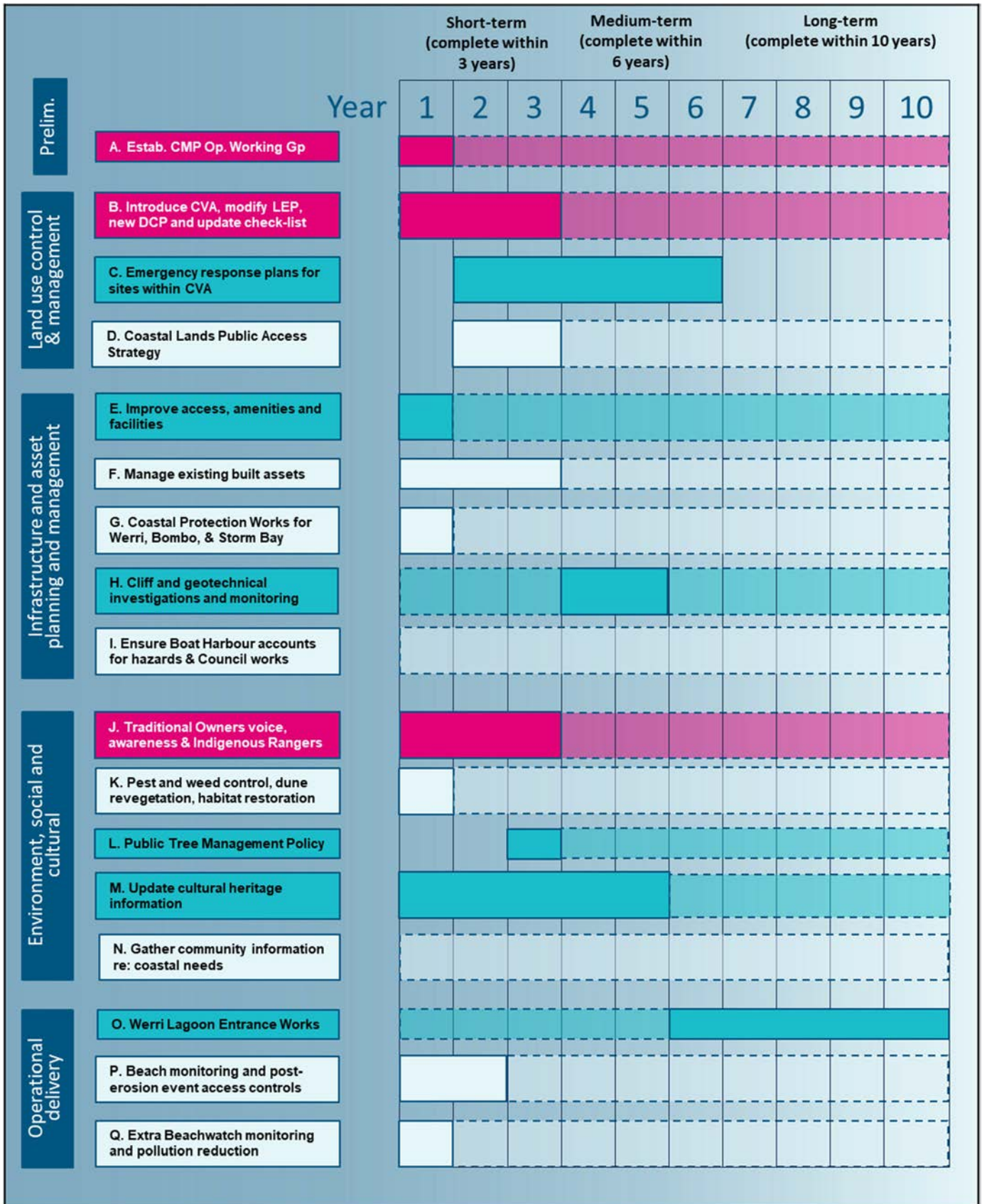
Implementation Pathway

Implementation of the Kiama CMP will need to follow a pathway as some Management Actions cannot be implemented effectively until other Actions are underway or have been largely completed. The pathway highlights the integrated and inter-connected nature of the Actions that have been developed for the Kiama CMP. This also highlights the importance of managing the Kiama coastline through a multi-agency/stakeholder forum, as the issues and objectives of the coastline need to be addressed when the coastline is considered in a complete way.

The pathway for implementation of the CMP commences with the establishment of a CMP Operational Working Group (**Action A**), which can oversee the planning and implementation of all Management Actions of the CMP. The CMP has four main implementation themes:

- Land use control and management;
- Infrastructure and asset planning and management;
- Environment, social and cultural; and
- Operational delivery.

The implementation pathway for the Kiama CMP is presented in Figure 1, aligned with the four implementation themes.



Legend: VERY HIGH PRIORITY STRATEGIES HIGH PRIORITY STRATEGIES MEDIUM PRIORITY STRATEGIES ONGOING

Figure 1. Pathway for Coastal Management of the Kiama Coastline

Glossary and Abbreviations

| Term | Definition |
|---|---|
| Biodiversity | The variety and variability of wildlife (both plants and animals) and habitats. Biodiversity is typically a measure of variation at the genetic, species, and ecosystem level. |
| BC Act | Biodiversity Conservation Act 2016 |
| BCSG | Biodiversity Conservation Science Group of the NSW Department of Climate Change, Energy, the Environment and Water (DEECCW) |
| BDAR | Biodiversity Development Assessment Report as required under the BC Act |
| CEA | Coastal Environment Area (as prescribed in the CM Act 2016) |
| Climate change | The long-term change (decades or longer) in pattern of weather, and related changes in oceans, land surfaces and ice sheets. |
| CM Act | NSW Coastal Management Act 2016 |
| CMA | Coastal Management Area |
| CMP | Coastal Management Program |
| Cliff instability | <p>Cliff instability refers to a variety of geotechnical processes on coastal cliffs and bluffs, including rock fall, slumps and landslides. It may be driven by coastal processes such as wave undercutting and overtopping, or by differential weathering of rock layers in cliffs and bluffs or by surface and groundwater flows. Instability may occur during or following a coastal storm event, but may also occur at other times. There may be very little warning that a cliff instability incident is imminent. Signs of cliff instability include (DPIE, 2019):</p> <ul style="list-style-type: none"> • Open cracks, or steps, along contours • Ground water seepage, or springs • Bulging in the lower part of the slope • Trees leaning down slope, or with exposed roots • Debris/fallen rocks at the foot of a cliff • Tilted power poles, or fences • Cracked or distorted structures. |
| Coastal erosion (also called Beach erosion) | 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. |
| Coastal inundation | The temporary and permanent flooding of a portion of land within the coastal zone |
| CPW | Coastal Protection Works |
| CSP | Community Strategic Plan |
| CUA | Coastal Use Area (as prescribed in the CM Act 2016) |
| CVA | Coastal Vulnerability Area (as prescribed in the CM Act 2016) |
| CWLRA | Coastal Wetlands and Littoral Rainforests Area (as prescribed in the CM Act 2016) |

| Term | Definition |
|---------------------|--|
| CZEAS | Coastal Zone Emergency Action Subplan |
| CZMP | Coastal Zone Management Plan – a plan for managing the coastal zone developed under the old (now superseded) coastal management framework for NSW. Now replaced by CMPs |
| DA | Development Application |
| DCCEEW | NSW Department of Climate Change, Energy, the Environment and Water |
| DCP | Development Control Plan |
| DP | Delivery Program |
| DPHI | NSW Department of Planning, Housing and Infrastructure |
| DPI | NSW Department of Primary Industries |
| DPE | Former NSW Department of Planning and Environment (now DCCEEW and DPHI) |
| Ecosystem | A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functioning unit |
| Entrance management | Includes artificial opening of waterway entrances to the coast, managing the configuration, height, or location of the beach berm to facilitate entrance opening at a level lower than the natural range |
| EP&A Act | Environmental Planning and Assessment Act 1979 |
| EPW | Environmental Protection Works |
| IAP2 | International Association of Public Participation |
| ILALC | Illawarra LALC |
| IPCC | Intergovernmental Panel on Climate Change. A scientific and intergovernmental body under the auspices of the United Nations, set up at the request of member governments, dedicated to the task of providing the world with an objective, scientific view of climate change and its political and economic impacts |
| IP&R | NSW Integrated Planning and Reporting Framework |
| ISJO | Illawarra Shoalhaven Joint Organisation |
| ISO | International Standards Organisation |
| JLALC | Jerrinja LALC |
| KMC | Kiama Municipal Council |
| LALC | Local Aboriginal Lands Council |
| LEMC | Local Emergency Management Committee |
| LEP | Local Environmental Plan |
| LGA | Local Government Area |
| LGNSW | Local Government NSW, is an independent organisation that existing to serve the interests of NSW general and special purpose Councils |
| LLS | NSW Local Land Services – a stage government agency within the Department of Regional NSW. The South East LLS is relevant for the study area |

| Term | Definition |
|------------------|--|
| LSPS | Local Strategic Planning Statement |
| MEM Act | Marine Estate Management Act 2014 |
| MEMA | Marine Estate Management Authority |
| MEMS | Marine Estate Management Strategy |
| MER | Monitoring and Evaluation Reporting |
| Midden | Aboriginal place of significance where debris from eating shellfish and other food has accumulated over time. Often found on headlands, beaches and dunes, around estuaries, swamps and along the banks of rivers, creeks and lakes |
| MIDO | Maritime Infrastructure Delivery Office (a part of Transport for NSW) |
| MSL | Mean Sea Level. The mean level of the sea over a long period (preferably 18.6 years) or the mean level which would exist in the absence of tides |
| NGO | Non-Government Organisation |
| NIAA | National Indigenous Australians Agency |
| NPWS | The NSW National Parks and Wildlife Service |
| OEH | Former Office of Environment and Heritage. Now known as DCCEEW – BCSG |
| OWG | [Kiama Coastal Management Program] Operational Working Group |
| PoM | Plan of Management – as required for Crown reserves under the Crown Lands Management Act 2016 |
| R&H | Resilience and Hazards, in reference to the State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021 |
| Resilience | The ability of a system (in this case natural systems and states, and human systems along the coast) to 'bounce back' after a hazard or threatening event, returning to some quasi-stable state and maintaining functions, processes and services |
| Risk | Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood |
| SEPP | State Environmental Planning Policy |
| SES (NSW SES) | NSW State Emergency Service |
| SLR | Sea level rise - a long-term increase in MSL, usually associated with climate change and increase in temperature in particular |
| Stakeholders | Persons or organisations with an interest or concern in a given matter |
| Storm surge | The increase in coastal water levels caused by the barometric and wind set-up effects of storms. Barometric set-up refers to the increase in coastal water levels associated with the lower atmospheric pressures characteristic of storms. Wind set-up refers to the increase in coastal water levels caused by an onshore wind driving water shorewards and piling it up against the coast |
| TARA | Threat and Risk Assessment |
| TfNSW | Transport for NSW |
| 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 |

| Term | Definition |
|---------|--|
| | 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 (HAT) |
| Tide | The periodic rise and fall of the water of oceans, seas, bays, etc., caused mainly by the gravitational interactions between the Earth, Moon and Sun |
| Wetland | Areas of land that are partly or periodically saturated by water, including marshes, swamps etc |
| WSUD | Water Sensitive Urban Design |

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1 Introduction

1.1 Purpose of this Coastal Management Program

The purpose of this Coastal Management Program (CMP) is to deliver a 10 year (2024-2034) strategy for coordinated, sustainable management of the Kiama coastline and land within the associated coastal zone. This is achieved through a program of integrated management actions that are intended to address key issues, and harness new opportunities, with a focus on the ecological habitats, physical and chemical processes, recreational usage and amenity, and cultural heritage aspects of the coast, which drive the high environmental and community value.

The CMP seeks to achieve the objects of the *Coastal Management Act 2016* (CM Act) by preserving the social, cultural, economic and environmental values of the coast. The CMP considers a range of timeframes (immediate, 20 years, 50 years, 100 years) where appropriate, as required by the CM Act. Longer-term pressures, such as climate change and population growth, have been considered in the formulation of Management Actions, to ensure resilience against future threats and the conservation of the values of the coastline for future generations.

The CMP has been prepared in accordance with mandatory requirements specified in the CM Act, and the accompanying NSW Coastal Management Manual (OEH, 2018a) (the Manual).

1.2 Area Covered by the CMP

The Kiama LGA is located on the south coast of New South Wales, about 130 km south of Sydney. The Kiama coast is characterised by embayed pocket beaches (see Figure 1.1), with the exception of Seven Mile Beach, interspersed with prominent rocky headlands and cliffs formed of Permian age sedimentary and volcanic rocks (see Figure 1.2). At a regional scale, the coastline faces southeast and experiences a high energy wave climate. Locally, Kiama's beaches are compartmentalised, with steep shoreface slopes meaning that little sediment transfer is likely between adjacent beach systems. Tall cliffs and wide rocky shore platforms are a typical feature of Kiama's rocky sections of coast.



Figure 1.1 Bombo, Surf and Kendalls Beaches and Kiama Boat Harbour



Figure 1.2 Kiama coast from Kaleula Head to Black Head

This CMP only applies to part of the coastal zone, as defined in Figure 1.3. The CMP applies to coastal waters only to the extent of the Kiama LGA boundary, which is ostensibly immediately adjacent to the shoreline (beaches and rocky headlands). The CMP Study Area includes open beaches, foreshores and headlands along the 34 km stretch of coastline within the Kiama LGA from Minnamurra / Mystics Beach (bordering Shellharbour LGA) to 2km south of Black Head (bordering Shoalhaven LGA). The CMP Study Area extends inland over the foreshore to the landward extent of the mapped coastline Coastal Management Areas (CMAs), specifically the Coastal Use Area (CUA) (refer Section 1.3 for further details).

Although the coastal zone, as defined by the CMAs, extends offshore approximately 6km (3 nautical miles), no Management Actions are proposed outside the Kiama LGA boundary. To avoid misrepresentation, the CMP Study Area excludes the coastal waters within the CMA beyond the Kiama LGA boundary.

Crooked River, Minnamurra River, Werri Lagoon, Spring Creek and Munna Munnora Creek are also excluded from the Kiama CMP, along with their associated CMAs (including proximity areas to Coastal Wetlands and Littoral Rainforests). These locations already have CZMP or will have separate CMP(s) to manage these elements. Thus, to avoid duplication and potential overlap of CMP, these estuarine areas (and associated CMAs) have been excluded from the Kiama Coastline CMP. The exception to this is the estuary entrances, which are included in this Kiama Coastline CMP. The entrances are included to address the coastline hazard of estuary entrance instability (e.g. entrance closure/breakout, entrance migration and shoaling etc), which is controlled by open coastal processes (wave driven transport), catchment processes (rainfall, runoff) and wave run up / overtopping, as relevant.

Management Actions pertaining to managing estuary entrance stability hazards are included within the Kiama Coastline CMP.

The area covered by the CMP primarily focuses on beaches and bays within the Kiama LGA that are in close proximity to settlements, infrastructure and assets. These include:

- Minnamurra Beach,
- Jones / Boyds Beach,
- Bombo Beach,
- Black's Beach / Kiama Harbour,
- Surf Beach,
- Kendall's Beach,
- Easts Beach,
- Werri Beach,
- Gerringong Boat Harbour and
- Seven Mile Beach (covering approximately 2km of the northern-most section).

The CMP Study Area spans both the Kiama Coast and Shoalhaven River coastal sediment compartments (shared with Shellharbour and Shoalhaven LGA's respectively). In developing this CMP, consideration has been given to the broader regional coastal processes, which occur within the primary sediment compartments, such as littoral sand transport processes. The CMP Study Area does not include parts of the coastal sediment compartments beyond the Kiama LGA boundary as Management Actions proposed in the CMP will not impact coastal processes beyond the LGA.

1.3 Coastal Management Areas

The coastal zone is defined under the CM Act as comprising four coastal management areas (CMAs). These CMAs, as defined by the NSW Government in the Resilience and Hazards State Environmental Planning Policy (R&H SEPP), are presented in Figure 1.3 along with the CMP Study Area. The CMAs comprise, in order of priority:

- coastal wetlands and littoral rainforest areas (CWLRA),
- coastal vulnerability areas (CVA),
- coastal environment areas (CEA), and
- coastal use areas (CUA).

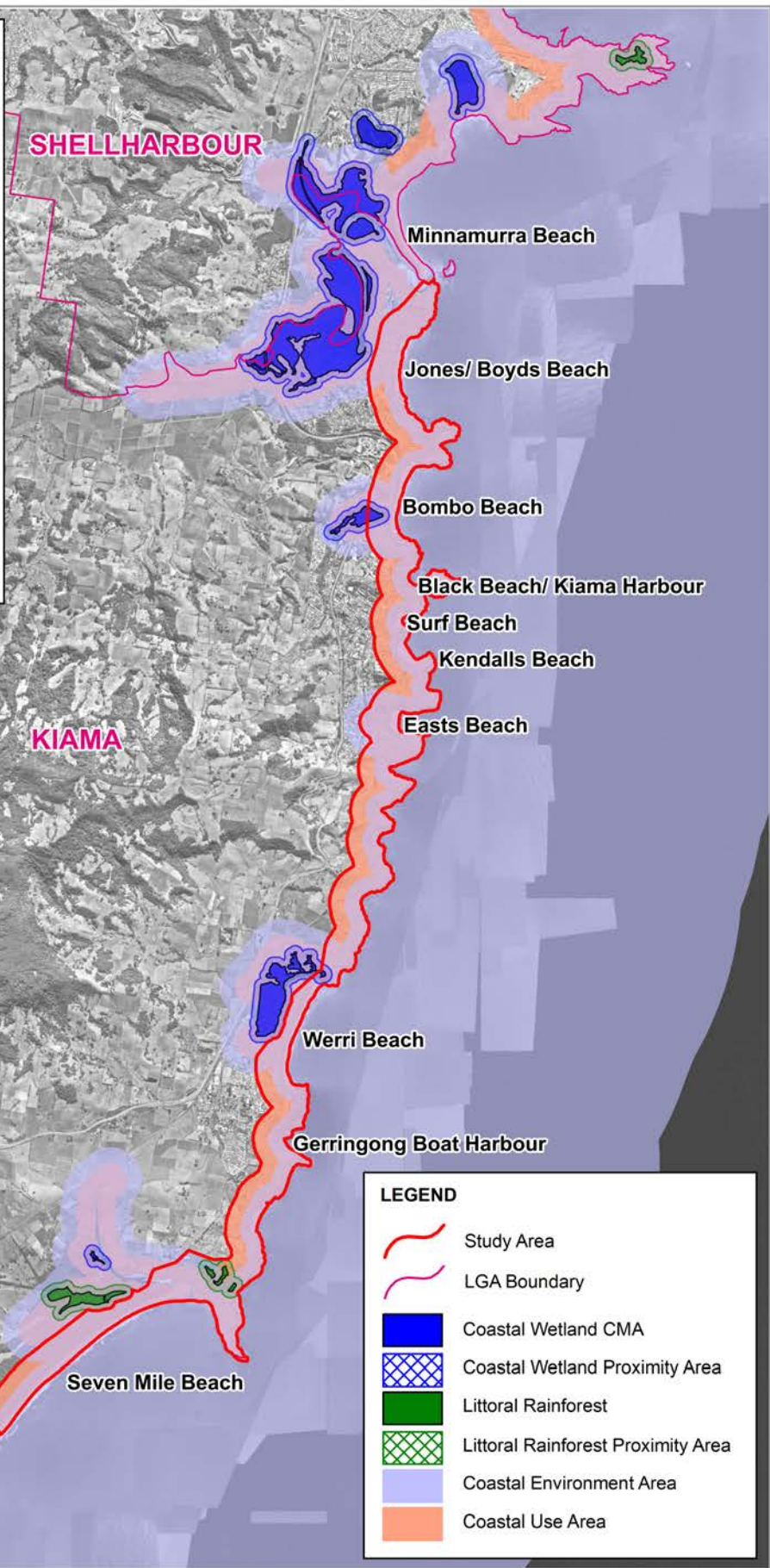
It should be noted that the coastal vulnerability area (CVA) has not yet been mapped for the Kiama CMP study area. Mapping of the CVA will occur following completion and certification of this CMP (through a planning proposal, and in accordance with *the Environmental Planning and Assessment (EP&A) Act 1979* via the Gateway process). Notwithstanding, a draft CVA map is included as part of **Action B** of the CMP.

Crooked River, Minnamurra River, Werri Lagoon, Spring Creek and Munna Munnora Creek are excluded from the Kiama CMP. These locations already have CZMPs or will have separate CMP(s) to manage these elements.

This CMP will provide guidance on parameters for hazards affecting the estuaries e.g. tidal inundation, entrance stability.

The estuary entrances are included in relation to the hazard of estuary entrance instability (e.g. entrance closure/breakout, entrance migration and shoaling etc.), which is controlled by both open coastal processes (wave driven transport) and catchment processes (rainfall runoff); and wave run up/overtopping, as relevant.

Note that, areas/influences outside of the study area will be considered in the context of defining risks within the study area e.g. population growth North and South of Kiama influencing holiday visitation.



LEGEND

- Study Area
- LGA Boundary
- Coastal Wetland CMA
- Coastal Wetland Proximity Area
- Littoral Rainforest
- Littoral Rainforest Proximity Area
- Coastal Environment Area
- Coastal Use Area

| | | |
|--|-------------------------------|--------------------------|
| <p>Title: Kiama Municipal Council CMP Study Area and Coastal Management Areas</p> | <p>Figure: 1-3</p> | <p>Rev: A</p> |
|--|-------------------------------|--------------------------|

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



In accordance with the CM Act, this CMP gives effect to the management objectives for the four coastal management areas that exist within the CMP study area. Each area has different characteristics and objectives and may overlap, and the CM Act provides the definition and objectives for each of the management areas.

Management objectives for the four CMAs, as defined by the CM Act, are reproduced in Table 1.1 to Table 1.4. These objectives of the CMAs covered by this CMP have been given effect in the CMP through the specific alignment between the CMP Objectives and the CMA management objectives, and through the specific alignment of the CMP Management Actions to these objectives. Implementation of the Management Actions across the 10 year timeframe of this CMP will achieve specific Action outcomes, will address the CMP objectives, and thus will help to address the CMA management objectives with regard to the CMAs within the CMP Study Area.

Table 1.1 to Table 1.4 show how the management objectives for the four CMAs are aligned and addressed by the CMP Objectives and Management Actions.

Table 1.1 Coastal Wetlands and Littoral Rainforest Areas Management Objectives

| Coastal Wetlands and Littoral Rainforest Areas (CWLRA) Management Objectives from the CM Act | How this CMP addresses the CWLRA Management Objectives |
|---|--|
| (a) to protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity, | CMP Objective 1 Actions B, O |
| (b) to promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests, | CMP Objective 2 Action K, O |
| (c) to improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration, | CMP Objective 3 Action K, O |
| (d) to support the social and cultural values of coastal wetlands and littoral rainforests, | CMP Objectives 4, 5 and 7 Actions E, J, K, O |
| (e) to promote the objectives of State policies and programs for wetlands or littoral rainforest management | CMP Objective 6 A, O |

Table 1.2 Coastal Vulnerability Areas Management Objectives

| Coastal Vulnerability Areas (CVA) Management Objectives from the CM Act | How this CMP addresses the CVA Management Objectives ¹ |
|--|---|
| (a) to ensure public safety and prevent risks to human life, | CMP Objectives 1, 3, 6 and 7 Actions B, C, E, F, G, H, P |
| (b) to mitigate current and future risk from coastal hazards by taking into account the effects of coastal processes and climate change, | CMP Objectives 1 and 3 Actions B, C, E, G, F, I, P |
| (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, | CMP Objectives 1, 2, 3 and 7 Actions B, C, E and P |
| (d) to maintain public access, amenity and use of beaches and foreshores, | CMP Objective 7 Actions C, D, E, F, G |
| (e) to encourage land use that reduces exposure to risks from coastal hazards, including through siting, design, construction and operational decisions, | CMP Objectives 1 and 3 Actions B, H, I |
| (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 | CMP Objectives 1, 3 and 7 Actions B, C, E, F, G, K, P |

| Coastal Vulnerability Areas (CVA) Management Objectives from the CM Act | How this CMP addresses the CVA Management Objectives ¹ |
|---|---|
| (ii) if that is not sufficient, by taking other action to reduce exposure to those coastal hazards, | |
| (g) if taking that other action to reduce exposure to coastal hazards— (i) to avoid significant degradation of biological diversity and ecosystem integrity, and (ii) to avoid significant degradation of or disruption to ecological, biophysical, geological and geomorphological coastal processes, and (iii) to avoid significant degradation of or disruption to beach and foreshore amenity and social and cultural values, and (iv) to avoid adverse impacts on adjoining land, resources or assets, and (v) to provide for the restoration of a beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by actions to reduce exposure to coastal hazards, | CMP Objectives 1, 2, 3, 4 and 7 Actions B, C, E, F, P |
| (h) to prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency, | CMP Objective 3, 6 and 7 Actions C, F, G |
| (i) to improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses. | CMP Objectives 1 and 3 Actions B, C, E, F |

1. It is recognised that the CVA within the CMP Study Area has not yet been included within the SEPP. Nonetheless, the management objectives of the CVA as defined by the CM Act are still addressed by the CMP as noted in this table.

Table 1.3 Coastal Environment Areas Management Objectives

| Coastal Environment Areas (CEA) Management Objectives from the CM Act | How this CMP addresses the CEA Management Objectives |
|---|--|
| (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, | CMP Objectives 1 and 2 Actions B, K, O, P |
| (b) to reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change, | CMP Objective 3 Actions B, E, F, J, K, P, O, Q |
| (c) to maintain and improve water quality and estuary health, | CMP Objective 4 Actions F, Q |
| (d) to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons, | CMP Objectives 5 and 7 Actions C, D, E, G, I, J, L, M, P, Q |
| (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, | CMP Objectives 2 and 3 Actions C, E, F, K, P |
| (f) to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms. | CMP Objective 7 Actions D, E, G, I, N |

Table 1.4 Coastal Use Areas Management Objectives

| Coastal Use Areas (CUA) Management Objectives from the CM Act | How this CMP addresses the CUA Management Objectives |
|--|--|
| (a) to protect and enhance the scenic, social and cultural values of the coast by ensuring that— (i) the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and (ii) adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and (iii) urban design, including water sensitive urban design, is supported and incorporated into development activities, and (iv) adequate public open space is provided, including for recreational activities and associated infrastructure, and (v) the use of the surf zone is considered, | CMP Objectives 1 and 5 Actions B, D, M |
| (b) to accommodate both urbanised and natural stretches of coastline. | CMP Objectives 1, 2 and 7 Actions B, E |

Chapter 2 of the *State Environmental Planning Policy (Resilience and Hazards) 2021* (R&H SEPP) provides development controls for each of the management areas, along with state-wide mapping of the areas, with the exception of CVA. Mapping of CWLRA, CEA and CUA for the Kiama coastline is shown in Figure 1.3.

1.4 Vision, Values and Objectives for this CMP

Vision for the CMP

The Vision statement was developed, agreed and presented in the Stage 1 report (BMT 2020):

Kiama’s colourful, diverse, beautiful and iconic coastline is managed in a manner consistent with the principles of ecologically sustainable development to ensure that its biodiversity, cultural heritage, scenic landforms and natural beauty are preserved and enhanced for current and future generations. The Kiama coastline maintains its small, connected communities feel and remains easily accessible and freely available for all users.

Values for the CMP

As outlined in the Stage 1 Report, the key values for the Kiama coastline that should be protected and preserved through this CMP are:

Value 1: Biodiversity, habitat and ecosystem integrity

Specifically, Value 1 recognises:

- Preserved natural environment, wildlife habitat and environmentally significant areas
- Variety of natural areas and habitats i.e. wetlands, dunes, beach and river systems
- Coastal dune systems with natural vegetation for biodiversity and natural defences
- Diversity of vegetation communities on the coastal plain and escarpment
- Presence and health of flora and fauna including birds, fish, mammals, other animals and plants.

Value 2: Scenic landforms, natural beauty and geodiversity

Specifically, Value 2 recognises:

- Diverse range of landforms and interesting coastal geology i.e. escarpment, floodplain and coastline
- Special geological formations i.e. fossils and volcanic remnants
- Unique, beautiful and scenic landscapes
- Spectacular scenery, natural beauty, scenic values and aesthetics.

Value 3: Clean waters

Specifically, Value 3 recognises:

- Clean waters with high water quality
- Supporting mangrove and floodplain health as well as recreational activities and amenity
- Pollution is controlled ensuring cleanliness of beaches and waterways.

Value 4: Easy and equitable access

Specifically, Value 4 recognises the:

- Ease of public access to public areas, reserves and coastal walk (on private lands)
- Fair and equitable usage of the beaches and public spaces to support recreation, participation, social interaction and sense of community responsibility for the coast
- Provision of access for various uses i.e. off-leash dog areas, fishing access etc.

Value 5: Small connected communities

Specifically, Value 5 recognises:

- Strong community identity and sense of community
- Well-connected communities via coastal activities and shared values.

Value 6: Heritage and culture

Specifically, Value 6 recognises:

- Tangible and intangible Aboriginal cultural heritage
- The presence of historical sites – colonial and settlement heritage.

Value 7: Ample recreation opportunities and facilities

Specifically, Value 7 recognises:

- The abundance of recreational opportunities on the foreshore and in the water (i.e. swimming, surfing, sand play, running, cycling, picnicking, bird / whale watching, kayaking, boating, fishing and nature appreciation etc.)
- Adequate facilities to support recreational values i.e. toilets, walkways, parking etc.
- Social interactions through coastal activities i.e. surfing groups, nippers etc.

Value 8: Tourism industry

Specifically, Value 8 recognises the:

- Strong tourism industry that provides opportunities and income to the local economy
- Sustainability of the tourism that is balanced with capacity e.g. not over-crowded or over-commercialised
- Opportunities provided by Kiama Harbour.

Value 9: Sustainable economic growth and development

Specifically, Value 9 recognises:

- Sustainable economic growth and development but not overly commercialised or over-developed
- Sustainable empathetic development to maintain connected villages character and feel
- Reasonable planning outcomes to “Keep Kiama Kiama”.

Objectives for the CMP

Specific objectives and associated outcomes for the Kiama CMP have been defined based on the values of the coastline and the highest priority issues and threats to those values. These specific objectives, which are consistent with the objects of the CM Act, guide the identification and evaluation of potential management options to address the issues and threats most pertinent to the Kiama coastline.

Connections between the CMP Objectives and the Values of the Kiama Coastline are presented in Table 1.5, while correlation between the CMP Objectives and the CM Act Objects is provided in Table 1.6. Also shown in Table 1.6 are the Relevant CMP Management Actions (as detailed further in Section 5 of this CMP) that give effect to the CM Act Objects.

CMP Objective 1: Future Development

Objective Outcome sought: Planning and development decisions made by Council and other authorities recognise the constraints imposed by natural coastal processes, as well as community and environmental values within the coastal zone. Moreover, future development is planned to accommodate future coastal processes, including the natural response to climate change, and sea level rise in particular, without introducing new user conflicts and land use inconsistencies.

CMP Objective 2: Ecosystem Health

Objective Outcome sought: Natural habitats and ecosystems within coastal lands and waters along the Kiama coastline are rehabilitated, maintained and protected, where necessary, to restore and preserve environmental values of the coastline and to support the community values that are connected to an appreciation of the quality and condition of the natural environment.

CMP Objective 3: Hazards and Climate Resilience

Objective Outcome sought: Supported by a thorough understanding of local and regional scale coastal processes and an appreciation of the projected impacts of climate change, and sea level rise in particular, natural and built assets within the Kiama coastal areas are planned, designed, modified and managed to cater for existing and future coastal hazards and climate extremes.

CMP Objective 4: Water Quality

Objective Outcome sought: Pollutant loads from urban and rural sources within Kiama coastal areas will be reduced to enable the water quality within coastal waters to sustain a healthy and productive marine ecosystem, which enhances broader environmental and community values.

CMP Objective 5: Culture

Objective Outcome sought: The significant cultural heritage of the Kiama coastline, and specifically, the spiritual, social, customary and economic connection with, and use of, the coastal land and waters by the Wodi Wodi and D’harawal peoples is celebrated and preserved for future generations.

CMP Objective 6: Governance and Compliance

Objective Outcome sought: Management and control of uses and activities within Kiama coastal areas, including delivery and implementation of this CMP, is championed and led by a forum that brings together all relevant stakeholders, including community and user groups, enabling co-ordinated and co-operative planning and decision-making regarding local policies and management activities, as required under relevant legislation including the *Coastal Management Act 2016*.

CMP Objective 7: Community Use and Conflicts

Objective Outcome sought: Coastal amenity is enjoyed by all, conflicts between users are limited and detrimental impacts on environmental and community values are avoided through rationalising and encouraging more appropriate and ecologically sensitive access along the coast, and the sustainable use of precious coastal resources and facilities.

Table 1.5 Relationship between Values and Objectives for this CMP

| CMP Objectives | Values | | | | | | | | |
|-----------------------------------|---|---|--------------|---------------------------|-----------------------------|----------------------|---|------------------|---|
| | Biodiversity, habitat and ecosystem integrity | Scenic landforms, natural beauty and geodiversity | Clean waters | Easy and equitable access | Small connected communities | Heritage and culture | Ample recreation opportunities and facilities | Tourism industry | Sustainable economic growth and development |
| 1: Future Development | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |
| 2: Ecosystem Health | ✓ | ✓ | ✓ | | | ✓ | | ✓ | ✓ |
| 3: Hazards and Climate Resilience | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| 4: Water Quality | ✓ | | ✓ | | | ✓ | | | ✓ |
| 5: Culture | ✓ | ✓ | | | | ✓ | | | ✓ |
| 6: Governance and Compliance | | | ✓ | ✓ | | ✓ | | | ✓ |
| 7: Community Use and Conflicts | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Table 1.6 Matrix showing correlation between the objects of the CM Act, the CMP objectives and the CMP Management Actions that give effect to the objects of the CM Act

| CMP Objectives CM Act Objects | 1. Future Development | 2. Ecosystem Health | 3. Hazards and Climate Resilience | 4. Water Quality | 5. Culture | 6. Governance and Compliance | 7. Community Use and Conflicts | Relevant CMP Management Actions that give effect to the CM Act Objects (refer Sections 5 and 6 for details) |
|---|-----------------------|---------------------|-----------------------------------|------------------|------------|------------------------------|--------------------------------|--|
| (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 | ✓ | ✓ | ✓ | ✓ | | ✓ | | B, D, K, L, O |
| (b) to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety, and | | | | | ✓ | | ✓ | C, D, E, F, I |
| (c) to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone, and | | ✓ | | | ✓ | | ✓ | J, M |
| (d) to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies, and | | | | | | | ✓ | B, C, E, F, I, J, N |
| (e) to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making, and | ✓ | | ✓ | | | | ✓ | B, I |
| (f) to mitigate current and future risks from coastal hazards, taking into account the effects of climate change, and | ✓ | | ✓ | | | | | B, C, E, F, G, H, I, P |
| (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 | ✓ | | ✓ | | | | | B, C, E, F, P, G |
| (h) to promote integrated and co-ordinated coastal planning, management and reporting, and | | | | | | ✓ | | A, B, F |
| (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 | ✓ | | ✓ | | | | ✓ | C, F |
| (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 | | | | | | ✓ | | A |

| CMP Objectives | 1. Future Development | 2. Ecosystem Health | 3. Hazards and Climate Resilience | 4. Water Quality | 5. Culture | 6. Governance and Compliance | 7. Community Use and Conflicts | Relevant CMP Management Actions that give effect to the CM Act Objects (refer Sections 5 and 6 for details) |
|--|-----------------------|---------------------|-----------------------------------|------------------|------------|------------------------------|--------------------------------|---|
| CM Act Objects | | | | | | | | |
| (k) to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions, and | ✓ | | | | | ✓ | ✓ | A, J, K, L, P |
| (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 | ✓ | | ✓ | | | | ✓ | B, D, K |
| (m) to support the objects of the <i>Marine Estate Management Act 2014</i> . | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | All Actions in this CMP |

1.5 The NSW Coastal Management Framework

The Framework

To plan for development, protect environmental assets and manage coastal hazards across the state, the NSW Government has implemented the *NSW Coastal Management Framework*¹, which includes legislation and planning policy, and aims to provide an integrated framework for coastal management across the state.

Key components of the framework include:

- *Coastal Management Act 2016 (CM Act)*: An act that provides for the integrated management of the coastal environment of New South Wales, consistent with the principles of ecologically sustainable development, for the social, cultural and economic wellbeing of the people of the state.
- *Resilience and Hazards State Environmental Planning Policy 2018 (R&H SEPP)*: One of the key environmental planning instruments for land use planning in the coastal zone. Chapter 2 of the R&H SEPP gives effect to the objectives of the CM Act and delivers the statutory management objectives of the act by specifying how development proposals are to be assessed if they fall within the coastal zone.
- *Coastal Management Programs (CMPs)*: A five stage coastal management process intended to set the long-term strategy for the coordinated management of the coastal zone for a given region.

¹ <https://www.environment.nsw.gov.au/topics/water/coasts/coastal-management/framework>

- NSW Coastal Management Manual (The Manual): A manual that sets forth mandatory requirements and provides guidance to coastal councils in connection with the preparation, development, adoption, implementation, amendment, and review of CMPs.
- NSW Coastal Council: Responsible for providing independent advice to the Minister on coastal issues.
- NSW Coastal and Estuary Grants Program: Provides technical and financial support to local government to help manage the coastal zone.

A schematic of the NSW Coastal Management Framework is provided in Figure 1.4.

Coastal Management Program

A Coastal Management Program (CMP) sets the long-term strategy for the coordinated management of the coastal zone of a given area. It should focus on achieving coastal management objectives at a local level, whilst also achieving the broader objects of the CM Act.

A CMP provides an opportunity for councils, public authorities, and local communities to clearly identify and balance competing interests and priorities in the coastal zone. Under the Coastal Management Framework, Council may (or must do so if directed by the Minister) prepare a CMP, or a series of CMPs, for its coastline and coastal estuaries.

A CMP is prepared through a five-stage risk management process as described in the NSW Coastal Management Manual (refer Figure 1.5). The Manual defines mandatory requirements for CMPs, and provides guidance regarding their preparation, development, adoption, implementation, and review.

Stage 1 of the Kiama Coastline CMP was completed in 2020 (BMT, 2020). The Stage 1 report reviewed relevant background information, undertook a first pass risk assessment, and provided a data gap analysis. This allowed Council to understand where their organisation is currently, where they need to be, and how to make informed and confident decisions during development and implementation of the CMP. In essence, the Stage 1 report was a 'scoping study' defining a path for progressing to further stages of the CMP and covered the strategic context for coastal management, the vision and objectives of the CMP, the areas to be covered (geographic extent and coastal management areas), the priority issues to be addressed, knowledge and information gaps requiring attention, the communities and stakeholders to be involved, governance, and the roles and responsibilities of stakeholders of the CMP.

Stage 2 of the Kiama Coastline CMP (BMT, 2021) built on the Stage 1 report to undertake detailed studies to help Council to identify, analyse and evaluate risks, vulnerabilities and opportunities affecting the environmental, social, and economic assets and values of the coastline. Specifically, the scope of Stage 2 included an assessment of physical coastal processes, and the development of sediment transport conceptual model/s, a probabilistic assessment of beach erosion and shoreline recession (inc. both underlying and sea level rise (SLR) induced recession), an assessment of tidal and coastal inundation for the study area, and at the timeframes required by the manual (i.e. current, 20, 50 and 100 years), a first-pass assessment of cliff and slope instability, and a detailed risk assessment, bringing together the results of the coastal hazard mapping and conceptual models from previous sections, and identifying key "areas of interest (Aoi)" for each risk in the study area that should be targeted for management.

NSW Coastal Management Framework

Environmental Planning & Assessment Act 1979 (EP&A Act)

Is the principal legislation regulating land use in NSW, which provides for environmental planning instruments, which establish development controls.

The EP&A Act also provides for the determination of development applications, and includes enforcements and compliance powers in respect of unauthorized development.

Coastal Management Act 2016 (CM Act)

Sets the State framework and objects for managing the NSW coastal zone, which is now defined as comprising four coastal management areas (CMAs).

Establishes the NSW Coastal Council, to provide independent advice to the Minister.

Sets the minimum requirement for preparing and implementing a Coastal Management Program (CMP).

Marine Estate Management Act 2017 (MEM Act)

Brings a closer link between marine estate and coastal management.

The marine estate is defined to include all features of the coastal zone (including estuaries).

An object of the CM Act is to support the objectives of the MEM Act.

Section 9.1 Directions (Coastal Management)

Applies to planning authorities preparing Planning Proposals under section 9.1 of the EP&A Act.

Planning Proposals can be amended in conjunction with preparation and implementation of CMPs.

Proposed land use changes must be consistent with the CM Act and R&H SEPP.

State Environmental Planning Policy (Resilience and Hazards) 2021 (R&H SEPP)

Chapter 2 of the R&H SEPP covers coastal management. It identifies and maps the coastal zone, comprised of the following four CMAs: Coastal Wetlands and Littoral Rainforest Area (CWLRA), Coastal Vulnerability Area (CVA); Coastal Environment Area (CEA); and Coastal Use Area (CUA).

Sets development controls for each four CMAs, as defined by the CM Act.

Marine Estate Management Strategy (2018)

Details how the Marine Estate Management Authority (MEMA) will achieve its vision for the NSW marine estate over the next 10 years.

The Strategy is underpinned by an evidence based statewide NSW marine estate Threat And Risk Assessment (TARA) completed by MEMA.

Coastal Management Programs

Set the long-term strategy for coordinated management of the coast, with focus on achieving the objects of the CM Act. CMPs are prepared by local councils in consultation with their communities and relevant public authorities. CMPs are implemented by councils through their Integrated Planning and Reporting (IP&R) framework.

NSW Coastal Management Manual 2018 (the Manual)

Provides guidance to local councils on preparing CMPs.

Part A outlines the mandatory requirements in the CM Act, and the essential elements councils are required to follow in preparing a CMP.

Part B describes the process for completing each of the five stages of a CMP in detail.

Coastal and Estuary Grants Program

Provides finance and technical support to the local governments assisting in management of the coastal zone.

Assistance provided for both: coastal and estuary planning; and implementing works (identified within a certified CMP)

Figure 1.4 NSW Coastal Management Framework

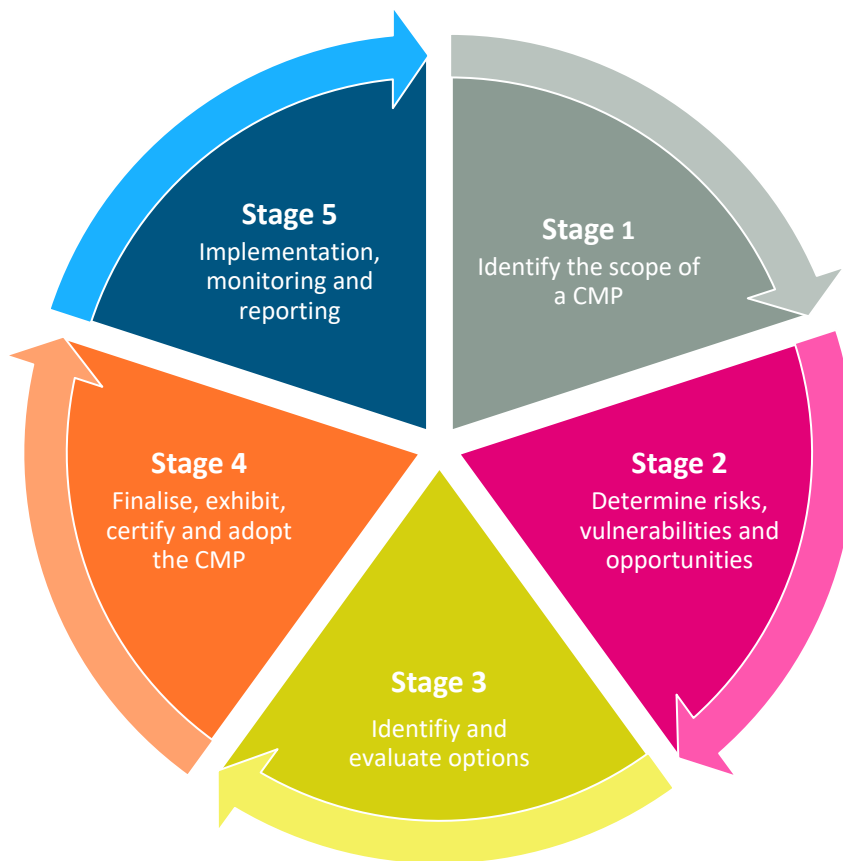


Figure 1.5 The Five Stage Process of the NSW Coastal Management Program

Stage 3 of the Kiama Coastline CMP (BMT, 2023) confirmed the values and objectives to be adopted in the CMP, and then identified, objectively and defensibly assessed, and finally prioritised potential management options to address the objectives of the CMP. Management options were drawn from a selection of planning and development controls, physical works, such as amenities, facilities etc, environmental rehabilitation and protection works, education and awareness programs, and monitoring programs, data collection and assessments. The outcomes of Stage 3 were guided through consultation with relevant stakeholders and the community.

This report, **Stage 4**, provides all necessary information on the Management Actions for the Kiama Coastline to enable certification of the CMP under the CM Act, therein achieving the Objects of the CM Act.

As outlined in the Manual (OEH, 2018a), Stage 4 covers:

- Preparation and exhibition of the draft CMP;
- Submission report on the draft CMP;
- Confirmation of public authority commitments;
- Certification by the Minister; and
- Gazettal of the CMP.

This Stage 4 CMP document is accompanied by letters of support from agencies and relevant stakeholders that have responsibility for implementation of one or more CMP actions, and / or will provide a significant support role to others during implementation of CMP actions.

Stage 5 of the CMP involves implementation of the actions by nominated agencies and relevant stakeholders of the CMP, along with monitoring and evaluation of the effectiveness of the CMP and will extend from 2024 to 2034.

1.6 Management Context

Governance Context

The current governance of the coastline is multi-layered, with the foreshores and waters of the study area (and associated assets) owned and managed by a number of stakeholders across multiple levels of government. A key objective of the CMP is to facilitate the integration of management responsibilities across the study area, including Council, land managers and public authorities (*CM Act, Division 3, s23*).

Local Government

Kiama Municipal Council (Council) in partnership with local communities and other public authorities has a central role in managing the coastline and adjacent coastal lands within the CMP study area. Council responsibilities generally relate to strategic planning and management of land and built assets across the LGA, including the coastal zone.

Council is responsible for preparation of CMPs that set out the long-term strategy for management of the coastal zone in its LGA, including both the open coastline and major estuaries.

Section 355 of the *Local Government Act 1993* makes provision for some Council functions to be exercised by a committee. Subsequently, Council has established a number of committees, with many involving community members. Historically, Council's Floodplain and Coastal Committee provided strategic advice to Council in relation to coastal management. While this Committee is no longer operational, this CMP proposes to establish a Coastal Management Program Operational Working Group that would provide a similar advisory and governance role and provide advice and feedback to Council representing broad stakeholder interest in the LGA's coastal zone. The Operational Working Group would also provide ongoing sharing of information and ideas and facilitate local stakeholder oversight of coastal projects. As outlined in **Action A** of this CMP, the Operational Working Group is intended to comprise Council representatives, Aboriginal-led stakeholder groups/organisations, other stakeholder groups, and representatives of state government agencies, including Sydney Water and Transport for NSW.

State Government

There are many state government agencies with management roles and responsibilities across the study area that are relevant to the CMP. Some of these agencies have a land and asset management role, whilst others are issues based. A summary of the roles and responsibilities of the most relevant state government departments and agencies is provided below.

Department of Climate Change, Energy, the Environment and Water (DCCEEW): Formed on 1 January 2024 and replacing parts of the former Department of Planning and Environment (DPE), DCCEEW contains many of the CMP stakeholder organisations, and their responsibilities across the study area relate to land and asset management, issues management, and nature conservation.

DCCEEW – Biodiversity Conservation Science Group (BCSG): Within DCCEEW, the Biodiversity Conservation Science Group (BCSG) has absorbed the responsibilities of the former DPE Environment, Energy and Science Group and the former Office of Environment and Heritage (OEH). DCCEEW

(BCSG) is responsible for administering the CM Act and provides oversight of the State's coastal management program. DCCEEW (BCSG) provides oversight in the development of each council's CMPs and provides data and technical advice as needed. It also administers the Coastal and Estuary Grants Program that provides funding for councils to prepare and implement their CMPs.

Department of Planning, Housing and Infrastructure (DPHI): Also formed on 1 January 2024 and replacing parts of the former DPE, DPHI covers a number of stakeholders of the CMP including planning and Crown land management.

DPHI - Crown Lands (Crown Lands): is responsible for the administration and / or management of Crown land under the *Crown Land Management Act 2016* (CLM Act). The bed of waterways within the study area including the ocean and estuary entrances, and many tracts of land along the foreshore are publicly owned Crown Land. Crown land includes the seabed to three nautical miles from the coastline of NSW. Under the CLM Act, DPHI – Crown Lands can designate authorised care and control of Crown Land to a Crown Land Manager. Much of the Crown Land foreshore areas within the Kiama LGA are designated to Council as the Land Manager for management and maintenance.

Department of Primary Industries - Fisheries (DPI-Fisheries): is responsible for administering the *Fisheries Management Act 1994* and ensures decisions made about land management and development avoids and minimises impacts on fisheries resources. Its responsibilities also include the licensing of recreational fishers, enforcement of bag limits, and permits for commercial fishing activities. It is responsible for threatened species conservation and marine vegetation protection (including mangroves, saltmarsh, and seagrass) across the study area.

Fisheries also administer the *Marine Estate Management Act 2014* in coordination with the NSW Marine Estate Management Authority (MEMA).

The Marine Estate Management Authority (MEMA): advises the NSW government on the management of the NSW marine estate, and coordinates policies and programs for maintaining and improving the marine environment. The Authority brings together the heads of the NSW government agencies with key marine estate responsibilities – including DCCEEW (BCSG), DPHI (PlanningBCSG), DPI-Fisheries, and TfNSW.

The Department of Primary Industries – Agriculture (DPI-Agriculture): is responsible for increasing the productivity and resilience of the agricultural sector in NSW. It does this through agricultural productivity research across livestock, plants and natural resource management areas, as well as providing education and training.

South East Local Land Services (LLS): was established under the *Local Land Services Act 2013* to provide agricultural production advice, biosecurity, natural resource management and emergency management functions cross the South East region. The LLS engages in regional and sub-catchment NRM planning, training, and education for the community in areas such as farm management practices, as well as environmental monitoring of horticultural practices. LLS also delivers grant and funding programs to support natural resource management and sustainable agriculture activities. The LLS region extends from Wollongong to the Victorian border.

National Parks and Wildlife Service (NPWS): is part of DCCEEW and is responsible for managing national parks and reserves (covering more than 7.5 million hectares of land in NSW). Management of these areas involves a wide range of responsibilities, including plant and animal conservation, fire management, sustainable tourism and visitation, research, education and volunteering programs. Seven Mile Beach National Park is located at the southern end of CMP Study Area. NPWS must be consulted prior to any works proposed on NPWS estate.

Transport for NSW (TfNSW): sets the strategic direction for transport and works in partnership with government transport operating agencies and private service providers to deliver improved transport outcomes for the community and economy of NSW.

TfNSW is the state's maritime safety regulator for commercial and recreational vessels and their operators. TfNSW's role is to promote safe, responsible, and sustainable use of waterways, including but not limited to the enforcement of safe on-water vessel practices, the administration of recreational vessel licenses and vessel registrations, and provision of guidance for safe navigation. TfNSW is also responsible for the direct delivery of maritime infrastructure projects as well as investment in many others across the state. Other responsibilities include property administration, policy development, strategic planning and infrastructure management related to commercial and recreational boating – including some of the boat ramps and public jetties, wharves, and pontoons across the study area (noting that most boat ramps are generally owned and managed by councils).

TfNSW has established a range of programs to improve the coordination and delivery of coastal and boating infrastructure programs and projects across NSW that support recreational boating, fishing, tourism and a range of other commercial activities (delivered through the Maritime Infrastructure Delivery Office (MIDO)). These TNSW programs Boating Now Program, DCCEE's Coastal Infrastructure Program, Rescuing our Waterways dredging program and a number of major projects including the Kiama Boat Harbour Revitalisation Plan.

Community Organisations

There are a number of community or non-governmental organisations (NGOs) that operate across the study area. Organisations that have a direct interest in the Kiama coastline include:

Aboriginal-led Organisations: these include Local Aboriginal Land Councils (LALC) and Native Title Services Incorporations (NTSCorps). LALCs act as representatives of Aboriginal People and have a degree of governance and interface with Local Government, as well as the various State and Federal Government bodies. The objects of each LALC are to "*improve, protect and foster the best interests of all Aboriginal persons within the Council's area and other persons who are members of the Council*". LALCs operate to acquire and manage land, promote/protect culture and heritage and facilitate business enterprise. LALCs have a right to be informed in the planning, protection and preservation of cultural sites and areas under the *NSW Aboriginal Land Rights Act 1983* on land within their boundaries.

Illawarra LALC (ILALC): The ILALC represent Aboriginal People of the Illawarra and Southern Highlands, stretching from the Royal National Park, north of Wollongong to Black Head at Gerroa (covering the vast majority of the Kiama coastline study area). The ILALC are actively involved in environmental management along the Illawarra coastline, including Kiama, through programs such as the ILALC Green Team.

Jerrinja LALC (JLALC): The JLALC represent Aboriginal people along the NSW coast from Black Head at Gerroa to Lake Conjola, including areas surrounding Jervis Bay. Within the Study Area, the JLALC area covers Seven Mile Beach, Crooked River, Gerroa and some parts close to Gerringong.

Illawarra Landcare: is an incorporated not for profit community organisation acting as the umbrella group for volunteers across the Wollongong, Shellharbour and Kiama LGAs. It assists members and the general public with their natural resource management activities, and pursues funding assistance for projects, practical assistance, and education and training across the study area. There are at least eight Landcare groups along the Kiama coastline, including Seven Mile, Werri, Little Blow Hole, Bombo Headland, Bombo, Bombo Outlook, Jones Beach and Kaleula Headland.

Statutory Context

The legislation and policy governing management of the study area is complex and includes acts and policies from all levels of government. A brief overview of the most relevant acts is provided herein for context, however more information can be found in the Kiama CMP Stage 1 report (BMT, 2020).

Coastal Management Act 2016

The CM Act establishes the framework and sets forth the objectives for coastal management in New South Wales. The purpose of the CM Act is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales.

The CM Act lists a series of management objects that must be considered when developing a CMP (refer to Part 3 of the Act). There are also objectives provided for each of the four coastal management areas.

The objects in the CM Act have been considered and promoted in preparing this CMP in the following ways:

- The Vision and Objectives of this CMP are based on, and consistent with, the objectives set forth in the CM Act.
- Stage 1 of the Kiama CMP (BMT, 2020) has considered the State and regional policies and plans prescribed by the Act;
- Stage 2 of the Kiama CMP (BMT, 2021) has assessed in detail the various coastal zone issues, and hazards outlined in the CM Act.
- Stage 3 of the Kiama CMP (BMT, 2023) has involved high level consultation with the community and relevant stakeholders in order to develop a series of management actions intended to address these issues and risks in an integrated and strategic manner. In doing so, the suite of actions:
 - Promotes the objects of the Act; and
 - Gives effect to the management objectives for the coastal management areas covered by the program.
- Stage 4 of the CMP (this document) has been developed consistent with the statutory requirements of the Act, and the mandatory requirements set out in NSW Coastal Management Manual.

State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 2 of the State Environmental Planning Policy (Resilience and Hazards) 2021 (R&H SEPP), which came into effect on 1 March 2022, incorporates the coastal management provisions that were previously contained in the State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP). The R&H SEPP updates and consolidates into one integrated policy a series of previously enforced SEPPs, including: SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5 of the Standard Instrument – Principal Local Environmental Plan.

Chapter 2 of the R&H SEPP streamlines coastal development assessment requirements, identifies development controls for consent authorities to apply to each coastal management area to achieve the objectives of the CM Act, and establishes the approval pathway for coastal protection works.

State-wide mapping that accompanies the R&H SEPP is available for the Coastal Wetlands and Littoral Rainforest Area (CWLRA), the Coastal Environment Area (CEA), and the Coastal Use Area (CUA). The mapping of Coastal Vulnerability Areas (CVAs) is typically undertaken as part of CMP development, based on either existing coastal hazard mapping, or mapping developed during Stage 2 of the CMP.

This Kiama Coastline CMP proposed adoption of a CVA based on coastal risk areas identified during the CMP Stage 2 (BMT, 2021), as documented in **Action B**, and presented in Figure 2.1.

Crown Lands Management Act 2016

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

Marine Estate Management Act 2014

The *Marine Estate Management Act 2014* (MEM Act) forms part of the NSW Marine Estate Management Framework. The framework comprises statutory instruments, strategies, assessment, plans and policy settings, and is administered under the auspices of the Marine Estate Management Authority (MEMA).

The objective of the MEM Act is to provide for strategic and integrated management of the NSW marine estate, including the marine waters, coasts and estuaries. The key legislative instruments under the act include:

- Marine Estate Management Regulation 2017;
- Marine Estate Management (Management Rules) Regulation 1999; and,
- Aquatic Reserves Notification 2015.

It should be noted that one of the objectives of the CM Act (and of the CMP) is to support the objectives of the MEM Act 2014.

NSW Marine Estate Threat and Risk Assessment (2017)

The NSW Marine Estate Threat and Risk Assessment (TARA) (BMT, 2017) is a legislative requirement of the *Marine Estate Management Act 2014*. The TARA directly underpins two key statutory documents – the NSW Marine Estate Management Strategy and the Draft Marine Park Network Management Plan. Section 19 of the MEM Act requires public authorities to have regard to the Marine Estate Management Strategy to the extent that the strategy is relevant to the exercise of their functions.

The TARA has assessed and prioritised the threats to environmental, social, cultural and economic values of the marine estate. It has specifically identified priority threats for the south coast region of NSW, including the coastline and waters within the Study Area of this CMP (noting that the CMP Study Area includes very limited coastal waters that were covered by the TARA). Stage 1 Scoping Study (BMT, 2020) consider the TARA within its methodology and identified relevant coastal management issues potentially affecting the marine estate. The Stage 2 CMP specifically investigated the coastal hazards and built the priority threats into the detailed risk assessment process.

Social, Cultural and Economic Context

Indigenous Heritage

The Wodi Wodi are the First Nations custodians of the Illawarra region, who spoke a variant of the Dharawal language. Dharawal speakers lived and live in the country from Botany Bay to the north, through Campbelltown and Moss Vale to the west, and south to the Shoalhaven River and Jervis Bay. Dharawal people are distinguished as fresh water, bitter water or salt water people, depending on whether they occupied the coastal regions, the swamps or the plateaus and inland river valleys.

The Minnamurra River was harvested for fish and shellfish over millennia, as evidenced by the many middens that line the riverbank, and nearby swamplands were home to range of birds. There are midden sites at Bass Point, Minnamurra River, Minnamurra Point, Gerroa and Gerringong, and quarry sites in Shellharbour, Killalea, Knights Hill and Saddleback. There are also stone arrangements in the Jamberoo Valley and engravings in Foxground. The Bass Point campsites are possibly the oldest dated coastal campsites in NSW, with occupation going back 17,000 years.

European colonisation brought conflict, disease, dispossession of lands, and dramatic environmental changes to the landscape, resulting in the displacement of First Nations communities and loss of traditional homelands. Despite great adversity, First Nations people survived and adapted, and have kept their connection to the land through the maintenance of customs and stories and responsibility for country.

Population and Demographic

The estimated resident population of the Kiama Municipal Council Area (LGA) in 2018 was 23,006. This represents an increase of 3,073 people (15.4%) from the 2008 total. This growth rate is equivalent to that experienced by NSW over this period (15.0%), whereas the Illawarra had a marginally smaller growth rate (11.8%) (REMPLAN, 2019b).

Kiama LGA has an aged population, with a median age of 46, compared to the NSW median of 39 years old (KMC, 2017a). It has been estimated that over the next few years to 2031:

- Kiama's age profile will be skewed towards older residents (65+);
- the number of working age residents aged between 15 and 64 will increase by approximately 25% above 2014 levels,
- the population aged under 15 will increase by one-third (SGS Economics and Planning, 2014).

The Illawarra Shoalhaven Regional Plan (DPIE, 2021) states that Kiama is expected to accommodate an additional 3,997 people by 2041, with Bombo Quarry identified as an emerging growth area to accommodate future demand rather than housing expansion in other non-urban areas. Kiama Municipal Council has committed to developing a Local Housing Strategy and the NSW Government will work collaboratively with Council so it can respond to changing housing needs in line with the community's vision (DPIE, 2021).

Economic Context

As per the Illawarra-Shoalhaven Regional Plan, Kiama is a Regional Centre, which is "a major town centre which services the local area and surrounding suburbs, providing a range of business, retail and entertainment uses, including supermarkets, health and other services. They include some higher density residential development."

Kiama's economic profile has transformed from the diary and quarrying industries to a more diverse economic base, where tourism is a major contributor (SGS Economics and Planning, 2014). The highest employment industry type in Kiama is accommodation and food services (i.e. supporting tourism), followed by construction, health care and social assistance, retail trade and education and

training. Compared to NSW, the accommodation and food services and construction industries have a far greater representation in Kiama than other industry types, which are broadly on par with State averages. Arts and recreation is another industry which notably exceeded the state average.

There is a wide range of economic and commercial values provided by the Kiama coastline and the study area, these broadly include:

- The Kiama coastline is a vibrant holiday and tourist destination on the NSW coast, providing both employment and bringing economic stimulation to the region;
- Catchment areas have extensive agricultural areas supporting productive farmlands and dairy industries;
- Commercial recreational providers and fisherman use the coastline to support their industries; and
- Sand mining is undertaken in the region that provides a significant resource.

Projected Land Use

The most recent update to the Illawarra-Shoalhaven Regional Plan (DPIE, 2021) has introduced an emerging urban growth area at Bombo Quarry. The Bombo Quarry land is a 114-hectare regionally significant site long recognised for its potential reuse for employment and residential needs. The Quarry has supplied hard-rock resources to the Illawarra and Sydney construction markets since the 1940s, providing rail ballast, aggregate and road-based products. As the quarry nears the end of its operational life, it could potentially be transformed with new housing, workplaces or recreational areas.

The site is seen as a once-in-a-generation opportunity to attract sustainable and diverse employment opportunities and supply a greater choice of housing in an area where supply is limited. The quarry site will require a shared vision for its future that incorporates community aspirations, builds on the area's strengths and adds to its vibrancy. Relevant to this CMP, the site is close to the coastline, although not within the proposed CVA (refer Figure 2.1 and **Action B**). Future addenda to the CVA following more detailed cliff instability assessments may potentially cover some areas of the Bombo Quarry land. An increase in local population through development of the Bombo Quarry site would potentially add pressure to the coastal environment through higher user demand.

Future growth and land use considerations as outlined in the Illawarra Shoalhaven Region Plan (DPIE, 2021) are shown in Figure 1.6.



Figure 1.6 Regional Plan for the Illawarra – Shoalhaven Region (Source: DPIE, 2021)

2 Whether the CMP identifies recommended changes to the relevant planning controls, including any proposed maps

2.1 Planning Control Changes

This CMP seeks to define a CVA for the open coastline of Kiama LGA based on the detailed information presented as part of Stage 2 (proposed in **Action B**) via a formal planning proposal. Stage 2 of the CMP did not define risk-based mapping of coastal hazards due to cliff instability. Therefore, future updates of the CVA should be considered to include cliff instability risks once these are better defined (refer **Action H**).

As agreed with DCCEEW-BCSG and Council, the proposed CVA covers coastal lands potentially affected by 1% exceedance of coastal erosion by 2120, or 5% exceedance of tidal inundation by 2120, or 5% exceedance of coastal inundation by 2120. These represent the upper limits for erosion and inundation estimates in approximately 100 years (considered to be a reasonable planning horizon) that were determined in the Stage 2 CMP (BMT, 2021).

Strategy 11.6 of the Illawarra-Shoalhaven Regional Plan (DPIE, 2021) calls to align local plans with any certified Coastal Zone Management Plan or certified Coastal Management Program, while Strategy 12.2 of the Regional Plan aims to reduce the region's exposure to natural coastal hazards by considering coastal hazards including consideration of climate change, and ensuring areas identified for development are consistent with limitations and agreed long-term management strategies in the CMP.

Updates to existing Local Environment Plan (LEP) and supporting local policies are required to incorporate:

- the outcomes of CMP Stage 2 hazards mapping and risk assessment, including the first-pass cliff instability assessment;
- areas important for habitat protection/conservation, including areas to be earmarked / preserved to accommodate future habitat migration in response to climate change and sea level rise in particular (to be further updated once estuary-based CMPs are developed for the Kiama LGA);
- a Coastal Hazards DCP to capture the provisions of the CVA following submission of a planning proposal, and other recommended requirements within the CMP;
- best-practice coastal design guidelines for development and infrastructure; and
- regional plans and strategies that have been developed, or are underway, by all relevant stakeholders, including for example the Kiama Growth Planning Project and Illawarra Regional Masterplan by Sydney Water.

To accompany the updated LEP and new Coastal Hazards DCP, this CMP also proposes to update the pre-lodgement Development Action checklist to incorporate key elements of the Coastal Hazards DCP and the updated LEP. This checklist would be utilised for all coastal infrastructure development proposed within the identified coastal risk area to ensure that future development considers coastal hazards, including climate change projections and future sea level rise scenarios, in a consistent manner. The updated checklist should be used for both Part 4 and Part 5 assessments under the *Environmental Planning and Assessment (EP&A) Act 1979*, including Council-proposed development.

2.2 Maps

The CMP Study Area is defined in Figure 1.3, along with relevant and currently mapped Coastal Management Areas (CMAs). Figure 2.1 show details of the proposed CVA.

Key features of these maps include:

- Coastal Wetlands and Littoral Rainforest Areas (CWLRA), covering coastal wetlands at Spring Creek, to the south of Bombo Beach, and at Werri Lagoon at Gerringong, as well as littoral rainforest areas to the north of Gerroa and the west of Seven Mile Beach. Minnamurra River estuary also contains extensive coastal wetlands, but these are just outside of the Kiama Coastline CMP Study Area. **No changes are proposed to the CWLRA at this stage.**
- Coastal Vulnerability Area (CVA) is proposed as part of this CMP (refer **Action B**). Draft mapping is presented in Figure 2.1.
- Coastal Environment Area (CEA), comprising lands within approximately 250m of the open coast and within approximately 500m of high tide limits within estuaries. **No changes are proposed to the CEA at this stage.**
- Coastal Use Areas (CUA), comprising lands within approximately 500m of the open coast and within approximately 250m of high tide limits within estuaries. **No changes are proposed to the CUA at this stage.**
- CMAs (including proximity areas) within and around the estuarine waterways of Crooked River, Minnamurra River, Werri Lagoon, Spring Creek and Munna Munnora Creek are excluded from the Kiama CMP, except for the estuary entrances given that open coastal processes impact these entrance areas directly. It is anticipated that Council will prepare other CMPs in the future that will cover these estuaries, with respective study area boundaries neatly abutting the study area for this CMP (i.e. no overlapping of areas).

Maps relevant to each Management Action of this CMP are presented in **Annex B**, which provides a detailed description of each Management Action. Note, not all Management Actions have a specific geographic footprint and instead relate to the whole of the CMP Study Area (e.g. **Action A** – establishing a CMP Operational Working Group).



Note:

- Proposed CVA represents the most landward of
 - 5% exceedance of coastal inundation at 2120; or
 - 1% exceedance of beach erosion at 2120; as determined in Stage 2 of the CMP.
- Proposed seaward CVA boundary is the Kiama LGA boundary

Title:

Proposed Coastal Vulnerability Area (CVA) for Kiama coastline (Map 1 of 6)

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

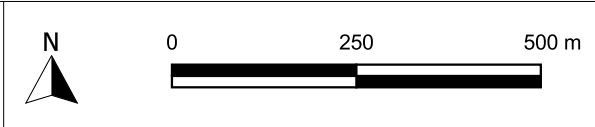


Figure: **2.1a** Rev: **A**





LEGEND

- Proposed CVA Area
- Cadastral Boundaries

Note:

1. Proposed CVA represents the most landward of
 - i) 5% exceedance of coastal inundation at 2120; or
 - ii) 1% exceedance of beach erosion at 2120; as determined in Stage 2 of the CMP.
2. Proposed seaward CVA boundary is the Kiama LGA boundary

Title:
Proposed Coastal Vulnerability Area (CVA) for Kiama coastline (Map 2 of 6)

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



Figure:
2.1b

Rev:
A





LEGEND

- Proposed CVA Area
- Cadastral Boundaries

Note:

1. Proposed CVA represents the most landward of
 - i) 5% exceedance of coastal inundation at 2120; or
 - ii) 1% exceedance of beach erosion at 2120; as determined in Stage 2 of the CMP.
2. Proposed seaward CVA boundary is the Kiama LGA boundary

Title:

Proposed Coastal Vulnerability Area (CVA) for Kiama coastline (Map 3 of 6)

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

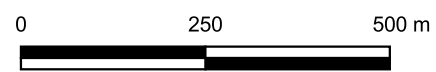


Figure: **2.1c** Rev: **A**





LEGEND

- Proposed CVA Area
- Cadastral Boundaries

Note:

1. Proposed CVA represents the most landward of
 - i) 5% exceedance of coastal inundation at 2120; or
 - ii) 1% exceedance of beach erosion at 2120; as determined in Stage 2 of the CMP.
2. Proposed seaward CVA boundary is the Kiama LGA boundary

Title:

Proposed Coastal Vulnerability Area (CVA) for Kiama coastline (Map 4 of 6)

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

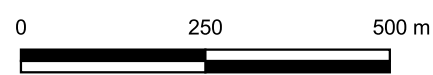


Figure: **2.1d** Rev: **A**





Note:

- Proposed CVA represents the most landward of
 i) 5% exceedance of coastal inundation at 2120; or
 ii) 1% exceedance of beach erosion at 2120;
 as determined in Stage 2 of the CMP.
- Proposed seaward CVA boundary is the Kiama LGA
 boundary

Title:
**Proposed Coastal Vulnerability Area (CVA) for Kiama
 coastline (Map 5 of 6)**

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



Figure:
2.1e

Rev:
A





LEGEND

Proposed CVA Area

Cadastral Boundaries

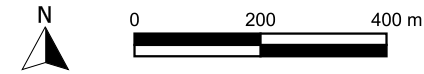
Note:

1. Proposed CVA represents the most landward of
 - i) 5% exceedance of coastal inundation at 2120; or
 - ii) 1% exceedance of beach erosion at 2120; as determined in Stage 2 of the CMP.
2. Proposed seaward CVA boundary is the Kiama LGA boundary

Title: **Proposed Coastal Vulnerability Area (CVA) for Kiama coastline (Map 6 of 6)**

Drawing: **2.1f** Rev: **A**

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



Filepath: I:\N21130.i.ajs_Kiama\QGIS\Stage_4\N21130_001_Proposed CVA for Kiama coastline_Atlas.qgz

3 A Snapshot of Issues

3.1 Coastal Hazards and Identification of Issues

The important social, cultural, economic and environmental values of the Kiama Coastline are outlined in Section 1.4, and cover: Biodiversity, habitat and ecosystem integrity; Scenic landforms, natural beauty and geodiversity; Clean waters; Easy and equitable access; Small connected communities; Heritage and culture; Ample recreation opportunities and facilities; Tourism industry; and Sustainable economic growth and development. These values are potentially under threat by a range of coastal hazards and other factors creating future management issues for the coastline, both under present day conditions, and also in the future as the coast responds to the influence of climate change, and sea level rise in particular.

The CM Act recognises seven coastal hazards within the NSW coastal zone, comprising:

- 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.

With respect to the Kiama coastline, the relevant coastal hazards as listed above include: Beach erosion; Shoreline recession; Coastal and Tidal Inundation; Entrance Instability; and Coastal cliff and slope instability.

Key threats and management issues potentially threatening the values of the Kiama coastline for the present day and in the future were identified, synthesised and documented during the Stage 1 CMP Scoping Study (BMT, 2020). These were further refined in consultation with relevant stakeholders and the community, and through additional fieldwork, as documented in the Stage 2 CMP report (BMT, 2021). The final list of threats and management issues include relevant coastal hazards as well as several other 'non-hazard' factors discussed further below.

3.2 Summary of Threats and Issues

Issues and specific threats to the values of the Kiama coastline are listed in Table 3.1, along with their first pass risk level as determined during CMP Stage 1. Many of these threats are consistent with the priority environmental and social/economic threats identified at a state-wide level through the NSW Marine Estate Threat and Risk Assessment (TARA) (BMT, 2017). While all threats and issues were considered in the Stage 1 Scoping Study (BMT, 2020), not all were taken forward for further assessment as they were not considered to be a priority for the 10-year CMP. All future reviews and updates to the CMP should re-consider and re-assess the full list of issues and threats to coastal values, as well as identifying any new issues or threats if they emerge in time.

Table 3.1 Issues and Threats to Kiama Coastal Values and Associated Risk Levels

| Issue | Threat | Current Risk | Future Risk (indicatively 2120) | NSW Marine Estate TARA priority threat |
|--|--|---------------|---------------------------------|--|
| Inappropriate or Excessive Development | Over Development | High | High | |
| | Poorly Sited or Inappropriate Development | Medium | High | yes |
| Disturbance of Biodiversity and Habitat | Invasive Species, Pests and Feral Animals | High | High | yes |
| | Illegal Dune Vegetation Removal | Med-High | Med-High | yes |
| | Recreational Activities | Medium | High | yes |
| | Overfishing | Medium | High | yes |
| Coastal Hazards and Sea Level Rise | Beach Erosion | High | High | |
| | Shoreline Recession | High | High | |
| | Coastal Inundation | High | High | |
| | Wave Overtopping | Medium | High | |
| | Tidal Inundation | Low | Medium | |
| | Coastal Lake or Watercourse Entrance Instability | Low | Medium | yes |
| | Coastal Cliff Instability | Medium | Medium | |
| | Dune Slope Instability | Medium | High | |
| Poor Quality Catchment Runoff | Stormwater Runoff | Medium | High | yes |
| | Agricultural Runoff | Medium | Medium | yes |
| | Sewage Effluent and Septic Runoff | Low | Medium | yes |
| Degradation of Heritage and Culture | Aboriginal Culture Not Preserved | Medium | High | |
| | Community Not Valuing Culture and Heritage | Low | Medium | |
| Lack of Engagement, Governance and Compliance | Lack of Community Awareness and Engagement | Medium | Medium | yes |
| | Lack of Compliance | Medium | High | yes |
| | Insufficient Governance and Management | Medium | High | |
| Overuse by Recreation and Tourism | Overuse and Overcrowding | Medium | High | yes |
| | Anti-Social Behaviour | Low | Medium | yes |
| Conflict Over Resource Use and Access Availability | User Group Conflicts | Low | Medium | |
| | Commercial Activities Causing Overcrowding | Low | Medium | yes |
| | Poorly Maintained Facilities and Access | Low | Medium | |
| | Insufficient Facilities and Access | Medium | High | yes |

3.3 Risks Assessment Summary

The CMP Stage 2 report (BMT, 2021) details an extensive risk assessment for assets along the Kiama coastline that are potentially impacted by coastal hazard risks. Risks, ranging from Low to Extreme, were considered for four timeframes: current (2020); +20 years (2040); +50 years (2070); and +100 years (2120). The risk assessment follows an ISO consistent framework, as specified in the CMP Guidelines (OEH, 2018a), and accords with current international best practice.

A full listing of the risk assessment for coastal erosion risks, coastal inundation risks and tidal inundation risks is presented in **Annex C**. A summarised version of the risk assessment, showing only the high and extreme risks between 2020 and 2120, is presented below covering Coastal Erosion Risks (Table 3.2), Coastal Inundation Risks (Table 3.3) and Tidal Inundation Risks (Table 3.4).

Table 3.2 High to Extreme Coastal Erosion Risks, 2020 - 2120

| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
|------------|--------------------------------|---|--------|--------|---------|---------|
| Minnamurra | Council Managed Crown Land | Minnamurra Beach and Dunes (including beach accessways) (Council managed Crown lands) | Medium | Medium | High | High |
| Jones | Council Land | Jones Beach and Beach Reserve (including beach accessways, picnic facilities) (Council owned and managed) | Medium | Medium | High | High |
| Jones | Biodiversity Asset | Shrubland/Heathland (LEP 2011), within beach reserve | N/A | N/A | N/A | High |
| Bombo | Council Managed Crown Land | Bombo Beach and Dunes, Black Beach (Council managed crown lands, Crown Land) | High | High | Extreme | Extreme |
| Bombo | Heritage, Council Managed Land | Northern end of beach within the Quarry Heritage LEP 2011 listing | High | High | High | High |
| Bombo | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (50% to 1%) | N/A | High | High | High |
| Bombo | Transport NSW | South Coast Rail Line (Zone SP2) (note, inundation impacts are very minor in area) | N/A | N/A | N/A | High |
| Bombo | Transport NSW | Bombo Train Station (Heritage LEP 2011) and platform (Zone SP2) | N/A | N/A | N/A | High |
| Bombo | Transport NSW | Train Station Carpark (at edge of A1 Princes Highway) (Zone SP2) | N/A | N/A | N/A | High |
| Bombo | Sydney Water | Sewer main and pump station (south of train station, north of Spring Creek) | N/A | N/A | N/A | High |
| Bombo | Sydney Water | Water pipe/main (south of train station, north of Spring Creek) | N/A | N/A | N/A | High |
| Bombo | Sydney Water | Sewer main, maintenance hole (Spring Creek mouth/Black Beach) | N/A | High | High | High |
| Surf | Council Managed Crown Land | Surf Beach | High | High | High | Extreme |
| Surf | Council Managed Crown Land | Kiama SLSC building (Zone RE1) | N/A | Medium | Medium | High |
| Surf | Private Asset | Saint Peter and Paul Catholic Church and Primary School Lands (eastern end of grounds inc some Norfolk Pines, no buildings in erosion zone) (Heritage LEP 2011, Zone R3, private owner) | N/A | N/A | N/A | High |
| Surf | Council Managed Crown Land | Surf Beach Holiday Park (northern most cabin - Council asset) | N/A | N/A | N/A | High |
| Surf | Sydney Water | Sewer main and other assets (pump station) along entire length of back of beach/promenade | N/A | N/A | High | Extreme |
| Kendalls | Council Land, Crown Land | Kendalls Beach (Zone RE1) (including beach access, and any buried structures) | Medium | High | High | High |
| Kendalls | Sydney Water | Sewer main (along back of beach, northern end only). | N/A | N/A | N/A | High |

| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
|------------|------------------------------|--|------|--------|---------|---------|
| Easts | Private Asset | Easts Beach Holiday Park: Beach front cabins | N/A | N/A | N/A | High |
| Easts | Council Managed Crown Land | Easts Beach (Zone RE1), including seawall under beach. Ownership of seawall unknown | High | High | Extreme | Extreme |
| Easts | Sydney Water | Sewer main (along back of northern end of beach / behind seawall, condition of seawall unknown) | N/A | N/A | High | Extreme |
| Werri | Council Land, Crown Land | Werri Beach and Dunes (noting berm to waterline is Crown Land, & area opposite Werri Beach HP) (Zone RE1) | High | High | High | High |
| Werri | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (Northern end 10% to 1% erosion, southern end 50% to 1% erosion) | N/A | N/A | Medium | High |
| Werri | Council Road | Pacific Ave (from S of Werri Beach HP) | High | High | Extreme | Extreme |
| Walkers | Council Land, Crown Land | Walkers Beach (Zone E2) | N/A | Medium | Medium | High |
| Seven Mile | Crown Land | Seven Mile Beach and dunes | N/A | High | High | High |
| Seven Mile | Private Asset | 2 Residences on Burke Pde | N/A | High | High | Extreme |
| Seven Mile | Biodiversity | Natural Grassland (LEP Biodiversity) | N/A | N/A | N/A | High |
| Seven Mile | Biodiversity | Shrubland / Heathland (LEP Biodiversity) | N/A | N/A | High | High |
| Seven Mile | Biodiversity | Eucalypt Forest (LEP Biodiversity) | N/A | N/A | N/A | High |

Table 3.3 High to Extreme Coastal Inundation Risks, 2020 - 2120

| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
|------------|--------------------------------|---|---------|---------|---------|---------|
| Minnamurra | Council Land | Council owned reserve land (zoned RE1) | High | High | High | High |
| Jones | Council Land | Jones Beach and Beach Reserve (including beach accessways, picnic facilities) (Council owned and managed) | Medium | Medium | High | High |
| Jones | Biodiversity Asset | Shrubland/Heathland (LEP 2011), within beach reserve | Medium | Medium | High | High |
| Jones | Council Building | Kiama Downs SLSC building and Amenities Block (95%) | N/A | N/A | N/A | High |
| Jones | Council Road | North Kiama Drive | N/A | N/A | N/A | High |
| Jones | Private Asset | 4 - 6 properties on N Kiama Drive | N/A | N/A | N/A | High |
| Jones | Sydney Water | Sewer pipe (and pump station) | N/A | N/A | N/A | High |
| Bombo | Council Managed Crown Land | Bombo Beach and Dunes (Council managed crown lands, Crown Land) | Medium | Medium | High | Extreme |
| Bombo | Heritage, Council Managed Land | Northern end of beach within the Quarry Heritage LEP 2011 listing | High | High | High | High |
| Bombo | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (50% to 1%) | Medium | Medium | High | High |
| Bombo | Transport NSW | South Coast Rail Line (Zone SP2) (note, inundation impacts are very minor in area) | High | High | High | High |
| Bombo | Transport NSW | South Coast Rail Bridge/Culvert over Spring Creek (Zone SP2) | Extreme | Extreme | Extreme | Extreme |
| Bombo | Council Asset | Stormwater Pit and pipe (at northern creek on beach) | High | High | High | High |

| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
|--------------------|---|---|---------|---------|---------|---------|
| Bombo | Council Asset | Stormwater Pit into Spring Creek | High | High | High | High |
| Bombo | Sydney Water | Sewer main, maintenance hole (Spring Creek mouth/Black Beach) | Extreme | Extreme | Extreme | Extreme |
| Bombo | Sydney Water | Water pipe/main (south of train station, north of Spring Creek) | N/A | N/A | Medium | High |
| Surf | Council Managed Crown Land | Surf Beach | High | High | Extreme | Extreme |
| Surf | Council Managed Crown Land | Kiama SLSC building (Zone RE1) | High | High | High | High |
| Surf | Private Asset | Saint Peter and Paul Catholic Church and Primary School Lands (eastern end of grounds inc some Norfolk Pines, no buildings in erosion zone) (Heritage LEP 2011, Zone R3, private owner) | High | High | High | High |
| Surf | Council Managed Crown Land | Coronation Park (Zone RE1) | High | High | High | High |
| Surf | Private Asset | 4 - 6 Residences on Barney St (Zone R3) | N/A | N/A | High | Extreme |
| Surf | Sydney Water | Sewer main (inc. pump station) and other assets along entire length of back of beach/promenade | Extreme | Extreme | Extreme | Extreme |
| Kendalls | Council Land, Crown Land | Kendalls Beach (Zone RE1) including seawall (and access) | High | High | Extreme | Extreme |
| Kendalls | Council Asset | Kendalls on the Beach Holiday Park (includes cabins, access roads etc) | High | High | Extreme | Extreme |
| Kiama Boat Harbour | Various (see individual assets below) | Kiama Harbour as a whole (ie, considering harbour as a whole, integrated asset, not just its individual parts) | High | High | Extreme | Extreme |
| Kiama Boat Harbour | Crown Lands | Harbour Breakwaters / Robertson Basin (Heritage LEP 2011) (Zone IN4) | High | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Lighthouse/Blowhole access roads | N/A | Medium | Medium | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Helipad | Medium | Medium | High | High |
| Kiama Boat Harbour | Transport NSW | South coast train line/ railway bridge (note. bridge only partially impacted) | N/A | N/A | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Private lease of building | Fish and Chips/Restaurant (part of Robertson Basin Heritage listing) (Zone IN4) | High | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Kiama boat ramp | High | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council | Black Beach, and Black Beach Reserve | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Council Road | Shoalhaven Street | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Council Road | Blowhole Point Access Roads | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Council Road | Terralong Street (Manning St corner) | N/A | N/A | High | Extreme |
| Kiama Boat Harbour | Private Asset | Belle Vue Holiday Accommodation (Zone B2), Kiama Harbourside Apartments, Yves | Medium | High | High | High |

| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
|--------------------|--------------------------------------|---|---------|---------|---------|---------|
| Kiama Boat Harbour | Crown Lands / Council (manages) | Scout Hall | High | High | High | High |
| Kiama Boat Harbour | Council Stormwater Asset | Stormwater pits and pipes (numerous) | High | High | High | High |
| Kiama Boat Harbour | Sydney Water | Sewer pipe (section at back of Black Beach Reserve) | Extreme | Extreme | Extreme | Extreme |
| Kiama Boat Harbour | Sydney Water | Sewer Main (section along northern edge of harbour/promenade) | Extreme | Extreme | Extreme | Extreme |
| Kiama Boat Harbour | Sydney Water | Sewer pipe (section at Terralong/Manning St corner) | N/A | N/A | High | Extreme |
| Kiama Boat Harbour | Sydney Water | Water pipe (section at Terralong/Manning St corner) | N/A | N/A | Medium | High |
| Kiama Boat Harbour | Sydney Water | Water pipe (and sewer?) (section along Blowhole Point Road) | N/A | N/A | N/A | High |
| Kiama Boat Harbour | Crown Lands | Fishermans Shed (N of slipway), Heritage listed | High | High | High | High |
| Kiama Boat Harbour | Council Road | Carpark associated with Basin | High | High | High | High |
| Kiama Boat Harbour | Crown Lands with private leaseholder | Fishermans market | High | High | High | High |
| Easts | Private Asset | Easts Beach Holiday Park (beach front cabins, campsites, recreational facilities, access roads, onsite stormwater, and Munna Munnora Ck) (Zone E3), and 1 lot (north of this) separately privately owned. | Extreme | Extreme | Extreme | Extreme |
| Easts | Council Managed Crown Land | Easts Beach (Zone RE1), including seawall under beach. Ownership of seawall unknown | High | High | Extreme | Extreme |
| Easts | Sydney Water | Sewer main and pump station (along back of beach, northern end only). Behind "seawall" (unsure of its condition). | Extreme | Extreme | Extreme | Extreme |
| Easts | Sydney Water | Water main (centre) servicing HP | High | High | High | High |
| Werri | Council Land, Crown Land | Werri Beach and Dunes (noting berm to waterline is Crown Land, plus area opp Werri Beach HP) (Zone RE1) | High | High | Extreme | Extreme |
| Werri | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (Northern end 10% to 1% erosion, southern end 50% to 1% erosion) | High | High | Extreme | Extreme |
| Werri | Council Road | Pacific Ave (from S of Werri Beach HP) | Extreme | Extreme | Extreme | Extreme |
| Werri | Council Managed Crown Land | Werri Beach Holiday Park (Council cabins etc) | N/A | N/A | N/A | High |
| Walkers | Council Land, Crown Land | Walkers Beach (Zone E2) | Medium | Medium | Medium | High |
| Seven Mile | Council Asset | Walkway bridge over creek | High | High | High | High |
| Seven Mile | Crown Land | Seven Mile Beach and dunes | High | High | High | High |
| Seven Mile | Council Road | Park Rd (and Properties 2 -11 in 2120) | N/A | N/A | Medium | High |
| Seven Mile | Private Asset | 2 Residences on Burke Pde | N/A | High | High | Extreme |
| Seven Mile | Biodiversity | Natural Grassland (LEP Biodiversity) | High | High | High | High |
| Seven Mile | Biodiversity | Shrubland / Heathland (LEP Biodiversity) | High | High | High | High |
| Seven Mile | Biodiversity | Eucalypt Forest (LEP Biodiversity) | N/A | High | High | High |
| Seven Mile | Biodiversity | Floodplain Forest (LEP Biodiversity) | High | High | High | High |

Table 3.4 High to Extreme Tidal Inundation Risks, 2020 - 2120

| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
|--------------------|---|---|--------|--------|------|---------|
| Minnamurra | Council Land | Council owned reserve land (zoned RE1) | High | High | High | High |
| Bombo | Sydney Water | Sewer main, maintenance hole (Spring Creek mouth/Black Beach) | N/A | N/A | N/A | High |
| Surf | Sydney Water | Sewer main, and other assets (pump station?) along entire length of back of beach/promenade | N/A | N/A | N/A | High |
| Kendalls | Sydney Water | Sewer main (along back of beach, northern end only). | N/A | N/A | N/A | High |
| Kiama Boat Harbour | Various (see individual assets below) | Kiama Harbour as a whole (ie, considering harbour as a whole, integrated asset, not just its individual parts) | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands | Harbour Breakwaters / Robertson Basin (Heritage LEP 2011) (Zone IN4) | High | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Ocean Pools (north and south, both Heritage LEP 2011) | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Private lease of building | Fish and Chips/Restaurant (part of Robertson Basin Heritage listing) (Zone IN4) | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Kiama boat ramp | Medium | Medium | High | High |
| Kiama Boat Harbour | Crown Lands / Council | Black Beach, and Black Beach Reserve | Medium | Medium | High | High |
| Kiama Boat Harbour | Crown Lands / Council | Storm Bay Reserve | Medium | Medium | High | High |
| Kiama Boat Harbour | Council Road | Robertson Basin access road (inc. carpark) | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Council Stormwater Asset | Stormwater pits and pipes (numerous) | High | High | High | High |
| Kiama Boat Harbour | Sydney Water | Sewer Main (section along northern edge of harbour/promenade) | N/A | N/A | High | High |
| Kiama Boat Harbour | Crown Lands / Leased | Boat moorings | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Leased | Slipway SE corner Robertsons Basin | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands | Fishermans Shed (N of slipway), Heritage listed | N/A | N/A | N/A | High |
| Kiama Boat Harbour | Crown Lands with private leaseholder | Fishermans market | N/A | N/A | N/A | High |
| Easts | Private Asset | Easts Beach Holiday Park (beach front cabins, campsites, recreational facilities, access roads, onsite stormwater, and Munna Munnora Ck) (Zone E3), and 1 lot (north of this) separately privately owned. | Medium | Medium | High | Extreme |

| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
|------------|------------------------------|---|--------|--------|------|---------|
| Easts | Sydney Water | Sewer main and pump station (along back of beach, northern end only). Behind "seawall" (unsure of its condition). | N/A | N/A | N/A | High |
| Easts | Sydney Water | Water main (centre) servicing CP | N/A | N/A | N/A | High |
| Seven Mile | Council Land | Reserve at 52-45 Burke Pde (only small area subject to inundation) | N/A | N/A | N/A | High |
| Seven Mile | Council Road | Park Rd (Properties 2 -11) | N/A | N/A | High | Extreme |
| Seven Mile | Council Road | Bourke Pde | N/A | N/A | N/A | High |
| Seven Mile | Biodiversity | Eucalypt Forest (LEP Biodiversity) | Medium | Medium | High | High |
| Seven Mile | Biodiversity | Floodplain Forest (LEP Biodiversity) | Medium | Medium | High | High |

3.4 Risk Tolerance

The degree of tolerance for risk helps to prioritise risk management actions to address coastal risks. Risk tolerability can be subjective depending on the interests of relevant stakeholders. In most cases it would be expected that low risks can simply be monitored rather than demanding valuable management resources, while extreme or high risks would require more immediate management attention.

A risk tolerance scale (Table 3.5) has been applied to the coastal hazards along the Kiama Coastline. The risk tolerance scale was selected as part of a Risk Assessment Workshop with relevant stakeholders, held during Stage 2 of the CMP (BMT, 2021). The resulting tolerability of these risks to coastal assets, along with the timeframes over which these risks manifest, has been used to guide development and prioritisation of coastal management actions.

Table 3.5 Risk Tolerance Scale

| Risk Level | Action required | Tolerance |
|-----------------------|--|--------------------|
| Extreme / High | Eliminate or reduce the risk; or Accept the risk provided residual risk level is understood | Intolerable |
| Medium | Reduce the risk; or Accept the risk provided residual risk level is understood | Tolerable |
| Low | Accept the risk | Acceptable |

Extreme and high risks are considered intolerable, and therefore will need management action as a priority, especially if the risks occur currently or within a short-medium term horizon (+20 years). For risks that will not reach high or extreme levels until some point in the medium-long term future, then pro-active measures may be delayed (beyond the term of this initial CMP). It is still important, however, to signal future management intent.

Implementation of future management actions will require designation of a trigger to commence works. This trigger will need to be defined to allow sufficient lead time to plan, design and implement relevant actions without resulting in unacceptable impacts (as per adaptive management philosophy). Notwithstanding, 'no regrets' management actions can be implemented irrespective of timeframe, which would include strategic land use planning and on-going data collection / monitoring.

As outlined in Section 1.4, objectives of the CMP have been developed to target the highest rated risks that potentially compromise the most important values of the Kiama coast. As shown in the risk registers presented as Table 3.2 to Table 3.4, there are many coastal assets that are at High or Extreme Risk at 2020, and thus are considered to be Intolerable Risks that need prioritised action. These assets include, but are not limited to:

- South Coast Rail Line infrastructure
- Sydney Water sewerage infrastructure
- Pacific Avenue roadway at Warri Beach
- Kiama SLSC
- St Peter and Paul Catholic School
- Kendalls on the Beach Holiday Park
- Easts Beach Holiday Park
- North Bombo Beach carpark access road (identified following CMP Stage 2)
- Storm Bay foreshore revetment (identified following CMP Stage 2).

Management Actions targeting the intolerable risks in the short-medium term that are detailed in Table 3.2, Table 3.3 and Table 3.4 are expressly identified in Table 5.2 (refer Section 5 for full details of the identification, assessment and prioritisation of management actions).

4 Stakeholder and Community Engagement

Consultation with Council, other public authorities, stakeholders and the community has been undertaken in accordance with the requirements of the CM Act and the accompanying Guidelines for Community and Stakeholder Engagement in Coastal Management (OEH, 2018b).

A comprehensive engagement strategy was developed to support this CMP. The engagement framework adopted was based on leading practice, including consideration of International Association for Public Participation (IAP2) recommendations and guidance delivered through CoastAdapt (Smith *et al.*, 2016), covering the spectrum of engagement as:

- **Inform** (stakeholders are informed about the project and process)
- **Consult** (engaged and feeding advice and information into the project)
- **Involve** (two-way engagement and joint learning)
- **Collaborate** (two-way engagement; joint learning, decision-making and actions)
- **Empower** (to place final decision-making in the hands of the public).

Details of consultation carried out during the different stages of this CMP are provided below.

4.1 Stage 1 – Scoping Study

Various stakeholder consultation activities were undertaken to capture information for use in this Scoping Study. These activities established the stakeholder engagement process that was carried through the entire CMP. Activities included:

- Regular contact with Council and State Government representatives (now DCCEEW-BCSG);
- A First Pass Risk Assessment Workshop, where activities were conducted to gather feedback from the state agencies and other stakeholders involved in coastal management; and
- Input from the community regarding what they consider to be the key values of the Kiama coastline, what are the priority issues and threats that could put the area at risk and their aspirations for future management of the area. Community input was garnered via three community drop-in sessions and an on-line survey, hosted on Council's website. Posters promoting the CMP and the community drop-in sessions were placed at strategic locations along the coast, including surf clubs (refer Figure 4.1). Information from the community consultation helped to frame the Vision for the Kiama coastline (see Figure 4.2), along with identifying coastal values and the important issues that threaten these values.

Kiama's Coastal Management Program

Kiama Municipal Council has begun developing a Coastal Management Program (CMP) for the Kiama LGA open coast. A CMP is a plan for Council and others to manage the amazing Kiama coastline in a coordinated way. The CMP will undertake a risk assessment and technical assessment of hazards to the open coast areas and provide actions to address identified coastal hazard risks, preserve habitats, maintain or improve recreational amenity and improve overall resilience of the Kiama coast into the future.

The CMP project focuses on the coastline from the Minnamurra River to Seven Mile Beach for about 2km south of Black Head. The CMP will be prepared in accordance with NSW legislation and will take about 2 years to complete.

The 5 stage process for preparing a CMP is:

- *Stage 1 - Scoping Study:* to determine the context, purpose and scope of the CMP.
- *Stage 2 - Determine Risks, Vulnerabilities and Opportunities:* to complete technical studies that provide the necessary information to underpin the actions and decisions that will need to be made in the next stages of the CMP process.
- *Stage 3 - Identify and Evaluate Options:* to evaluate potential coastal management actions, and then select the preferred actions to be implemented in the CMP in consultation with stakeholders and community. The selected actions shall address issues on the Kiama coast and be practical and affordable to Council and the community.
- *Stage 4 - Exhibit, Finalise and Certify the CMP:* to finalise the CMP with community input and obtain certification from the Minister for Environment. The CMP document will summarise outcomes from previous stages and detail how to implement and fund the actions of the CMP.
- *Stage 5 - Implementation, Monitor and Reporting:* to implement actions within the CMP in partnership with the community and stakeholders and monitor the effectiveness and success of implementing the CMP.

GET INVOLVED

We are seeking your involvement in developing the CMP across all 5 stages. We encourage you to get involved, share your ideas, knowledge and passion for the coast, and help us develop a plan that manages our beautiful Kiama coast sustainably and equitably for future generations.

For more information and to register your interest in future CMP events, please go to the following website: <http://www.kiama.nsw.gov.au/environment/our-environment/water/coastal--estuary-management/coastal-estuary-management>



Figure 4.1 Notification requesting community involvement in the CMP



Figure 4.2 Community-derived ideas regarding the Vision for the Kiama CMP

4.2 Stage 2 – Risk Assessment

Consultation with Council staff was undertaken throughout CMP Stage 2, as well as several other key agency representatives including the former DPE (now DCCEEW). An Expert Panel Workshop and a series of Risk Assessment Workshops were conducted with agencies, Council staff, independent research institutions (i.e. University of Wollongong) and other relevant stakeholders. Invitees to the workshops included representatives from multiple organisations as presented in Table 4.1.

Table 4.1 CMP Stage 2 Workshop Participants

| Expert Panel Workshop | Risk Assessment Workshop |
|--|--|
| Kiama Municipal Council | Kiama Municipal Council (multiple departments) |
| DPE- (now DCCEEW-BCSG) coastal experts | DPE () – now DCCEEW (BCSG) |
| University of Wollongong | DPE (Crown Lands) – now DPHI (Crown Lands) |
| BMT Study Team | Transport for NSW |
| | Sydney Water |
| | BMT Study Team |

The Expert Panel Workshop was used to agree on input parameters for erosion and inundation modelling undertaken during Stage 2 of the CMP, and to build confidence and trust in the results and outcomes of the technical assessment underpinning the CMP.

The Risk Assessment Workshops were used to conduct a full-scale risk assessment of assets along the Kiama coast. A level of consequence was assigned to assets and land potentially affected by coastal erosion, coastal inundation and tidal inundation using inputs derived from these workshops, which included:

- A Council workshop involving representatives from various departments of Council including planning, engineering and asset management (including stormwater, roads and buildings), tourism facilities managers (e.g. for the Council-managed holiday parks), parks and recreation, and natural resources, plus DPE- (now DCCEEW-BCSG) and DPE-Crown Lands (now DPFI-Crown Lands).
- A workshop bringing together the various land and assets managers for Kiama Boat Harbour, including various departments within TfNSW, DPE-Crown Lands (now DPFI-Crown Lands), and Council, particularly those involved in the Harbour masterplan that was in preparation at the time.
- A workshop with a representative from TfNSW managing climate change risks to trains within the Sydney Trains network, along with Council and DPE- (now DCCEEW-BCSG) representatives for the CMP project.
- A workshop with a representative from Sydney Water who assists with CMP preparation with regards to Sydney Water’s water and sewerage networks.

4.3 Stage 3 – Options Assessment

Consultation with Council staff, other public authorities, relevant stakeholders, and the general public was undertaken during Stage 3 of the CMP. A summary of the consultation activities conducted during Stage 3 is provided in Table 4.2.

Table 4.2 Stage 3 Consultation Summary

| Stakeholder | Scope of consultation undertaken and outcomes derived |
|--|--|
| KMC, DPE- (now DCCEEW-BCSG) | <p>On-line technical workshop held with KMC and DPE-(now DCCEEW-BCSG) representatives. Discussed and agreed on:</p> <ul style="list-style-type: none"> • Long list of options to be considered • Criteria used in options assessment to down-select options list • Outcomes of first pass assessment of options • Weightings of criteria used in more detailed assessment to help prioritise options • Outcomes of second pass assessment of options <p>Reviewed outcomes from broader engagement and agreed on process for incorporating consultation feedback.</p> <p>Reviewed and provided feedback and suggestions for changes on multiple versions of the draft Stage 3 report prior to exhibition and finalisation.</p> |
| Other agency and stakeholder representatives | <p>Participation in a formal workshop to provide information and receive feedback regarding potential management options, acceptability of options and details regarding implementation responsibilities.</p> <p>Reviewed and provided feedback and suggestions for changes on multiple versions of the draft Stage 3 management actions prior to the Stage 3 Report finalisation.</p> <p>Invitations to provide input to the CMP were extended to other agencies and stakeholder representatives but with no response.</p> |
| Community members | <p>In-person drop-in sessions (18 May 2023 (5-7pm) and 19 May 2023 (9-11am)) attracting 21 participants. The proposed management actions and associated maps were presented and discussed with the community via community consultation during May 2023.</p> <p>Provision of an on-line website, which included a survey to provide feedback. The survey was open between 4 May and 26 May 2023 and attracted 1,453 visits from 346 users.</p> |

| Stakeholder | Scope of consultation undertaken and outcomes derived |
|-------------|--|
| | Feedback from the community included comments and a record of likes/dislikes for each Action (community feedback details provided in Annex E of the CMP Stage 3 report). |

4.4 Stage 4 – CMP

In accordance with Section 16(1) of the CM Act, before adopting a CMP, Council must consult on the draft program with:

(a) the community, and

(b) if the local council’s local government area contains:

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

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

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

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

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

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

An overview of the consultation undertaken as part of Stage 4 of the CMP and the key outcomes from this are presented in Table 4.3.

The study area spans both the Kiama Coast and Shoalhaven River coastal sediment compartments (shared with Shellharbour and Shoalhaven LGAs, respectively). As such, consultation regarding this CMP has also included Shellharbour City Council and Shoalhaven City Council as the CMP proposes the establishment of a CVA (refer **Action B**).

Table 4.3 CMP Stage 4 Consultation

| Stakeholder | Scope of consultation undertaken and outcomes derived |
|---|--|
| KMC, DCCEEW | Initial review of Preliminary Draft Stage 4 document to determine suitability against CMP requirements as defined by DCCEEW’s CMP checklist. Feedback from the review was incorporated into the second iteration of the document that was distributed for broader agency and stakeholder consultation. |
| Public authorities and stakeholders, including: <ul style="list-style-type: none"> KMC DPE- (now DCCEEW-BCSG) Sydney Water | Review of Initial draft Stage 4 document to ensure alignment with agency/stakeholder intent and agreed position on contributions towards the CMP implementation. This included an in-person workshop on 10 October 2023. Feedback from the agency/stakeholder review has been incorporated into the Draft Stage 4 document for distribution to the community as part of public exhibition. |

| Stakeholder | Scope of consultation undertaken and outcomes derived |
|--|--|
| <ul style="list-style-type: none"> • TfNSW • DPE-Crown Lands (now DPHI-Crown Lands) • ILALC • JLALC • DPI-Fisheries • Landcare • NPWS • LLS • ISJO • NSW SES | <p>Letters of support on the CMP by the relevant public authorities are accompanying this CMP.</p> |
| <p>Neighbouring Councils: Shellharbour, Shoalhaven</p> | <p>Shellharbour and Shoalhaven Councils received formal written updates on the progress of the CMP and were provided opportunity to offer feedback. Both councils were also invited to agency stakeholder consultation.</p> |
| <p>General public</p> | <p>The Stage 4 CMP document and draft CZEAS were placed on public exhibition from 23rd November 2023 to 15th January 2024. Three formal submissions were received following the public exhibition and were considered as part of finalising this document.</p> |

5 Selection of Coastal Management Actions

5.1 Identification of Potential Actions

There are many dimensions to potential management of the Kiama coastline that can be targeted through the coastal management framework, while there are also some aspects of natural resource management that are beyond the remit of this process. Development of management actions for the CMP focused on those mechanisms that can actually be delivered through the CMP process. In this regard, emphasis has been given to works and actions that are located within the coastal zone, as defined by the Coastal Management Areas mapped in the R&H SEPP.

The Manual (OEH, 2018a) summaries management actions into the following categories:

- **Alert** – includes coastal management actions that seek to ‘watch and wait’ such as monitoring change and setting thresholds, low regret responses and research to improve knowledge.
- **Avoid future impact** – includes recommending proactive land use planning and encouraging new development only in locations of low-risk.
- **Active intervention** – includes coastal management actions that seek to protect assets or accommodate change in any of the coastal management areas, while maintaining current systems and values.
- **Planning for change** – includes coastal management actions that seek to facilitate habitat migration and transformative changes to natural systems. For built areas, this includes planning to relocate or redevelop assets to consider the dynamic and ambulatory nature of the shoreline. It may be timed to commence as opportunities arise or when thresholds of exposure, impact and risk are exceeded.
- **Emergency response** – includes coastal management actions to address residual risk in emergency situations.

Figure 5.1 presents a conceptual framework for how these approaches respond to either existing or future development.

An initial list of potential management actions applicable to the Kiama coast was compiled through collation and review of the following:

1. Suggested options outlined in the Manual. Options from the Manual relate to the different coastal areas including:
 - a. Coastal Wetlands and Littoral Rainforests Areas
 - b. Coastal Vulnerability Areas
 - c. Coastal Environment Areas
 - d. Coastal Use Areas.
2. Options proposed within existing Coastal Zone Management Plans (CZMPs) and Coastal Management Plans (CMPs) including the certified Lake Illawarra CMP (BMT, 2019).
3. Current and proposed works and activities, and other funding commitments of state agencies and other authorities responsible for land, water and infrastructure management in the NSW South Coast region, as provided through stakeholder engagement.
4. Other suggestions from the CMP Study Team.

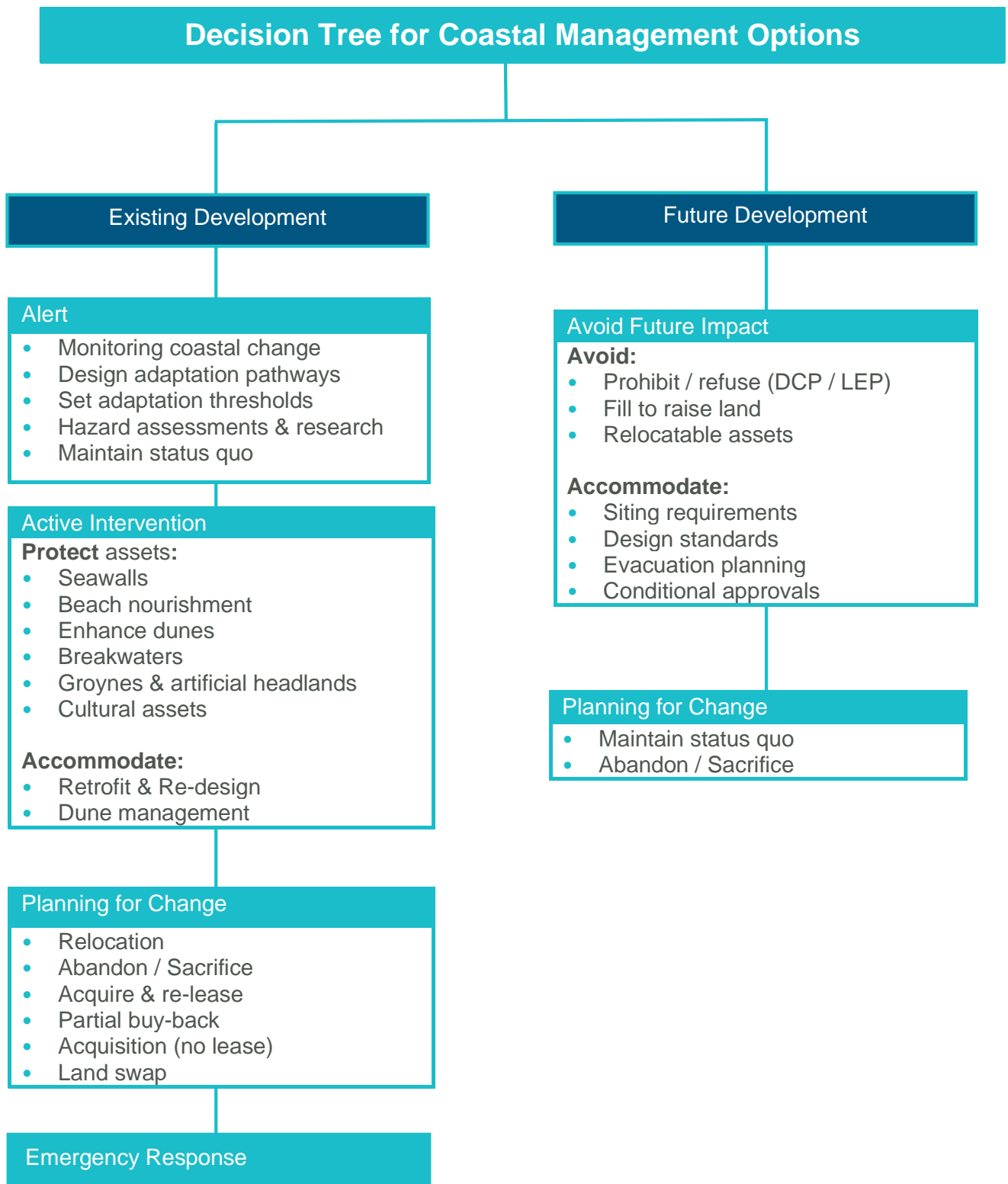


Figure 5.1 Conceptual Framework for Application of Coastal Management Actions

5.2 Evaluation and Refinement of Management Actions

The list of potential management actions for the Kiama coastline, compiled from the sources listed above, was consolidated and refined to provide a more succinct list of action-oriented potential management options.

Initially, the potential actions were evaluated using a detailed multi-criteria assessment (MCA) across a broad range of evaluation criteria, to assess the feasibility, viability and acceptability of the actions as required by the Manual (OEH, 2018a). Scoring of potential management actions was provided by technical representatives from Council and State Government (DCCEEW, formerly DPE).

Refinement of the potential management actions was then undertaken to provide more meaningful and tangible Management Actions. This refinement was achieved through a detailed agency and stakeholder consultation process, as part of Stage 3 of this CMP (BMT, 2023), including a dedicated workshop with agencies and follow up input from agencies. Please see the Stage 3 CMP report (BMT, 2023) for details on the methodology used for refining potential management actions.

Further, and as assisted by the consultation with agencies, the refinement of management actions included developing a more targeted approach to each action, as defined through a series of sequential and/or concurrent tasks for each.

5.3 Prioritisation and Timing of Actions

Given Council's limited funding and resources, a key element of CMP implementation is the prioritisation and rationalisation of management actions. Potential management actions were allocated a relative priority, based on the weighted MCA scoring of the initial potential management options upon which the preferred actions are based. In some circumstances, priority was further refined based on information provided by agencies and stakeholders during the Stage 3 CMP consultation process.

Priority of the management actions were largely based on the following MCA score scale:

- Very High Priority – MCA score > 3.75
- High Priority – MCA score between 3.5 and 3.75
- Medium Priority – MCA score < 3.5

Timing for implementation has been defined to align with Council's Delivery Program (DP) under the NSW Integrated Planning and Reporting (IP&R) Framework covering:

- Short term – complete within 3 years
- Medium term – complete within 6 years
- Long term – complete within 10 years.

All actions within this CMP are to be implemented and completed within a 10-year window. It is expected that at the end of the 10-year period, the CMP will be reviewed and new actions will be identified and/or existing actions will be selected to be continued, in order to maintain pro-active management of the Kiama coastline.

It should also be acknowledged that some of the actions may be able to be fast-tracked to provide “quick, easy wins” throughout the process, particularly those that require minimal cost or effort to implement. Therefore, agencies and stakeholders responsible for implementation should remain vigilant for opportunities to implement these actions as they may arise.

5.4 Summary of Management Actions

The CMP has four main themes that relate to the different approaches in implementation:

- Land use control and management;
- Infrastructure and asset planning and management;
- Environment, social and cultural; and
- Operational delivery.

A summary of the agreed management actions, including specific tasks for each action, along with priorities, timeframes and associated CMP Objectives being addressed, is presented in Table 5.1, separated into these four implementation themes.

Table 5.1 Summary of Management Actions

| Action Name and Associated Tasks | Priority | Timeframe for completion | CMP Objectives met ⁽¹⁾ |
|--|-----------|--|-----------------------------------|
| Preliminaries | | | |
| <p>A. Establish a Coastal Management Program (CMP) Operational Working Group (OWG) for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP.</p> <p>Task A.1 – Engage with agencies and stakeholders to gauge interest and establish scope of OWG.</p> <p>Task A.2 – Prepare Terms of Reference (ToR) for the OWG</p> <p>Task A.3 – Formally establish the OWG in accordance with the agreed ToR.</p> | Very High | Short term (within 3 years) Target: Year 1, with continuity to Year 10 | 6 |
| Land use control and management | | | |
| <p>B. Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach for future development to adequately manage existing and future coastal risks.</p> <p>Task B.1 – Prepare and submit a Planning Proposal to State Government for mapping the Coastal Vulnerability Area (CVA).</p> <p>Task B.2 – Undertake a thorough review of the LEP and supporting documents for consistency with the Coastal Management Program (CMP) and CVA.</p> <p>Task B.3 – Review options and propose changes to the LEP and other land use planning controls, including a new Coastal Hazards DCP.</p> <p>Task B.4 – Make recommended changes to the LEP and prepare the new DCP following appropriate legislated process, including public consultation.</p> <p>Task B.5 – Update pre-lodgement Development Application (DA) checklist to include key elements of the Coastal Hazards DCP, the updated LEP and the R&H SEPP.</p> <p>Task B.6 – Utilise the use of the pre-lodgement checklist for all coastal infrastructure development proposed within a coastal risk area (being assessed through both Parts 4 and 5 of the <i>Environment Planning & Assessment Act 1979</i>).</p> | Very High | Short term (within 3 years) Target: Years 1 to 3 with continuity to Year 10 | 1, 3, 7 |
| <p>C. Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA).</p> <p>Task C.1 – Consult with relevant landholders and provide them with information resources regarding existing and future coastal hazards, including the CZEAS, and implications for CVA declaration on land use and future development.</p> <p>Task C.2 – Incentivise and support relevant landholders and lessees of public land in hazard-affected coastal areas to engage with local emergency services including the NSW State Emergency Service (SES), and prepare an appropriate emergency plan that takes into account response to coastal hazards, such as severe storm surge inundation.</p> <p>Task C.3 – Amend Council’s Public Land Management Policy to incorporate a requirement for an appropriate emergency plan into future leasing agreements of public coastal land at risk of coastal hazards.</p> | High | Medium term (within 6 years) Target: Years 2 to 6 | 3, 7 |

| Action Name and Associated Tasks | Priority | Timeframe for completion | CMP Objectives met ⁽¹⁾ |
|--|----------|--|-----------------------------------|
| <p>D. Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area (LGA) coastline.</p> <p>Task D.1 – Consult with private landholders along the coast where new public access is sought.</p> <p>Task D.2 – Identify and prioritise coastal fringe land to be acquired or easements established (depending on suitability).</p> <p>Task D.3 – Prepare and implement a Coastal Land Public Access strategy, guided by Council’s Acquisition and Disposal of Land and Easements Policy.</p> <p>Task D.4 – Incorporate provisions within the proposed Coastal Hazards Development Control Plan (DCP) or other relevant local plans requiring dedication of priority coastal fringe lands for public access if associated lots are developed in the future (e.g. subdivision of land).</p> | Medium | Short term (within 3 years) Target: Years 2 to 3 | 1, 3 |
| Infrastructure and asset planning and management | | | |
| <p>E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values.</p> <p>Task E.1 – Assess the condition of all existing access tracks and other community facilities and amenities on coastal lands.</p> <p>Task E.2 – Review existing Council policies and asset plans, and consult with Council’s Infrastructure and Liveability Advisory Committee, to identify priority works for improving coastal access tracks, amenities and facilities.</p> <p>Task E.3 – Undertake on-ground works to improve coastal access tracks, amenities and facilities.</p> | High | Long term (within 10 years) Target: Year 1, with continuity to Year 10 | 1, 2, 3, 4, 6, 7 |
| <p>F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks.</p> <p>Task F.1 – Guided by the Stage 2 CMP risk assessment, conduct a detailed evaluation of each asset identified as being at risk of coastal hazards.</p> <p>Task F.2 – Modify existing asset management plans and/or develop new plans, where required, to address coastal hazards and risks.</p> <p>Task F.3 – Condition of existing coastal infrastructure and built assets to be monitored by owners/managers.</p> | Medium | Short term (within 3 years) Target: Years 1 to 3 with continuity to Year 10 | 3, 6, 7 |
| <p>G. Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Werri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.</p> <p>Task G.1 – Prepare REF and obtain approval for ‘interim’ coastal protection works (CPWs).</p> <p>Task G.2 – If agreed triggers and thresholds are reached, construct interim coastal protection works (CPWs) without delay at required location(s).</p> <p>Task G.3 – Triggered by the construction of interim coastal protection works (CPWs) at one or more locations (refer Task G.2), undertake site-specific investigations (survey, geotechnical etc), prepare detailed designs, prepare REF and obtain approval of permanent CPWs</p> <p>Task G.4 – Construct permanent coastal protection works (CPWs) at one or more locations to replace interim CPWs established at the same location(s)</p> | Medium | Long term (within 10 years) Target: Year 1 and as-required to Year 10 | 1, 3, 7 |
| <p>H. Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline.</p> <p>Task H.1 – Undertake additional site specific geotechnical investigations.</p> <p>Task H.2 – Monitor cliff and slope instability at key locations identified within the Stage 2 report.</p> <p>Task H.3 – Undertake a research study into the geodiversity of the Kiama coastline to support future conservation and management of key geological features.</p> | High | Medium term (within 6 years) Target: continuous for Years 1 to 10, with specific works during Years 4 to 10 | 3, 6 |

| Action Name and Associated Tasks | Priority | Timeframe for completion | CMP Objectives met ⁽¹⁾ |
|---|-----------|---|-----------------------------------|
| Task H.4 - Update mapping the R&H SEPP and/or LEP to incorporate cliff instability hazard based on results of relevant geotechnical studies, including studies done by agencies. | | | |
| <p>I. Ensure that infrastructure development and future management of Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable.</p> <p>Task I.1 – TfNSW and Council to work collaboratively in delivering specific actions within the Kiama Harbour Revitalisation Plan that are aligned with the objectives and time frame of this CMP subject to approved funding and environmental planning approvals.</p> | Medium | <p>Long term (within 10 years)</p> <p>Target: opportunistic until Year 10.</p> | 1, 3, 6, 7 |
| Environmental, social and cultural | | | |
| <p>J. Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country.</p> <p>Task J.1 – Engage with the local Aboriginal community to understand their preferences for participation in land and sea management along the Kiama coastline.</p> <p>Task J.2 – Invite Traditional Owner (TO) representation onto the CMP Operational Working Group.</p> <p>Task J.3 – Consult with Aboriginal cultural knowledge holders to gain an understanding of the cultural and heritage significance of the coastline and culturally appropriate ways to better acknowledge and share, if appropriate, the indigenous cultural heritage of the Kiama coastline.</p> <p>Task J.4 – Support the existing, and develop additional, Indigenous Rangers groups for the Kiama / Illawarra area under the National Indigenous Australians Agency’s National Indigenous Rangers Program and/or any other funding, legislative or hand back arrangements.</p> | Very High | <p>Short term (within 3 years)</p> <p>Target: Years 1 to 3 with continuity to Year 10</p> | 5, 6 |
| <p>K. Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values.</p> <p>Task K.1 – Prepare a coastal habitat restoration and revegetation works plan that identifies, maps and prioritises specific works locations, along with works details suitable for implementation, such as weeds to be controlled and plants to be used, including species and habitats and locations that have cultural significance to the local community.</p> <p>Task K.2 – Engage field teams, including existing Landcare groups and Aboriginal-led organisations, to implement pest and weed control, revegetation, fencing and habitat restoration works. Where works are identified as Environment Protection Works (EPWs) within Coastal Wetland and Littoral Rainforest Areas (CWLRA), appropriate planning pathways will be used.</p> <p>Task K.3 – Monitor the success of habitat restoration works and refine coastal habitat restoration and revegetation works plan as required.</p> | Medium | <p>Long term (within 10 years)</p> <p>Target: initial action in Year 1 with continuity to Year 10</p> | 2, 6 |
| <p>L. Raise community awareness regarding Council’s Public Tree Management Policy to reduce illegal dune vegetation damage and removal.</p> <p>Task L.1 – Install signage at strategic locations regarding value of dune vegetation along with actions and penalties that are enforceable under Council’s Public Tree Management Policy.</p> <p>Task L.2 – As appropriate to the circumstances, pursue one or more elements of Council’s Public Tree Management Policy as a deterrent for on-going dune vegetation damage and removal.</p> | High | <p>Short term (within 3 years)</p> <p>Target: initial action in Year 3 with continuity to Year 10</p> | 2, 5, 6, 7 |
| <p>M. Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and update culturally appropriate management measures.</p> <p>Task M.1 – Undertake a Kiama coastline Aboriginal cultural values, threats and resilience study.</p> <p>Task M.2 – Explore options to revise relevant aspects of the Local Environmental Plan, to recognise Aboriginal cultural values of the Kiama coastline.</p> <p>Task M.3 - Monitor Aboriginal cultural heritage sites at risk of coastal hazards</p> | High | <p>Long term (within 10 years)</p> <p>Target: Years 5 to 6, subject to funding (could be sooner or later)</p> | 5, 6 |

| Action Name and Associated Tasks | Priority | Timeframe for completion | CMP Objectives met ⁽¹⁾ |
|---|----------|--|-----------------------------------|
| <p>N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities.</p> <p>Task N.1 – Maintain awareness of potential community engagement programs that relate to coastal lands, such as engagement for future Local Strategic Planning Statements (LSPS).</p> <p>Task N.2 – Where suitable, expand planned community engagement programs to capture community input regarding use and demand of coastal lands, facilities and services, and potential conflicts, including conflicts with the natural environment.</p> | Medium | <p>Long term (within 10 years)</p> <p>Target: continuous for Years 1 to 10</p> | 3, 6, 7 |
| Operational delivery | | | |
| <p>O. Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position.</p> <p>Task O.1 – Advocate and support maintaining automated water level gauges at Werri Lagoon and in the Crooked River.</p> <p>Task O.2 – Work with Department of Primary Industries - Fisheries to investigate removal options, assess potential impacts, seek necessary approvals and conduct public engagement.</p> <p>Task O.3 - Undertake necessary on-ground works to remove the derelict concrete drainage channel located within Werri Lagoon entrance.</p> <p>Task O.4 – Review and update the Werri Lagoon Interim Entrance Management Policy and the Crooked River Entrance Policy Position.</p> | High | <p>Long term (within 10 years)</p> <p>Target: continuous for Years 1 to 10, with specific works from Years 5 to 10</p> | 2, 3, 6 |
| <p>P. Monitor and assess beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required.</p> <p>Task P.1 – Use CoastSnap, or similar photo point monitoring, to undertake citizen science beach monitoring and to assess beach condition change based on image comparisons.</p> <p>Task P.2 – When beach erosion scarps are high, install temporary fencing / barricades and/or close beach access to reduce dangers to the public from these unstable slopes.</p> <p>Task P.3 – Implement the Coastal Zone Emergency Action Subplan (CZEAS) when erosion events potentially compromise the integrity and safety of the public, public infrastructure and cultural sites.</p> <p>Task P.4 – Prepare REF, obtain permits and approval and undertake beach scraping of Surf Beach following periods of significant erosion, as required</p> | Medium | <p>Short term (within 3 years)</p> <p>Target: continuous for Years 1 to 10, with specific works in Years 1 and 2</p> | 2, 3, 6, 7 |
| <p>Q. Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations).</p> <p>Task Q.1 – Expand the current Illawarra Ocean beaches Beachwatch program to other areas of high primary contact with coastal waters.</p> <p>Task Q.2 – Where deemed inadequate, increase maintenance of stormwater quality improvement devices.</p> <p>Task Q.3 – Sydney Water to provide periodic updates to the Coastal Management Program Operational Working Group on proposed sewer network improvements.</p> | Medium | <p>Short term (within 3 years)</p> <p>Target: continuous for Years 1 to 10, with specific works in Year 1</p> | 2, 4, 6 |

(1) CMP Objectives are (refer Section 1.4 for details):

- | | |
|-----------------------------------|--------------------------------|
| 1: Future Development | 5: Culture |
| 2: Ecosystem Health | 6: Governance and Compliance |
| 3: Hazards and Climate Resilience | 7: Community Use and Conflicts |
| 4: Water Quality | |

As outlined in Section 3.3, a number of intolerable risks have been identified for the Kiama coastline, targeting built and natural assets. Table 5.2 summarises those risks that are considered intolerable (high or extreme risk levels) in the short to medium term (up to 2040) and details the specific Management Actions that will help to address these particular coastal risks. In addition to the location-specific risks outlined in Table 5.2, the risk to Aboriginal cultural assets including artefacts, middens and burial sites along the entire Kiama coastline is considered intolerable.

Table 5.2 Intolerable (High or Extreme) risks in short-medium term (up to 2040) and associated Management Actions to help address these risks

| Beach | Asset Type / Owner / Manager | Asset | Erosion Risk (2040) | Coastal Inundation Risk (2040) | Tidal Inundation Risk (2040) | Action(s) to address risk |
|--------------------|---------------------------------------|--|---------------------|--------------------------------|------------------------------|---------------------------|
| Minnamurra | Council Land | Council owned reserve land (zoned RE1) | | High | High | B, F, K |
| Bombo | Council Managed Crown Land | Bombo Beach and Dunes, Black Beach (Council managed crown lands, Crown Land) | High | | | B, E, F, J, K, P |
| Bombo | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (50% to 1%) | High | | | B, E, J, K |
| Bombo | Heritage, Council Managed Land | Northern end of beach within the Quarry Heritage LEP 2011 listing | High | High | | B, J, K, P |
| Bombo | Transport NSW | South Coast Rail Line (Zone SP2) (note, inundation impacts are very minor in area) | | High | | F, G, P |
| Bombo | Transport NSW | South Coast Rail Bridge/Culvert over Spring Creek (Zone SP2) | | Extreme | | F, P |
| Bombo | Council Asset | Stormwater pit and pipe (at northern creek on beach) | | High | | F, P |
| Bombo | Council Asset | Stormwater Pit into Spring Creek | | High | | F, P |
| Bombo | Sydney Water | Sewer main, maintenance hole (Spring Creek mouth/Black Beach) | High | Extreme | | F, P |
| Surf | Council Managed Crown Land | Surf Beach | High | High | | B, P |
| Surf | Council Managed Crown Land | Kiama SLSC building (Zone RE1) | | High | | B, C, F, P |
| Surf | Private Asset | Saint Peter and Paul Catholic Church and Primary School Lands (eastern end of grounds including some Norfolk Pines, no buildings in erosion zone) (Heritage LEP 2011, Zone R3) | | High | | B, C, F, P |
| Surf | Council Managed Crown Land | Coronation Park (Zone RE1) | | High | | B, E, F, J, K, P |
| Surf | Sydney Water | Sewer main (inc. pump station) and other assets along entire length of back of beach/promenade | | Extreme | | F, P |
| Kendalls | Council Land, Crown Land | Kendalls Beach (Zone RE1) including seawall (and access) | High | High | | B, E, F, J, K, P |
| Kendalls | Council Asset | Kendalls on the Beach Holiday Park (includes cabins, access roads etc) | | High | | B, C, F, P |
| Kiama Boat Harbour | Various (see individual assets below) | Kiama Harbour as a whole (ie, considering harbour as a whole, integrated asset, not just its individual parts) | | High | | B, E, F, H, I, N |
| Kiama Boat Harbour | Crown Lands | Harbour Breakwaters / Robertson Basin (Heritage LEP 2011) (Zone IN4) | | High | High | B, F, I |

| Beach | Asset Type / Owner / Manager | Asset | Erosion Risk (2040) | Coastal Inundation Risk (2040) | Tidal Inundation Risk (2040) | Action(s) to address risk |
|--------------------|---|---|---------------------|--------------------------------|------------------------------|---------------------------|
| Kiama Boat Harbour | Crown Lands / Private lease of building | Fish and Chips/Restaurant (part of Robertson Basin Heritage listing) (Zone IN4) | | High | | B, C, F, I |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Kiama boat ramp | | High | | E, F, I |
| Kiama Boat Harbour | Private Asset | Commercial venues on Shoalhaven Street between Minnamurra Street and the rail overpass | | High | | B, C, F, I |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Scout Hall | | High | | B, C, F, I |
| Kiama Boat Harbour | Council Stormwater Asset | Stormwater pits and pipes (numerous) | | High | High | F |
| Kiama Boat Harbour | Sydney Water | Sewer pipe (section at back of Black Beach Reserve) | | Extreme | | F |
| Kiama Boat Harbour | Sydney Water | Sewer Main (section along northern edge of harbour/promenade) | | Extreme | | F |
| Kiama Boat Harbour | Crown Lands | Fishermans Shed (N of slipway), Heritage listed | | High | | B, C, F, I |
| Kiama Boat Harbour | Council Road | Carpark associated with Basin | | High | | B, F, I |
| Kiama Boat Harbour | Crown Lands with private leaseholder | Fishermans market | | High | | B, C, F, I |
| Easts | Private Asset | Easts Beach Holiday Park (beach front cabins, campsites, recreational facilities, access roads, onsite stormwater, and Munna Munnora Ck) (Zone E3), and 1 lot (north of this) separately privately owned. | | Extreme | | B, C, F, P |
| Easts | Council Managed Crown Land | Easts Beach (Zone RE1), including seawall under beach. Ownership of seawall unknown | High | High | | B, E, F, P |
| Easts | Sydney Water | Sewer main and pump station (along back of beach, northern end only). Behind "seawall" of unknown condition | | Extreme | | F, P |
| Easts | Sydney Water | Water main (centre) servicing HP | | High | | F, P |
| Werri | Council Land, Crown Land | Werri Beach and Dunes (noting berm to waterline is Crown Land, plus area opposite Werri Beach HP) (Zone RE1) | High | High | | B, E, F, P |
| Werri | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (Northern end 10% to 1% erosion, southern end 50% to 1% erosion) | | High | | B, E, F, J, K, L, P |
| Werri | Council Road | Pacific Ave (from S of Werri Beach HP) | High | Extreme | | B, C, F, G, P |
| Seven Mile | Council Asset | Walkway bridge over creek | | High | | E, F |
| Seven Mile | Crown Land | Seven Mile Beach and dunes | High | High | | B, E, F, J, K, P |
| Seven Mile | Private Asset | 2 Residences on Burke Pde | High | High | | B, C, F |
| Seven Mile | Biodiversity | Natural Grassland (LEP Biodiversity) | | High | | B, J, K, P |
| Seven Mile | Biodiversity | Shrubland / Heathland (LEP Biodiversity) | | High | | B, J, K, P |

| Beach | Asset Type / Owner / Manager | Asset | Erosion Risk (2040) | Coastal Inundation Risk (2040) | Tidal Inundation Risk (2040) | Action(s) to address risk |
|------------|------------------------------|--------------------------------------|---------------------|--------------------------------|------------------------------|---------------------------|
| Seven Mile | Biodiversity | Eucalypt Forest (LEP Biodiversity) | | High | | B, J, K, P |
| Seven Mile | Biodiversity | Floodplain Forest (LEP Biodiversity) | | High | | B, J, K, P |

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

6.1 CMP Implementation Pathway

Implementation of the Kiama CMP will need to follow a pathway in that some Management Actions cannot be implemented effectively until other Management Actions are underway or have been largely completed. The pathway highlights the integrated and inter-connected nature of the Management Actions that have been developed for the Kiama CMP. This also highlights the importance of managing the Kiama coastline through a multi-agency/stakeholder forum, as the issues and objectives of the coastline need to be addressed when the coastline is considered in a holistic way.

The pathway for implementation of the CMP commences with the establishment of a CMP Operational Working Group (**Action A**), which can oversee the planning and implementation of all remaining Management Actions of the CMP.

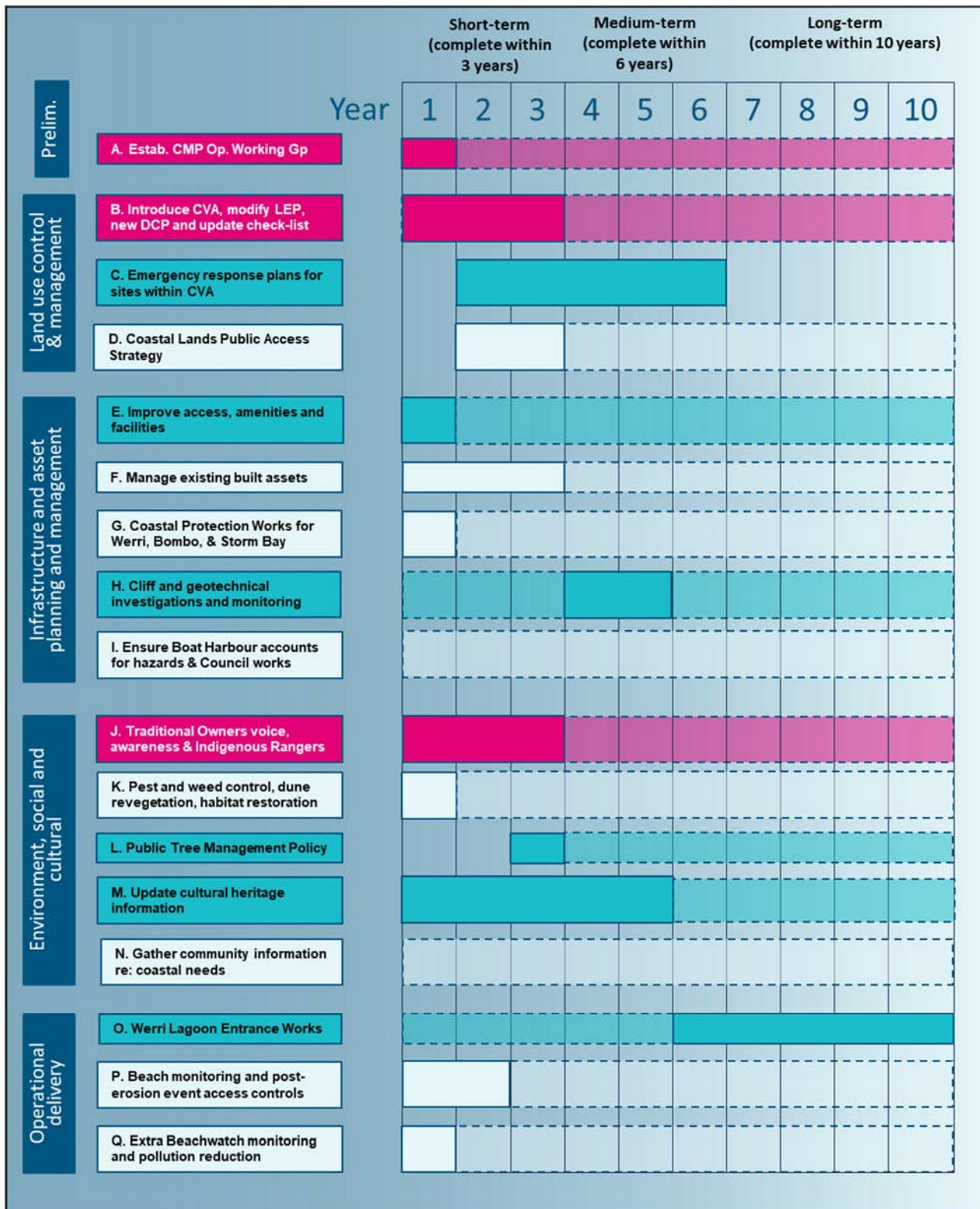
The implementation pathway for the Kiama CMP is presented in Figure 6.1, aligned with the four implementation themes of:

- Land use control and management;
- Infrastructure and asset planning and management;
- Environment, social and cultural; and
- Operational delivery.

6.2 Implementation Details

Table 6.1 provides high level implementation details of all Management Actions and associated Tasks that require direct involvement by various stakeholders, either as a lead or support organisation.

Only abbreviated implementation details are provided in Table 6.1. For full implementation details of each Management Action, please refer to **Annex B** of this CMP.



Legend: VERY HIGH PRIORITY STRATEGIES HIGH PRIORITY STRATEGIES MEDIUM PRIORITY STRATEGIES ONGOING

Figure 6.1 Implementation Pathway for the Kiama Coastline CMP

Table 6.1 Implementation Details for Kiama CMP

| Action Name | Lead agency | Supporting agencies | Indicative 10 year Cost | Sources of funding |
|--|-------------|---|-------------------------|--|
| Preliminaries | | | | |
| <p>A. Establish a Coastal Management Program (CMP) Operational Working Group (OWG) for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP.</p> <p>Task A.1 – Engage with agencies and stakeholders to gauge interest and establish scope of OWG.</p> <p>Task A.2 – Prepare Terms of Reference (ToR) for the OWG</p> <p>Task A.3 – Formally establish the OWG in accordance with the agreed ToR.</p> | Council | DCCEEW-BCSG DPHI-Crown Lands DPHI-Planning DPI-Fisheries TfNSW LLS NPWS Sydney Water ILALC JLALC ISJO | Staff time only | <ul style="list-style-type: none"> Kiama Municipal Council |
| Land use control and management | | | | |
| <p>B. Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach for future development to adequately manage existing and future coastal risks.</p> <p>Task B.1 – Prepare and submit a Planning Proposal to State Government for mapping the Coastal Vulnerability Area (CVA).</p> <p>Task B.2 – Undertake a thorough review of the LEP and supporting documents for consistency with the Coastal Management Program (CMP) and CVA.</p> <p>Task B.3 – Review options and propose changes to the LEP and other land use planning controls, including a new Coastal Hazards DCP.</p> <p>Task B.4 – Make recommended changes to the LEP and prepare the new DCP following appropriate legislated process, including public consultation.</p> <p>Task B.5 – Update pre-lodgement Development Application (DA) checklist to include key elements of the Coastal Hazards DCP, the updated LEP and the R&H SEPP.</p> <p>Task B.6 – Utilise the use of the pre-lodgement checklist for all coastal infrastructure development proposed within a coastal risk area (being assessed through both Parts 4 and 5 of the <i>Environment Planning & Assessment Act 1979</i>).</p> | Council | DCCEEW-BCSG DPHI-Planning Sydney Water TfNSW | Up to \$650k capex | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Increasing Resilience to Climate Change Program (or similar future programs) Kiama Municipal Council |
| <p>C. Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA).</p> <p>Task C.1 – Consult with relevant landholders and provide them with information resources regarding existing and future coastal hazards, including the CZEAS, and implications for CVA declaration on land use and future development.</p> | Council | DCCEEW-BCSG NSW SES DPHI-Crown Lands | Up to \$60k capex | <ul style="list-style-type: none"> Increasing Resilience to Climate Change Program Coasts and Estuaries Grants Program Kiama Municipal Council |

| Action Name | Lead agency | Supporting agencies | Indicative 10 year Cost | Sources of funding |
|---|--|----------------------------------|--|---|
| <p>Task C.2 – Incentivise and support relevant landholders and lessees of public land in hazard-affected coastal areas to engage with local emergency services including the NSW State Emergency Service (SES) and prepare an appropriate emergency plan that takes into account response to coastal hazards, such as severe storm surge inundation.</p> <p>Task C.3 – Amend Council’s Public Land Management Policy to incorporate a requirement for an appropriate emergency plan into future leasing agreements of public coastal land at risk of coastal hazards.</p> | | | | |
| <p>D. Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area (LGA) coastline.</p> <p>Task D.1 – Consult with private landholders along the coast where new public access is sought.</p> <p>Task D.2 – Identify and prioritise coastal fringe land to be acquired or easements established (depending on suitability).</p> <p>Task D.3 – Prepare and implement a Coastal Land Public Assess strategy, guided by Council’s Acquisition and Disposal of Land and Easements Policy.</p> <p>Task D.4 – Incorporate provisions within the proposed Coastal Hazards Development Control Plan (DCP) or other relevant local plans requiring dedication of priority coastal fringe lands for public access if associated lots are developed in the future (e.g. subdivision of land).</p> | Council | DCCEEW-BCSG DPHI-Planning | Up to \$100k capex | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Environmental Trust Grants Business Case and Strategy Development Fund Kiama Municipal Council |
| Infrastructure and asset planning and management | | | | |
| <p>E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values.</p> <p>Task E.1 – Assess the condition of all existing access tracks and other community facilities and amenities on coastal lands.</p> <p>Task E.2 – Review existing Council policies and asset plans, and consult with Council’s Infrastructure and Liveability Advisory Committee, to identify priority works for improving coastal access tracks, amenities and facilities.</p> <p>Task E.3 – Undertake on-ground works to improve coastal access tracks, amenities and facilities.</p> | Council | DCCEEW-BCSG DPHI-Crown Lands | Up to \$780k capex and \$200k opex incl maint. | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Crown Reserve Improvement Fund NSW Environment Trust Kiama Municipal Council |
| <p>F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks.</p> <p>Task F.1 – Guided by the Stage 2 CMP risk assessment, conduct a detailed evaluation of each asset identified as being at risk of coastal hazards.</p> <p>Task F.2 – Modify existing asset management plans and/or develop new plans, where required, to address coastal hazards and risks.</p> <p>Task F.3 – Condition of existing coastal infrastructure and built assets to be monitored by owners/managers.</p> | Multiple (asset owners), eg Council, Sydney Water, TfNSW | DCCEEW-BCSG, DPHI-Crown Lands | Up to \$200k capex and \$360k opex incl maint. | <ul style="list-style-type: none"> Asset owners Increasing Resilience to Climate Change Program Coasts and Estuaries Grants Program |

| Action Name | Lead agency | Supporting agencies | Indicative 10 year Cost | Sources of funding |
|--|---------------------------|---|---|--|
| <p>G. Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Werri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.</p> <p>Task G.1 – Prepare REF and obtain approval for ‘interim’ coastal protection works (CPWs).</p> <p>Task G.2 – If agreed triggers and thresholds are reached, construct interim coastal protection works (CPWs) without delay at required location(s).</p> <p>Task G.3 – Triggered by the construction of interim coastal protection works (CPWs) at one or more locations (refer Task G.2), undertake site-specific investigations (survey, geotechnical etc), prepare detailed designs, prepare REF and obtain approval of permanent CPWs</p> <p>Task G.4 – Construct permanent coastal protection works (CPWs) at one or more locations to replace interim CPWs established at the same location(s)</p> | Council | DCCEEW-BCSG DPHI-Crown Lands, DPI-Fisheries | Nominally \$6.75m capex \$50,000 opex | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Kiama Municipal Council |
| <p>H. Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline.</p> <p>Task H.1 – Undertake additional site specific geotechnical investigations.</p> <p>Task H.2 – Monitor cliff and slope instability at key locations identified within the Stage 2 report.</p> <p>Task H.3 – Undertake a research study into the geodiversity of the Kiama coastline to support future conservation and management of key geological features.</p> <p>Task H.4 - Update mapping the R&H SEPP and/or LEP to incorporate cliff instability hazard based on results of relevant geotechnical studies, including studies done by agencies.</p> | Council | DCCEEW-BCSG DPHI-Planning TfNSW | Up to \$205k capex | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Kiama Municipal Council |
| <p>I. Ensure that infrastructure development and future management of Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable.</p> <p>Task I.1 – TfNSW and Council to work collaboratively in delivering specific actions within the Kiama Harbour Revitalisation Plan that are aligned with the objectives and time frame of this CMP subject to approved funding and environmental planning approvals.</p> | Council | DPHI-Crown Lands DCCEEW-BCSG TfNSW | Nominal \$3.2m capex and \$800K opex | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Crown Reserve Improvement Fund NSW Environment Trust NSW Boating Now Kiama Municipal Council |
| Environmental, social and cultural | | | | |
| <p>J. Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country.</p> <p>Task J.1 – Engage with the local Aboriginal community to understand their preferences for participation in land and sea management along the Kiama coastline.</p> <p>Task J.2 – Invite Traditional Owner (TO) representation onto the CMP Operational Working Group.</p> | Council ILALC JLALC | DCCEEW-BCSG DPI - Fisheries LLS NPWS | Up to \$70k capex and \$225k opex incl maint. | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program NSW Heritage Grants National Indigenous Australian Agency MEMS |

| Action Name | Lead agency | Supporting agencies | Indicative 10 year Cost | Sources of funding |
|---|----------------|---|---|--|
| <p>Task J.3 – Consult with Aboriginal cultural knowledge holders to gain an understanding of the cultural and heritage significance of the coastline and culturally appropriate ways to better acknowledge and share, if appropriate, the indigenous cultural heritage of the Kiama coastline.</p> <p>Task J.4 – Support the existing, and develop additional, Indigenous Rangers groups for the Kiama / Illawarra area under the National Indigenous Australians Agency’s National Indigenous Rangers Program and/or any other funding, legislative or hand back arrangements.</p> | | | | <ul style="list-style-type: none"> Local Lands Services Protecting our Places Grants DCCEEWS Environmental Restoration and Rehabilitation Kiama Municipal Council |
| <p>K. Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values.</p> <p>Task K.1 – Prepare a coastal habitat restoration and revegetation works plan that identifies, maps and prioritises specific works locations, along with works details suitable for implementation, such as weeds to be controlled and plants to be used, including species and habitats and locations that have cultural significance to the local community.</p> <p>Task K.2 – Engage field teams, including existing Landcare groups and Aboriginal-led organisations, to implement pest and weed control, revegetation, fencing and habitat restoration works. Where works are identified as Environment Protection Works (EPWs) within Coastal Wetland and Littoral Rainforest Areas (CWLRA), appropriate planning pathways will be used.</p> <p>Task K.3 – Monitor the success of habitat restoration works and refine coastal habitat restoration and revegetation works plan as required.</p> | Council | ISJO DCCEEWS-BCSG LLS NPWS ILALC JLALC | Up to \$50k capex and \$2.6m opex incl maint. | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program LLS DCCEEWS Environmental Restoration and Rehabilitation Crown Reserve Improvement Fund Kiama Municipal Council (Landcare, Coastcare support) |
| <p>L. Raise community awareness regarding Council’s Public Tree Management Policy to reduce illegal dune vegetation damage and removal.</p> <p>Task L.1 – Install signage at strategic locations regarding value of dune vegetation along with actions and penalties that are enforceable under Council’s Public Tree Management Policy.</p> <p>Task L.2 – As appropriate to the circumstances, pursue one or more elements of Council’s Public Tree Management Policy as a deterrent for on-going dune vegetation damage and removal.</p> | Council | DCCEEWS-BCSG | Up to \$55k capex | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Kiama Municipal Council LLS DCCEEWS Environmental Restoration and Rehabilitation |
| <p>M. Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and update culturally appropriate management measures.</p> <p>Task M.1 – Undertake a Kiama coastline Aboriginal cultural values, threats and resilience study.</p> <p>Task M.2 – Explore options to revise relevant aspects of the Local Environmental Plan, to recognise Aboriginal cultural values of the Kiama coastline.</p> <p>Task M.3 - Monitor Aboriginal cultural heritage sites at risk of coastal hazards</p> | ILALC JLALC | Council Heritage NSW DCCEEWS-BCSG | Up to \$200k capex and \$200k opex incl maint | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program NSW Heritage Grants National Indigenous Australian Agency MEMS LLS Protecting our Places Grants Australian Research Council Kiama Municipal Council |

| Action Name | Lead agency | Supporting agencies | Indicative 10 year Cost | Sources of funding |
|--|-------------------------|---|------------------------------------|---|
| <p>N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities.</p> <p>Task N.1 – Maintain awareness of potential community engagement programs that relate to coastal lands, such as engagement for future Local Strategic Planning Statements (LSPS).</p> <p>Task N.2 – Where suitable, expand planned community engagement programs to capture community input regarding use and demand of coastal lands, facilities and services, and potential conflicts, including conflicts with the natural environment.</p> | Council | DCCEEW-BCSG | Up to \$20k capex | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Kiama Municipal Council |
| Operational delivery | | | | |
| <p>O. Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position.</p> <p>Task O.1 – Advocate and support maintaining automated water level gauges at Werri Lagoon and in the Crooked River.</p> <p>Task O.2 – Work with Department of Primary Industries - Fisheries to investigate removal options, assess potential impacts, seek necessary approvals and conduct public engagement.</p> <p>Task O.3 - Undertake necessary on-ground works to remove the derelict concrete drainage channel located within Werri Lagoon entrance.</p> <p>Task O.4 – Review and update the Werri Lagoon Interim Entrance Management Policy and the Crooked River Entrance Policy Position.</p> | Council | DCCEEW-BCSG DPHI-Planning DPHI-Crown Lands DPI-Fisheries | Up to \$630k capex . | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Floodplain Management Grants Program NSW DPI - Fisheries, Habitat Action Grants MEMS |
| <p>P. Monitor and assess beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required.</p> <p>Task P.1 – Use CoastSnap, or similar photo point monitoring, to undertake citizen science beach monitoring and to assess beach condition change based on image comparisons.</p> <p>Task P.2 – When beach erosion scarps are high, install temporary fencing / barricades and/or close beach access to reduce dangers to the public from these unstable slopes.</p> <p>Task P.3 – Implement the Coastal Zone Emergency Action Subplan (CZEAS) when erosion events potentially compromise the integrity and safety of the public, public infrastructure and cultural sites.</p> <p>Task P.4 – Prepare REF, obtain permits and approval and undertake beach scraping of Surf Beach following periods of significant erosion, as required.</p> | Council | DCCEEW-BCSG DPI - Fisheries DPHI-Crown Lands | Up to \$200k capex and \$380k opex | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Kiama Municipal Council |
| <p>Q. Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations).</p> | Council Sydney Water | DCCEEW-BCSG | Up to \$650k opex incl maint. | <ul style="list-style-type: none"> Coasts and Estuaries Grants Program Kiama Municipal Council |

BMT (OFFICIAL)

| Action Name | Lead agency | Supporting agencies | Indicative 10 year Cost | Sources of funding |
|---|-------------|---------------------|--|--|
| <p>Task Q.1 – Expand the current Illawarra Ocean beaches Beachwatch program to other areas of high primary contact with coastal waters.</p> <p>Task Q.2 – Where deemed inadequate, increase maintenance of stormwater quality improvement devices.</p> <p>Task Q.3 – Sydney Water to provide periodic updates to the Coastal Management Program Operational Working Group on proposed sewer network improvements.</p> | | | | <ul style="list-style-type: none"> • Environment Protection Authority • Sydney Water |
| TOTAL | | | \$13.17m capex including one-off costs \$5.47m opex including maintenance over 10 years | |

6.3 Actions to be Implemented by Kiama Municipal Council (All Actions)

Kiama Municipal Council is responsible for leading the vast majority of tasks within this CMP. For the tasks that they are not leading (or co-leading), Council will still be providing a strong supporting role in implementation.

6.4 Actions to be Implemented by DCCEEW (BCSG) (All Actions)

DCCEEW (BCSG) administers the Coastal Management Framework. Once a CMP is certified by the Minister, relevant actions within the CMP become eligible for funding under the Coasts and Estuaries Grants Program, which is administered by DCCEEW (BCSG).

DCCEEW (BCSG) is not the lead agency for any Actions and Tasks in the CMP. However, given their involvement and oversight of the state-wide program, DCCEEW (BCSG) will play a significant supporting role for most Actions and associated Tasks of this CMP, including facilitating potential funding where it meets with the Coastal and Estuary grants eligibility requirements. In particular, DCCEEW (BCSG) will provide key support to Council in the establishment of a CMP Operational Working Group (**Action A**), and the introduction of a Coastal Vulnerability Area (CVA) in accordance with the provisions of the CM Act and the R&H SEPP (**Action B**). Additionally, DCCEEW (BCSG) will provide key support for the introduction of additional Beachwatch monitoring locations (**Action Q, Task Q1**) through the Science, Economics and Insights Division.

6.5 Actions to be Implemented by Sydney Water (Select Actions)

Sydney Water owns and operates land and assets within the Kiama CMP Study Area. With reference to the implementation details as outlined in Table 6.1, Sydney Water is responsible, shares responsibility, or should provide a supporting role for the following Actions and associated Tasks:

- **Action A:** Establish a Coastal Management Program (CMP) Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP
 - Supporting implementation of Tasks A1 and A3 as a key stakeholder and potential participant in the Operational Working Group
- **Action B:** Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks
 - Supporting implementation of Task B5 as a landholder and future proponent of new coastal assets
- **Action F:** Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks
 - Sharing the lead in implementation of Tasks F1, F2 and F3 along with other asset owners in the CMA, in respect to existing assets owned and managed by Sydney Water
- **Action Q:** Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations)
 - Supporting implementation of Task Q1, as the provider of laboratory services
 - Leading implementation of Task Q3, by providing periodic updates to the Operational Working Group

6.6 Actions to be Implemented by Transport for NSW (Select Actions)

Transport for NSW own land and assets within the Kiama CMP Study Area. Operation of these assets is delegated to divisions of Transport for NSW in respect to assets within the Kiama CMA. With reference to the implementation details as outlined in Table 6.1, Transport for NSW is responsible, shares responsibility, or should provide a supporting role for the following Actions and associated Tasks:

- **Action A:** Establish a Coastal Management Program (CMP) Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP
 - Supporting implementation of Tasks A1 and A3 as a key stakeholder and potential participant in the Operational Working Group
- **Action B:** Introduce a Coastal Vulnerability Area (CVA), modify the LEP and introduce a new DCP to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks, including cliff instability risks
 - TfNSW to support implementation of Task B5 as a landholder and future proponent of new coastal assets
- **Action F:** Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks
 - Sharing the leading role in implementation of Tasks F1, F2 and F3 along with other asset owners in the CMA in respect to existing assets owned and managed by TfNSW
- **Action H:** Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline
 - Support implementation of Task H1 involving assessment of the unstable seawall along Black Beach, which forms part of the Kiama Boat Harbour Revitalisation Plan
- **Action I:** Ensure that infrastructure development and future management of the Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable
 - Support implementation of Task I1 with respect to collaborative delivery of the Boat Harbour Revitalisation Plan

6.7 Actions to be Implemented by DPI-Fisheries (Select Actions)

DPI-Fisheries are responsible for managing the marine estate of NSW. With reference to the implementation details as outlined in Table 6.1, DPI-Fisheries is responsible for, or should provide a supporting role for, the following Actions and associated Tasks:

- **Action A:** Establish a Coastal Management Program (CMP) Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP
 - Supporting implementation of Tasks A1 and A3 as a key stakeholder and potential participant in the Operational Working Group

- **Action G:** Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Werri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.
 - Supporting implementation of Tasks G1 and G3 involving submitting applications and gaining approvals for CPWs, insofar as DPI-Fisheries will be a potential consent authority
- **Action J:** Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to help First Nations people care for their land and sea Country
 - Supporting implementation of Tasks J3 and J4, particularly in respect of Traditional Owners role in managing Sea Country, which would cover NSW marine water (albeit small in the context of the CMP Study Area).
- **Action O:** Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position.
 - Supporting implementation of Task O2, to remove derelict infrastructure for the marine estate within the entrance of Werri Lagoon. The removal works are considered environmental protection works (EPW) to be undertaken within a coastal wetland proximity area. No EPWs are proposed within the CWLRA.
 - Supporting implementation of Task O3, which involves review and update of the Werri Lagoon Entrance Management Policy
- **Action P:** Monitor beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Emergency Action Sub-Plan following coastal events and approved beach scraping on Surf Beach as required
 - Supporting implementation of Task P2, which involves temporary barriers/fencing on the beach and/or closing beach access following significant erosion
 - Supporting implementation of Task P4 regarding submitted appropriate approvals for beach scraping on Surf Beach

6.8 Actions to be Implemented by Illawarra Local Aboriginal Lands Council (ILALC) and Jerrinja Aboriginal Lands Council (JLALC) (Select Actions)

Aboriginal-led organisations, such as Local Aboriginal Lands Councils (LALCs) act as representatives of Aboriginal People to improve, protect and foster the best interests of all Aboriginal persons. Such organisations operate to acquire and manage land, promote/protect culture and heritage and facilitate business enterprise. Two LALCs operate within the Kiama CMA: Illawarra LALC and Jerrinja LALC. Other Aboriginal-led organisations may also be relevant for implementation of the Kiama CMP. With reference to the implementation details as outlined in Table 6.1, Illawarra LALC and Jerrinja LALC, are responsible for, or should provide a supporting role for, the following Actions and associated Tasks:

- **Action A:** Establish a Coastal Management Program (CMP) Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP
 - Supporting implementation of Tasks A1 and A3 as key stakeholders and potential participants in the Operational Working Group
- **Action J:** Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to help First Nations people care for their land and sea Country
 - Supporting the implementation of Tasks J1, J3 and J4 involving engagement with Aboriginal communities and establishing Indigenous Ranger Groups for the Kiama area
 - Supporting implementation of Task J2 by participating in the Operational Working Group and/or helping to organise alternative Traditional Owner (TO) representation on the Operational Working Group
- **Action K:** Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values.
 - Supporting implementation of Tasks K1 and K2 by facilitating the involvement of Aboriginal community organisations in preparation of the coastal habitat restoration and revegetation works plan, and the subsequent delivery of this plan through undertaking on-ground environmental land management and restoration works
- **Action M:** Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and update culturally appropriate management measures
 - Implementing Task M1, involving a cultural values, threats and resilience study for Kiama
 - Supporting implementation of Task M2, aimed at protecting cultural values through planning instruments
 - Implementing Task M3, involving monitoring of Aboriginal cultural sites at risk from coastal hazards

6.9 Actions to be Implemented by DPHI (Crown Lands) (Select Actions)

DPHI (Crown Lands) owns Crown land. Under the *Crown Land Management Act 2016*, DPHI (Crown Lands) delegates control and management of Crown land to a dedicated land manager. In most cases in the Kiama CMA, this responsibility falls to Council. Notwithstanding, DPHI (Crown Land) still has a vested interest in the CMP insofar as actions are implemented on, or have an impact on, Crown land, as well as potential funding for implementation of works on Crown land. With reference to the implementation details as outlined in Table 6.1, DPHI (Crown Lands) provide a supporting role for the following Actions and associated Tasks:

- **Action A:** Establish a Coastal Management Program (CMP) Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP

- Supporting implementation of Tasks A1 and A3 as a key stakeholder and potential participant in the Operational Working Group
- **Action C:** Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA)
 - Support implementation of Task C2 regarding emergency plans that cover Crown land
- **Action E:** Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values
 - Support implementation of Tasks E1, E2 and E3 where coastal amenities and facilities are located on Crown land
- **Action F:** Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks
 - Support implementation of Tasks F1, F2 and F3 where coastal assets are located on Crown land
- **Action G:** Design and obtain relevant permits and approvals for 'interim' coastal protection works (CPW) along Pacific Avenue at South Werri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.
 - Supporting implementation of Tasks G1 and G3 involving submitting applications and gaining approvals for CPWs, insofar as DPHI (Crown Lands) will be a potential consent authority and will be required to licence CPWs if they are located on Crown land.
- **Action I:** Ensure that infrastructure development and future management of the Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable
 - Support implementation of Task I2 as the Kiama Boat Harbour is located on Crown land
- **Action O:** Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position.
 - Support implementation of Tasks O2 and O3 as Werri Lagoon entrance is located on Crown land and a licence may be required for undertaking works and potentially for on-going entrance management actions under a revised and updated entrance management policy
- **Action P:** Monitor beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Emergency Action Sub-Plan following coastal events and approved beach scraping on Surf Beach as required
 - Supporting implementation of Task P2, which involves temporary barriers/fencing on the beach and/or closing beach access following significant erosion
 - Supporting implementation of Task P4 involving submitting applications and gaining approval for beach scraping on Surf Beach, insofar as DPHI (Crown Lands) will be a potential consent authority and will be required to licence the works if they are located on Crown land

6.10 Actions to be Implemented by DPHI (Planning) (Select Actions)

DPHI (Planning) will provide a supporting function to a number of Actions in the CMP that require consents and approvals. DPHI (Planning) will also support the development of a CVA along the Kiama coastline. With reference to the implementation details as outlined in Table 6.1, DPHI (Planning) provide a supporting role for the following Actions and associated Tasks:

- **Action A:** Establish a Coastal Management Program (CMP) Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP
 - Supporting implementation of Task A1 as a key stakeholder and potential participant in the Operational Working Group
- **Action B:** Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach for future development to adequately manage existing and future coastal risks
 - Supporting implementation of Tasks B1, B2, B3 and B5 as a key stakeholder regarding changes to state legislation (R&H SEPP) associated with introduction and application of a CVA along the Kiama coastline
- **Action D:** Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area (LGA) coastline
 - Supporting implementation of Tasks D1 and D2 as a key stakeholder in engaging with landholders of coastal land and prioritising lands that can be opened up to greater public access
- **Action H:** Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline
 - Supporting implementation of Task H4 with respect to updating the CVA mapping in the R&H SEPP based on updated geotechnical information.
- **Action O:** Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position.
 - Supporting implementation of Task O2 with respect to confirming applicable approvals pathway and submitting applications and gaining approvals for removal of derelict drainage infrastructure.
- **Action P:** Monitor beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Emergency Action Sub-Plan following coastal events and approved beach scraping on Surf Beach as required
 - Supporting implementation of Task P4 with respect to confirming applicable approvals pathway and submitting applications and gaining approvals for beach scraping at Surf Beach

6.11 Other Agencies and Organisations Providing Minor Supporting Roles (Limited Actions)

In addition to the major contributors to implementation of the Kiama CMP, there are a number of other agencies and organisations that will need to support implementation of the CMP, although their level of involvement and time commitment required is considered relatively minor. A summary of these minor contributions to the implementation of the Kiama CMP is outlined in Table 6.2.

Table 6.2 Minor Contributors to Implementation of the Kiama CMP

| Agency / Organisation | Scope of Proposed Participation in Kiama CMP |
|--|--|
| Illawarra Shoalhaven Joint Organisation (ISJO) | Supporting implementation of Tasks A1, A3, K1, K2 and K3 |
| South East Local Lands Service (LLS) | Supporting implementation of Tasks A1, A3, J4, K1, K2 and K3 |
| National Parks and Wildlife Service (NPWS) | Supporting implementation of Tasks A1, A3, J4, K1, K2 and K3 |
| NSW State Emergency Services (SES) | Supporting implementation of Task C2 |
| Heritage NSW | Supporting implementation of Tasks M1 and M3 |

6.12 Opportunities for Involvement by Private Landholders and the General Public (Select Actions)

Privately owned lands and assets are located within the Kiama CMA. With reference to the Actions and Tasks identified within the Kiama CMP, private landholders and the broader community may choose to support implementation of the CMP through their involvement in the following:

- **Action B:** Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks
 - Support implementation of Task B1 by participating in consultation regarding the planning proposal to establish a CVA
 - Support implementation of Task B5 as a landholder and potential proponent of future assets located within the CVA
- **Action C:** Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans as well as longer term adaptation plans for on-going land use within the Coastal Vulnerability Area (CVA)
 - Supporting implementation of Tasks C1 and C2 by participating in consultation, and where relevant, preparing their own home or business emergency plans to protect residents and occupants of land affected by coastal hazards, such as severe storm surge inundation
- **Action D:** Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area (LGA) coastline
 - Supporting implementation of Task D1 by participating in consultation regarding public access along the coast
- **Action F:** Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks
 - Sharing the implementation of Tasks F1, F2 and F3 along with other asset owners in the CMA in respect to existing assets owned and managed by private landholders

- **Action K:** Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values.
 - Participate in pest and weed control works, revegetation and habitat restoration works organised through specialist field teams, Landcare groups and Aboriginal community groups
- **Action P:** Monitor and assess beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Emergency Action Sub-Plan following coastal events and approved beach scraping on Surf Beach as required
 - Participating in citizen science beach monitoring to assess beach conditions change by opportunistically using the proposed CoastSnap facilities

6.13 Implementation Process

Actions to be Implemented by Council

Under Section 22 of the CM Act, CMP actions that are to be implemented by Council are to be given effect through the Integrated Planning and Reporting (IP&R) Framework, which is required to conform to the state-based Integrated Planning and Reporting (IP&R) structure mandated in the *Local Government Act 1993*. This framework is shown in Figure 6.2.

Table 6.3 shows how the CMP process informs, and is informed by, the elements of the IP&R framework.

The Business Plan for this CMP (refer Section 7) outlines how each of the management actions may be implemented within Council's IP&R framework. While some actions may be identified as a priority for implementation in the CMP, it is recognised that the Plan needs to retain sufficient flexibility such that Council (or other responsible agencies) may implement any of the management actions at any time on an opportunistic basis, regardless of their priority. Such an opportunity may arise where, for example, funding becomes available through a specific grant or funding program.

Actions to be Implemented by Other Public Authorities

Section 23 of the CM Act set out the obligations for public authorities for the implementation of a CMP:

1. Public authorities (other than local councils) are to have regard to coastal management programs to the extent that those programs are relevant to the exercise of their functions.
2. In particular, those public authorities are to have regard to relevant coastal management programs and the coastal management manual in the preparation, development and review of, and the contents of, any plans of management that those public authorities are required to produce and, in doing so, are to have regard to the objects of the CM Act.

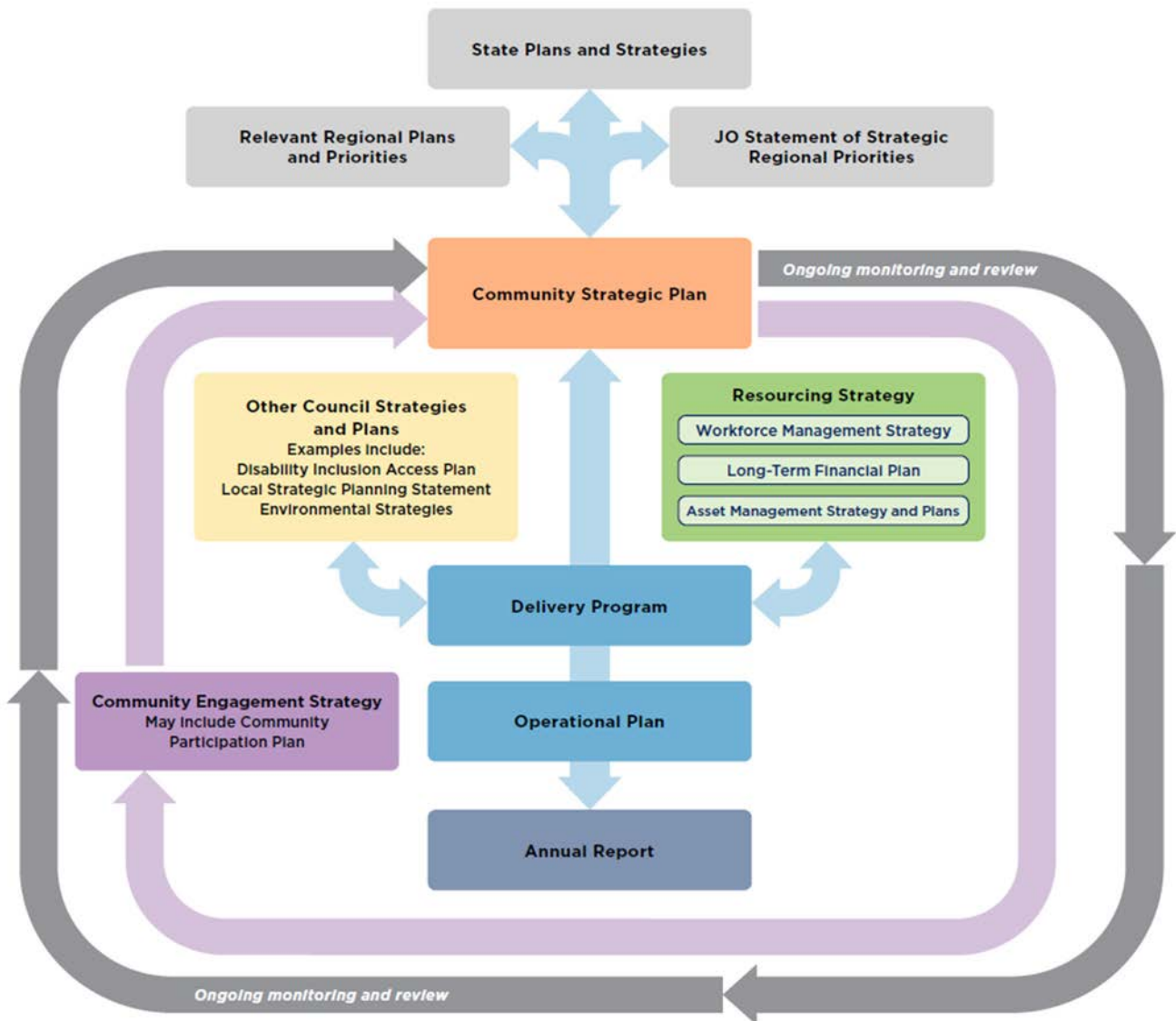


Figure 6.2 Integrated Planning and Reporting Framework (Source: NSW OLG, 2021)

Table 6.3 Relationship between IP&R Framework and the CMP

| Council IP&R Component | Purpose | CMP Implementation & Linkage |
|---|--|---|
| Kiama Community Strategic Plan (CSP) 2022 - 2032 10+ years | The CSP 2022 – 2032 forms the overarching, visionary document that translates the community’s key priorities and aspirations into long-term strategic goals that guide the future direction of the LGA. The Plan represents the highest level of strategic planning undertaken by a local council. | The CMP must reflect and support implementation of the CSP. Under the CM Act, the objectives and management actions developed as part of the CMP are required to be strategically aligned with the objectives and strategies outlined in the CSP. |

| Council IP&R Component | Purpose | CMP Implementation & Linkage |
|--------------------------------|--|--|
| Delivery Program 4 years | The Delivery Program is a four (4) year program that translates the strategic objectives of the Community Strategic Plan into actions. It is a fixed four-year program, which is a statement of commitment from each newly elected council. It identifies all key activities a council has committed to undertake over its four-year life cycle. | Forthcoming and ongoing CMP actions for the relevant 4-year period must be included in the associated delivery program. |
| Resourcing Strategy 4 years | The Resourcing Strategy supports the delivery program and outlines the resources required to implement it. It is therefore a critical link when translating strategic objectives into actions. The Resourcing Strategy generally consists of three inter-related elements: Long-Term Financial Planning, Asset Management Planning and Workforce Planning. | Resourcing implications of the CMP should be reflected in the Resourcing Strategy, and CMP actions relating to council assets should be considered in the Asset Management Plan. |
| Operational Plan Annual | The Operational Plan is generated over shorter, one-year planning timeframes and provides the detail of the Delivery Program, identifying the individual projects and activities that will be undertaken in a specific year to achieve the commitments of the program. | Forthcoming and ongoing CMP actions are scheduled into each years' operational plan. |
| Annual Report Annual | Council is required to deliver an Annual Report to document their progress in implementing the Delivery Program and Operational Plan activities over each financial year. | The annual report is a mechanism to report on the progress of each CMP action listed in the Delivery Program and Operational Plan. |

6.14 Coastal Protection Works and Emergency Coastal Protection Works

Coastal Protection Works

Public and private infrastructure on the Kiama coast is under immediate threat from coastal erosion and/or inundation. The most critical of these locations and associated coastal assets have been identified in the CMP Stage 2 report (BMT, 2021) and have been prioritised for action through the CMP.

Action G in this CMP outlines plans for interim and permanent coastal protection works (CPWs) at:

- Pacific Avenue, Werri Beach
- North Bombo Beach carpark access road
- Storm Bay northern foreshore

Within the context of this CMP (2024-2034), **Action G** follows an adaptive management approach wherein preliminary activities are carried out to enable CPWs to be established if and when they are needed. In this regard, triggers and thresholds have been established (and will be further reviewed and confirmed as part of **Action G**) that clearly define when future works are to commence.

Given the uncertainty in timing of reaching these triggers and thresholds, CPWs may or may not be established during the 10 year term of this CMP. Notwithstanding, this CMP does propose CPWs as detailed in **Action G**.

Interim Coastal Protection Works

Action G proposes that Interim Coastal Protection Works be constructed as an initial ‘stop-gap’ measure for managing coastal risks prior to construction of permanent CPWs at the locations noted above. The Interim CPWs provide sufficient protection for a period of time to allow appropriate investigations, design, approvals and construction of permanent CPWs at the same locations.

The interim CPWs are designed to be removable, and if permanent CPWs are not in place within 5 years, then the interim CPWs will be removed.

For clarity, interim CPWs are considered as ordinary CPWs under the provisions of the CM Act and therefore require approval before they can be constructed (unlike emergency CPWs that are exempt development, refer further below).

Emergency Coastal Protection Works

Given the unpredictable nature of hazard events, it is possible that severe erosion or inundation along the Kiama coastline may occur during the term of this CMP. If this occurs, then Emergency Coastal Protection Works may be required to prevent further impact and to temporarily preserve functionality of the coastal asset.

Emergency Coastal Protection Works are detailed in the Coastal Zone Emergency Action Subplan (CZEAS) as detailed below.

6.15 Coastal Zone Emergency Action Subplan, if the *Coastal Management Act 2016* requires that subplan to be prepared

A Coastal Zone Emergency Action Subplan (CZEAS) has been developed and forms an important component of the CMP (refer **Annex A**). It provides details of emergency works to be done along the Kiama coast. Section 15(1)(e) of the CM Act outlines that a CZEAS must be included in a CMP if the local council’s local government area contains land within the coastal vulnerability area (CVA), and beach erosion, coastal inundation or cliff instability is occurring on that land.

The CZEAS complies with Section 15 of the CM Act and follows the guidelines for preparing CZEAS (DPIE, 2019). Section 15(3) of the CM Act states that “a coastal zone emergency action subplan is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or cliff instability where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event. For the purposes of this subsection, those roles and responsibilities include the carrying out of works for the protection of property affected or likely to be affected by beach erosion, coastal inundation or cliff instability”.

The Kiama Coastline CZEAS specifies potential emergency coastal protection works at various sites along the Kiama coast where protection may be required in emergency situations following extreme erosion, coastal inundation or cliff instability, including:

- High erosion scarps (storm bite) in any section of beach
- Sewer pump stations, sewer mains and water mains
- Stormwater pits, outlets and channels

- Walkways and footpaths located immediately behind beaches and across headlands, including specifically the Black Beach promenade seawall
- Beach accessways along all beaches, including steps leading onto beaches where a large drop may develop under highly eroded beach conditions
- South Coast Rail Line
- Kiama SLSC
- St Peter and Paul Catholic School
- Low brick wall behind Surf Beach and other buried informal seawalls behind other beaches
- Park Road and Burke Parade, Gerroa
- Carparks adjacent to roadways behind or beside beaches
- Aboriginal cultural sites

The CZEAS, presented in **Annex A** of this CMP Stage 4 report, specifies criteria and thresholds for when emergency action will be initiated, and include a combination of meteorological warnings, set distance offsets for wave run-up or erosion scarps from key assets or essential infrastructure, and where erosion impedes important access or poses a significant risk to the public.

The CZEAS outlines specific works to be carried out. These works include:

- Placement of sand or sandbags (which must be removed within 90 days) on a beach or sand dune adjacent to a beach, in accordance with the following:
 - the council is the lead agency for this work,
 - works must only be implemented when it is safe to do so.
- Installation of temporary fencing and/or signage on council managed land (e.g. foreshore reserves and beach access ways) affected by beach erosion, coastal inundation or cliff instability
- Closure of council managed roads affected by beach erosion, coastal inundation or cliff instability hazards.
- Shut down water and sewer infrastructure affected by beach erosion, coastal inundation or cliff instability hazards.

7 A Business Plan

A business plan as presented in this section of the CMP outlines the key components of the funding strategy for the CMP, including the cost of the proposed actions, proposed cost-sharing arrangements and other potential funding mechanisms. It has been prepared in accordance with the requirements of the NSW Coastal Management Manual OEH (2018a).

7.1 The Benefits of Implementing the Kiama Coastline CMP

The Kiama Coast is an important natural asset for Council that has significant environmental, social and economic value.

From an environmental perspective, the coastline provides a range of important ecological communities and habitats, and contains a variety of species assemblages and communities. The clean waters along the coastline and mostly productive dune ecosystems also provide excellent examples of healthy environments for educational value.

From a social and cultural perspective, the coast provides an abundance of rich cultural linkages and connections, and contains many tangible and intangible cultural assets and values. The coast is utilised for a variety of passive and active recreational pursuits, with highly valued access by the public.

From an economic perspective, the coast contributes significantly to the local economy of Kiama and more broadly to the economy of the whole Illawarra region through its broad ecosystem services, tourist visitation and via local businesses and industries, especially those relating to the Kiama Boat Harbour.

The Kiama Coastline CMP provides a program of works, acquisition, monitoring, investigations, strategic planning and education initiatives that target the threats and risks to the significant environmental, social and cultural values of the coast. The CMP also includes actions directly aimed at improving coastal access and recreational opportunities for the public.

Investment in this CMP provides an opportunity to directly improve and preserve the water quality, environmental habitats, cultural values and recreational amenity of the coast, and will help to improve resilience of the coastal lands to future climate change. Implementation of the CMP will therefore bring significant public benefits.

7.2 Financial Planning and Potential Funding Mechanisms

The Kiama Coastline CMP is estimated to cost \$18.64 million over 10 years (present day value). This includes approximately \$13.17 million in capital works (requiring capex) or one-off costs, and approximately \$5.47 million in operational works and maintenance (requiring opex). Costs include \$6.8 million associated with construction of interim and permanent CPWs that may not be required during the term of this CMP. Costs can be partially reduced if Council and agency staff can undertake various activities in the CMP rather than engaging consultants.

Existing staff resources in Council and supporting agencies are expected to be involved in facilitating the delivery of the CMP actions, with continuing oversight by the CMP Operational Working Group, once established (see **Action A**).

Cost Sharing Arrangements

Council will not have available staff, budget and resources to fund and implement this CMP alone. Cost sharing arrangements will therefore be needed with other stakeholders of the Kiama coastline.

Sustainable funding and cost sharing arrangements for management actions will be established in consultation with key stakeholders. Funding for management actions may be gained from various

sources, including Council's internal funds, competitive State Government grant programs and local third parties. In most cases, costs will need to be equitably shared by the stakeholders and supporting organisations that are responsible for implementation.

Certification of this CMP will facilitate eligibility for funding of key actions through the competitive NSW Coastal and Estuary (C&E) Grants Program. Project eligibility under this program is subject to funding round objectives. For relevant projects that address a documented action in a certified CMP, funding under the NSW Coastal and Estuary Grants Program is provided on the ratio of \$2 from the State Government for every \$1 provided by Council.

Funding through multiple grant programs is expected in order to fully implement the CMP. Eligibility of funding to support this CMP depends on the requirements of each funding mechanism.

The CMP Business Plan should be used in future applications for external funding and contributions, which details indicative costs and indicative cost sharing arrangements.

Sourcing appropriate funding for each Management Action may require considerable effort. If difficulties in seeking sufficient funding are delaying the implementation of the CMP, then alternative sources of funding may need to be explored, including applying for new or novel grant funding programs as they are established throughout the course of this CMP.

Council Funding

Council funding is allocated based on the Resource Strategy and Long Term Financial Plan, which supports the Delivery Program (four-yearly) and the Operational Plan (yearly) under the IP&R Framework.

Key funding sources for Council are statutory rates and charges, which can be applied to private landowners and businesses. Ordinary rates fund a range of Council operational and delivery services, and therefore may also be a key revenue stream to support the implementation of activities recommended in this CMP.

External Sources of Funding

It will not be possible for Council to implement all actions identified in this CMP without additional sources of funding. As such, the identification of grants and the submission of successful funding applications is an important component of this CMP.

There are a range of other funding mechanisms available for financing the implementation of the CMP. For example, Council has the opportunity to access various state grants programs, as listed in Table 7.1. The value of this funding cannot be accurately quantified until such time as it is awarded. It should be noted that this is not an exhaustive list of all funding opportunities, and that additional or new funding sources may become available over the ten-year lifecycle of the CMP, while some existing funding sources may be replaced or cease in the future.

Regardless of the nominated priority and timeframe of each of the Management Actions listed in the CMP, implementation will be largely determined by the availability of resources and funding.

Table 7.1 Summary of External Funding Sources

| Funding Source | Specifics of Grant Program |
|--|---|
| NSW Coastal and Estuary Grants Program | <p>The costs associated with delivery of the CMP can be partly funded by the NSW Coastal and Estuary Grants Program administered by DCCEEW (Office of the Secretary) and supported by DCCEEW-BCSG. The program supports coastal and estuary planning projects and the implementation of works identified in certified CMPs. Funding is available under five funding streams:</p> <ul style="list-style-type: none"> • A planning stream: for planning and studies including investigation, design and cost-benefit analyses for infrastructure works recommended in a certified CMP; and • Four (4) implementation streams – one for each of the coastal management areas (viz: CWLRA, CVA, CEA, CUA). The focus of these streams are projects that manage risks from coastal hazards, and improve the health of estuaries, wetlands and littoral rainforests across New South Wales. |
| Marine Estate Management Strategy | <p>A number of management actions in the CMP may be eligible for funding under the NSW Marine Estate Management Strategy (MEMS). The MEMS provides an overarching, strategic approach to the coordination and management of the marine estate through to 2028.</p> <p>The management of priority threats is grouped into nine (9) management initiatives that summarise the objectives, benefits, threats, stressors and proposed management actions. An implementation plan (developed by the Authority’s member agencies in consultation with key stakeholders) articulates the management actions in more detail. CMPs are key delivery mechanisms for the MEMS.</p> |
| Increasing Resilience to Climate Change Program | <p>This is a partnership program between Local Government NSW (LGNSW) and DCCEEW (BCSG) – Coast and Estuaries, to encourage implementation of actions to address identified climate risks and enhance adaptive capacity across the state.</p> |
| Saving our Species program | <p>Administered by DCCEEW (BCSG), the Saving our Species (SoS) program sets out the NSW Government’s threatened species management plan. The main objectives of SoS are to increase the number of threatened species that are secure in the wild in New South Wales for the next 100 years, and control the key threats facing the states threatened plants and animals.</p> |
| Habitat Action Grants | <p>Administered by DPI - Fisheries, the Habitat Action Grants program offers grants of up to \$40,000, funded from the Recreational Fishing Trust, with revenue from the NSW Recreational Fishing Fee. The aim of the grants is to improve fish habitat and recreational fishing. Habitat rehabilitation projects that may be funded include:</p> <ul style="list-style-type: none"> • Removal or modification of barriers to fish passage • rehabilitation of riparian lands (river banks, wetlands, mangrove forests, saltmarsh) • re-snagging waterways with timber structure • removal of exotic vegetation from waterways and replace with native species • bank stabilisation works |
| Flagship Fish Habitat Rehabilitation Grants | <p>Administered by DPI - Fisheries, the Flagship Fish Habitat Rehabilitation Grant program offers grants of up to \$400,000 for individual projects that significantly enhance fish habitat, water quality and fish passage opportunities within the coastal catchments of NSW. The program builds on the existing Habitat Action</p> |

| Funding Source | Specifics of Grant Program |
|--|--|
| | Grants and seeks to tackle much larger scale projects that require higher levels of funding assistance. |
| NSW Heritage Grants | <p>This program is administered by DCCEEW (BCSG) and aims to fund projects that provide sustainable, long-term heritage benefits and provide public benefit and enjoyment from heritage. Funding may be available for the management of heritage items in the coastal environment. Areas of interest include:</p> <ul style="list-style-type: none"> • Aboriginal Cultural Heritage grants • Caring for State Heritage grants • Community Heritage grants • Grants for local government |
| NSW Environment Trust Grants | <p>The NSW Environment Trust is an independent statutory body established by the NSW Government to make and supervise the environment grants. The Trust is administered by DCCEEW (BCSG).</p> <p>Funding is available under the NSW Environment Trust to a broad range of organisations for projects that enhance the environment of NSW. Grants may be awarded for on ground rehabilitation and improvement works, research applications, land acquisition, waste reduction and promotion of environmental education.</p> |
| Council Litter Prevent Grants Program | Administered by the NSW Environment Protection Authority (EPA), the Council Litter Prevention Grants Program provides funding for councils to deliver litter reduction and prevention, applying an integrated approach to projects that help institutionalise litter prevention. Funding covers both on-ground projects and behavioural initiatives for organisations to reduce litter generation. Works cover integration of education, infrastructure, enforcement and monitoring and evaluation. |
| Crown Reserves Improvement Fund Program | Administered by DPHI (Crown Lands), the Crown Reserves Improvement Fund Program provides financial support for the development, maintenance and improvement of Crown reserves. Funding under this program is subject to a competitive grant application process and eligibility requirements which may change from year to year and in accordance with departmental priorities. |
| Australian Research Council (ARC) | <p>The Australian Research Council (ARC) is a Commonwealth entity within the Australian Government that supports fundamental and applied research and research training. The ARC Linkage Program promotes partnerships between researchers and business, industry, community organisations and other publicly funded research agencies, to transfer skills, knowledge and ideas.</p> <p>ARC funding is provided to research organisations.</p> |
| National Indigenous Australia Agency (NIAA) | <p>The NIAA works to influence policy across the entire Australian Government, in support to the Minister for Indigenous Australians. It liaises closely with State and Territory governments, Indigenous peak bodies, stakeholders and service providers to ensure that Indigenous programs and services are delivering for Aboriginal and Torres Strait Islander peoples as intended.</p> <p>NIAA supports the national Indigenous Rangers Program, which has created more than 2,100 full-time, part-time and casual jobs in land and sea management across the country. Federal grants to Rangers groups are administered by NIAA.</p> |

| Funding Source | Specifics of Grant Program |
|---|---|
| <p>Protecting our Place program</p> | <p>The program encourages and empowers Aboriginal communities to protect, conserve and restore landscapes and waterways important to them. Projects undertaken under the program aim to:</p> <ul style="list-style-type: none"> • Contribute to ongoing sustainable management of significant Aboriginal cultural landscapes in NSW • Contribute to healthier environments and communities • Develop project management capabilities of Aboriginal groups • Encourage new collaborations and positive relationships with other organisations, government and stakeholders. <p>The program is administered through DCCEE (BCSG) and NSW Environment Trust.</p> |
| <p>NSW Boating Now</p> | <p>Administered by Transport for NSW, the NSW Boating Now Program provides grant funding to improve maritime infrastructure and facilities across NSW, including boat ramps, pontoons, sewage pump-outs and passive craft launching facilities. This investment supports the needs of recreational and commercial boaters and enables broader economic and social benefits for communities. The program is funded from boating licences, registrations and other fees collected by Transport for NSW.</p> |
| <p>Business Case and Strategy Development Fund</p> | <p>Administered by the Department of Primary Industries and Regional Development (formerly Regional NSW), the Business Case and Strategy Development Fund aims to support local councils, joint organisations of councils, not-for-profit, industry and Aboriginal community groups develop business cases or strategies for projects delivering significant economic or social benefits to regional communities, with a focus on infrastructure.</p> |

7.3 Cost-Benefit Distribution

An analysis of the distribution of costs and benefits to Council, public authorities, stakeholders and the environment is recommended when preparing a CMP (OEH, 2018a). During Options Assessments undertaken in Stage 3 (BMT, 2022), a multi-criteria analysis was undertaken in order to assess the direct and indirect impact of each potential option on identified risks and threats. Through this process, actions in the CMP have been developed with the primary aim to benefit the environmental health and condition of the Kiama coastline.

One action within this CMP has relevance to private interests, **Action F**, which involves the management and on-going monitoring of existing assets and infrastructure within the coastal zone. Most existing assets and infrastructure at risk from coastal hazards are publicly owned, however, there are a small number of private lands that are also at risk and contain assets requiring on-going management to ensure the safety of people and to minimise future property damage.

Adoption of **Action F** on private land will require funding from those individual private landholders. Public money is not proposed to address existing or future coastal risks on private lands.

For clarity, all Actions in this CMP to be undertaken by public authorities, will be 100% for public benefit.

7.4 Implementation Plan

The Kiama CMP Business Plan is provided in Table 7.2 and identifies:

- Action ID and Name;
- Responsibilities – including the lead agency for implementation and any supporting agencies;
- Priority and timeframe for delivery;
- Forward cost estimates (capital [capex] and operational plus maintenance [opex]) – which have been discretised into the forthcoming Delivery Program (DP) periods of the Kiama Municipal Council IP&R framework. Where an action would only require existing staff time, assets and services these are noted as “\$ST”. Where there are no costs for capex, opex or staff time, these are noted as “\$ -”.
- Potential funding mechanisms; and
- The private vs public benefit distribution of the action.

7.5 Implementation Schedule

A summarised Implementation Schedule for the Management Actions of this CMP and their associated tasks is presented in Table 7.3. This schedule has taken into consideration the capacity of relevant authorities to undertake the necessary works to successfully deliver the CMP within the timeframes specified.

Included in Table 7.3 are capital expenses (capex) including one-off expenses, and operational and maintenance expenses (opex), along with relevant funding sources and indicative cost sharing arrangements between stakeholders responsible for implementation.

Note: Where an action would only require existing staff time, assets and services these are noted as "\$ST". Where there are no costs for capex, opex or staff time, these are noted as "\$ -"

Table 7.2 Kiama CMP Business Plan

| Action/Task ID and Name | Responsibilities | | Delivery | | Costs and Funding (note opex includes operational and maintenance costs) | | | | | | | | | | | | |
|---|------------------|---|------------------|--------------------|--|----|----|----------------------------|----------------------------|----|----------------------------|----|----|----------------------------|--|--------------------------|-------------------------|
| | Lead Agency | Supporting Agencies | Priority | Delivery Timeframe | Delivery Program 2024-2026 | | | Delivery Program 2027-2029 | | | Delivery Program 2030-2033 | | | | Total 10yr Cost | Sources of Funding | Indicative Cost Sharing |
| | | | | | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | | | |
| A. Establish a Coastal Management Program (CMP) Operational Working Group (OWG) for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP | | | Very High | Short Term | \$ST | | | | \$ST | | | | | \$ST | | | |
| Task A.1 – Engage with agencies and stakeholders to gauge interest and establish scope of OWG | Council | DCCEEW-BCSG, DPHI-Crown Lands, DPHI-Planning, DPI-Fisheries, TfNSW, LLS, NPWS, Sydney Water, ILALC, JLALC, ISJO | | | \$ST | | | | \$ - | | | | | \$ - | Kiama Municipal Council | Council | |
| Task A.2 – Prepare Terms of Reference (ToR) for the OWG | Council | DCCEEW-BCSG | | | \$ST | | | | \$ - | | | | | \$ - | Kiama Municipal Council | Council | |
| Task A.3 – Formally establish the OWG in accordance with the agreed ToR | Council | DCCEEW-BCSG, DPHI-Crown Lands, DPI-Fisheries, TfNSW, LLS, NPWS, Sydney Water, ILALC, JLALC, ISJO | | | \$ST | | | | \$ST | | | | | \$ST | Kiama Municipal Council | Council | |
| B. Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach for future development to adequately manage existing and future coastal risks | | | Very High | Short Term | \$650,000 capex \$ST | | | | \$ST | | | | | \$650,000 capex | | | |
| Task B.1 – Prepare and submit a Planning Proposal to State Government for mapping the Coastal Vulnerability Area (CVA) | Council | DCCEEW-BCSG, DPHI-Planning | | | \$50,000 capex or \$ST | | | | \$ - | | | | | \$50,000 capex or \$ST | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Task B.2 – Undertake a thorough review of the LEP and supporting documents for consistency with the Coastal Management Program (CMP) and CVA | Council | DCCEEW-BCSG, DPHI-Planning | | | \$100,000 capex or \$ST | | | | \$ - | | | | | \$100,000 capex or \$ST | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Task B.3 – Review options and propose changes to the LEP and other land use planning controls, including a new Coastal Hazards DCP | Council | DCCEEW-BCSG, DPHI-Planning | | | \$200,000 capex or \$ST | | | | \$ - | | | | | \$200,000 capex or \$ST | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Task B.4 – Make recommended changes to the LEP and prepare the new DCP following appropriate legislated process, including public consultation | Council | DCCEEW-BCSG | | | \$200,000 capex or \$ST | | | | \$ - | | | | | \$200,000 capex or \$ST | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Task B.5 – Update pre-lodgement Development Application (DA) checklist to include key elements of the Coastal Hazards DCP, the updated LEP and the R&H SEPP | Council | DCCEEW-BCSG, DPHI-Planning, Sydney Water, TfNSW | | | \$100,000 capex or \$ST | | | | \$ - | | | | | \$100,000 capex or \$ST | Increasing Resilience to Climate Change Program (or similar future programs) Kiama Municipal Council | NSW Government / Council | |
| Task B.6 – Utilise the use of the pre-lodgement checklist for all coastal infrastructure development proposed within a coastal risk area (being assessed through both Parts 4 and 5 of the Environment Planning & Assessment Act 1979) | Council | | | | \$ST | | | | \$ST | | | | | \$ST | Kiama Municipal Council | Council | |
| C. Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA) | | | High | Medium Term | \$30,000 capex \$ST | | | | \$30,000 capex \$ST | | | | | \$60,000 capex \$ST | | | |
| Task C.1 – Consult with relevant landholders and provide them with information resources regarding existing and future coastal hazards, including the CZEAS, and implications for CVA declaration on land use and future development | Council | DCCEEW-BCSG | | | \$10,000 capex \$ST | | | | \$ - | | | | | \$10,000 capex \$ST | Kiama Municipal Council Coastal and Estuary Grants Program | NSW Government / Council | |
| Task C.2 – Incentivise and support relevant landholders and lessees of public land in hazard-affected coastal areas to engage with local emergency services including the NSW State Emergency Service (SES), and prepare an appropriate emergency plan that takes into account response to coastal hazards, such as severe storm surge inundation | Council | DCCEEW-BCSG NSW SES DPHI-Crown Lands | | | \$20,000 capex \$ST | | | | \$30,000 capex \$ST | | | | | \$50,000 capex \$ST | Increasing Resilience to Climate Change Program Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Task C.3 – Amend Council's Public Land Management Policy to incorporate a requirement for an appropriate emergency plan into future leasing agreements of public coastal land at risk of coastal hazards | Council | DCCEEW-BCSG | | | \$ST | | | | \$ - | | | | | \$ - | Kiama Municipal Council | Council | |

Note: Where an action would only require existing staff time, assets and services these are noted as "\$ST". Where there are no costs for capex, opex or staff time, these are noted as "\$ -"

| Action/Task ID and Name | Responsibilities | | Delivery | | Costs and Funding (note opex includes operational and maintenance costs) | | | | | | | | | | Sources of Funding | Indicative Cost Sharing |
|---|------------------------------|--|----------|--------------------|--|----|----------------------------|--|----|----------------------------|----|----|--|--|--|--------------------------|
| | Lead Agency | Supporting Agencies | Priority | Delivery Timeframe | Delivery Program 2024-2026 | | Delivery Program 2027-2029 | | | Delivery Program 2030-2033 | | | Total 10yr Cost | | | |
| | | | | | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | | Y9 | | |
| D. Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area (LGA) coastline | | | Medium | Short Term | \$100,000 capex \$ST | | | \$ST | | | | | \$100,000 capex or \$ST | | | |
| Task D.1 – Consult with private landholders along the coast where new public access is sought | Council | DCCEEW-BCSG, DPHI-Planning | | | \$ST | | | \$ - | | | | | \$ - | Kiama Municipal Council | Council | |
| Task D.2 – Confirm and prioritise coastal fringe land to be acquired or easements established (depending on suitability) | Council | DCCEEW-BCSG, DPHI-Planning | | | \$ST | | | \$ - | | | | | \$ - | Kiama Municipal Council | Council | |
| Task D.3 – Prepare and implement a Coastal Land Public Assess strategy, guided by Council's Acquisition and Disposal of Land and Easements Policy | Council | DCCEEW-BCSG | | | \$50,000 capex or \$ST | | | \$ST | | | | | \$50,000 capex or \$ST | Business Case and Strategy Development Fund Coastal and Estuary Grants Program Environmental Trust Grants Kiama Municipal Council | NSW Government / Council | |
| Task D.4 – Incorporate provisions within the proposed Coastal Hazards Development Control Plan (DCP) or other relevant local plans requiring dedication of priority coastal fringe lands for public access if associated lots are developed in the future (e.g. subdivision of land). | Council | DCCEEW-BCSG | | | \$50,000 capex or \$ST | | | \$ - | | | | | \$50,000 capex or \$ST | Coastal and Estuary Grants Program Environmental Trust Grants Kiama Municipal Council | NSW Government / Council | |
| E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values | | | High | Long Term | \$290,000 capex \$60,000 opex \$ST | | | \$210,000 capex \$60,000 opex | | | | | \$280,000 capex \$80,000 opex | \$780,000 capex \$200,000 opex \$ST | | |
| Task E.1 – Assess the condition of all existing access tracks and other community facilities and amenities on coastal lands | Council | DCCEEW-BCSG DPHI-Crown Lands | | | \$80,000 capex or \$ST | | | \$ - | | | | | \$80,000 capex | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Task E.2 – Review existing Council policies and asset plans, and consult with Council's Infrastructure and Liveability Advisory Committee, to identify priority works for improving coastal access tracks, amenities and facilities | Council | DCCEEW-BCSG DPHI-Crown Lands | | | \$ST | | | \$ - | | | | | \$ - | Kiama Municipal Council | Council | |
| Task E.3 – Undertake on-ground works to improve coastal access tracks, amenities and facilities | Council | DCCEEW-BCSG DPHI-Crown Lands | | | \$70,000 / yr capex \$20,000 / yr opex | | | \$70,000 / yr capex \$20,000 / yr opex | | | | | \$70,000 / yr capex \$20,000 / yr opex | Coastal and Estuary Grants Program Crown Reserve Improvement Fund NSW Environment Trust Kiama Municipal Council | NSW Government / Council | |
| F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks | | | Medium | Short Term | \$200,000 capex \$80,000 opex \$ST | | | \$120,000 opex | | | | | \$160,000 opex | \$200,000 capex \$360,000 opex \$ST | | |
| Task F.1 – Guided by the Stage 2 CMP risk assessment, conduct a detailed evaluation of each asset identified as being at risk of coastal hazards | Council, Sydney Water, TfNSW | DCCEEW-BCSG DPHI-Crown Lands | | | \$200,000 capex | | | \$ - | | | | | \$200,000 capex | Asset owners Increasing Resilience to Climate Change Program Coastal and Estuary Grants Program | Individual asset owners Council / NSW Government | |
| Task F.2 – Modify existing asset management plans and/or develop new plans, where required, to address coastal hazards and risks | Council, Sydney Water, TfNSW | DCCEEW-BCSG DPHI-Crown Lands | | | \$ST | | | \$ - | | | | | \$ST | Asset owners | Individual asset owners | |
| Task F.3 – Condition of existing coastal infrastructure and built assets to be monitored by owners/managers | Council, Sydney Water, TfNSW | DCCEEW-BCSG DPHI-Crown Lands | | | \$40,000 / yr opex (commencing Year 2) | | | \$40,000 / yr opex | | | | | \$40,000 / yr opex | Asset owners Increasing Resilience to Climate Change Program Coastal and Estuary Grants Program | Individual asset owners Council / NSW Government | |
| G. Design and obtain relevant permits and approvals for 'interim' coastal protection works (CPW) along Pacific Avenue at South Werri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established. | | | Medium | Long Term | \$200,000 capex | | | \$550,000 capex \$20,000 opex | | | | | \$6,000,000 capex \$30,000 opex | \$6,750,000 capex \$50,000 opex | | |
| Task G.1 – Prepare REF and obtain approval for 'interim' coastal protection works (CPWs). | Council | DCCEEW-BCSG DPHI-Crown Lands DPI-Fisheries | | | \$200,000 capex (Year 1) | | | \$ - | | | | | \$200,000 capex | Kiama Municipal Council Coastal and Estuary Grants Program | NSW Government / Council | |
| Task G.2 – If agreed triggers and thresholds are reached, construct interim coastal protection works (CPWs) without delay at required location(s). | Council | DCCEEW-BCSG | | | \$ - | | | \$250,000 capex (value and timing assumed) \$10,000/yr opex | | | | | \$10,000 / yr opex (to 5 year max) | \$250,000 capex \$50,000 opex | Kiama Municipal Council Disaster funding, if disaster declared Coast and Estuary Grants Program (if timing aligns) | NSW Government / Council |
| Task G.3 – Triggered by the construction of interim coastal protection works (CPWs) at one or more locations (refer Task G.2), undertake site-specific investigations (survey, geotechnical etc), prepare detailed designs, prepare REF and obtain approval of permanent CPWs | Council | DCCEEW-BCSG DPHI-Crown Lands DPI-Fisheries | | | \$ - | | | \$300,000 capex (value and timing assumed) | | | | | \$ - | \$300,000 capex | Kiama Municipal Council Coastal and Estuary Grants Program | NSW Government / Council |
| Task G.4 – Construct permanent coastal protection works (CPWs) at one or more locations to replace interim CPWs established at the same location(s) | Council | DCCEEW-BCSG | | | \$ - | | | \$ - | | | | | \$6,000,000 capex (value and timing assumed) Capex includes: \$1m North Bombo \$1.7m Storm Bay \$3.3m South Werri | \$6,000,000 capex | Kiama Municipal Council Coastal and Estuary Grants Program | NSW Government / Council |

Note: Where an action would only require existing staff time, assets and services these are noted as "\$ST". Where there are no costs for capex, opex or staff time, these are noted as "\$ -"

| Action/Task ID and Name | Responsibilities | | Delivery | | Costs and Funding (note opex includes operational and maintenance costs) | | | | | | | | | | | |
|---|-------------------------|---|------------------|--------------------|--|--|----------------------------|---|--------------------------|---|-------------|---|-------------------------------------|-----------------|--------------------|-------------------------|
| | Lead Agency | Supporting Agencies | Priority | Delivery Timeframe | Delivery Program 2024-2026 | | Delivery Program 2027-2029 | | | Delivery Program 2030-2033 | | | | Total 10yr Cost | Sources of Funding | Indicative Cost Sharing |
| | | | | | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | | | |
| H. Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline | | | High | Medium Term | \$ST | \$175,000 capex | \$ST | \$30,000 capex | \$ST | \$205,000 capex | \$ST | | | | | |
| Task H.1 – Undertake additional site specific geotechnical investigations | Council | DCCEEW-BCSG TfNSW | | | \$ - | \$150,000 capex | | \$ - | | \$150,000 capex | | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | | | |
| Task H.2 – Monitor cliff and slope instability at key locations identified within the Stage 2 report | Council | DCCEEW-BCSG | | | \$ST | \$ST | | \$30,000 capex \$ST | | \$30,000 capex \$ST | | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | | | |
| Task H.3 – Undertake a research study into the geodiversity of the Kiama coastline to support future conservation and management of key geological features | Council | DCCEEW-BCSG | | | \$ - | \$25,000 capex | | \$ - | | \$25,000 capex | | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | | | |
| Task H.4 - Update mapping the R&H SEPP and/or LEP to incorporate cliff instability hazard based on results of relevant geotechnical studies, including studies done by agencies. | Council | DCCEEW-BCSG DPHI-Planning | | | \$ST | \$ST | | \$ST | | \$ST | | Kiama Municipal Council | Council | | | |
| I. Ensure that infrastructure development and future management of Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable | | | Medium | Long Term | \$ST | \$800,000 capex | \$200,000 opex | \$ST | \$2,400,000 capex | \$600,000 opex | \$ST | \$3,200,000 capex | \$800,000 opex | \$ST | | |
| Task I.1 – TfNSW and Council to work collaboratively in delivering specific actions within the Kiama Harbour Revitalisation Plan that are aligned with the objectives and time frame of this CMP subject to approved funding and environmental planning approvals (Includes updating the existing jetty adjacent to the boatramp and expanding and improving access | Council | TfNSW DPHI-Crown Lands DCCEEW-BCSG | | | \$ST | \$800,000 capex \$200,000 opex \$ST (Update existing Jetty) | | \$2,400,000 capex \$600,000 opex \$ST (Expand and improve access Black Beach / School Flat) | | \$3,200,000 capex \$800,000 opex \$ST | | Coastal and Estuary Grants Program Crown Reserve Improvement Fund NSW Environment Trust NSW Boating Now Kiama Municipal Council | NSW Government / Council | | | |
| J. Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country | | | Very High | Short Term | \$70,000 capex | \$15,000 opex | \$ST | \$90,000 opex | \$ST | \$120,000 opex | \$ST | \$70,000 capex | \$225,000 opex | \$ST | | |
| Task J.1 – Engage with the local Aboriginal community to understand their preferences for participation in land and sea management along the Kiama coastline | Council ILALC, JLALC | DCCEEW-BCSG | | | \$ST | \$ST | | \$ST | | \$ST | | Kiama Municipal Council ILALC / JLALC | NSW Government / Council / LALCs | | | |
| Task J.2 – Invite Traditional Owner (TO) representation onto the CMP Operational Working Group | Council | ILALC, JLALC | | | \$5,000 / yr opex \$ST | \$5,000 / yr opex \$ST | | \$5,000 / yr opex \$ST | | \$50,000 opex \$ST | | Coastal and Estuary Grants Program NSW Heritage Grants National Indigenous Australian Agency MEMS Kiama Municipal Council | NSW Government / Council | | | |
| Task J.3 – Consult with Aboriginal cultural knowledge holders to gain an understanding of the cultural and heritage significance of the coastline and culturally appropriate ways to better acknowledge and share, if appropriate, the indigenous cultural heritage of the Kiama coastline | Council ILALC, JLALC | DCCEEW-BCSG DPI - Fisheries | | | \$50,000 capex \$ST | \$ST | | \$ST | | \$50,000 capex \$ST | | Coastal and Estuary Grants Program NSW Heritage Grants National Indigenous Australian Agency MEMS Protecting our Places Grants Kiama Municipal Council | NSW Government / Council / LALCs | | | |
| Task J.4 – Support the existing, and develop additional, Indigenous Rangers groups for the Kiama / Illawarra area under the National Indigenous Australians Agency's National Indigenous Rangers Program and/or any other funding, legislative or hand back arrangements | Council ILALC, JLALC | DCCEEW-BCSG DPI - Fisheries LLS NPWS | | | \$20,000 capex | \$25,000 / yr opex (commencing Year 4) | | \$25,000 / yr opex | | \$20,000 capex \$175,000 opex | | Coastal and Estuary Grants Program NSW Heritage Grants National Indigenous Australian Agency MEMS Local Lands Services Protecting our Places Grants DCCEEW Environmental Restoration and Rehabilitation Kiama Municipal Council | NSW Government / Council / LALCs | | | |

Note: Where an action would only require existing staff time, assets and services these are noted as "\$ST". Where there are no costs for capex, opex or staff time, these are noted as "\$ -"

| Action/Task ID and Name | Responsibilities | | Delivery | | Costs and Funding (note opex includes operational and maintenance costs) | | | | | | | | | | Sources of Funding | Indicative Cost Sharing | |
|---|------------------|--|----------|--------------------|--|----|----|----------------------------|----|----|----------------------------|---------------------|----|-----|--|--|-------------------------------------|
| | Lead Agency | Supporting Agencies | Priority | Delivery Timeframe | Delivery Program 2024-2026 | | | Delivery Program 2027-2029 | | | Delivery Program 2030-2033 | | | | | | Total 10yr Cost |
| | | | | | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | | | |
| K. Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values | | | Medium | Long Term | \$50,000 capex \$780,000 opex \$ST | | | \$780,000 opex | | | | \$1,040,000 opex | | | \$50,000 capex \$2,600,000 opex \$ST | | |
| Task K.1 – Prepare a coastal habitat restoration and revegetation works plan that identifies, maps and prioritises specific works locations, along with works details suitable for implementation, such as weeds to be controlled and plants to be used, including species and habitats and locations that have cultural significance to the local community | Council | ISJO DCCEEW-BCSG LLS NPWS ILALC JLALC | | | \$50,000 capex or \$ST | | | \$ - | | | | \$ - | | | \$50,000 capex or \$ST | Coastal and Estuary Grants Program LLS DCCEEW Environmental Restoration and Rehabilitation Protecting our Places Grant Kiama Municipal Council | NSW Government / Council |
| Task K.2 – Engage field teams, including existing Landcare groups and Aboriginal community organisations, to implement pest and weed control, revegetation, fencing and habitat restoration works. Where works are identified as Environment Protection Works (EPWs) within Coastal Wetland and Littoral Rainforest Areas (CWLRA), appropriate planning pathways will be used | Council | ISJO DCCEEW-BCSG LLS NPWS ILALC JLALC | | | \$250,000 / yr opex | | | \$250,000 / yr opex | | | | \$250,000 / yr opex | | | \$2,500,000 opex | Coastal and Estuary Grants Program LLS DCCEEW Environmental Restoration and Rehabilitation Crown Reserve Improvement Fund Kiama Municipal Council (Landcare, Coastcare support) Protecting our Places Grant | NSW Government / Council |
| Task K.3 – Monitor the success of habitat restoration works and refine coastal habitat restoration and revegetation works plan as required | Council | ISJO DCCEEW-BCSG LLS NPWS | | | \$10,000 / yr opex | | | \$10,000 / yr opex | | | | \$10,000 / yr opex | | | \$100,000 opex | Coastal and Estuary Grants Program LLS DCCEEW Environmental Restoration and Rehabilitation Kiama Municipal Council (Landcare, Coastcare support) | NSW Government / Council |
| L. Raise community awareness regarding Council's Public Tree Management Policy to reduce illegal dune vegetation damage and removal | | | High | Medium Term | \$5,000 capex \$ST | | | \$50,000 capex \$ST | | | | \$ST | | | \$55,000 capex \$ST | | |
| Task L.1 – Install signage at strategic locations regarding value of dune vegetation along with actions and penalties that are enforceable under Council's Public Tree Management Policy | Council | DCCEEW-BCSG | | | \$5,000 capex | | | \$ - | | | | \$ - | | | \$5,000 capex | Kiama Municipal Council | Council |
| Task L.2 – As appropriate to the circumstances, pursue one or more elements of Council's Public Tree Management Policy as a deterrent for on-going dune vegetation damage and removal | Council | DCCEEW-BCSG | | | \$ - | | | \$50,000 capex \$ST | | | | \$ST | | | \$50,000 capex \$ST | Coastal and Estuary Grants Program Kiama Municipal Council LLS DCCEEW Environmental Restoration and Rehabilitation | NSW Government / Council |
| M. Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and develop/update culturally appropriate management measures | | | High | Long Term | \$200,000 capex \$60,000 opex \$ST | | | \$60,000 opex \$ST | | | | \$80,000 opex | | | \$200,000 capex \$200,000 opex \$ST | | |
| Task M.1 – Undertake a Kiama coastline Aboriginal cultural values, threats and resilience study | ILALC, JLALC | Council Heritage NSW DCCEEW-BCSG | | | \$200,000 capex | | | \$ - | | | | \$ - | | | \$200,000 capex | Coastal and Estuary Grants Program NSW Heritage Grants National Indigenous Australian Agency MEMS LLS Protecting our Places Grants Australian Research Council Kiama Municipal Council | NSW Government / Council / LALCs |
| Task M.2 – Explore options to revise relevant aspects of the Local Environmental Plan, to recognise Aboriginal cultural values of the Kiama coastline | Council | ILALC JLALC | | | \$ST | | | \$ST | | | | \$ - | | | \$ST | Kiama Municipal Council | Council |
| Task M.3 - Monitor Aboriginal cultural heritage sites at risk of coastal hazards | ILALC, JLALC | Council Heritage NSW DCCEEW-BCSG | | | \$20,000/yr opex | | | \$20,000/yr opex | | | | \$20,000/yr opex | | | \$200,000 opex | Coastal and Estuary Grants Program NSW Heritage Grants (eg Protecting our Place) National Indigenous Australian Agency Protecting our Places Grants Kiama Municipal Council | NSW Government / Council / LALCs |

Note: Where an action would only require existing staff time, assets and services these are noted as "\$ST". Where there are no costs for capex, opex or staff time, these are noted as "\$ -"

| Action/Task ID and Name | Responsibilities | | Delivery | | Costs and Funding (note opex includes operational and maintenance costs) | | | | | | | | | | | | |
|--|------------------|--|----------|--------------------|--|----|----|----------------------------|----|----|----------------------------|----|----|---|---|--------------------------|-------------------------|
| | Lead Agency | Supporting Agencies | Priority | Delivery Timeframe | Delivery Program 2024-2026 | | | Delivery Program 2027-2029 | | | Delivery Program 2030-2033 | | | | Total 10yr Cost | Sources of Funding | Indicative Cost Sharing |
| | | | | | Y1 | Y2 | Y3 | Y4 | Y5 | Y6 | Y7 | Y8 | Y9 | Y10 | | | |
| N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities | | | Medium | Long Term | \$ST | | | \$ST | | | \$20,000 capex \$ST | | | \$20,000 capex \$ST | | | |
| Task N.1 – Maintain awareness of potential community engagement programs that relate to coastal lands, such as engagement for future Local Strategic Planning Statements (LSPS) | Council | DCCEEW-BCSG | | | \$ST | | | \$ST | | | \$ST | | | \$ST | Kiama Municipal Council | Council | |
| Task N.2 – Where suitable, expand planned community engagement programs to capture community input regarding use and demand of coastal lands, facilities and services, and potential conflicts, including conflicts with the natural environment | Council | DCCEEW-BCSG | | | \$ - | | | \$ - | | | \$20,000 capex \$ST | | | \$20,000 capex \$ST | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| O. Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position. | | | High | Long Term | \$ST | | | \$50,000 capex \$ST | | | \$80,000 capex \$ST | | | \$630,000 capex \$ST | | | |
| Task O.1 – Advocate and support maintaining automated water level gauges at Werri Lagoon and in the Crooked River | Council | DCCEEW-BCSG | | | \$ST | | | \$ST | | | \$ST | | | \$ST | Kiama Municipal Council | Council | |
| Task O.2 – Work with Department of Primary Industries - Fisheries to investigate removal options, assess potential impacts, seek necessary approvals and conduct public engagement | Council | DCCEEW-BCSG DPHI-Planning DPHI-Crown Lands DPI-Fisheries | | | \$ - | | | \$50,000 capex \$ST | | | \$ - | | | \$50,000 capex \$ST | Coastal and Estuary Grants Program Floodplain Management Grants Program NSW DPI - Fisheries, Habitat Action Grants MEMS Kiama Municipal Council | NSW Government / Council | |
| Task O.3 - Undertake necessary on-ground works to remove the derelict concrete drainage channel located within Werri Lagoon entrance | Council | DCCEEW-BCSG DPHI-Crown Lands DPI-Fisheries | | | \$ - | | | \$500,000 capex | | | \$ - | | | \$500,000 capex | Coastal and Estuary Grants Program Floodplain Management Grants Program NSW DPI - Fisheries, Habitat Action Grants MEMS Kiama Municipal Council | NSW Government / Council | |
| Task O.4 – Review and update the Werri Lagoon Interim Entrance Management Policy | Council | DCCEEW-BCSG DPHI-Crown Lands DPI-Fisheries | | | \$ - | | | \$ - | | | \$80,000 capex or \$ST | | | \$80,000 capex or \$ST | Coastal and Estuary Grants Program Floodplain Management Grants Program NSW DPI - Fisheries, Habitat Action Grants Kiama Municipal Council | NSW Government / Council | |
| P. Monitor and assess beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required | | | Medium | Short Term | \$200,000 capex \$100,000 opex \$ST | | | \$120,000 opex \$ST | | | \$160,000 opex \$ST | | | \$200,000 capex \$380,000 opex \$ST | | | |
| Task P.1 – Use CoastSnap, or similar photo point monitoring, to undertake citizen science beach monitoring and to assess beach condition change based on image comparisons | Council | DCCEEW-BCSG | | | \$20,000 capex \$20,000/yr opex (commencing Year 2) | | | \$20,000 / yr opex | | | \$20,000 / yr opex | | | \$20,000 capex \$180,000 opex | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Task P.2 – When beach erosion scarps are high, install temporary fencing / barricades and/or close beach access to reduce dangers to the public from these unstable slopes | Council | DCCEEW-BCSG DPI - Fisheries DPHI-Crown Lands | | | \$ST | | | \$ST | | | \$ST | | | \$ST | Kiama Municipal Council | Council | |
| Task P.3 – Implement the Coastal Zone Emergency Action Subplan (CZEAS) when erosion events potentially compromise the integrity and safety of the public, public infrastructure and cultural sites | Council | DCCEEW-BCSG | | | \$80,000 capex \$20,000/yr opex | | | \$20,000 / yr opex | | | \$20,000 / yr opex | | | \$80,000 capex \$200,000 opex | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Task P.4 – Prepare REF, obtain permits and approval and undertake beach scraping of Surf Beach following periods of significant erosion, as required | Council | DCCEEW-BCSG, DPHI- Planning, DPHI-Crown Lands, DPI-Fisheries | | | \$100,000 capex (Year 1) or \$ST | | | \$ST | | | \$ST | | | \$100,000 capex \$ST | Coastal and Estuary Grants Program Kiama Municipal Council | NSW Government / Council | |
| Q. Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations) | | | Medium | Medium Term | \$195,000 opex \$ST | | | \$195,000 opex \$ST | | | \$260,000 opex \$ST | | | \$650,000 opex \$ST | | | |
| Task Q.1 – Expand the current Illawarra Ocean beaches Beachwatch program to other areas of high primary contact with coastal waters | Council | Sydney Water | | | \$40,000 / yr opex | | | \$40,000 / yr opex | | | \$40,000 / yr opex | | | \$400,000 opex | Kiama Municipal Council Environment Protection Authority Sydney Water | NSW Government / Council | |
| Task Q.2 – Where deemed inadequate, increase maintenance of stormwater quality improvement devices | Council | DCCEEW-BCSG | | | \$25,000 / yr opex | | | \$25,000 / yr opex | | | \$25,000 / yr opex | | | \$250,000 opex | Kiama Municipal Council Environment Protection Authority Environmental Trust Grants | NSW Government / Council | |
| Task Q.3 – Sydney Water to provide periodic updates to the Coastal Management Program Operational Working Group on proposed sewer network improvements | Sydney Water | Council | | | \$ST | | | \$ST | | | \$ST | | | \$ST | Sydney Water Council | Sydney Water / Council | |

Table 7.3 Implementation Schedule for Kiama Coastline CMP

| Action Name (and tasks) | Years during CMP | | | | | | |
|---|------------------|---|---|---|---|---|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7-10 |
| A. Establish a Coastal Management Program (CMP) Operational Working Group (OWG) for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP | | | | | | | |
| Task A.1 – Engage with agencies and stakeholders to gauge interest and establish scope of OWG | ■ | | | | | | |
| Task A.2 – Prepare Terms of Reference (ToR) for the OWG | ■ | | | | | | |
| Task A.3 – Formally establish the OWG in accordance with the agreed ToR | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| B. Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach for future development to adequately manage existing and future coastal risks | | | | | | | |
| Task B.1 – Prepare and submit a Planning Proposal to State Government for mapping the Coastal Vulnerability Area (CVA) | ■ | ■ | | | | | |
| Task B.2 – Undertake a thorough review of the LEP and supporting documents for consistency with the Coastal Management Program (CMP) and CVA | | ■ | | | | | |
| Task B.3 – Review options and propose changes to the LEP and other land use planning controls, including a new Coastal Hazards DCP | | ■ | | | | | |
| Task B.4 – Make recommended changes to the LEP and prepare the new DCP following appropriate legislated process, including public consultation | | | ■ | | | | |
| Task B.5 – Update pre-lodgement Development Application (DA) checklist to include key elements of the Coastal Hazards DCP, the updated LEP and the R&H SEPP | | | ■ | | | | |
| Task B.6 – Utilise the use of the pre-lodgement checklist for all coastal infrastructure development proposed within a coastal risk area (being assessed through both Parts 4 and 5 of the Environment Planning & Assessment Act 1979) | | | ■ | ■ | ■ | ■ | ■ |
| C. Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA) | | | | | | | |
| Task C.1 – Consult with relevant landholders and provide them with information resources regarding existing and future coastal hazards, including the CZEAS, and implications for CVA declaration on land use and future development | | ■ | | | | | |
| Task C.2 – Incentivise and support relevant landholders and lessees of public land in hazard-affected coastal areas to engage with local emergency services including the NSW State Emergency Service (SES), and prepare an appropriate emergency plan that takes into account response to coastal hazards, such as severe storm surge inundation | | | ■ | ■ | ■ | ■ | |
| Task C.3 – Amend Council’s Public Land Management Policy to incorporate a requirement for an appropriate emergency plan into future leasing agreements of public coastal land at risk of coastal hazards | | | ■ | | | | |

■ Capital or one-off works ■ Operational or maintenance works

| Action Name (and tasks) | Years during CMP | | | | | | |
|---|------------------|---|---|---|---|---|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7-10 |
| D. Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area (LGA) coastline | | | | | | | |
| Task D.1 – Consult with private landholders along the coast where new public access is sought | | ■ | | | | | |
| Task D.2 – Confirm and prioritise coastal fringe land to be acquired or easements established (depending on suitability) | | | ■ | | | | |
| Task D.3 – Prepare and implement a Coastal Land Public Access strategy, guided by Council’s Acquisition and Disposal of Land and Easements Policy | | | ■ | ■ | ■ | ■ | ■ |
| Task D.4 – Incorporate provisions within the proposed Coastal Hazards Development Control Plan (DCP) or other relevant local plans requiring dedication of priority coastal fringe lands for public access if associated lots are developed in the future (e.g. subdivision of land). | | | ■ | | | | |
| E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values | | | | | | | |
| Task E.1 – Assess the condition of all existing access tracks and other community facilities and amenities on coastal lands | ■ | | | | | | |
| Task E.2 – Review existing Council policies and asset plans, and consult with Council’s Infrastructure and Liveability Advisory Committee, to identify priority works for improving coastal access tracks, amenities and facilities | ■ | | | | | | |
| Task E.3 – Undertake on-ground works to improve coastal access tracks, amenities and facilities | | ■ | ■ | ■ | ■ | ■ | ■ |
| F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks | | | | | | | |
| Task F.1 – Guided by the Stage 2 CMP risk assessment, conduct a detailed evaluation of each asset identified as being at risk of coastal hazards | ■ | ■ | ■ | | | | |
| Task F.2 – Modify existing asset management plans and/or develop new plans, where required, to address coastal hazards and risks | ■ | ■ | ■ | | | | |
| Task F.3 – Condition of existing coastal infrastructure and built assets to be monitored by owners/managers | | | | ■ | ■ | ■ | ■ |
| G. Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Werri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established. | | | | | | | |
| Task G.1 – Prepare REF and obtain approval for ‘interim’ coastal protection works (CPWs). | ■ | | | | | | |
| Task G.2 – If agreed triggers and thresholds are reached, construct interim coastal protection works (CPWs) without delay at required location(s). | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Task G.3 – Triggered by the construction of interim coastal protection works (CPWs) at one or more locations (refer Task G.2), undertake site-specific investigations (survey, geotechnical etc), prepare detailed designs, prepare REF and obtain approval of permanent CPWs | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Task G.4 – Construct permanent coastal protection works (CPWs) at one or more locations to replace interim CPWs established at the same location(s) | | | | | ■ | ■ | ■ |
| H. Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline | | | | | | | |
| Task H.1 – Undertake additional site specific geotechnical investigations | | | | ■ | ■ | | |
| Task H.2 – Monitor cliff and slope instability at key locations identified within the Stage 2 report | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Task H.3 – Undertake a research study into the geodiversity of the Kiama coastline to support future conservation and management of key geological features | | | | | ■ | ■ | |
| Task H.4 - Update mapping the R&H SEPP and/or LEP to incorporate cliff instability hazard based on results of relevant geotechnical studies, including studies done by agencies. | | | | | | | ■ |

■ Capital or one-off works ■ Operational or maintenance works

| Action Name (and tasks) | Years during CMP | | | | | | |
|---|------------------|---|---|---|---|---|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7-10 |
| I. Ensure that infrastructure development and future management of Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable | | | | | | | |
| Task I.1 – TfNSW and Council to work collaboratively in delivering specific actions within the Kiama Harbour Revitalisation Plan that are aligned with the objectives and time frame of this CMP subject to approved funding and environmental planning approvals | | | | | | | |
| J. Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country | | | | | | | |
| Task J.1 – Engage with the local Aboriginal community to understand their preferences for participation in land and sea management along the Kiama coastline | | | | | | | |
| Task J.2 – Invite Traditional Owner (TO) representation onto the CMP Operational Working Group | | | | | | | |
| Task J.3 – Consult with Aboriginal cultural knowledge holders to gain an understanding of the cultural and heritage significance of the coastline and culturally appropriate ways to better acknowledge and share, if appropriate, the indigenous cultural heritage of the Kiama coastline | | | | | | | |
| Task J.4 – Support the existing, and develop additional, Indigenous Rangers groups for the Kiama / Illawarra area under the National Indigenous Australians Agency’s National Indigenous Rangers Program and/or any other funding, legislative or hand back arrangements | | | | | | | |
| K. Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values | | | | | | | |
| Task K.1 – Prepare a coastal habitat restoration and revegetation works plan that identifies, maps and prioritises specific works locations, along with works details suitable for implementation, such as weeds to be controlled and plants to be used, including species and habitats and locations that have cultural significance to the local community | | | | | | | |
| Task K.2 – Engage field teams, including existing Landcare groups and Aboriginal community organisations, to implement pest and weed control, revegetation, fencing and habitat restoration works. Where works are identified as Environment Protection Works (EPWs) within Coastal Wetland and Littoral Rainforest Areas (CWLRA), appropriate planning pathways will be used | | | | | | | |
| Task K.3 – Monitor the success of habitat restoration works and refine coastal habitat restoration and revegetation works plan as required | | | | | | | |
| L. Raise community awareness regarding Council’s Public Tree Management Policy to reduce illegal dune vegetation damage and removal | | | | | | | |
| Task L.1 – Install signage at strategic locations regarding value of dune vegetation along with actions and penalties that are enforceable under Council’s Public Tree Management Policy | | | | | | | |
| Task L.2 – As appropriate to the circumstances, pursue one or more elements of Council’s Public Tree Management Policy as a deterrent for on-going dune vegetation damage and removal | | | | | | | |
| M. Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and develop/update culturally appropriate management measures | | | | | | | |
| Task M.1 – Undertake a Kiama coastline Aboriginal cultural values, threats and resilience study | | | | | | | |
| Task M.2 – Explore options to revise relevant aspects of the Local Environmental Plan, to recognise Aboriginal cultural values of the Kiama coastline | | | | | | | |
| Task M.3 - Monitor Aboriginal cultural heritage sites at risk of coastal hazards | | | | | | | |

Capital or one-off works Operational or maintenance works

| Action Name (and tasks) | Years during CMP | | | | | | |
|--|------------------|---|---|---|---|---|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7-10 |
| N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities | | | | | | | |
| Task N.1 – Maintain awareness of potential community engagement programs that relate to coastal lands, such as engagement for future Local Strategic Planning Statements (LSPS) | | | | | | | |
| Task N.2 – Where suitable, expand planned community engagement programs to capture community input regarding use and demand of coastal lands, facilities and services, and potential conflicts, including conflicts with the natural environment | | | | | | | |
| O. Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position. | | | | | | | |
| Task O.1 – Advocate and support maintaining automated water level gauges at Werri Lagoon and in the Crooked River | | | | | | | |
| Task O.2 – Work with Department of Primary Industries - Fisheries to investigate removal options, assess potential impacts, seek necessary approvals and conduct public engagement | | | | | | | |
| Task O.3 - Undertake necessary on-ground works to remove the derelict concrete drainage channel located within Werri Lagoon entrance | | | | | | | |
| Task O.4 – Review and update the Werri Lagoon Interim Entrance Management Policy | | | | | | | |
| P. Monitor and assess beach and dune conditions to build knowledge and to guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required | | | | | | | |
| Task P.1 – Use CoastSnap, or similar photo point monitoring, to undertake citizen science beach monitoring and to assess beach condition change based on image comparisons | | | | | | | |
| Task P.2 – When beach erosion scarps are high, install temporary fencing / barricades and/or close beach access to reduce dangers to the public from these unstable slopes | | | | | | | |
| Task P.3 – Implement the Coastal Zone Emergency Action Subplan (CZEAS) when erosion events potentially compromise the integrity and safety of the public, public infrastructure and cultural sites | | | | | | | |
| Task P.4 – Prepare REF, obtain permits and approval and undertake beach scraping of Surf Beach following periods of significant erosion, as required | | | | | | | |
| Q. Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations) | | | | | | | |
| Task Q.1 – Expand the current Illawarra Ocean beaches Beachwatch program to other areas of high primary contact with coastal waters | | | | | | | |
| Task Q.2 – Where deemed inadequate, increase maintenance of stormwater quality improvement devices | | | | | | | |
| Task Q.3 – Sydney Water to provide periodic updates to the Coastal Management Program Operational Working Group on proposed sewer network improvements | | | | | | | |

Capital or one-off works Operational or maintenance works

8 Monitoring, Evaluation and Reporting Program

8.1 CMP Monitoring Evaluation and Reporting Requirements

Monitoring, evaluation and reporting (MER) is a mandatory requirement for CMPs under the CM Act. The purpose of MER is to monitor progress on implementing the coastal management actions outlined in the CMP, and to assess the performance of the CMP in achieving its intended outcomes, and therefore the performance of the CMP in achieving the objects of the CM Act. Where monitoring finds that performance is sub-optimal, the evaluation process should identify contingencies to remedy the situation.

This CMP document is the first of many iterations of a coastal program of works to manage the Kiama coastline. The CMP, and the technical studies that underpin it, should be revised at least every 10 years (*CM Act Division 2, s18*).

8.2 Overview of the Monitoring and Evaluation Process

The MER process for the CMP should be fit-for-purpose and focus on the information needed to evaluate the status of coastal management actions and their outcomes. As per the NSW Coastal Management Manual (OEH, 2018a), key elements of a MER program should consider the outcomes that the CMP is trying to achieve over the short, medium, and long term. The MER program comprises of a systematic and integrated approach to CMP planning, implementation and evaluation. Components of the MER include:

- **Component 1: The implementation status of the CMP actions.** The MER should constantly monitor and evaluate the implementation of the management actions.
 - It aims to answer the question: “Has the program of management actions been implemented in accordance with the implementation plan?”
- **Component 2: Relevant environmental parameters** (indicators of environmental health). One of the main goals of the CMP is to improve the environmental and social values of the coastline. Therefore, the MER should also include a component that monitors key environmental health and social value indicators.
 - It aims to answer the question: “Has the implementation of individual management actions, and the integrated CMP more generally, resulted in an improvement in environmental health and social / cultural values of the study area?”
- **Component 3: The performance of the CMP in terms of meeting the objects of the CM Act.** This includes a holistic review of the CMP and its performance against its long-term objectives.
 - It aims to answer the questions – based on the outcomes of Components 1 and 2:
 - “Has the CMP more broadly achieved its intended objectives?”
 - “How has the CMP made a difference?” and
 - “Has the level of risk associated with the various threats facing the coast been reduced?”.

The three components of the MER are described in more detail in the Section below.

If it is determined that the implementation of an action is being delayed compared to the nominated timeframe, then one or both of the following contingencies should be adopted:

- *Contingency 1: Delays in Commencing Actions.* Determine the cause for the delay in implementation. If delays are funding based, then seek alternative sources of funding, including applying for new or novel grant funding programs. If delays are resource-based, seek additional assistance from stakeholder agencies and / or consider using an external consultancy to coordinate implementation of the action(s). This can be facilitated through the Business Plan; and
- *Contingency 2: Delays in Completing Actions:* If necessary, modify and update the CMP to reflect a timeframe or costing for implementation of the action that is more achievable. It should be noted that revisions to the CMP would need to be supported by all relevant stakeholders and agencies responsible for implementation and recertified by the Minister.

8.3 Component 1: Delivery of CMP Actions

Monitoring

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

It is recommended that the proposed CMP Operational Working Group monitor the status of the various CMP Management Actions, and maintain an up-to-date program of works. Management Actions and associated tasks can be reviewed and updated at each CMP Operational Working Group meeting, each being classified as one of the following:

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

Dates of commencement and practical completion should be monitored and recorded by the Operational Working Group.

Evaluation and Reporting

Each Management Action itemised in this CMP relates to one or more defined CMP objectives, and has one or more specific performance indicators to indicate success of the action. Each CMP action should be evaluated for its performance in achieving the designated objectives, using the established success indicators (as detailed in **Annex B** of this CMP). The CMP Operational Working Group should be responsible for deciding if the success indicators have been met for each CMP Management Action.

The IP&R reporting system (including annual operational reporting and longer interval strategic reporting) provides the opportunity to formally report on monitoring of coastal management and its outcomes. Council delivers an Annual Report to document their progress in implementing their Four-Year Delivery Program and Annual Operational Plan activities over each financial year. This provides for a yearly evaluation of the implementation status of each action in the CMP. In addition, Council should provide four-yearly and ten-yearly reporting on the CMP implementation in line with the delivery program and the 10 yearly review of the CMP.

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

8.4 Component 2: Environmental Parameters and Indicators

Monitoring

A key component of the MER process will be to utilise physical datasets that can provide an indication of environmental health and social values, and track the progress of the CMP towards achieving intended outcomes. Furthermore, datasets will be used to improve our understanding of the stressors that influence the outcomes.

It should be noted that while the monitoring of environmental indicators is important to ascertain environmental health at a point in time, it cannot always be reliably used to determine the short term “success” of individual management actions. This is because the environmental processes respond to both short term stressors, as well as to longer term historical legacy impacts. For this reason, environmental health indicators can demonstrate variability over short-, medium- and long-term cycles that may range from several days, to years or even decades. Furthermore, the cause and effect of such variability may not always be readily understood, nor easily detected in a short-term dataset. In this context, linking short to medium term changes in environmental health indicators to the impact of CMP management actions, can often be fraught with complexity.

Nonetheless, over the *long term*, the monitoring of key environmental health indicators is the most practical way to assess the overall performance of the CMP at achieving its outcomes. Assessing outcomes over the short to medium term will require consideration of the physical and chemical process context, and expert technical judgement.

Environmental data is currently collected along the coastline, including the Beachwatch water quality program. **Action Q** proposes to continue the Beachwatch program and to expand the number of primary contact sites where water quality is monitored.

Monitoring is also proposed as part of several other Actions including:

- **Action G** – monitoring of beach erosion conditions, specifically threatening identified assets at risk
- **Action H** – monitoring of cliff stability at higher risk locations
- **Action K** – monitoring coastal vegetation and habitats for pest, weeds and success of rehabilitation and restoration works
- **Action M** – monitoring of cultural sites
- **Action O** – monitoring of water levels in Werri Lagoon and Crooked River to support entrance management
- **Action P** – monitoring of beach conditions using citizen science image capture and analysis

Triggers and Thresholds

For some Management Actions, specific tasks or responses will be required once certain environmental conditions occur. These conditions would be defined by specific trigger levels, or thresholds, of relevant environmental conditions. This approach of defining a trigger or threshold, conducting monitoring, and then responding only when the trigger or threshold is reached to avoid an unacceptable outcome occurring is the fundamental basis of adaptive management.

In its simplest form, **Action Q** supports a well-established management approach addressing health risks on beaches used for recreation. When monitoring results from the Beachwatch program exceed defined thresholds, Council is instructed to erect signs and close beaches for swimming to avoid the risk of bacterial infections. This is generally limited to periods immediately following rainfall, and hence 'rule of thumb' triggers and thresholds are also established advising the general public to avoid swimming at beaches for 24 hours after significant rainfall.

Task G.1 of **Action G** should be implemented immediately, however, Tasks G.2, G.3 and G.4 are dependent on meeting triggers and thresholds. Task G.2 is to be initiated when erosion conditions at the three subject locations meet pre-determined limits. Initial triggers and thresholds for this are included in Annex E of this CMP, however, they are to be reviewed and confirmed as part of implementing Task G.1, with guidance through stakeholder consultation. Task G.2 covers three locations. Triggers and thresholds are identified for each location and are considered entirely independently. This means that one, two or all three locations may progress to Task G.2 concurrently, or sequentially. The implementation of Task G.3 is triggered by the completion of Task G.2. Again, this is considered independently across all three locations. Implementation of Task G.4 is triggered by completion of Task G.3, subject to approval and funding. Again this is considered independently across all three locations, although approval may be sought and provided for multiple locations. Prior to implementation of Task G.4 (at considerable expense), an engineering review should be undertaken to confirm that public assets remain at-risk from coastal hazards. If the beach has recovered and the public asset is no longer at risk, the interim CPW may be removed (after 5 years) without constructing the permanent CPW. If this is the case, careful consideration should be given as part of future CMP reviews.

Task P.4 of **Action P** involves beach scraping on Surf Beach following a period of erosion. While the approval for this work will need to be obtained immediately, undertaking the physical works of beach scraping will only be undertaken when a defined trigger and threshold is reached. The trigger and threshold for undertaking beach scraping at Surf Beach is a minimum 0.5m drop-off at the end of the concrete steps providing beach access. A secondary trigger relating to loss of sand immediately in front of the vertical retaining wall at the back of the beach, potentially exposing the wall to direct wave action, can be provided based on engineering judgement by an experienced coastal engineer.

Triggers and thresholds are required for initiation of the CZEAS to respond to coastal hazard risks (refer Section 6.15). Specifically, the CZEAS is activated when a coastal emergency is triggered.

A coastal emergency is triggered by one or more of the following:

- The release of a "**Severe Weather Warning**" for either Damaging Surf or Storm Tides by the Bureau of Meteorology (BoM) for the Kiama coastal area. This is the same trigger used by the SES as a primary test of whether or not they should be involved in a potential coastal erosion (and/or inundation) event. The BoM specifies the following thresholds for issuing severe weather warnings:

- Sustained winds of gale force (63 km/h) or more;
- Wind gusts of 90 km/h or more (100 km/h or more in Tasmania);
- Very heavy rain that may lead to flash flooding;
- Abnormally high tides (or storm tides) expected to exceed highest astronomical tide;
- Very large waves and high tides expected to cause unusually damaging or dangerous conditions on the coast.

While the threat remains, a Severe Weather Warning will usually be updated every 6 hours, however, more frequent warnings may be issued as required if conditions are changing.

- **Beach erosion** (including subsequent natural reprofiling/flattening of sub-vertical sand escarpments that are formed by storm waves) is occurring or expected to occur along the Kiama coastline, impacting or with potential to impact on public or private assets and/or affect safe access/egress.
- **Wave run-up** (the uprush of water from waves across a beach or up a structure, exacerbated by temporary abnormal sea level conditions, e.g. due to barometric effects and/or wave set-up) is occurring or expected to occur along the Kiama coastline, impacting or with potential to impact on public or private assets and/or affect safe access/egress;
- **Cliff instability** is occurring or expected to occur at key locations at risk of cliff instability, impacting or with potential to impact on public or private assets and/or affect safe access/egress. Cliff instability is dictated by a variety of geotechnical processes on coastal cliffs and bluffs, including rock fall, slumps and landslides. It may be driven by coastal processes such as wave undercutting and overtopping, or by differential weathering of rock layers in cliffs and bluffs or by surface and groundwater flows. Instability may occur during or following a coastal storm event but may also occur at other times. There may be very little warning that a cliff instability incident is imminent. Signs of cliff instability include (DPIE, 2019):
 - Open cracks, or steps, along contours;
 - Ground water seepage, or springs;
 - Bulging in the lower part of the slope;
 - Trees leaning down slope, or with exposed roots;
 - Debris/fallen rocks at the foot of a cliff;
 - Tilted power poles, or fences; and
 - Cracked or distorted structures.

Monitoring is required to support the decision to trigger a coastal emergency. Monitoring includes:

- **Severe Weather Warning:** maintaining awareness of alerts issued by BoM. This can be done by requesting automated alerts from BoM for areas of interest. The BoM app allows an easy facility for authorities and the general public to be informed immediately upon alerts being raised by the BoM.
- **Beach conditions:** visual monitoring of conditions by Council will be required, with heightened frequency before and during storm conditions. Pre-storm beach conditions will give an indication of potential erosion susceptibility based on the amount of available sand on the beach. This is supported by supported beach monitoring as proposed in **Action P** of the CMP. Expert engineering judgement would need to be applied at times of storms to assess when to initiate particular actions as required.

- **Wave run-up:** as per beach monitoring, visual monitoring of conditions by Council will be required, with heightened frequency before and during storm conditions. Low-lying areas susceptible to wave run-up and associated coastal inundation are known and are documented in Stage 2 CMP report (BMT, 2021). These areas would be the focus for monitoring during storm conditions.
- **Cliff instability:** monitoring of geotechnical conditions at key locations along the Kiama coastline is proposed as an action of the Kiama CMP (**Action H**).

The relationship between monitoring and triggers and thresholds in this CMP is presented schematically in Figure 8.1, along with the necessary response measures once triggers and thresholds are reached. For coastal hazards along the Kiama coastline, monitoring is to be undertaken in order to initiate the CZEAS if the coastal emergency trigger is reached (refer CZEAS in **Annex A** for details). Once activated, the CZEAS outlines works needed in order to keep people and property safe during and immediately after a coastal emergency event. Following the conclusion of the coastal emergency event, as part of the recovery phase of the CZEAS, further monitoring is to be carried out to identify the extent of damage and assess potential on-going risks to infrastructure and public access. If this post-event monitoring shows that triggers are reached as per defined in **Action G** or **Action P**, then appropriate works are to be undertaken as outlined in this CMP (details provided in **Annex B**).

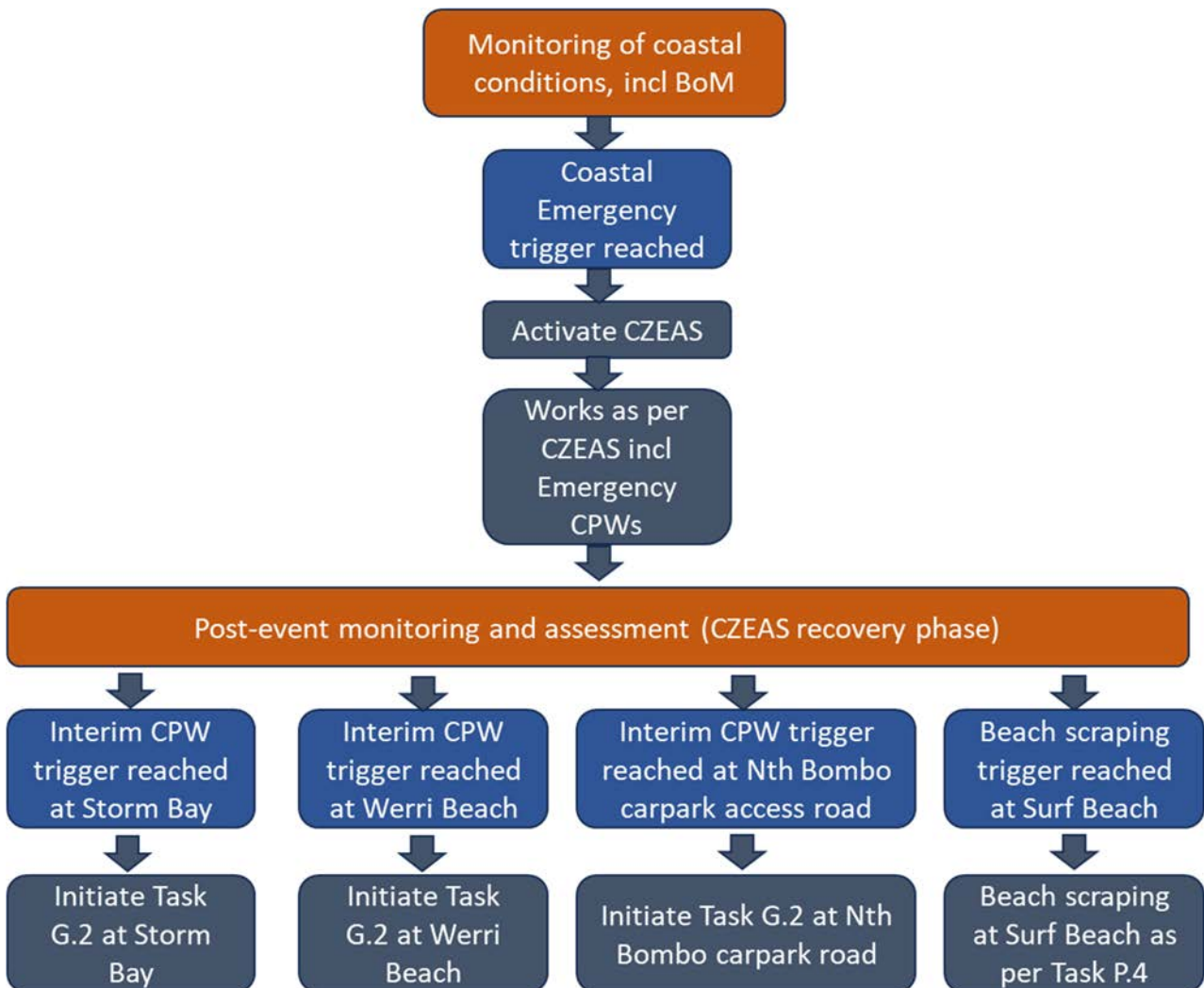


Figure 8.1 Schematic representation of monitoring, triggers and thresholds and responsive works

Evaluation and Reporting

The current Beachwatch program involves weekly on-line reporting of water quality conditions at select locations along the Kiama coastline using a four point star rating system (see <https://www.environment.nsw.gov.au/topics/water/beaches/illawarra-beaches/weekly-star-ratings>).

Action Q proposes to maintain and expand this program, including the evaluation and reporting of results, to include additional locations within the Kiama LGA that are highly used for primary contract recreational activities.

Action O proposes continuation of monitoring of water levels in Werri Lagoon and the Crooked River. Manly Hydraulics Laboratory (MHL) currently monitors these locations and results are continuously uploaded for reporting of the past 7 days records to their website (see <https://www.mhl.nsw.gov.au/Station-214445>, <https://www.mhl.nsw.gov.au/Station-215410>).

Action P proposes the monitoring of beach conditions through collecting imagery taken by the public. Using the UNSW program, CoastSnap, the uploaded images are to be analysed and reported back to the public via the CoastSnap website (<https://www.coastsnap.com/>), or via Council's website.

The CZEAS (**Annex A**) requires evaluation and reporting following each activation of the CZEAS, initiated by declaration of a Coastal Emergency, as described above.

Council is to share relevant data and reports with neighbouring councils given connections in coastal and environmental processes. Information gathered through the CMP, including specifically data collected as part of **Action J** (cultural knowledge), **Action K** (bush regeneration success), **Action M** (Cultural Study), **Action O** (Werri Lagoon and Crooked River water levels), **Action P** (CoastSnap, noting Shoalhaven and Shellharbour have already adopted this approach), and **Action Q** (Beachwatch water quality) would be relevant and of interest to neighbouring councils (particularly noting that Jerrinja LALC has interests covering coastal areas within both Kiama and Shoalhaven LGAs).

8.5 Component 3: Achieving the Objectives of the CMP and Objects of the CM Act

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

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

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

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

The primary mechanism for gauging whether the CMP has been successful should be the re-evaluation of the threats and risks across the study area through a repeat of the first pass risk assessment completed in Stage 1 Scoping Study (BMT, 2020) and a repeat of the more detailed coastal hazards risk assessment completed as part of Stage 2 of the CMP (BMT, 2021). Controls that assist with managing the threats should be included when assessing the level of risk, particularly those actions that have or are being implemented through the CMP. There are two specific questions to be answered:

- Has the level of risk changed?
- Have the very high or high threats been adequately managed?

This will therefore include a formal review of the implemented management strategies. The review should include a granular assessment of:

- The status of CMP actions, including the extent to which actions proposed to be wholly implemented within that 10-year period have been implemented;
- Identification of the CMP's successes, highlights, limitations, and any barriers to effective implementation;
- Where applicable, the identification of possible avenues for increasing the effectiveness of the CMP (including potential new funding sources);
- Consideration of any new or updated scientific knowledge, including data garnered and compiled from the monitoring programs implemented through the CMP; and
- The progress of any actions and commitments which continue beyond the original 10-year timeframe.

If it is determined through the re-evaluation process that the threats have not been adequately managed / mitigated, or that new intolerable threats have arisen, the following contingencies should be adopted:

- Identify possible avenues for increasing the effectiveness of the present CMP actions in managing the risks to the estuaries (including new risks);
- Implement additional/back-up management actions that may assist in meeting the objectives of the CMP (possibly 'fast tracking' some longer-term strategies as necessary);
- Reconsider the urgency of management for key threats. Upscaling from passive to active management may be needed, for example, where climate related threats have increased in severity and now require intervention to ameliorate impacts.

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

The formal review of the CMP should be facilitated and conducted through the proposed CMP Operational Working Group (**Action A**).

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10 Further Reading

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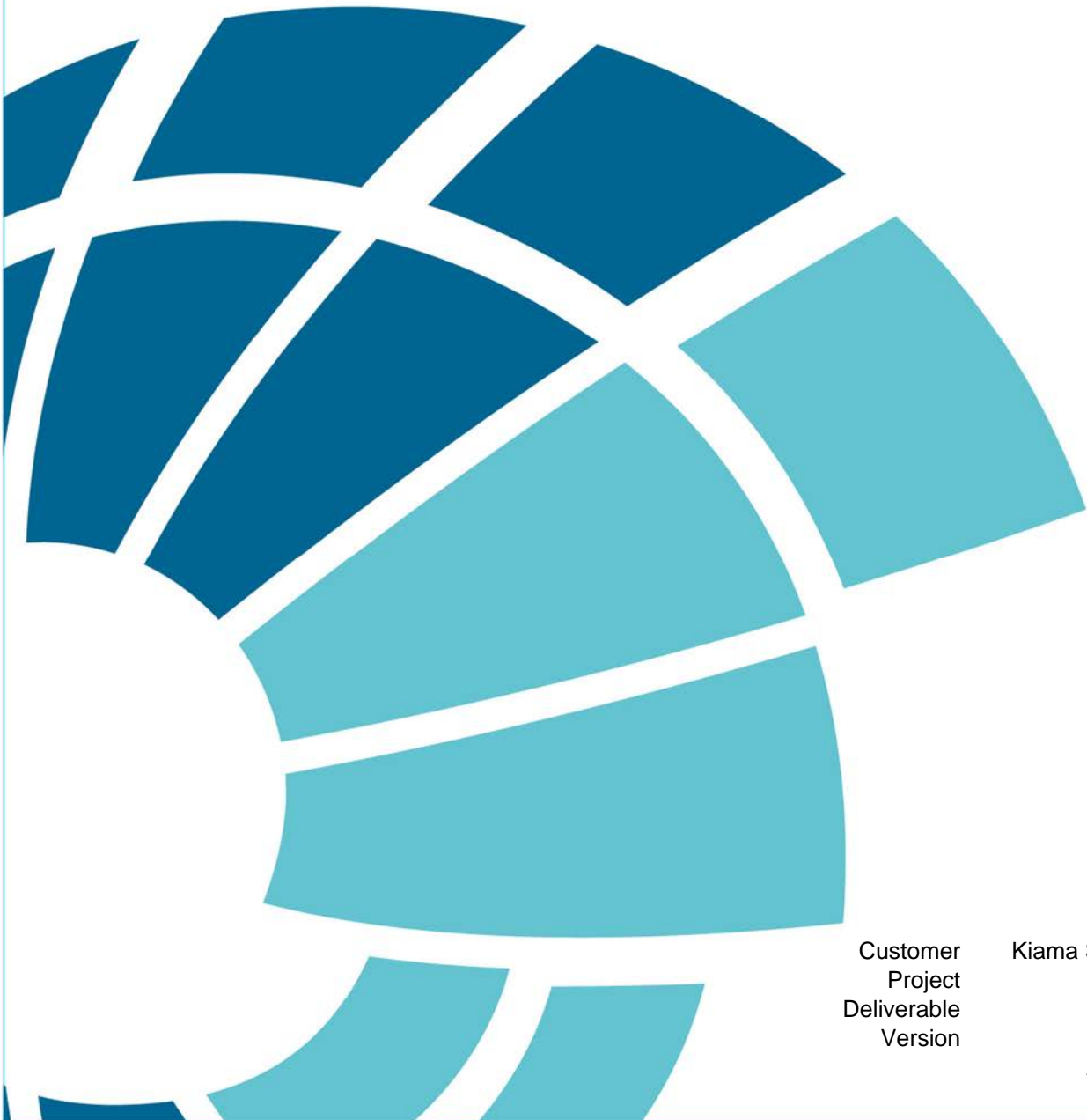
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Annex A: Kiama Coastline Coastal Zone Emergency Action Subplan

Coastal Zone Emergency Action Subplan

Kiama Coastline



Customer
Project
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Kiama Shire Council
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| Synopsis | This draft CZEAS is a supplementary document to the Kiama CMP and outlines the actions, roles and responsibilities to be followed before, during and after a coastal emergency event that threatens damage to coastal assets or infrastructure along the Kiama coastline. |
| Author | Dr Philip Haines |
| Reviewed By | Katrina O'Malley-Jones |
| Project Manager | Dr Philip Haines |

Amendment Record

The Amendment Record below records the history and issue status of this document.

| Version | Version Date | Distribution | Record |
|---------|-------------------|--------------|-------------------------------------|
| 00 | 01 September 2023 | Council | Initial draft for Council review |
| 01 | 30 October 2023 | Council | Draft for stakeholder review |
| 02 | 01 March 2024 | Council | Final for Agency Letters of Support |
| 03 | 26 April 2024 | Council | Final |

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Acknowledgements

While this document focusses on the present-day uses and values of the Kiama Coastline and its surrounds, BMT and Kiama Municipal Council acknowledges the traditional custodians of the land, the Dharawal and Wodi Wodi people, who have cared for this land and sea country since time immemorial. We pay our respects to their elders, past, present and emerging, and commit ourselves to a future with reconciliation and renewal at its heart.

For consistency at State, local government, and stakeholder levels, many elements of this document are drawn from details and information provided for the Eurobodalla Open Coast Coastal Zone Emergency Action Subplan (2022), prepared by Rhelm & Baird on behalf of Eurobodalla Shire Council, and the Woolgoolga Region Estuaries Coastal Zone Emergency Action Subplan (2023) prepared by Water Technology for the City of Coffs Harbour. The use of these documents, as well as additional direct inputs from Council, DCCEEW (BCSG) and other relevant stakeholders, is acknowledged and greatly appreciated.

Kiama Municipal Council has prepared this document with financial assistance from the NSW Government through its Coastal Management Program. This document does not necessarily represent the opinions of the NSW Government or the Department of Planning and Environment.

Glossary and Abbreviations

| Term / Acronym | Definition |
|--------------------------------|--|
| AWS | Australian Warning System |
| BCSG | Biodiversity Conservation Science Group of DCCEEW |
| Beach erosion | 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. |
| BoM | Bureau of Meteorology |
| CEA | Coastal Environment Area (as prescribed in the CM Act 2016) |
| Cliff instability | Cliff instability refers to a variety of geotechnical processes on coastal cliffs and bluffs, including rock fall, slumps and landslides. It may be driven by coastal processes such as wave undercutting and overtopping, or by differential weathering of rock layers in cliffs and bluffs or by surface and groundwater flows. Instability may occur during or following a coastal storm event, but may also occur at other times. There may be very little warning that a cliff instability incident is imminent. Signs of cliff instability include (DPIE, 2019): <ul style="list-style-type: none"> • Open cracks, or steps, along contours • Ground water seepage, or springs • Bulging in the lower part of the slope • Trees leaning down slope, or with exposed roots • Debris/fallen rocks at the foot of a cliff • Tilted power poles, or fences • Cracked or distorted structures. |
| Climate change | The long-term change (decades or longer) in pattern of weather, and related changes in oceans, land surfaces and ice sheets. |
| CM Act | NSW <i>Coastal Management Act 2016</i> |
| CMA | Coastal Management Area |
| CMP | Coastal Management Program |
| Coastal hazard | Coastal hazards, as defined by the CM Act, include: <ul style="list-style-type: none"> • Beach erosion • Shoreline recession • Coastal lake or watercourse entrance instability • Coastal inundation • Coastal cliff or slope instability • Tidal inundation • Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters. |
| Coastal inundation | The temporary and permanent flooding of a portion of land within the coastal zone |
| Coastal Protection Works (CPW) | In accordance with the CM Act and Resilience & Hazards SEPP: <ul style="list-style-type: none"> (a) beach nourishment activities or works, and (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. |
| CUA | Coastal Use Area (as prescribed in the CM Act 2016) |
| CVA | Coastal Vulnerability Area (as prescribed in the CM Act 2016) |
| CWLRA | Coastal Wetlands and Littoral Rainforests Area (as prescribed in the CM Act 2016) |
| CZEAS | Coastal Zone Emergency Action Subplan |
| CZMP | Coastal Zone Management Plan – a plan for managing the coastal zone developed under the old (now superseded) coastal management framework for NSW. Now replaced by CMPs |
| DCCEEW | NSW Department of Climate Change, Energy, the Environment and Water |

| Term / Acronym | Definition |
|------------------------------------|--|
| DPHI | NSW Department of Planning, Housing and Infrastructure |
| DPI | NSW Department of Primary Industries |
| DPIE | Former NSW Department of Planning, Industry and Environment |
| DPE | Former NSW Department of Planning and Environment (now DCCEEW and DPHI) |
| Emergency Coastal Management Works | In accordance with the Resilience & Hazards SEPP, works comprising the placement of sand, or the placing of sandbags for a period of not more than 90 days, on a beach, or a sand dune adjacent to a beach, to mitigate the effects of coastal hazards on land. |
| Entrance management | Includes artificial opening of waterway entrances to the coast, managing the configuration, height, or location of the beach berm to facilitate entrance opening at a level lower than the natural range |
| EMPLAN | Emergency Management Plan |
| EP&A Act | NSW <i>Environmental Planning and Assessment Act 1979</i> |
| EPW | Environmental Protection Works |
| KMC (Council) | Kiama Municipal Council |
| LEMC | Local Emergency Management Committee |
| LEMO | Local Emergency Management Officer |
| LEOCON | Local Emergency Operations Controller |
| LGA | Local Government Area |
| MIDO | Maritime Infrastructure Delivery Office (a part of Transport for NSW) |
| MSL | Mean Sea Level. The mean level of the sea over a long period (preferably 18.6 years) or the mean level which would exist in the absence of tides |
| NSW SES | NSW State Emergency Service |
| NPWS | The NSW National Parks and Wildlife Service |
| OEH | Former Office of Environment and Heritage. Now known as DCCEEW – BCSG |
| R&H | Resilience and Hazards, in reference to the State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021 |
| Resilience | The ability of a system (in this case natural systems and states, and human systems along the coast) to 'bounce back' after a hazard or threatening event, returning to some quasi-stable state and maintaining functions, processes and services |
| Risk | Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood |
| SEPP | State Environmental Planning Policy |
| SERM Act | NSW <i>State Emergency and Rescue Management Act 1989</i> |
| SES (NSW SES) | NSW State Emergency Service |
| SLR | Sea level rise - a long-term increase in MSL, usually associated with climate change and increase in temperature in particular |
| Stakeholders | Persons or organisations with an interest or concern in a given matter |
| Storm bite (escarpment) | The landward limit of erosion in the dune system caused by storm waves. At the end of a storm the escarpment may be nearly vertical; as it dries out the sand slumps to a typical slope of one vertical to 1.5 horizontal |
| Storm surge | The increase in coastal water levels caused by the barometric and wind set-up effects of storms. Barometric set-up refers to the increase in coastal water levels associated with the lower atmospheric pressures characteristic of storms. Wind set-up refers to the increase in coastal water levels caused by an onshore wind driving water shorewards and piling it up against the coast |
| TfNSW | Transport for NSW |
| Tide | The periodic rise and fall of the water of oceans, seas, bays, etc., caused mainly by the gravitational interactions between the Earth, Moon and Sun |
| 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 |

| Term / Acronym | Definition |
|----------------|---|
| | 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 (HAT). |
| 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 |

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1 Introduction

1.1 Background

This Coastal Zone Emergency Action Subplan (CZEAS) forms a part of the Kiama Coastline Coastal Management Program (CMP) (BMT, 2023). This CZEAS has been prepared in accordance with the requirements of the:

- *Coastal Management Act 2016* (the CM Act);
- Coastal Management Manual (OEH, 2018) (the Manual); and
- Guideline for preparing a coastal zone emergency action subplan (DPIE, 2019) (the Guideline).

The *Coastal Management Act 2016* (CM Act) (section 15(1)(e)) outlines that a CZEAS must be included in a coastal management program (CMP) if a coastal vulnerability area (CVA) is located within a local council's local government area (LGA), and beach erosion, coastal inundation or cliff instability is occurring on that land. The Kiama CMP proposes that Kiama Shire Council (Council) follows the planning proposal process to amend the CVA described within in the *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience & Hazards SEPP) (**Action B**, refer BMT, 2023). As such, this CZEAS has been prepared to support the Kiama Coastline CMP.

Section 3 of this document presents the extent of the proposed Kiama Coastline CVA along with specific details of the open coast locations at risk within the proposed CVA where this CZEAS applies.

1.2 Purpose

As specified in the CM Act, a CZEAS is a plan that outlines the roles and responsibilities of all public authorities (including the local council) in response to coastal emergency events immediately preceding or during periods of beach erosion, coastal inundation or cliff instability where the beach erosion, coastal inundation or cliff instability occurs through storm activity or an extreme or irregular event. An "emergency" is defined in the *State Emergency and Rescue Management Act 1989* (SERM Act) and the State Disaster Plan as:

"An emergency due to an actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, terrorist act, accident, epidemic or warlike action) which -

- a) endangers, or threatens to endanger, the safety or health of persons or animals in the State; or*
- b) destroys or damages, or threatens to destroy or damage, any property in the State, or*
- c) causes a failure of, or a significant disruption to, an essential service or infrastructure, being an emergency, which requires a significant and co-ordinated response.*

For the purposes of the definition of emergency, property in the State includes any part of the environment of the State. Accordingly, a reference in the Act to -

- a) threats or danger to property includes a reference to threats or danger to the environment, and*
- b) the protection of property includes a reference to the protection of the environment."*

In accordance with the Guideline (DPIE, 2019), the purpose of a CZEAS is to identify and facilitate the implementation of appropriate emergency response actions in order to:

- Protect human life and public safety;
- Minimise damage to property and assets;
- Minimise impacts on social environmental and economic values;
- Not create additional hazards or risk.

This CZEAS details arrangements for the four emergency phases (viz: prevention, preparation, response and recovery) to manage coastal emergency events relating to beach erosion, cliff instability and coastal inundation. Those roles and responsibilities include the carrying out of emergency coastal protection works for the protection of property and assets affected or likely to be affected by coastal emergency events.

The SERM Act establishes the overarching framework for emergency management in New South Wales. The SERM Act outlines roles and responsibilities for all emergency management in the state, and specifies:

- That emergency management committees are established at the state, regional and local levels;
- That emergency management plans (EMPLANs) are prepared and reviewed at the state, regional and local level;
- Arrangements for controlling emergency operations;
- Responsibilities of emergency operations controllers.

The NSW State Emergency Management Plan 2018 (EMPLAN) describes the NSW approach to emergency management, the governance and coordination arrangements, and roles and responsibilities of agencies. The plan is supported by hazard specific subplans and functional area supporting plans.

The NSW State Emergency Service (NSW SES) is the designated combat agency for management of floods, tsunami and storms, including severe storms which cause coastal erosion. The NSW SES prepares the State Storm Plan, State Flood Plan and State Tsunami Plan. Where no specific combat agency is nominated, the Emergency Operations Controller has responsibility for operations (DPIE, 2019).

This CZEAS does not include matters dealt with in any plan made under the SERM Act. This is to ensure that there is no duplication or ambiguity of emergency response planning.

Notwithstanding, the CZEAS is consistent with plans prepared under the SERM Act including the state, regional and local Emergency Management Plans (EMPLANs), State Storm Plan, State Flood Plan, State Tsunami Plan (which are subplans to the NSW State EMPLAN) and the Illawarra (Wollongong City, Shellharbour City and Kiama Local Government Areas) Local Flood Plan (2022).

The relationship between the SERM Act and CM Act is detailed in Figure 1.1.

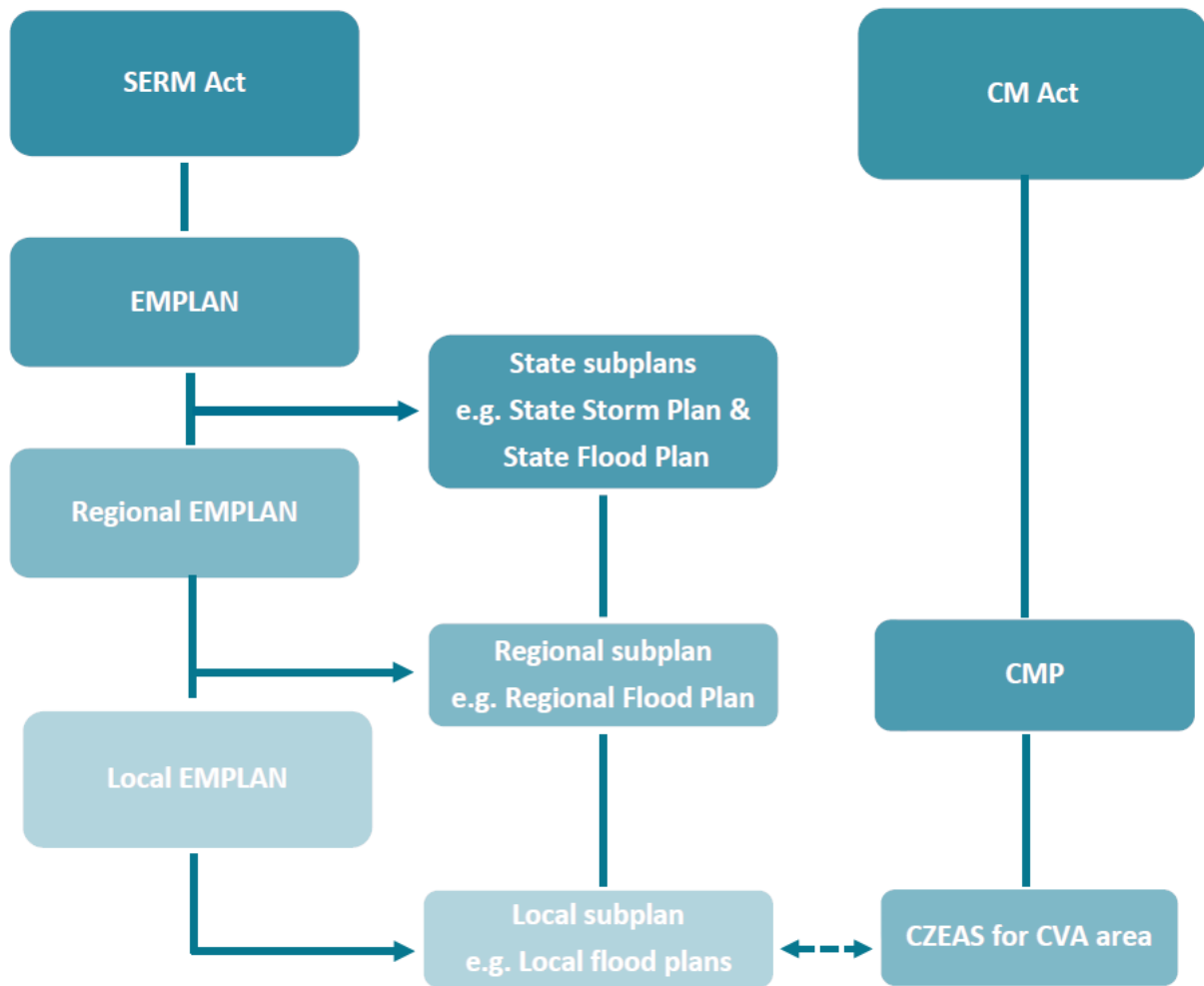


Figure 1.1 Legislative framework for emergency management in NSW and its relationship with coastal management legislation (DPIE, 2019)

1.3 Scope

The Kiama coastline is subject to the coastal hazards of beach erosion, coastal inundation, cliff instability, shoreline recession and tidal inundation hazards, which are addressed through the Kiama CMP (BMT, 2023). Based on the scope of the CM Act, the Guideline (DPIE, 2019) states that shoreline recession and tidal inundation hazards are not included within the scope of a CZEAS.

The three coastal hazards identified in the CM Act that should be considered when developing a CZEAS are:

- a. **Beach erosion:** Firstly, not all beach erosion occurring during a storm event provokes a coastal emergency response. Therefore a “beach erosion emergency” in the context of this CZEAS can be defined as an actual or imminent occurrence of a beach erosion event that occurs when wind, waves, currents are removing the sediment that comprises the foreshore and/or frontal dune system, landward of the fully accreted condition. The consequence of such erosion can create risks to public safety, and public and private assets, which requires a coordinated emergency response.

- b. **Coastal inundation:** Coastal inundation occurs when marine and atmospheric forces combine and raise water levels at the coast (or inside estuaries) above normal elevations causing dry land to be inundated by seawater. Coastal inundation is often associated with storms and results from elevated still water levels (barometric storm surge), wave set-up, wave runup and over-wash flows. Storm surges and powerful waves can also penetrate estuaries giving rise to strong currents or seiching. This may result in the inundation of low-lying land and any associated infrastructure (e.g. roads) adjacent to estuaries.
- c. **Cliff instability:** This refers to a variety of geotechnical processes on coastal cliffs and bluffs, including rock fall, slumps and landslides. Cliff instability is mostly driven by coastal processes such as wave undercutting and overtopping, or by differential weathering of rock layers in cliffs and bluffs or by surface and groundwater flows.

Coastal erosion caused by storm activity is within the scope of the NSW State Storm Plan (NSW SES, 2023). Emergency management of coastal erosion that is **not** caused by storm activity is within the scope of this plan.

Flooding is within the scope of the NSW Emergency Management Plan (EMPLAN) (NSW SES, 2021), and its subordinate Flood Plans (state, regional, and local). Within these plans, flood is defined as a relatively high-water level that overtops the natural or artificial banks in any part of a stream, river, estuary, lake, or dam, and/or local overland flooding associated with drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences.

Emergency response actions relating to Coastal Inundation hazards as defined in the CM Act therefore are not included within this CZEAS, as they are captured within the respective EMPLANs and subordinate Flood Plans.

1.4 Objectives

As required by the Guideline (DPIE, 2019) this CZEAS:

- Defines a coastal emergency and triggers for emergency response actions (Section 2);
- Identifies the locations that may be affected by beach erosion, coastal inundation (not included in this CZEAS) or cliff instability that would constitute a coastal emergency (Section 3);
- Outlines the roles and responsibilities of all public authorities, including Council, and coordinates their response to emergencies immediately preceding or during periods of beach erosion, coastal inundation (not included in this CZEAS) and cliff instability (Section 4);
- Outlines what actions are to be undertaken in the four phases of emergency management (Section 5);
- Identifies the locations and types of works that may be undertaken for the protection of property and assets (Section 5);
- Informs the public and potentially affected property owners about their responsibilities during a coastal emergency and what actions they are and are not permitted to undertake (Section 7).

Both the SERM Act and the Manual (OEH, 2018) identify four phases of emergency management: prevention, preparation, response, and recovery (Figure 1.2). This CZEAS details arrangements for these four phases of emergency management.



Figure 1.2 Emergency response in the coastal management context (from DPIE, 2019)

1.5 Consultation

A draft version of this CZEAS was shared with all relevant agencies as part of consultation of the Kiama CMP. This document, along with the Kiama CMP, was also placed on public exhibition for the period 23rd November 2023 to 15th January 2024. All feedback received on the CMP and CZEAS, including feedback from NSW SES, were considered as part of finalisation of this document.

2 Coastal Emergency Event Triggers

For the purposes of this CZEAS, a coastal emergency is triggered by the release of a “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides” by the Bureau of Meteorology (BoM) for the Kiama coastal area. This is the same trigger used by the NSW SES as a primary test of whether or not they should be involved in a potential coastal erosion (and/or inundation) event. The BoM specifies the following thresholds for issuing severe weather warnings:

- Sustained winds of gale force (63 km/h) or more;
- Wind gusts of 90 km/h or more (100 km/h or more in Tasmania);
- Very heavy rain that may lead to flash flooding;
- Abnormally high tides (or storm tides) expected to exceed highest astronomical tide;
- Very large waves and high tides expected to cause unusually damaging or dangerous conditions on the coast.

While the threat remains, a Severe Weather Warning will usually be updated every 6 hours, however, more frequent warnings may be issued as required if conditions are changing.

Weather warnings issued by the BoM and can be found at the following link:

www.bom.gov.au/nsw/warnings/. Alternatively, the BoM weather App can show weather warnings customised to a specific area of interest. NSW SES adopted the Australian Warning System (AWS), a new national approach to warnings for hazards including bushfire, flood, storm, cyclone, and heat (refer <https://www.australianwarningsystem.com.au/>). The AWS has three levels of warning: 1) Advice; 2) Watch and Act; and 3) Emergency Warning.

In addition to the Severe Weather Warning, location specific triggers for coastal emergencies include:

- Beach erosion (including subsequent natural reprofiling/flattening of sub-vertical sand escarpments that are formed by storm waves) is occurring or expected to occur at key locations at risk as identified in Section 3, impacting or with potential to impact on public or private assets and/or affect safe access/egress.
- Wave run-up (the uprush of water from waves across a beach or up a structure, exacerbated by temporary abnormal sea level conditions, e.g. due to barometric effects and/or wave set-up) is occurring or expected to occur at the key locations at risk of coastal inundation identified in Section 3, impacting or with potential to impact on public or private assets and/or affect safe access/egress;
- Signs of cliff instability are occurring or expected to occur at key locations at risk of cliff instability identified in Section 3, impacting or with potential to impact on public or private assets and/or affect safe access/egress. Cliff instability is dictated by a variety of geotechnical processes on coastal cliffs and bluffs, including rock fall, slumps and landslides. It may be driven by coastal processes such as wave undercutting and overtopping, or by differential weathering of rock layers in cliffs and bluffs or by surface and groundwater flows. Instability may occur during or following a coastal storm event but may also occur at other times. There may be very little warning that a cliff instability incident is imminent. Signs of cliff instability include (DPIE, 2019):

- Open cracks, or steps, along contours;
- Ground water seepage, or springs;
- Bulging in the lower part of the slope;
- Trees leaning down slope, or with exposed roots;
- Debris/fallen rocks at the foot of a cliff;
- Tilted power poles, or fences; and
- Cracked or distorted structures.

Monitoring of geotechnical conditions at key locations along the Kiama coastline is proposed as an action of the Kiama CMP (**Action H**, refer BMT, 2023).

In practice, expert engineering judgement would need to be applied at times of storms to decide if a coastal emergency should be triggered. This relies on continuous monitoring of conditions including beach behaviour and cliff stability preceding and during a coastal event. Council may seek appropriate support and advice from experienced coastal and/or geotechnical engineers if required to assist with decision-making during an event.

Once a coastal emergency event is triggered, Council will activate this CZEAS and follow the actions detailed in the Response Phase of the Emergency Response Action Plan (Section 5, Table 5.3).

3 Locations at Risk

This CZEAS applies the area covered by the proposed Kiama Coastline CVA, and where beach erosion, coastal inundation or cliff instability is occurring on that land.

The Kiama CMP identified areas along the Kiama coastline where coastal risks are most pronounced under present day and projected 2040, 2070 and 2120 conditions. Specific locations known to be affected by beach erosion, coastal inundation or cliff instability are detailed in this section.

It is possible that beach erosion, coastal inundation or cliff instability will affect additional locations not currently assessed or known to be risk locations along the Kiama coastline. In this event Council should assess these locations and revise this CZEAS to include new locations at risk, as the need arises.

3.1 Beach Erosion

Present day coastal risks due to beach erosion that were identified in the Kiama CMP (BMT, 2023) are outlined in Table 3.1. Refer to BMT (2023) for descriptions of Risk Levels.

Table 3.1 Present Day Beach Erosion Risks

| Location | Asset Impacted | Risk Level (2020) |
|------------------|--|-------------------|
| Minnamurra Beach | Beach and dunes (including beach accessways) | Medium |
| Jones Beach | Beach and dunes (including beach accessways and picnic facilities) | Medium |
| Bombo Beach | Beach and dunes, including area at northern end of beach within the Quarry Heritage LEP 2011 listing and the North Bombo Beach carpark access road | High |
| Surf Beach | Beach | High |
| | Walkway and reserve, southern end | Low |
| Kendalls Beach | Beach (including beach accessways and any buried structures) | Medium |
| Easts Beach | Beach (including seawall under beach) | High |
| Werri Beach | Beach and dunes | High |
| | Stormwater pits (southern end) | Low |
| | Carpark (from south of Park Lane down to SLSC and Pacific Ave carparks) | Low |
| | Pacific Avenue (from south of Werri Beach Holiday Park) | High |
| Storm Bay | Parkland and accessway behind northern foreshore | High* |

* A provisional High rating has been provided based on the need for potential Coastal Protection Works (refer **Action G** of CMP) identified subsequent to the Stage 2 CMP risk assessment.

Black Beach promenade seawall has previously sustained damage during large coastal inundation events from storm surge and wave overtopping (See also Action P in CMP). Coastal erosion may also impact on known and high potential Aboriginal cultural sites along the entire Kiama coastline.

3.2 Coastal Inundation

The Kiama CMP (BMT, 2023) identified a number of locations along the Kiama coastline that are subject to coastal inundation risks under present day and under projected 2040, 2070 and 2120 conditions. In addition to Kiama beaches and dunes, locations where severe coastal inundation under present day conditions potentially impacts on infrastructure that could endanger the public include:

- Various commercial premises around Kiama boatharbour;
- Kiama SLSC;
- Sts Peter and Paul Catholic Church and Primary School;
- Barney Street and carpark;
- Kendalls on the Beach Holiday Park;
- Easts Beach Holiday Park; and
- Pacific Avenue, South Werri Beach.

Coastal inundation may also impact on known and high potential Aboriginal cultural sites along the entire Kiama coastline.

Actions to manage coastal inundation risks are covered within the scope of the NSW Emergency Management Plan (EMPLAN) (NSW SES, 2021), and its subordinate Flood Plans (state, regional, and local). Therefore, although a coastal emergency may still be triggered by coastal inundation (with activation of the CZEAS), specific actions to address coastal inundation are not captured in this CZEAS, but rather, are included in the EMPLAN and Flood Plans to avoid duplication and potential conflict.

Notwithstanding, where coastal inundation is accompanied by coastal erosion, this CZEAS address the coastal erosion aspects of the coastal emergency. In particular, Black Beach promenade seawall has previously sustained damage during large coastal inundation events from storm surge and wave overtopping (See also Action P in CMP).

3.3 Cliff Instability

A high-level geomorphic assessment of cliff stability was conducted during Stage 2 of the CMP (BMT, 2021), based upon a review of literature, LiDAR survey data and site inspections relating to the geology, coastal cliff/slopes types and failure mechanisms, and assets. This assessment provided a first pass screening for cliff and slope instability along the Kiama coastline.

Key locations of potential cliff instability identified in the Stage 2 CMP (BMT, 2021) first pass screening include:

- Southern side of Pheasant Point, between School Flat and Continental Pool;
- Around the Kiama Blowhole;
- Clifftop pathway at Church Point;
- Clifftop pathway at Kendalls Point;
- South Werri Beach headland, around the carpark;
- Western side of Black Head, Gerroa.

Cliff instability may also impact on known and high potential Aboriginal cultural sites along the entire Kiama coastline.

3.4 Mapping

The exact location(s) requiring actions under this CZEAS during an event, including the placement of Emergency Coastal Protection Works, will be dependent on a range of variables including (but not limited to) swell size, swell direction, current state of the beach, etc. Notwithstanding, Figure 3.1 presents locations (please refer to the captions on this map which relate to specific at-risk locations) where potential actions are most likely to be needed as part of this CZEAS. Note that the at-risk locations shown as captions in Figure 3.1 are based on the locations described in sections 3.1 to 3.3 and the CMP Stage 2 Study.



Minnamurra Beach and Dunes including accessways (access via boat ramp)

Jones Beach and Dunes including accessways and picnic facilities (access via SLSC)

Former Bombo Quarry Site

North Bombo Beach carpark access road (access via road under highway)

Kiama Downs

Kiama

LEGEND

- Proposed CVA Area
- Cadastral Boundaries

Note:

1. Proposed CVA represents the most landward of i) 5% exceedance of coastal inundation at 2120; or ii) 1% exceedance of beach erosion at 2120; as determined in Stage 2 of the CMP.
2. Proposed seaward CVA boundary is the Kiama LGA boundary

Title:
Present Day Coastal Risk Areas for Kiama coastline covered by CZEAS (Map 1 of 6)

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

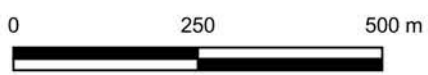


Figure: **3.1** Rev: **A**





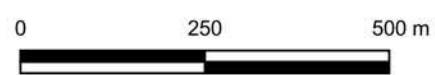
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- Proposed seaward CVA boundary is the Kiama LGA boundary

Title:
Present Day Coastal Risk Areas for Kiama coastline covered by CZEAS (Map 2 of 6)

Figure: **3.1** Rev: **A**

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Note:

- Proposed CVA represents the most landward of i) 5% exceedance of coastal inundation at 2120; or ii) 1% exceedance of beach erosion at 2120; as determined in Stage 2 of the CMP.
- Proposed seaward CVA boundary is the Kiama LGA boundary

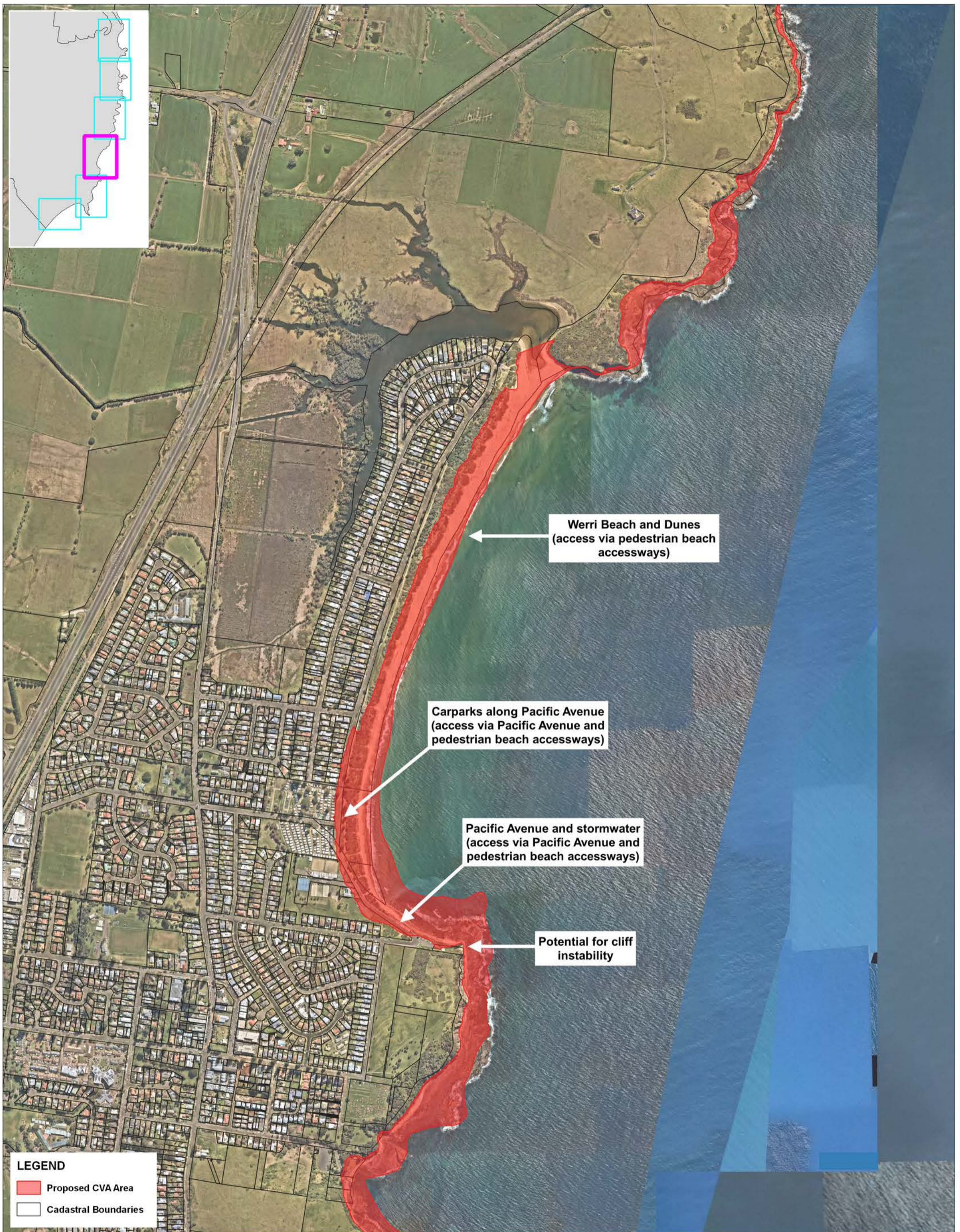
Title:
Present Day Coastal Risk Areas for Kiama coastline covered by CZEAS (Map 3 of 6)

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Figure: **3.1** Rev: **A**





Note:

1. Proposed CVA represents the most landward of
 i) 5% exceedance of coastal inundation at 2120; or
 ii) 1% exceedance of beach erosion at 2120;
 as determined in Stage 2 of the CMP.
2. Proposed seaward CVA boundary is the Kiama LGA
 boundary

Title:
**Present Day Coastal Risk Areas for Kiama coastline covered
 by CZEAS (Map 4 of 6)**

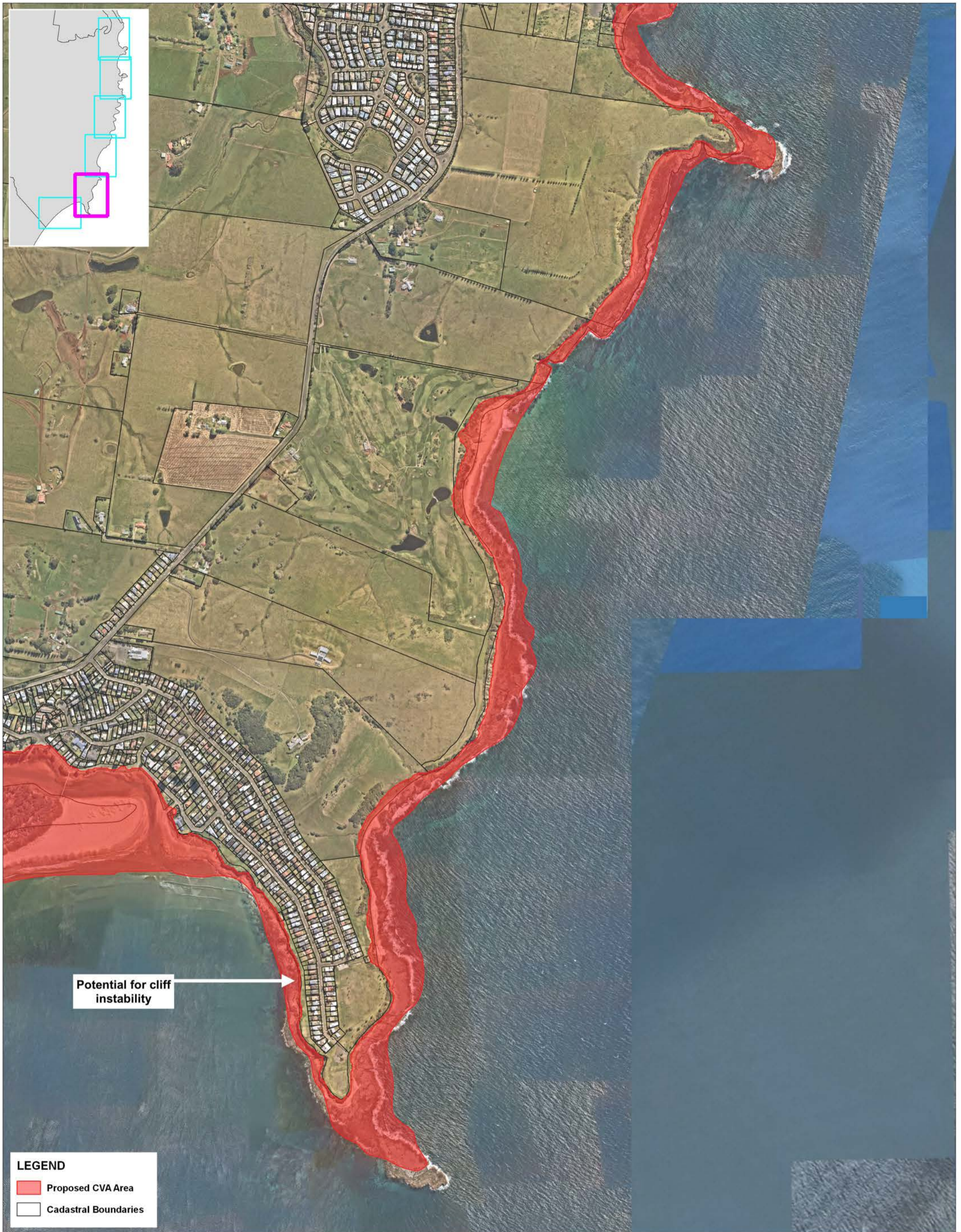
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Figure:
3.1

Rev:
A





Potential for cliff instability

LEGEND

- Proposed CVA Area
- Cadastral Boundaries

Note:

1. Proposed CVA represents the most landward of i) 5% exceedance of coastal inundation at 2120; or ii) 1% exceedance of beach erosion at 2120; as determined in Stage 2 of the CMP.
2. Proposed seaward CVA boundary is the Kiama LGA boundary

Title:
Present Day Coastal Risk Areas for Kiama coastline covered by CZEAS (Map 5 of 6)

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



Figure: **3.1** Rev: **A**





LEGEND

- Proposed CVA Area
- Cadastral Boundaries

Note:

1. Proposed CVA represents the most landward of
i) 5% exceedance of coastal inundation at 2120; or
ii) 1% exceedance of beach erosion at 2120;
as determined in Stage 2 of the CMP.
2. Proposed seaward CVA boundary is the Kiama LGA boundary

Title:

Present Day Erosion Risk Areas for Kiama coastline covered by CZEAS (Map 6 of 6)

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



Drawing:

3.1

Rev:

A



4 Roles and Responsibilities

Table 4.1 lists agencies with roles and responsibilities under this CZEAS, along with a description of their respective roles and responsibilities. The general responsibilities of emergency services organisations and support agencies are further detailed in the local and state EMPLANs.

Table 4.1 CZEAS Roles and Responsibilities

| Authority | Roles and Responsibilities |
|--|--|
| All | <ul style="list-style-type: none"> Note that whilst the agencies listed below have responsibilities associated with coastal inundation, the actions that address coastal inundation are outlined within the Local and State Flood Plans rather than this CZEAS |
| Kiama Shire Council | <ul style="list-style-type: none"> Prepare, maintain and update this CZEAS as necessary and provide the NSW SES with a copy Implement the Prevention and Preparation Phase emergency actions prior to a coastal emergency event occurring (Table 5.1; Table 5.2) In the event of a coastal emergency at a location at risk, activate this CZEAS and implement the Response Phase emergency actions for the duration of the coastal emergency event (Table 5.3) Implement the Recovery Phase emergency actions following a coastal emergency event (Table 5.4) implement (or authorise and coordinate) emergency coastal protection works, including construction of physical works where appropriate, to protect property and public assets from beach erosion, coastal inundation and cliff instability. <ul style="list-style-type: none"> <i>Note: Private landholders are responsible for private land. Council does not have an obligation to take particular action to protect private property from erosion events. There is, however, a statutory obligation upon Council to consider any valid development application for coastal protection works which may be lodged by private property owners.</i> Assist the NSW SES with reconnaissance of areas susceptible to beach erosion and/or coastal inundation Liaise with the NSW SES Local Commander or NSW SES Incident Controller to provide advice regarding the need for response actions by the NSW SES such as evacuations Assist, at their request, NSW SES, Local Emergency Operations Controller (LEOCON) and the Police, in dealing with a coastal emergency Provide engineering and other resources required for response and recovery phases Provide information on the status of roads and other accessways in the emergency-impacted areas Provide a range of support to the LEOCON Provide back-up radio communications. |
| Local Emergency Operations Controller (LEOCON) | <ul style="list-style-type: none"> Monitor coastal emergency event operations Act as the combat/responsible agency in the event of coastal erosion that <u>is not</u> caused by storm activity by controlling and coordinating emergency management of the coastal emergency event Act as the combat/responsible agency in the event of a landslip (Illawarra South Coast Regional Emergency Management Committee, 2019) Coordinate support to the NSW SES Kiama Shire Local Controller, if requested to do so. |
| Local Emergency Management Officer (LEMO) | <ul style="list-style-type: none"> Provide executive support to the Local Emergency Management Committee (LEMC) and LEOCON in accordance with the Illawarra Local EMPLAN (Illawarra Local Emergency Management Committee, 2017). |
| NSW State Emergency Service (NSW SES) Kiama Unit Members | <ul style="list-style-type: none"> Act as the combat/responsible agency for damage control and the coordination of community evacuation during the following coastal zone hazards as per the Illawarra Local EMPLAN (Illawarra Local Emergency Management Committee, 2017): <ul style="list-style-type: none"> Flooding Storms Tsunamis |

| Authority | Roles and Responsibilities |
|--|---|
| | <ul style="list-style-type: none"> • Act as the combat/responsible agency in the event of coastal erosion that <u>is</u> caused by storm activity (emergency management of coastal erosion that is caused by storm activity is within the scope of the NSW State Storm Plan) • Act as the combat/responsible agency in the event that coastal inundation that <u>is</u> caused by storm activity (emergency management of coastal inundation that <u>is</u> caused by storm activity is within the scope of the NSW State Flood Plan and the Illawarra (Wollongong City, Shellharbour City and Kiama Local Government Areas) Local Flood Plan (2023) <ul style="list-style-type: none"> - <i>Note: The role of the NSW SES as a combat agency for storms does not include coastal erosion and inundation caused by astronomical high tides when severe weather is not actually developing or occurring (NSW SES, 2008)</i> • Carry out required response tasks. These may include: <ul style="list-style-type: none"> - Assist in the collection of flood and coastal erosion/inundation information for the development of intelligence - Evacuation - Delivery of warning products in line with the Australian Warning System (AWS) - Assisting with road closures and traffic control operations |
| <p>NSW SES Southern Illawarra Local Commander or NSW SES Incident Controller</p> | <ul style="list-style-type: none"> • Deal with floods as per the Illawarra (Wollongong City, Shellharbour City and Kiama Local Government Areas) Local Flood Plan (2022) • Identify and monitor people and/or communities at risk of flooding, coastal inundation and coastal erosion during storm or flood events • Provide an information service in relation to: <ul style="list-style-type: none"> - Coastal erosion - Coastal inundation • Road conditions and closures • Confirmation of warning products in line with the AWS • Direct the evacuation of people and/or communities • Ensure all vulnerable facilities (e.g. caravan parks) are advised of flood/coastal inundation warnings • Coordinate the collection of flood and coastal erosion/inundation information for development of intelligence. |
| <p>The Ambulance Service of NSW</p> | <ul style="list-style-type: none"> • During an emergency, the Ambulance Service of NSW will manage on-site operations, communications and transport requirements for the health response (NSW Health, 2013). |
| <p>NSW Police Force</p> | <ul style="list-style-type: none"> • Assist the NSW SES with delivery of warning products in line with the AWS the conduct of evacuations • Conduct road and traffic control operations in conjunction with Council and/or Transport for NSW • Coordinate the registration of evacuees • Secure evacuated areas (NSW SES, 2008). |
| <p>Fire and Rescue NSW</p> | <ul style="list-style-type: none"> • Assist the NSW SES with delivery of warning products in line with the AWS and the conduct of evacuations • Provide equipment for pumping flood water out of buildings and from low-lying areas • Provide back-up radio communications |
| <p>Australian Government Bureau of Meteorology (BoM)</p> | <ul style="list-style-type: none"> • Issue public weather and storm warning products before and during a storm for the Kiama Shire i.e. Severe Thunderstorm Warnings, Severe Weather Warnings, Tropical Cyclone Watches and Tropical Cyclone Warnings (NSW SES, 2023), Tsunami Warnings (NSW SES, 2018) as well as Flood Watches and Flood Warnings (NSW SES, 2021). |
| <p>Marine Rescue NSW (Shellharbour, Shoalhaven)</p> | <ul style="list-style-type: none"> • Assist the NSW SES with delivery of warning products in line with the AWS and the conduct of evacuations (NSW SES, 2021). |
| <p>Surf Life Saving NSW</p> | <ul style="list-style-type: none"> • Assist the NSW SES with the warning and/or evacuation of at-risk communities and flood rescue operations (NSW SES, 2021). |

5 Emergency Response Action Plans for Locations at Risk

Council’s ability to undertake the actions identified in this CZEAS will be dependent on the availability of resources during emergency events.

Actions undertaken should not impede, conflict, or overlap with the actions of agencies operating under the SERM Act, including the NSW State Emergency Service (NSW SES) or the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW), unless there is prior agreement between the relevant parties.

All actions must not put personnel staff or volunteers in danger. Emergency management works must not be undertaken during extreme weather unless environmental conditions permit works to be undertaken safely.

Actions in this CZEAS aim to reduce risk:

- In areas where Council has chosen not to implement other coastal protection works detailed in the CMP to reduce coastal hazard risks, which have been evaluated as tolerable or acceptable
- Where coastal hazard risks have not been reduced or eliminated because an agreed action in a CMP has not yet been implemented
- Where coastal hazard risks remain after other CMP actions have been implemented (residual risk)
- When rare and very large or unexpected events occur, outside the design criteria or capacity of agreed management actions in the CMP.

Emergency coastal protection works may comprise the placement of sand, or the placing of sand bags for a period of not more than 90 days, on a beach, or a sand dune adjacent to the beach, to mitigate the effects of coastal hazards on land.

As coastal protection works (CPWs) on private lands have not been identified in the CMP, private landowners who would like the ability to be able to undertake short term coastal protection works or activities in the event of an emergency need to obtain prior consent from the regional planning panel (refer Section 6.2).

Table 5.1 to Table 5.4 detail the coastal emergency actions to be undertaken through the four phases of emergency response, that apply to the locations at risk along the Kiama coastline (**Section 3**).

Table 5.1 Phase 1 - Prevention Actions

| Action | Responsibility | Trigger | Relevant Locations |
|--|---------------------|--|--------------------|
| Provide up-to-date copies of this CZEAS to all relevant Council staff and other stakeholders including those with dedicated roles and responsibilities as outlined in Section 4. | Council | CZEAS finalisation and further updates | All locations |
| Provide advice to the community, landholders and the NSW SES about the potential for a coastal emergency event and the types of responses that are permitted and not permitted. | Council | As required | All locations |
| Assess threats to life and property arising from a coastal emergency through the CMP process. Make the public aware of the hazards and risks and intended erosion emergency responses through publication of the Kiama Coastline CMP and this CZEAS, and associated education campaigns. | NSW SES and Council | CZEAS and CMP finalisation and further updates | All locations |

| Action | Responsibility | Trigger | Relevant Locations |
|--|--------------------------|--|--------------------|
| Storm prediction and monitoring, including issuing hazard alerts i.e. Severe Weather Warnings by the BoM. Includes implementation of Action P of CMP to monitor and assess beach conditions. | NSW SES, BoM and Council | Continuous | All locations |
| Consult with NSW SES, DCCEEW (BCSG), Local Police, LEOCON, FRNSW to ensure this CZEAS remains consistent the relevant local, regional, and state-based emergency management plans | LEMC | CZEAS updates; emergency management plan updates | All locations |
| Review and update this CZEAS in line with any future updates to the CVA mapping or CMP implementation. | Council | CMP review | All locations |
| Work in partnership with the Aboriginal community, LALCs, DCCEEW, DPHI, NPWS and Heritage NSW to understand and provide advice to the community, landholders and the NSW SES about the potential for a coastal emergency event and the types of responses that are permitted and not permitted | Council | CZEAS finalisation and further updates | All locations |
| Assess threats to cultural assets arising from a coastal emergency through the CMP process (see Action M) for both known and high potential locations | Council | CMP finalisation and endorsement | All locations |

Table 5.2 Phase 2 - Preparation Actions

| Action | Responsibility | Trigger | Relevant Locations |
|--|--------------------------|--|--|
| Obtain all necessary permits, approvals or licences from Public Authorities that are required to enable implementation of the activities outlined within the CZEAS. This includes permits, approvals, or licences for works such as beach scraping and emergency coastal protection works including the placement of geotextile sandbags | Council | CZEAS finalisation and CMP certification | Locations at risk as identified in Table 3.1, and by textboxes inside Figure 3.1, as required. |
| Maintain a stockpile of at least 200 sand containers for the purpose of emergency coastal protection works and filling frame for faster production. Sand bags to be made of geotextile fabric or woven polypropylene fabric (not hessian) with a volume of about 0.012m ³ (about the size of a cement bag) and weigh approximately 18 kg when filled with dry sand. Ensure source of sand for filling bags using medium grained sand (D50 of 0.2 to 0.5mm). | Council | CZEAS finalisation and further updates | All beaches |
| Develop an operations procedure to guide Council's response to coastal emergency events (including resourcing, internal training, testing and periodic review). | Council | CZEAS finalisation and further updates | All locations |
| Maintain up-to-date personal contact details for key Council staff involved in coordinating actions under this CZEAS and individuals Council may need advice from, such as DCCEEW (BCSG) staff, or to integrate with personnel from other emergency sectors. | Council | Annually | All locations |
| Monitor conditions during events to assess whether triggers are reached that will activate the Response Phase. | NSW SES, BoM and Council | Severe Weather Warnings declared | All locations |
| Ensure availability of temporary fencing, hazard tape and signage to close foreshore and clifftop accessways and roadways, as well as general signage to warning pedestrians for use during coastal emergencies. | Council, NSW SES | CZEAS finalisation and further updates | All locations |
| Ensure availability of plant, equipment and adequately experienced and trained personnel for implementation of coastal emergency management works. | Council, NSW SES | CZEAS finalisation and further updates | All locations |

Table 5.3 Phase 3 - Response Actions

| Action | Responsibility | Trigger | Relevant Locations |
|--|---------------------|---|--|
| Implement the communication protocol in conjunction with the combat agency (NSW SES) to advise landholders, residents, SLSCs, public authorities and other organisations that a coastal emergency is likely or is occurring and that actions in this CZEAS are to be implemented. Release media information as necessary to keep community informed. | Council and NSW SES | Response Phase Activated | All locations |
| Alert residents if risk level is high and if any emergency management actions are being implemented in line with the AWS. | NSW SES | Coastal emergency works are underway | Surrounding locations where emergency management actions are underway |
| Place appropriate equipment (back up radios, signage, plant, barricades etc.) and relevant personnel on standby | NSW SES, Council | Response Phase Activated | All locations |
| Erect barricades and temporary signage describing dangers along public foreshores and accessways and/or close beach access. | Council | Access is unsafe due to: <ul style="list-style-type: none"> Damaged accessway steps, slats, platforms, posts etc. A vertical erosion escarpment of greater than 0.5 m in height. Dangerous waves or excessive wave run-up progressing into accessways Otherwise deemed unsafe | All beaches |
| Close affected Council managed roads, or liaise with road owners to enable closure. | Council | Roads or vehicle access tracks are unsafe due to: <ul style="list-style-type: none"> Coastal erosion resulting in instability or undermining Wave run-up and overtopping causing or likely to cause inundation of areas | Pacific Ave, Gerringong; Access road to North Bombo Beach carpark Kendall's Beach Holiday Park access road; Barney Street and carpark, Kiama |
| Erect temporary signage of dangers or closure to cliff areas and install fencing to barricade access to the unstable cliff area (above and below area of instability subject to accessibility). | Council | Signs of cliff instability include (DPIE, 2019): <ul style="list-style-type: none"> Open cracks, or steps, along contours; Ground water seepage, or springs; Bulging in the lower part of the slope; Trees leaning down slope, or with exposed roots; Debris/fallen rocks at the foot of a cliff; Tilted power poles, or fences; and Cracked or distorted structures near the cliff. | All cliff locations |
| Evacuate residents due to access impacts. | NSW SES | Access to landholders is impeded through road closures | Pacific Avenue, Gerringong; Kendall's Beach Holiday Park |

| Action | Responsibility | Trigger | Relevant Locations |
|--|-----------------------|--|---|
| Increase surveillance of coastal hazards. | Council | Conditions present, or are likely to present, a potential danger to the public | All locations |
| Undertake Emergency Coastal Protection Works by placement of sand bags as protective barrier. Sand bags be filled to only two-thirds of their capacity and under no circumstance should they be overfilled. This allows for overlap, which assists in locking sandbags together. Where possible, sand bags to be placed stretcher-bond style, or alternatively can be placed randomly at the toe of the scarp or asset under threat. Emergency coastal protection works are to be placed in consultation with a suitably qualified coastal or geotechnical engineer. Works to be carried out only if safe to do so. Plant and equipment should access the works area from the closest suitable beach access pathway, avoiding disturbance to surrounding areas, in particular to any dune vegetation | Council | Erosion scarp (>0.8m) within 5 metres of asset. With respect to the Black Beach promenade seawall, undermining of structure, or visible signs of wall movement, such as cracking in the façade. | Locations at risk as identified in Table 3.1, and by textboxes inside Figure 3.1, in particular structures along Surf, Kendalls and Easts Beach, as well as the Black Beach promenade seawall |
| Close affected water and sewer infrastructure, or liaise with asset owners to enable shut down. | Council, Sydney Water | Conditions present, or are likely to present, a potential for damage to water and sewer infrastructure | All locations |
| Seek advice from DCCEEW (BCSG) staff or other specialist coastal engineering professionals. | Council | As required | All locations |

Table 5.4 Phase 4 - Recovery Actions

| Action | Responsibility | Trigger | Relevant Locations |
|--|----------------|--|--|
| Inspect the sites potentially affected by storm conditions, including the structural integrity of any assets / infrastructure or cultural sites that were impacted or damaged. Geotechnical, structural and/or coastal engineering / cultural investigations may be required to understand residual risk following a coastal emergency event. Assess whether triggers and thresholds have been reached relating to Task G.2 of CMP Action G for initiating interim coastal protection works at one or more of South Warri Beach, North Bombo Beach and Storm Bay. Assess whether trigger and threshold has been reached relating to Task P.4 of CMP Action P for undertaking beach scraping of Surf Beach. | Council | As soon as safe and practicable following emergency event. | All locations |
| Issue orders under the Local Government Act 1993 and/or the Environmental Planning and Assessment Act 1979 when properties are deemed structurally unsafe or pose a risk to the public. | Council | Post-event inspections indicate unsafe conditions | All locations |
| Arrange for permanent repair of damaged assets / infrastructure, including stormwater pits and pipes, accessways, footpaths and roadways. | Council | Post-event inspections indicate repairable damage | All locations |
| Monitor the condition, performance and impact of any emergency coastal protection works | Council | As soon as safe and practicable following emergency event | Where emergency coastal protection works have been established |
| Remove emergency coastal protection works once the beach has sufficiently recovered, or within 90 days of installation, whichever the sooner. | Council | 90 days following installation of emergency coastal protection works or following beach recovery | Where emergency coastal protection works have been established |

| Action | Responsibility | Trigger | Relevant Locations |
|---|------------------|---|--------------------|
| Liaise with property owners to ensure any private and/or public structures do not pose a risk to the public. | Council | As soon as safe and practicable following emergency event | All locations |
| Removal of beach/storm debris and general clean up that poses a risk to public safety. | Council | As soon as safe and practicable following emergency event | All locations |
| Remediate area to restore safe access to beaches if beach erosion has caused a large escarpment / drop off (>0.5 m). | Council | As soon as safe and practicable following emergency event | All beaches |
| Undertake works to re-establish or enhance the natural protective features of the coast, such as dune revegetation. | Council | As soon as safe and practicable following emergency event | All beaches |
| Undertake cliff stabilisation works, if post-event geotechnical inspection indicates cliff instability. This may be done by anchoring (the use of terracing, planting, wiring or concrete supports to hold cliffs in place), smoothing the slope, or dewatering (drainage of excess rainwater to reduce water-logging). Cliff stabilisation works will need to be appropriately designed to support geotechnical conditions. Installation of alternative accessways to be considered if stabilisation of cliff edges is not practical in the short-medium term. | Council | As soon as safe and practicable following emergency event | All cliffs |
| Maintain temporary barricades, safety fencing and associated warning signage, until risks to public have been mitigated. | Council | On-going | All locations |
| Erect permanent warning signs if risks to public cannot be mitigated within a 3 month period (e.g. for cliff instability risks). | Council | On-going | All locations |
| Critically review this CZEAS, communications protocol/plan and operational procedures to ensure they achieved their performance objectives. Amend if shortcomings or improvements are identified to improve the future effectiveness of coastal emergency response actions. | Council | Within 2 months following emergency event | All locations |
| Replenish any used emergency materials and supplies for future emergency events. | Council, NSW SES | As soon as practicable following emergency event | All locations |

6 Other Emergency Response Details

6.1 Emergency Coordination Centres

The key coordination centre will be the Kiama Municipal Council Administration Centre. Alternative centres may include the central hubs for emergency response services, such as NSW SES.

6.2 Approval Pathways

Information on approval pathways for emergency coastal protection works are set out in the coastal protection works fact sheet (DPE, 2018) (refer Figure 6.1).

A public authority, such as Council, can carry out emergency coastal protection works, as exempt development, where these works are in accordance with a CZEAS (this document) prepared by Council and included in the relevant certified CMP (DPE, 2018).

A separate approval pathway is required for Coastal Protection Works (not Emergency Coastal Protection Works) also as set out in the coastal protection works fact sheet (DPE, 2018). Coastal Protection Works are not covered under this CZEAS.

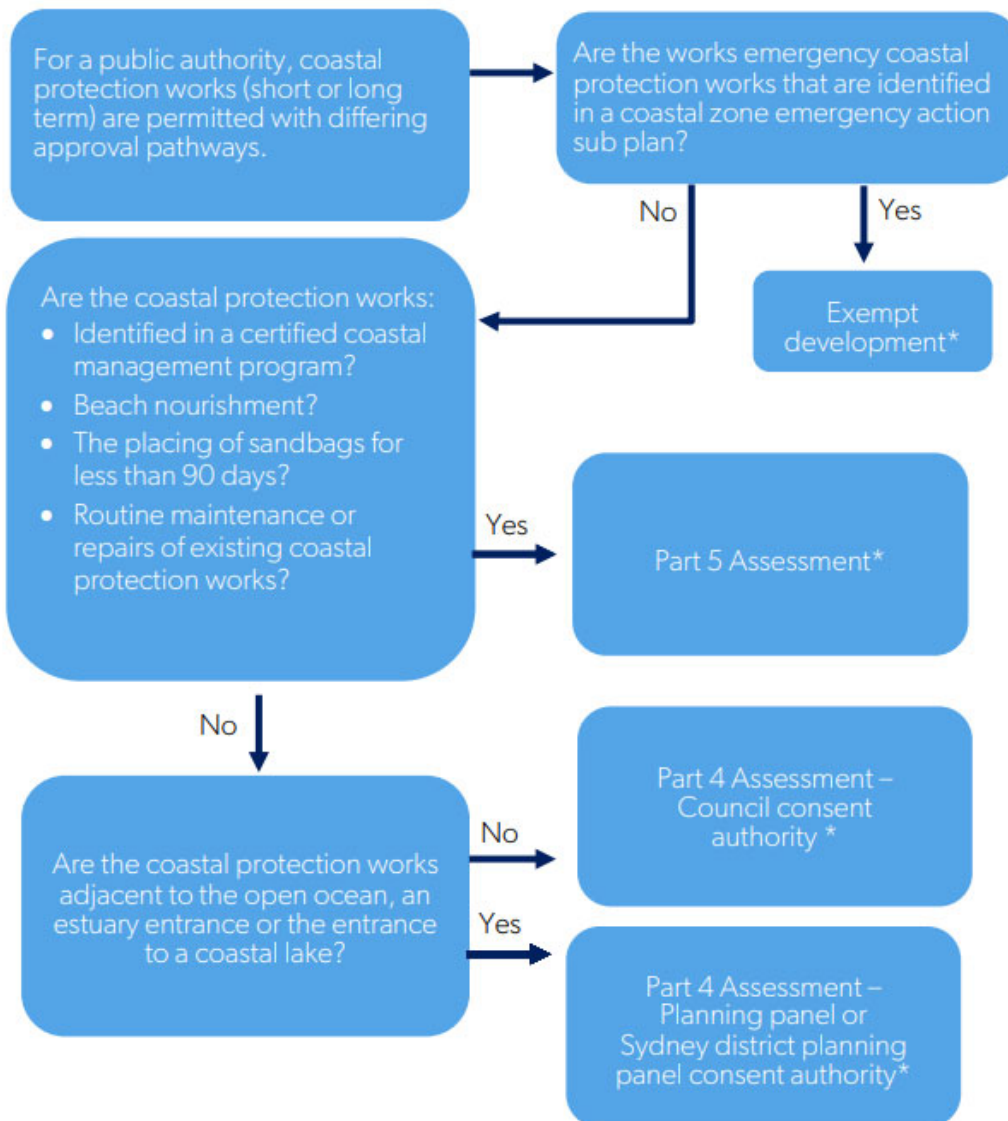
Coastal Protection Works undertaken by private landowners requires a separate approvals pathway as detailed in the coastal protection works fact sheet (DPE, 2018) and replicated as Figure 6.2.

6.3 Recording Coastal Emergency Impacts and Emergency Response Actions

After a coastal emergency event, Council will collect records of the event, resulting impacts and response actions undertaken along with decision-making processes. Records will be captured within a database and reviewed to learn from experience in order to improve efficiency of emergency response actions and to understand any changes in coastal conditions over time. Data and records to be collected should include:

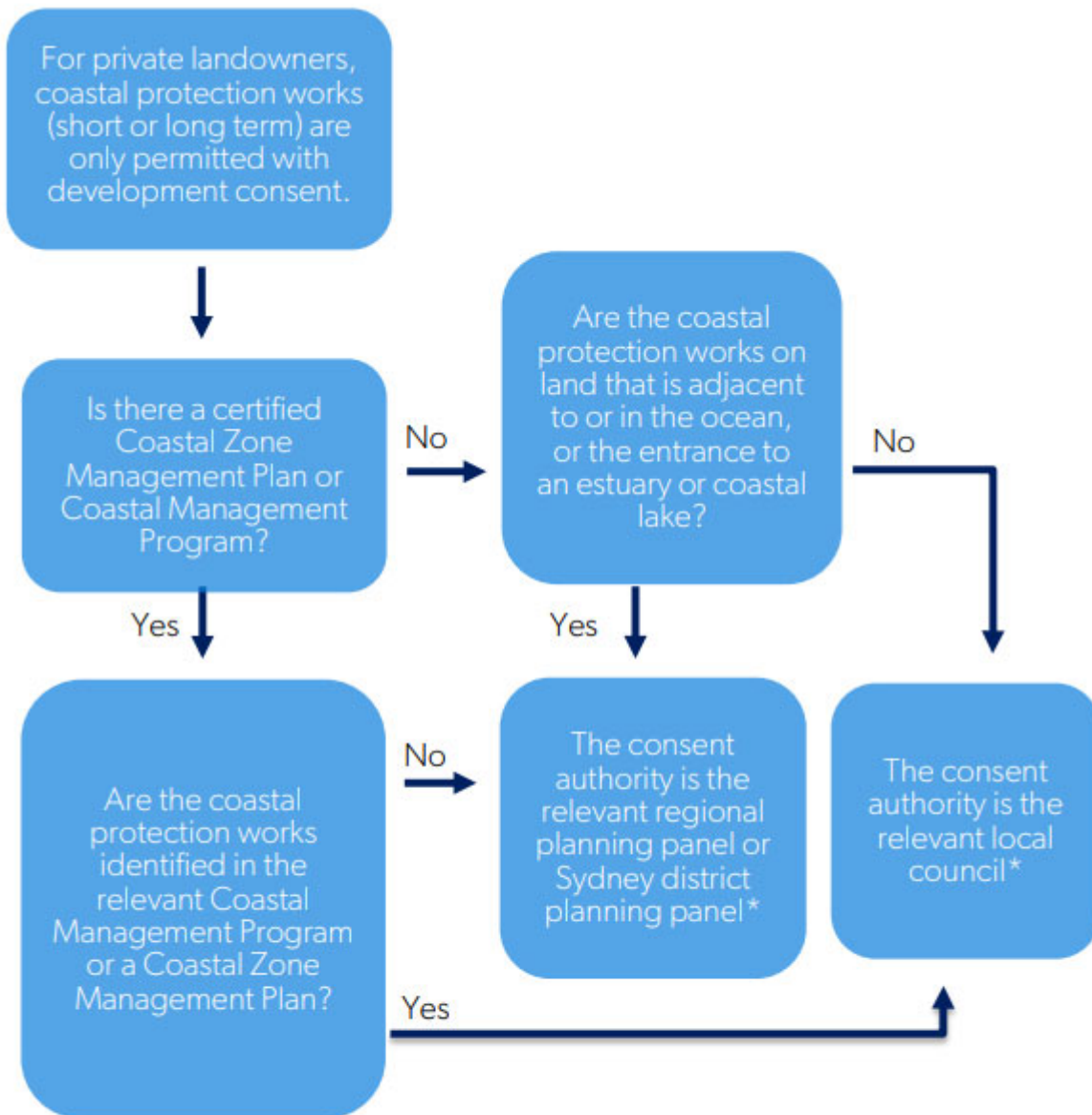
- Details of any beach erosion, coastal inundation, landslips or cliff instability and the weather conditions under which they were caused, including photographs, locations of assets and infrastructure that were damaged by the storm and details of the extent of damage;
- Details of any emergency coastal protection works undertaken, including the cost and the installation date;
- Details of any survey of beach levels and other features that may be required to provide a greater understanding of the hazard or the event;
- Review and update (if required) of this CZEAS, in particular the Emergency Response Action Plans (Section 5), in consultation with the NSW SES and any other relevant agencies.

Complementary to **Action P** of the CMP, the records of storm events, extent of damage and coastal protection works will assist Council to understand how climate change and/or extreme events are affecting the Kiama coastline and to better plan for adaptation to the effects of sea level rise and other factors such as increasing storm frequency and intensity over time.



*Other approvals may be required under different legislation.

Figure 6.1 Coastal protection works assessment pathway for public authorities (including councils). Source: DPE (2018)



*Other approvals may be required under different legislation.

Figure 6.2 Coastal protection works assessment pathway for private landowners. Source: DPE (2018)

7 Communication Protocol for Coastal Emergency Events

Kiama Municipal Council will provide information about anticipated coastal emergency events to potentially impacted residents, holiday parks, surf clubs and nearby businesses through the following mechanisms:

- Provide routine emergency management briefings to Council staff to communicate the strategy outlined in this CZEAS, including coastal emergency event triggers, locations at risk, roles and responsibilities; relationship to other EMPLANS and subordinate plans and the proposed emergency response actions, including ensuring they have the capacity to respond;
- In collaboration with the NSW SES, provide emergency management briefings to the public as needed, in particular affected landholders, to communicate the strategy outlined in this CZEAS, including coastal emergency event triggers, locations at risk, roles and responsibilities and the emergency response actions, including what actions a landholder may need to take and any assistance that may be available to them;
- Provide emergency management information (in the form of signage and brochures) at local community centres and at Council offices;
- In consultation with the NSW SES and BoM, issue safety advice to landowners and the community regarding the likelihood of an impending emergency that would initiate actions under this CZEAS (e.g. on Council's website);
- Co-ordinate with NSW SES to ensure residents are aware of urgent hazards during emergency events, and provide assistance with door-to-door communication as necessary;
- Communicate with relevant NSW State Government agencies if emergency coastal protection works are being pursued;
- Place barriers and signage at beach and foreshore accessways and roads that are closed due to coastal erosion impacts;
- Provide up to date information on Council's website regarding closures of beach and foreshore accessway and roads, and subsequent re-openings;
- Coordinate with Heritage NSW and appropriate Aboriginal representatives should cultural artefacts become exposed or damaged as a result of a storm event. Inform the NSW Police should an Aboriginal burial site become exposed.

8 References

- BMT (2021) Kiama Coastline Coastal Management Program. Stage 2 Final Report. Prepared for Kiama Shire Council
- BMT (2023) Kiama Coastline Coastal Management Program. Stage 4: Coastal Management Plan. Prepared for Kiama Shire Council.
- DECCW (2011) Guide to the Statutory Requirements for Emergency Coastal Protection Works. March 2011.
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- Illawarra South Coast Regional Emergency Management Committee (2017). Illawarra Local Emergency Plan. January 2017.
- Illawarra South Coast Regional Emergency Management Committee (2019). Illawarra South Coast Regional Emergency Management Plan. February 2019.
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- NSW SES (2022). Illawarra (Wollongong City, Shellharbour City and Kiama Local Government Areas) Local Flood Plan. Endorsed by the Local Emergency Management Committee, 1 June 2022.
- NSW SES (2023). New South Wales State Storm Plan. A Sub Plan of the State Emergency Management Plan. Endorsed by the State Emergency Management Committee, 28 September 2023. <https://www.nsw.gov.au/rescue-and-emergency-management/sub-plans/storm>
- OEH (2018). Coastal Management Manual Part A: Introduction and mandatory requirements for a coastal management program. Sydney: Office of Environment and Heritage, NSW Government.
- Rhelm & Baird (2022) Eurobodalla Open Coast Coastal Zone Emergency Action Subplan. Prepared for Eurobodalla Shire Council
- Water Technology (2023) Woolgoolga Region Estuaries Coastal Zone Emergency Action Subplan. Prepared for the City of Coffs Harbour.

Annex B: Detailed Descriptions of CMP Management Actions

| | | | |
|-----------------------------------|---|------------------|-----------------------------|
| Action A | Establish a Coastal Management Program Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP and to facilitate future reviews and assessments of the effectiveness of this CMP | | |
| Location / Scale | Covering whole Coastal Management Area (CMA) | | |
| Priority | Very High | Timeframe | Short-term (within 3 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> Lack of Engagement, Governance and Compliance | | |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Governance and compliance | | |
| Description | <p>There are multiple stakeholders regarding the management and governance of lands, water, infrastructure and the community within the Kiama coastal areas. At this point in time, there is no established forum for sharing communications or consulting on integrated and collaborative planning regarding the interests of the coast.</p> <p>This Action involves establishing a Coastal Management Program (CMP) Operational Working Group (OWG) with the specific remit of overseeing implementation of the CMP, and to advise on issues pertaining to the Kiama coastline. Although the OWG would not be a decision-making body, it could nonetheless shape and influence decisions made by individual stakeholders through co-ordinated discussions and knowledge sharing. The OWG should include relevant agencies, stakeholders and expert staff from within Council.</p> <p>The OWG could hold special knowledge sharing workshops to cover topics relevant to the CMA, such as Intermittently Closed and Open Lake and Lagoon (ICOLL) management, infrastructure planning and cultural heritage by inviting subject matter experts (SMEs) to give presentations. The OWG provides a mechanism for consistent communications between key stakeholders of the Kiama coastal zone and allow all stakeholders to share important information on their strategic intents and plans for land and assets along the Kiama coastline. From this, the OWG can identify and explore opportunities for managing multi-use lands with shared values and land use outcomes.</p> <p>This Action should be the highest priority of all actions in this CMP, so that the remainder of the CMP can be implemented more effectively and within a framework of stakeholder engagement and consultation, and with a sound governance structure in place that will ensure delivery and outcomes are achieved.</p> | | |

| Action A Establish a Coastal Management Program Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP and to facilitate future reviews and assessments of the effectiveness of this CMP | | | | | |
|---|---|-------------|--|--|-----------------------------------|
| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
| | <p>A.1: Engage with agencies and stakeholders to gauge interest and establish scope of OWG. Hold detailed discussions with all relevant agencies and stakeholders of the Kiama coastline to determine interest in participation in the Operational Working Group (OWG) and available time/resources/costs each agency and stakeholder can contribute to governance of the Kiama Coastline CMP. Agencies to be consulted should include DCCEEW-BCSG, DPPI-Crown Lands, DPPI-Planning, DPPI-Fisheries, TfNSW (including representatives with interest in Kiama Boat Harbour), LLS, NPWS, Sydney Water, ISJO and Aboriginal-led organisations including Illawarra LALC and Jerrinja LALC. It is acknowledged that agencies and stakeholders are asked to participate in many similar forums, so gauging the level of time available for participation will be critical to the Terms of Reference (see below) and future success of the OWG.</p> | Council | DCCEEW-BCSG, DPPI-Crown Lands, DPPI-Planning, DPPI-Fisheries, TfNSW, LLS, NPWS, Sydney Water, ILALC, JLALC, ISJO | Council staff time. | Council budget if done internally |
| | <p>A.2: Prepare Terms of Reference (ToR) for the OWG. The ToR should provide clarity on roles, responsibilities and expectations on Operational Working Group (OWG) members, as well as mechanisms for review of effectiveness and duration of membership tenure. Similar ToRs have been established for similar CMP governance groups elsewhere in NSW under the DCCEEW-led NSW Coastal Management Program.</p> | Council | DCCEEW-BCSG | Council staff time. | Council budget if done internally |
| | <p>A.3: Formally establish the OWG in accordance with the agreed ToR. Hold regular meetings of the Operational Working Group (OWG) in accordance with the agreed terms</p> | Council | DCCEEW-BCSG, DPPI-Crown Lands, | Council staff time Consultation fees for First | Council budget if done internally |

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|---|---|---|---------------------------------------|
| Action A | Establish a Coastal Management Program Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP and to facilitate future reviews and assessments of the effectiveness of this CMP | | |
| | of reference (see Task A.2). Undertake periodic self-reviews of the OWG and adjust Terms of Reference if not effective or appropriate. | DPI-Fisheries, TfNSW, LLS, NPWS, Sydney Water, ILALC, JLALC, ISJO | Nations members covered by Action J.2 |
| Success indicators | <ul style="list-style-type: none"> Engagement with all relevant agencies and stakeholders regarding challenges and opportunities for improved governance of land, water, infrastructure and users of the Kiama CMA Formalisation of new Operational Working Group with specific role to oversee the implementation of the CMP and for sharing information and knowledge regarding the Kiama CMA | | |
| Integrated or concurrent Actions | Relates to every Action within this CMP | | |

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| Action B | Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks | | |
| Location / Scale | Within the Coastal Management Area (CMA) of Council Local Government Area (LGA). Targeting locations where there may be conflict between CMA outcomes and purpose/objectives of existing land use zonings and their associated planning provisions. In the future, a defined CVA will capture the area potentially impacted by coastal erosion and inundation risks to 2120, so the LEP and supporting local policies, guidelines and strategies should carefully consider future CVA mapping to match planning provisions. Coastal erosion and coastal inundation mapping at 2120 along with current cliff instability areas are shown in CMP Stage 2 mapping. Refer Figure B-1 for suggested scope of Kiama open coastline CVA. | | |
| Priority | Very High | Timeframe | Short-term (within 3 years) |
| Risks/issue addressed (from CMP Stage 2) | <ul style="list-style-type: none"> Inappropriate or excessive development Overuse by recreation and tourism | | <ul style="list-style-type: none"> Coastal hazards and sea level rise Conflict over resource use and access availability |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Future development Community use and conflicts | | <ul style="list-style-type: none"> Hazards and climate resilience |
| Description | <p>Define a CVA, as specified in the <i>Coastal Management Act (2016)</i> (CM Act) and Chapter 2 the Resilience and Hazards State Environmental Planning Policy (2021) (R&H SEPP), for the open coastline of Kiama Local Government Area (LGA) based on the detailed information presented as part of Stage 2 of the CMP. As agreed with DCCEEW-BCSG and Council, the CVA is to cover coastal lands affected by 1% exceedance of coastal erosion by 2120, or 5% exceedance of tidal inundation by 2120, or 5% exceedance of coastal inundation by 2120, and is consistent with actual and proposed definitions of CVAs along other parts of the NSW coast (refer Figure B-1). Stage 2 of the CMP did not define risk-based mapping of coastal hazards due to cliff instability. Therefore, future updates of the CVA should be considered to include cliff instability risks once these are better defined (refer Action H).</p> <p>Update existing LEP and supporting local policies, guidelines and strategies to incorporate:</p> <ol style="list-style-type: none"> the outcomes of CMP Stage 2 hazards mapping and risk assessment, including the first-pass cliff instability assessment; areas important for habitat protection/conservation, including areas to be earmarked / preserved to accommodate future habitat migration in response to climate change and sea level rise in particular (to be further updated once estuary-based CMPs are developed for the Kiama LGA); a Coastal Hazards DCP to capture the provisions of the CVA following submission of a planning proposal, and other recommended requirements within the CMP; best-practice coastal design guidelines for development and infrastructure; and | | |

Action B Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks

v) regional plans and strategies that have been developed, or are underway, by all relevant stakeholders, including for example the Kiama Growth Planning Project and Illawarra Regional Masterplan by Sydney Water.

Strategy 11.6 of the Illawarra-Shoalhaven Regional Plan (DPIE, 2021) calls to align local plans with any certified Coastal Zone Management Plan or certified Coastal Management Program, while *Strategy 12.2* of the Regional Plan aims to reduce the region’s exposure to natural coastal hazards by considering coastal hazards including consideration of climate change, and ensuring areas identified for development are consistent with limitations and agreed long-term management strategies in the CMP.

To accompany the updated LEP and new Coastal Hazards DCP, this Action proposes to update the pre-lodgement Development Action checklist to incorporate key elements of the Coastal Hazards DCP and the updated LEP.

This checklist would be utilised for all coastal infrastructure development proposed within the identified coastal risk area to ensure that future development considers coastal hazards, including climate change projections and future sea level rise scenarios, in a consistent manner. The updated checklist should be used for both Part 4 and Part 5 assessments under the *Environmental Planning and Assessment (EP&A) Act 1979*, including Council-proposed development.

This action complements the development of emergency response plans for specific sites located within the CVA to help ensure that risks to people and property are managed appropriately (refer **Action C**).

Project eligibility under the Coast and Estuaries Grant Program will be subject to funding round objectives

| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
|---------------|--|-------------|----------------------------|--|--|
| | <p>B.1: Prepare and submit a Planning Proposal to State Government for mapping the Coastal Vulnerability Area (CVA). CVA proposal to cover agreed land within the Kiama LGA that is subject to coastal erosion and inundation risks to 2120 as detailed under the R&H SEPP.</p> <p>As the CVA within the R&H SEPP will potentially impact future development, this also includes engagement and consultation with all owners of lands that will be within the CVA, and especially those owners that have existing assets and infrastructure within the proposed CVA, or may potentially require new assets within the CVA in the future. This</p> | Council | DCCEEW-BCSG, DPPI-Planning | Council, staff time or \$50,000 capex for consultancy. | <ul style="list-style-type: none"> Council budget if done internally Kiama Municipal Council Coastal and estuary grants Program |

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| <p>Action B</p> | <p>Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks</p> | | | |
| | <p>consultation with land owners can be facilitated through the Operational Working Group to be established under Action A.</p> | | | |
| | <p>B.2: Undertake a thorough review of the LEP and supporting documents for consistency with the Coastal Management Program (CMP) and CVA. Review to identify possible and actual tensions and conflicts between the stated purpose and objectives of land use zonings/provisions and the purpose and objectives of the CMP and the CVA. Supporting documents to include local policies, guidelines and strategies, e.g. Local Strategic Plan Statement.</p> | <p>Council</p> | <p>DCCEEW-BCSG, DPFI-Planning</p> | <p>Council staff time or \$100,000 capex for consultancy</p> <p>Council budget if done internally, or</p> <ul style="list-style-type: none"> Coastal and estuary grants Program Kiama Municipal Council |
| | <p>B.3: Review options and propose changes to the LEP and other land use planning controls, including a new Coastal Hazards DCP. This would aim to address tensions and conflicts with the existing instruments and the CMP and CVA, and also to encapsulate the requirements of the updated Coastal Design Guidelines (NSW Government, 2022). Changes to the LEP could include, for example, changes to zonings within the CVA and introduction of specific coastal hazard provisions within relevant zones. This task is also to consider the development of a Coastal Hazards DCP to guide future development within the CVA and potentially other Coastal Management Areas beyond the CVA. Changes to the LEP and development of the DCP should also be guided by the Illawarra-Shoalhaven Regional Plan. Within this Plan, <i>Strategy 17.1</i> provides considerations regarding water resources and water quality management, including water reuse, incorporating water sensitive urban design, and managing new developments to minimise impacts on downstream environments based on the <i>Risk-based</i></p> | <p>Council</p> | <p>DCCEEW-BCSG, DPFI-Planning</p> | <p>Council staff time or \$200,000 capex for consultancy</p> <p>Staff time if done internally, or</p> <ul style="list-style-type: none"> Coastal and estuary grants Program Kiama Municipal Council |

Action **B**

Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks

Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions (NSW Government).

Proposed drafting instructions for changes to the LEP and development of the new DCP would be a specific outcome from this task.

Coastal Hazards DCP

A new Coastal Hazards DCP could ensure that future built infrastructure and assets are planned, sited and constructed to accommodate future coastal risks to allow for natural responses of the coastal environment under the influences of future climate change.

The Coastal Hazards DCP should stipulate the completion of site-specific Geological Society NSW (GSNSW)-approved geotechnical assessments for proposed developments located adjacent to coastal cliffs and headland bluffs (within 50m say), with development controls determined by the outcomes of these geotechnical assessments. Based on the Stage 2 CMP walkover, this should include, as a minimum, new development or significant site redevelopment on properties located below:

- Stafford St, Gerroa (Black Head)
- Eastern end of Geering St, Gerringong
- Boanyo Ave and northern section of Gwinganna Ave (Kaleula Head)
- Church Point
- Pheasant Point Dr (Pheasant Point)
- Cliff Drive (Cathedral Rocks)
- Johnson St (Minnamurra Headland)

| Action B | Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks | | | | |
|-----------------|---|---------|---|--|--|
| | <p>B.4: Make recommended changes to the LEP and prepare the new DCP following appropriate legislated process, including public consultation. Drafting changes to the LEP and development of the new DCP to be agreed and endorsed by Council for enacting amendments to statutory and non-statutory documents. Changes to supporting policies, guidelines and strategies also to be agreed and endorsed by Council as appropriate and relevant.</p> <p>Develop supporting information for the community to understand how the CVA mapping has been developed, how to interpret the maps and what a CVA means for landowners.</p> <p>Amendments to the new Coastal Hazards DCP should be considered when new information becomes available regarding the extents and significance of cliff instability risks (refer Action H).</p> | Council | DCCEEW-BCSG | Council staff time only or \$200,000 capex for consultancy, excluding consultation | Council budget if done internally, or <ul style="list-style-type: none"> • Coastal and estuary grants Program • Kiama Municipal Council |
| | <p>B.5: Update pre-lodgement Development Application (DA) checklist to include key elements of the Coastal Hazards DCP, the updated LEP and the R&H SEPP. Using the information contained within the Coastal Design Guidelines, other best practice guidelines, standards and relevant practice notes, and aligned with Infrastructure NSW process, update Council's pre-lodgement DA checklist and/or link to relevant part of the NSW Government Planning Portal https://www.planningportal.nsw.gov.au/.</p> <p>With specific reference to new and updated provisions of the LEP and new DCP, the checklist is to be used to demonstrate consistency of a proposed infrastructure development with the objects of the CM Act and the objectives of this CMP, and has adequately accounted for all relevant coastal risks,</p> | Council | DCCEEW-BCSG, DPPI-Planning, Sydney Water, TfNSW | Council staff time only or \$100,000 capex for consultancy | Council budget if done internally or <ul style="list-style-type: none"> • Increasing Resilience to Climate Change Program (or similar future programs) • Kiama Municipal Council |

BMT (OFFICIAL)

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| <p>Action B</p> | <p>Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks</p> | | |
| | <p>environmental values and future impacts of climate change. The checklist can flag particular issues that should be addressed by proposed coastal infrastructure, including for example the need for emergency response or special protection in the event of a coastal storm, which may subsequently endanger responders or have an impact on future environmental or amenity values.</p> | | |
| | <p>B.6: Utilise the use of the pre-lodgement checklist for all coastal infrastructure development proposed within a coastal risk area (being assessed through both Parts 4 and 5 of the EP&A Act 1979). The updated checklist should be utilised when reviewing proposed coastal development that is subject to approval following both Part 4 and Part 5 of the EP&A Act. Thus, the updated checklist should form part of Council’s own REF process. The checklist should also be used by other public authorities undertaking Part 5 assessable development. Meetings of the Coastal Management Program Operational Working Group, established under Action A, can be used as a forum for discussing coastal development proposed by public authorities within the Kiama CMA and ensuring that all future development utilises the pre-lodgement checklist. The checklist should be used early in the infrastructure planning process (e.g. at initial conceptualisation and Business Case stages) so that it can truly influence infrastructure planning and design outcomes.</p> | <p>Council</p> | <p>Council staff time Council budget</p> |
| <p>Success indicators</p> | <ul style="list-style-type: none"> • CVA proposal submitted and approved • LEP is amended, a Coastal Hazards DCP is developed and the pre-lodgement checklist is updated | | |

BMT (OFFICIAL)**Action B**

Introduce a Coastal Vulnerability Area (CVA), modify the Local Environmental Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks

Integrated or concurrent Actions

- D. Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama LGA coastline
- F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks
- H. Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline
- M. Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, and assess threats and risks to these values



Legend

- Proposed CVA Area
- Cadastral Boundaries

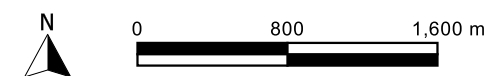
Note:

*Proposed CVA represents the most landward of
 i) 5% exceedance of coastal inundation at 2120; or
 ii) 1% exceedance of beach erosion at 2120;
 as determined in Stage 2 of the CMP.*

Title:

Proposed Coastal Vulnerability Area (CVA) for Kiama coastline

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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| Action C | Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA) | | |
| Location / Scale | <p>Applicable to relevant private and public lands within the CVA that are utilised by the general public. Specific examples of locations relevant to this Action include:</p> <ul style="list-style-type: none"> • Easts Beach Holiday Park located immediately behind Easts Beach (subject to extreme risk of coastal inundation at 2020, high risk of tidal inundation by 2070, and high risk of beach erosion by 2120). • St Peter and Paul Catholic School, located immediately behind Surf Beach (subject to high risk of coastal inundation at 2020, and high risk of beach erosion by 2120). • Kiama Surf Life Saving Club, located behind Surf Beach (subject to high risk of coastal inundation at 2020, and high risk of beach erosion by 2120). • Kendalls on the Beach Holiday Park located immediately behind Kendalls Beach (subject to high risk of coastal inundation at 2020, and extreme risk of coastal inundation by 2070). • Park Road, Gerroa and access to several private properties (subject to high risk of tidal inundation at 2070, and high risk of coastal inundation by 2120). • Discovery Holiday Park, located adjacent to Crooked River (susceptibility to be confirmed through future Crooked River CMP). <p>These locations are shown on Figure C-1.</p> | | |
| Priority | High | Timeframe | Medium-term (within 6 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> • Inappropriate or excessive development | | <ul style="list-style-type: none"> • Coastal hazards and sea level rise |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> • Community Use and Conflicts | | <ul style="list-style-type: none"> • Hazards and climate resilience |
| Description | <p>Land within the CVA is subject to coastal hazards. When this land is utilised for various purposes, potential coastal hazards create risks to the users. For certain land parcels, specific land use results in high concentration of people on the land, e.g. at Holiday Parks and schools. Beyond the specific steps that will be taken during coastal emergencies, as detailed in the CZEAS, this Action aims to ensure that people potentially impacted by a coastal hazard event are evacuated from impacted areas efficiently and effectively, without creating undue burden on emergency response agencies, such as the NSW State Emergency Service (NSW SES). For the Holiday Parks and the Catholic School (St Peter and Paul School), this involves development of a site-based emergency response plans that can be implemented when necessary to keep people safe from coastal hazards.</p> | | |

Action C Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA)

Whilst not compulsory, private landholders that are at risk of coastal hazards (or else are at risk of being isolated by them) are also encouraged to develop a Home Emergency Plan. Further information about developing these plans is available from the NSW SES (see <https://www.ses.nsw.gov.au/storm-resources/after-a-storm/plan-for-now-what-you-will-do/>), while Council can provide information to private landowners about their coastal risks.

With specific reference to caravan parks, Shoalhaven Council have some caravan park emergency plans that could potentially be useful resources for Kiama caravan parks to base theirs on (e.g. <https://www.floodplainconference.com/papers2016/Stephen%20Yeo%20and%20Ailsa%20Schofield.pdf>), while Victoria SES has established guidelines for caravan park emergency management planning (see <https://www.ses.vic.gov.au/plan-and-stay-safe/caravan-park/planning>).

In the longer term, the frequency of coastal hazard impacts on some lands within the CVA may require reconsideration of suitable land use. Owners and occupiers of these lands, including Council, should develop a long term adaptation plan for these lands so that risks to people are not exacerbated in the future, due to climate change and sea level rise in particular. Council may also develop a broader coastal adaptation plan in the future to support and direct a consistent and integrated approach to coastal risk management as the impacts of coastal hazards become more prevalent. This broader coastal adaptation plan would be beyond the timeframe of this CMP but should be considered further as part of future reviews and updates.

| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
|---------------|---|-------------|---------------------|--|--|
| | <p>C.1: Consult with relevant landholders and provide them with information resources regarding existing and future coastal hazards, including the CZEAS, and implications for CVA declaration on land use and future development. Under Action B, the establishment of a CVA will potentially impact on land use and future development of land within the CVA. As the CVA will likely cover lands to be impacted by coastal hazards out to 2120, some lands within the CVA are at higher risk than others. Engagement with owners of land within the CVA will be required so that the owners understand the implication of the CVA and also the</p> | Council | DCCEEW-BCSG | Mostly Council, staff time. \$10,000 allowance for resources to support this action. | <p>Council budget if done internally, or</p> <ul style="list-style-type: none"> • Kiama Municipal Council • Coastal and Estuary Grants Program |

Action C Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA)

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| | <p>likely timeframe for impacts. Information resources to support this engagement will be developed.</p> <p>Communication of the CZEAS to landholders and lessees of coastal land will be required to ensure that protocols are understood and expectations of support during coastal emergencies are consistent.</p> | | | | |
| | <p>C.2: Incentivise and support relevant landholders and lessees of public land in hazard-affected coastal areas to engage with local emergency services including the NSW State Emergency Service (NSW SES), and prepare an appropriate emergency plan that takes into account response to coastal hazards, such as severe storm surge inundation. Emergency Plans are required to ensure that people will not be placed in danger during future coastal hazard events. Incentivisation and support for preparation of Emergency Management Plans could include funding for development of the works, or provision of resources, templates etc. The Local Emergency Management Committee (LEMC) and NSW SES should be made aware of the need for emergency response for the relevant lands and ensure their emergency arrangements (e.g. within the Kiama Local Flood Plan) are up to date and take these coastal hazards into consideration. The land managers should engage with the NSW SES in preparing their own Emergency Response Plans. Private landowners at risk of being impacted or isolated by coastal hazards should be encouraged to prepare their own Home Emergency Plans (see https://www.ses.nsw.gov.au/storm-resources/after-a-storm/plan-for-now-what-you-will-do/).</p> | <p>Council</p> | <p>DCCEEW-BCSG, NSW SES, DPHI-Crown Lands</p> | <p>Council staff time and for budgeting purposes, adopt \$50,000 capex in incentives / resource support</p> | <p>Council budget, and</p> <ul style="list-style-type: none"> Increasing Resilience to Climate Change Program Coastal and Estuary Grants Program Kiama Municipal Council |

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| <p>Action C</p> | <p>Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA)</p> | | | | |
| | <p>The Plans should consider all relevant issues raised by the LEMC and the NSW SES, and which include for example evacuation centres/destinations, access routes, time required to evacuate, decision-making process, effective/reliable warnings etc.</p> <p>Similar to Shoalhaven Council, evacuation plans should also be developed for currently managed Council lands if these lands expose people to coastal hazards, such as the Kiama SLSC and Kendalls on the Beach Holiday Park.</p> | | | | |
| | <p>C.3: Amend Council’s Public Land Management Policy to incorporate a requirement for an appropriate emergency plan into future leasing agreements of public coastal land at risk of coastal hazards. Leasing agreements for public land are renewed and renegotiated on a periodic basis. For public lands located within the CVA, conditions of the leasing agreement should be introduced that require consideration of emergency response to coastal hazards. This requirement would require an update to the Public Land Management Policy, which is the guiding document for use of public land.</p> | <p>Council</p> | <p>DCCEEW-BCSG</p> | <p>Council staff time</p> | <p>Council budget if done internally</p> |
| <p>Success indicators</p> | <ul style="list-style-type: none"> Emergency Response Plans prepared for all sites where these is concentrated numbers of people located within the CVA. At risk private landowners engagement with the NSW SES and Council to understand their risk and develop their own Home Emergency Plans Changes to the Public Land Management Policy stipulating the need for Emergency Response Plans when leasing public land within the CVA. | | | | |

Action C

Support and encourage relevant landholders and lessees of public lands to prepare and implement short-term emergency response plans for on-going land use within the Coastal Vulnerability Area (CVA)

Integrated or concurrent Actions

- B. Introduce a CVA, modify the Local Environment Plan (LEP) and introduce a new DCP to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks, including cliff instability risks
- F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks
- N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities
- P. Monitor beach and dune conditions to build knowledge and guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required



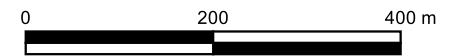
Legend

- Proposed CVA Area
- Cadastral Boundaries

Title:

Support and encourage short term emergency plans and longer term adaptation plans

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| Action D | Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama LGA coastline | | |
| Location / Scale | Applicable to lands that are strategic and important for public access or improved amenity to facilitate public access along the entire Kiama coastline. Specifically, this Management Action will prioritised locations for creating new areas of public access along the coastline. Focus will be on establishing a narrow corridor of land along the coastline between Gerringong and Gerroa available for public access, including cliff top areas and land adjacent to Werri Lagoon to enable extension of the existing Kiama Coastal Walk. May also cover publicly owned and managed land on Bombo Headland, subject to further discussions with DPHI (Planning) State team. | | |
| Priority | Medium | Timeframe | Short-term (within 3 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> Inappropriate or Excessive Development | | <ul style="list-style-type: none"> Coastal Hazards and Sea Level Rise |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Future Development | | <ul style="list-style-type: none"> Hazards and climate resilience |
| Description | <p>Providing continuous public access along the cliff tops of Kiama LGA has been an ambition of Council for many years. The coastline between Kiama and Gerringong is fully accessible to the public, however, the stretch from Gerringong to Gerroa is constrained by some private lands. Further, Easts Beach is backed by privately owned land, and as the beach retreats in the future in response to climate change and sea level rise, the beach could migrate to be largely within this private land.</p> <p>This Action involves developing a Coastal Lands Public Access Strategy that provides Council and the broader community a clear direction regarding future intent for public access along the coastline (cliff tops and beaches). The Strategy would outline the preferred locations for access, easements required, or land parcels for acquisition. The Strategy should also consider multiple points of entry/access to the coastal walk to facilitate emergency services access.</p> <p>Development of the Coastal Lands Public Access Strategy will require consultation with affected land owners so that a mutually agreeable outcome can be achieved in the future.</p> <p>Given the intent of the Strategy, Council can also consider modifications of relevant LEP and DCPs to provide a mechanism for accelerating strategy implementation should the opportunity arise through proposed land development.</p> <p>This Management Action focuses on the development of the strategy that will guide future land acquisition and subsequent development of infrastructure to support public access on the newly acquired land. Actual implementation of the Coastal Lands Public Access Strategy, that is, acquisition of land or securing of easements along the coastal fringe, should be pursued opportunistically, subject to additional funding being identified and available, from Council and relevant State Government programs, including the NSW Coastal Lands Protection Scheme. Similarly, works to provide access (e.g. construction of walking tracks/boardwalks etc) should be pursued once land</p> | | |

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|------------------------|---|--------------------|-----------------------------------|----------------------------|--|
| <p>Action D</p> | <p>Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama LGA coastline</p> | | | | |
| | <p>is acquired (or easements secured). It is anticipated that some progress of the Strategy may be made within the 10 year timeframe of the CMP, as guided by priorities set out in the Strategy and if agreements with relevant land owners can be established.</p> <p>For clarity, the costs associated with implementation of the Coastal Lands Public Access Strategy (i.e. acquisition or easements) and subsequent works to establish public access (e.g. walking tracks, boardwalks, stairs) are not included specifically within this CMP due to the high degree of uncertainty associated with the land costs.</p> <p>Future reviews and updates to the CMP should consider including works and costs associated with implementation of the Coastal Lands Public Access Strategy and associated works to provide public access, thereby extending the current Kiama Coastal Walk.</p> <p>Where land is acquired, a Plan of Management would need to be prepared to guide management of the land under public care and control (most likely Council).</p> | | | | |
| <p>Detailed Plan</p> | <p>Defined tasks</p> | <p>Lead Agency</p> | <p>Supporting Agencies</p> | <p>Cost estimate</p> | <p>Funding options</p> |
| | <p>D.1: Consult with landholders along the coast where new public access is sought. This would include private land owners of coastal land between Gerringong and Gerroa, as well as DPHI (Planning) regarding publicly owned and managed land at Bombo Headland, East Beach Holiday Park regarding East Beach, and landowners of relevant land adjacent to Werri Lagoon (previously identified by Council and DPI-Fisheries).</p> | <p>Council</p> | <p>DCCEEW-BCSG, DPHI-Planning</p> | <p>Council staff time.</p> | <p>Council budget if done internally</p> |
| | <p>D.2: Confirm and prioritise coastal fringe land to be acquired or easements established (depending on suitability). This would be a direct output from the consultation with land holders (Task D.1) and would incorporate the willingness of land holders to assist with implementation of the strategy, and the likely costs that would be incurred, either through acquisition of land directly, or acquisition of an easement for public access. Depending on the outcomes of Task D.1, initial focus would be on extension of the Kiama coastal walk between Gerringong and Gerroa.</p> | <p>Council</p> | <p>DCCEEW-BCSG, DPHI-Planning</p> | <p>Council staff time</p> | <p>Council budget if done internally</p> |

| Action D | Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama LGA coastline | | | | |
|-----------------|---|---------|-------------|--|---|
| | <p>D.3: Prepare and implement Coastal Land Public Asset strategy, guided by Council’s Acquisition and Disposal of Land and Easements Policy. As a formal Council Strategy, this will likely require community consultation and then endorsement by Council.</p> <p>Implementation of the strategy, including potential acquisition of land or easements over private land, to be pursued by Council as opportunity and funding arises. Costs of land acquisition is not included in this CMP due to significant uncertainty of extent and value. This task includes the identification and pursuit of funding that would allow implementation of Council’s Coastal Land Public Asset strategy.</p> <p>Prepare Plans of Management for any land acquired by public authority.</p> | Council | DCCEEW-BCSG | Council staff time or \$50,000 capex for consultancy <i>Excludes costs for acquisition or easement due to significant uncertainty</i> | Council budget if done internally, or <ul style="list-style-type: none"> • Business Case and Strategy Development Fund • Coasts and Estuaries Grants Program • Environmental Trust Grants • Kiama Municipal Council |
| | <p>D.4: Incorporate provisions within the proposed Coastal Hazards Development Control Plan (DCP) or other relevant local plans requiring dedication of priority coastal fringe lands for public access if associated lots are developed in the future (e.g. subdivision of land).</p> <p>Options should be considered for modifying relevant LEP and DCPs, including the new Coastal Hazards DCP, that facilitate the transfer of land to Council, or ensure that specific land is dedicated for public access if certain coastal lots are developed in the future (including coastal fringe lands along Kiama cliff-tops and behind Easts Beach). Changes to LPIs will require community consultation as prescribed through regulations, and endorsement by Council.</p> <p>Clause 5.1 of the LEP (Relevant acquisition authority) identifies the authority that will be the relevant authority to</p> | Council | DCCEEW-BCSG | Council staff time or \$50,000 capex for consultancy | Council budget if done internally, or <ul style="list-style-type: none"> • Coasts and Estuaries Grants Program • Kiama Municipal Council |

| | | |
|---|---|---|
| Action D | Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama LGA coastline | |
| | acquire land reserved for certain public purposes if the land is required to be acquired under Division 3 of Part 2 of the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> (the owner-initiated acquisition provisions). | |
| Success indicators | <ul style="list-style-type: none"> • Development of Coastal Lands Access Strategy that prioritises areas along the coastal fringe and has incorporated consultation with affected land holders. | <ul style="list-style-type: none"> • Changes to relevant LEP and DCPs to enable dedication of priority coastal lands upon development of subject land parcels. |
| Integrated or concurrent Actions | <ul style="list-style-type: none"> • B. Introduce a Coastal Vulnerability Area (CVA), modify the LEP and introduce a new DCP to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks, including cliff instability risks • K. Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values • N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities | |

| | | |
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| Action E | Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values | |
| Location / Scale | Targeting Council-owned and Crown land that are utilised by the public for access and other coastal-related uses. These lands are shown in Figure E-1 . | |
| Priority | High | Timeframe Long-term (within 10 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> Inappropriate or Excessive Development Disturbance of Biodiversity and Habitat Overuse by Recreation and Tourism | <ul style="list-style-type: none"> Coastal Hazards and Sea Level Rise Lack of Engagement, Governance and Compliance Conflict Over Resource Use and Access Availability |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Ecosystem health Water quality Future development | <ul style="list-style-type: none"> Hazards and climate resilience Governance and compliance Community use and conflicts |
| Description | <p>This action involves upgrading existing facilities or constructing new facilities and other amenities that will improve public access to the coast and reduce conflicts that are sometimes experienced between different user groups (including conflicts between environmental, social and cultural values). This action should also aim to discourage inappropriate access/use/activities/behaviour, including through physical barriers etc if necessary.</p> <p>Community engagement undertaken during Stage 1 and 3 of the CMP identified several opportunities for improvement of management of community land including:</p> <ul style="list-style-type: none"> Signage for coastal walk Improving the surface condition and grade of the coastal walk, to enable more accessible use by community members Provision of formal track access across coastal dunes Repairs and upgrades to existing access and boardwalks, including at Seven Mile Beach Sufficient parking amenities to support user demands Facilities to support high usage (over-usage), including toilets, rubbish bins, picnic tables. Additional viewing platforms for whale watching (e.g. at Black Head) Additional facilities to support potential extension of the coastal walk to avoid pressure being placed on existing private facilities (e.g. golf course toilet facilities) | |

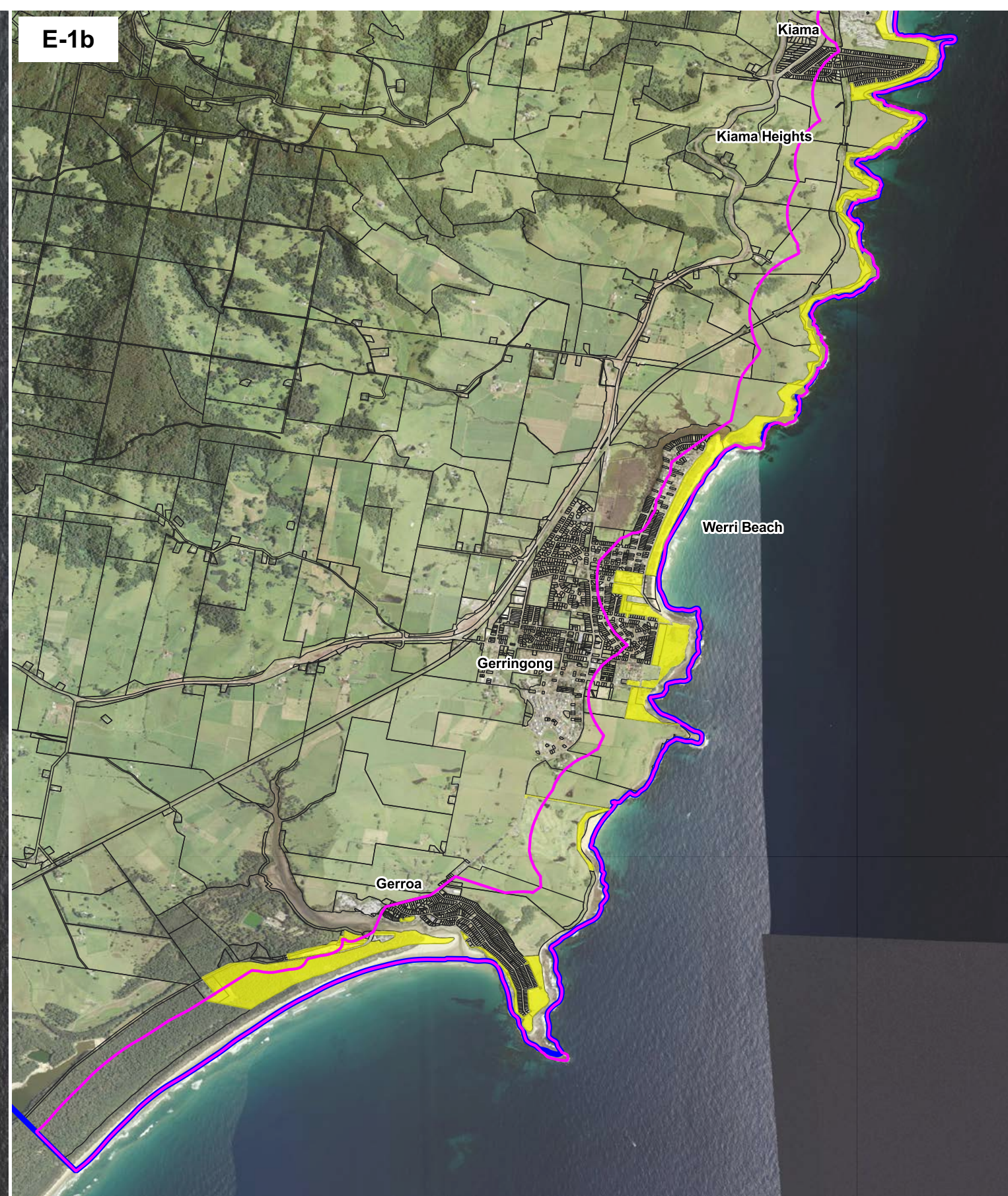
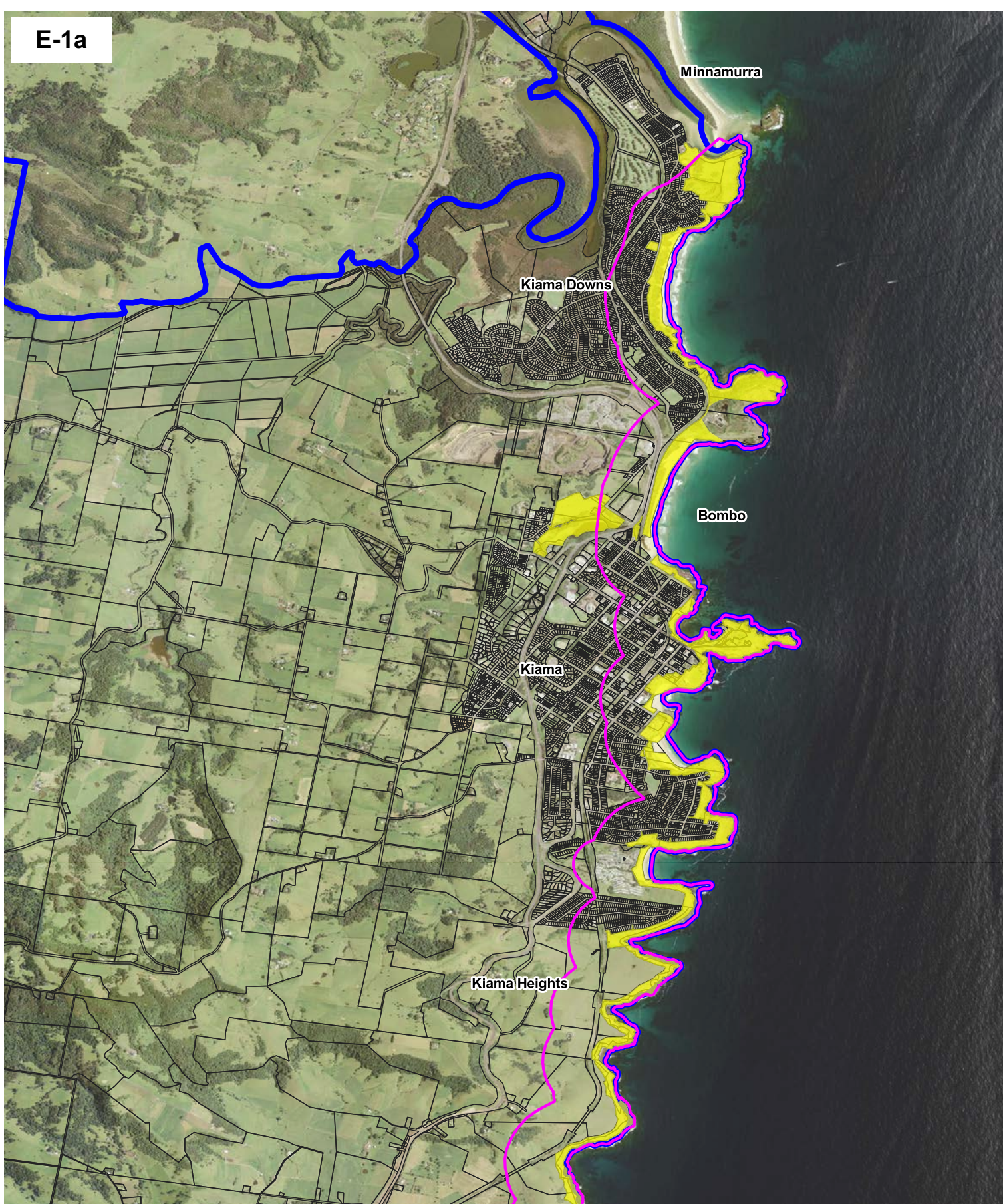
| Action E Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values | | | | | |
|---|---|-------------|-------------------------------|--|---|
| <ul style="list-style-type: none"> Extension of steps onto Surf Beach so there is not a dangerous drop-off at the bottom of the steps following a period of erosion (or overall sand depletion from the beach). <p>Plans for improving facilities and amenities along the coast should be preceded by first considering proposed actions under the Council Managed Crown Land Plan of Management 2022 (under development), the Kiama Assets Management Plan (Buildings) 2016 and the Kiama Asset Management Plan (Recreation) 2016, along with the Kiama Open Spaces and Recreation Strategy that is currently under development. Consideration should also be given to Council’s Disability Inclusion Action Plan, Council’s Tourism Opportunities Plan 2018, the NSW South Coast Marine Based Tourism Strategy, and the Kiama Strategic Tourism & Events Plan 2017-2021.</p> | | | | | |
| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
| | <p>E.1: Assess the condition of all existing access tracks and other community facilities and amenities on coastal lands. Before improvements can be planned, a condition assessment of existing facilities and amenities is required. This would include an engineering appraisal of the condition and functionality of built infrastructure, and serviceability of other amenities such as coastal access tracks and beach access steps.</p> | Council | DPHI-Crown Lands, DCCEEW-BCSG | Council staff time or \$80,000 capex for consultancy | Council budget if done internally, or <ul style="list-style-type: none"> Coastal and estuary grants Program (only some activities eligible) Kiama Municipal Council |
| | <p>E.2: Review existing Council policies and asset plans and consult with Council’s Infrastructure and Liveability Advisory Committee, to identify priority works for improving coastal access tracks, amenities and facilities. Amenities and facilities captured under this CMP are only those located with the Kiama Coastal Management Area. Proposed works to improve coastal amenities and facilities should be captured within Council’s forward works program, to support budgeting and resource planning.</p> | Council | DPHI-Crown Lands, DCCEEW-BCSG | Council staff time | Council budget if done internally |
| | <p>E.3: Undertake on-ground works to improve coastal access tracks, amenities and facilities. Works would need</p> | Council | DPHI-Crown Lands, | Allow \$700,000 capex over the 10 | Council budget if done internally, or |

| Action E | Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values | | | |
|----------------------------------|---|-------------|---|---|
| | <p>to be preceded by all necessary survey, investigations, cultural assessments, environmental assessments and approvals, as required, including provisions set out in the new Coastal Hazards Development Control Plan and pre-lodgement check-list (see Action B).</p> <p>Works are expected to include:</p> <ul style="list-style-type: none"> • Signage for coastal walk • Improving the surface condition and grade of the coastal walk, to enable more accessible use by community members • Repair / rehabilitate / provide new formal access tracks across coastal dunes • Repairs and upgrades to existing access and boardwalks, including at Seven Mile Beach • Sufficient parking amenities to support user demands, including Seven Mile Beach • Facilities to support high usage (over-usage), including toilets rubbish bins, picnic tables • Additional viewing platforms for whale watching (e.g. at Black Head) • Extension of steps onto Surf Beach so there is not a dangerous drop-off at the bottom of the steps following a period of erosion (or overall sand depletion from the beach). | DCCEEW-BCSG | year CMP period, and \$20,000/yr opex for maintenance | <ul style="list-style-type: none"> • Coastal and estuary grants Program • Crown Reserves Improvement Fund • NSW Environment Trust • Kiama Municipal Council |
| Success indicators | <ul style="list-style-type: none"> • Upgrading of existing, and/or construction of new, amenities and community facilities along the coast. | | | <ul style="list-style-type: none"> • Reduction in conflicts between users, as gauged through periodic pulse surveys of the community (not included as part of this CMP). |
| Integrated or concurrent Actions | <ul style="list-style-type: none"> • D. Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area coastline • F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks | | | |

Action **E**



Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values

- I. Ensure that infrastructure development and future management of the Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable
- N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities



Legend

-  CMP Study Area
-  Coastal Council Maintained Land
-  Kiama LGA Boundary
-  Cadastral Boundaries

| | | | |
|--|--|-----------------------------------|-----------------------------|
| <p>Title:</p> <p>Improve coastal access tracks, amenities and facilities on public land</p> <p><small>BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small></p> | <p>0 800 1,600 m</p>  | <p>Drawing:</p> <p>E-1</p> | <p>Rev:</p> <p>A</p> |
|  <p>BMT www.bmt.org</p> | | | |
| <p>Filepath: I:\N21130.i.ajs_Kiama\QGIS\Stage_3_Strategies\N21130_021_Improve coastal access tracks amenities and facilities on public land.qgz</p> | | | |

| Action F Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks | | | | |
|---|---|--|------------------|--|
| Location / Scale | <p>Covering all existing assets located within the Coastal Management Area (CMA). These are documented within the CMP Stage 2 risk register. Assets in the register are separated by asset owners (Council, Sydney Water, TfNSW, DPHI-Crown Lands, private etc) and identify timeframes and risk levels for each asset.</p> <p>Built assets that are identified as either High or Extreme Risk at the current timeframe (2020) include:</p> <ul style="list-style-type: none"> • South Coast Rail line, along with bridge and abutments over Spring Creek • Stormwater infrastructure on Bombo Creek and within Spring Creek • Sewer main maintenance access within Spring Creek • Kiama Surf Life Saving Club (SLSC) • St Peter and Paul Catholic School • Sewer main and pump station at Surf Beach • Kendalls on the Beach Holiday Park • Easts Beach Holiday Park • Sewer and water infrastructure behind Easts Beach • Pedestrian bridge over creek at Seven Mile Beach • Extensive infrastructure within Kiama Boat Harbour including the Black Beach promenade seawall (see also Action I). <p>Existing built assets potentially affected by intolerable (high or extreme) risks out to 2120 that will require consideration of coastal hazards as part of future management practices are shown in Figure F-1.</p> | | | |
| Priority | <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Medium</td> <td style="width: 10%; background-color: #00A0C0; color: white; text-align: center;">Timeframe</td> <td style="width: 40%;">Short-term (within 3 years)</td> </tr> </table> | Medium | Timeframe | Short-term (within 3 years) |
| Medium | Timeframe | Short-term (within 3 years) | | |
| Risks/issue addressed | <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> • Inappropriate or excessive development • Overuse by recreation and tourism </td> <td style="width: 10%;"></td> <td style="width: 40%; vertical-align: top;"> <ul style="list-style-type: none"> • Coastal hazards and sea level rise • Conflict over resource use and access availability </td> </tr> </table> | <ul style="list-style-type: none"> • Inappropriate or excessive development • Overuse by recreation and tourism | | <ul style="list-style-type: none"> • Coastal hazards and sea level rise • Conflict over resource use and access availability |
| <ul style="list-style-type: none"> • Inappropriate or excessive development • Overuse by recreation and tourism | | <ul style="list-style-type: none"> • Coastal hazards and sea level rise • Conflict over resource use and access availability | | |
| CMP Objective(s) addressed | <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> • Hazards and climate resilience • Community use and conflicts </td> <td style="width: 10%;"></td> <td style="width: 40%; vertical-align: top;"> <ul style="list-style-type: none"> • Governance and compliance </td> </tr> </table> | <ul style="list-style-type: none"> • Hazards and climate resilience • Community use and conflicts | | <ul style="list-style-type: none"> • Governance and compliance |
| <ul style="list-style-type: none"> • Hazards and climate resilience • Community use and conflicts | | <ul style="list-style-type: none"> • Governance and compliance | | |
| Description | Using the risk register developed as part of Stage 2 as a foundation, conduct an audit of existing built assets and infrastructure within the coastal zone (including stormwater and sewerage assets, rail infrastructure, foreshore paths and other amenities, coastal protection | | | |

| Action F Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks | | | | | |
|--|--|------------------------------|-------------------------------|--|---|
| <p>structures, breakwaters/walls, boat harbour infrastructure etc) to ascertain vulnerabilities to existing and future coastal hazards as define in Stage 2 report.</p> <p>Update existing asset management plans to redress asset vulnerabilities through proposed asset modifications, changes to maintenance regimes etc. Routinely monitor future condition of assets, especially if impacted by coastal hazard events. All planned asset replacements/upgrades etc to factor in future coastal hazards and risks as part of resilient design, re-positioning, future maintenance regime etc.</p> <p>Some asset owners, such as Sydney Water, have already commenced internal audits of assets and identified vulnerabilities to climate change. Improvements works to existing Sydney Water assets aim to stop ingress from infiltration prevent flood/tidal inundation. With respect to the Kiama coastal area, this includes the Easts Beach – Emergency Relief Structure (ERS) upgrade and valve installation, and Kiama Surf Beach – Decommissioning of existing ERS and relocating a new ERS and stormwater diversion works.</p> | | | | | |
| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
| | <p>F.1: Guided by the Stage 2 CMP risk assessment, conduct a detailed evaluation of each asset identified as being at risk of coastal hazards. Cognisant of all current asset management approaches, each owner/manager of infrastructure or built assets located within the coastal zone, and as documented in the CMP Stage 2 risk register, to conduct a detailed evaluation of each asset. The context of this evaluation is to determine vulnerability to coastal hazards and to establish remaining life of asset. Initial prioritisation for asset evaluation should be given to those assets that have been identified in the Stage 2 CMP as being high or extreme risk by 2120, although all assets should ultimately be evaluated.</p> <p>Where assets are confirmed as likely to experience high or extreme risks within the remaining life of the asset (e.g. an asset with 30 years remaining life and has a high risk at 2020</p> | Council, Sydney Water, TfNSW | DCCEEW-BCSG, DPFI-Crown Lands | For Business Plan purposes, assume \$200,000 capex | <ul style="list-style-type: none"> Asset owners Increasing Resilience to Climate Change Program Coastal and estuary grants Program |

Action **F** Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks

or 2040), specific consideration needs to be given to managing the potential impacts of coastal hazards. Detailed evaluations will include existing built assets within Kiama Boat Harbour to determine vulnerability to coastal hazards and to establish remaining life of asset. Asset vulnerability to existing and future coastal risks is to be used as an input to future upgrades and development planning and investment under the Kiama Boat Harbour Revitalisation Plan (see **Action I**). This would include the seawalls in the harbour and along Black Beach that are in variable condition and will require removal, replacement or refurbishment in the future.

F.2: Modify existing asset management plans and/or develop new plans, where required, to address coastal hazards and risks. As necessary, modify current asset management plans to ensure continuing asset performance following consideration of risks associated with existing and future coastal hazards. Where no asset management plans are in place, develop new asset plans to guide continuing asset performance. Asset management plans to typically detail maintenance, repairs, modifications, upgrades etc required to the asset for continuing functionality and longevity. Asset management plans for individual assets to be implemented by asset owners as part of normal operational duties, and are excluded from this CMP.

F.3: Condition of existing coastal infrastructure and built assets to be monitored by owners/managers. Each owner/manager of infrastructure or built assets located within the coastal zone is to plan and carry out periodic asset condition monitoring, as well as monitoring after each major coastal hazard event that has the potential to impact on the

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| Council, Sydney Water, TfNSW | DPHI-Crown Lands | Staff time only for changing documentation. Costs of asset management plan implementation excluded from this CMP | <ul style="list-style-type: none"> Asset owners |
| Council, Sydney Water, TfNSW | DPHI-Crown Lands | For Business Plan purposes, assume \$40,000 per year opex | <ul style="list-style-type: none"> Asset owners Increasing Resilience to Climate Change Program |

| Action F Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks | |
|--|---|
| | <p>asset. Results of the monitoring are to be incorporated into plans for asset maintenance, or replacement if necessary.</p> <ul style="list-style-type: none"> • Coastal and estuary grants Program |
| Success indicators | <ul style="list-style-type: none"> • Review/evaluation of each asset to incorporate consideration of coastal risks • Modified existing asset management plan activities, including monitoring of asset performance |
| Integrated or concurrent Actions | <ul style="list-style-type: none"> • B. Introduce a Coastal Vulnerability Area (CVA), modify the LEP and introduce a new DCP to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks, including cliff instability risks • E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values • G. Design and obtain relevant permits and approvals for 'interim' coastal protection works (CPW) along Pacific Avenue at South Warri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established |



Legend

- CMP Study Area
- Cadastral Boundaries

Note:

Timeframe noted for each asset represents the time when the coastal risk to that asset reaches high/extreme (intolerable risk), as determined in Stage 2 of the CMP.

Title:

Manage Existing Built Assets along the Kiama coastline

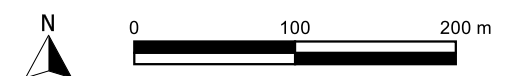
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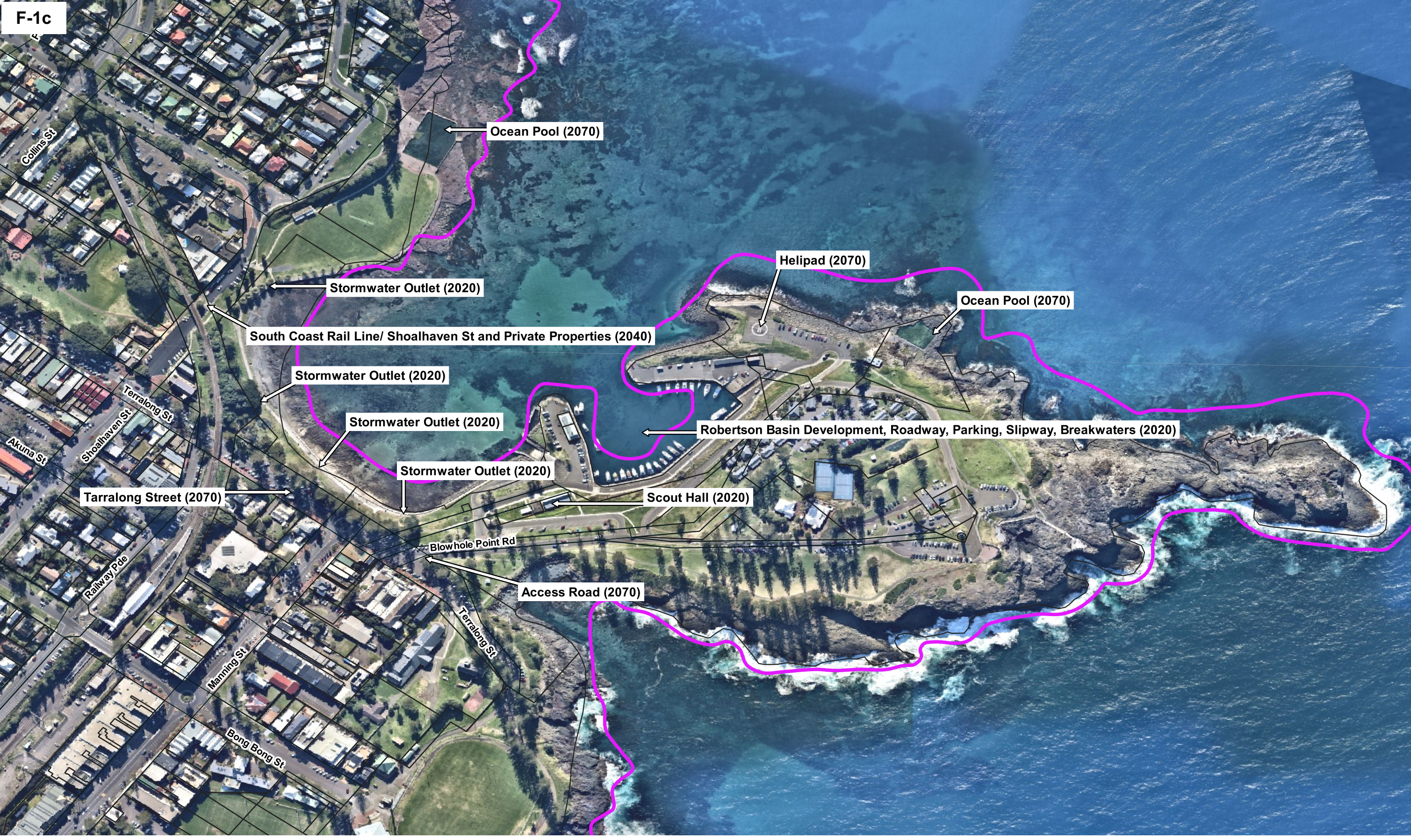
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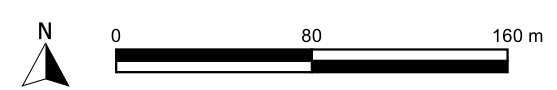
F-1c

- Legend**
- CMP Study Area
 - Cadastral Boundaries

Note:
Timeframe noted for each asset represents the time when the coastal risk to that asset reaches high/extreme (intolerable risk), as determined in Stage 2 of the CMP.

| | | |
|---|------------------------|------------------|
| Title: Manage Existing Built Assets along the Kiama coastline | Drawing: F-1 | Rev: A |
|---|------------------------|------------------|

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Legend

- CMP Study Area
- Cadastral Boundaries

Note:

Timeframe noted for each asset represents the time when the coastal risk to that asset reaches high/extreme (intolerable risk), as determined in Stage 2 of the CMP.

Title:

Manage Existing Built Assets along the Kiama coastline

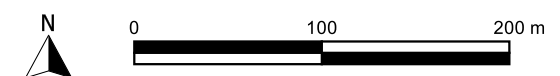
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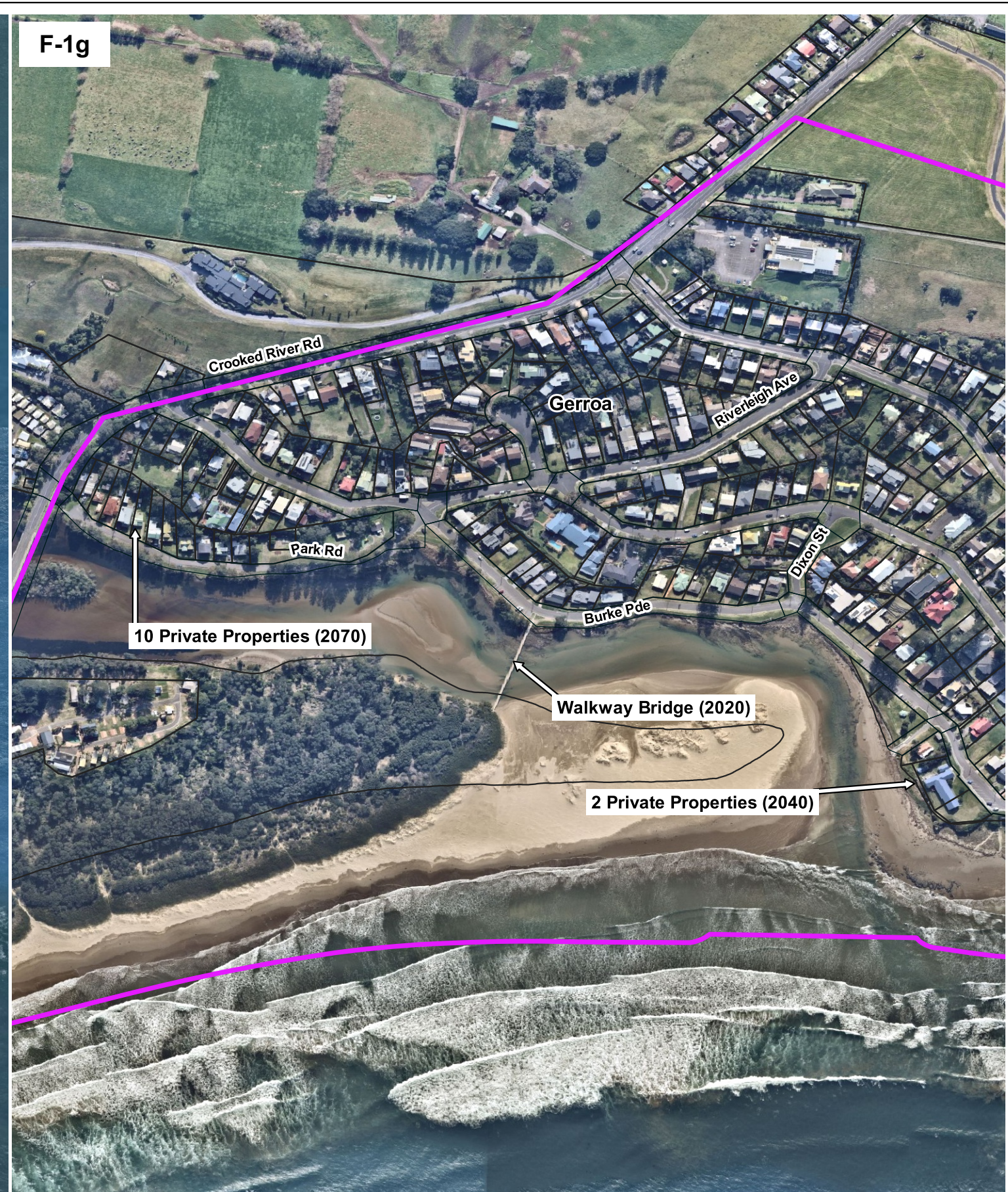
F-1

Rev:

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Legend

- CMP Study Area
- Cadastral Boundaries

Note:

Timeframe noted for each asset represents the time when the coastal risk to that asset reaches high/extreme (intolerable risk), as determined in Stage 2 of the CMP.

Title:

Manage Existing Built Assets along the Kiama coastline

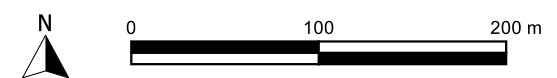
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Rev:

A

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BMT (OFFICIAL)

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| <p>Action G</p> | <p>Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Warri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.</p> | | |
| <p>Location / Scale</p> | <p>This Action targets existing coastal assets that are at high risk of impact in the immediate to short term. The Stage 2 CMP assessment flagged Pacific Avenue at South Warri Beach as an important asset that may require coastal protection. During the preparation of CMP Stage 3, two other locations were also identified where existing assets were at high of impact in the immediate to short term. These additional locations were the carpark access road at North Bombo Beach (this is the only access to this carpark and public land), and the public reserve to the immediate north of Storm Bay (which includes a shared pathway and a roadway providing access to Blowhole Point). These locations are shown in Figure G-1.</p> <p>While there are high value assets elsewhere along the Kiama coast (e.g. South Coast Rail Line, water and sewer infrastructure, St Peter and Paul School), these other assets will not be at significant risk of erosion until 2070 or later. Kiama Surf Life Saving Club is built upon a bedrock platform so although it is located close to the active beach, the asset in not at risk of undermining due to coastal erosion. Further, many coastal assets are at risk of coastal inundation at the current timeframe and in the short term (by 2040), and should be managed accordingly through an asset management plan (see Action F).</p> | | |
| <p>Priority</p> | <p>Medium</p> | <p>Timeframe</p> | <p>Long-term (within 10 years)</p> |
| <p>Risks/issue addressed</p> | <ul style="list-style-type: none"> • Inappropriate or Excessive Development • Coastal Hazards and Sea Level Rise | | <ul style="list-style-type: none"> • Overuse by Recreation and Tourism • Conflict Over Resource Use and Access Availability |
| <p>CMP Objective(s) addressed</p> | <ul style="list-style-type: none"> • Future Development • Hazards and climate resilience | | <ul style="list-style-type: none"> • Community use and conflicts |
| <p>Description</p> | <p>This Action involves undertaking all investigations, approvals and coastal protection works (CPW) to reduce risks of erosion at selected locations along the coastline. CPW are specifically flagged within the Coastal Management Act and the Risk and Hazards State Environment Planning Policy (R&H SEPP) to mean:</p> <ul style="list-style-type: none"> • <i>“Beach nourishment activities or works; and</i> • <i>Activities or works to reduce the impacts of coastal hazards on land adjacent to tidal waters, including (but not limited to) seawalls, revetments and groynes”</i> (as per the intent of this Action). <p>Coastal management requires an adaptive approach. That is, significant works should not be undertaken until it is necessary to do so. However, when it is necessary, there will be relatively little time to respond as the coastal environment is highly dynamic and responds to</p> | | |

Action **G**

Design and obtain relevant permits and approvals for 'interim' coastal protection works (CPW) along Pacific Avenue at South Warri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.

binary events, such as storms. Time is required to prepare appropriate engineering designs, seek relevant approvals, obtain sufficient funds and then construct the required works to manage coastal risk.

The adaptive approach taken to address coastal erosion risks at Kiama involve constructing 'interim' coastal protection works (CPWs), which are temporary in nature, but effectively 'buy sufficient time' to enable permanent CPWs to be appropriately designed, approvals sought and constructed as replacement for the interim CPWs. While three (3) specific locations have been identified along the Kiama coastline for interim and subsequent permanent CPWs, these works may be required during the course of this CMP, as the works would only be triggered by an actual threat to the public infrastructure at these locations due to prevailing coastal erosion conditions.

Clause 2.16(2) of the R&H SEPP specifies that a public authority may carry out CPWs without development consent if the works are:

- identified in the relevant certified CMP
- beach nourishment
- placing sand bags for not more than 90 days
- routine maintenance works or repairs to existing coastal protection works

While these provisions in the R&H SEPP will facilitate the CPW construction process, it would still be appropriate for community and agency consultation relating to the proposed works, so that an agreeable and acceptable solution can be 'pulled off the shelf' when needed.

With respect to Pacific Avenue, geotechnical investigations are required to understand bedrock location to ensure an appropriate design. Similarly, the northern foreshore of Storm Bay requires further geotechnical assessment to support an appropriate design for a revetment to stabilise on-going erosion at this location. These geotechnical investigations are identified in **Action H**.

With respect to North Bombo Beach carpark access road, the location is very close to the South Coast Rail line embankment (in fact the access road passes under the rail line immediately behind the beach). Prior to committing funding and resources to implementation of CPW along the carpark access road, consideration should be given to a more integrated works package that may provide protection to multiple assets in this location including the rail embankment as well as the access road.

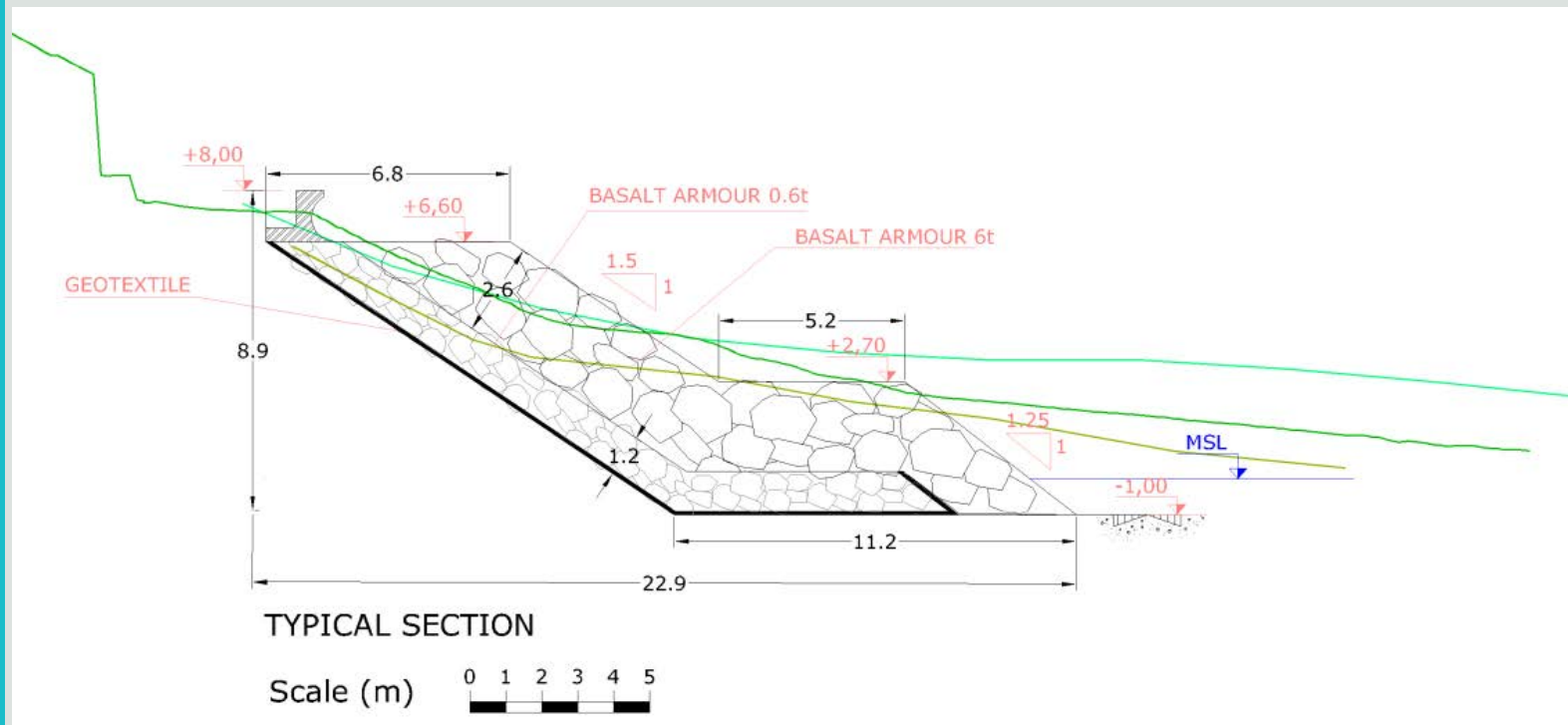
With respect to Storm Bay, DPI-Fisheries advise that Storm Bay is one of only two locations where the marine slug *Smeagol hilarus* is found in NSW. This species is listed as being threatened under the *Fisheries Management Act 1994*. Any CPW in this area should avoid impacts upon this species. Appropriate environmental and threatened species assessments will need to be undertaken when seeking approval.

For the purposes of this CMP, permanent CPWs would typically be a conventional rock armoured revetment comprising two layers of graded rock armour overlying a graded rock filter layer. Similar rock revetments are located at Stockton Beach (Newcastle), Belongil

Action **G**

Design and obtain relevant permits and approvals for 'interim' coastal protection works (CPW) along Pacific Avenue at South Warri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.

Beach (Byron Bay), Lennox Head, Port Kembla (Wollongong) and Collaroy Beach (Sydney). Other examples of rock revetments include various seawalls along the Gold Coast, built in accordance with an agreed A-line design and alignment. A typical rock armour revetment design profile is shown below (source: Wamberal Beach revetment design report, MHL, 2021).



Typical slopes for rubble mound revetments range between 1V:1.5H and 1V:3H. A steeper slope of 1V:1.5H is preferred to reduce the footprint of the structure to minimise encroachment into the active beach profile. Given proximity of quarries, basalt would be the preferred armour stone, which provides a higher specific gravity that sandstone alternative (thus enabling smaller armour unit size to meet weight requirements).

Action G Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Warri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.

| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
|---------------|--|-------------|--|-----------------|---|
| | <p>G.1: Prepare REF and obtain approval for ‘interim’ coastal protection works (CPWs). Approval to follow Part 5 process of EP&A Act, including consultation with appropriate agencies. Approval to remain active for the duration of the CMP, i.e. 10 years, so that interim works can be initiated as required in accordance with this CMP. Interim CPWs to be based on details specified in Annex E, subject to further design during the REF and approvals process.</p> <p>For the Storm Bay location, given the existing rocky nature of the foreshore, interim CPWs may require the use of rock-filled bags/cages rather than sand bags. Details are to be confirmed during the interim works design, REF and approvals process. Alternatively for Storm Bay, construction of interim CPWs could be bypassed and a permanent solution for coastal protection works fast-tracked instead if the site can be made safe during the interim through fencing, access closures or similar.</p> <p>While the R&H SEPP provides concession with respect to development consent, other permits may still be required (e.g. if works are to be undertaken on Crown land or below mean high water –MHW - mark). A clear understanding of the legal pathway for constructing interim CPW should be confirmed with relevant authorities, which can be facilitated through the CMP Operational Working Group (Action A).</p> <p>As part of design and approval process, confirm triggers and thresholds to be adopted to initiate construction of the interim</p> | Council | DCCEEW-BCSG, DPHI-Crown Lands, DPI-Fisheries | \$200,000 capex | <ul style="list-style-type: none"> Coastal and Estuary Grants Program Kiama Municipal Council |

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|------------------------|---|----------------|---|---|--|
| <p>Action G</p> | <p>Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Warri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.</p> | | | | |
| | <p>CPWs. Initial triggers and thresholds for these works are presented in Annex E.</p> <p>Acquire equipment and stockpile necessary materials (including sufficient appropriately sized geotextile sand containers and filling frame) to allow for construction without delay when necessary.</p> | | | | |
| | <p>G.2: If agreed triggers and thresholds are reached, construct interim coastal protection works (CPWs) without delay at required location(s). Construction to comply with permits and approvals obtained as part of Task G.1, including confirmed triggers and thresholds as well as interim CPW design and construction method.</p> <p>Remove interim CPWs as part of construction of subsequent permanent CPWs, or 5 years, whichever the sooner.</p> | <p>Council</p> | <p>DCCEEW-BCSG</p> | <p>\$250,000 capex (only if required during course of CMP) \$50,000 opex (\$10,000 / year for a maximum of 5 years)</p> | <ul style="list-style-type: none"> • Kiama Municipal Council • Disaster funding, if disaster declared • Coastal and Estuary Grants Program (if timing aligns) |
| | <p>G.3: Triggered by the construction of interim coastal protection works (CPWs) at one or more locations (refer Task G.2), undertake site-specific investigations (survey, geotechnical etc), prepare detailed designs, prepare REF and obtain approval of permanent CPWs. Technical specifications and estimated costs will be required for funding and tendering purposes. Design of the permanent CPWs will be based on individual circumstances at each location (which may change with time, and hence is indeterminate at this stage).</p> <p>The approvals pathway for permanent CPWs will likely follow the same process as adopted for gaining approvals for the interim CPWs. However, as legislation and regulations may</p> | <p>Council</p> | <p>DCCEEW-BCSG, DPHI-Crown Lands, DPI-Fisheries</p> | <p>\$300,000 capex (only if required during course of CMP). <i>Cost is indicative as scope of works is dependent on future conditions</i></p> | <ul style="list-style-type: none"> • Coastal and Estuary Grants Program • Kiama Municipal Council |

| | | | | | |
|------------------------|---|----------------|--------------------|--|---|
| <p>Action G</p> | <p>Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Warri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.</p> | | | | |
| | <p>change during the applicability of this CMP, relevant authorities should be consulted initially, facilitated through the CMP Operational Working Group (Action A).</p> <p>Seek funding for construction of permanent CPWs, canvassing all commonwealth and state grants programs that are available at the time (including any programs targeting recovery and resilience from natural hazards).</p> <p>If interim CPWs are deemed not suitable and are not constructed at Storm Bay, the trigger for advancing with permanent CPWs would be the threshold for erosion tolerance at Storm Bay, as defined in Annex E, and to be confirmed as part of Action G.1.</p> | | | | |
| | <p>G.4: Construct permanent coastal protection works (CPWs) at one or more locations to replace interim CPWs established at the same location(s). Construction subject to approval and available funding. Construction to incorporate removal/replacement of interim CPWs.</p> <p>Maintenance regime to be established following construction.</p> <p>For the purposes of this CMP, costs for this task are indicative only (as the scope and hence cost) will only be fully known in the future when this Task is triggered. No maintenance costs have been included within the life of this CMP given capital works aren’t expected until near the end of the CMP period, and may not be required at all. Subsequent iterations of the CMP should take note of this and include maintenance costs.</p> | <p>Council</p> | <p>DCCEEW-BCSG</p> | <p>\$6 million capex (only if required during course of CMP). <i>Cost is indicative (based on \$20,000/m as scope of works is dependent on future conditions. (i.e. \$1m North Bombo \$1.7m Storm Bay, \$3.3 South Warri). \$0 opex within the timeframe of this CMP</i></p> | <ul style="list-style-type: none"> • Coastal and Estuary Grants Program • Kiama Municipal Council |

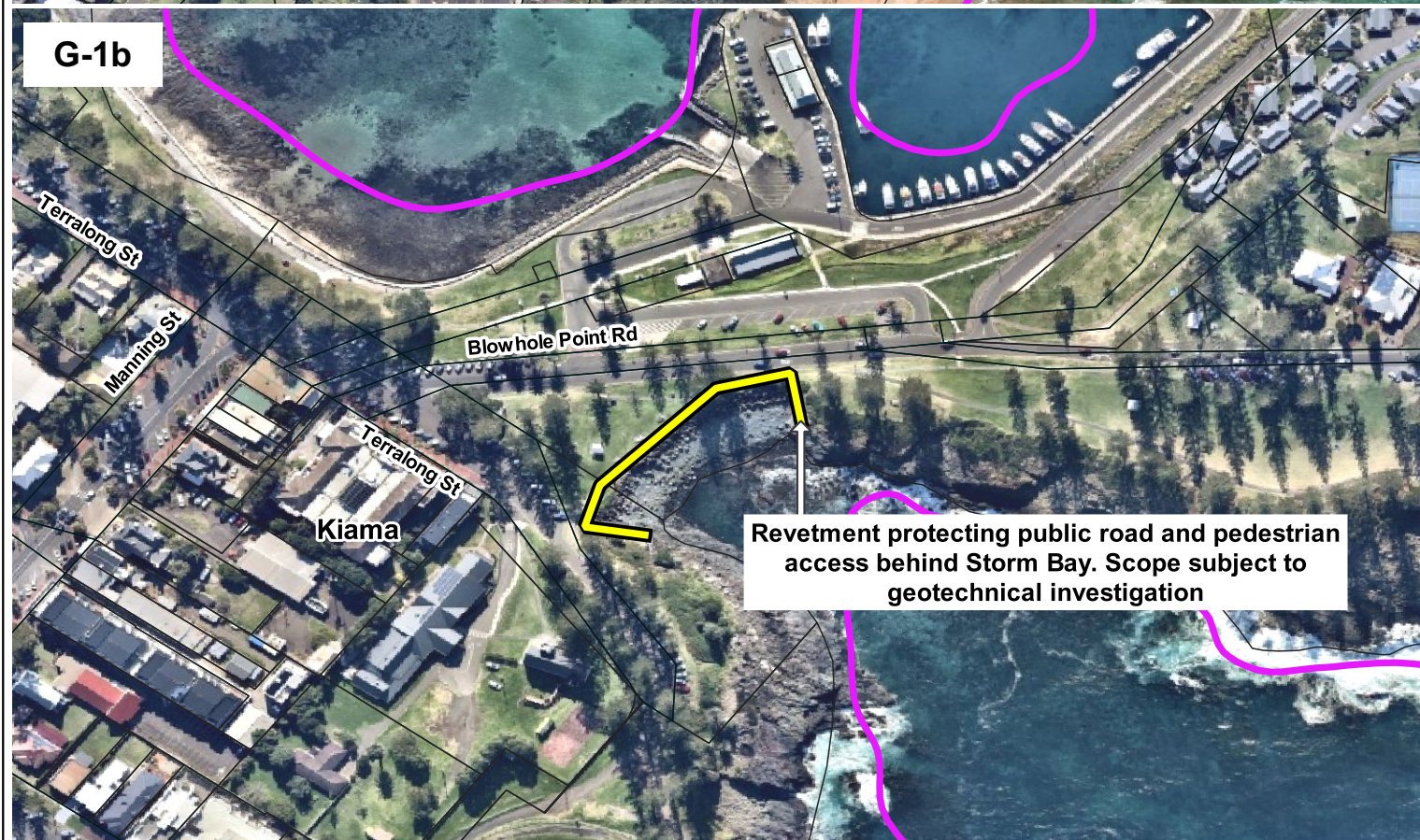
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| <p>Action G</p> | <p>Design and obtain relevant permits and approvals for ‘interim’ coastal protection works (CPW) along Pacific Avenue at South Warri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established.</p> | |
| <p>Success indicators</p> | <ul style="list-style-type: none"> • Approval for interim coastal protection works. • Purchase or all materials and equipment to enable rapid deployment and construction of interim coastal protection works without delay when required | <ul style="list-style-type: none"> • Agreed triggers and thresholds for constructing interim coastal protection works. |
| <p>Integrated or concurrent Actions</p> | <ul style="list-style-type: none"> • B. Introduce a CVA, modify the Local Environment Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks, including cliff instability risks • F. Manage existing built assets within the Kiama coastal management areas to cater for current and future coastal risks • H. Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline | |



Revetment protecting public road access to North Bombo Beach carpark





Revetment protecting Pacific Avenue. Scope subject to bedrock and geotechnical investigation



Revetment protecting public road and pedestrian access behind Storm Bay. Scope subject to geotechnical investigation

Legend

-  CMP Study Area
-  Cadastral Boundaries

Title:
Coastal Protection Works at North Bombo Beach, Storm Bay and South Werri Beach

Drawing: **G-1** Rev: **A**

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| Action H | Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline | | | |
| Location / Scale | <p>Further geotechnical investigations are to target specific areas where more detailed information is needed in order to manage those locations effectively. These specific areas include:</p> <ul style="list-style-type: none"> • Burke Parade, Gerroa, along the northern embankment of the Crooked River entrance to determine vulnerability of the properties to coastal hazards • The southern end of Werri Beach, Gerringong (south of the surf club), to determine presence of bedrock to assist with the design of potential coastal protection works at this location (see Action G). • Kiama Harbour / Black Beach promenade seawalls, to determine structural integrity and understand processes resulting in undercutting of these structures (see also Action I). • Storm Bay, to understand stability issues and foundations of the existing rock revetment at the northern end of the bay, to be used in the design of potential coastal protection works at this location (see Action G). <p>Cliff stability is to be monitored at locations where there are current signs of ground movement. Based on the Stage 2 CMP, locations for monitoring of cliff stability on public lands include:</p> <ul style="list-style-type: none"> • Western side of Black Head, Gerroa • South Werri Beach headland, around the carpark • Clifftop pathway at Kendalls Point • Clifftop pathway at Church Point • Around the Kiama Blowhole • Southern side of Pheasant Point, between School Flat and Continental Pool <p>A geodiversity investigation would cover the entire Kiama coastline.</p> <p>Relevant areas covered by this Action are shown in Figure H-1.</p> | | | |
| Priority | High | <table border="1"> <tr> <td>Timeframe</td> <td>Medium-term (within 6 years)</td> </tr> </table> | Timeframe | Medium-term (within 6 years) |
| Timeframe | Medium-term (within 6 years) | | | |
| Risks/issue addressed | <ul style="list-style-type: none"> • Coastal Hazards and Sea Level Rise | <ul style="list-style-type: none"> • Lack of Engagement, Governance and Compliance | | |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> • Hazards and climate resilience | <ul style="list-style-type: none"> • Governance and compliance | | |
| Description | <p>The CMP Stage 2 identified gaps in knowledge relating to cliff instability, which is a defined coastal hazard in the Coastal Management Act. This Action involves undertaking further specific investigations and periodic monitoring to provide a better definition of the slope and cliff instability risks along the Kiama coastline, as well as investigations to support the design of coastal protection works proposed at</p> | | | |

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| <p>Action H</p> | <p>Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline</p> | | | | |
| | <p>South Werri Beach and Storm Bay (Action G), and the promenade seawall at Black Beach (Action I). As appropriate, the additional information gathered through the monitoring may lead to an update of the Coastal Vulnerability Area (CVA), the LEP and the DCP to recognise those risks within the statutory planning framework.</p> <p>Kiama has a rich and varied coastal landscape with significant cliffs, rock shelves and nearshore rocky outcrops, including the well-known and regionally significant Cathedral Rocks and the Kiama Blowhole. A better appreciation of the significance of the geodiversity of the Kiama coastline can help inform future land use planning decisions and help guide future coastal planning. A better understanding of the Kiama coastline geodiversity would be best pursued through engagement with academia and support for targeted higher education investigations. Learned knowledge coming out of a geodiversity investigation can be shared with the community through appropriate education mechanisms (e.g. newsletters, brochures, website) and via the Coastal Management Program Operational Working Group.</p> | | | | |
| <p>Detailed Plan</p> | <p>Defined tasks</p> | <p>Lead Agency</p> | <p>Supporting Agencies</p> | <p>Cost estimate</p> | <p>Funding options</p> |
| | <p>H.1: Undertake additional site specific geotechnical investigations. Building on the work completed as part of CMP Stage 2, prepare for, and undertake, site specific geotechnical investigations, include ground penetrating radar for example, to determine susceptibility for future instability at:</p> <ul style="list-style-type: none"> Burke Parade, Gerroa, along the northern embankment of the Crooked River entrance to determine vulnerability of the properties to coastal hazards The southern end of Werri Beach, Gerringong (south of the surf club), to determine presence of bedrock to support the design of possible coastal protection works (refer also Action G). Kiama Harbour / Black Beach promenade seawalls, to determine structural integrity and understand processes resulting in undercutting of these structures (refer also Action I). Storm Bay, to understand stability issues and foundations of the existing rock revetment at the northern end of the | <p>Council</p> | <p>DCCEEW-BCSG, TfNSW</p> | <p>\$150,000 capex</p> | <ul style="list-style-type: none"> Kiama Municipal Council Coastal and Estuary Grants Program |

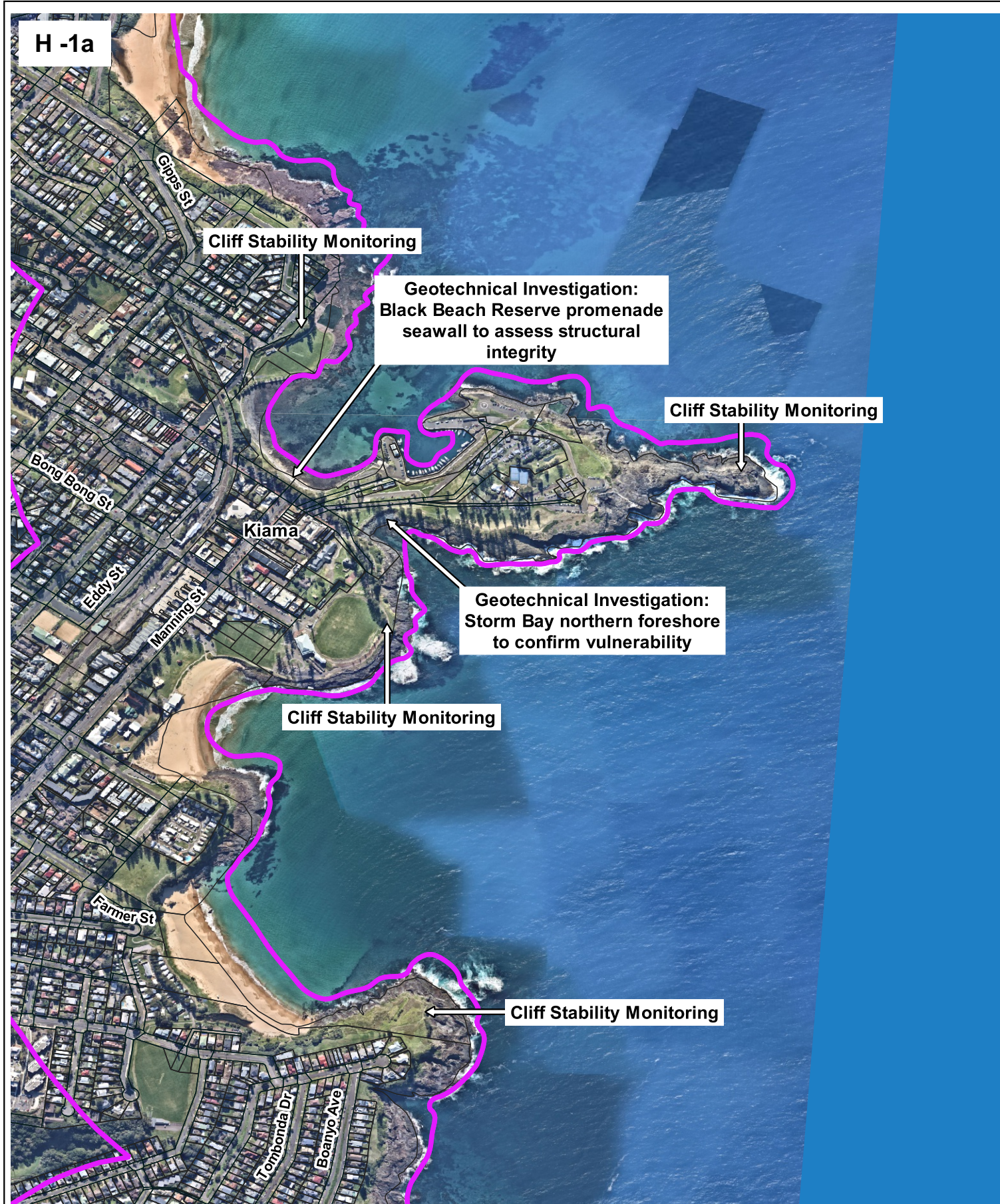
| Action H | Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline | | | | |
|-----------------|---|---------|-------------|--|---|
| | <p>bay, which will be used in the design of potential coastal protection works (refer Action G).</p> <p>TfNSW to be involved in discussions regarding scope and scale of investigations as well as use of data captured.</p> | | | | |
| | <p>H.2: Monitor cliff and slope instability at key locations identified within the Stage 2 report. Undertake annual photographic assessments of coastal cliffs, using standardised photo points, to observe any movement of the vegetation or landform (e.g. boulders, hummocks) on the cliff surface. Locations would include:</p> <ul style="list-style-type: none"> • Western side of Black Head, Gerroa • South Werri Beach headland, around the carpark • Clifftop pathway at Kendall's Point • Clifftop pathway at Church Point • Around the Kiama Blowhole • Southern side of Pheasant Point, between School Flat and Continental Pool <p>If comparison of photos indicates notable movement on the cliff surface over a short period of time that potentially compromises coastal assets, then plan to undertake more detailed ground survey of the cliff surface to investigate further the stability issue. Safe ways of conducting the survey of the cliff surface should be explored, including drone-mounted Light Detection and Ranging (LiDAR) for example.</p> | Council | DCCEEW-BCSG | Council staff time for photographic monitoring. Costs for more detailed ground survey estimated \$10,000 per location assumed 3 for a total of \$30,000 capex within the term of this CMP. | <ul style="list-style-type: none"> • Kiama Municipal Council • Coastal and Estuary Grants Program |
| | <p>H.3: Undertake a research study into the geodiversity of the Kiama coastline to support future conservation and management of key geological features. Consult with University of Wollongong and/or other academic institutions regarding support for higher education studies into the</p> | Council | DCCEEW-BCSG | \$25,000 capex for support of academia | <ul style="list-style-type: none"> • Kiama Municipal Council • Coastal and Estuary Grants Program |

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| <p>Action H</p> | <p>Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline</p> | | | |
| | <p>geodiversity of the Kiama coastline. Geodiversity investigations should focus on the local and regional uniqueness of the geological and geomorphological character of the coast. The deliverable of the research study should include recommendations for changes to local planning instruments to capture Kiama’s geodiversity and landforms as a landscape character value that requires preservation and consideration as part of future land development.</p> | | | |
| | <p>H.4: Update mapping the R&H SEPP and/or LEP to incorporate cliff instability hazard based on results of relevant geotechnical studies, including studies done by agencies. Actions H.1 and H.2 details cliff and geotechnical monitoring to be undertaken to better appreciate the risk associated with cliff instability. Consideration can also be given to geotechnical assessments done by private landholders. Where these risks can be adequately defined, the CVA mapping as defined in the R&H SEPP and/or the LEP can be modified to incorporate the additional cliff instability coastal risks. Modifying the CVA within the R&H SEPP will require a similar process to the initial establishment (refer Action B.1) via a Planning Proposal to Stage Government. Where the CVA is modified, consideration should be given to commensurate modifications to the LEP and DCP (as per Action B.4).</p> | <p>Council</p> | <p>DCCEEW-BCSG, DPPI-Planning</p> | <p>Council staff time Council budget if done internally</p> |
| <p>Success indicators</p> | <ul style="list-style-type: none"> • Completion of geotechnical risk assessments for targeted areas and establishment of a photo-based monitoring for high risk sections of the coast. • Geodiversity study of the Kiama coastline undertaken as an academic investigation | | | |
| <p>Integrated or concurrent Actions</p> | <ul style="list-style-type: none"> • B. Introduce a Coastal Vulnerability Area (CVA), modify the Local Environment Plan (LEP) and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks, including cliff instability risks | | | |

Action **H**

Monitor cliff stability and undertake further geotechnical investigations to provide a better understanding of unstable slopes, geotechnical risks and geodiversity along the coastline

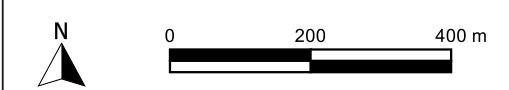
- G. Design and obtain relevant permits and approvals for 'interim' coastal protection works (CPW) along Pacific Avenue at South Werri Beach, along the North Bombo Beach carpark access road, and along the northern foreshore of Storm Bay, south of the Boat Harbour. Construct interim CPWs if coastal erosion triggers and thresholds are reached. Subsequently, design, obtain relevant permits and approvals, and construct permanent CPWs to replace any interim works that are established



- Legend**
- CMP Study Area
 - Cadastral Boundaries

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| Title: Cliff stability monitoring and geotechnical investigations | Drawing: H-1 | Rev: A |
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| Action | Ensure that infrastructure development and future management of the Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable | | | | |
| Location / Scale | This Action relates to the Kiama Boat Harbour Revitalisation Plan Project Area, as shown in Figure I-1 . The Kiama Boat Harbour Revitalisation Plan has been developed by Transport for NSW (TfNSW). | | | | |
| Priority | Medium | Timeframe | Long-term (within 10 years) | | |
| Risks/issue addressed | <ul style="list-style-type: none"> Inappropriate or Excessive Development Coastal Hazards and Sea Level Rise | | <ul style="list-style-type: none"> Governance and compliance Community use and conflicts | | |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Future Development Hazards and climate resilience Conflict Over Resource Use and Access Availability | | <ul style="list-style-type: none"> Lack of Engagement, Governance and Compliance Overuse by Recreation and Tourism | | |
| Description | <p>This action involves stakeholders working collaboratively with Transport for NSW (TfNSW) as they implement the Kiama Boat Harbour Revitalisation Plan. By working collaboratively with TfNSW, all coastal stakeholders have the opportunity to ensure that the aims and objectives of this CMP are maintained during the infrastructure development phase and the on-going future management of the Boat Harbour as outlined in the Kiama Boat Harbour Revitalisation Plan.</p> <p>Importantly, future investments associated with the development need to be cognisant of the current and future coastal hazards and risks identified during the CMP Stage 2, and design specifications for the development established accordingly. This would include for example the design for new or upgraded seawalls, revetments, pontoons, boat ramps and all other maritime infrastructure.</p> | | | | |
| Detailed Plan | <p>Defined tasks</p> <p>I.1: TfNSW and Council to work collaboratively in delivering specific actions within the Kiama Harbour Revitalisation Plan that are aligned with the objectives and time frame of this CMP subject to approved funding and environmental planning approvals. These Actions relate to Council managed and owned assets and would include:</p> | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
| | | Council | DPHI-Crown Lands, DCCEEW-BCSG, TfNSW | For budgeting purposes, assume \$3,200,000 capex and \$800,000 opex during the term of this CMP. This | <ul style="list-style-type: none"> TfNSW Coastal and Estuary Grants Program Crown Reserves Improvement Fund NSW Environment Trust NSW Boating Now |

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| <p>Action </p> | <p>Ensure that infrastructure development and future management of the Kiama Boat Harbour adequately accounts for present and future coastal risks, along with future community demands and expectations, to provide a public facility that is resilient and economically sustainable</p> | | |
| | <ul style="list-style-type: none"> Action 1.1 – updating existing jetty adjacent to the boatramp Action 4.3 – expand and improve access and connections to Black Beach promenade and School Flat. <p>With regard to Action 4.3, it is noted that the Black Beach promenade seawall is currently undercut and is subject to geotechnical investigations as part of this CMP (refer Action H, Task H.1) and is identified in the CZEAS as a location for potential emergency coastal protection works (CPW) (refer Annex A).</p> <p>While there are other Actions under the Boat Harbour Revitalisation Plan that are assigned to Council for implementation (such as Action 1.5 and Action 4.1), the anticipated timeframe for these other actions would extend beyond term of this CMP. It is anticipated that these other actions in the Boat Harbour Revitalisation Plan can be reconsidered as part of future reviews and iterations of the CMP.</p> | <p>includes ~\$800,000 capex for action 1.1 and ~\$2.4m capex for action 4.3. Maintenance costs ~\$200k opex for action 1.1 and \$600k opex for action 4.3. With staff time to progress</p> | <ul style="list-style-type: none"> Kiama Municipal Council |
| <p>Success indicators</p> | <ul style="list-style-type: none"> Revitalisation Plan is implemented with appreciation of coastal hazards from Stage 2 CMP, including Actions aligned with the objectives of the CMP | <ul style="list-style-type: none"> TfNSW remain actively engaged with Council and other stakeholders during the development of future Kiama Boat Harbour infrastructure and associated investments | |
| <p>Integrated or concurrent Actions</p> | <ul style="list-style-type: none"> A. Establish a Coastal Management Program Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities | | |

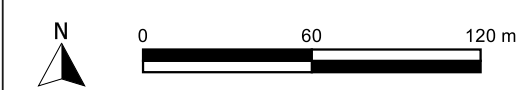


- Legend**
- Project Area - Revitalisation Plan
 - Multi-use Space
 - Maritime Hub
 - Recreation and Events Area
 - Cadastral Boundaries

Title:
Infrastructure development via the Kiama Boat Harbour Revitalisation Plan

Drawing: **I-1** Rev: **A**

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| Action J | Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country | | |
| Location / Scale | Covering the whole CMA and adjacent coastal waters. Focus areas for caring for Country are to be agreed through consultation, and may include various headlands, beaches and reserves along the coastline that hold cultural significance. | | |
| Priority | Very High | Timeframe | Short-term (within 3 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> Degradation of Heritage and Culture | <ul style="list-style-type: none"> Lack of Engagement, Governance and Compliance | |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Culture | <ul style="list-style-type: none"> Governance and compliance | |
| Description | <p>This Action involves increasing the engagement and active participation of Traditional Owners in the governance and management of land of sea Country along the Kiama coastline. As Council establishes a formal Operational Working Group to oversee the implementation of the CMP, Traditional Owners should be represented on that Operational Working Group (Action A). Traditional Owners will therefore be included and involved in directing and prioritising implementation of Actions, and working with Lead Agencies and Supporting Organisations to secure funding, as well as helping to implement some of the on-ground works.</p> <p>This Action also involves working with the Aboriginal community to identify culturally appropriate ways to better acknowledge and share, if appropriate, the indigenous cultural heritage of the Kiama coastline. This could include informative signage at high traffic and prominent locations that helps explain the significance of locations and the connection to country by the Wodi Wodi D'harawal people. Signage can include, for example, information on traditional cultural names for locations, or species that are commonly found at those locations (for example, whale stories adjacent to formal whale watching platforms at Minnamurra and Gerringong). Signage can also be used in support of more creative information and engagement activities, such as a bush tucker trail along the coastline. Other ways of sharing Aboriginal culture and knowledge would also be explored, including participation in community events, cultural immersion training and re-naming/shared naming of sites of cultural value.</p> <p>Further, this Action supports the establishment of additional Indigenous Rangers Groups for the Kiama areas to complement existing Illawarra Local Aboriginal Land Council (LALC) Green Teams and Jerrinja LALC rangers. Facilitated through the National Indigenous Australians Agency (NIAA), Indigenous ranger projects enable Indigenous people to combine traditional knowledge with conservation training to protect and manage their land, sea and culture. This includes activities such as bushfire mitigation, protection of threatened species, and biosecurity compliance. Indigenous ranger groups also develop partnerships with research, education, philanthropic and commercial organisations to share skills and knowledge, engage with schools, and generate additional income and jobs in the environmental, biosecurity, heritage and other sectors. An existing excellent example of this is a native species nursery that has been set</p> | | |

| Action J | | | | | |
|--|--|---------------------------------------|-------------------------------|--|---|
| Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country | | | | | |
| up through the Jerrinja LALC to provide tubestock and plants for bush restoration. While the creation of additional Indigenous Ranger Groups in the Kiama / Illawarra area could provide significant value to the regional overall, the Actions presented in the Kiama CMP provide a series of tangible projects that Indigenous Ranger Groups can be involved in, and hence would provide direct benefit to the Kiama Coastal Management Areas. | | | | | |
| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
| | <p>J.1: Engage with the local Aboriginal community to understand their preferences for participation in land and sea management along the Kiama coastline. Council would work closely with the existing Illawarra and Jerrinja LALCs to engage with relevant Aboriginal communities regarding preferences for involvement in the implementation of the Kiama CMP. Guided by the LALCs, additional engagement may be required with NTSCorp and/or native title claimants to determine the scope and extent of any relevant native title considerations.</p> | Council Illawarra LALC, Jerrinja LALC | DCCEEW-BCSG, | Staff time | Council, JLALC and ILALC budgets if done internally |
| | <p>J.2: Invite Traditional Owner (TO) representation onto the CMP Operational Working Group (refer Action A). Traditional Owner participation may include agreed consultation fees for sharing knowledge and input to the Operational Working Group (OWG). As part of the OWG, Traditional Owners would be able to provide valuable input that will help with the successful implementation of the CMP, including re-prioritisation as appropriate, support of grants and funding arrangements, and facilitation in completing works (possibly through Indigenous Ranger groups or LALC Green teams, see task below).</p> | Council | Illawarra LALC, Jerrinja LALC | For budgeting purposes, adopt \$5,000/yr opex for TO consultation fees plus Council staff time | <ul style="list-style-type: none"> • Coastal and Estuary Grants Program • NSW Heritage Grants Program • National Indigenous Australian Agency • Marine Estate Management Strategy (MEMS) • Kiama Municipal Council |

| Action J | Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country | | | | |
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| | <p>J.3: Consult with Aboriginal cultural knowledge holders to gain an understanding of the cultural and heritage significance of the coastline and culturally appropriate ways to better acknowledge and share, if appropriate, the indigenous cultural heritage of the Kiama coastline. Ways of acknowledging and sharing Aboriginal culture could include appropriate signage along the coast as well as re-naming/shared naming of sites of cultural value. A similar approach has been adopted at Bundarwa (Beecroft Peninsula) with signage introducing the Aboriginal name for the area and recognition of the Jerrinja Aboriginal people as traditional custodians of the location.</p> <p>Consideration could be given to formally naming the Coastal Walk along the Kiama coastline in recognition of the Aboriginal Country it transects (e.g. 'Wodi Wodi – Coastal Trail' or similar)</p> | <p>Council Illawarra LALC, Jerrinja LALC</p> | <p>DCCEEW-BCSG, DPI-Fisheries,</p> | <p>\$50,000 capex for knowledge consultation fees, and preparation and installation of signage for example. Plus staff time to support</p> | <ul style="list-style-type: none"> •Coastal and Estuary Grants Program •NSW Heritage Grants Program •National Indigenous Australian Agency •MEMS •Protecting our Places Grants •Kiama Municipal Council |
| | <p>J.4: Support the existing, and develop additional, Indigenous Rangers groups for the Kiama / Illawarra area under the National Indigenous Australians Agency's National Indigenous Rangers Program and/or any other funding, legislative or hand back arrangement. With support from the Illawarra LALC and Jerrinja LALC, work with the National Indigenous Australians Agency to continue to support the existing and develop additional Indigenous Rangers groups for the Kiama / Illawarra area under the National Indigenous Rangers Program, so that younger First Nations people have the opportunity to look after country like Elders have in the past. Through consultation with Traditional Owners, identify and agree on locations where Rangers groups can focus attention. Examples could include various headlands and beaches along the Kiama coastline that are under Crown or Council ownership</p> | <p>Council Illawarra LALC, Jerrinja LALC</p> | <p>DCCEEW – BCSG, DPI-Fisheries, DPHI-Crown Lands, LLS, NPWS</p> | <p>\$20,000 capex for consultation fees with Traditional Owners. Then specific projects totalling \$25,000/yr capex for delivery by Ranger groups. These costs are additional to the environmental works costs in Action K.</p> | <ul style="list-style-type: none"> • Protecting our Places Grants • Environment Trust - Environmental Restoration and Rehabilitation • Coastal and Estuary Grants Program • NSW Heritage Grants Program • National Indigenous Australian Agency |

| | | |
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| <p>Action J</p> | <p>Provide Traditional Owners a voice in Coastal Management Program (CMP) implementation, promote the cultural significance of the coastline, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country</p> | |
| | <p>and control, as well as the coastal corridor that supports the Coastal Walk between Kiama and Gerroa.</p> <p>Provide support for the continuation of existing groups, and once established, additional Indigenous Ranger groups and their on-going environmental works on Country, which can be linked to Action K of this CMP.</p> | <ul style="list-style-type: none"> • Kiama Municipal Council • LLS • MEMS |
| <p>Success indicators</p> | <ul style="list-style-type: none"> • Traditional owner representation on future OWG established to oversee the implementation of the CMP • Indigenous Rangers Groups established to work on Country along the Kiama coastline | <ul style="list-style-type: none"> • Delivery of cultural awareness and knowledge sharing such as signage and renaming of sites along the Kiama coastline |
| <p>Integrated or concurrent Actions</p> | <ul style="list-style-type: none"> • A. Establish a Coastal Management Program Operational Working Group for Kiama to provide effective governance and support the implementation of this CMP, and to facilitate future reviews and assessments of the effectiveness of this CMP • K. Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values • M. Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, and assess threats and risks to these values | |

| | | |
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| Action K | Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values | |
| Location / Scale | <p>Pests and weeds are to be controlled within all valued coastal land along the Kiama Municipal Council coastline including open space parcels, beaches, dunes, coastal wetlands, coastal and estuary foreshore reserves and headland bluffs. Bitou bush, lantana and morning glory are prevalent across many coastal lands, while coastal habitats are impacted by presence of vertebrate pests (e.g. foxes, rabbits, domestic cats).</p> <p>Targeted revegetation and habitat restoration is to occur on headlands (e.g. Boneyards, Bombo Headland, Black Head, along coastal cliff walk) and within coastal dunes (Jones, Bombo, Werri, Seven Mile) to improve quality and connectivity of habitats (including for example roosting and breeding areas for migratory birds), as well as improving stability and resilience of dunes to coastal storms.</p> <p>Some dunes have been actively denuded of stabilising vegetation. These areas are to be specifically targeted for revegetation, including Jones Beach and Werri Beach, where dunes front existing residential development.</p> <p>The majority of the land covered by this Action is under the care and control of Council, with assistance from Landcare and other community groups (including the active Bombo Headland Landcare Group and Seven Mile Beach Landcare Group). Key locations for pest and weed control and targeted revegetation along the Kiama coastline are shown in Figure K-1.</p> | |
| Priority | Medium | Timeframe Long-term (within 10 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> Disturbance of Biodiversity and Habitat | <ul style="list-style-type: none"> Lack of Engagement, Governance and Compliance |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Ecosystem health | <ul style="list-style-type: none"> Governance and compliance |
| Description | <p>In conjunction with Illawarra Shoalhaven Joint Organisation (ISJO), undertake environmental land management of public lands along the Kiama coastline covering the control of pests and weeds, as well as enhancement of habitats and ecological communities through targeted revegetation in accordance with the Illawarra Biodiversity Strategy. Works can be completed by Council staff, specialist bush regeneration contractors where required, volunteer groups (e.g. Dunecare, Landcare) and other community organisations (including Green teams and Indigenous Rangers groups (refer Action J). Collaboration will be required with agencies other than Council that have care and control over open coastal land, such as Sydney Water and DPHI (at Bombo Headland).</p> <p>Some works, such as dune revegetation, may require an Aboriginal Heritage Impact Permit (AHIP), issued by NSW Heritage, and may need to be preceded by an Aboriginal cultural heritage assessment report depending on the location and scope of proposed works and the presence of known sites of cultural significance (see also Action M). Even digging for vegetation to stabilise sand dunes has the potential to impact Aboriginal cultural artefacts and ancestral remains. All on-ground works should be carried out cautiously and using teams than</p> | |

Action K Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values

are skilled in identifying middens and other culturally significant artefacts. An understanding of areas that have been previously disturbed may reduce the need for such caution.

The use of indigenous contractors including indigenous ranger groups should be preferred where works are known to occur in culturally sensitive locations such as on or near aboriginal middens. Indigenous rangers may also potentially be utilised to support projects with seed collection, plant supply, cultural burning, drone and ground penetrating radar surveys.

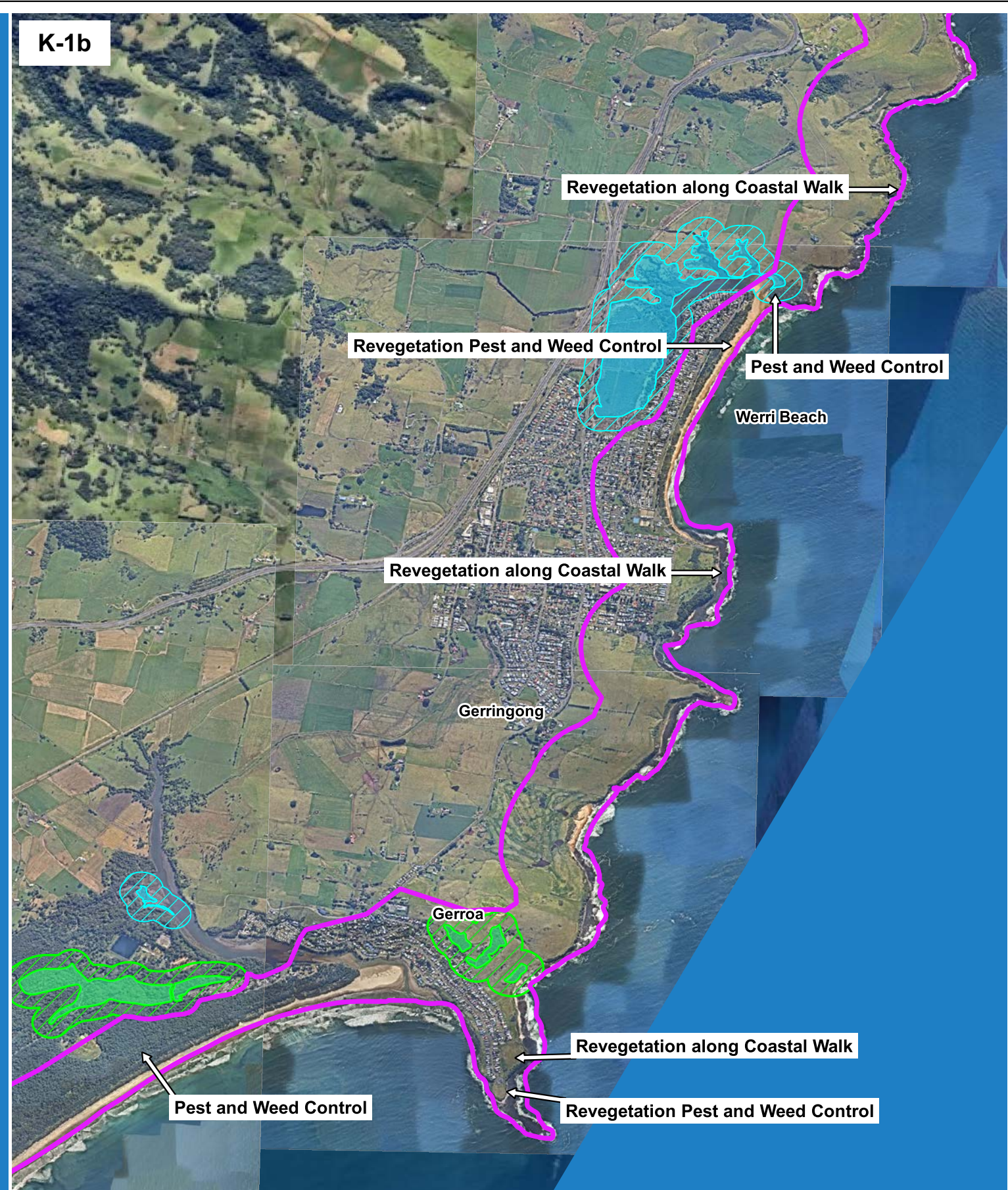
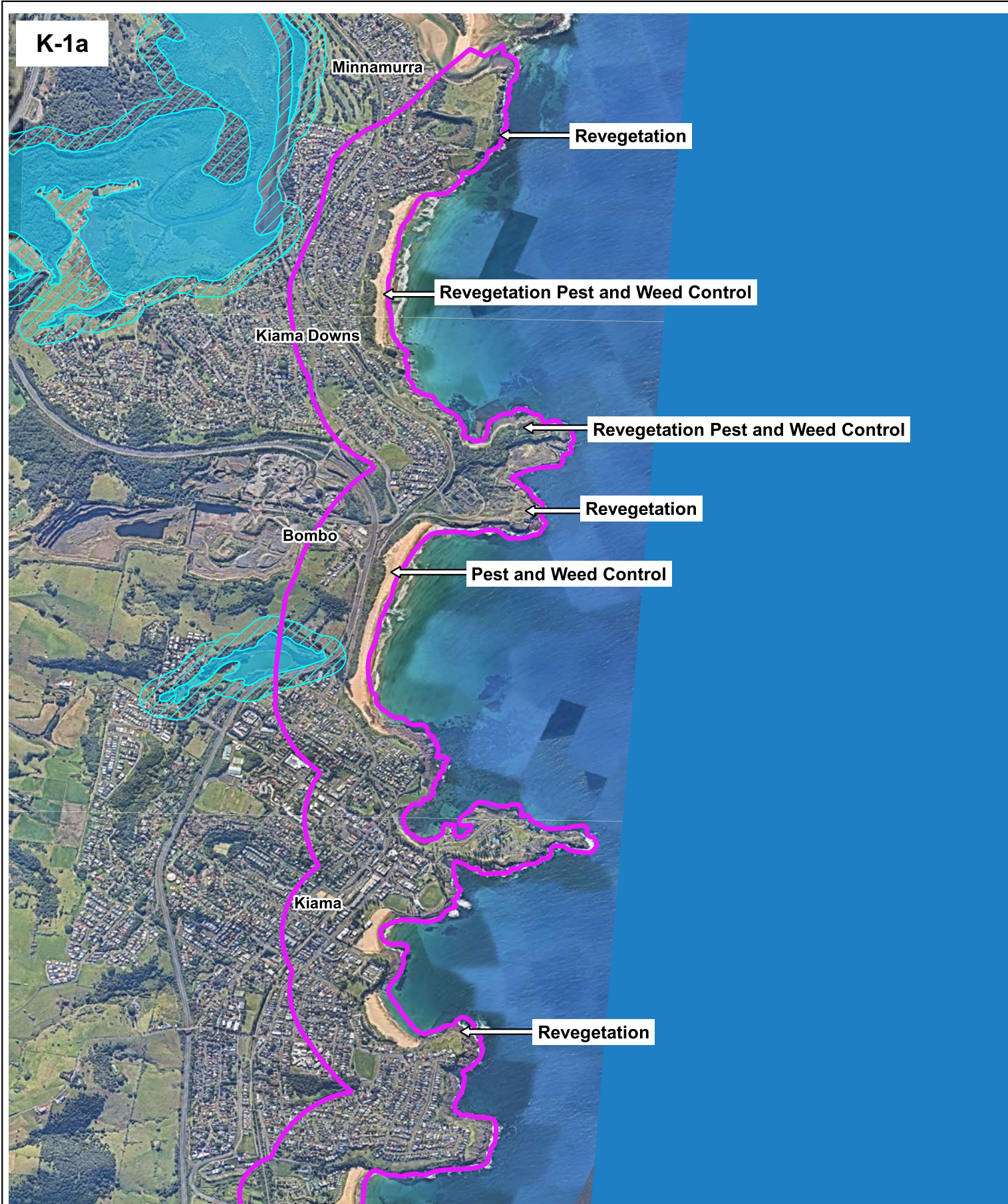
The Illawarra District Weeds Authority (IDWA) is a program which sits under ISJO. The IDWA is the Local Control Authority (weeds only) and has delegated authority from Wollongong, Shellharbour and Kiama Councils to carry out local control authority functions under the *Biosecurity Act 2015*. As the Local Control Authority, the IDWA carries out targeted control and detection programs on listed priority weed species as defined in the South East Regional Strategic Weeds Management Plan 2023-2027. This list consists of State priority weed species and regional priority weed species identified through the South East LLS. In the context of this Action, ISJO/IDWA focus on weed control. As such, they do not share responsibilities related to revegetation and habitat restoration works, or pest monitoring and control.

| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
|---------------|---|-------------|--|--|---|
| | <p>K.1: Prepare a coastal habitat restoration and revegetation works plan that identifies, maps and prioritises specific works locations, along with works details suitable for implementation, such as weeds to be controlled and plants to be used, including species, habitats and locations that have cultural significance to the local community. Works Plan to be based on the Illawarra Biodiversity Strategy, CMP Stage 1, and incorporate as a minimum the following locations using accepted best practice restoration techniques (See also Figure K-1):</p> <ul style="list-style-type: none"> • Jones Beach dunes (reveg and pest/weeds), • Boneyards (reveg and pest/weeds), • Bombo Headland around Sydney Water and DPHI land (reveg), • Bombo Beach dunes (pest/weeds), | Council | ISJO, DCCEEW-BCSG, LLS, NPWS, ILALC, JLALC | Council staff time or \$50,000 capex for consultancy | Council budget if done internally, or <ul style="list-style-type: none"> • Coasts and Estuaries Grants Program • LLS • Environment Trust - Environmental Restoration and Rehabilitation • Protecting our Places Grants • Kiama Municipal Council |

| Action K | Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values | | | | |
|-----------------|--|---------|--|--|--|
| | <ul style="list-style-type: none"> • along coastal cliff walk between Kiama and Gerringong (reveg /weeds), and any additional land acquired to extend this walk as part of Action D. • Black Head (weeds/reveg) • Werri Beach dunes (reveg and pest/weeds), • Werri Lagoon Entrance area within the Coastal Wetland and Coastal Wetland proximity area (weeds) • Seven Mile Beach dunes (pest/weeds). <p>Works plan to be developed in consultation with the Aboriginal community and other relevant stakeholders such as Sydney Water where stakeholder land is included for works. Works Plan is to set out priorities and timeframes for environmental works, including environmental protection works (EPW) within the Coastal Wetlands and Littoral Rainforests Areas (CWLRA) or the CWLRA proximity areas, including near the entrance of Werri Lagoon.</p> <p>The plan would also outline the need for any fencing and defined accessways to help protect vegetation from human disturbance, trampling and vandalism as well as to meet public accessibility needs.</p> <p>This document can be used as a guide for volunteer groups such as Landcare as well as to seek funding for bushland regeneration and pest control contractors / Indigenous Ranger teams.</p> | | | | |
| | <p>K.2: Engage field teams, including existing Landcare groups and Aboriginal-led organisations to implement pest and weed control, revegetation, fencing and habitat restoration works. Where works are identified as Environment Protection Works (EPWs) within Coastal</p> | Council | ISJO, DCCEEW-BCSG, LLS, NPWS, Landcare, ILALC, JLALC | Approx. \$2500/ha. For budgeting purposes, adopt | <ul style="list-style-type: none"> • Coasts and Estuaries Grants Program • LLS |

| Action K | Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values | | | | |
|-----------------|---|--|---|--|---|
| | <p>Wetland and Littoral Rainforest Areas (CWLRA), appropriate planning pathways will be used.</p> <p>Where appropriate, works should be undertaken in accordance with the coastal habitat restoration and revegetation works plan targeting high priority locations outlined within Action K.1. Pest and weed control and other environmental protection works should also target the following key locations as a minimum:</p> <ul style="list-style-type: none"> • Jones Beach dunes (reveg and pest/weeds), • Boneyards (reveg and pest/weeds), • Bombo Headland around Sydney Water and DPE land (reveg), • Bombo Beach dunes (pest/weeds), • along coastal cliff walk between Kiama and Gerringong (reveg / weeds), and any additional land acquired to extend this walk as part of Action D, • Werri Beach dunes (reveg and pest/weeds), • Seven Mile Beach dunes (pest/weeds) • Werri Lagoon entrance within the Coastal Wetlands and Coastal Wetland proximity area (weeds), • Black Head (weeds/reveg). <p>Continue to maintain revegetated areas until such time that vegetation has fully established.</p> <p>Existing active community groups including Bombo Headland Landcare Group and Seven Mile Beach Landcare Group should be consulted prior to assigning environmental works orders.</p> | \$250,000/yr opex (covering 100 ha/yr) | <ul style="list-style-type: none"> • Environment Trust - Environmental Restoration and Rehabilitation • Kiama Municipal Council (including through Landcare, Coastcare support) • Protecting our Places Grants • Crown Reserve Improvement Fund | | |
| | <p>K.3: Monitor the success of habitat restoration works and refine coastal habitat restoration and revegetation works plan as required. Undertake periodic ground surveys using</p> | Council | ISJO, DCCEEW-BCSG, LLS, NPWS | \$10,000 per quadrat survey. Staff time only | <ul style="list-style-type: none"> • Coasts and Estuaries Grants Program |

| Action K | Control pests and weeds, and undertake targeted land, dune and marine revegetation, habitat restoration and protection works along the Kiama coastline to enhance environmental, community and cultural values | | |
|----------------------------------|--|--|---|
| | <p>formal quadrat surveys every 5 years after completion of a works area, along with informal techniques by using common photo-points every 12 months following commencement of works, to help determine progress and success of Action. Modify the coastal habitat restoration and revegetation works plan (as endorsed by the CMP Operational Working Group – see Action A) based on learnings from on-ground implementation. Strategy to be reviewed at least once during the course of the CMP.</p> | | <p>for photo monitoring. For budgeting purposes, adopt \$10,000/yr opex (assuming 1 quadrat survey per year)</p> <ul style="list-style-type: none"> • LLS • Environment Trust - Environmental Restoration and Rehabilitation • Kiama Municipal Council (including through Landcare, Coastcare support) |
| Success indicators | <ul style="list-style-type: none"> • Development of coastal habitat restoration and revegetation works plan to guide pest and weed control, revegetation and other environmental protection works | <ul style="list-style-type: none"> • Increased coverage of native vegetation and a demonstrable reduction in environmental pests and weeds within targeted areas as determined through formal and informal monitoring | |
| Integrated or concurrent Actions | <ul style="list-style-type: none"> • D. Develop a new Coastal Lands Public Access Strategy that identifies and prioritises coastal fringe lands proposed for acquisition or gaining easements to enable continuous public access along the entire Kiama Local Government Area coastline • J. Provide Traditional Owners a voice in CMP implementation, promote the cultural significance of the coastline through informative signage and place naming, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country • L. Raise community awareness regarding Council’s Vegetation and Tree Vandalism Policy to reduce illegal dune vegetation damage and removal | | |



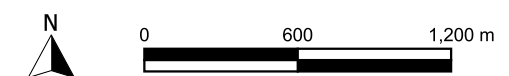
Legend

- CMP Study Area
- SEPP Coastal Wetlands
- SEPP Coastal Wetlands Proximity Area
- SEPP Littoral Rainforest
- SEPP Littoral Rainforest Proximity Area

Title:

Pest and weed control, revegetation and habitat restoration along the Kiama coastline

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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| Action L | Raise community awareness regarding Council’s Public Tree Management Policy to reduce illegal dune vegetation damage and removal | | |
| Location / Scale | <p>This Action targets communities around those dunes that have experienced illegal dune vegetation removal in the past. This Action therefore targets communities surrounding:</p> <ul style="list-style-type: none"> • Jones Beach • Werri Beach <p>Areas of degraded dune vegetation along Jones Beach and Werri Beach, including areas that have been actively denuded and vandalised, are presented in Figure L-1.</p> <p>This action is also guided by Kiama Municipal Council’s Public Tree Management Policy particularly Section 7 Tree and Vegetation Vandalism.</p> | | |
| Priority | High | Timeframe | Medium-term (within 6 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> • Disturbance of Biodiversity and Habitat • Overuse by Recreation and Tourism | | <ul style="list-style-type: none"> • Lack of Engagement, Governance and Compliance • Conflict Over Resource Use and Access Availability |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> • Ecosystem health • Community use and conflicts | | <ul style="list-style-type: none"> • Governance and compliance • Promote and protect cultural heritage |
| Description | <p>Coastal dunes form an important natural defence for the coastline against the hazards generated by coastal storms. The dunes provide a ‘reservoir’ of sand that can be released during erosion events, protecting land and properties behind. This lost sand generally returns to the dune after the storms during ‘quieter’ times. Natural vegetation on coastal dunes helps to stabilise the sand, preventing it from being lost to wind (Aeolian transport) or prematurely lost by regular ocean movements (tides, waves). In addition, vegetated coastal dunes provide an important ecological habitat (including nesting and roosting grounds for many migratory and threatened shorebirds), and form part of a critical wildlife corridor that has regional significance for many species. The coastal dunes along the Kiama coastline also hold significance to the Wodi Wodi people on D’harawal Country, and contain many middens and other sacred sites.</p> <p>Community consultation during the CMP Stage 1 highlighted division within the community regarding dune vegetation. While community members generally recognised the importance of dune vegetation, some community members were of the firm opinion that vegetation should only be ‘low shrubs’. It is understood from the Stage 1 consultation and through additional stakeholder engagement that taller trees that are planted or naturally germinate within some coastal dunes become vandalised, poisoned and physically removed by community members.</p> | | |

Action L**Raise community awareness regarding Council's Public Tree Management Policy to reduce illegal dune vegetation damage and removal**

Kiama Municipal Council adopted a Public Tree Management Policy in April 2022. The policy outlines the actions that Council may take in response to tree or vegetation vandalism on public land and provides guidelines for a consistent and appropriate response to acts of tree or vegetation vandalism.

Targeted measures outlined in the Public Tree Management Policy to prevent on-going vandalism of highly sensitive areas, such as coastal dunes, include:

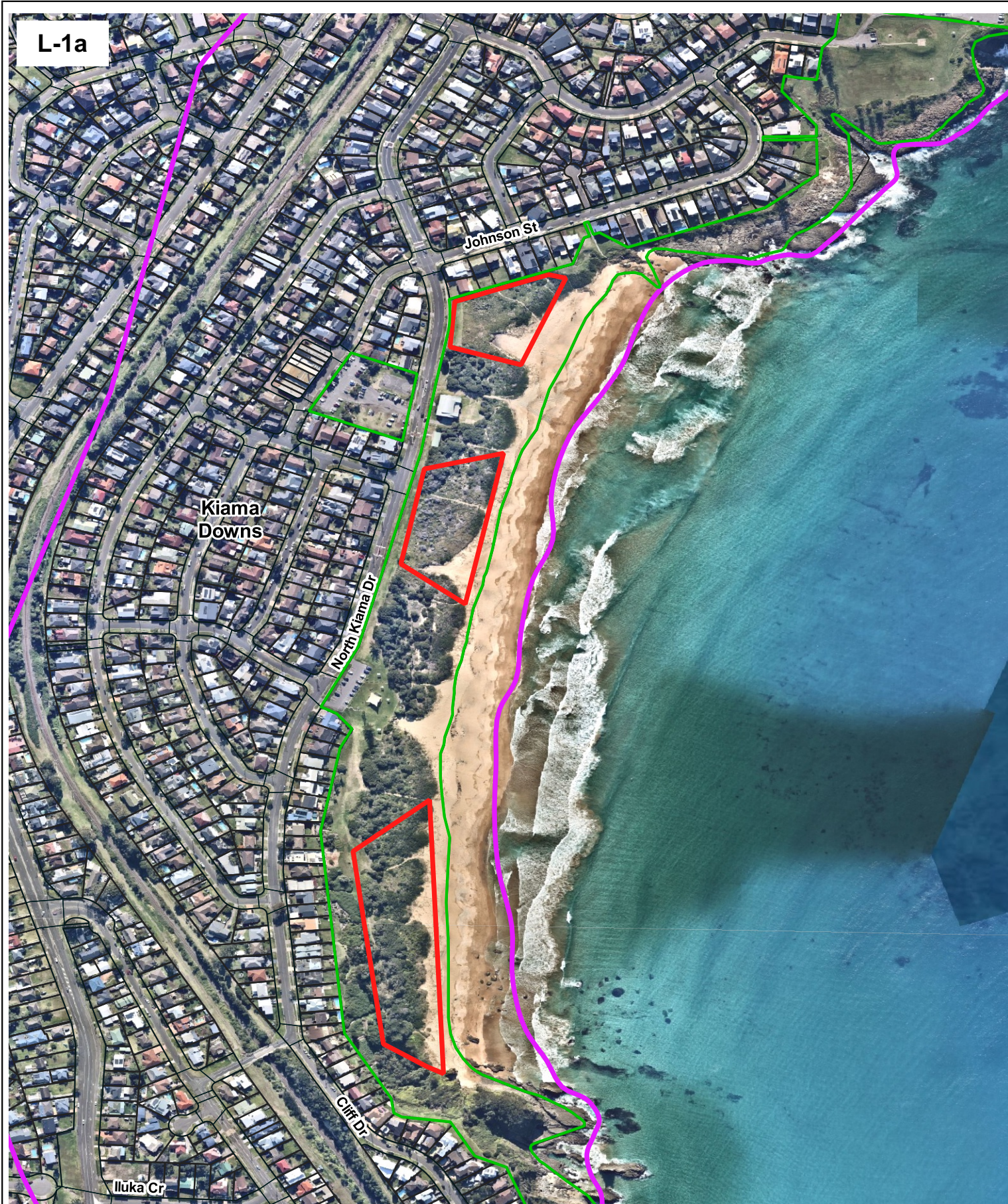
- Targeted community education in a localised area
- Increasing Council Officer presence in the area
- Implementing Closed Circuit Television (CCTV) surveillance
- Monitoring site condition through photographs and aerial photographs
- Engage community groups in the targeted area
- Developing, reviewing and implementing plans of management for high risk or sensitive areas
- Installation of signage

Where tree and vegetation vandalism continues to occur, the Policy stipulates that Council may pursue the following response measures:

- Post letters to surrounding properties notifying residents of the vandalism and requesting information
- Investigate and interview relevant persons as they are identified
- Place a notice regarding the vandalism in the local media
- Erect a large sign (1.2m x 1.2m) on the ground and / or install large banners (3m x 1m) in the tree canopy/ground level (signs or banners are to remain until replacement trees have been restored to Council's satisfaction)
- Where large trees have died from poisoning, the tree will be labelled with a yellow "Poisoned" stencil
- Retain dead trees once safety concerns are satisfied by Council
- Re-plant replacement trees at a ratio of up to five replacement trees for every tree damaged
- Offer an appropriate reward (up to \$500) for information leading to a prosecution in accordance with Council's Vandalism Reward Scheme
- Consider legal proceedings if sufficient evidence exists
- Implement CCTV to the affected area for large scale and persistent cases of vandalism or in highly sensitive areas
- Covert surveillance cameras may be used as a response measure for high impact vandalism incidents at the discretion of the General Manager

| Action L Raise community awareness regarding Council’s Public Tree Management Policy to reduce illegal dune vegetation damage and removal | | | | | |
|--|---|-------------|---------------------|---|--|
| <p>Council’s Policy also allows them to issue Penalty infringement notices for minor offences, while more serious acts of vandalism may result in further action being taken through the NSW Local Court or the NSW Land and Environment Court.</p> <p>Attempts at targeted community education in the past have had limited benefit, as coastal dune vegetation continued to be vandalised and removed. This Action involves clearly advising the relevant communities of the scope and content of Council’s Public Tree Management Policy, and then pursuing one or more of the avenues outlined in the policy in order to reduce the future incidents of coastal vegetation and tree vandalism.</p> | | | | | |
| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
| | <p>L.1: Install signage at strategic locations regarding value of dune vegetation along with actions and penalties that are enforceable under Council’s Public Tree Management Policy. Signage should target key locations along the coastal dunes that have been vandalised in the past. If appropriate, signage could also include other relevant information such as discouraging litter and illegal dumping of rubbish (again with penalties for such actions outlined).</p> | Council | DCCEEW-BCSG | \$5,000 capex for signage design, manufacturing and installation | <ul style="list-style-type: none"> • Kiama Municipal Council |
| | <p>L.2: As appropriate to the circumstances, pursue one or more elements of Council’s Public Tree Management Policy as a deterrent for on-going dune vegetation damage and removal. There are many options for pursuing matters further if dune vegetation and trees continue to be vandalised. The most appropriate option would depend on the circumstances and Council’s willingness to enforce the different elements of the policy.</p> | Council | DCCEEW-BCSG | For budgeting purposes, adopt \$50,000 capex if vandalism is still prevalent after Year 3 of the CMP. | <ul style="list-style-type: none"> • Kiama Municipal Council • Coastal and Estuary Grants Program • Local Land Services (LLS) • Environment Trust - Environmental Restoration and Rehabilitation |

| | | |
|---|---|---|
| Action L | Raise community awareness regarding Council’s Public Tree Management Policy to reduce illegal dune vegetation damage and removal | |
| Success indicators | <ul style="list-style-type: none"> • Signage installed at strategic locations outlining Council’s Vegetation and Tree Vandalism Policy and associated penalties for offences. | <ul style="list-style-type: none"> • Reduction (or even cessation) of vandalism (removal, damage, poisoning) of coastal dune vegetation and especially taller trees (e.g. banksia, casuarina) within the vegetation. |
| Integrated or concurrent Actions | <ul style="list-style-type: none"> • K. Control pests and weeds, and undertake targeted land, dune and marine revegetation and habitat restoration along the Kiama coastline to enhance environmental, community and cultural values | |



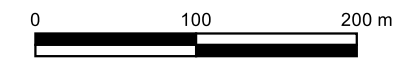
Legend

- CMP Study Area
- Areas of degraded dune vegetation, including areas of deliberate vegetation vandalism
- Costal Council Maintained Land
- Cadastral Boundaries

Title:

Degraded dune vegetation, including areas of deliberate vegetation vandalism

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| Action M | Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and develop/update culturally appropriate management measures | | | | | | | | | | | | | | |
|---|--|------------------------------------|---|--|---------------|-----------------|---|-------------------------------|------------------------------------|---|--|--|--|--|--|
| Location / Scale | Covering whole Coastal Management Area (CMA). In particular, the backs of dunes are recognised as areas containing middens, while headlands also have tangible and intangible heritage value. Cultural sites can incorporate a range of complexes including artefact scatters, burials and middens. | | | | | | | | | | | | | | |
| Priority | High | Timeframe | Medium-term (within 6 years) | | | | | | | | | | | | |
| Risks/issue addressed | <ul style="list-style-type: none"> Degradation of Heritage and Culture | | <ul style="list-style-type: none"> Lack of Engagement, Governance and Compliance | | | | | | | | | | | | |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Culture | | <ul style="list-style-type: none"> Governance and compliance | | | | | | | | | | | | |
| Description | <p>Undertake a study to identify coastal Aboriginal cultural heritage values, their current status and potential threats and community-led management solutions to mitigate these threats.</p> <p>Taking a community-led approach (via implementation by the Illawarra LALC and Jerrinja LALC), this project would build on First Nation people’s knowledge and connections to the Kiama region’s coastal waters. This strategy involves collating and auditing existing cultural heritage information (including Aboriginal Heritage Information Management System, AHIMS, database, historical and ethnographic research), community workshops and on-ground surveys to identify Aboriginal cultural values within the Kiama CMA.</p> <p>The current status and potential risks for Aboriginal cultural values will be assessed and appropriate management actions will be determined by the Aboriginal community.</p> <p>Prior to implementation of this Action, further consultation with Illawarra LALC and Jerrinja LALC is required to define and agree on the scope and geographic extents of investigations to be undertaken.</p> <p>It is understood that both Illawarra LALC and Jerrinja LALC have secured some grant funding to undertake some cultural mapping / cultural assessments.</p> | | | | | | | | | | | | | | |
| Detailed Plan | <table border="1"> <thead> <tr> <th>Defined tasks</th> <th>Lead Agency</th> <th>Supporting Agencies</th> <th>Cost estimate</th> <th>Funding options</th> </tr> </thead> <tbody> <tr> <td> M.1: Undertake a Kiama coastline Aboriginal cultural values, threats and resilience study. The study (<i>‘Kiama Coastal Resilience Project: Aboriginal cultural heritage values, current status and potential threats’</i>) should include three elements: </td> <td> Illawarra LALC, Jerrinja LALC </td> <td> Heritage NSW, DCCEEW-BCSG, Council </td> <td> \$200,000 capex including Traditional Owner consultation fees </td> <td> <ul style="list-style-type: none"> Protecting our Places Grants Coastal and Estuary Grants Program </td> </tr> </tbody> </table> | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options | M.1: Undertake a Kiama coastline Aboriginal cultural values, threats and resilience study. The study (<i>‘Kiama Coastal Resilience Project: Aboriginal cultural heritage values, current status and potential threats’</i>) should include three elements: | Illawarra LALC, Jerrinja LALC | Heritage NSW, DCCEEW-BCSG, Council | \$200,000 capex including Traditional Owner consultation fees | <ul style="list-style-type: none"> Protecting our Places Grants Coastal and Estuary Grants Program | | | | |
| Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options | | | | | | | | | | | |
| M.1: Undertake a Kiama coastline Aboriginal cultural values, threats and resilience study. The study (<i>‘Kiama Coastal Resilience Project: Aboriginal cultural heritage values, current status and potential threats’</i>) should include three elements: | Illawarra LALC, Jerrinja LALC | Heritage NSW, DCCEEW-BCSG, Council | \$200,000 capex including Traditional Owner consultation fees | <ul style="list-style-type: none"> Protecting our Places Grants Coastal and Estuary Grants Program | | | | | | | | | | | |

Action **M**

Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and develop/update culturally appropriate management measures

1. Collate and audit existing cultural heritage information for the Kiama coastline. This information would include AHIMS database, historical and ethnographic research available through common sources.

2: Conduct workshops with cultural knowledge holders and undertake on-ground surveys to identify Aboriginal cultural values within the Kiama CMA. These surveys should be undertaken by traditional owner groups to confirm their significant sites and values. Depending on context and sensitivities of these, some may be registered as location-specific, while others may remain generic in locality. Include any new sites within a confidential register, such as AIHMS, for protection under Heritage Law.

3: Identify threats and assess potential risks to Aboriginal cultural values and develop culturally appropriate management actions. Threats and management actions will be determined by the Aboriginal community. Supporting agencies can assist through delivery of an established risk management process. With respect to this CMP, focus would be on identifying those culturally significant tangible and intangible sites that are located within areas that are at risk from current or future coastal processes (as established through CMP Stage 2). This can be simplified to the Coastal Vulnerability Area (CVA), if established. Where appropriate and feasible, risk response measures can be incorporated into other works captured under this CMP, including rehabilitation and revegetation works (refer **Action K, Action J**).

- NSW Heritage Grants Program
- National Indigenous Australian Agency
- Kiama Municipal Council
- Local Land Services (LLS)
- Marine Estate Management Strategy (MEMS)
- Australian Research Council

| Action M Undertake community-led investigations to collate, identify and assess Aboriginal cultural heritage values along the Kiama coastline, assess threats and risks to these values from coastal hazards and develop/update culturally appropriate management measures | | | | | |
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| | <p>M.2: Explore options to revise relevant aspect of the Local Environmental Plan (LEP), to recognise Aboriginal cultural values of the Kiama coastline. Updated LEP and relevant DCPs should aim to prevent conflicts between cultural values and future development through appropriate zonings and development control provisions (refer also Action B)</p> | Council | Illawarra LALC, Jerrinja LALC | Council staff time only. | Council budget if done internally |
| | <p>M.3: Monitor Aboriginal cultural heritage sites at risk of coastal hazards. These sites would be identified through the study conducted as part of Action M.1. Monitoring could be done via ground surveys or aerial surveys (i.e. drones). Monitoring should be done by appropriate indigenous representatives.</p> | Illawarra LALC, Jerrinja LALC | Heritage NSW, DCCEEW-BCSG, Council | \$20,000/yr opex | <ul style="list-style-type: none"> • Protecting our Places Grants • Coastal and Estuary Grants Program • NSW Heritage Grants Program • National Indigenous Australian Agency • Kiama Municipal Council |
| Success indicators | <ul style="list-style-type: none"> • Completion of a 'Kiama Coastal Resilience Project: Aboriginal cultural heritage values, current status and potential threats' | | | | <ul style="list-style-type: none"> • Modifications to the Kiama LPIs to reflect new cultural heritage information • Monitoring records/footage for heritage sites |
| Integrated or concurrent Actions | <ul style="list-style-type: none"> • B. Introduce a CVA, modify the LEP and introduce a new Development Control Plan (DCP) to incorporate a risk-based land use planning approach to future development to adequately manage existing and future coastal risks, including cliff instability risks • K. Control pests and weeds, and undertake targeted land, dune and marine revegetation and habitat restoration along the Kiama coastline to enhance environmental, community and cultural values • J. Provide Traditional Owners a voice in CMP implementation, promote the cultural significance of the coastline through informative signage and place naming, and support Indigenous Ranger Groups to enable First Nations people to care for their land and sea Country | | | | |

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| Action N | Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities | | | | |
| Location / Scale | This Action would potentially engage all Kiama residential and business communities, as part of other community engagement activities within Kiama. | | | | |
| Priority | Medium | Timeframe | Long-term (within 10 years) | | |
| Risks/issue addressed | <ul style="list-style-type: none"> Coastal Hazards and Sea Level Rise Conflict Over Resource Use and Access Availability | <ul style="list-style-type: none"> Lack of Engagement, Governance and Compliance Overuse by Recreation and Tourism | | | |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Hazards and climate resilience Community use and conflicts | <ul style="list-style-type: none"> Governance and compliance | | | |
| Description | <p>The CMP Stage 2 identified the need to better understand future needs and pressures on coastal lands and environments. This Action aims to help fill the knowledge gap regarding community expectations and perspectives of the coastline through direct engagement with the community. Council periodically undertakes community consultation on a range of topics, many involving use of open space and public lands (e.g. the Open Spaces and Recreation Strategy: https://www.kiama.nsw.gov.au/Council/Your-say/Open-Spaces-and-Recreation-Strategy, and the recent Local Strategic Planning Statement that established a 20 year vision for land use in the Kiama LGA).</p> <p>While it is not proposed to undertake community engagement for the sole purpose of gathering this information, this Action involves utilising community consultation programs that will be developed for other purposes, and modifying those programs slightly to capture the additional information relating to usage and conflicts of coastal public land.</p> <p>Council’s Community Engagement Officer (or similar position) would be well placed to assist with the implementation of this Action.</p> | | | | |
| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
| | <p>N.1: Maintain awareness of potential community engagement programs that relate to coastal lands, such as engagement for future Local Strategic Planning Statements (LSPS). It is expected that relevant programs of community engagement would be carried out every few years by Council for various purposes.</p> | Council | DCCEEW-BCSG | Council, staff time | Council budget if done internally |

| Action N | Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities | | | | |
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| | <p>N.2: Where suitable, expand planned community engagement programs to capture community input regarding use and demand of coastal lands, facilities and services, and potential conflicts, including conflicts with the natural environment. Other community consultation programs to be expanded in scope to obtain a larger and more extensive view of community perspectives of existing and future needs and pressures on community coastal land and environments. This may involve web-based responses and/or face to face interactions at key locations (e.g. on high traffic community lands) and at community events (e.g. local markets) depending on the primary needs of the community consultation program.</p> <p>Care should be taken in designing questions that will provide sufficient basis for future planning and management of community land, facilities, services and environments along the coast.</p> | Council | DCCEEW-BCSG | \$20,000 capex, costed as an expanded scope for other community consultation activities | <ul style="list-style-type: none"> • Kiama Municipal Council • Coastal and Estuary Grants Program |
| Success indicators | <ul style="list-style-type: none"> • Completion of community consultation that provides information on existing and future user needs and demands on coastal land, facilities, services and environments. | | | | <ul style="list-style-type: none"> • Integration of the results of the consultation into the implementation of other Actions in this CMP |
| Integrated or concurrent Actions | <ul style="list-style-type: none"> • E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values | | | | |

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| Action O | Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position | |
| Location / Scale | Coastal Management Areas (CMA) associated with Werri Lagoon, including the Coastal Wetlands and Rainforests Area (CWLRA) within and around Werri Lagoon, have been excluded from the study area of this CMP, with the exception of the immediate entrance area. Likewise, the Coastal Management Areas associated with the Crooked River and the CWLRA within and around the Crooked River estuary have also been excluded from the study area of this CMP, with the exception of the immediate entrance area. These exclusions have been imposed because estuary-specific CMPs for these Coastal Management Areas will be prepared in the future by Kiama Municipal Council. This Action therefore only relates to the immediate entrance areas of Werri Lagoon and the Crooked River, as shown in Figure O-1 . | |
| Priority | High | Timeframe Long-term (within 10 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> • Disturbance of Biodiversity and Habitat • Coastal Hazards and Sea Level Rise • Lack of Engagement, Governance and Compliance | |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> • Ecosystem health • Hazards and climate resilience • Governance and compliance | |
| Description | Council adopted an Interim Entrance Management Policy for Werri Lagoon in 2005. Council adopted a Policy Position pertaining to the Crooked River Entrance, also in 2005. <u>Werri Lagoon</u> The Interim Entrance Management Policy permits artificial opening of the entrance to minimise impacts of inundation on private and public lands and roads when the entrance is closed and when water levels in the lagoon rise. The lagoon entrance can be opened immediately once it reaches a level of reduced level (RL) 1.8m Australian Height Datum (AHD), or it can be opened on the top of the first available high tide if it reaches a level of 1.65m AHD. Council staff are responsible for artificially opening the entrance when it is required. In addition to permitting opening of the entrance, the Interim Policy calls for monitoring of the data relating to the entrance during each opening event as well as during any natural entrance break out events. Further, the Interim Entrance Management Policy requires a review and update of the Interim Policy. It calls for the policy to be reviewed as part of the Werri Lagoon Estuary Management Plan or Floodplain Management Plan. In the absence of either Plan, the policy was to be reviewed in 2006/7. An Estuary Management Plan for Werri Lagoon has not been developed, while the Ooaree Creek and Werri Lagoon Catchment Flood Study was only completed in 2019, although this has still not been followed by a floodplain management plan for the waterway. It is | |

Action 

Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position

understood that the Werri Lagoon Interim Entrance Management Policy has therefore not been formally reviewed since it was developed in 2005.

This Action involves continuing to implement the Werri Lagoon Interim Entrance Management Policy as documented, including a review of the policy. The Ooaree Creek and Werri Lagoon Catchment Flood Study provides sufficient information to critically review the Interim Policy and revise the strategic position of the document to accord with the objects of the CM Act and the overall objectives and outcomes sought by this Kiama Coastline CMP.


A revised Entrance Management Strategy or Policy for Werri Lagoon (and similarly for other estuaries requiring artificial entrance management), should consider whether authorisations, for example a Crown Land licence, will be required under the *Crown Lands Management Act 2016* (CLM Act) for actions that are located on Crown land. A revised strategy or policy should take into consideration a monitoring program for shorebirds, hydrological conditions and other specifics for the estuary.

As part of the licencing process under the CLM Act, a determined environmental assessment, undertaken in accordance with the EP&A Act, must be submitted with any Crown Land licence application. DPHI – Crown Lands recommends that Council consult with relevant agencies, including DPI-Fisheries, as part of preparing these environmental assessments. Feedback from agencies should be considered and incorporated into the assessment.

In addition to continuing to implement the Interim Policy, this Action includes the removal of redundant drainage infrastructure within the entrance of Werri Lagoon that was installed in the past as an early attempt to help manage lagoon water levels.

The *Local Land Services Act 2013* and the *Standard Instrument (Local Environmental Plans) Order 2006* define EPW as works associated with the rehabilitation of land towards its natural state or any work to protect land from environmental degradation, and includes re-vegetation or bush regeneration works, wetland protection works, erosion protection works, dune restoration works and the like, but does not include coastal protection works (CPW). The drainage infrastructure within the entrance berm of Werri Lagoon has been inoperable for many decades and remains derelict. Its removal will help to restore aquatic habitat and reinstate a more natural flow regime, including fish passage. Removal of the structure was recommended in the recent government report “Audit of trained river entrances, armoured harbours and groynes and the multi-use and eco-features in NSW: Shellharbour to the Victorian border (illustrated volume III)” (MEMA, 2021).

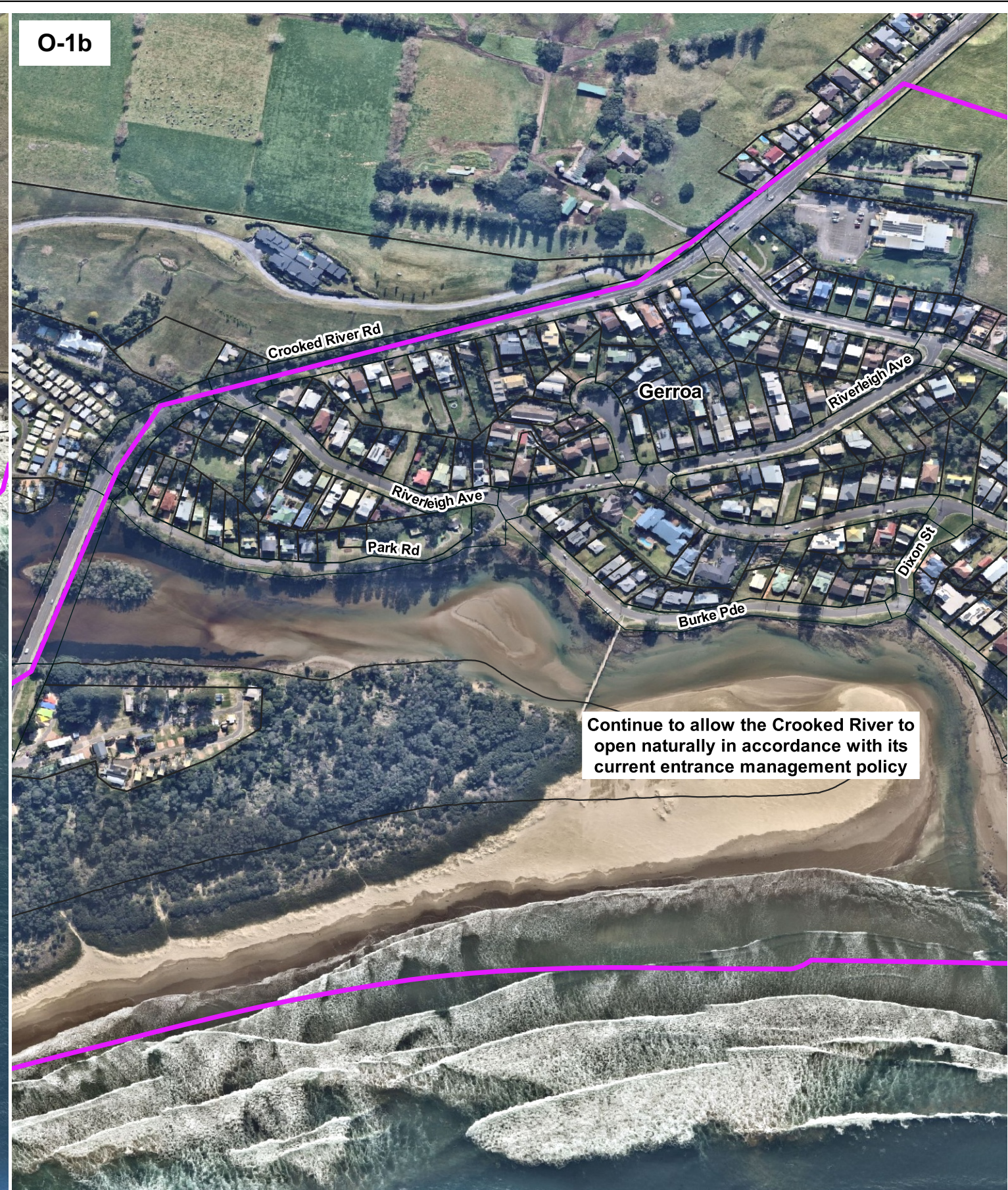
The proposed works to remove the derelict drainage infrastructure is located within the proximity area of the CWLRA as mapped in the R&H SEPP. Section 2.8(1) of the R&H SEPP specifies that works within the proximity area of a CWLRA must not significantly impact upon the biophysical, hydrological or ecological integrity of the adjacent wetland, or change the quantity or quality of surface or groundwater flow in the wetland. An important consideration for removal of the derelict drainage infrastructure is the potential to impact/remove marine vegetation protected under the *Fisheries Management Act 1994*.

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| <p>Action </p> | <p>Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position</p> | | | | |
| | <p>Further details of the proposed works, as provided in the abovementioned MEMA report, are provided in Annex D.</p> <p><u>Crooked River</u></p> <p>The Policy Position for the Crooked River Entrance states that the entrance is to be allowed to open naturally, unless there are extenuating circumstances. This position was taken because there are no permanent dwellings that would be impacted when the entrance closes and water levels in the river rise (only on-site caravans in Discovery Holiday Park at Gerroa would be impacted). <u>This holiday park is located outside of the study area of the Open Coast CMP.</u></p> <p>This Action does not propose any works or further investigations in respect of the Crooked River entrance, remaining consistent with the Policy Position of 2005. It is envisaged that Council’s Crooked River Entrance Policy Position would be reviewed as part of a future Crooked River CMP, to be prepared under the provisions of the <i>Coastal Management Act 2016</i>.</p> | | | | |
| <p>Detailed Plan</p> | <p>Defined tasks</p> | <p>Lead Agency</p> | <p>Supporting Agencies</p> | <p>Cost estimate</p> | <p>Funding options</p> |
| | <p>O.1: Advocate and support maintaining automated water level gauges at Werri Lagoon and in the Crooked River to continue providing real-time data to allow implementation of the Werri Lagoon Interim Entrance Management Policy and the Crooked River Entrance Management Policy Position. Note that relocation of the Werri Lagoon gauge should be considered as part of the future Werri Lagoon CMP as the gauge is not located withing the Coastline CMP study area.</p> | <p>Council</p> | <p>DCCEEW-BCSG</p> | <p>Staff time for implementation. Costs for maintenance of gauges borne by MHL and DCCEEW</p> | <ul style="list-style-type: none"> • Kiama Municipal Council |
| | <p>O.2: Work with Department of Primary Industries - Fisheries (DPI-Fisheries) to investigate removal options, assess potential impacts, seek necessary approvals and conduct public engagement. Removal of the entrance structure in Werri Lagoon is recommended in the Marine Estate Management Authority (MEMA) Audit of trained river entrances, armoured harbours and groynes and the multi-use and eco-features in NSW: Shellharbour to the Victorian border (illustrated volume III) (MEMA, 2021). The approvals pathway</p> | <p>Council</p> | <p>DCCEEW-BCSG, DPHI-Planning, DPHI-Crown Lands, DPI-Fisheries</p> | <p>Council staff time for investigations and obtaining approvals, with \$50,000 capex for associated disbursements or planning consultancy</p> | <ul style="list-style-type: none"> • Coastal and Estuary Grants Program • NSW DPI – Fisheries, Habitat Action Grants • MEMS • Crown Lands – Breakwater Governance and |

| Action O | Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position | | | | |
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| | for the works would need to be confirmed as it would trigger multiple matters for consideration given the nature and location of the works. Given these works are identified in this CMP, Part 5 of the <i>Environmental Planning and Assessment (EP&A) Act 1979</i> may be applicable, thus fast-tracking the process. | | | | Management MEMS Project |
| | <p>O.3: Undertake necessary on-ground works to remove the derelict concrete drainage channel located within Werri Lagoon entrance. Works would need to consider the dynamic nature of Werri Lagoon entrance, including surf and beach conditions as well as the variable lagoon water level. Ideally works would be carried out when lagoon water levels are low and surf conditions are small. Construction access would be via the carpark at the northern end of Pacific Avenue, adjacent to the toilet facilities (same access as when artificial entrance opening is required as per the Werri Lagoon Interim Entrance Management Policy).</p> | Council | DCCEEW-BCSG, DPHI-Crown Lands, DPI-Fisheries | \$500,000 capex for on-ground works (estimated) | <ul style="list-style-type: none"> • Coastal and Estuary Grants Program • NSW DPI – Fisheries, Habitat Action Grants • MEMS • Crown Lands – Breakwater Governance and Management MEMS Project |
| | <p>O.4: Review and update the Werri Lagoon Interim Entrance Management Policy. The opportunity should arise for the Interim Entrance Management Policy to be revised as part of a future Werri Lagoon CMP. However, should a future Werri Lagoon CMP be delayed, revision and update of the Interim Policy should be pursued as part of this Coastline CMP. The review should use current flood study information to determine appropriate entrance management conditions that will assist with overall flood risk management of the waterway.</p> <p>Council should aim to minimise the need to intervene in entrance management, and as such, should explore other</p> | Council | DCCEEW-BCSG, DPI-Fisheries, DPHI-Crown Lands | Council staff time or \$80,000 capex for consultancy if not completed as part of the future Werri Lagoon CMP. | <ul style="list-style-type: none"> • Coastal and Estuary Grants Program • Floodplain Management Program • NSW DPI – Fisheries, Recreational Fishing Trust Flagship Grants • Kiama Municipal Council |

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| <p>Action O</p> | <p>Review and update the Werri Lagoon Interim Entrance Management Policy and undertake works to remove derelict drainage infrastructure from the entrance of Werri Lagoon to improve public safety, restore habitat and reinstate a more natural flow regime. Continue to allow the Crooked River entrance to open naturally and manage it in accordance with the existing policy position</p> | |
| | <p>mechanisms for reducing risks of inundation of private and public land and assets around the waterway (including for example acquisition of low-lying fringing properties for estuarine / wetland conservation purposes around Werri Lagoon). Council should also consider DPI – Marine Estate Management Strategy (MEMS) – Domestic Waterfront Strategy particularly for the unauthorised jetties in Werri Lagoon. These other mechanisms should be captured and implemented as part of a future Werri Lagoon CMP or Werri Lagoon Flood Risk Management Plan.</p> | |
| <p>Success indicators</p> | <ul style="list-style-type: none"> • Removal of derelict drainage infrastructure from the entrance of Werri Lagoon | <ul style="list-style-type: none"> • Review and update of the Werri Lagoon Interim Entrance Management Policy |
| <p>Integrated or concurrent Actions</p> | <ul style="list-style-type: none"> • nil | |



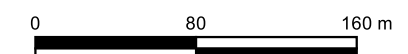
Legend

- CMP Study Area
- Drainage Infrastructure
- Approx. location of opening channel (from the Interim Policy)
- SEPP Coastal Wetlands
- SEPP Coastal Wetlands Proximity Area
- SEPP Littoral Rainforest
- SEPP Littoral Rainforest Proximity Area

Title:

Entrance Management Works at Werri Lagoon and Crooked River

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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| Action P | Monitor and assess beach and dune conditions to build knowledge and guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required | | |
| Location / Scale | Covering all sandy beaches and dunes along the Kiama coastline. Locations to be covered by this Action are shown on Figure P-1 , including potential locations for monitoring sites. | | |
| Priority | Medium | Timeframe | Short-term (within 3 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> Disturbance of Biodiversity and Habitat Coastal Hazards and Sea Level Rise Lack of Engagement, Governance and Compliance | | <ul style="list-style-type: none"> Overuse by Recreation and Tourism Conflict Over Resource Use and Access Availability |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Ecosystem health Hazards and climate resilience | | <ul style="list-style-type: none"> Governance and compliance Community use and conflicts |
| Description | <p>Dune revegetation works are ostensibly captured under Action K. This Action involves the monitoring of beach and dune conditions via the use of citizen science photographic data, collected through CoastSnap (www.coastsnap.com/) or similar. Monitoring sites need to be in elevated locations and could include:</p> <ul style="list-style-type: none"> Jones Beach (possibly from the Kiama Downs Surf Life Saving Club, SLSC) Bombo Beach (from the North Bombo Beach carpark) Surf Beach (from the coastal path on the northern side of the beach) Kendalls Beach (from Chapman Point Reserve to the north of the beach) East Beach (from the coastal path on the southern side of the beach) Werri Beach (from the coastal path on the headland to the north of the beach) Werri Beach (from the South Werri Beach carpark) Seven Mile Beach (from Burke Parade Road reserve) <p>CoastSnap (or similar) provides a mechanism to use image comparison for shoreline tracking, time-lapse videos of beach change and delivery of coastal data via a community-accessible on-line dashboard. Images can also be stored for future reference. CoastSnap is currently being utilised along the Shoalhaven coast with nine sites (refer https://www.shoalhaven.nsw.gov.au/For-Residents/Our-Environment/Coast-Waterways/Coastal-Estuary-Management-Planning#section-4). Coastsnap is also being used by Shellharbour Council for community beach monitoring at four sites (refer https://www.shellharbour.nsw.gov.au/environment/coastal-zone-management/beach-monitoring-program).</p> | | |

Action P Monitor and assess beach and dune conditions to build knowledge and guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required

In addition to monitoring, this Action involves erecting temporary fencing and barricades around areas of high erosion scarps on beaches following erosion events to keep the public safe. If necessary, section of beach could be closed entirely to public access, including access tracks leading to those parts of the beach. Dunes that may be susceptible to high erosion scarps are limited along the Kiama coastline, confined mostly to North Werri Beach.

Where beach erosion threatens existing public infrastructure, the Coastal Zone Emergency Action Subplan (CZEAS) is to be implemented (refer **Annex A**). Where erosion of Surf Beach in particular impacts on public access to the beach, this Action enables the artificial movement of sand from areas of accretion on the beach to areas that have suffered erosion. This is termed beach scraping and would be carried out using soft-wheeled earthmoving equipment. The trigger and threshold for undertaking beach scraping at Surf Beach is a minimum 0.5m drop-off at the end of the concrete steps providing beach access. A secondary trigger relating to loss of sand immediately in front of the vertical retaining wall at the back of the beach, potentially exposing the wall to direct wave action, can be provided based on engineering judgement by an experienced coastal engineer.

Works on beaches will be on Crown land and will require Crown Land licencing for borrowing from intertidal areas for nourishment of dunes and beaches that covers the sediment compartment (rather than individual beaches). To support the implementation of the CZEAS and beach scraping works, a 5-year ‘head licence’ may be a potential option for any works or emergency works required on Crown land.

| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
|---------------|--|-------------|---------------------|--|---|
| | <p>P.1: Use CoastSnap, or similar photo point monitoring, to undertake citizen science beach monitoring and assess temporal beach condition change based on image comparisons. There is growing popularity in employing citizen science to assist in environmental monitoring using every-day digital technology. CoastSnap has been developed by the University of New South Wales that involves community members capturing an image of a targeted location (e.g. a specific section of beach or dune) by mobile phone using a fixed phone cradle to provide a fixed and repeatable reference position. Images taken by the community can then be uploaded to the Coastsnap database via a QR code or similar. Phone cradle reference sites along</p> | Council | DCCEEW-BCSG | \$20,000 capex for installation of 8 sites (including 1 fixed camera location), plus \$20,000/yr opex for data analytics and data presentation via a customised on-line dashboard. | <ul style="list-style-type: none"> • Kiama Municipal Council • Coastal and Estuary Grants Program |

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|------------------------|--|----------------|------------------------------------|---|
| <p>Action P</p> | <p>Monitor and assess beach and dune conditions to build knowledge and guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required</p> | | | |
| | <p>the Kiama coastline can be established in elevated locations where there is relatively high pedestrian activity. These could include sites at:</p> <ul style="list-style-type: none"> • Jones Beach SLSC (see note below) • North Bombo Beach carpark • Surf Beach, from the coastal path on the northern side • Kendalls Beach, from Chapman Point Reserve to the north of the beach • Easts Beach, from the coastal path to the south of the beach • North Werri Beach, from the coastal path on the headland to the north of the Werri Lagoon entrance • South Werri Beach carpark • Burke Parade Road reserve, overlooking the Crooked River entrance and Seven Mile Beach. <p>Signage would be required at each location explaining the purpose of the phone cradle, along with some recent and historical images for reference and education regarding how dynamic beach environments can be.</p> <p><u>Note:</u> Regarding Jones Beach, the most effective means of capturing elevated photos of Jones Beach may be to use a fixed camera mounted on top of the Kiama Downs SLSC. The camera would be programmed to take photos at a set time interval. This would require manual download of these photos on a periodic basis (say every 3 or 6 months), or otherwise establish a 4G connection to the camera for automatic download.</p> | | | |
| | <p>P.2: When beach erosion scarps are high, install temporary fencing / barricades and/or close beach access to reduce dangers to the public from these</p> | <p>Council</p> | <p>DCCEEW-BCSG, DPI-Fisheries,</p> | <p>Council staff time Council budget if done internally</p> |

| | | | | | |
|------------------------|--|----------------|-------------------------|---|---|
| <p>Action P</p> | <p>Monitor and assess beach and dune conditions to build knowledge and guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required</p> | | | | |
| | <p>unstable slopes. Assess beach conditions following each major storm event, potentially assisted by inspection of uploaded citizen science camera imagery. Where eroded beach scarps are high (more than 0.5 metres), overly steep / vertical and unstable, erect temporary fencing or barricades to prevent public access to the unstable area that presents a danger to the public. If necessary, close beach access entirely until the beach profile returns to a stable condition. Werri Beach is likely to be the only location where high erosion scarps will form (as there are few other areas where high dunes are present). See also response actions within the CZEAS (Annex A).</p> | | <p>DPHI-Crown Lands</p> | | |
| | <p>P.3 Implement the Coastal Zone Emergency Action Subplan (CZEAS) when erosion events potentially compromise the integrity and safety of the public, public infrastructure and cultural sites. As required by the <i>Coastal Management Act 2016</i>, a Coastal Zone Emergency Action Subplan (CZEAS) is required within this CMP. The CZEAS for the Kiama coastline is provided in Annex A.</p> <p>This task involves Council implementing the procedures outlined in the CZEAS when public coastal infrastructure and/or cultural sites are potentially threatened by coastal hazards. As outlined in the Kiama CZEAS, public infrastructure potentially at high risk that may require temporary protection through implementation of the CZEAS includes:</p> <ul style="list-style-type: none"> • Sewer pump stations, sewer mains and water mains • Stormwater pits, outlets and channels • Walkways and footpaths located immediately behind beaches and across headlands, including specifically the Black Beach promenade seawall | <p>Council</p> | <p>DCCEEW-BCSG</p> | <p>\$80,000 capex for equipment and gear required to implement CZEAS. Then costs only incurred if the Coastal Zone Emergency Action Subplan (CZEAS) is implemented (assumed \$20,000/yr opex)</p> | <ul style="list-style-type: none"> • Kiama Municipal Council |

| | | | | |
|------------------------|---|----------------|--|---|
| <p>Action P</p> | <p>Monitor and assess beach and dune conditions to build knowledge and guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required</p> | | | |
| | <ul style="list-style-type: none"> • Beach accessways along all beaches, including steps leading onto beaches where a large drop may develop under highly eroded beach conditions, such as Surf Beach • South Coast Rail Line • Kiama SLSC • St Peter and Paul Catholic School • Low brick wall behind Surf Beach and other buried informal seawalls behind beaches • Park Road and Burke Parade, Gerroa • Carparks adjacent to roadways behind or beside beaches • Cultural sites | | | |
| | <p>P.4 Prepare REF, obtain permits and approval and undertake beach scraping of Surf Beach following periods of significant erosion, as required. Proposed works involve moving sand via earthmoving equipment from an area of local sand accumulation to a nearby area of sand depletion, in order to restore beach access and amenity, while also restoring a sand buffer in front of the small vertical retaining wall at the back of Surf Beach. These works do not align with the definition of emergency coastal protection works, and as such, approval will be required. Approval should be provided to cover potential works throughout the 10 year timeframe of the CMP on an as-required basis. The borrow area and the placement area are likely to vary from event to event and as such approvals should be as generic as possible within the limits of Surf Beach.</p> <p>The trigger and threshold for undertaking beach scraping at Surf Beach is a minimum 0.5m drop-off at the end of the concrete steps providing beach access. A secondary trigger relating to loss of sand immediately in front of the vertical retaining wall at the back of the beach, potentially exposing</p> | <p>Council</p> | <p>DCCEEW-BCSG, DPHI-Planning, DPHI-Crown Lands, DPI-Fisheries</p> | <p>Council staff time or \$100,000 capex for consultancy for preparing REF and gaining approvals (assuming consultancy). Works to be carried out by Council staff and equipment</p> <ul style="list-style-type: none"> • Coastal and Estuary Grants Program • Kiama Municipal Council |

| | |
|---|--|
| Action P | Monitor and assess beach and dune conditions to build knowledge and guide management of risks to the public following erosion events. Implement the Coastal Zone Emergency Action Subplan (CZEAS) following coastal events and approved beach scraping on Surf Beach as required |
| | the wall to direct wave action, can be provided based on engineering judgement by an experienced coastal engineer |
| Success indicators | <ul style="list-style-type: none"> • Installation of CoastSnap (or similar) monitoring sites along the coastline and an operable on-line dashboard that presents information on beach dynamics • Approvals for as-required sand scraping of Surf Beach • Temporary fencing and barricades placed around high erosion scarps after significant coastal erosion events. |
| Integrated or concurrent Actions | <ul style="list-style-type: none"> • E. Improve coastal amenities and facilities on public land to reduce risks to the public from coastal hazards and reduce conflicts between users, whilst enhancing environmental, social and cultural values |



Legend

- CMP Study Area
- Beach Monitoring Locations
- Cadastral Boundaries

Title:
Beach Monitoring Locations

Drawing: **P-1** Rev: **A**

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.





Legend

- CMP Study Area
- Beach Monitoring Locations
- Cadastral Boundaries

Title:
Beach Monitoring Locations

Drawing: **P-1** Rev: **A**

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Legend

- CMP Study Area
- Beach Monitoring Locations
- Cadastral Boundaries

Title:
Beach Monitoring Locations

Drawing: **P-1** Rev: **A**

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



| | | | |
|-----------------------------------|--|------------------|---|
| Action Q | Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations) | | |
| Location / Scale | <p>Beachwatch recreational water quality data is collected from Jones Beach, Bombo Beach, Surf Beach, Werri Beach and Seven Mile Beach. Only bacteria are tested through the Beachwatch program as an indicator of faecal contamination, which has been designed to provide information to the community on the safety of swimming in ocean beaches in accordance with the National Health and Medical Research Guidelines for Managing Risks in Recreational Waters 2008 (NHMRC, 2008).</p> <p>Stormwater outlets discharge into coastal waters along the whole of the Kiama coastline, especially around the more urbanised parts of the coast. Major stormwater outlets (some facilitating emergency overflows from sewage pumping stations) occur at Black Beach / Kiama Harbour, Surf Beach, Kendalls Beach, Easts Beach, South Werri Beach. Stormwater assets are managed by Council while sewer assets are managed by Sydney Water.</p> <p>Coastal water quality can also be impacted by runoff from rural and peri-urban lands, which flows to the coast via natural watercourses. Improved land management practices within catchment areas can help to reduce pollutant loads. As the majority of the catchments flowing to the coastal waters along the Kiama coastline are beyond the extents of the Coastal Zone, as defined by the <i>Coastal Management Act 2016</i> and mapped through the Risk & Hazard State Environment Planning Policy, this CMP does not propose works or actions targeting water quality improvements through broader catchment management approaches.</p> <p>Existing and proposed Beachwatch monitoring locations are presented in Figure Q-1, along with locations of major stormwater outlets, including stormwater outlets that service high flow sewer overflows.</p> | | |
| Priority | Medium | Timeframe | Short-term (within 3 years) |
| Risks/issue addressed | <ul style="list-style-type: none"> Disturbance of Biodiversity and Habitat Poor Quality Catchment Runoff | | <ul style="list-style-type: none"> Lack of Engagement, Governance and Compliance |
| CMP Objective(s) addressed | <ul style="list-style-type: none"> Ecosystem health Water quality | | <ul style="list-style-type: none"> Governance and compliance |
| Description | <p>Coastal water quality can be affected by treated sewage discharged from ocean outfalls, such as at Bombo Headland. Water quality in coastal areas can also become degraded following rainfall due to runoff from the local catchment and potential cross-contamination of sewage into the stormwater system (e.g. if a sewage pumping station capacity is exceeded, typically exacerbated by illegal connections of stormwater to the sewerage system).</p> <p>Weekly monitoring of water quality at Boyds/Jones Beach, Bombo Beach, Surf Beach, Werri Beach and Seven Mile Beach provides assurance to the community regarding the safety of recreational activities, such as swimming, at those beaches. Sydney Water is responsible for collecting water samples at Boyds/Jones Beach, Bombo Beach, Surf Beach and Werri Beach, while Council is responsible</p> | | |

Action **Q**

Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations)

for collecting water samples at Seven Mile Beach. The Beachwatch State of the beaches 2021-2022 report summary for Kiama beaches is shown below.

| Kiama Municipal Council | | | | |
|---------------------------|-------------|-----------|--|---|
| Boyd's Jones Beach | Ocean beach | G | | ○ |
| Bombo Beach | Ocean beach | G | | ↓ |
| Surf Beach Kiama | Ocean beach | G | | ○ |
| Werri Beach | Ocean beach | VG | | ↑ |
| Seven Mile Beach (Gerroa) | Ocean beach | G | | ↓ |

| Beach Suitability Grade | | | | | Change | | |
|-------------------------|----------|----------|----------|-----------|----------|--------|----------|
| VG | G | F | P | VP | ↑ | ○ | ↓ |
| Very Good | Good | Fair | Poor | Very Poor | Improved | Stable | Declined |

The Beachwatch program should be expanded to include other beaches that are utilised for swimming, including Kendalls Beach and Easts Beach (which are both fringed by Holiday Parks), the entrance of the Minnamurra River (adjacent to the boatramp, where there is high primary contact usage of the river) and the entrance of the Crooked River (which is also highly utilised for recreation with multiple Holiday Parks nearby). These new sites should be confirmed following a review of the updated WQ Objectives primary recreation locations, which are currently in development.

Sydney Water currently undertakes sewerage improvements as directed by their Illawarra Regional Master Plan, and more specifically their Kiama Growth Servicing Plan, which outlined targeted Pollution Reduction Programs (PRPs). Sydney Water engages with Council on a regular basis to ensure that water and sewage services within the Kiama Local Government Area are cognisant of broader land use and demographic needs and demands.

Kiama Municipal Council is responsible for maintaining stormwater assets, which includes cleaning of stormwater pollution collection devices, such as gross pollutant traps.

Although this action is to be completed within 6 years, monitoring of existing sites continues as normal, while the additional sites can commence as early as feasible. Any acceleration of the proposed timeframe will benefit the community through better information on the water quality of beaches highly utilised by the public.

| Action Q Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations) | | | | | |
|--|---|-------------|---------------------|--|---|
| Detailed Plan | Defined tasks | Lead Agency | Supporting Agencies | Cost estimate | Funding options |
| | <p>Q.1: Expand the current Illawarra Ocean beaches Beachwatch program to other areas of high primary contact within coastal waters. Subject to confirmation following a review of the updated Water Quality Objectives primary recreation locations, the expanded program in the Kiama LGA would cover the following sites:</p> <ul style="list-style-type: none"> • Minnamurra entrance boat ramp (new site) • Boyds/Jones Beach (existing site) • Bombo Beach (existing site) • Surf Beach (existing site) • Kendalls Beach (new site) • Easts Beach (new site) • Werri (Gerringong) Beach (existing site) • Crooked River entrance (new site) • Seven Mile Beach (existing site) <p>New sites are to be monitored by Council, with samples analysed by Sydney Water under the existing Beachwatch program protocols.</p> <p>Where monitoring shows unusual results, or results that exceed Sydney Water operational licence conditions (covering both wet and dry weather scenarios), undertake further analysis where the origin/source is unknown, to discern wastewater from other environmental contamination sources.</p> | Council | Sydney Water | <p>Adopt \$8,000 / yr for each site to be covered by Council (including existing sites). Costs therefore are \$40,000/yr.</p> <p>Existing Sydney Water monitoring sites, as well as MST costs, to be covered under Sydney Water's operational budget</p> | <ul style="list-style-type: none"> • Kiama Municipal Council • Coastal and Estuary Grants Program • Environment Protection Authority • Sydney Water |
| | <p>Q.2: Where deemed inadequate, increase maintenance of stormwater quality improvement devices. Review existing</p> | Council | DCCEEW-BCSG | For budgeting purposes | <ul style="list-style-type: none"> • Kiama Municipal Council |

| | | | | | |
|---|--|---------------------|---|--|---|
| <p>Action Q</p> | <p>Expand Beachwatch water quality monitoring program, and continue to reduce pollutants discharged to the coast through stormwater outlets, ocean outfalls and high flow sewerage overflows (e.g. at pumping stations)</p> | | | | |
| | <p>stormwater management practices, including cleaning and maintenance regimes. Where considered beneficial, increase the frequency for cleaning and maintenance of gross pollutant traps, and modify other management practices to reduce pollutant loads reaching coastal waters.</p> | | <p>assume an additional \$25,000/yr is required for improved stormwater maintenance</p> | <ul style="list-style-type: none"> • Environment Protection Authority • Environmental Trust Grants | |
| | <p>Q.3: Sydney Water to provide periodic updates to the Coastal Management Program Operational Working Group on proposed sewer network improvements. Proposed sewer improvements within the Kiama Local Government Area (LGA) should further reduce pollutant loads discharged to the ocean and natural environment, accommodate future infrastructure demands, and meet community and stakeholder expectations</p> | <p>Sydney Water</p> | <p>Council</p> | <p>Staff time</p> | <p>Sydney Water and Council budgets</p> |
| <p>Success indicators</p> | <ul style="list-style-type: none"> • Expanded Beachwatch program within the Kiama LGA • Increased maintenance frequency of stormwater improvement devices, leading to higher total pollutant removal from these devices | | | | |
| <p>Integrated or concurrent Actions</p> | <ul style="list-style-type: none"> • N. Gather information from the public to better understand community needs that place pressure on public coastal land, facilities, services and the natural environment as part of other community engagement activities | | | | |



Legend

- Existing Beachwatch Monitoring Sites
- Proposed Future Beachwatch Monitoring Sites
- Major Stormwater Outlets

| | | | |
|--|----------|--------------------------------|--------------------------|
| <p>Title: Beachwatch program and major stormwater outlets along the Kiama coastline</p> <p><small>BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small></p> | <p>N</p> | <p>Drawing: Q-1</p> | <p>Rev: A</p> |
| | | | |
| <p>Filepath: I:\N21130.i.ajs_Kiama\QGIS\Stage_3_Strategies\N21130_017_Beachwatch program and major stormwater.gqz</p> | | | |

Annex C: Detailed Risk Assessment from Stage 2 CMP

Erosion Risks to Assets along the Kiama Coastline, 2020 to 2120

| Erosion Risk Register | | | Level of Risk | | | |
|-----------------------|--------------------------------|--|---------------|--------|---------|---------|
| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
| Minnamurra | Council Managed Crown Land | Minnamurra Beach and Dunes (including beach accessways) (Council managed Crown lands) | Medium | Medium | High | High |
| Jones | Council Land | Jones Beach and Beach Reserve (including beach accessways, picnic facilities) (Council owned and managed) | Medium | Medium | High | High |
| Jones | Biodiversity Asset | Shrubland/Heathland (LEP 2011), within beach reserve | N/A | N/A | N/A | High |
| Jones | Council Stormwater Asset | Pit/Outlet onto Beach (erosion = only 2 at S end, inundation is all 3 pits, plus pipes) | N/A | N/A | N/A | Medium |
| Bombo | Council Managed Crown Land | Bombo Beach and Dunes, Black Beach (Council managed crown lands, Crown Land) | High | High | Extreme | Extreme |
| Bombo | Heritage, Council Managed Land | Northern end of beach within the Quarry Heritage LEP 2011 listing | High | High | High | High |
| Bombo | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (50% to 1%) | N/A | High | High | High |
| Bombo | Transport NSW | South Coast Rail Line (Zone SP2) (note, inundation impacts are very minor in area) | N/A | N/A | N/A | High |
| Bombo | Transport NSW | Bombo Train Station (Heritage LEP 2011) and platform (Zone SP2) | N/A | N/A | N/A | High |
| Bombo | Transport NSW | Train Station Carpark (at edge of A1 Princes Highway) (Zone SP2) | N/A | N/A | N/A | High |
| Bombo | Sydney Water | Sewer main and pump station (south of train station, north of Spring Creek) | N/A | N/A | N/A | High |
| Bombo | Sydney Water | Water pipe/main (south of train station, north of Spring Creek) | N/A | N/A | N/A | High |
| Bombo | Sydney Water | Sewer main, maintenance hole (Spring Creek mouth/Black Beach) | N/A | High | High | High |
| Surf | Council Managed Crown Land | Surf Beach | High | High | High | Extreme |
| Surf | Council or Crown Asset | Low brick wall along beach (not structural). | N/A | N/A | Low | Medium |
| Surf | Council Managed Crown Land | Kiama SLSC building (Zone RE1) | N/A | Medium | Medium | High |
| Surf | Council Stormwater Asset | Stormwater Pits and Pipes (north and south ends of beach) | N/A | N/A | Low | Medium |
| Surf | Council or Crown Asset | Concrete lined creek/stormwater outlet | N/A | N/A | N/A | Medium |
| Surf | Private Asset | Saint Peter and Paul Catholic Church and Primary School Lands (eastern end of grounds inc some Norfolk Pines, no buildings in erosion zone) (Heritage LEP 2011, Zone R3, private owner?) | N/A | N/A | N/A | High |
| Surf | Council Managed Crown Land | Coronation Park (Zone RE1) | N/A | N/A | N/A | Medium |
| Surf | Council Managed Crown Land | Surf Beach Holiday Park (northern most cabin - Council asset) | N/A | N/A | N/A | High |
| Surf | Council Asset | Carpark southern end (partly on Crown Land managed by Council) | N/A | N/A | N/A | Low |
| Surf | Council Asset | Walkway and reserve, southern end (partly on Crown Land managed by Council) | Low | Low | Low | Low |
| Surf | Sydney Water | Sewer main and other assets (pump station) along entire length of back of beach/promenade | N/A | N/A | High | Extreme |
| Kendalls | Council Land, Crown Land | Kendalls Beach (Zone RE1) (including beach access, and any buried structures) | Medium | High | High | High |
| Kendalls | Sydney Water | Sewer main (along back of beach, northern end only). | N/A | N/A | N/A | High |
| Easts | Private Asset | Easts Beach Holiday Park: Beach front cabins | N/A | N/A | N/A | High |
| Easts | Council Managed Crown Land | Easts Beach (Zone RE1), including seawall under beach. Ownership of seawall unknown | High | High | Extreme | Extreme |
| Easts | Sydney Water | Sewer main (along back of northern end of beach / behind seawall, condition of seawall unknown) | N/A | N/A | High | Extreme |
| Werri | Council Land, Crown Land | Werri Beach and Dunes (noting berm to waterline is Crown Land, & area opposite Werri Beach HP) (Zone RE1) | High | High | High | High |
| Werri | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (Northern end 10% to 1% erosion, southern end 50% to 1% erosion) | N/A | N/A | Medium | High |
| Werri | Council Stormwater Assets | Pits (at south end only) - stormwater | Low | Low | Medium | Medium |
| Werri | Council Asset | Walkway/Cycleway (south of Moore St to southern end of beach) | N/A | N/A | N/A | Low |
| Werri | Council Asset | Werri Beach Progress Hall (opp Sandy Wha Road) | N/A | N/A | N/A | Medium |
| Werri | Council Asset | Carparks (from south of Park Lane, down to SLSC and Pacific Ave carparks) | Low | Medium | Medium | Medium |
| Werri | Council Road | Pacific Ave (from S of Werri Beach HP) | High | High | Extreme | Extreme |
| Werri | Private Asset | Gerringong Bowling & Recreation Club - Carpark only (Zone RE1) | N/A | N/A | N/A | Medium |
| Werri | Council Building | Gerringong SLSC Building | N/A | N/A | N/A | Medium |
| Walkers | Council Land, Crown Land | Walkers Beach (Zone E2) | N/A | Medium | Medium | High |
| Walkers | Private Asset | Gerringong Golf Course (very minor extents at eastern end) (Zone E3) | N/A | N/A | N/A | Low |
| Seven Mile | Council Stormwater Asset | Pits along Crooked River entrance (east of bridge). Only stormwater pipe & pit to boat ramp off Burke Pde at risk from erosion | N/A | N/A | N/A | Medium |
| Seven Mile | Crown Land | Seven Mile Beach and dunes | N/A | High | High | High |
| Seven Mile | Council / MIDO Asset | Boat ramp off Burke Pde | N/A | N/A | N/A | Medium |
| Seven Mile | Council Land | Reserve at 52-54 Burke Pde (only small area subject to erosion) | N/A | N/A | N/A | Low |
| Seven Mile | Private Asset | 2 Residences on Burke Pde | N/A | High | High | Extreme |
| Seven Mile | Council Road | Access Road to Boat Ramp | N/A | N/A | N/A | Medium |
| Seven Mile | Biodiversity | Natural Grassland (LEP Biodiversity) | N/A | N/A | N/A | High |
| Seven Mile | Biodiversity | Shrubland / Heathland (LEP Biodiversity) | N/A | N/A | High | High |
| Seven Mile | Biodiversity | Eucalypt Forest (LEP Biodiversity) | N/A | N/A | N/A | High |

Coastal Inundation Risks to Assets along the Kiama Coastline, 2020 to 2120

| Beach | Asset Type / Owner / Manager | Asset | Level of Risk | | | |
|--------------------------|--|---|---------------|---------|---------|---------|
| | | | 2020 | 2040 | 2070 | 2120 |
| Minnamurra | Council Asset | Boat Ramp (river mouth south) | Medium | Medium | High | High |
| Minnamurra | Council Land | Council owned reserve land (zoned RE1) | High | High | High | High |
| Minnamurra | Council Asset | Access Road and Carpark (zoned RE1) | N/A | N/A | N/A | Medium |
| Jones | Council Land | Jones Beach and Beach Reserve (including beach accessways, picnic facilities) (Council owned and managed) | Medium | Medium | High | High |
| Jones | Biodiversity Asset | Shrubland/Heathland (LEP 2011), within beach reserve | Medium | Medium | High | High |
| Jones | Council Stormwater Asset | Pit/Outlet onto Beach (erosion = only 2 at S end, inundation is all 3 pits, plus pipes) | Medium | Medium | Medium | Medium |
| Jones | Council Building | Kiama Downs SLSC building and Amenities Block (95%) | N/A | N/A | N/A | High |
| Jones | Council Road | North Kiama Drive | N/A | N/A | N/A | High |
| Jones | Council Road | Merindah Avenue | N/A | N/A | N/A | Medium |
| Jones | Council Asset | Carpark and courts behind SLSC, southern Carpark and picnic area (50%) (zoned RE1) | N/A | N/A | N/A | Medium |
| Jones | Private Asset | 4 - 6 properties on N Kiama Drive | N/A | N/A | N/A | High |
| Jones | Sydney Water | Sewer pipe (land pump station) | N/A | N/A | N/A | High |
| Bombo | Council Managed Crown Land | Bombo Beach and Dunes (Council managed crown lands, Crown Land) | Medium | Medium | High | Extreme |
| Bombo | Heritage, Council Managed Land | Northern end of beach within the Quarry Heritage LEP 2011 listing | High | High | High | High |
| Bombo | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (50% to 1%) | Medium | Medium | High | High |
| Bombo | Transport NSW | South Coast Rail Line (Zone SP2) (note, inundation impacts are very minor in area) | High | High | High | High |
| Bombo | Transport NSW | South Coast Rail Bridge/Culvert over Spring Creek (Zone SP2) | Extreme | Extreme | Extreme | Extreme |
| Bombo | Council Asset | Access Road and Carpark (zoned SP2) to northern end of beach | N/A | N/A | Medium | Medium |
| Bombo | Council Asset | Stormwater Pit and pipe (at northern creek on beach) | High | High | High | High |
| Bombo | Council Asset | Stormwater Pit into Spring Creek | High | High | High | High |
| Bombo | Council Asset | Council reserve on Hothersal St (next to carpark, and Spring Creek) (Zone RE1) | Medium | Medium | Medium | Medium |
| Bombo | Private Asset / Council | Bombo Beach reserve adjacent to Black Beach / Spring Creek (Zone RE1, possibly in private ownership) | Medium | Medium | Medium | Medium |
| Bombo | Sydney Water | Sewer main, maintenance hole (Spring Creek mouth/Black Beach) | Extreme | Extreme | Extreme | Extreme |
| Bombo | Sydney Water | Water pipe/main (south of train station, north of Spring Creek) | N/A | N/A | Medium | High |
| Surf | Council Managed Crown Land | Surf Beach | High | High | Extreme | Extreme |
| Surf | Council / Crown Asset | Along beach, low brick wall (not structural). | Medium | Medium | Medium | Medium |
| Surf | Council Managed Crown Land | Kiama SLSC building (Zone RE1) | High | High | High | High |
| Surf | Council Stormwater Asset | Stormwater Pits and Pipes (north and south ends of beach) | Medium | Medium | Medium | Medium |
| Surf | Council / Crown Asset | Concrete lined creek/stormwater outlet | Medium | Medium | Medium | Medium |
| Surf | Private Asset | Saint Peter and Paul Catholic Church and Primary School Lands (eastern end of grounds inc some Norfolk Pines, no buildings in erosion zone) (Heritage LEP 2011, Zone R3, private owner?) | High | High | High | High |
| Surf | Council Managed Crown Land | Coronation Park (Zone RE1) | High | High | High | High |
| Surf | Council Asset | Carpark southern end (partly on Crown Land managed by Council). | Medium | Medium | Medium | Medium |
| Surf | Council Asset | Walkway and reserve, southern end (partly on Crown Land managed by Council) | Medium | Medium | Medium | Medium |
| Surf | Council Road | Barney Street | Medium | Medium | Medium | Medium |
| Surf | Private Asset | 4 - 6 Residences on Barney St (Zone R3) | N/A | N/A | N/A | High |
| Surf | Sydney Water | Sewer main (inc. pump station) and other assets along entire length of back of beach/promenade | Extreme | Extreme | Extreme | Extreme |
| Kendalls | Council Land, Crown Land | Kendalls Beach (Zone RE1) including seawall (and access) | High | High | Extreme | Extreme |
| Kendalls | Council Asset | Kendalls on the Beach Holiday Park (includes cabins, access roads etc) | High | High | Extreme | Extreme |
| Kendalls | Council Stormwater Asset | Stormwater Pipes to small beach creek | Medium | Medium | Medium | Medium |
| Kendalls | Sydney Water | Sewer main (along back of beach, northern end only). | Medium | Medium | Medium | Medium |
| Kiama Boat Harbour | <i>Various (see individual assets below)</i> | Kiama Harbour as a whole (<i>ie, considering harbour as a whole, integrated asset, not just its individual parts</i>) | High | High | Extreme | Extreme |
| Kiama Boat Harbour | Crown Lands | Harbour Breakwaters / Robertson Basin (Heritage LEP 2011) (Zone IN4) | High | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Lighthouse/Blowhole access roads | N/A | Medium | Medium | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Helipad | Medium | Medium | High | High |
| Kiama Boat Harbour | Transport NSW | South coast train line/ railway bridge (note, bridge only partially impacted) | N/A | N/A | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Ocean Pools (north and south, both Heritage LEP 2011) | Medium | Medium | Medium | Medium |
| Kiama Boat Harbour | Crown Lands / Private lease of building | Fish and Chips/Restaurant (part of Robertson Basin Heritage listing) (Zone IN4) | High | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Kiama boat ramp | High | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council | Black Beach, and Black Beach Reserve | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Council | Storm Bay Reserve | N/A | N/A | Medium | Medium |
| Kiama Boat Harbour | Council Road | Shealhaven Street | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Council Road | Blowhole Point Access Roads | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Council Road | Terralong Street (Manning St corner) | N/A | N/A | High | Extreme |
| Kiama Boat Harbour | Private Asset | Belle Vue Holiday Accommodation (Zone B2), Kiama Harbourside Apartments, Yves | Medium | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Scout Hall | High | High | High | High |
| Kiama Boat Harbour | Council Stormwater Asset | Stormwater pits and pipes (numerous) | High | High | High | High |
| Kiama Boat Harbour | Sydney Water | Sewer pipe (section at back of Black Beach Reserve) | Extreme | Extreme | Extreme | Extreme |
| Kiama Boat Harbour | Sydney Water | Sewer Main (section along northern edge of harbour/promenade) | Extreme | Extreme | Extreme | Extreme |
| Kiama Boat Harbour | Sydney Water | Sewer pipe (section at Terralong/Manning St corner) | N/A | N/A | High | Extreme |
| Kiama Boat Harbour | Sydney Water | Water pipe (section at Terralong/Manning St corner) | N/A | N/A | Medium | High |
| Kiama Boat Harbour | Sydney Water | Water pipe (and sewer?) (section along Blowhole Point Road) | N/A | N/A | N/A | High |
| Kiama Boat Harbour | Crown Lands / Boat owners association Leasehold (managed by Transport NSW) | Storm Bay | Medium | Medium | Medium | Medium |
| Kiama Boat Harbour | Crown Lands / Boat owners association Leasehold (managed by Transport NSW) | Boat moorings | Medium | Medium | Medium | Medium |
| Kiama Boat Harbour | Crown Lands / Boat owners association Leasehold (managed by Transport NSW) | Slipway SE corner Robertsons Basin | Medium | Medium | Medium | Medium |
| Kiama Boat Harbour | Crown Lands | Fishermans Shed (N of slipway), Heritage listed | High | High | High | High |
| Kiama Boat Harbour | Council Road | Carpark associated with Basin | High | High | High | High |
| Kiama Boat Harbour | Crown Lands with private leaseholder | Fishermans market | High | High | High | High |
| Kiama Boat Harbour | Crown Lands with private leaseholder | Game fishing club weighing station (gantry) | Medium | Medium | Medium | Medium |
| Easts | Private Asset | East's Beach Holiday Park (beach front cabins, campsites, recreational facilities, access roads, onsite stormwater, and Munna Munna Gai) (Zone E3), and 1 lot (north of this) separately privately owned. | Extreme | Extreme | Extreme | Extreme |
| Easts | Council Managed Crown Land | East's Beach (Zone RE1), including seawall under beach. Ownership of seawall unknown. | High | High | Extreme | Extreme |
| Easts | Sydney Water | Sewer main and pump station (along back of beach, northern end only). Behind "seawall" (unsure of its condition). | Extreme | Extreme | Extreme | Extreme |
| Easts | Sydney Water | Water main (centre) servicing HP | High | High | High | High |
| Werri | Council Land, Crown Land | Werri Beach and Dunes (noting berm to waterline is Crown Land, plus area opp Werri Beach HP) (Zone RE1) | High | High | Extreme | Extreme |
| Werri | Biodiversity | Shrubland/Heathland (LEP 2011) at back of dunes (Northern end 10% to 1% erosion, southern end 50% to 1% erosion) | High | High | Extreme | Extreme |
| Werri | Council Stormwater Assets | Stormwater Pits (at south end only) | Medium | Medium | Medium | Medium |
| Werri | Council Asset | Carparks (from south of Park Lane, down to SLSC and Pacific Ave - esp. lower beachside carpark) | Medium | Medium | Medium | Medium |
| Werri | Council Road | Pacific Ave (from S of Werri Beach HP) | Extreme | Extreme | Extreme | Extreme |
| Werri | Private Asset | Gerringsong Bowling & Recreation Club - Carpark only (Zone RE1) | N/A | N/A | N/A | Medium |
| Werri | Council Building | Gerringsong SLSC Building | N/A | N/A | N/A | Medium |
| Werri | Council Managed Crown Land | Werri Beach Holiday Park (Council cabins etc) | N/A | N/A | N/A | High |
| Walkers | Council Land, Crown Land | Walkers Beach (Zone E2) | Medium | Medium | Medium | High |
| Walkers | Private Asset | Gerringsong Golf Course (very minor extents at eastern end) (Zone E3) | N/A | N/A | N/A | Low |
| Gerringsong Boat Harbour | Council Managed Crown Land | Boat Harbour and Rock Pool (Heritage LEP 2011) | Medium | Medium | Medium | Medium |
| Gerringsong Boat Harbour | Council / MIDO | Gerringsong Boat ramp | Medium | Medium | Medium | Medium |
| Gerringsong Boat Harbour | Council Stormwater Asset | Stormwater Pits (2) and pipes (2) | Medium | Medium | Medium | Medium |
| Gerringsong Boat Harbour | Council Managed Crown Land | Cooke Park (including walkway and "seawall") | Medium | Medium | Medium | Medium |
| Gerringsong Boat Harbour | Council Asset | Amenities building (in Cooke Park) | N/A | N/A | Medium | Medium |
| Gerringsong Boat Harbour | Council Asset | Car Park (next to Boat ramp / Park) | Medium | Medium | Medium | Medium |
| Seven Mile | Council Stormwater Asset | Pits along Crooked River entrance (east of bridge). Only stormwater pipe & pit to boat ramp off Burke Pde at risk from erosion. | Medium | Medium | Medium | Medium |
| Seven Mile | Council Asset | Walkway bridge over creek | High | High | High | High |
| Seven Mile | Crown Land | Seven Mile Beach and dunes | High | High | High | High |
| Seven Mile | Council / MIDO Asset | Boat ramp off Burke Pde | Medium | Medium | Medium | Medium |
| Seven Mile | Council Land | Reserve at 52-45 Burke Pde (only small area subject to inundation) | Medium | Medium | Medium | Medium |
| Seven Mile | Council Road | Park Rd (and Properties 2 -11 in 2120) | N/A | N/A | Medium | High |
| Seven Mile | Council Road | Burke Pde | N/A | N/A | N/A | Medium |
| Seven Mile | Private Asset | 2 Residences on Burke Pde | N/A | N/A | High | Extreme |
| Seven Mile | Council Road | Access Road to Boat Ramp | N/A | N/A | N/A | Medium |
| Seven Mile | Biodiversity | Natural Grassland (LEP Biodiversity) | High | High | High | High |
| Seven Mile | Biodiversity | Shrubland / Heathland (LEP Biodiversity) | High | High | High | High |
| Seven Mile | Biodiversity | Eucalypt Forest (LEP Biodiversity) | N/A | High | High | High |
| Seven Mile | Biodiversity | Floodplain Forest (LEP Biodiversity) | High | High | High | High |

Tidal Inundation Risks to Assets along the Kiama Coastline, 2020 to 2120

| Tidal Inundation Risk Register | | | Level of Risk | | | |
|--------------------------------|---|---|---------------|--------|--------|---------|
| Beach | Asset Type / Owner / Manager | Asset | 2020 | 2040 | 2070 | 2120 |
| Minnamurra | Council Asset | Boat Ramp (river mouth south) | Medium | Medium | Medium | Medium |
| Minnamurra | Council Land | Council owned reserve land (zoned RE1) | High | High | High | High |
| Minnamurra | Council Asset | Access Road and Carpark (zoned RE1) | N/A | N/A | N/A | Medium |
| Jones | Council Asset | Jones Beach accessways (x 3) | N/A | N/A | N/A | Medium |
| Bombo | Council Asset | Council reserve on Hothersal St (next to carpark, and Spring Creek) (Zone RE1) | N/A | N/A | N/A | Medium |
| Bombo | Sydney Water | Sewer main, maintenance hole (Spring Creek mouth/Black Beach) | N/A | N/A | N/A | High |
| Bombo | Sydney Water | Water pipe/main (south of train station, north of Spring Creek) | N/A | N/A | N/A | Medium |
| Surf | Council / Crown Asset | Concrete lined creek/stormwater outlet | N/A | N/A | N/A | Medium |
| Surf | Sydney Water | Sewer main, and other assets (pump station?) along entire length of back of beach/promenade | N/A | N/A | N/A | High |
| Kendalls | Council Stormwater Asset | Pipes to small beach creek | N/A | N/A | N/A | Medium |
| Kendalls | Sydney Water | Sewer main (along back of beach, northern end only). | N/A | N/A | N/A | High |
| Kiama Boat Harbour | Various (see individual assets below) | Kiama Harbour as a whole (ie, considering harbour as a whole, integrated asset, not just its individual parts) | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands | Harbour Breakwaters / Robertson Basin (Heritage LEP 2011) (Zone IN4) | High | High | High | High |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Lighthouse/Blowhole access roads | Medium | Medium | Medium | Medium |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Ocean Pools (north and south, both Heritage LEP 2011) | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Private lease of building | Fish and Chips/Restaurant (part of Robertson Basin Heritage listing) (Zone IN4) | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Council (manages) | Kiama boat ramp | Medium | Medium | High | High |
| Kiama Boat Harbour | Crown Lands / Council | Black Beach, and Black Beach Reserve | Medium | Medium | High | High |
| Kiama Boat Harbour | Crown Lands / Council | Storm Bay Reserve | Medium | Medium | High | High |
| Kiama Boat Harbour | Council Road | Robertson Basin access road (inc. carpark) | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Council Stormwater Asset | Stormwater pits and pipes (numerous) | High | High | High | High |
| Kiama Boat Harbour | Sydney Water | Sewer Main (section along northern edge of harbour/promenade) | N/A | N/A | High | High |
| Kiama Boat Harbour | | Storm Bay | Medium | Medium | Medium | Medium |
| Kiama Boat Harbour | Crown Lands / Leased | Boat moorings | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands / Leased | Slipway SE corner Robertsons Basin | Medium | Medium | High | Extreme |
| Kiama Boat Harbour | Crown Lands | Fishermans Shed (N of slipway), Heritage listed | N/A | N/A | N/A | High |
| Kiama Boat Harbour | Crown Lands with private leaseholder | Fishermans market | N/A | N/A | N/A | High |
| Easts | Private Asset | Easts Beach Holiday Park (beach front cabins, campsites, recreational facilities, access roads, onsite stormwater, and Munna Munnora Ck) (Zone E3), and 1 lot (north of this) separately privately owned. | Medium | Medium | High | Extreme |
| Easts | Sydney Water | Sewer main and pump station (along back of beach, northern end only). Behind "seawall" (unsure of its condition). | N/A | N/A | N/A | High |
| Easts | Sydney Water | Water main (centre) servicing CP | N/A | N/A | N/A | High |
| Werri | Council Stormwater Assets | Pits (at south end only) | N/A | N/A | N/A | Medium |
| Gerrongong Boat Harbour | Council Managed Crown Land | Boat Harbour and Rock Pool (Heritage LEP 2011) | Medium | Medium | Medium | Medium |
| Gerrongong Boat Harbour | Council / MIDO | Gerrongong Boat ramp | Medium | Medium | Medium | Medium |
| Gerrongong Boat Harbour | Council Stormwater Asset | Pits (2) | N/A | Medium | Medium | Medium |
| Gerrongong Boat Harbour | Council Managed Crown Land | Cooke Park (including walkway and "seawall") | N/A | N/A | Medium | Medium |
| Seven Mile | Council Stormwater Asset | Pits along Crooked River entrance (east of bridge). Only stormwater pipe & pit to boat ramp off Burke Pde at risk from erosion | Medium | Medium | Medium | Medium |
| Seven Mile | ? Council / MIDO Asset | Boat ramp off Burke Pde | N/A | Medium | Medium | Medium |
| Seven Mile | Council Land | Reserve at 52-45 Burke Pde (only small area subject to inundation) | N/A | N/A | N/A | High |
| Seven Mile | Council Road | Park Rd (Properties 2 -11) | N/A | N/A | High | Extreme |
| Seven Mile | Council Road | Bourke Pde | N/A | N/A | N/A | High |
| Seven Mile | Biodiversity | Eucalypt Forest (LEP Biodiversity) | Medium | Medium | High | High |
| Seven Mile | Biodiversity | Floodplain Forest (LEP Biodiversity) | Medium | Medium | High | High |

Annex D: Werri Lagoon Drainage Infrastructure

Werri Lagoon Entrance



-34.728S
150.8389W

| | |
|---|--|
| Responsible authority: Kiama Council Built: 1930s invert 0.8 m AHD Modified: 1975 concrete race 0.9 m AHD Primary purpose when first built: Drainage and flood mitigation Current uses: – The structure has not been used for drainage of the Lagoon since 2000. | Multi-use features: Nil Eco-features: Nil Werri Lagoon estuary is partially trained with a disused, deteriorating and often buried concrete race and pipeline structure on the northern side of the entrance. The estuary entrance is now managed in accordance with the Werri Lagoon Interim Entrance Management Policy. This involves occasionally using an excavator to create a breakout channel when water in the Lagoon has reached a trigger height of 1.65 m AHD (Kiama Council 2005). |
| Recommendations: make the area safer by removing hazardous components (protruding metal pieces) | |
| Future multi-use features Nil | Future eco-features Nil |



Entrance of Werri Lagoon, Gerringong with the concrete training pipe on the northern bank Credit: Google Earth



Part of the deteriorated and buried concrete race and pipeline at the entrance to Werri Lagoon in 1970s (LHS) and today. Credit: Kiama Council and Byron Robinson



Lagoon inlet showing part of the deteriorated and buried concrete race and pipeline at the entrance to Werri Lagoon.

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Extract from: *Audit of trained river entrances, armoured harbours and groynes and the multi-use and eco-features in NSW: Shellharbour to the Victorian border (illustrated volume III) (MEMA, 2021)*

Annex E: Indicative Details of Interim Coastal Protection Works

E.1 Interim CPW Triggers and Thresholds

- **Pacific Avenue, Werri Beach:** active erosion scarp (more than 0.8m high) within 5 metres of the footpath edge adjacent to Pacific Avenue, including footpath in front of perpendicular parking bays.
- **North Bombo Beach carpark access road:** active erosion scarp (more than 0.8m high) within 5 metres of the roadway edge
- **Storm Bay northern foreshore:** active erosion scarp (more than 0.8m high) within 5 metres of the footpath edge behind the northern foreshore



Figure E.1 Approximate locations of erosion scarp to reach trigger and threshold (to be confirmed through REF and approvals process) (Source: Google)

E.2 Interim CPW Design

These works involve filling large bags (0.75m^3) made from a geotextile fabric with sand and placing these bags at the toe (or bottom) of the erosion escarpment. These bags weigh around 1,200 kg when filled with dry sand and are usually placed using machinery.

To undertake this option, the following resources will normally be required:

- 0.75 m^3 geotextile containers (approx.. 25 per 10m of protection works)
- sand to fill geotextile containers (medium grained sand, 0.25 to 0.5mm diam.)
- filling frame
- hand held sewing machine

- excavator (25–30 tonne) to fill and place (with modified rock grab) filled geotextile containers.

Filling of geotextile containers should be done using a filling frame and excavator. Empty geotextile containers are typically purchased as an open 'pillow' which is sealed shut on three of its four sides. The container is placed in a filling frame and filled with sand using an excavator. Once filled, the container is sewn closed using a hand held sewing machine.

Geotextile container suppliers can supply filling frames and site sewing machines and provide advice on their use. Geotextile containers should be filled as close as possible to 100% full for maximum hydraulic stability. The containers are to be placed (where practical) in a single layer stretcher bond pattern, with the long axis of the container placed against the escarpment and perpendicular to the direction of wave action. If possible, a double-layer of geotextile containers should be placed seaward of the bottom course of the revetment.

Prior to placing containers, the erosion scarp should be profiled so that it has a consistent batter of approximately 1(v):1.5(h). A flat (horizontal) foundation should be established at the toe of the batter for placement of the first course of sand containers (see figure below).

Filled containers are to be placed by using a modified rock grab on the excavator. The rock grab is modified in such a way as to limit the stress on the geotextile containers during the lifting operation. Minimal excavation of the beach is acceptable to ensure the geotextile containers can be placed horizontally. It is not necessary to have a geotextile underlayer between the containers and the backing slope for these short-term emergency works, or for the geotextile fabric to be vandal resistant, as the works are only temporary.

Note that geotextile containers may not be appropriate at Storm Bay, which is exposed to large and turbulent wave action, and has an existing rocky foreshore and rock wall (although not a contemporary engineered structure). Interim CPWs for Storm Bay may alternatively utilise rock-filled bags / cages, e.g. gabions.

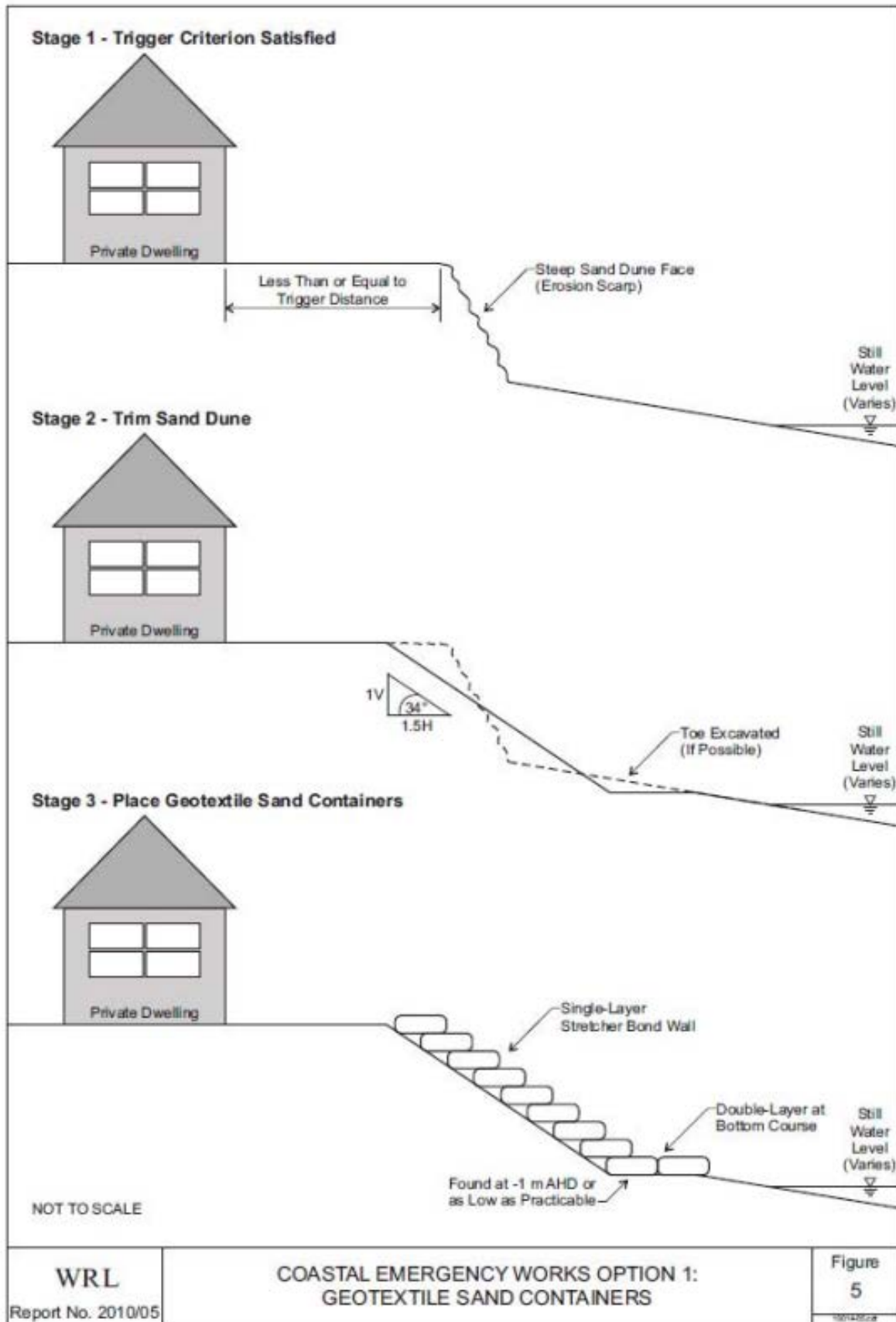


Figure E.2 Indicative interim CPW design (Source: DECCW, 2010)

