

CENTRAL COAST COUNCIL

Central Coast Open Coast

Coastal Management Program - DRAFT

Document no. Rev D: CS-REP-005



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Synopsis

This report provides a draft Coastal Management Program for the Central Coast Open Coast. It has been prepared on behalf of Central Coast Council.

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PROJECT 311015-00572 - CS-REP-005: Central Coast Open Coast - Coastal Management Program - DRAFT

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Acknowledgement of Country

"We acknowledge the Traditional Custodians of the land on which we live, work and play. We pay our respects to Darkinjung country, and Elders past and present. We recognise the continued connection to these lands and waterways and extend this acknowledgement to the homelands and stories of those who also call this place home. We recognise our future leaders and the shared responsibility to care for and protect our place and people."

Acronyms and abbreviations

Acronym/ abbreviation	Definition
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability, refers to the probability that a particular event will be exceeded in any given year.
AID	Action Implementation Database
ALRA	Aboriginal Land Rights Act 1983
ARI	Average Recurrence Interval, sometimes used in place of AEP. For example, a 100 year ARI storm event is equivalent to a storm event with an AEP of 1%, which has a 1% probability of being exceeded every year.
AS/NZS	Australian Standard/New Zealand Standard
CBA	Cost Benefit Analysis
CCC	Central Coast Council
CCDCP	Central Coast Development Control Plan 2022
CCLEP	Central Coast Local Environment Plan 2022
CEA	Coastal Environment Area
CLM Act	Crown Land Management Act
CM Act	NSW Coastal Management Act 2016
CM Manual	NSW Coastal Management Manual
CMA	Coastal Management Area
CMP	Coastal Management Program
COSS	Coastal Open Space System
CSP	Central Coast Community Strategic Plan
CUA	Coastal Use Area
CVA	Coastal Vulnerability Area
CWLRA	Coastal Wetland and Littoral Rainforest Area
CZEAS	Coastal Zone Emergency Action Subplan
CZMP	Coastal Zone Management Plan
DA	Development Application
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DCCEEW-CPHR	Conservation Programs, Heritage and Regulation Group of DCCEEW
DCP	Development Control Plan
DLALC	Darling Local Aboriginal Land Council
DP	Delivery Program
DP&E	Department of Planning & Environment, now DCCEEW
DPHI	NSW Department of Planning, Housing and Infrastructure (Crown Lands)
DPI	Department of Primary Industries, now DPIRD Fisheries
DPIRD Fisheries	NSW Department of Primary Industries and Regional Development, Fisheries
DRF	Disaster Ready Fund
EDR	Engineering Design Requirements
ENSO	ENSO is the term used to describe the oscillation between the El Niño phase and the La Niña, or opposite, phase. The phases of ENSO are tracked by a metric known as the Southern Oscillation Index (SOI), which measures the difference in surface air pressure between Tahiti and Darwin

Acronym/ abbreviation	Definition
EP&A Act	Environmental Planning & Assessment Act 1979
ESD	Ecologically Sustainable Development
FAQs	Frequently Asked Questions
FM Act	Fisheries Management Act 1994
GPT	Gross Pollutant Trap
IAS	Indigenous Advancement Strategy
ICOLL	Intermittently Closed or Open Lake or Lagoon
IFC	International Finance Corporation
IP&R	Integrated Planning and Reporting Framework
ISO	International Standards Organisation
LALC	Local Aboriginal Land Council
LEP	Central Coast Local Environment Plan 2022
LG Act	Local Government Act 1993
LGA	Local Government Area
LIDAR	Light Detection and Ranging, a remote sensing technology that uses laser light to measure distances and create detailed 3D representations of objects and environments
LLS	NSW Local Land Services
m	metres
MCA	Multi Criteria Analysis
MEMA	Marine Estate Management Authority
MEMS	NSW Marine Estate Management Strategy
MER	Monitoring, Evaluation and Reporting
MHL	Manly Hydraulics Laboratory
MIDO	Maritime Infrastructure Delivery Office, a division of Transport for NSW
MS	Microsoft
NIAA	National Indigenous Australians Agency
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NSW SES	New South Wales State Emergency Service
OEH	Office of Environment and Heritage, now DCCEEW
POM	Plan of Management
RH SEPP	State Environmental Planning Policy (Resilience and Hazards) 2021
SDMPs	State Disaster Mitigation Plans
SEPP	State Environmental Planning Policy
SOI	Southern Oscillation Index
SoS	Saving our Species program
St	Street
TfNSW	Transport for NSW
TSC Act	Threatened Species Conservation Act 1995
ZSA	Zone of Slope Adjustment

Executive Summary

Overview of the CMP

Central Coast Council (Council), with the assistance of the NSW Government, is preparing their Coastal Management Program (CMP) for the Open Coast. The future management of the Central Coast Open Coast is to be guided by a CMP as described under the NSW Coastal Management Framework and the *NSW Coastal Management Act 2016* (CM Act). The CMP aims to ensure the integrated and effective management of the coastal zone, considering environmental, social, and economic factors. Specifically, the CMP is a plan of management for Council, Public Authorities and land managers responsible for management of the coastal zone to:

- address coastal hazard risks;
- preserve cultural use and habitats;
- encourage sustainable development in the coastal zone (agricultural, economic and built);
- maintain and improve recreational amenity; and,
- adapt to emerging issues.

The study area for the CMP includes the Central Coast open coast areas as illustrated in Figure E-0-1. In particular, the Study Area includes those areas mapped as Coastal Wetlands/Coastal Wetland Proximity Areas, Littoral Rainforest/Littoral Rainforest Proximity Areas, Coastal Environment Areas and Coastal Use Areas under the *State Environmental Planning Policy (Resilience and Hazards) 2021* (the SEPP).

The CMP aims to ensure the integrated and effective management of the coastal zone, considering environmental, social, and economic factors. The CMP outlines specific actions over a 10-year management cycle and provides details on how the actions will be delivered, monitored, funded and evaluated.

As per the process described in the NSW Coastal Management Manual (NSW Office of Environment and Heritage, 2018), the CMP procedure is divided into five stages as illustrated in Figure E-0-2.

- Stage 1 (Royal Haskoning DHV, 2021) included a review of relevant background information, a first pass risk assessment, data gap analysis and proposed a forward program for the CMP.
- Stage 2 (Bluecoast Consulting Engineers, 2024-2025) included a Coastal Hazard Study, which investigated beach erosion/recession, cliff recession, coastal inundation and tidal inundation for immediate, 2040, 2050, 2070 and 2120 planning periods throughout the Central Coast LGA. The updated coastal hazard mapping (Bluecoast Consulting Engineers, 2024-2025) provides probabilistic coastal hazard extents for coastal erosion events up to the 100 year Average Recurrence Interval (ARI) (or 1% Annual

Exceedance Probability). The mapping indicates which areas are at risk from beach erosion/recession, cliff recession and coastal inundation over the various planning periods, to assist in defining which assets are subject to the highest level of risk, with these risks considered in defining coastal management options in Stage 3. Further, the Central Coast Recreational Use Study (Vision Environment, 2022) was undertaken as part of Stage 2, to identify the coastal recreational activities occurring in the area and determine the adequacy of public amenities and infrastructure to accommodate for those activities now and into the future.

- Stage 3 (Worley Consulting, 2024) involved the identification and evaluation of management actions based on the information gleaned in the previous two stages.

The CMP has been developed in accordance with the Mandatory Requirements set out in the CM Act and the NSW Coastal Management Manual (CM Manual, OEH 2018). The CMP has been developed on behalf of Central Coast Council, with part funding and support by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), and in consultation with state agencies and various other stakeholders.

Study Area

The study area for the CMP includes the open coast of the Central Coast LGA (between Killcare and Budgewoi Beach) and the land bounded by the Coastal Management Areas within the coastal zone as defined in the RH SEPP and the CM Act. The study area does not include the national parks and the coastline within Broken Bay (i.e. Umina Beach, Pearl Beach or Patonga Beach), these are included within the study area of the Hawkesbury Nepean CMP. It also does not include the estuaries of Tuggerah Lakes, Wamberal Lagoon, Terrigal Lagoon, Avoca Lagoon or Cockrone Lagoon – these have been included in separate CMPs.

The study area covering the CMP for the Central Coast Open Coast is shown below.

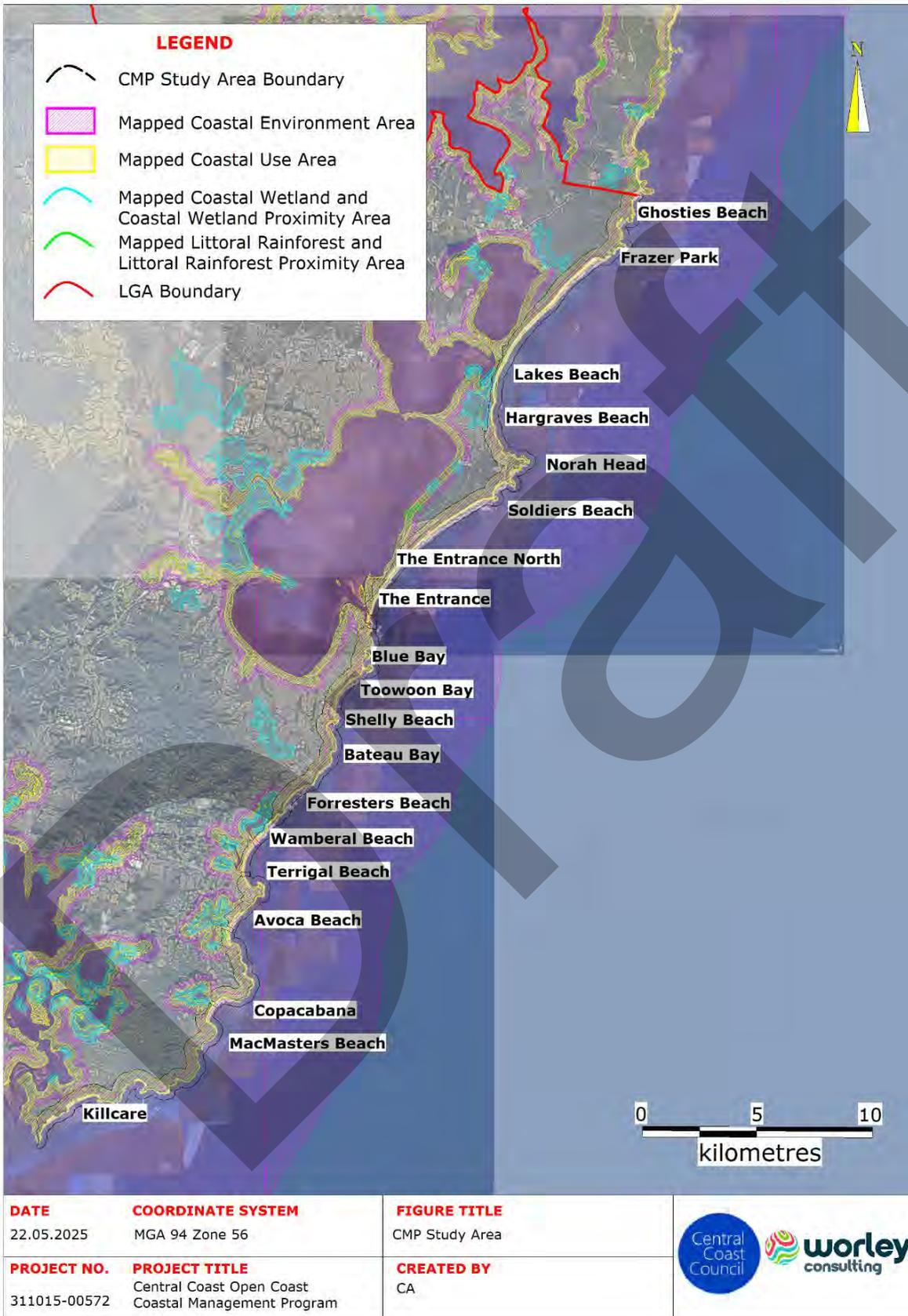


Figure E-0-1: Study Area for the Central Coast Open Coast CMP

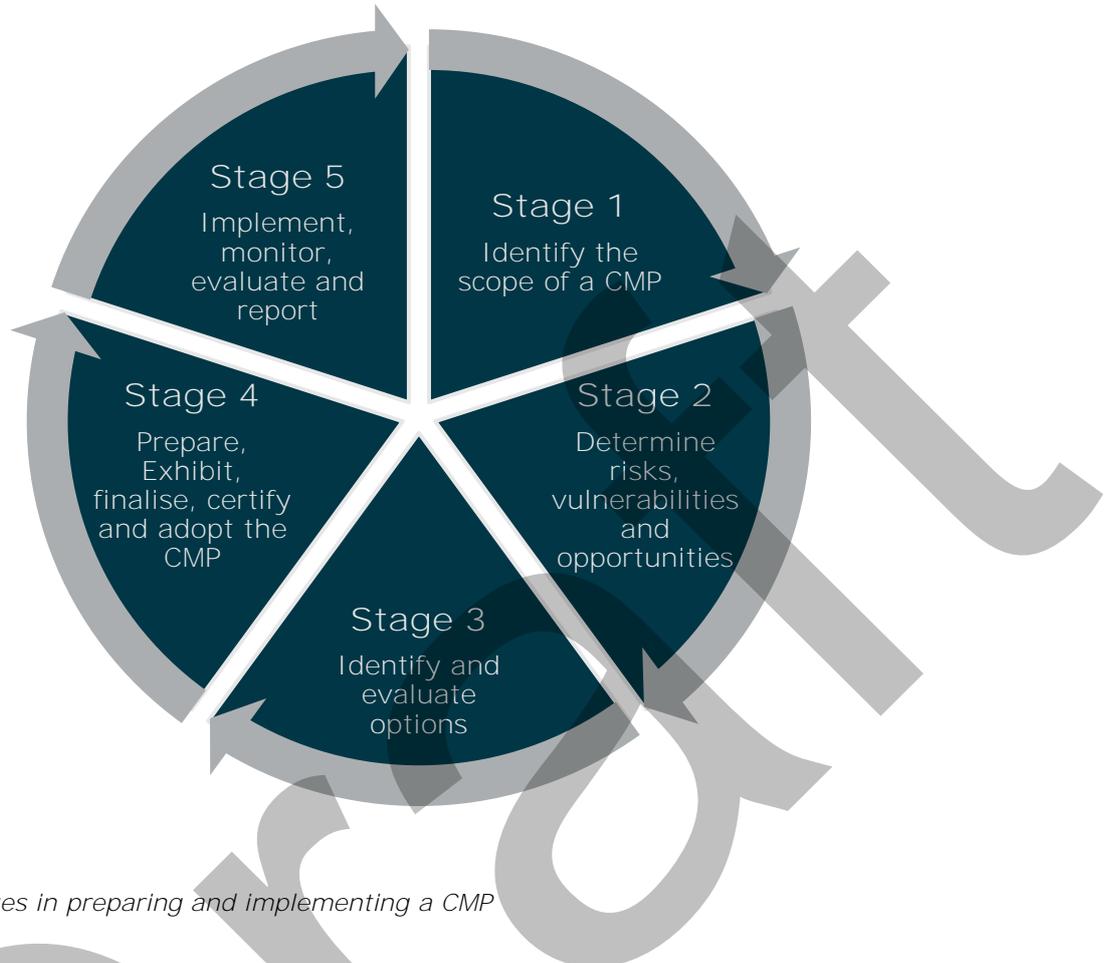


Figure E-0-2: Stages in preparing and implementing a CMP

Vision, Purpose and Objectives

New coastal legislation was introduced in 2016, requiring all coastal councils in NSW to develop new CMPs in line with updated coastal reforms.

CMPs set the long-term strategy for the coordinated management of the coast, with a focus on achieving the objects and objectives of the CM Act. CMPs identify coastal management issues and the actions required to address these issues in a strategic and integrated way. CMPs detail how and when those actions are to be implemented, their costs and proposed cost-sharing arrangements and other viable funding mechanisms.

The CM Act (and other relevant legislation) establishes specific roles and responsibilities for relevant Ministers, the NSW Coastal Council, public authorities and local councils, as well as providing opportunities for communities to participate when preparing and implementing a CMP.

In keeping with the **“One – Central Coast”** developed during the Community Strategic Plan 2018 – 2028, a Vision for the CMP was proposed to be further developed and refined in consultation with the local community and stakeholders during CMP development.

We are ONE Central Coast – A smart, green and liveable region with a shared sense of belonging and responsibility.

The CMP is driven by a series of Strategic and Specific Objectives, which are based on the objects of the CM Act and provide guidance and direction for the CMP.

Snapshot of Issues

The key management issues identified through the CMP process relate to the following six themes, shown below.



Figure E-0-3: Themes used in defining issues in the CMP

In Stage 1, a First Pass Risk Assessment was undertaken which identified key risks and issues impacting the coastal zone across the Central Coast.

Supporting studies undertaken during Stage 2 included a Coastal Hazard Study, which investigated beach erosion/recession, cliff recession, coastal inundation and tidal inundation for immediate, 2040, 2050, 2070 and 2120 planning periods throughout the Central Coast LGA (Bluecoast Consulting Engineers, 2024-2025), and the Central Coast Recreational Use Study (Vision Environment, 2022), which have provided insight into the key coastal hazards, risks and issues in relation to the above six categories. In addition to these studies, a series of community engagement sessions and a Detailed Risk Assessment (Worley Consulting, 2024a) has been undertaken as part of Stage 3 to identify the key issues, risks, existing management approaches and potential management actions.

In addition, Council has undertaken an audit of all relevant previous studies, community engagement, technical expertise and actions (Wyong/Gosford CZMP actions). Actions were reviewed to determine their status, appropriateness and whether they could be carried over to this CMP.

The coastal hazards of beach erosion/recession, cliff recession, coastal inundation and tidal inundation that impact the study area are expected to become more severe in the future with sea level rise. In the context of this CMP, the area impacted by these hazards, has been mapped in the Coastal Hazard Study (Bluecoast Consulting Engineers, 2024-2025). These maps will be used to develop the future Coastal Vulnerability Area to be included in the RH SEPP. The coastal hazards maps are provided in Appendix A.

The issues identified during Stage 2 and Stage 3 are summarised below, with existing controls in place to reduce the impact of these issues identified as part of the Risk Assessment.

Category	Key Issues
Access & Safety	<ul style="list-style-type: none"> • Increased erosion/scour associated with stormwater assets. • Stormwater assets impacted by coastal inundation • Risk to public safety due to wave run up, wave overtopping, cliff instability, rockfalls and coastal erosion • Informal private access and use damaging vegetation and impacting on recreational amenity for the public • Inaccessible beach accessways impacted by coastal erosion • Damage to dunes and safety concerns due to generation of informal/unauthorised beach accessways • Safety concerns regarding exposure and mobilisation of buried remnants of historic foreshore protection works • Injury to beach users caused by structures mobilising during storm events • Dune instability/steep dune scarp impacted by coastal erosion • Damage to coastal recreational assets from storm events • Limited or out-dated information available on key indicators of coastal hazards and coastal dynamics • Coastal hazards impacting viability of existing and future infrastructure long term, need for long-term coastal adaptation planning • Coastal erosion threatening coastlines and infrastructure • Inconsistent standards of SLSC's patrol towers along the coast. Unable to provide sufficient public services. • Safety hazard due to unfenced cliff lines
Amenities	<ul style="list-style-type: none"> • Aging or incompatible coastal recreation amenity infrastructure not compliant with engineering standards or industry best practice • Lack of guidance for implementing and assessing coastal protection works • Insufficient waste facilities and collection at coastal locations impacting amenity
Coastal Hazards	<ul style="list-style-type: none"> • Need for stronger planning controls to manage development in the coastal zone in relation to coastal hazards • Legacy coastal emergency works on beaches which no longer serve purpose, causing detrimental impacts or timeframe expired. • Structural integrity/slope stability

Category	Key Issues
	<ul style="list-style-type: none"> • Unknown impacts associated with legacy landfill sites or other contamination that be become exposed following erosion. • Structural integrity of coastal protection works • Coastal erosion threatening private properties and public infrastructure • Flat beach profile, no protection from wave overtopping at Avoca Beach • Depletion of sand along southern side of The Entrance channel and undermining of seawall • Structural Integrity of seawall at The Haven
Community & Social	<ul style="list-style-type: none"> • Need for community and agency representation to support decision making • Lack of detailed cultural and heritage assessments across the LGA. • Need for Aboriginal Heritage Impact Permits in areas affected by coastal erosion. • Unapproved memorial sites • Community awareness of coastal hazards and issues • Community awareness of cultural issues and practices, lack of understanding of traditional knowledge for managing the coast
Development	<ul style="list-style-type: none"> • Need for geotechnical information/investigations to inform planning decisions • Infrastructure at risk • Rock/ocean pools maintenance and accessibility • Lack of awareness of property owners for properties affected by coastal hazards
Ecological Environment	<ul style="list-style-type: none"> • Reduced water quality from urban catchments, leading to reduced water quality in open coast receiving waters • Invasive weeds and pests reducing the diversity and abundance of native species. • Lack of guidance for appropriate planting in the coastal zone. • Lack of guidance for appropriate fencing/dune stabilisation controls in the coastal zone. • Illegal vegetation clearing. • Enhancement and conservation of marine biodiversity • Dune blowout at southern carpark at Soldiers Beach

Community and Stakeholder Engagement

The management actions have been informed by a series of community consultation activities throughout Stages 1, 2 and 3 of the CMP process.

During Stage 3, the engagement process aimed to inform, engage and obtain input from stakeholders and the wider community on coastal management actions and their viability and acceptability, including timing.

From December 2023 to March 2024, Council undertook the Stage 3 community consultation and engagement. This phase included:

- Project dedicated website [Your Voice Our Coast – Open Coast Coastal Management Program](#) with project background, FAQ's, links to studies and coastal staff contact email.
- Interactive [Social Pinpoint](#) page
- Six community pop up events

- Two targeted community stakeholder sessions

The feedback received during the Stage 3 consultation activities has been invaluable in refining and updating the list of potential management actions.

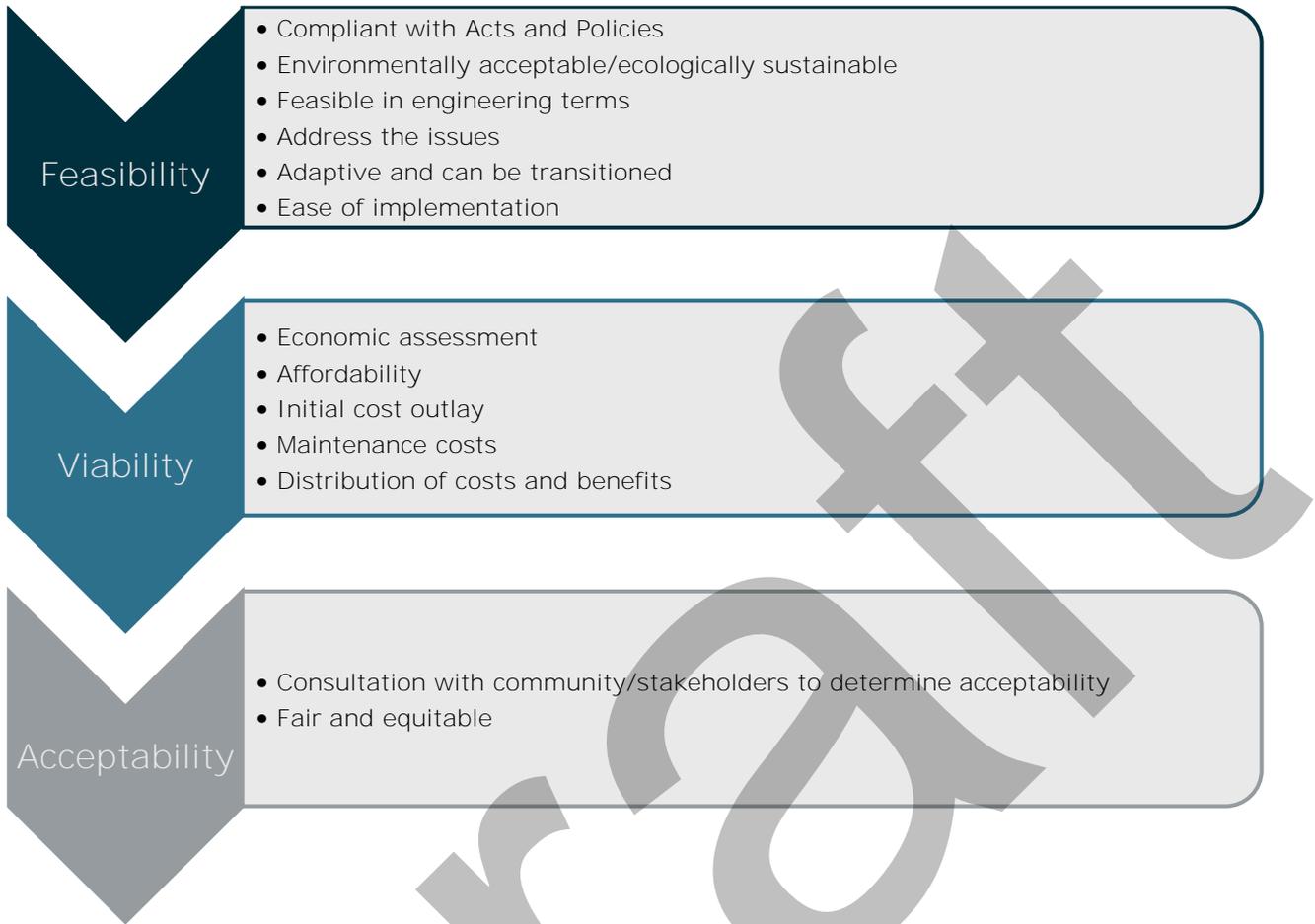
Stage 4 has involved the public exhibition of the draft CMP, together with public information sessions, to gain community and stakeholder feedback on the draft management actions, prior to the CMP being finalised and submitted to the Minister for certification.

Actions to be implemented by the Council or by public authorities

Stage 3 involved identifying and evaluating management options to select preferred coastal management actions with a focus on achieving the objectives of the CM Act.

The supporting studies that have been undertaken as part of the CMP during Stage 2, have enabled an understanding in detail of what the key issues are. The outcome of these studies, as well as the community and Agency engagement that has been carried out throughout the project, has enabled the key issues to be identified and draft management options to be developed in Stage 3. These actions have been further refined and included in this Stage 4 CMP.

Following on from the identification of management options, the options were assessed and prioritised to ensure the final Stage 4 program of management options are appropriate, achievable, and meet the objectives of the CM Act. A Multi Criteria Analysis (MCA) was implemented based on evaluating the feasibility, viability and acceptability of each potential action as depicted below.



Overview of Management Actions

The CMP structure includes:

- Management actions based on the six categories of management issues
- Management actions that apply across the entire study area
- Location-specific management actions to manage localised risks and opportunities.

There are a total of 55 actions applying across the coast and at specific locations, aimed at addressing the issues identified during Stages 1, 2 and 3. Management actions to be implemented by Council are listed in Table 4-8.

A Business Plan

A Business Plan has been developed for the CMP which outlines the key components of the funding strategy for the CMP, including the cost of proposed actions, proposed cost-sharing arrangements and other potential funding mechanisms. Delivery of the CMP for the Central Coast Open Coast is estimated to cost \$36.072 million (2025 dollars) over 10 years, excluding works to be funded privately. The Business Plan for implementing the CMP is provided in Section 6.

Sustainable funding and financing 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.**

All actions in this CMP to be undertaken by public authorities, will be 100% for public benefit. Public money is not proposed in this CMP to address existing or future coastal risks on private lands.

Coastal Zone Emergency Action Subplan

The Study Area is subject to a high level of risk from coastal inundation and erosion events.

A Coastal Zone Emergency Action Subplan (CZEAS) has been developed for the Central Coast Open Coast areas, for those areas subject to immediate hazards from coastal inundation and erosion. The objectives of the CZEAS are to:

- outline measures to reduce the risk to public safety, the coastal environment and public assets arising from coastal inundation.
- identify key actions to be carried out by Council before, during and following a coastal emergency to reduce the risk to public safety, the coastal environment and public assets.
- identify the responsibilities of other public authorities during a coastal emergency, and defining a protocol for communication and engagement before, during and after an emergency event.
- identify key areas and assets subject to immediate hazards from coastal erosion and inundation and prioritise actions to reduce the risks to those areas and assets.

The CZEAS is provided in Appendix B.

Monitoring, Evaluation and Reporting

The CMP is a living document subject to review every ten years to ensure that actions to manage the coastal zone within the CMP Study Area remain current and relevant in light of new information, legislative and policy changes, and improved understanding of the local coastal processes.

A framework has been developed to monitor, evaluate and report on the status of the actions in the CMP. This comprises three components:

- Component 1: The implementation status of the CMP actions
- Component 2: Monitoring of relevant environmental indicators
- Component 3: A formal review of the implemented management strategies to assess **the status of CMP actions, the CMP's successes, highlights and limitations, consideration of any new or updated scientific knowledge, and the progress of any actions and commitments which continue beyond the original 10-year timeframe.**

Council must maintain sufficient information and records about its management of the relevant parts of the coastal zone to demonstrate how the Central Coast Open Coast CMP has been implemented, and what has been achieved in connection with the CMP, including whether coastal management actions have been carried out within the timeframes identified in the CMP.

Draft

1. Introduction

Central Coast Council (Council), with the assistance of the NSW Government, is preparing their Coastal Management Program (CMP) for the Open Coast. The future management of the Central Coast Open Coast is to be guided by a CMP as described under the NSW Coastal Management Framework and the *NSW Coastal Management Act 2016* (CM Act). The CMP aims to ensure the integrated and effective management of the coastal zone, considering environmental, social, and economic factors. Specifically, the CMP is a plan of management for Council, Public Authorities and land managers responsible for management of the coastal zone to:

- address coastal hazard risks;
- preserve cultural use and habitats;
- encourage sustainable development in the coastal zone (agricultural, economic and built);
- maintain and improve recreational amenity; and,
- adapt to emerging issues.

1.1 Need for Coastal Management Program

The CMP aims to address specific risks and opportunities for the Central Coast open coast for the present day, 20 year, 50 year and 100 year planning periods. The risks and opportunities have been identified through the earlier stages of the CMP process, including the First Pass Risk Assessment (Royal Haskoning DHV, 2021), the Stage 2 Coastal Hazard Assessment (Bluecoast Consulting Engineers, 2024-2025), the Central Coast Recreational Use Study (Vision Environment, 2022) and the Stage 3 Detailed Risk Assessment (Worley Consulting, 2024a). Council has undertaken extensive community and stakeholder engagement throughout Stage 1, 2 and 3 of the CMP process which has informed the management actions presented in the CMP.

The CMP outlines specific actions over a 10-year management cycle and provides details on how the actions will be delivered, monitored, funded and evaluated.

The CMP has been developed in accordance with the Mandatory Requirements set out in the CM Act and the NSW Coastal Management Manual (CM Manual, OEH 2018). The CMP has been developed on behalf of Central Coast Council, with part funding and support by the Department of Climate Change, Energy, the Environment and Water (DCCEE), and in consultation with state agencies and various other stakeholders.

This CMP supersedes the previous Coastal Zone Management Plans (CZMP) for the former Gosford Open Coast beaches, and the former CZMP for the Wyong Coastlines. These CZMPs were prepared by the former Gosford City and Wyong Shire Councils, under the previous NSW coastal management framework and *NSW Coastal Protection Act 1979*, which no longer applies.

1.2 Structure of the Coastal Management Program

As per the process described in the CM Manual, the CMP procedure is divided into five stages (Figure 1-1). Stage 1 of the CMP (Royal Haskoning DHV, 2021) was adopted by Council in August 2021. It included a review of relevant background information, a first pass risk assessment, data gap analysis and proposed a forward program for the CMP. Stage 2 (Bluecoast Consulting Engineers, 2024-2025) assessed the coastal erosion, recession, inundation hazards, estuary hazards and coastal cliffs and geotechnical hazards. As part of Stage 2, a Recreational Use Study (Vision Environment, 2022) was undertaken to identify the coastal recreational activities occurring in the area and determine the adequacy of public amenities and infrastructure to accommodate for those activities now and into the future. Stage 3 of the process involves the identification and evaluation of management options based on the information gleaned in the previous two stages.

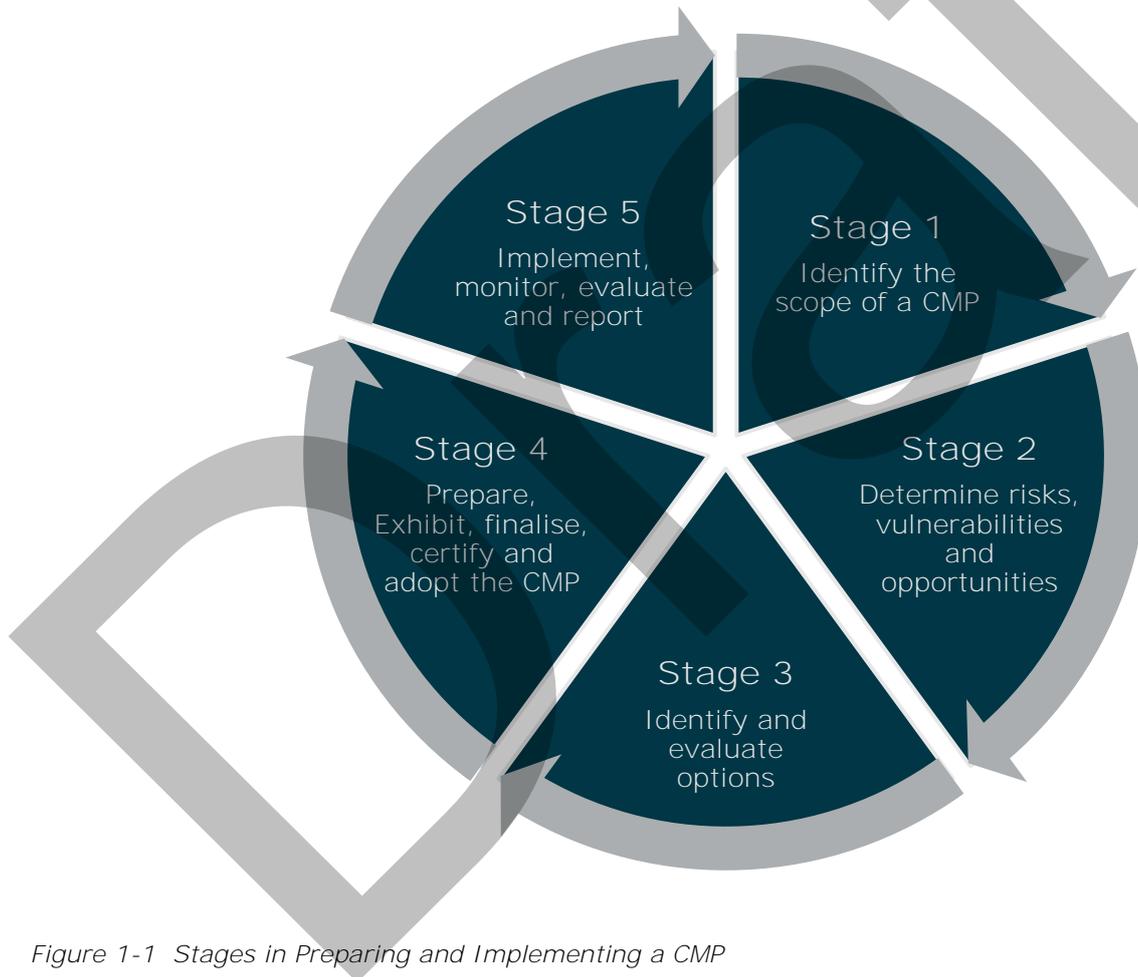


Figure 1-1 Stages in Preparing and Implementing a CMP

1.2.1 Stage 1

The Scoping Study (Royal Haskoning DHV, 2021) was the first step in drawing together the Gosford Beaches Coastal Zone Management Plan (2017), the Wyong Coastal Zone Management Plan (2011), the Draft Wyong Coastal Zone Management Plan (2018), and the Gosford Lagoons Coastal Zone Management Plan (2015). The Scoping Study noted that the CZMPs do not carry equal status as only the Gosford Beaches Coastal Zone Management Plan (2017) had been certified under the *Coastal Protection Act 1979*. As part of the Scoping

Study, an audit was undertaken by Council of the 320 recommended actions and strategies put forth in the adopted CZMPs listed above.

The Scoping Study documented a First Pass Risk Assessment to assist with identifying key management issues and threats requiring further assessment during Stage 2 of the development of the CMP for the Central Coast Open Coast. The Scoping Study documented the risk assessment and provided commentary on the existing levels of risk, identifying the issues of highest risk for the coastal zone. It also documented the environmental and physical context of the Central Coast coastal zone. For the Open Coast of the study area, the key risks and challenges identified from the first pass risk assessment were split into four impact areas with specific threats and control measures detailed in within the Scoping Study document. These included:

- Public Safety
- Infrastructure Damage
- Environmental Risk and
- Public Amenity.

The key threats identified throughout the study area in Stage 1 related to:

- Coastal Erosion and beach recession
- Coastal and tidal inundation/flooding
- Wave runup and overtopping
- Stormwater erosion and discharge
- Coastal Lagoon entrance dynamics
- Slope and cliff instability
- Water quality

1.2.2 Stage 2

As part of Stage 2 of the CMP, Council has undertaken a Coastal Hazard Study, which investigated beach erosion/recession, cliff recession, coastal inundation and tidal inundation for immediate, 2040, 2050, 2070 and 2120 planning periods throughout the Central Coast LGA (Bluecoast Consulting Engineers, 2024-2025).

The updated coastal hazard mapping (Bluecoast Consulting Engineers, 2024-2025) provides probabilistic coastal hazard extents for coastal erosion events up to the 100 year Average Recurrence Interval (ARI) (or 1% Annual Exceedance Probability¹). The mapping indicates which areas are at risk from beach erosion/recession, cliff recession and coastal inundation

¹ 1% Annual Exceedance Probability refers to a storm event that has a probability of being exceeded of 1% in any given year.

over the various planning periods, to assist in defining which assets are subject to the highest level of risk, with these risks considered in defining coastal management options in Stage 3.

The investigation provided a detailed register of both private and public assets impacted by coastal hazards for each of the planning periods. Those areas most affected include MacMasters Beach/Copacabana, Avoca, Terrigal/Wamberal, The Entrance/The Entrance North. That study has provided updated coastal hazard mapping for the entire LGA, which updates previous mapping carried out under the Gosford Open Coast and Broken Bay Beaches Coastal Zone Management Plan (CZMP) and the Wyong Coastlines CZMP.

Further, the Central Coast Recreational Use Study (Vision Environment, 2022) was undertaken as part of Stage 2, to identify the coastal recreational activities occurring in the area and determine the adequacy of public amenities and infrastructure to accommodate for those activities now and into the future.

1.2.3 Stage 3

Stage 3 involves identifying and evaluating management options to select preferred coastal management actions with a focus on achieving the objectives of the CM Act. As per the CM Manual, there are four main steps in completing Stage 3 of the CMP process (Figure 1-2).

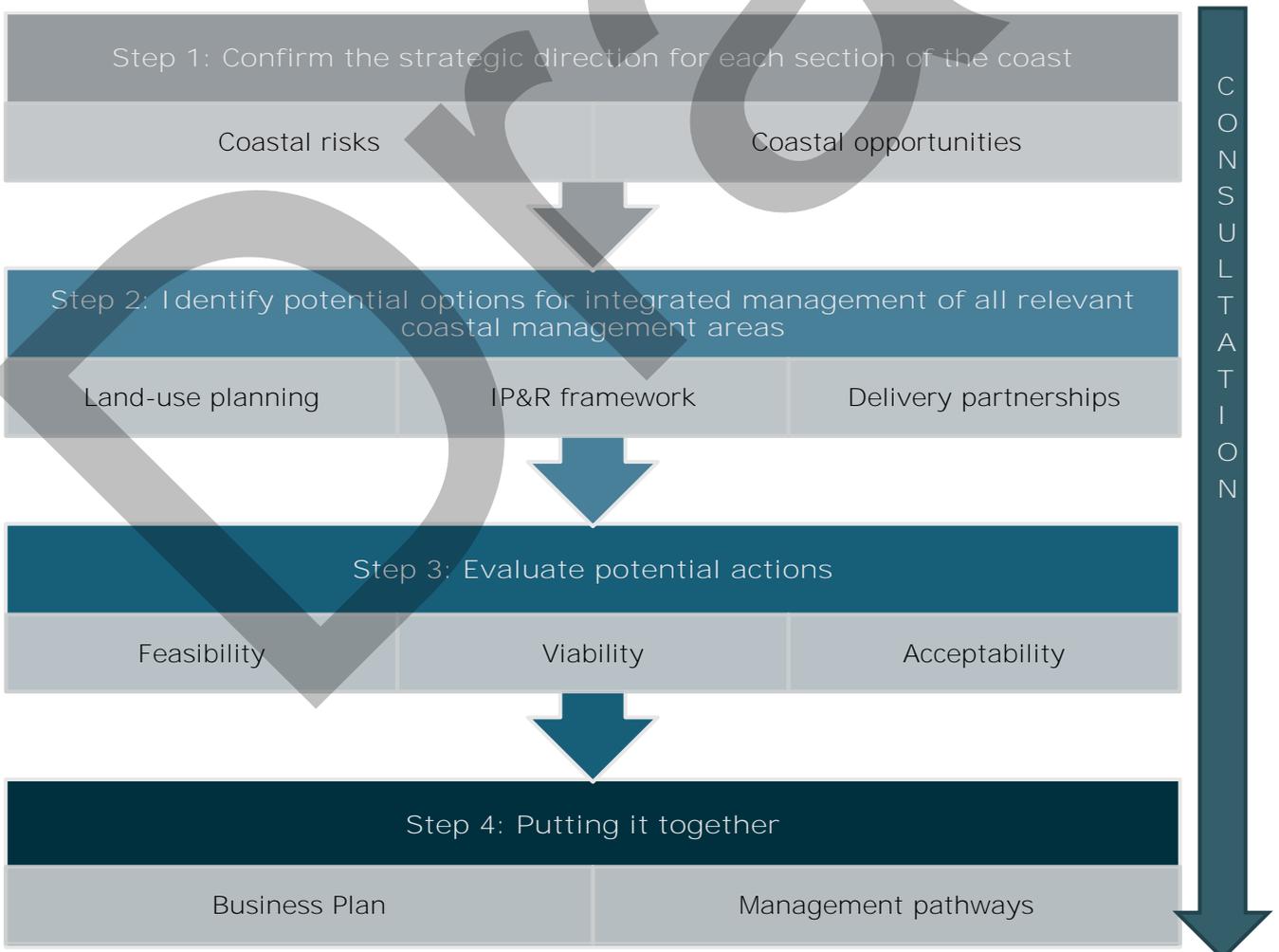


Figure 1-2 Four Main Steps in action identification and evaluation

Council has, and continues, to undertake a range of community engagement and consultation activities as part of developing the CMP, including further engagement undertaken as part of Stage 3.

As part of Stage 3 of the CMP, a Detailed Risk Assessment (Worley Consulting, 2024a) was undertaken for the Central Coast Open Coast. The Risk Assessment categorises the main risks for the study area in terms of the Coastal Management Areas as referred to in the CM Act and RH SEPP, detailed in Section 1.5.2.

The Detailed Risk Assessment builds upon the first-pass risk assessment undertaken for the coastal zone as part of the Stage 1 Scoping Study (Royal Haskoning DHV, 2021), by identifying key issues, opportunities and risks in greater detail.

From the Risk Assessment (Worley Consulting, 2024a) and the outcome of the Stage 2 Coastal Hazard Assessment (Bluecoast Consulting Engineers, 2024-2025), a suite of potential management actions has been developed and categorised in terms of the issues and particular locations which they relate to.

1.3 Area covered by this CMP

The study area for the CMP includes the Central Coast open coast areas. In particular, the Study Area includes those areas mapped as Coastal Wetlands/Coastal Wetland Proximity Areas, Coastal Environment Areas and Coastal Use Areas under the *State Environmental Planning Policy (Resilience and Hazards) 2021* (the SEPP).

The study area for the Open Coast CMP is shown in Figure 1-3.

Central Coast Council is developing five CMPs to guide the long-term, sustainable management of the coastal environments within the Central Coast local government area. These programs are mandated under the NSW Coastal Management Act 2016 and align with the NSW Coastal Management Framework, ensuring that coastlines, lakes, lagoons, estuaries, and beaches are protected and enhanced for future generations. The series of CMPs that are being implemented by Council include:

- Lake Macquarie CMP (certified in collaboration with Lake Macquarie City Council)
- Tuggerah Lakes CMP
- Open Coast CMP (this document)
- Coastal Lagoons CMP
- Hawkesbury-Nepean River System CMP (delivered in collaboration with 5 other partner councils)

The study areas covered within each of these CMPs have been defined to group together locations that share similar physical and ecological characteristics at local and regional scales, as well as the community context and unique issues that apply to each area.

The extent of the study area covered in the Open Coast CMP study area was defined in consultation with key stakeholders including state agencies, adjacent Councils and project

teams preparing adjacent CMPs. The study boundary was chosen to include open coast beaches, cliffs and bluffs as these locations have many common physical and social characteristics and shared management issues and responsibilities. This includes areas where there is urban infrastructure that has been identified to be at extreme risk from coastal processes.

The study area for the CMP includes the open coast of the Central Coast LGA (between Killcare and Frazer Park) and the land bounded by the Coastal Management Areas within the coastal zone as defined in the RH SEPP and the CM Act. The beaches of Broken Bay (Ettalong, Umina, Pearl and Patonga Beaches) are included in the Hawkesbury Nepean CMP. The Open Coast CMP also does not include the national parks, the estuaries or their entrances (i.e. Cockrone, Avoca, Terrigal and Wamberal Lagoons, Tuggerah Lakes or Lake Macquarie), which are covered in separate CMPs. The Central Coast Open Coast CMP covers part of the coastal zone of the Central Coast LGA, and does not apply to any areas outside of the coastal zone. The CMP Study Area is located entirely within the Central Coast LGA.

The CM Act sets out mandatory requirements for the preparation of a CMP. Under S13 (b) of the **CM Act, the CMP must “consider and promote the objects of (the) Act” and “give effect to the management objectives for the coastal management areas covered by the program”.** The RH SEPP commenced on 1 March 2022. It supports implementation of the management objectives set out in the NSW CM Act.

1.3.1 Sediment Compartments

A sediment compartment is a spatial unit along the coast, based on sediment movement and coastal types. Primary sediment compartments are those defined by large landforms such as headlands or rivers. Secondary compartments are those defined by sediment movement on the shoreface, and tertiary compartments are defined by sediment movement in the nearshore area (i.e. beaches) (CoastAdapt 2024). The compartment boundary is usually a feature such as a headland or river mouth which effectively divides the compartment and its processes from its neighbour. The compartment boundaries act as natural barriers to sediment transport, enabling the area between boundaries to be treated as a semi-closed system with quantifiable sediment sources and sinks.

The majority of the Central Coast is contained within the Central Coast coastal sediment compartment listed within Schedule 1 of the CM Act, however the northern extent of the LGA encompassing the open coast north of Norah Head connects with the Newcastle coastal sediment compartment, as shown in Figure 1-6: .

The dominant regional processes of the Central Coast sediment compartment include south-easterly Tasman Sea swells, easterly seas, northerly longshore transport, and the El Nino Southern Oscillation driving beach erosion/accretion cycles. Regional hazards or processes driving large scale rapid coastal changes include East Coast Lows (extra-tropical cyclones), mid-latitude cyclones (depressions), and storm surges (<1m) (CoastAdapt 2024).

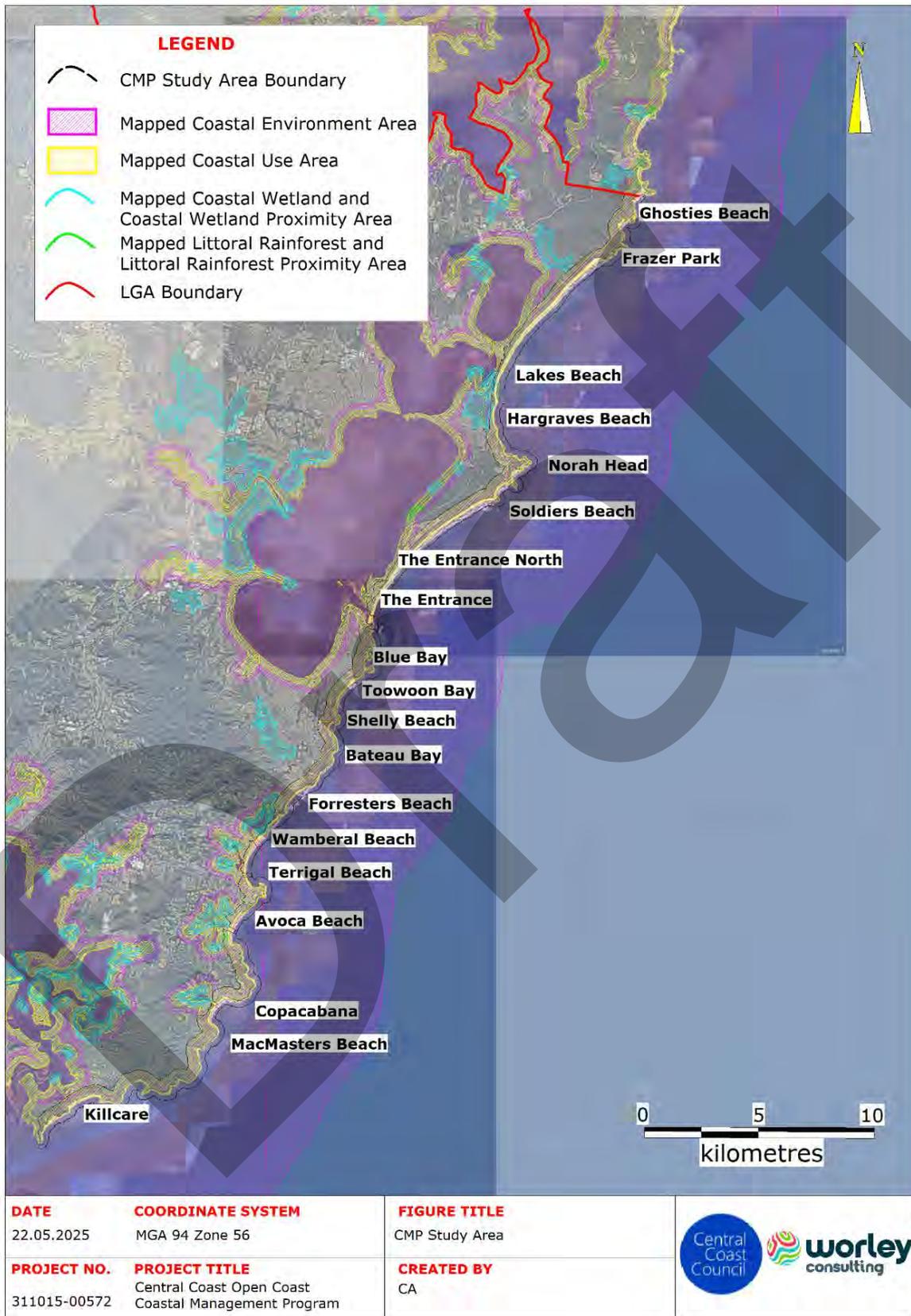


Figure 1-3 Central Coast Open Coast CMP Study Area

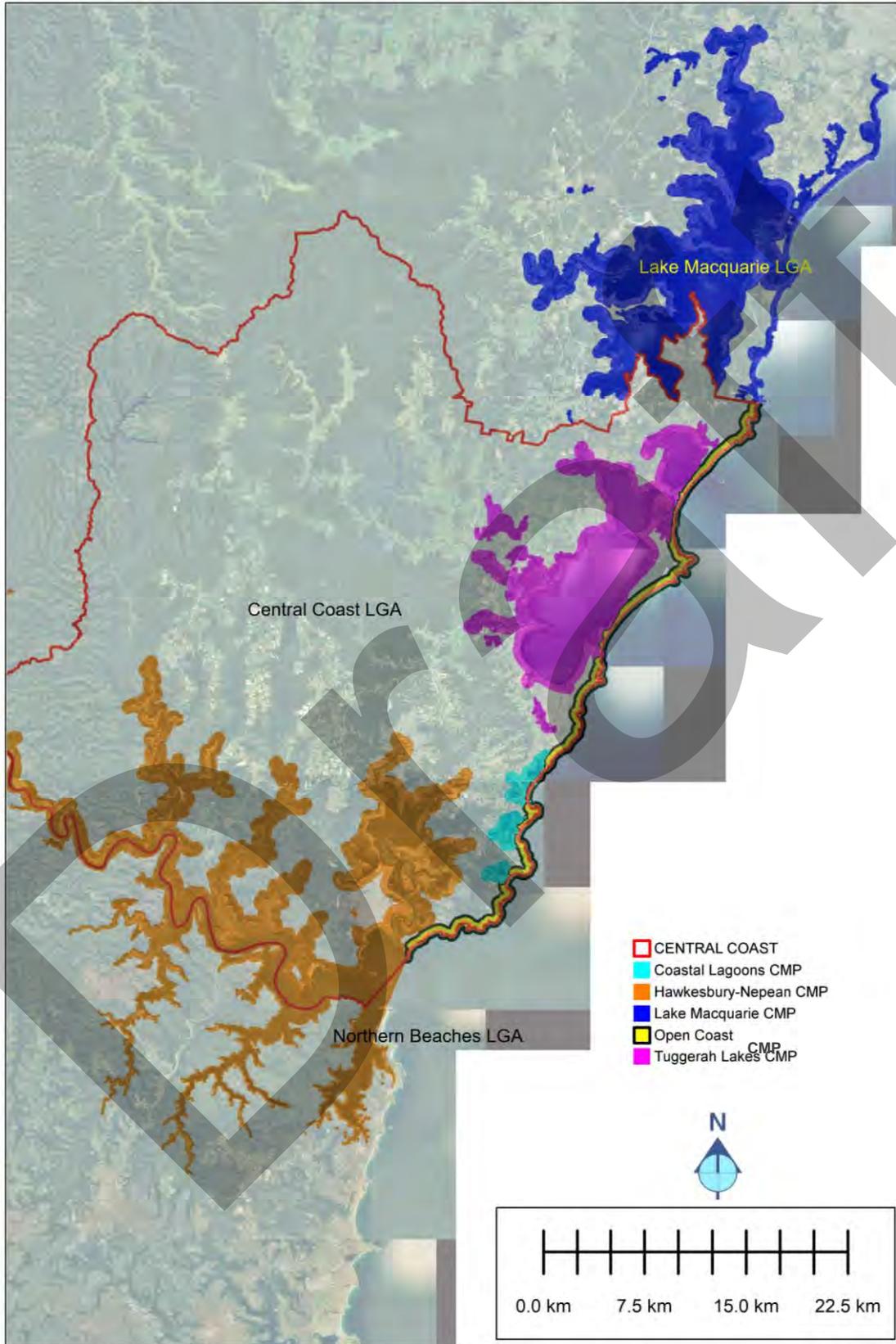


Figure 1-4 Open Coast CMP boundaries, with boundaries of other CMPs in the Central Coast area

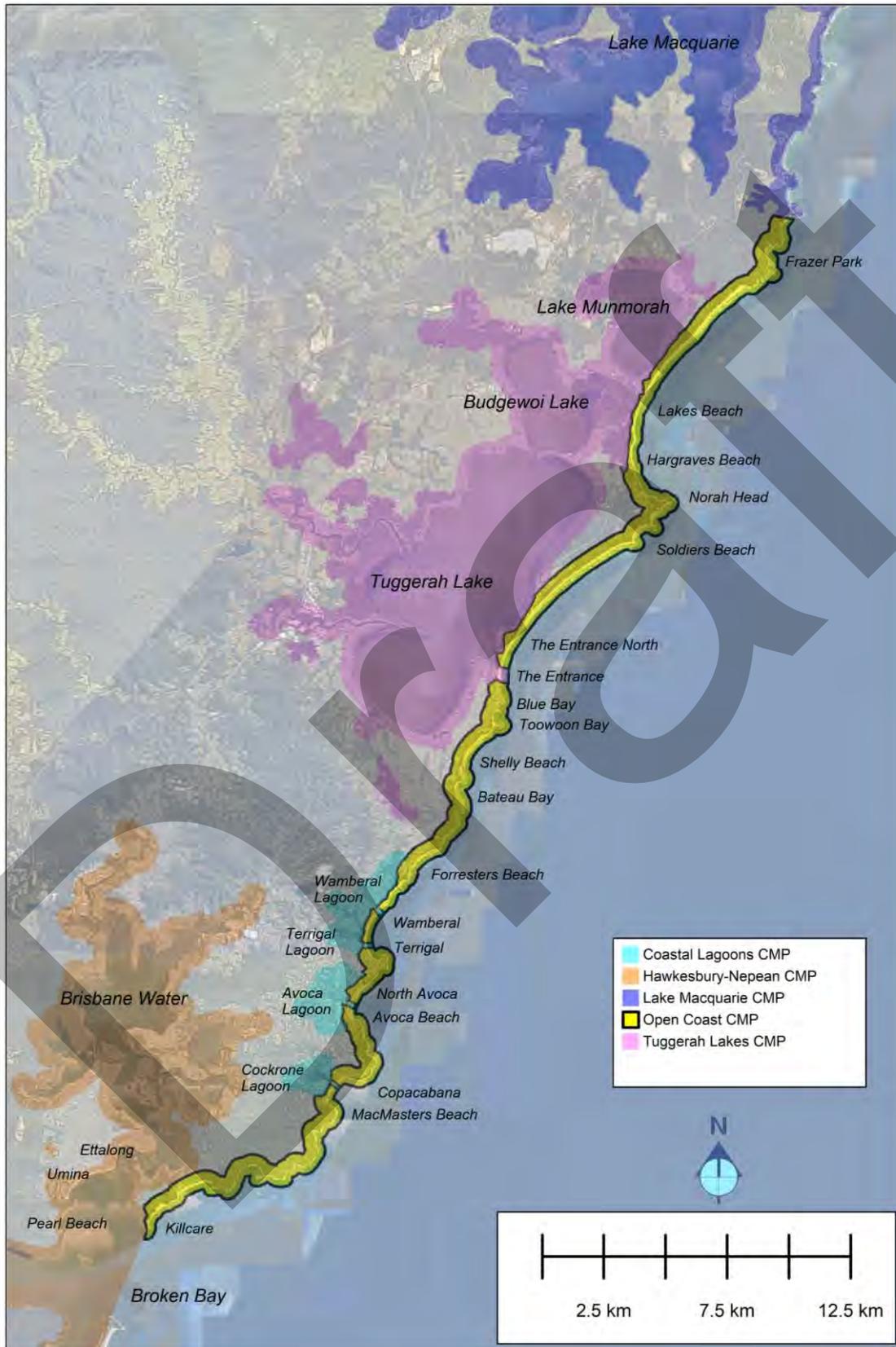


Figure 1-5 Close-up of the study area showing locations within adjacent CMPs

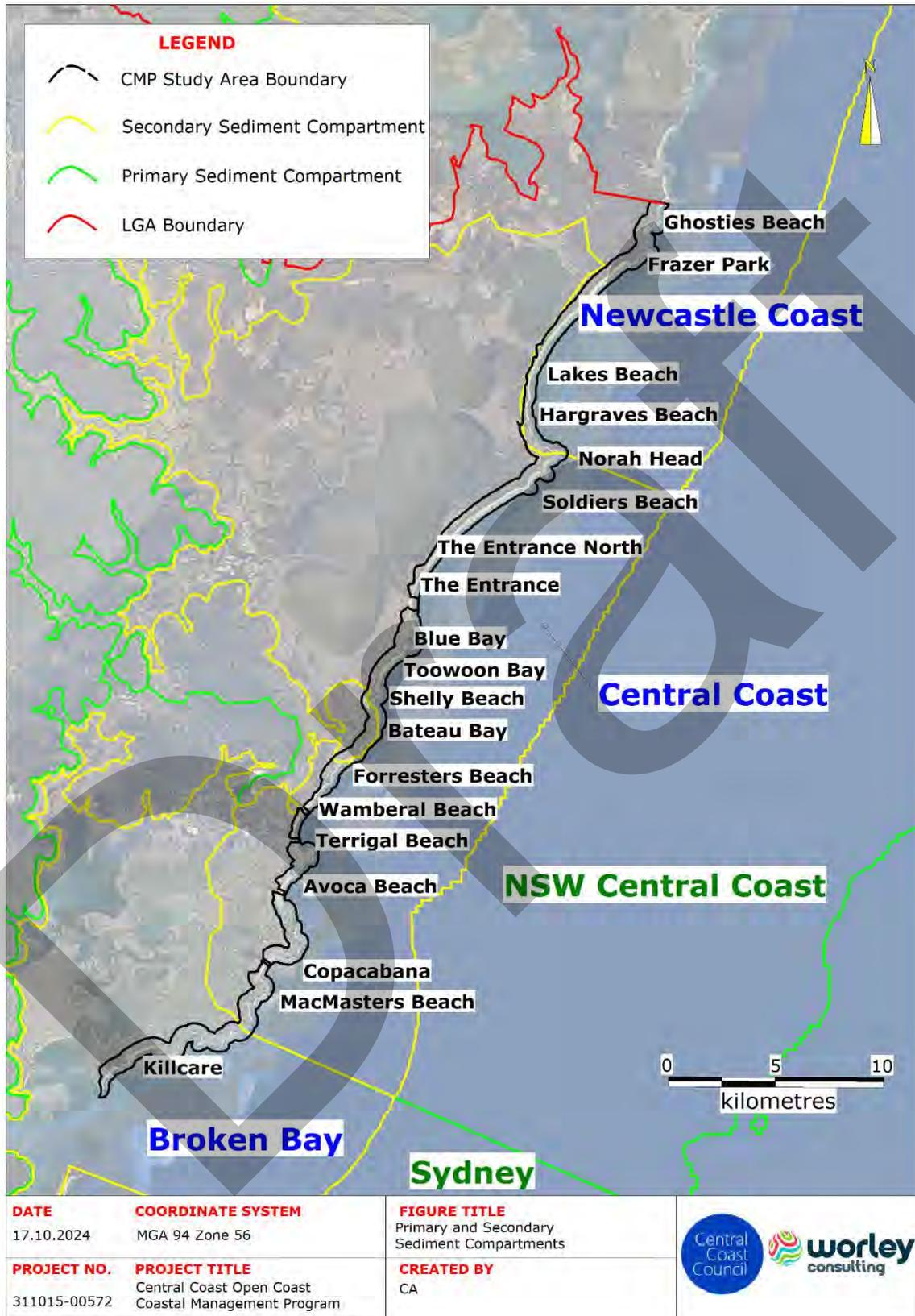


Figure 1-6: Central Coast Coastal Sediment Compartments (McPherson, 2015)

1.3.2 Social values

As detailed in the Central Coast Council Community Strategic Plan, 2018-2028:

The central coast community are strongly tied to our local natural environment, including our beaches, waterways, ridges, estuaries, lakes, and valley floors.

We are committed to leaving a positive legacy for future generations through responsible stewardship of our natural areas – this is our shared responsibility as residents of the Central Coast. We encourage our community to contribute to that stewardship by minimizing resource use (energy, water, and waste) and treating these natural areas with respect.

Creating a vibrant, liveable and sustainable future for the Central Coast is a key priority (Central Coast Council, 2018).

The Central Coast highly values the preservation and enhancement of its natural environment. The community is supportive of activating public spaces in a way that increases access to its coastal areas and green spaces as well as enhances overall liveability of the region. Central to this is also the ongoing protection of the environment (Central Coast Council, 2018).

1.3.3 Cultural heritage values

Across the Central Coast there are numerous areas of significant Aboriginal and non-Aboriginal heritage value to the wider community. First Nations people have been custodians of the Central Coast area for 60,000 years and there are thousands of registered **sites of cultural significance on the Central Coast. It is noted that 'the Central Coast local government area is one of the largest and fastest growing Aboriginal communities in Australia. This population grew by 38% in the last Census reporting period'** (Central Coast Council, 2023).

In recognition of this and the Central Coast Council's commitment to reconciliation and developing and a shared future vision with First Nations people, the Council adopted a Central Coast Council First Nations Accord on 13 December 2022. As a part of this, an Aboriginal Advisory Committee has been established to support the incorporation of Aboriginal views and sentiment into key Council activities. This Committee will be engaged in the CMP process via external agency meetings as representatives.

As per the Accord:

The Darkinjung Local Aboriginal Land Council is the largest non-government land holder on the Central Coast, giving them the ability to take care of their community and create programs that are meaningful (Central Coast Council, 2022).

At a regional level, the Barang Regional Alliance, consisting of seven Central Coast Aboriginal organisations, is the voice of the local First Nations Community. The organisations include: ara Barang Corporation, Gudjagang Ngara li-dhi Aboriginal Corporation, NAISDA, Ngaimpe Aboriginal Corporation – The Glen, Mingaletta Aboriginal

Corporation, Yerin Eleanor Duncan Aboriginal Health Services Ltd and Darkinjung Local Aboriginal Land Council (Central Coast Council, 2022).

1.3.4 Socio-economic context

At the time of the 2021 Census, the population of the Central Coast Council was recorded at 346,956. The median age of residents was 43, as opposed to 38 Australia wide (ABS, 2021). Key demographic data of the Central Coast LGA is presented in Figure 1-7: .

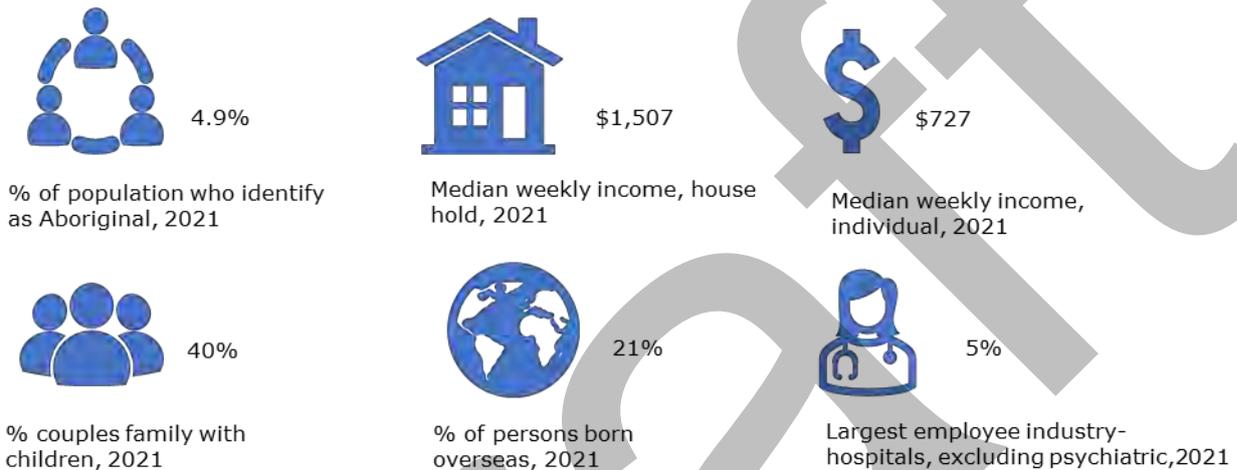


Figure 1-7: Central Coast LGA Statistics (ABS, 2021).

Between 2021 and 2046, the population for Central Coast NSW is forecast to increase by 64,124 persons (18.41% growth), at an average annual change of 0.68% (<https://forecast.id.com.au/central-coast-nsw/population-summary>). Most of the growth is forecast to occur in inland areas of the Central Coast, with the coastal areas on average expected to grow in population by less than 10% between 2021 and 2046 (Figure 1-8). However, the coastal areas are expected to grow in population by more than 10% for people over 55.

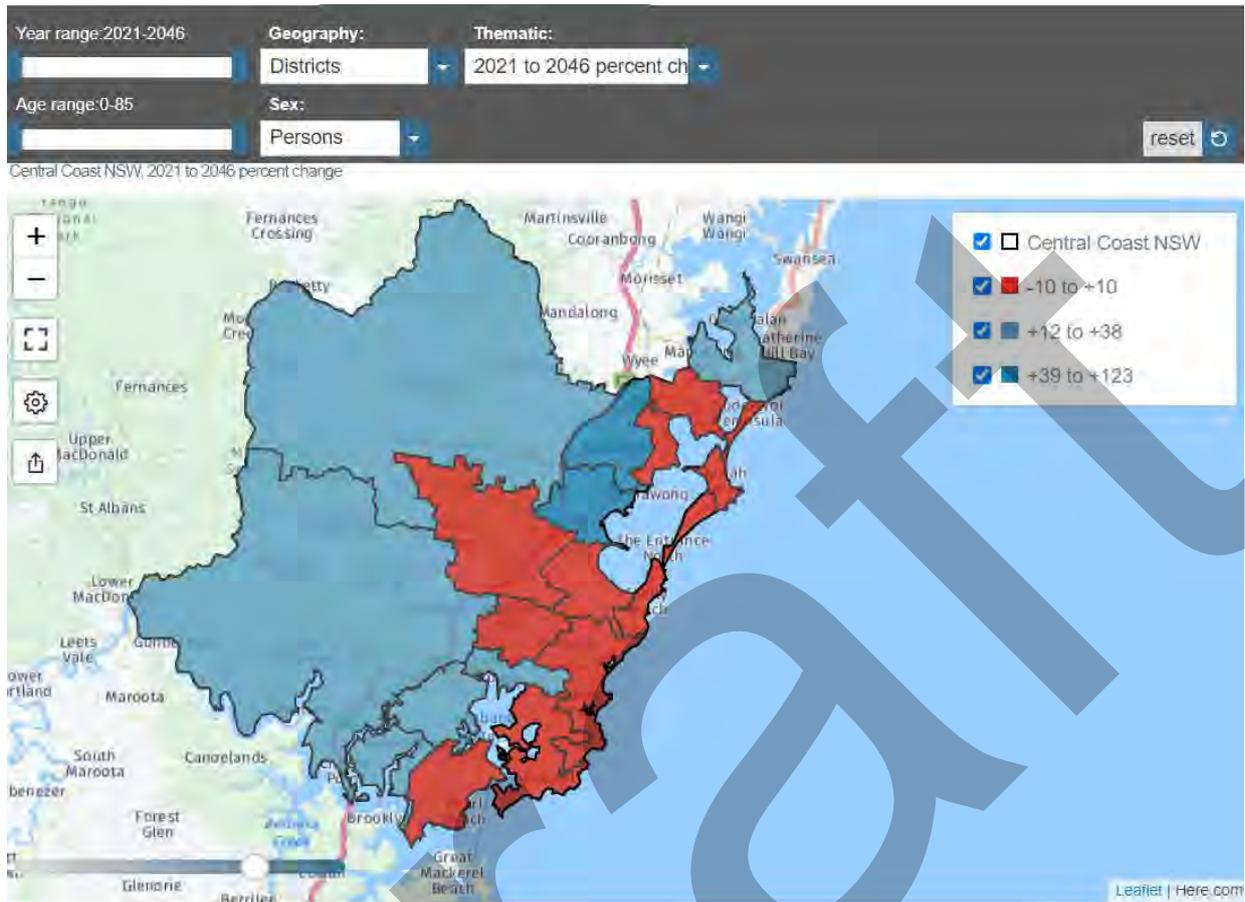


Figure 1-8: Expected % population growth between 2021 and 2046

(<https://forecast.id.com.au/central-coast-nsw/population-age-structure-map?CustomAgeFrom=0&CustomAgeTo=85&thetype=PerChangeY1Y3&OverlayID=10>)

1.4 Vision, Purpose and Objectives

The Vision, Purpose and Objectives of the CMP were set out by Council during Stage 1 of the CMP process (Royal Haskoning DHV, 2021).

Aligned with the purpose of CMPs as set out by the CM Act, the purpose of the Central Coast CMP for the Open Coast will be to provide an integrated, adaptive and long-term strategy for the coordinated management of the **open coastline of the Central Coast's** coastal zone. The CMP will confirm the focus of coastal zone management by Council and by public authorities and co-ordinate the delivery of priority management actions.

The CMP will seek to assist the smart and coordinated management, and environmentally **sustainable development, of the dynamic open coastline of the Central Coast's** coastal zone in order to protect the social, cultural, economic and environmental values, and identity of the region against current and future coastal hazards.

In keeping with the **“One – Central Coast”** developed during the Community Strategic Plan 2018 – 2028 a draft Vision was proposed to be further developed and refined in consultation with the local community and stakeholders during CMP development.

We are ONE Central Coast – A smart, green and liveable region with a shared sense of belonging and responsibility.

1.4.1 CMP Objectives and Objects of the Coastal Management Act 2016

The CMP Objectives provide a clear and tangible path towards fulfilling the strategic objectives. They provide an operational roadmap for development of specific actions and targets.

The Objectives of the CMP adopted in the Scoping Study were based on the objects of the *Coastal Management Act 2016* (CM Act). The objectives and management actions developed as part of the CMP are strategically aligned with the objectives and strategies as outlined in the Community Strategic Plan.

In addition, the objectives and management actions consider and promote the objects of the CM Act, by having undertaken rigorous assessments of the risks associated with coastal processes and environmental values.

The CMP gives effect to the management objectives for the Coastal Management Areas covered by the program, by mapping and identifying issues, threats and opportunities directly impacting the Coastal Management Areas, and developing management actions specifically for these areas.

The CMP considers relevant State and regional policies and plans, as CMP actions have been reviewed and discussed with partner Agencies to obtain their support prior to inclusion in the CMP.

Table 1-1: outlines the objects of the CM Act, together with how they have been achieved in this CMP.

A detailed explanation of how the CMP promotes the objects of the CM Act and gives effect to the management objectives for the Coastal Management Areas is provided in Appendix C.

Table 1-1: How the CMP achieves the Objects of the Coastal Management Act 2016

Objects of the Coastal Management Act 2016 (Section 3)	How achieved
(a) to protect and enhance natural coastal processes and coastal environmental values including natural	Rigorous assessment of the risks associated with coastal processes and coastal environmental values, as evidenced through the detailed studies undertaken to understand coastal processes and

Objects of the Coastal Management Act 2016 (Section 3)	How achieved
character, scenic value, biological diversity and ecosystem integrity and resilience	environmental values, the identification of risks associated with these and the identification of management actions to address the risks.
(b) to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety	Rigorous assessment of the risks associated with social and cultural values, as evidenced through community engagement and the detailed studies undertaken to identify risks associated with these, together with the identification of management actions to address the risks.
(c) to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone	Specific management actions have been included to specifically acknowledge and protect Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone , including engagement with the Darkinjung Local Aboriginal Land Council seeking input to the CMP.
(d) to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies	The importance of the CMP Study Area for recreation, and economic activities associated with recreational activities in the CMP Study Area has been specifically recognised, with a specific risk category developed for amenity and community and social issues, with these issues being explored in detail within the Central Coast Recreational Use Study (Vision Environment, 2022). The CMP has included development of management actions with a focus on improving recreational amenity in the CMP Study Area.
(e) to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making	The CMP has identified actions to promote sustainable land use planning and decision-making, including actions to identify areas which are subject to coastal hazards, as well as environmentally sensitive areas that would require planning controls to facilitate ecologically sustainable development.
(f) to mitigate current and future risks from coastal hazards, taking into account the effects of climate change	The CMP has identified natural and built assets impacted by current and future risks from coastal hazards with these hazards clearly articulated in the Stage 2 Coastal Hazard Assessment (Bluecoast Consulting Engineers, 2024-2025), and has devised management actions to address these hazards.
(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	The CMP has identified areas subject to coastal erosion and slope instability, as well as areas subject to coastal inundation with sea level rise, and has identified actions to address the risks posed by loss of coastal land caused by future climate change, including the development of an overarching coastal planning framework to guide future coastal development in the Central Coast open coast coastal zone.

Objects of the Coastal Management Act 2016 (Section 3)	How achieved
(h) to promote integrated and co-ordinated coastal planning, management and reporting	The CMP actions and timeframes have been developed in accordance with the NSW Integrated Management & Reporting Framework, with responsible and partner agencies identified for each management action.
(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	The CMP has provided actions that include strategies to improve the resilience of coastal natural and built assets to impacts of an uncertain climate future, including recognising the need for long-term adaptation planning for land subject to coastal erosion, slope instability and inundation. These strategies are explored in more detail in the CMP Planning Report (Worley Consulting 2025), which articulates how Council can apply planning controls to improve the resilience of coastal natural and built assets against coastal hazards.
(j) to ensure coordination 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	CMP actions have been reviewed and discussed with partner Agencies to obtain their support prior to inclusion in the CMP.
(k) to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions	The CMP includes management actions that specifically solicit public participation in coastal management and planning, and improve education, awareness and understanding of coastal processes. The CMP has been developed with input from the public through each stage of the process.
(l) to facilitate the identification of land in the coastal zone for acquisition by public or local authorities to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone	The CMP recognises the need for the protection of sensitive environmental communities in the coastal zone, and has identified management actions to facilitate the preservation of these communities.
(m) to support the objects of the Marine Estate Management Act 2014	<p>The CMP promotes a biologically diverse, healthy and productive marine estate by specifically including management actions which enhance:</p> <ul style="list-style-type: none"> • economic opportunities for regional communities (by improving local recreational facilities) • the cultural, social and recreational use of the marine estate (by improving local recreational amenity) • the maintenance of ecosystem integrity (by including actions to enhance ecological integrity)

Objects of the Coastal Management Act 2016 (Section 3)	How achieved
	<ul style="list-style-type: none"> the use of the marine estate for scientific research and education (by including actions for public education, monitoring and scientific research/collaboration).

1.5 NSW Coastal Management Framework

1.5.1 The Framework

Sustainable management of the coastal zone often involves councils, their communities and public authorities balancing a diverse range of challenges and opportunities. The context is one of rapid environmental, social and economic change along with dynamic coastal processes affecting the open coast, estuaries and coastal lakes (OEH 2018).

In order to achieve sustainable management of the coastal zone, NSW has developed a new coastal management framework through the *Coastal Management Act 2016* (CM Act), State Environmental Planning Policy (Resilience and Hazards) 2021 (the RH SEPP) and the NSW Coastal Management Manual 2018 (the CM Manual). The CM Manual sets out the framework in detail and defines the requirements for a CMP. The purpose of a CMP is to set the long-term strategy for the coordinated management of the coastal zone with a focus on achieving the objects of the CM Act.

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 NSW, consistent with the principles of ecologically sustainable development, for the social, cultural, and economic wellbeing of the people of the state.
- State Environmental Planning Policy (Resilience and Hazards) 2021 (RH SEPP): One of the key environmental planning instruments for land use planning in the coastal zone. It gives effect to the objectives of the CM Act 2016 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.
- Environmental Planning and Assessment Act 1979 (EP&A Act): This Act governs land use planning and development in NSW. While this Act is not directly part of the NSW Coastal Framework, it is relevant from a planning perspective and ties into the RH SEPP.
- Coastal Management Programs (CMP): 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.

- The NSW Coastal Management Manual (The CM 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.
- The NSW Coastal Council: Is responsible for providing independent and expert advice on matters relating to the Minister's functions under the CM Act, and in relation to the development and implementation of CMPs by local councils.
- The NSW Coastal and Estuary Grants Program: Provides technical and financial support to local government to help manage the coastal zone.

The NSW Coastal Management Framework is illustrated schematically in Figure 1-9: .



Figure 1-9: The NSW Coastal Management Framework (OEH 2018)

1.5.2 The RH SEPP

The CM Act sets out mandatory requirements for the preparation of a CMP. Under S13 (b) of the CM Act, the CMP must “consider and promote the objects of (the) Act” and “give effect to the management objectives for the Coastal Management Areas covered by the program”. The RH SEPP commenced on 1 March 2022. It supports implementation of the management objectives set out in the NSW CM Act. The hierarchy of Coastal Management Areas as referred to in the CM Act and RH SEPP are identified below, from highest to lowest priority:

- coastal wetland and littoral rainforest area (CWLRA) - areas which display the characteristics of coastal wetlands or littoral rainforests. Development controls for the mapped CWLRA aim to continue existing protection for these important ecological communities. Areas within a 100 m buffer zone bordering coastal wetlands or littoral rainforest are mapped within the RH SEPP as Coastal Wetland Proximity Areas or Littoral Rainforest Proximity Areas.

- coastal vulnerability area (CVA) - areas subject to coastal hazards such as coastal erosion and tidal inundation. Development controls for the CVA are concerned with managing risk to human life, infrastructure, and public and private property that may be impacted by coastal hazards and ensuring that legacy issues are not created for future generations to deal with. Note that the CVA for the open coast within the CMP Study Area is yet to be determined.
- coastal environment area (CEA) - areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included. Development controls for the CEA aim to protect and improve natural coastal features, coastal waters and environmental values for places such as beaches, dunes, surf zone and undeveloped headlands.
- coastal use area (CUA) - land adjacent to coastal waters, estuaries and coastal lakes and lagoons where impacts of development on the use and enjoyment of the beaches, foreshores, dunes, estuaries, coastal lakes and lagoons, and the ocean, need to be considered. Development controls for CUA are concerned with ensuring appropriate urban development for coastal areas, considering urban design issues such as the bulk, scale and size of proposed development, water sensitive urban design, and preventing adverse impacts on scenic qualities, visual amenity and Aboriginal cultural heritage.

Each of the above areas has outcome-oriented management objectives (as outlined in Section 1.5.2) so that councils can apply appropriate management tools and development controls.

This CMP does not propose any changes to the CWLRA, CUA or CEA at this stage. It is noted that the NSW Government has commenced consultation on the proposed Climate Change and Natural Hazards State Environmental Planning Policy (SEPP), which will support the new object in the *Environmental Planning and Assessment Act 1979* to better respond to climate change risks (including coastal hazards) and make decisions that reflect the level of risk involved.

1.5.3 Coastal Management Program

The purpose of a CMP is to set the long-term strategy for the coordinated management of the coastal zone with a focus on achieving the objects of the CM Act. It provides an opportunity for councils, public authorities and local communities to plan for, and implement, actions that will help achieve coastal management objectives at a local level, consistent with the objects of the CM Act.

The CM Manual provides information to help councils evaluate and select management actions that are feasible and effective in managing the coastal environment. These **actions are then incorporated into councils' land use planning instruments and Integrated Planning and Reporting (IP&R) Framework**, established under the *Local Government Act 1993* (LG Act).

This CMP has been prepared in accordance with the process described in Section 1.2 and depicted in Figure 1-1.

1.6 Roles and Responsibilities

1.6.1 Governance Context

The current governance across the coastal zone is multi-layered, with the shorelines, waterways and reserves of the CMP Study Area (and associated assets) owned and managed by a number of stakeholders across multiple levels of government. One of the objectives of the CMP is to facilitate the integration of management responsibilities across the CMP Study Area, including the council, land managers and public authorities.

The following agencies have a role in management of the coastal zone.

1.6.1.1 Central Coast Council

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

1.6.1.2 NSW Government

There are numerous state government agencies with management roles and responsibilities across the CMP Study Area that are relevant to the CMP. These agencies are spread across five (5) separate state government departments (or clusters). These agencies and their role in coastal management in NSW are listed in Table 1-2: . Some of these agencies have a land and asset management role, whilst others are issues based.

Table 1-2: Agencies with a role in Coastal Management

Agency	Role
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. MEMA brings together the heads of the NSW government agencies with key marine estate responsibilities – including DCCEEW, Department Primary Industries and Regional Development (DPIRD) Fisheries, and TfNSW (MEMA, 2019).
NSW Department of Climate Change, Energy, the Environment	The Conservation Programs, Heritage and Regulation Group of DCCEEW (DCCEEW-CPHR) has the role of supporting councils and communities in managing the open coast, estuaries and coastal lakes. The Department provides oversight of the State's coastal management program. The Department is the first point of contact for local councils planning to prepare and implement a CMP. The Department's role is to work in partnership with councils and local communities to manage the coast

Agency	Role
<p>and Water (DCCEEW)</p>	<p>in accordance with the Coastal Management Framework. DCCEEW-CPHR provides the following data and technical advice:</p> <ul style="list-style-type: none"> • wave data and data on historical coastline changes • information on coastal and estuarine processes, sediment cells and coastal geomorphology/coastal engineering • information on coastal hazard and risk assessment • advice on ecosystem health and habitat mapping. <p>The Department also administers the Coastal and Estuary Grants Program that provides funding for councils to prepare and implement their coastal management program.</p>
<p>National Parks and Wildlife Service (NPWS)</p>	<p>NPWS manage over 7 million hectares of land across NSW, including more than 870 national parks and reserves, 4 World Heritage-listed sites, a number of Australian National Heritage sites and 17 Ramsar wetlands. These protected areas play a critical role in conserving biodiversity, as well as natural and cultural heritage. NPWS manages the estuaries and beaches within national parks on the Central Coast coastline and is responsible for provision of facilities such as picnic areas, boardwalks and lookouts in the national park areas.</p> <p>Much of the CMP Study Area is managed by NPWS as part of Bouddi National Park, Wamberal Lagoon Nature Reserve, Wyrabalong National Park and Munmorah State Recreation Area.</p>
<p>Crown Lands Department of Planning, Housing and Infrastructure (DPHI)</p>	<p>Crown land is land held by the NSW Government on behalf of the public. The Department of Planning, Housing and Infrastructure (DPHI) Crown Lands are responsible for the administration of Crown Land, including its parks, reserves, roads, assets, infrastructure, and cemeteries. Crown land is managed by a range of organisations including the Minister for Lands and Property, Crown Land Reserve Managers and Councils. Crown Lands supports and partners with a range of agencies and organisations to ensure that Crown Land is managed in accordance with the Crown Land Management Act 2016 and associated regulations, policies and guidelines</p>
<p>Transport for NSW (TfNSW)</p>	<p>TfNSW, through Roads and Maritime Services, is the operating agency responsible for provision and management of road and maritime networks as part of the transport system. Through the maritime division, TfNSW is responsible for managing recreational boating activities, navigable waterways and assets in the Central Coast. It is also responsible for the direct delivery of a number 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,</p>

Agency	Role
	wharves and pontoons across the CMP Study Area (noting that most boat ramps are generally owned and managed by local councils).
NSW State Emergency Service (NSW SES)	NSW SES is the combat agency for floods, storms and tsunami. NSW SES is responsible for planning for and responding to flood, storm and tsunami events, including evacuation of those at risk. Coastal erosion events that are not caused by storms are the responsibility of the Local Emergency Operations Controller (LEOCON). The NSW State Storm Plan (2023) aligns with the CM Act. Under this Act, Local Government Councils have the responsibility for developing CMPs (which outline the management of the coastal zone). Part of this plan outlines actions that can be undertaken during emergency situations, to minimise damage to the coastal zone (known as a Coastal Zone Emergency Action Subplan).
NSW Department of Primary Industries and Regional Development (DPIRD Fisheries)	DPIRD Fisheries has a regulatory role which seeks to ensure that developments comply with the requirements of the <i>Fisheries Management Act 1994</i> , (FM Act, namely the aquatic habitat protection and threatened species conservation provisions in Part 7 and 7A of the Act, respectively), and the associated Policy and Guidelines for Fish Habitat Conservation and Management (2013). CMPs should take into account the objectives of the FM Act and associated regulations.
Infrastructure NSW	Infrastructure NSW was established in July 2011 to assist the NSW Government in identifying and prioritising the delivery of critical public infrastructure for NSW. It is an independent statutory agency, established under the <i>Infrastructure NSW Act 2011</i> . Among other functions as outlined in the <i>Infrastructure NSW Act 2011</i> , Infrastructure NSW is responsible for preparing project implementation plans for major infrastructure projects, reviewing and evaluating proposed major infrastructure projects by government agencies or the private sector, overseeing and monitoring the delivery of major infrastructure projects and other infrastructure projects identified in plans adopted by the Premier and managing and assessing the risks involved in planning, funding, delivering and maintaining infrastructure.
NSW Environment Protection Authority (NSW EPA)	<p>The NSW Environment Protection Authority (EPA) is the primary environmental regulator for New South Wales. The EPA's role includes protecting, restoring and enhancing the quality of the environment in NSW and reducing risk to human health. The EPA's role in emergency management is to respond to emergencies where the environment is at risk of being impacted. Waste management and clean-up are a key function of this role in natural disaster and disease outbreak responses (pandemics and biosecurity emergencies).</p> <p>The EPA also issue environment protection licences to control activities that could have an impact on the environment or human health, and to encourage better environmental performance. They also monitor emissions and compliance, conduct audits and investigate reports of pollution, and enforce NSW environmental laws.</p>

Agency	Role
NSW Police	<p>The NSW Police Force has an important role in emergency management, being the agency responsible for:</p> <ul style="list-style-type: none"> • law enforcement and search and rescue • controlling and coordinating the evacuation of victims from the area affected by the emergency in conjunction with the combat agency being the combat agency for terrorist acts. <p>Some members of the NSW Police may also be appointed as Emergency Operations Controllers.</p> <p>Police would typically become involved in a coastal erosion or inundation event as follows:</p> <ul style="list-style-type: none"> • assisting NSW SES where required (for example controlling and coordinating evacuation) when NSW SES was acting in its Combat Agency role or • if NSW SES was not mobilised, police may undertake or coordinate activities such as evacuation, barricading, removal of the contents of buildings and the like.
NSW Local Land Services (LLS)	<p>Local Land Services is a regional-focused NSW Government agency delivering quality customer services to farmers, landholders and the wider community. Local Land Services connect people with groups, information, support and funding to improve agricultural productivity and better manage our natural resources. The agency's remit covers agricultural production, biosecurity, natural resource management and help during emergencies. Local Land Services administer a variety of funding opportunities to assist farmers, landholders, Landcare, Aboriginal community groups and other partners to assist and promote the adoption of sustainable land management practices.</p>
NSW Reconstruction Authority (RA)	<p>The Reconstruction Authority was established under the NSW <i>Reconstruction Authority Act 2022</i> and is responsible for promoting community resilience to the impact of disasters in New South Wales through:</p> <ul style="list-style-type: none"> (a) disaster prevention, preparedness and adaptation, and (b) recovery and reconstruction following disasters. <p>The Authority has functions and powers to:</p> <ul style="list-style-type: none"> • facilitate the protection, recovery and reconstruction of affected communities • mitigate against the impact of potential disasters on communities, and

Agency	Role
	<ul style="list-style-type: none"> improve the resilience and adaptability of affected communities in relation to potential disasters, including, for example, by the betterment of affected communities.

1.6.2 Traditional Owner Groups

First Nations people have been custodians of the Central Coast area for 60,000 years and there are thousands of registered sites of cultural significance on the Central Coast. It is noted that 'the Central Coast local government area is one of the largest and fastest growing Aboriginal communities in Australia. This population grew by 38% in the last Census reporting period' (Central Coast Council, 2023).

The Darkinjung Local Aboriginal Land Council (LALC) is active along the Central Coast, with its boundaries stretching from Catherine Hill Bay to the Hawkesbury River. The LALCs have a degree of governance and interface with the Council, as well as the various State and Federal Government bodies. 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. The LALCs aim to achieve long term economic and social solutions for the Aboriginal communities, and to conserve and maintain cultural and heritage land management.

Barang Regional Alliance Ltd (Barang) is the recognised regional governance structure for the Aboriginal community living on Darkinjung land. Their mandate is to empower the whole of the Aboriginal community through advocacy and the advancement of leadership, which is underpinned by culture. Barang supports improved outcomes for the local Aboriginal Community in early childhood development, youth empowerment, employment, health and across various other socioeconomic indicators, by collaborating with the community and partner organisations through targeted programs.

1.6.3 Stakeholders

Stakeholders are persons or groups who are affected, or whom can affect, the outcome of a project (IFC, 2008). Stakeholder identification and analysis is ongoing and those identified in stage 1 and 2 remain relevant to Stages 3, 4 and 5 of CMP development. Council has undertaken extensive Community and Stakeholder consultation as described in Section 3.

There are a number of stakeholders across the Central Coast with an interest in this CMP, and a non-exhaustive list is provided below in Table 1-3.

Table 1-3: Stakeholders with an interest in coastal management for the purpose of this CMP

Stakeholder groups	Interests	Communication tools and engagement methods
Central Coast Council – internal teams	<ul style="list-style-type: none"> • Strong Coastal Management in Council and community values, aspirations and long-term vision • Developing a CMP which is accepted by the community and maintains good relationships with the local community • Protection of the environment, community and coastal way of life 	<ul style="list-style-type: none"> • Meetings/Face-to face or MS Teams • Email updates • Reports and study updates
Relevant Ministers and Members of Parliament (State and Federal)	<ul style="list-style-type: none"> • Being across the CMP development to inform local constituents, if required 	<ul style="list-style-type: none"> • Formal letters and emails • Council website • Media releases as appropriate
State Government, including <ul style="list-style-type: none"> • NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) • NSW Coastal Council • NSW Department of Planning, Housing and Infrastructure (DPHI) • National Parks and Wildlife Services (NPWS) • Crown Lands • NSW Department of Primary Industry (DPI) – Fisheries • Infrastructure NSW • Heritage NSW • Transport for NSW (TfNSW) • NSW Local Land Services • NSW State Emergency Service (SES) • Marine Estate Management Authority • NSW Local Land Services 	<ul style="list-style-type: none"> • Involvement in CMP development and updates on progress as required • Alignment with government regulations • Coastal management, including management of coastal hazards and any changes to processes • Maritime safety • Boating infrastructure and facilities • Environmental management- impacts and opportunities • Crown land • Fisheries management and habitat conservation 	<ul style="list-style-type: none"> • Meetings/Face-to face or MS Teams if required • External workshops • Formal letters • Presentations • Emails/Email updates • Council website • Public exhibition
Local boating and fishing clubs, for example: <ul style="list-style-type: none"> • Central Coast Game Fishing Club • Social Fishing Club • Central Coast Rock Fishing NSW 	<ul style="list-style-type: none"> • Maritime safety • Potential constraints and opportunities associated with water and fishing access and boating navigation • Protection of fishing areas and marine species • Involvement in and updates on CMP development 	<ul style="list-style-type: none"> • Council website • Social media updates • Email updates • Community information sessions • Facilitated workshops • Public exhibition • Interactive maps and online

Stakeholder groups	Interests	Communication tools and engagement methods
<p>Local community associations and groups, for example:</p> <ul style="list-style-type: none"> • Surf lifesaving clubs • Walking groups • Save our Sands 	<ul style="list-style-type: none"> • Involvement in and updates on CMP development • Management of coastal areas in a way that protects and enhances the local environment and community safety • Potential impacts and opportunities relating to the environment, coastal areas and hazards, ongoing access and use of coastal areas 	<p>surveys</p> <ul style="list-style-type: none"> • Council website • Social media updates • Email updates • Community information sessions • Facilitated workshops • Public exhibition • Interactive maps and online surveys
<p>Local environment groups, including:</p> <ul style="list-style-type: none"> • Landcare groups • Bushcare groups • Coastcare groups • Dune care groups 	<ul style="list-style-type: none"> • Involvement in and updates on CMP development • Management of coastal areas in a way that protects and enhances the local environment and community safety • Potential impacts and opportunities relating to the environment, coastal hazards, access and use of coastal areas, cultural heritage, protection of flora and fauna- marine and terrestrial 	<ul style="list-style-type: none"> • Council website • Social media updates • Email updates • Community information sessions • Facilitated workshops • Public exhibition • Interactive maps and online surveys
<p>Aboriginal groups and stakeholders, including:</p> <ul style="list-style-type: none"> • Darkinjung Local Aboriginal Land Council • Aboriginal Advisory Committee • Traditional owners • Barang Regional Alliance 	<ul style="list-style-type: none"> • To improve, protect and foster the best interests of Aboriginal persons in the region • Protection of habitats, ecosystems, plant and animal species, landforms and cultural heritage sites of significance • Involvement in and updates on CMP development 	<ul style="list-style-type: none"> • Council website • Social media updates • Email updates • Community information sessions • Facilitated workshops • Meetings • Public exhibition • Interactive maps and online surveys
<p>Central Coast Community- including those who live and/or own properties in the LGA.</p>	<ul style="list-style-type: none"> • Involvement in and updates on CMP development • Management of coastal areas in a way that protects and enhances the local environment and community safety • Local benefits, opportunities and impacts from any changes to coastal management processes 	<ul style="list-style-type: none"> • Council website • Social media updates • Email updates • Community information sessions • Facilitated workshops • Meetings • Public exhibition • Interactive maps and online surveys
<p>Local business and industry groups, including:</p> <ul style="list-style-type: none"> • Chamber of Commerce • Tourism operators • Recreational boating and 	<ul style="list-style-type: none"> • Involvement in and updates on CMP development • Management of coastal areas in a way that protects and enhances the local environment and community safety 	<ul style="list-style-type: none"> • Council website • Social media updates • Email updates • Community information

Stakeholder groups	Interests	Communication tools and engagement methods
surfing hire	<ul style="list-style-type: none"> Potential impacts and opportunities relating to the environment, coastal hazards, access and use of coastal areas, cultural heritage, protection of flora and fauna- marine and terrestrial Potential impacts and opportunities to local business operations and future development 	sessions <ul style="list-style-type: none"> Facilitated workshops Meetings Public exhibition Interactive maps and online surveys
Police and Emergency Services: <ul style="list-style-type: none"> NSW Water Police Australian Border Force Ambulance Services NSW SES Fire Brigade Marine Rescue NSW 	<ul style="list-style-type: none"> Community and maritime safety Boating facilities and water access Management of natural and coastal hazards 	<ul style="list-style-type: none"> Council website Email updates Meetings Public exhibition Interactive maps and online surveys
Educational services, such as schools	<ul style="list-style-type: none"> Local benefits and opportunities as well as any potential impacts Future coastal management 	<ul style="list-style-type: none"> Council website Social media updates Email updates Community information sessions Facilitated workshops Meetings Public exhibition Interactive maps and online surveys
Media	<ul style="list-style-type: none"> Project updates and progress Potential impacts and opportunities 	<ul style="list-style-type: none"> Council website Media releases

1.6.4 Legislative Context

1.6.4.1 Coastal Management Act 2016

The *Coastal Management Act 2016* (CM Act), commencing on 3 April 2018 and replacing the *Coastal Protection Act 1979*, communicates 13 key objects (section 3) to achieve the **NSW Government’s vision for ecologically sustainable management, usage and development of the coast to best protect the natural, social, cultural and economic values of the coast and its communities.**

The ‘coastal zone’ is redefined in the CM Act (section 5) as a broad system composed of four different management areas: Coastal Wetland and Littoral Rainforest Zones, Coastal Vulnerability Zones, Coastal Environmental Zones and Coastal Use Zones, each with their own management objectives.

The CM Act mandates the requirement for local councils with land within coastal zones to prepare a CMP in accordance with the CM Manual (section 13 and 14). The CMP places emphasis on implementation of coastal management by requiring the program to be **given effect within the councils' strategic planning documents such as their IP&R** framework (section 22). This will involve performance auditing powers to ensure that programs are appropriately implemented.

The programs and activities undertaken as a result of the Act will aim to be feasible, financially viable and sustainable, reflect community priorities and align strongly with the broader community strategic plans.

1.6.4.2 State Environmental Planning Policy (Resilience and Hazards) 2021

The State Environmental Planning Policy (Resilience and Hazards) 2021 (the SEPP), supports implementation of the management objectives set out in the CM Act. It consolidates the three now-repealed coastal-related SEPPs: SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan, into one planning policy. The four Coastal Management Areas, defined in the Act, are mapped in the RH SEPP. Each area has outcome-oriented management objectives so that councils can apply appropriate management tools and development controls.

1.6.4.3 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act* (EP&A Act) 1979 forms the statutory basis for planning and environmental assessment in NSW. The EP&A Act 1979 ensures that consent authorities duly consider environmental concerns and the potential impacts of a proposed development on threatened species, populations and ecological communities listed under the *NSW Biodiversity Conservation Act* 2016 (which replaced the *Threatened Species Conservation Act* (TSC Act) 1995) and the *NSW Fisheries Management Act* (FM Act) 1994. Section 5A (7-part test) of the EP&A Act assesses whether the impact of a proposal on the above groups will be significant.

This assessment is undertaken to determine whether any proposed works will have a significant impact on the environment, threatened species, populations, ecological communities and their habitats. It also assesses the type, nature and severity of potential environmental impacts in accordance with state planning legislation and allows the determining authority to decide whether a significant environmental impact will occur by:

- Identifying all environmental issues relevant to a proposal;
- Assessing the significance of potential adverse environmental issues; and
- Outlining measures to minimise these impacts.

1.6.4.4 Central Coast Local Environmental Plan 2022

A Local Environmental Plan (LEP) is the primary legal planning document for guiding land use and planning decisions made by Council. An LEP describes what can be undertaken on land and is supported by mapping (including land use zones, height of building, lot size maps etc.). Through zoning and development controls, the LEP allows Council to manage the way in which land is used to strategically plan for the region and shape and support our local communities.

The Central Coast Local Environmental Plan 2022 (CCLEP 2022) is a consolidation of Gosford LEP 2014 and Wyong LEP 2013 into one plan for the entire Central Coast. The CCLEP 2022, and the corresponding Central Coast Development Control Plan 2022 (CCDCP 2022) currently provides two separate sets of controls underpinning the approach to planning decisions for the northern and southern half of the Central Coast LGA.

Currently, the CCLEP 2022 does not include any provision for development controls relating to coastal hazards, or any mapping of coastal vulnerability.

1.6.4.5 Crown Land Management Act 2016

The *Crown Land Management Act 2016* (CLM Act) commenced on 1 July 2018, introducing a consolidated, modern piece of legislation to govern the management of Crown land in NSW.

The CLM Act requires Councils to manage their dedicated or reserved land as if it were public land under the *Local Government Act 1993* (LG Act). Most of this land is classified as **"community land" under the LG Act, meaning that councils** are required to have plans of management in place for the land. Under the Local Government Act, a plan of management (POM) must be adopted by council for all community land.

Crown Lands released the Coastal Crown Land Guidelines in 2023. The guidelines explain how coastal Crown land management aligns with NSW legislation, clarifying planning and approval requirements, and formalising current processes and procedures.

The guidelines integrate coastal Crown land management with CMPs and PoMs prepared by local councils in consultation with communities.

Where management actions are proposed on Crown Land, relevant authorisations and approvals may need to be obtained under the Crown Land Management Act 2016.

Management actions undertaken on Crown Land will also need to consider Aboriginal Land Claims lodged under the NSW Aboriginal Land Rights Act 1983. All management actions will need to be compliant with the *Native Title Act 1993* (Commonwealth).

1.6.4.6 Fisheries Management Act 1994

The objects of the *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

This act applies to all waters within the Central Coast area and sets out guidelines for the management of recreational and commercial fisheries.

The Fisheries Management (FM) Act also has provisions within it to protect key fish habitat and threatened aquatic species. The FM Act also applies to the management of commercial, recreational and aboriginal fishing and aquaculture in NSW.

1.6.4.7 Local Government Act 1993

The *Local Government Act 1993* sets out the legal framework and responsibilities of a system of local government in NSW. The Act states that a council may levy an annual charge for the provision of coastal protection services to land that benefits from the services (Section 496B (1)). Section 606C sets out a process of review for the cost of coastal management in response to the administering of the *Coastal Management Act 2016*.

1.6.4.8 Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* is set out in Section 1.3 of the Act:

“to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development”

Set out in the Act are a range of bioregions and ecological communities present in the Central Coast region. The CMP must consider these communities and support the objectives of this Act in conserving biodiversity.

1.6.4.9 National Parks and Wildlife Act 1974

The NPW Act is the primary statute for management of Aboriginal cultural heritage in New South Wales. Items of Aboriginal heritage (Aboriginal objects) or Aboriginal places (declared under section 84) are protected and regulated under the NPW Act.

Under the Act, an Aboriginal object is defined as ‘any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains’. As such, Aboriginal objects are confined to physical evidence and are commonly referred to as Aboriginal sites.

Aboriginal objects are protected under section 86 of the Act. It is an offence to harm or desecrate an Aboriginal object, either knowingly (section 86(1)) or unknowingly (section 86(2)). There are offences and penalties relating to the harm to, or desecration of, an Aboriginal object or declared Aboriginal place. Harm includes to destroy, deface, damage or move.

Within the Central Coast area there are many sites with significant Aboriginal heritage value. Along the coast and associated estuaries, identified sites include middens, burial sites, artefacts and ceremonial areas.

1.6.4.10 Marine Estate Management Act 2014

The *Marine Estate Management Act 2014* guides management of marine estates to promote ecologically sustainable development, scientific research, economic and recreational use at the state level. Under the Act, a marine estate is defined as coastal water, estuaries, lakes, lagoons, partially enclosed bodies of water that are open to the sea, coastal wetlands and land adjacent to coastal waters that are subject to oceanic processes.

Part 3 of the Act states that a marine estate management strategy must state the vision and priorities for management of the marine estate, in consultation with relevant stakeholders and subject to periodic review by the ministers. Part 4 of the Act requires an assessment and report of the threats and risks to the marine estate in an environmental, economic and social context.

The Act also sets out regulations for the management of declared marine parks to conserve biological diversity, ecosystem integrity and function. To ensure these objectives are met, management plans for these areas are required by section 47 of the Act.

A CMP for the Central Coast open coast must support the objects of this Act.

1.6.4.11 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* (ALRA) recognises the Aboriginal people as the traditional owners and occupants on the land and introduces the following key legislations. The ALRA provides land rights to Aboriginal persons in NSW, provides the mechanisms to form Aboriginal Land Councils, and vests land in those Councils.

The ALRA was established with the purpose of returning land in NSW to the Aboriginal people through the process of lodging claims for certain Crown Lands.

The Central Coast LGA is within the administrative areas of the Darkinjung LALC. The CMP study area is incorporated entirely within the boundaries of the Darkinjung LALC, whose boundaries extend from Catherine Hill Bay to the Hawkesbury River.

1.6.4.12 Native Title Act 1993

The *Native Title Act 1993* is Commonwealth legislation that recognises and protects Native Title. The Act recognises the rights and interests of Aboriginal and Torres Strait Islander people in land and waters according to their traditional laws and customs. The Act established a process for claiming and recognising native title over lands and waters in Australia. The NTA aims to balance Indigenous and non-**Indigenous peoples' rights to**

land, and sets out how native title rights and interests fit within Australian law. The main objects of the Act are:

- (a) to provide for the recognition and protection of native title; and
- (b) to establish ways in which future dealings affecting native title may proceed and to set standards for those dealings; and
- (c) to establish a mechanism for determining claims to native title; and
- (d) to provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title.

Native title may be claimed in areas where it has not been extinguished, such as

- vacant (or unallocated) Crown land
- parks and public reserves
- beaches
- some leases (such as non-exclusive pastoral leases)
- land held by government agencies
- some land held for Aboriginal and Torres Strait Islander communities and
- oceans, seas, reefs, lakes, rivers, creeks and other waters that are not privately owned.

1.6.4.13 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and regulations are Australia's main national environmental legislation. The EPBC Act refers to the living things (including plants and animals), habitats and places that need protecting as 'matters of national environmental significance'. These include:

- World Heritage areas
- Commonwealth Heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and listed ecological communities
- listed migratory species (protected under international agreements)
- Commonwealth marine areas
- Great Barrier Reef Marine Park

- nuclear actions (including uranium mines)
- water resources (relating to unconventional gas development and large coal mining development).

When actions (projects) are taken that can have an impact on protected matters or Matters of National Significance under the EPBC Act, these may need approval from both the Australian government and state or territory or local governments, which may **require an Assessment of Significance to assess the project's impact on protected matters** listed in the EPBC Act. In the Central Coast coastal zone, an example of a Protected Matter under the EPBC Act is the presence of Little Terns at North Entrance.

2. A Snapshot of Issues

2.1 Overview

The CMP Study Area is impacted by the hazards of:

- beach erosion
- shoreline recession
- coastal lake or watercourse entrance instability
- coastal inundation
- tidal inundation
- coastal cliff or slope instability.

These coastal hazards are expected to become more severe in the future with sea level rise. The areas impacted by these hazards have been mapped based on the outcome of the supporting studies, with maps presented in Appendix A. These hazard maps will be used to develop the future Coastal Vulnerability Area to be included in the RH SEPP.

The issues identified within the CMP Study Area are summarised below, with existing controls in place to reduce the impact of these issues identified as part of the Stage 3 CMP Risk Assessment (Worley Consulting 2024a).

Table 2-1: A Snapshot of Issues

Issue/ Theme	Key Issues
Access & Safety	<ul style="list-style-type: none"> • Increased erosion/scour associated with stormwater assets • Stormwater assets impacted by coastal inundation • Risk to public safety due to wave run up, wave overtopping, cliff instability, rockfalls and coastal erosion • Informal private access and use damaging vegetation and impacting on recreational amenity for the public • Inaccessible beach accessways impacted by coastal erosion • Damage to dunes and safety concerns due to generation of informal/unauthorised beach accessways • Safety concerns regarding exposure and mobilisation of buried remnants of historic foreshore protection works • Injury to beach users caused by structures mobilising during storm events • Dune instability/steep dune scarp impacted by coastal erosion • Damage to coastal recreational assets from storm events • Limited or out-dated information available on key indicators of coastal hazards and coastal dynamics • Coastal hazards impacting viability of existing and future infrastructure long term, need for long-term coastal adaptation planning • Coastal erosion threatening coastlines and infrastructure • Inconsistent standards of SLSC's patrol towers along the coast. Unable to provide sufficient public services. • Safety hazard due to unfenced cliffline at southern carpark of Soldiers Beach

Issue/ Theme	Key Issues
Amenities	<ul style="list-style-type: none"> • Aging or incompatible coastal recreation amenity infrastructure not compliant with engineering standards or industry best practice • Lack of guidance for implementing and assessing coastal protection works • Insufficient waste facilities and collection at coastal locations impacting amenity
Coastal Hazards	<ul style="list-style-type: none"> • Need for stronger planning controls to manage development in the coastal zone in relation to coastal hazards • Legacy coastal emergency works on beaches which no longer serve purpose, causing detrimental impacts or timeframe expired. • Structural integrity/slope stability • Unknown impacts associated with legacy landfill sites or other contamination that become exposed following erosion. • Coastal erosion threatening private properties and public infrastructure • Flat beach profile, no protection from wave overtopping at some of the beaches in the Study Area • Depletion of sand and undermining of coastal protection infrastructure
Community & Social	<ul style="list-style-type: none"> • Need for community and agency representation to support decision making • Lack of detailed cultural and heritage assessments across the LGA. Need for Aboriginal Heritage Impact Permits in areas affected by coastal erosion. • Unapproved memorial sites • Community awareness of coastal hazards and issues • Community awareness of cultural issues and practices, lack of understanding of traditional knowledge for managing the coast
Development	<ul style="list-style-type: none"> • Need for stronger development controls for development in the coastal zone, particularly for areas under extreme risk from coastal hazards • Need for geotechnical information to inform planning decisions • Infrastructure at risk from coastal hazards • Coastal recreational amenity infrastructure as identified in the Central Coast Recreational Use Study (Vision Environment, 2022) at risk from or not resilient against coastal hazards • Rock/ocean pools maintenance and accessibility • Lack of awareness of property owners for properties affected by coastal hazards
Ecological Environment	<ul style="list-style-type: none"> • Reduced water quality from urban catchments, leading to reduced water quality in open coast receiving waters • Invasive weeds and pests reducing the diversity and abundance of native species. • Lack of guidance for appropriate planting in the coastal zone. • Lack of guidance for appropriate fencing/dune stabilisation controls in the coastal zone. • Illegal vegetation clearing. • Lack of Marine Park areas in Central Coast • Dune blowout at southern carpark at Soldiers Beach

Information gathered throughout the development of the CMP, including from community and stakeholder engagement and the results of the supporting studies, was compiled into a detailed risk assessment (Worley Consulting 2024a) to identify the key issues and risks throughout the Central Coast Open Coast. The sources of information included:

- Stage 1 Scoping Study (Royal Haskoning DHV 2021), which included a review of pre-existing information
- Stage 2 Coastal Hazard Study (Bluecoast Consulting Engineers, 2024-2025), investigating beach erosion/recession, cliff recession, coastal inundation and tidal inundation for immediate, 2040, 2050, 2070 and 2120 planning periods throughout the Central Coast LGA. A detailed register of both private and public assets impacted by coastal hazards for each of the planning periods was compiled

as part of Stage 2. Those areas most affected include MacMasters Beach/Copacabana, Avoca, Terrigal/Wamberal, The Entrance/The Entrance North.

- A series of community engagement activities held during Stages 1 to 3 including online surveys and input on the social pinpoint page, targeted engagement with community groups and workshops (as discussed in Section 3).

2.1.1 Stage 1

The first pass risk assessment, undertaken as part of the Scoping Study (Royal Haskoning DHV, 2021), identified Central Coast LGA-wide hazards and risks along with control measures/management actions while recognising the uncertainties associated with natural systems and future scenarios. Risks were identified together with existing management measures, with the key risks for the Open Coast evaluated in accordance with a risk matrix and recorded in a risk register.

For the Open Coast of the study area, the key risks and challenges identified from the first pass risk assessment were split into four impact areas: Public Safety, Infrastructure Damage, Environmental Risk and Public Amenity.

The key threats identified throughout the study area related to:

- Coastal Erosion and beach recession
- Coastal and tidal inundation/flooding
- Wave runup and overtopping
- Stormwater erosion and discharge
- Coastal Lagoon entrance dynamics
- Slope and cliff instability
- Water quality

Key gaps identified from the First Pass Risk Assessment include:

- Outdated coastal process and hazard information. The recommendation was made to undertake a coastal hazard study for the entire open coast and lagoons to define updated risk based derived coastal hazard lines for use in assessing risks to current and future development.
- Further update the definition of other hazards within the LGA including coastal inundation and coastal cliff or slope instability
- No register/database of public/private structures within the open coast area. Recommendation was made in the scoping study to undertake an audit of existing structures, including consideration of:
 - Ownership (public or private)
 - Permissibility

- Extent
- Year of construction (if known)
- Current condition
- Design standard (if known)

In addition, listed within the First Pass Risk Assessment as a risk control is to establish an ongoing coastal monitoring program to inform actions relating to coastal hazards, and to implement development and planning controls within the CCDCP/CCLEP.

2.1.2 Stage 2

The coastal hazard study undertaken in Stage 2 (Bluecoast Consulting Engineers, 2024-2025) provided a detailed register of both private and public assets impacted by coastal hazards for immediate, 2040, 2050, 2070 and 2120 planning periods. Those areas most affected include MacMasters Beach/Copacabana, Avoca, Terrigal/Wamberal, The Entrance/The Entrance North. Further, the Central Coast Recreational Use Study (Vision Environment, 2022) identified the coastal recreational activities occurring in the area and determined the adequacy of public amenities and infrastructure to accommodate for those activities now and into the future. The definition of the areas most at risk from coastal hazards was used to inform the detailed risk assessment undertaken in Stage 3.

2.1.3 Stage 3

The main issues, risks and opportunities for the Central Coast Open Coast were explored further during Stage 3, building upon the issues identified in the Stage 1 Scoping Study (Royal Haskoning DHV, 2021), by identifying key issues and risks in greater detail. This was informed by community and stakeholder consultation, which involved:

- the launch of a dedicated online *Our Coast, Our Waterways* consultation hub and community survey
- Interactive [Social Pinpoint](#) page
- Six community pop-up events and two targeted community stakeholder workshops
- Eight internal Council stakeholder workshops
- Agency stakeholder workshops

The key management issues identified through Stage 3 of the CMP process following stakeholder and community consultation are shown in Table 2-3. These relate to the six themes shown in Figure 2-1.



Figure 2-1: Key Issues/Themes Adopted for the Central Coast Open Coast CMP

Table 2-2: Key themes from Stage 3 Engagement

Coastal Hazards	Pathways and Access	Ecological Environment	Building and Encroachment	Amenities
<ul style="list-style-type: none"> - Sand nourishment and vegetation preferred over hard protection - Guidance for homeowners to implement seawalls - Council to plant natives along the dunes, grow in nursery and make available for the public to access - Install training walls at North Entrance - Sand scraping after storm events - Improve stormwater outlets to reduce erosion - More communication pre/post hazards - Plant low lying vegetation species to maintain line of sight for patrolling members - Secure rock escarpments - Lifeguards to patrol all year round 	<ul style="list-style-type: none"> - Carparks to be remarked/reconfigured to ensure safety and maximum parking - More parking at all beaches, create overflow parking (multistorey parking) - Parking designated for patrol members - Install clear signage in parking lots and boat ramps and regulate non-conformances - Reduce speed limits near beaches - Develop inclusive coastal walks along beaches - Develop inclusive viewing platforms - Provide adequate signage around boat ramps and regulate it - Secure bike and scooter parking - Safe beach access for families - Increase sand volume for accessibility - Provide disabled beach access 	<ul style="list-style-type: none"> - Need for educational signage to encourage the community to protect/value the environment and recognise cultural significance - Improve accessibility of ecological data - Council to grow/supply native/endemic coastal vegetation. More dune care groups and better resourcing to support them. - Increase vegetation to improve water quality and retain sand - Stronger stance and regulation on environmental vandalism - Increase wildlife habitat, build environmental corridors for animals - Control shark fishing/remove shark nets/restore fish habitats - Sand nourishment to replenish beaches - GPT's on all beaches to reduce rubbish - Create/implement Bitou and Lantana eradication plan - Educate Nippers about dune vegetation and to stay off the dunes - Compliance and targeting removal of unauthorised accessways - Support and host citizen science events - education programs 	<ul style="list-style-type: none"> - Softer engineering techniques - Don't allow development along the coastline. Buildings to be removable - Cost a buy back scheme - Reduce development in high-risk locations - Develop engineering guidelines to guide coastal protection on all beaches - No rezoning for C2 to R2 - No high rises - No subdivisions on any sand dune - Active compliance program to enforce DCP rules - Active compliance on illegal works, encroachment and environmental vandalism - Sustainable development for new housing population i.e., green spaces/community infrastructure/educational facilities - Council to challenge seaward boundaries 	<ul style="list-style-type: none"> - Ensure all amenity blocks and beach showers are fit for purpose, meet user demand, are inclusive and use water saving devices - Better signage to locate amenities - Install after hours defib and CPR signage - Bins for recycling, soft plastics and dog poo - Bin and collection required all year round - Moveable bins to be placed on the beaches - Consultation prior to changing amenities - More kids parks and shading - More public tables and seating

The outcome of the coastal hazard studies, as well as the community and State Government Agency engagement that has been carried out throughout the project, has enabled the key issues to be identified and risks quantified through a separate Detailed Risk Assessment (Risk Assessment report and Risk Register, Worley Consulting 2024a).

The Risk Assessment report and Risk Register categorises the main risks for the Central Coast Open Coast in terms of the Coastal Management Areas as referred to in the CM Act and RH SEPP (detailed in Section 1.5). The Risk Assessment builds upon the first-pass risk assessment undertaken as part of the Stage 1 Scoping Study (Royal Haskoning DHV, 2021), by identifying key issues and risks in greater detail. From the Risk Assessment and the outcome of the individual studies, a suite of potential management actions were developed and categorised in terms of the issues and particular locations which they relate to.

2.2 Social and Economic Context

There is widespread residential development along the Central Coast open coast with beachfront properties generally highly valued within the property market. A large number of these properties are at immediate risk from coastal hazards, as identified in Stage 2 (Bluecoast Consulting Engineers, 2024-2025). This risk increases into the future as a result of shoreline recession and climate change projections.

The Central Coast's Gross Regional Product is estimated at \$19.79 billion in 2022/23 (.id, 2025). Tourism directly or indirectly employed 11,500 people in 2022/23 (.id 2025). Tourism has added over \$2.5 billion to the local economy in 2022/23.

The importance of tourism to the local economy underscores the importance of planning for the enhancement of the local environment and public infrastructure along the coast.

The Central Coast Regional Plan 2041 identifies the need for strategic planning and local plans to consider opportunities to:

- review planning controls so that they are creating flexible and feasible conditions for housing supply
- align infrastructure and service delivery to match housing supply needs
- explore public domain improvements and limit development in hazard areas
- identify policies and processes that could be reviewed to improve certainty and streamline development processes
- promote urban design outcomes to support healthy and vibrant communities.

The coastal zone supports activities such as tourism that have important economic values for the region and local communities. With the Central Coast being a popular tourist destination for international and domestic visitors, the importance of well-located short-

term rental accommodation is recognised in the Central Coast Regional Plan 2041. The Plan also recognises that the risk from natural hazards including coastal processes is likely to increase over time due to climate change and that tourists, residents and communities may become isolated for extended periods. Strategy 7.6, 7.7 and 7.8 of the Plan recognises that local strategic planning is to consider pathways to build resilience and reduce vulnerabilities, demonstrate alignment with the NSW Government's natural hazard management and risk mitigation policy framework and ensure that future residential areas are not planned in areas where residents are exposed to a high risk from coastal hazards, evacuation is difficult or where existing residential areas are placed at increased risk.

The Central Coast Regional Plan 2041 identifies Terrigal and The Entrance as being "key activity destinations", with a need to maximise connectivity between these areas and the prioritisation of infill development between these areas, within 15 minutes' walk of locations such as Bateau Bay. One of the pillars of the NSW Housing Strategy 2041 is Resilience, which includes matching housing to community and environmental issues, so people, communities and their homes are safe, comfortable and resilient. This includes the need for infill and greenfield development to consider coastal hazards.

2.3 Coastal Hazards

The coastal hazards to be considered in a CMP are defined in Table 2-3. Of these, the coastal hazards relevant to the CMP Study Area and therefore covered by this CMP are:

- beach erosion
- shoreline recession
- coastal lake or watercourse entrance instability
- coastal inundation
- tidal inundation
- coastal cliff or slope instability.

Over the longer term, loss of sand from the beaches and coastal inundation will impact local tourism and the local economy. Where the risk cannot be reduced over time, adaptation of existing settlements to reduce the risk may be required. Strategy 7.9 of the Central Coast Regional Plan 2041 includes limiting the exposure of new development to coastal hazards, adaptation for existing settlements at risk of exposure to sea level rise and coastal hazards with means such as relocating or adapting infrastructure, undertaking beach nourishment or maintaining natural coastal defences through methods such as replanting and protecting coastal dune systems.

Beach Erosion is defined as occurring when wind, waves, currents or elevated ocean water levels are removing sediment that comprises the beach and frontal dune system,

landward of the fully accreted condition. Beach erosion can create risks to public and private assets and present public safety risk. Areas assessed to be at immediate risk from beach erosion are mapped in Appendix A and depicted in Table 2-4.

Key locations in the CMP Study Area that are subject to extreme risk from beach erosion include Wamberal and The Entrance North, with both public and private infrastructure to the value of hundreds of millions of dollars at immediate risk from erosion.

Consequences of beach erosion can include social impacts (loss of beach access, impacts on beach amenity), ecological impacts (beach and dune ecology), and economic impact (damage to infrastructure). Direct damage can occur to built assets such as dwellings, water and sewer infrastructure, roads, fencing and public amenities. Damage could be catastrophic, such as the destruction of dwellings or loss of life; or could be less serious, such as the temporary loss of services or damage to dune fencing. A temporary loss of beach amenity can occur due to beach erosion, which can have a direct impact on the economy or perceived values at the locality. Direct damage to natural assets such as beach dune ecology can also occur as a result of beach erosion – these systems are often resilient and may recover fully over time as the eroded dune system is restored under natural beach processes.



Figure 2-2: Beach Erosion at Wamberal. Top: June 1978 (News Limited); Bottom: June 2016 (Central Coast Council)

Shoreline recession refers to the continuing landward movement of the shoreline, or the net landward movement of the shoreline over a specified period of time, often over decadal timescales. This may be caused by an imbalance in the local sediment budget (e.g. longshore sediment transport out of a sediment compartment exceeding the sediment inflow, or permanent losses of sand due to offshore sediment transport to “sediment sinks” from which the sediment does not return, from a sediment compartment, or the landward transport of wind-blown sand out of the system, and long term impacts of sea level rise). The process is illustrated in Figure 2-3.

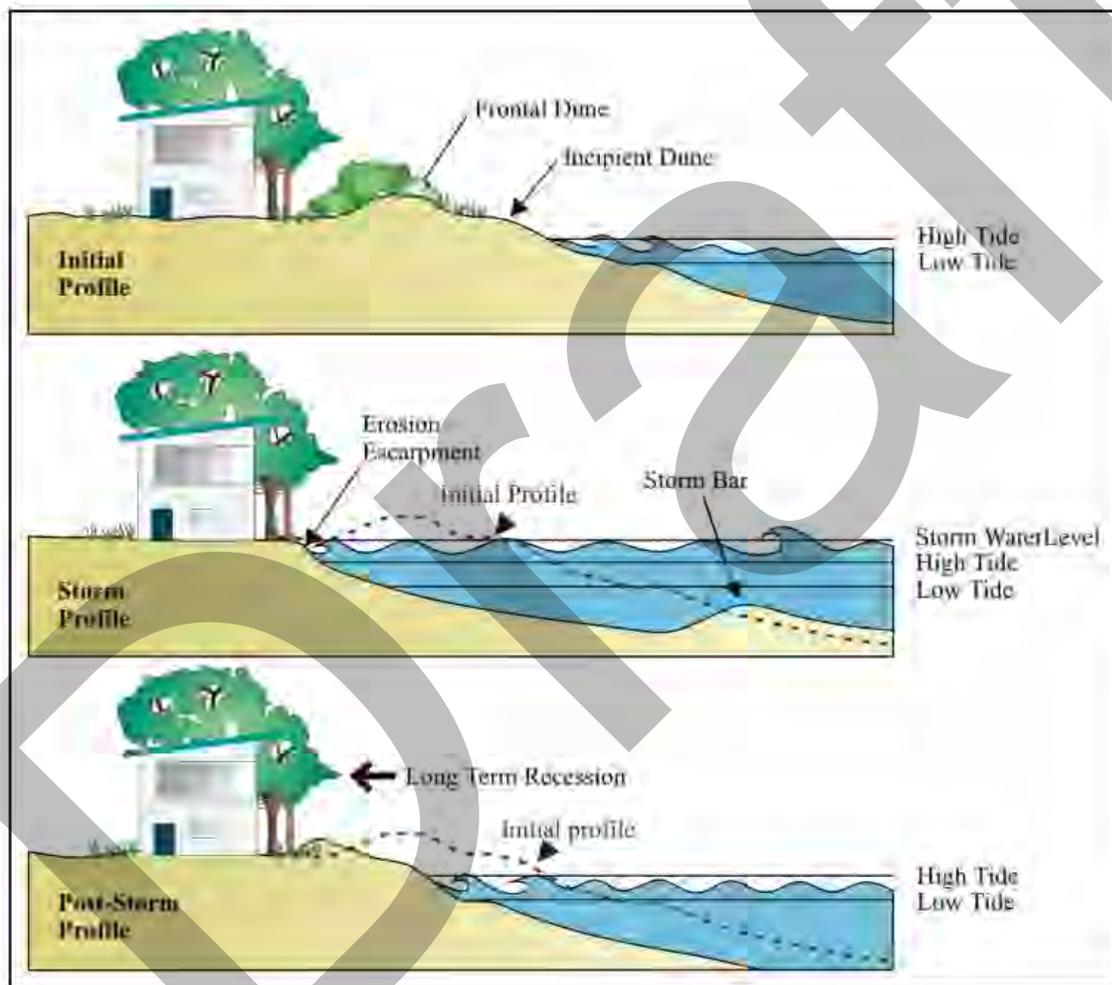


Figure 2-3: Beach erosion and shoreline recession (OEH 2018)

Cliff or slope 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 by surface and groundwater flows. Instability may occur during or following a coastal storm event, but may also occur at other times. The concept of cliff instability is shown in Figure 2-4. Areas affected by coastal cliff or slope instability are shown in Figure 2-5 and mapped in Appendix A.

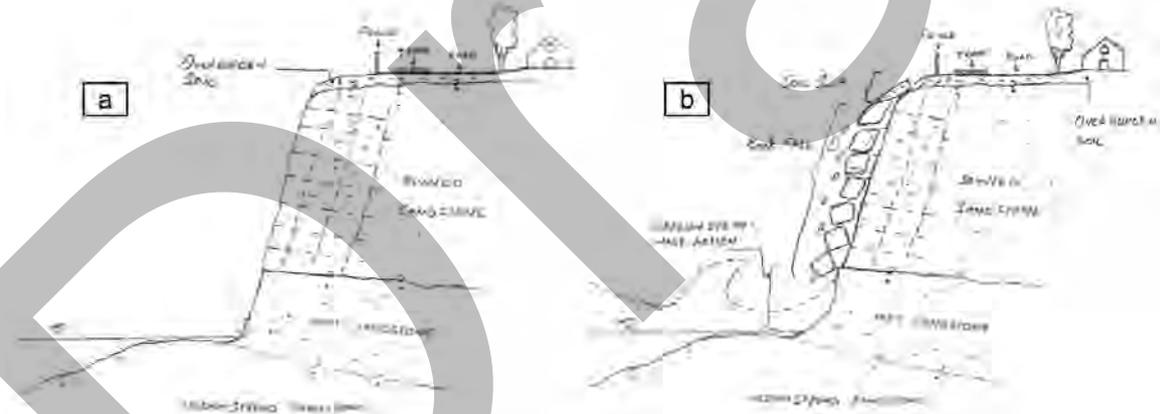


Figure 2-4: Concept of cliff instability (SMEC 2010)

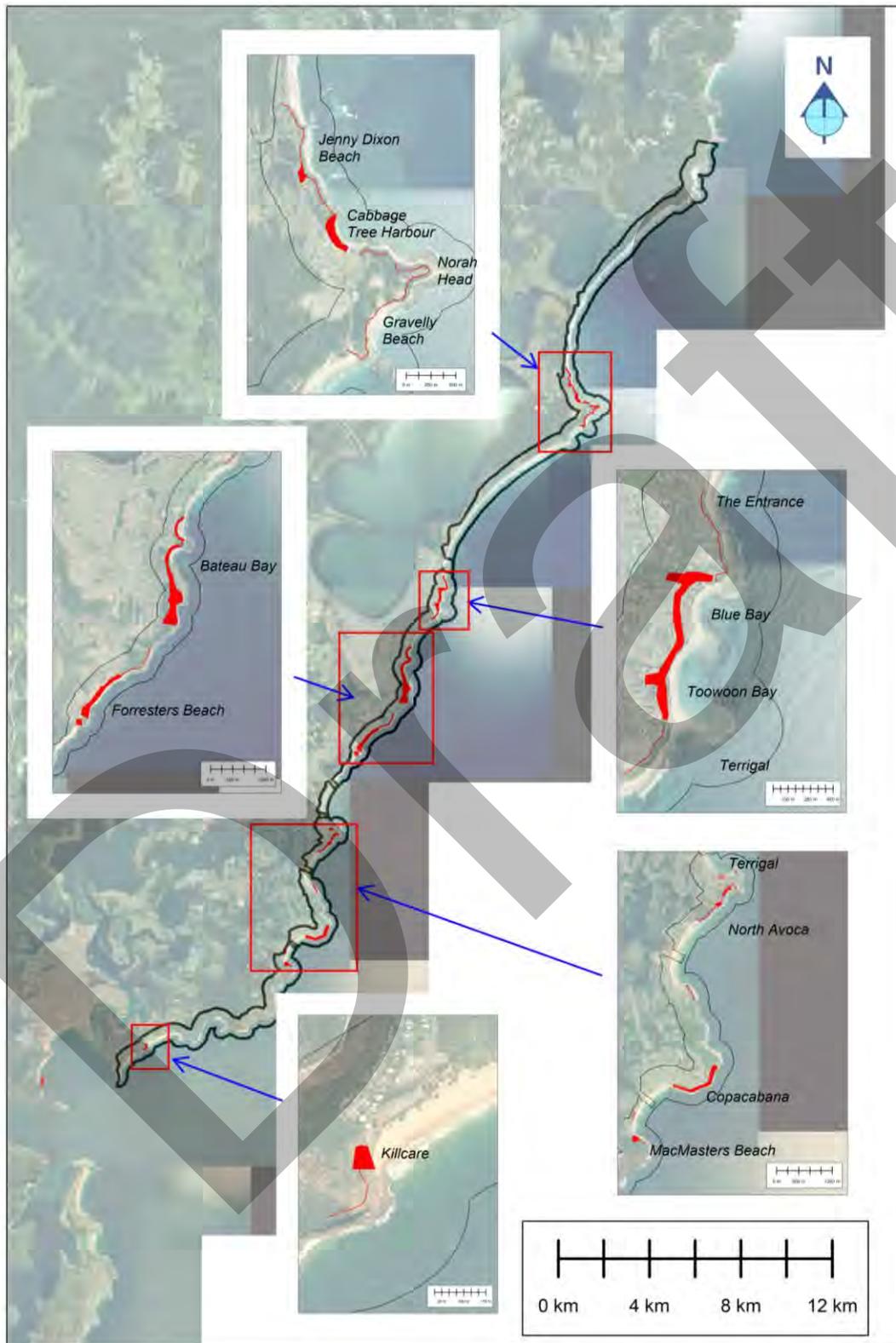


Figure 2-5: Areas subject to Coastal Cliff and Slope Instability

Coastal inundation is defined in the CM Manual Part B (OEH 2018) as occurring when a combination of marine and atmospheric processes raises ocean water levels above normal elevations, inundating low-lying areas. It is often associated with storms resulting in elevated still water levels (storm surge), wave setup, wave runup and wave overwash flows. For estuaries, this type of inundation is the result of water levels at the estuary entrances being elevated above normal levels due to coastal storms, with the elevated water levels propagating inside the estuary. Ocean waves can have an impact on the inundation level due to *wave setup*, which is the elevation of the nearshore still water level resulting from breaking waves. *Wind setup* can further cause an increase in oceanic **water levels, due to ocean water "piling up" against the coastline caused by wind stress.** Coastal inundation may also exacerbate foreshore erosion, which can impact infrastructure. Areas subject to immediate risk from coastal inundation are depicted in Table 2-5.

Built assets subject to inundation may not necessarily suffer catastrophic damage, depending on the depth and duration of the inundation. Inundation risk can sometimes be managed by applying certain design criteria to the building. Assets such as sewer and water pipelines may not be damaged or adversely impacted by coastal inundation, and dune ecology may be relatively adapted to occasional inundation. Inundation due to wave runup may pose a threat to public safety and the consequence could be injury or loss of life. There may also be temporary loss of access to properties as a result of coastal inundation.

Note that the NSW State Flood Plan (NSW State Flood Plan, 2021) under the *State Emergency and Rescue Management Act 1989* covers emergency actions for floods, **which include "...coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences".**

An example of coastal inundation at Avoca in May-June 1974 is shown in Figure 2-6.



Figure 2-6: Coastal inundation at Avoca Beach, May-June 1974

Tidal Inundation (also known as “sunny-day flooding”) is defined in the CM Manual as the inundation of land by tidal action under average meteorological conditions. Tidal inundation may include shorter-term incursion of seawater onto low-lying land during an elevated water level event such as a “king” or spring tide or more permanent inundation due to land subsidence, changes in tidal range or sea level rise.

Coastal Lake or Watercourse Entrance Instability - Both natural and trained entrances of estuaries and coastal lakes present a variety of potential hazards and risks. The entrance dynamics and the condition of the entrance also affect flood hazards, water quality and ecological health in the estuary or coastal lake (OEH 2018). Entrances are highly dynamic environments with their shape constantly changing in response to processes such as alongshore sediment transport, tidal flows, storms, and catchment flooding. Four of the beaches within the study area are backed by lagoons, namely Cockrone (behind MacMasters Beach), Avoca, Wamberal and Terrigal. All four of the lagoons are intermittently open to the oceans and are classed as Intermittently Closed and Open Lakes or Lagoons (ICOLLS). In addition, the dynamics at the entrance to Tuggerah Lakes have a strong influence on the dynamics of the surrounding beaches at The Entrance and The Entrance North. Entrance processes are covered by the CMPs for individual coastal lagoons or lakes, but their impact can extend some distance along the beach, impacting the area covered by the Open Coast CMP.

Table 2-3: Coastal Hazards covered by this CMP

Hazard	Rationale
Beach Erosion and Recovery	Covered in this CMP – this CMP covers the open coast beaches, which are all impacted to varying degrees by beach erosion due to coastal storm events. Beach erosion hazard has been mapped for different planning periods in Stage 2 (Bluecoast Consulting Engineers, 2024-2025). Mapping of beach erosion and recession has been undertaken for immediate, 2040, 2050, 2070 and 2120 planning periods, and for 1%, 2%, 5% and 10% Annual Exceedance Probability (AEP) storm events. Mapping has considered the landward limit of the <i>Zone of Slope Adjustment (ZSA)</i> , which is an area that encompasses that portion of the seaward face of the beach that would slump to a natural angle of repose following removal by wave erosion of the design storm demand. It represents the steepest stable beach profile under the conditions specified.
Shoreline Recession	Covered in this CMP – this CMP covers the open coast beaches. Stage 2 considered the sediment budget of all the beaches and considered long term adjustments to the shoreline due to sea level rise, longshore sediment transport, and known sediment sources and sinks (Bluecoast Consulting Engineers, 2024-2025). Mapping of this hazard has considered the position of the ZSA under different planning periods, following long term shoreline recession that is predicted to occur at some of the beaches in the CMP study area.
Coastal Lake or Watercourse Instability	Partially covered in this CMP – This CMP covers the impact of coastal lake and watercourse instability on the beaches of the open coast near the estuary entrances. The entrance areas themselves, and entrance management policies for each entrance, are not covered by this CMP but are covered separately in the CMPs for the coastal lagoons, and Tuggerah Lakes.
Coastal Cliff or Slope Instability	Covered in this CMP – this CMP covers the cliffs of the open coast, with the geotechnical hazards defined and mapped as part of Stage 2, and management actions developed to manage these hazards. Mapping of the predicted cliff line in 2120 for the Study Area, and mapping of zones of geotechnical instability, has been undertaken by (Bluecoast Consulting Engineers, 2024-2025) and J&K Geotechnics (2024), and is presented in Appendix A.
Coastal Inundation	Covered in this CMP – This CMP covers coastal inundation in the CMP Study Area caused by elevated oceanic water levels, wave runup and wave overtopping of the dunes that results in inundation of low-lying areas on the landward side of the dunes. This hazard has been mapped as part of Stage 2 (Bluecoast

Hazard	Rationale
	Consulting Engineers, 2024-2025). It does not cover coastal inundation caused by propagation of elevated water levels into the lagoons and estuaries, with this hazard covered separately in the CMPs for the coastal lagoons and Tuggerah Lakes.
Tidal Inundation	Covered in this CMP – This CMP covers tidal inundation of low-lying land adjacent to the open coast. It does not cover tidal inundation of low-lying lands adjacent to the lagoons and estuaries, where water levels at the estuary entrances are elevated due to astronomic tides under average meteorological conditions, with the elevated water levels propagating inside the estuary and inundating adjacent foreshores. Tidal inundation of the low-lying areas surrounding the estuaries is covered separately in the CMPs for the coastal lagoons and Tuggerah Lakes.
Erosion and Inundation of Foreshores Caused by the Action of Waves and Catchment Floodwaters	Not Covered in this CMP – This CMP does not cover foreshore erosion of the estuary foreshores of the coastal lagoons and Tuggerah Lakes – this is covered separately in the CMPs for the estuaries. This CMP does cover erosion and inundation of the foreshores of the open coast, with some of these areas being adjacent to estuary entrances (e.g. erosion/undermining at Marine Parade at the southern side of The Entrance channel).

“Catchment flooding” refers to flooding driven by heavy rainfall in the catchment areas of the estuaries and subsequent freshwater inflows. This type of flooding is often associated with the same weather systems as coastal inundation events, which are typically driven by low pressure systems, usually accompanied by intense rainfall. This CMP does not cover catchment flooding, which is covered under the NSW Floodplain Management process (with catchment flooding in the coastal lagoons covered in the Coastal Lagoon Catchments Overland Flood Study, MHL 2020).

A Coastal Vulnerability Area (CVA) has not yet been developed for the CMP Study Area. However, the mapped areas impacted by coastal erosion, shoreline recession, cliff and slope instability and coastal inundation as presented in Appendix A will be used to develop a CVA for inclusion in the RH SEPP.

Table 2-4: Areas assessed to be at immediate risk from beach erosion

Location	Private Property		Council and non-private property								
	Buildings (no)	Land (m ²)	Buildings (no)	Land (m ²)	Roads (m)	Pathways (m)	Utilities (m)				Total Utilities
							Drainage	Sewer	Water Mains	Sewer Pressure Mains	
Killcare	1	1,340									
MacMasters Beach Copacabana	7	54,005	2		112 (Marine Parade, Del Monte Pl)	72	73	103			176
Avoca											
Terrigal, Wamberal	72	44,490	2			34		15	2		17
Forresters Beach				80,260							
Shelly Beach						8					
Toowoan Bay, Blue Bay		287				8	9	32			41
The Entrance, The Entrance North	34	27,285	2	46,066	35 (Hargraves St)		27	8	8		43
Norah Head, Noraville	5	5,308		7,855		129	198	120		21	339
Budgewoi, Budgewoi Peninsula, Freeman, Wybung				273,245					2		2

Table 2-5: Areas subject to immediate risk from coastal inundation

Location	Private Property		Council and non-private property									
	Buildings (no)	Land (m ²)	Buildings (no)	Land (m ²)	Roads (m)	Pathways (m)	Utilities (m)				Total Utilities	
							Drainage	Sewer	Water Mains	Sewer Pressure Mains		
Killcare				2,516								
MacMasters Beach Copacabana	2	46,942	1		11 (Marine Pde)	6	47					47
Avoca*	78	54,526	12	-	644 (Ficus Avenue, Avoca Dr)	799	1,052	1,832	932	243		4,059
Terrigal, Wamberal	5	6,496	2			557	26					26
Forresters Beach				73,039								
Shelly Beach							3					3
Toowoan Bay, Blue Bay	3	2,683	1		27 (Access road to SLSC)	7	116	299				415
The Entrance, The Entrance North	3	6,397	2	95,392		38	146	173	37	35		391
Norah Head, Noraville	2	12,769		11,654	7 (Elizabeth Dr)	166	171	208	9	10		397
Budgewoi, Budgewoi Peninsula, Freeman, Wybung				317,589								

2.4 Coastal Management Issues

Key coastal management issues throughout the CMP study area have been identified at particular locations, through community/stakeholder engagement, review of existing information/studies, and detailed reconnaissance of the coastline by the CMP study team.

These issues are summarised below, with issues identified both for key specific locations, and issues which apply generally across the entire study area.

Examples of some of the issues and existing management responses within the CMP study area are provided in Figure 2-7.

2.4.1 Coastal Hazards

The CMP study area has been impacted by coastal hazards historically, and these have been subject to ongoing management at many locations, with management approaches determined from previous studies, the Gosford Beaches CZMP and the Wyong CZMP. Key impacts from coastal hazards across the open coast, together with existing management controls, are summarised in Table 2-6.

Figure 2-7: Example images of Coastal Hazards and known issues across the Central Coast open coast study area

	
<p>Windblown sand at carpark south of Avoca Lagoon entrance</p>	<p>Wave overtopping and coastal inundation at Avoca Beach (1986)</p>
	
<p>Site of surf club at MacMasters Beach, May-June 1974</p>	<p>Erosion escarpment at Copacabana Beach, May-June 1974</p>



Unstable slope and toe protection structure at Cabbage Tree Harbour, photo illustrating landslide occurrence in 2022 (Central Coast Council)



Scour from stormwater outflow at Copacabana



Coastal development at risk from erosion at Curtis Parade, The Entrance North (2022), photo courtesy Central Coast Council



Ad-hoc coastal protection works at Curtis Parade, The Entrance North (July 2024, photo courtesy Central Coast Council)



Slope instability and scour at stormwater outlet, Forresters Beach



Stormwater scour and damaged pedestrian access at Killcare SLSC



Ad-hoc coastal protection works at MacMasters Beach SLSC; works not engineered to provide protection against slope instability or beach erosion



Stormwater scour at North Avoca



Windblown dune at Soldiers Beach carpark (photo courtesy Central Coast Council)



Wave attack at coastal protection works at Terrigal Haven (photo DCCEEW)



Erosion and undermining of seawall at The Entrance channel



Unauthorised coastal protection works across the LGA (example shown at The Entrance North); works subsequently failed and slumped to the bottom of the slope in a storm event in May 2025



Coastal development at risk from erosion at Wamberal Beach



Coastal development at risk from erosion and authorised/unauthorised emergency protection works at Wamberal Beach

Table 2-6: Coastal management issues and existing management controls relating to coastal hazards

Beach	Coastal Management Area	Issue	Root Cause	Existing Controls
Avoca/Nth Avoca	Coastal Use	<p>Damage to public and private infrastructure and property, including Council Beach accessways</p> <p>Damage to foreshore vegetation</p>	Coastal erosion	<p>Seawall constructed at Avoca Beach to protect water and sewer infrastructure and improve beach access/amenity in front of SLSC</p> <p>Protocol in place to repair beach accessways and revegetation of dune following erosion in large storm event (Avoca Drive, Ficus Ave Carpark North Avoca)</p> <p>Relocation of sand to improve beach access and amenity (Avoca Lake Entrance)</p> <p>Repair damage to carpark and other infrastructure should coastal erosion occur (Avoca Beach SLSC and Carpark, Ficus Ave Carpark)</p> <p>Beach scraping to build dune in front of carpark and properties (165 Avoca Drive to 15 Ficus Avenue)</p> <p>Monitoring of dune erosion</p> <p>Beach scraping to build vegetated dune in front of SLSC and carpark</p> <p>Development controls based on a defined building line with new building to be founded into 2100 Stable Foundation Zone</p>
Avoca/Nth Avoca	Coastal Use	<p>Damage to seawalls caused by scour and/or coastal storms</p> <p>Damage to foreshore and assets seawalls are protecting</p>	Coastal erosion	<p>Monitor performance of existing rock works in front of surf club and carpark following large storm</p>
Avoca/Nth Avoca	Coastal Use	Injury to beach users caused by exposure and mobilisation of buried remnants of historic foreshore protection	Coastal erosion	<p>Monitor</p> <p>Encourage and assist Dunecare group and local residents to maintain and revegetate dune</p>

Beach	Coastal Management Area	Issue	Root Cause	Existing Controls
Avoca/Nth Avoca	Coastal Use	Injury to beach users caused by erosion, instability of erosion scarps following beach erosion and undermining at existing beach accessways	Coastal erosion	Beach scraping (165 Avoca Drive to 15 Ficus Avenue)
Avoca/Nth Avoca	Coastal Use	Damage to public and private infrastructure and property, including Council Beach Accessways, caused by beach recession	Beach recession	<p>Seawall constructed at Avoca Beach to protect water and sewer infrastructure and improve beach access/amenity in front of SLSC</p> <p>Protocol in place to repair beach accessways and revegetation of dune following erosion in large storm event (Avoca Drive, Ficus Ave Carpark North Avoca)</p> <p>Relocation of sand to improve beach access and amenity (Avoca Lake Entrance)</p> <p>Repair damage to carpark and other infrastructure should coastal erosion occur (Avoca Beach SLSC and Carpark, Ficus Ave Carpark)</p> <p>Beach scraping to build dune in front of carpark and properties (165 Avoca Drive to 15 Ficus Avenue)</p> <p>Monitoring of dune erosion</p> <p>Beach scraping to build vegetated dune in front of SLSC and carpark</p>
Avoca/Nth Avoca	Coastal Environment	Loss of dune or other coastal habitats due to coastal erosion	<p>Beach recession</p> <p>Coastal Erosion</p>	<p>Repair of beach accessways and revegetation of dune following erosion (properties on Avoca Drive and undermining of Norfolk Pines, North Avoca)</p> <p>Encourage and assist Dunecare group to improve dune vegetation management using appropriate endemic vegetation (Avoca Drive)</p>
Avoca/Nth Avoca	Coastal Use	Reduced beach amenity resulting from beach sand recession	Beach recession	Protocol in place to repair beach accessways and revegetation of dune following erosion in large storm event (Avoca Drive, Ficus Ave Carpark)

Beach	Coastal Management Area	Issue	Root Cause	Existing Controls
				<p>North Avoca)</p> <p>Relocation of sand to improve beach access and amenity (Avoca Lake Entrance)</p> <p>Beach scraping to build dune in front of carpark and properties (165 Avoca Drive to 15 Ficus Avenue)</p>
Avoca/Nth Avoca	Coastal Use	<p>Damage to public and private property and infrastructure caused by coastal floodwaters, particularly in the open coast area adjacent to the entrance to Avoca Lagoon</p> <p>Injury to public due to floodwaters caused by high sea level during storm events, particularly in the open coast area adjacent to the entrance to Avoca Lagoon</p>	Coastal Inundation	<p>Development controls for residence to be above inundation levels on redevelopment of properties (Properties south of Austral Avenue, Avoca Lake Entrance)</p> <p>Monitor storm run-up levels (north Avoca)</p> <p>Beach scraping to build vegetated dune in front of surf club and carpark above wave run-up level</p> <p>Monitor performance of existing rock works in front of surf club and carpark</p>
Avoca/Nth Avoca	Coastal Environment	<p>Damage to habitats caused by water in low-lying areas</p> <p>Introduction of hazardous materials/pollutants into the marine/estuarine environment</p>	Coastal Inundation	No controls currently in place
Avoca/Nth Avoca	Coastal Environment	Introduction of hazardous materials/pollutants into the marine/estuarine environment	Coastal Erosion	No controls currently in place
Budgewoi Beach	Coastal Use	Damage to infrastructure and amenity due to lack of dune	Coastal Erosion	Conduct dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing. Many dune stabilisation and revegetation works have been done and continue to be done.
Budgewoi Beach	Coastal Use	Damage to infrastructure and amenity due to	Coastal Inundation	Use beach scraping to reinforce dune and maintain dune crest heights above 7m at affected locations - Ongoing. Beach scraping has been done

Beach	Coastal Management Area	Issue	Root Cause	Existing Controls
		inundation/overlapping due to lack of dune height		and continues to be done at many locations, typically before or after major storm events.
Cabbage Tree Harbour	Coastal Use	Damage to amenity and infrastructure due to the slope at Cabbage Tree Harbour being undermined due to ongoing toe trimming by wave action, land slippages at upper part of slope e.g. in 2022	Coastal Erosion	Engineered toe protection installed at the base of the steep unstable slope at Cabbage Tree Harbour
Copacabana/MacMasters	Coastal Use	Damage to MacMasters beach SLSC from wave run-up	Coastal Inundation	Monitor performance of existing erosion works around base of Norfolk Island Pines and at Surf Club at southern end of beach and replace/improve as required
Copacabana/MacMasters	Coastal Vulnerability	Damage to Surf Club at the southern end of the beach, as well as carpark along Marine Parade, seaward portion of properties along Tudibaring Parade and future erosion affecting Copacabana Surf Club, Del Monte Place and properties along Del Monte Place	Coastal erosion	<p>Beach scraping to build dune in front of Surf Club, eroded pine tree roots and Marine Parade in the interim until erosion protection works are constructed</p> <p>Landward relocation of sewer infrastructure along Marine Parade if erosion protection works not implemented</p> <p>SLSC reconstructed on deep pile foundations</p> <p>Repair damage to Del Monte Place, Surf Club and surrounding land should it be damaged by future erosion (done on reactive basis)</p> <p>Development controls for residences and commercial premises to be on piled foundations on redevelopment of properties based on defined building line</p>
The Entrance	Coastal Use	Damage to amenity and infrastructure	Coastal Erosion	Historically Council has dredged sand from the active tidal delta in The Entrance channel on occasion and placed the sand on North Entrance beach. Council successfully moved approximately 45,000m ³ from the Entrance Channel in 2018. 2020-21 dredge plan focused on nourishment of North Entrance beach in response to significant erosion experienced.

Beach	Coastal Management Area	Issue	Root Cause	Existing Controls
				However, there is currently no commitment to dredge or place sand at any preference areas.
Forresters	Coastal Use	Immediate risk of erosion damage to properties and minor structures	Coastal erosion	Monitor beach for erosion and cliff lines for instability (Forresters Beach Dune)
Hargraves Beach	Coastal Use	Damage to infrastructure and amenity due to inundation/overtopping due to lack of dune height	Coastal Inundation	Beach scraping to reinforce dune and maintain dune crest heights above 7m at affected locations - Ongoing. Beach scraping has been done and continues to be done at many locations, typically before or after major storm events.
Hargraves Beach	Coastal Use	Damage to infrastructure and amenity due to lack of dune	Coastal Erosion	Conduct dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing.
Killcare	Coastal Use	Immediate risk of inundation to surf club and carpark	Coastal Inundation	Beach scraping to build vegetated dune in front of surf club above wave runup level with vegetation and fencing
Killcare	Coastal Use	Immediate risk of erosion damage to surf club and carpark	Coastal Erosion	Monitor beach for erosion in front of surf club and camping area Beach scraping to build vegetated dune in front of surf club with vegetation and or fencing
Lakes Beach	Coastal Use	Damage to infrastructure and amenity due to inundation/overtopping due to lack of dune height	Coastal Inundation	Beach scraping to reinforce dune and maintain dune crest heights above 7m at affected locations
Lakes Beach	Coastal Use	Damage to infrastructure and amenity due to lack of dune	Coastal Erosion	Dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing.
North Entrance Beach	Coastal Use	Loss of sand impacting infrastructure	Coastal Erosion	Development controls in Council's LEP/DCP
North Entrance Beach	Coastal Use	Damage to infrastructure and amenity due to inundation/overtopping due to lack of dune height	Coastal Inundation	Development controls in Council's LEP/DCP

Beach	Coastal Management Area	Issue	Root Cause	Existing Controls
North Entrance Beach	Coastal Use	Damage to infrastructure and amenity due to lack of dune	Coastal Erosion	Dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing.
Soldiers Beach	Coastal Use	Damage to infrastructure and amenity due to lack of dune	Coastal Erosion	Dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing.
Terrigal (SLSC)	Coastal Use	Immediate damage to assets/infrastructure due to coastal erosion	Coastal Erosion	Monitor performance of existing seawall - Photo monitoring of beaches undertaken on a regular basis to capture beach profiles and reactively during and following storms and large swells. A review has been completed of the "works as executed" plans for the existing seawall including the crest level.
Terrigal (SLSC)	Coastal Use	Immediate threat of inundation	Coastal Inundation	Monitor performance of seawall against inundation - Photo monitoring of beaches undertaken on a regular basis to capture beach profiles and reactively during and following storms and large swells to visually capture wave run up. UNSW WRL have completed bi-annual LiDAR surveys of Central Coast Beaches in recent years. A review has been completed of the 'Work as Executed' plans for the existing seawall including the crest levels.
Terrigal (Terrigal Beach)	Coastal Use	Immediate damage to assets/infrastructure due to coastal erosion	Coastal Erosion	UNSW WRL have completed bi-annual LiDAR surveys of Central Coast Beaches in recent years. A large sand clearance project to move sand out of the Terrigal Lagoon opening area and nourish southern Terrigal Beach was completed in 2017.
Terrigal (The Haven)	Coastal Use	Immediate damage to assets/infrastructure due to coastal erosion	Coastal Erosion	<p>Monitor performance of existing seawall in addressing erosion - Annual stability surveys of the seawall are conducted by Council to monitor any settlement or dislocation of the sandstone block. Regular 6 monthly surveys of the Haven Beach profile and sand volume are also conducted.</p> <p>Investigate beach nourishment to increase buffer against coastal erosion. Ongoing monitoring may indicate that beach nourishment is required in the future for amenity purposes rather than erosion protection given the full length seawall backing the beach</p> <p>Monitor beach profile following significant storm event - Photo monitoring of</p>

Beach	Coastal Management Area	Issue	Root Cause	Existing Controls
				<p>the beach undertaken of a regular basis to capture beach profiles and reactively prior, during and following storms and large swells to visually capture wave runup.</p> <p>A new boat ramp was completed by Council in 2016. Reconstruction of the Marine Rescue ramp and concrete apron was completed in 2019/20.</p>
Wamberal	Coastal Use	Immediate damage to assets/infrastructure due to coastal erosion	Coastal Erosion	<p>In May 2020, Council engaged Manly Hydraulics Laboratory to prepare concept plans for a terminal protection structure (seawall or sloping revetment) and sand nourishment solutions for Wamberal Beach. The study included:</p> <ul style="list-style-type: none"> • literature review, • coastal protection assessment, • concept design options • sand nourishment investigation • cost benefit analysis <p>Following the studies, MHL further developed the Wamberal Beach Terminal Protection Structure Engineering Design Requirements (EDRs) outlining specific criteria for the assessment of Wamberal Beach coastal protection development applications. The EDRs were adopted by Council in October 2022 and now form part of the development assessment criteria.</p> <p>Continue and enhance dune vegetation - Annual bush restoration works have been completed at the 'ruins'. Council facilitates and supports the dune restoration work completed by the Bushcare group in the dunes fronting the Wamberal SLSC and adjacent to the southern shores of Wamberal Lagoon.</p>
Wamberal Lagoon Entrance	Coastal Use	Damage to infrastructure	Coastal Inundation	Coastal Lagoon Catchments Overland Flood Study, completed (MHL 2020)
former Wyong Shire Coastline	Coastal Use	Coastal erosion impacting assets and infrastructure	Coastal Erosion	

Beach	Coastal Management Area	Issue	Root Cause	Existing Controls
former Wyong Shire Coastline	Coastal Use	Changing shoreline	Coastal Erosion and inundation	LiDAR data, combined with aerial photogrammetry and satellite imagery for evaluating changes to coastal terrain and terrestrial coastal ecology as sea levels rise - ongoing. Many LiDAR surveys have been done, typically before and after major coastal events. A 2 year contract with WRL for LiDAR survey for every 6 months was completed from Dec 2017 to Dec 2019
former Wyong Shire Coastline	Coastal Use	Damage to assets	Coastal Erosion and inundation	Asset register and maintenance program established for major council infrastructure in the coastal risk areas, such as stormwater systems, sea walls and sewage pumping stations for streamlined asset and infrastructure management, including condition records, storm impacts. Major Council coastal infrastructures were registered in 2018-19.

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2.4.2 Access and Safety

Coastal management issues relating to access and safety apply across the entire coastal zone of the Central Coast. The issues identified during the course of this CMP are provided in Table 2-7.

Table 2-7: Coastal management issues relating to access and safety

Issue Description	Root Cause
Injury to beach users caused by exposure and mobilisation of buried remnants of historic foreshore protection or unauthorised protection works/development	Coastal Erosion
Injury to beach users and/or residents caused by structures mobilising during storm events	
Injury to beach users caused by erosion, instability of erosion scarps following beach erosion, undermining at existing beach accessways	
Injury to the public due to the erosion and instability of erosion scarps caused by stormwater outlets and runoff	Stormwater Erosion
Injury to public due to floodwaters caused by high sea level during storm events, particularly in the areas surrounding the lagoon	Coastal Inundation
Injury to public caused by structures and/or debris mobilising during storm events	
Injury to public caused by wave runup or wave overtopping during storm conditions	Wave runup and overtopping
Injury to public caused by rock falls from instable cliff faces at beach headlands	Slope and Cliff Instability
Informal accessways and use damaging vegetation and impacting on recreational amenity for the public	Management and cost

2.4.3 Public Amenity

Specific coastal management issues relating to public recreational use and amenity identified during the course of the CMP are outlined below in Table 2-8.

Table 2-8: Coastal management issues relating to recreational use and public amenity

Beach	Issue	Consequence	Existing Controls
LGA-wide	Degrading infrastructure	Infrastructure degrading and thus not providing high level amenity for users	
LGA-wide	Impact on recreational amenity resultant from private landowners constructing seawalls	Degradation and impediment of beach amenity Increased risk to public safety	Council-issued orders to remove unauthorised works
LGA-wide	Poor accessibility and degradation of Council-managed rock/ocean pools	Lack of all-ability access to rock/ocean pools	Council Disability Inclusion Plan
LGA-wide	Damage to amenity/infrastructure due to loss of structural integrity of existing coastal protection works e.g. the Entrance seawall - damage to community infrastructure including road, parking and pedestrian promenade	Damage to Amenity/infrastructure	Review the structural integrity of existing coastal protection works e.g. The Entrance seawall and schedule structural upgrades as necessary to balance risk and cost - This is underway for The Entrance seawall - several inspections have been done. External consultants will be engaged to conduct an assessment and concept design.

2.4.4 Coastal Environment

Specific coastal management issues impacting the ecological environment of the Central Coast Open Coast identified in the CMP study area are illustrated in Table 2-9.

Table 2-9: Specific coastal management issues affecting coastal environment

Beach	Issue	Existing Controls
LGA-wide	Invasive weeds and pests reducing the diversity and abundance of native species. Illegal vegetation clearing.	NSW Dune Management manual for vegetation and fencing guidance
LGA-wide	Reduced water quality from urban catchments, leading to reduced water quality in open coast receiving waters	Council water quality monitoring program
Avoca/Nth Avoca	Various adverse impacts on aquatic ecology due to poor water quality, caused by erosion and urban run off, climate change resulting in more frequent extreme events	Development controls, public education, stormwater treatment Water quality monitoring
Copacabana/ MacMasters	Scour and water quality issues due to stormwater management near Copacabana surf club, impacting on recreational amenity, foreshore reserve and ecology	
Killcare	Scour around stormwater outlet impacting on recreational amenity, foreshore reserve and ecology	

2.4.5 Cultural and Social Issues

Key cultural and social issues identified during the CMP are shown in Table 2-10 which applies across the entire CMP Study Area.

Table 2-10: Key Cultural and Social Management Issues applying across entire Open Coast

Coastal Management Area	Issue	Existing Controls
Coastal Use	Need for community and agency representation to support decision making	Coastal, estuary and floodplain management Advisory Committee
Coastal Environment	Lack of detailed cultural and heritage assessments across the LGA, although these are completed at a local level for specific projects. Need for Aboriginal Heritage Impact Permits in areas affected by coastal erosion.	Development controls, public education program, Aboriginal heritage mapping, statutory and non-statutory planning controls.
Coastal Use	Unapproved memorial sites	Council Policy for Memorials, Naming of Council Facilities and Donations of Park Furniture and Trees (Central Coast Council 2018)
Coastal Use	Community awareness of coastal hazards and issues	Council website, existing public education measures.
Coastal Use	Community awareness of cultural issues and practices, lack of understanding of traditional knowledge for managing the coast	Council website, existing public education measures.
Coastal Use	Lack of awareness of property owners for properties affected by coastal hazards Lack of guidance for implementing and assessing coastal protection works	Coastal hazard notations, planning controls, Council website, existing public education measures Engineering Design Requirements for Wamberal Beach

2.5 Coastal Risks and Opportunities

A first pass risk assessment was undertaken as part of the Scoping Study (Royal Haskoning DHV, 2021), which identified LGA-wide hazards and risks along with control measures/management actions while recognising the uncertainties associated with natural systems and future scenarios.

Risks were identified together with existing management measures, with the key risks for the Open Coast evaluated in accordance with a risk matrix, recorded in a risk register. The risk assessment considered timeframes of 20 years, 50 years and 100 years, as stipulated by the CM Manual. The consideration of these planning timeframes allows a range of possible future scenarios to be incorporated into the assessment, including future scenarios for climate change, population growth, development and use of the coast. As outlined in the CM Manual, when considering future scenarios for critical infrastructure or long-term land use planning decisions, it is appropriate to gain an

understanding of the full range of risks over longer timeframes and high range projections.

The key issues identified as part of the Scoping Study have been updated as part of Stage 3 of the CMP process to include more specific local issues and risks, with the risk register acting as a tool to monitor the effectiveness of management actions as well as the development of specific management actions to address each risk. This has resulted in the development of a detailed risk assessment to inform the CMP and inform potential management actions.

2.5.1 Detailed Risk Assessment

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

The Risk Assessment is documented in detail in the Risk Assessment Report and Risk Register (Worley Consulting 2024a). The steps involved in the risk management process are outlined in Figure 2-8 and Figure 2-9. The risk matrix applied to quantify the risk is provided in Table 2-11.

The Central Coast Regional Plan 2041 recognises that there are areas at high immediate risk from coastal hazards, with houses, community facilities and infrastructure under threat, and that the risks are expected to increase significantly over the next 50 to 100 years. The Risk assessment identifies the increasing physical risk over time due to sea level rise, as well as the increasing exposure to coastal hazards due to ongoing development, population and tourism growth, with the risk assessed for the Present Day, 20 year, 50 year and 100 year planning periods.

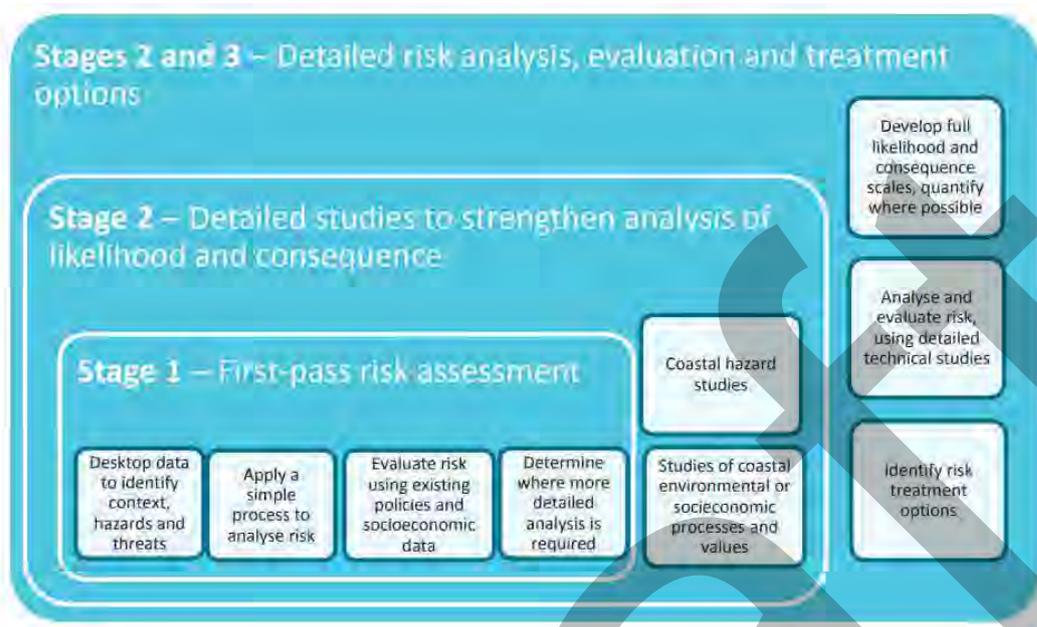


Figure 2-8: Detailed Risk Assessment Process (from NSW Coastal Management Manual 2018)

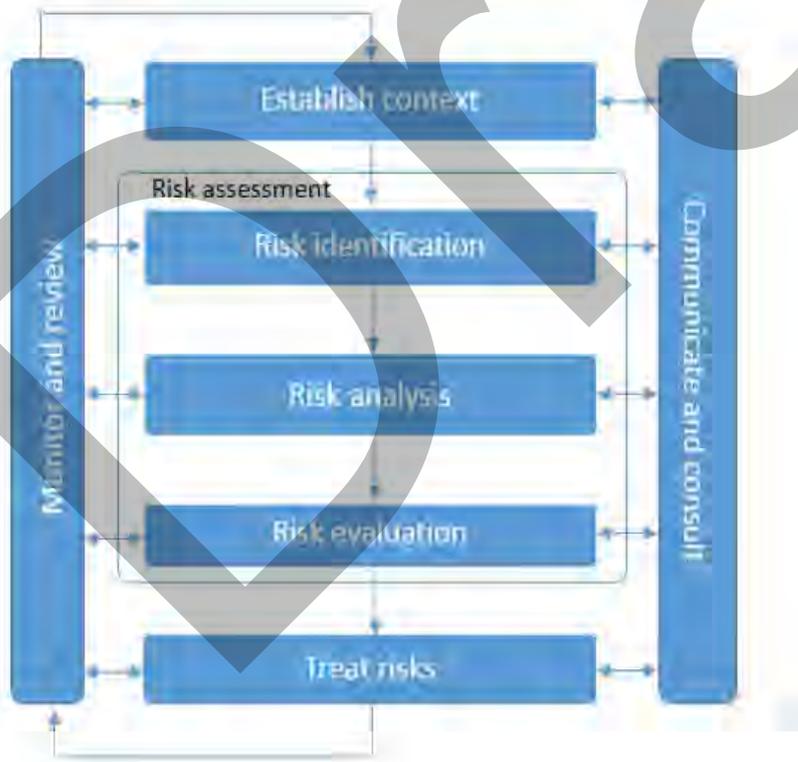


Figure 2-9: Risk Management Process (AS/NZS ISO 31000: Risk Management – Principles and Guidelines, as documented in the NSW Coastal Management Manual 2018)

Table 2-11: Risk Matrix applied to evaluate risk

Likelihood	Consequence				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Almost Certain 5	MODERATE	HIGH	HIGH	EXTREME	EXTREME
Likely 4	LOW	MODERATE	HIGH	HIGH	EXTREME
Possible 3	LOW	MODERATE	HIGH	HIGH	HIGH
Unlikely 2	LOW	LOW	MODERATE	MODERATE	HIGH
Rare 1	LOW	LOW	LOW	LOW	MODERATE

2.5.2 Results

The results of the risk assessment for the Open Coast are summarised below, with the risks identified as having a “MODERATE”, “HIGH” or “EXTREME” rating based on the existing controls listed in Table 2-12 for the risks that apply to the Open Coast.

A detailed Risk Register has been developed (Worley Consulting 2024a) that categorises the risks for the Central Coast Open Coast in terms of the four Coastal Management Areas as referred to in the RH SEPP:

- coastal wetland and littoral rainforest area
- coastal vulnerability area
- coastal environment area
- coastal use area.

The Risk Register is intended to be used as a living document that can act as a tool for ongoing assessment of the effectiveness of the management actions. The Risk Register has been developed in collaboration with stakeholders, including asset managers, Agency representatives and the community via the engagement undertaken for the project. The Register was used in Stage 3 to develop an initial suite of potential management actions, which were identified through the Register as additional actions that could be taken to mitigate the risks. Following stakeholder consultation in Stage 3, these were refined and combined into the list of management actions in Section 4 of this CMP.

Table 2-12: Detailed Risk Assessment Results

KEY: Likelihood: AC = Almost Certain, L = Likely, P = Possible, U = Unlikely, R = Rare
 Consequence: C = Catastrophic, Maj = Major, Mod = Moderate, Min = Minor, I = Insignificant

No.	Beach	Coastal Management Area	Risk Category	Risk Description	Root Cause	Consequence	Existing Controls	Present Day			20 years			50 years			100 years														
								Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating												
1	The Entrance North Beach (Curtis Parade)	Coastal Use	Coastal Hazard	Loss of sand impacting infrastructure	Storm Erosion	Damage to Amenity/Infrastructure	Establish a detailed monitoring program to clarify how sand placed on North Entrance Beach is redistributed and to facilitate a review to provide more effective sand retention - ongoing. The monitoring works are included in regular dredging program (every 2 or 3 years) with 50% funding from Rescue Our Waterways.	5	AC	5	C	25	Extreme	5	AC	5	C	25	Extreme	5	AC	5	C	25	Extreme						
2	Wamberal	Coastal Use	Coastal Hazard	Immediate damage to assets/infrastructure due to storm erosion	Storm Erosion	Damage to Infrastructure	<p>Allowing development landward of a specially defined building line with piled foundation into the 2100 Stable Foundation Zone - Incorporated into Gosford DCP 2013</p> <p>Terminal Protection - Council to action review, design and funding of terminal protection structure for Wamberal - Council worked with MHL to finalise a proposal and commence the investigation, concept design and coastal and environmental assessment work. The work was funded under the NSW Government Coast and Estuary Grants Program.</p> <p>Complete a vegetation profile for Wamberal Beach and support the natural vegetation profile - Bell (2009) provides some information on vegetation layers, communities to be verified on site.</p> <p>Continue and enhance dune vegetation - Annual bush restoration works have been completed at the 'ruins'. Council facilitates and supports the dune restoration work completed by the Bushcare group in the dunes fronting the Wamberal SLSC and adjacent to the southern shores of Wamberal Lagoon.</p> <p>Investigate sources of sand and feasibility of beach nourishment for Wamberal Beach</p> <p>Emergency protection works installation in accordance with Reconstruction Authority directions</p>	5	AC	5	C	25	Extreme	5	AC	5	C	25	Extreme	5	AC	5	C	25	Extreme	5	AC	5	C	25	Extreme
3	The Entrance North (between 1 Hutton Road and 21 Hargraves Street)	Coastal Use	Coastal Hazard	Damage to amenity and infrastructure	Storm Erosion	Damage to Amenity/Infrastructure	Continue to dredge sand from the active tidal delta in The Entrance channel and place the sand on North entrance beach. Some sand may also be placed on the Entrance Beach - Ongoing. Council successfully moved approximately 45,000m ³ from the Entrance Channel in 2018. 2020-21 dredge plan in progress expected to focus on nourishment of North Entrance beach in response to significant erosion experienced. The Reconstruction Authority constructed emergency works in late 2025 in response to a significant storm event in September 2025	4	L	5	C	20	Extreme	5	AC	5	C	25	Extreme	5	AC	5	C	25	Extreme	5	AC	5	C	25	Extreme
4	Terrigal (Terrigal Beach)	Coastal Use	Coastal Hazard	Immediate damage to assets/infrastructure due to storm erosion	Storm Erosion	Damage to Infrastructure	<p>Investigate source of sand and feasibility of beach nourishment for Southern Terrigal beach to increase buffer against storm erosion and improve beach amenity - Photo monitoring of beaches undertaken on a regular basis to capture beach profiles and reactively during and following storms and large swells to visually capture wave run up. UNSW WRL have completed bi-annual LiDAR surveys of Central Coast Beaches in recent years. A large sand clearance project to move sand out of the Terrigal Lagoon opening area and nourish southern Terrigal Beach was completed in 2017. Future nourishment for amenity purposes only, given the existing seawall, may be required. However, monitoring has indicated that Terrigal Beach is very dynamic and the volume of sand in front of the seawall fluctuates widely.</p> <p>Remove old seawall structure at southern end of beach to improve public safety - A large section of the 1930's seawall/promenade was removed in 2018 after being exposed following erosion. Some of the larger concrete sections were relocated to the far southern end of the beach to bolster the existing erosion protection rock work. Further sections of the seawall may require removal if it becomes exposed in the future.</p>	4	L	4	Maj	16	High	4	L	4	Maj	16	High	5	AC	5	C	25	Extreme	5	AC	5	C	25	Extreme



KEY: Likelihood: AC = Almost Certain, L = Likely, P = Possible, U = Unlikely, R = Rare
 Consequence: C = Catastrophic, Maj = Major, Mod = Moderate, Min = Minor, I = Insignificant

No.	Beach	Coastal Management Area	Risk Category	Risk Description	Root Cause	Consequence	Existing Controls	Present Day			20 years			50 years			100 years														
								Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating												
5	Terrigal (The Haven)	Coastal Use	Coastal Hazard	Immediate damage to assets/infrastructure due to storm erosion	Storm Erosion	Damage to infrastructure	<p>Monitor performance of existing seawall in addressing erosion - Annual stability surveys of the seawall are conducted by Council to monitor any settlement or dislocation of the sandstone block. Regular 6 monthly surveys of the Haven Beach profile and sand volume are also conducted.</p> <p>Investigate beach nourishment to increase buffer against storm erosion - regular 6 monthly surveys of the haven beach profile and sand volume are undertaken. Ongoing monitoring may indicate that beach nourishment is required in the future for amenity purposes rather than erosion protection given the full length seawall backing the beach</p> <p>Monitor beach profile following significant storm event - Photo monitoring of the beach undertaken on a regular basis to capture beach profiles and reactively prior, during and following storms and large swells to visually capture wave runup.</p> <p>Repair post storm damage to existing infrastructure - no repairs have been required to date. A new boat ramp was completed by Council in 2016. Reconstruction of the Marine Rescue ramp and concrete apron was completed in 2019/20.</p>	4	L	4	Maj	16	High	4	L	4	Maj	16	High	5	AC	4	Maj	20	Extreme	5	AC	5	C	25	Extreme
6	The Entrance North (other areas)	Coastal Use	Coastal Hazard	Damage to infrastructure and amenity due to lack of dune	Storm Erosion	Damage to Amenity/infrastructure	<p>Conduct dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing. Many dune stabilisation and revegetation works have been done and continue to be done.</p>	3	P	5	C	15	High	3	P	5	C	15	High	4	L	5	C	20	Extreme	5	AC	5	C	25	Extreme
7	Avoca/Nth Avoca	Coastal Use	Coastal Hazard	Damage to public and private property and infrastructure caused by coastal floodwaters, particularly in the area surrounding Avoca Lagoon	Coastal Inundation	Damage to assets and foreshore	<p>Development controls for residence to be above inundation levels on redevelopment of properties (Properties south of Austral Avenue, Avoca Lake Entrance)</p> <p>Monitor storm run-up levels (north Avoca)</p> <p>Beach scraping to build vegetated dune in front of surf club and carpark above wave run-up level</p> <p>Monitor performance of existing rock works in front of surf club and carpark</p>	5	AC	3	Mod	15	High	5	AC	3	Mod	15	High	5	AC	3	Mod	15	High	5	AC	3	Mod	15	High
8	Avoca/Nth Avoca	Coastal Use	Coastal Hazard	Injury to public due to floodwaters caused by high sea level during storm events, particularly in the area surrounding the lagoon	Coastal Inundation	Injury/loss of life		5	AC	3	Mod	15	High	5	AC	3	Mod	15	High	5	AC	3	Mod	15	High	5	AC	3	Mod	15	High
9	Terrigal (SLSC)	Coastal Use	Coastal Hazard	Immediate damage to assets/infrastructure due to storm erosion	Storm Erosion	Damage to infrastructure	<p>Monitor performance of existing seawall - Photo monitoring of beaches undertaken on a regular basis to capture beach profiles and reactively during and following storms and large swells. A review has been completed of the "works as executed" plans for the existing seawall including the crest level.</p>	3	P	3	Mod	9	High	3	P	3	Mod	12	High	4	L	4	Maj	16	High	5	AC	4	Maj	20	Extreme



KEY: Likelihood: AC = Almost Certain, L = Likely, P = Possible, U = Unlikely, R = Rare
 Consequence: C = Catastrophic, Maj = Major, Mod = Moderate, Min = Minor, I = Insignificant

No.	Beach	Coastal Management Area	Risk Category	Risk Description	Root Cause	Consequence	Existing Controls	Present Day			20 years			50 years			100 years														
								Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating												
10	Copacabana/MacMasters	Coastal Vulnerability	Coastal Hazard	Damage to Surf Club at the southern end of the beach, as well as carpark along Marine Parade, seaward portion of properties along Tudbaring Parade and future erosion affecting Copacabana Surf Club, Del Monte Place and properties along Del Monte Place	Storm erosion	Damage to assets and foreshore	Erosion protection works to be allowed for properties (Precinct 3 - North from Cockrone Lagoon outlet, Precinct 2) Erosion protection works for Marine Parade Beach scraping to build dune in front of Surf Club, eroded pine tree roots and Marine Parade in the interim until erosion protection works are constructed Landward relocation of sewer infrastructure along Marine Parade if erosion protection works not implemented SLSC reconstructed on deep pile foundations Repair damage to Del Monte Place, Surf Club and surrounding land should it be damaged by future erosion (done on reactive basis) Development controls for residences and commercial premises to be on piled foundations on redevelopment of properties based on defined building line	3	P	3	Mod	9	High	3	P	3	Mod	9	High	4	L	3	Mod	12	High	4	L	4	Maj	16	High
11	Copacabana/MacMasters	Coastal Use	Coastal Hazard	Risk of erosion due to lagoon entrance instability	Entrance instability and erosion	Damage to assets and foreshore	Seaward extension of existing training wall along southern side of entrance Undertake review of entrance management procedure	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	4	Maj	12	High
12	Terrigal (SLSC)	Coastal Use	Coastal Hazard	Immediate threat of inundation	Coastal inundation	Damage to infrastructure	Survey floor levels to determine degree of inundation hazard - A review has been completed of the 'Work as Executed' plans for the existing seawall including the crest levels. It is known that the SLSC has experienced inundation in the past and will be susceptible to future inundation. Further work to assess likelihood and severity of inundation proposed as part of Coastal Management Program studies. Monitor performance of seawall against inundation - Photo monitoring of beaches undertaken on a regular basis to capture beach profiles and reactively during and following storms and large swells to visually capture wave run up. UNSW WRL have completed bi-annual LIDAR surveys of Central Coast Beaches in recent years. A review has been completed of the 'Work as Executed' plans for the existing seawall including the crest levels. It is known that the SLSC has experienced inundation in the past and will be susceptible to future inundation. Further work to assess likelihood and severity of inundation proposed as part of Coastal Management Program studies.	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High	4	L	3	Mod	12	High
13	Wamberal Lagoon Entrance	Coastal Use	Coastal Hazard	Damage to infrastructure	Coastal inundation	Damage to infrastructure	Ensure floor levels for new development applications are above inundation levels - included in Gosford Development Control Plan (2013). A new flood study for the Coastal Lagoons is due for completion 2020 and any updates to the existing planning controls will be incorporated into the DCP Review entrance management guidelines for mechanical opening of Wamberal Lagoon - included in Gosford Lagoon and Creek Entrance Management Review. Review complete Council in process of implementing actions.	3	P	3	Mod	9	High	3	P	3	Mod	9	High	4	L	3	Mod	12	High	4	L	3	Mod	12	High
14	Former Wyong Shire Coastline	Coastal Use	Coastal Hazard	Coastal erosion impacting assets and infrastructure	Storm Erosion	Damage to Amenity/infrastructure	Work with NSW Government to provide most up to date method for assessing coastal erosion, recession and inundation hazard - Complete. Coastal hazard maps for Wyong coastline have been revised in the draft Wyong CZMP 2018.	3	P	3	Mod	9	High	3	P	3	Mod	9	High	4	L	3	Mod	12	High	4	L	3	Mod	12	High
15	Avoca/Nth Avoca	Coastal Environment	Ecological Environment	Various adverse impacts on aquatic ecology due to poor water quality	Catchment inputs - erosion and urban run off, climate change resulting in more frequent extreme events	Impact on recreational amenity, foreshore reserve and ecology Illness for users	Development controls, public education, stormwater treatment Water quality monitoring	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High



KEY: Likelihood: AC = Almost Certain, L = Likely, P = Possible, U = Unlikely, R = Rare
 Consequence: C = Catastrophic, Maj = Major, Mod = Moderate, Min = Minor, I = Insignificant

No.	Beach	Coastal Management Area	Risk Category	Risk Description	Root Cause	Consequence	Existing Controls	Present Day			20 years			50 years			100 years														
								Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating	Likelihood (1-5)	Consq.(1-5)	Pre Treatment Rating												
16	Hargraves Beach	Coastal Use	Coastal Hazard	Damage to infrastructure and amenity due to lack of dune	Storm Erosion	Damage to Amenity/infrastructure	Conduct dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing. Many dune stabilisation and revegetation works have been done and continue to be done.	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High
17	Killcare	Coastal Use	Coastal Hazard	Immediate risk of erosion damage to surf club and carpark	Storm Erosion	Damage to amenity and infrastructure	Monitor beach for erosion in front of surf club and camping area Erosion protection works at surf club if required based on outcome of geotechnical investigations Repair damage to surf club/carpark should storm erosion occur Beach scraping to build vegetated dune in front of surf club with vegetation and/or fencing Future relocation of surf club and associated infrastructure to an area landward of the coastal hazard area if required Redevelop surf club on deep piled foundation on future redevelopment	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High
18	Former Wyong Shire Coastline	Coastal Use	Coastal Hazard	Changing shoreline	Coastal Erosion and inundation	Damage to Amenity/infrastructure	LIDAR data, combined with aerial photogrammetry and satellite imagery for evaluating changes to coastal terrain and terrestrial coastal ecology as sea levels rise - ongoing. Many LIDAR surveys have been done, typically before and after major coastal events. A 2 year contract with WRL for LIDAR survey for every 6 months was completed from Dec 2017 to Dec 2019	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High
19	Former Wyong Shire Coastline	Coastal Use	Coastal Hazard	Damage to assets	Coastal Erosion and inundation	Damage to Amenity/infrastructure	Establish an asset register and maintenance program for major council infrastructure in the coastal risk areas, such as stormwater systems, sea walls and sewage pumping stations for streamlined asset and infrastructure management, including condition records, storm impacts - complete. Major Council coastal infrastructures were registered in 2018-19.	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High	3	P	3	Mod	9	High
20	Budgewoi Beach	Coastal Use	Coastal Hazard	Damage to infrastructure and amenity due to inundation/overlapping due to lack of dune height	Coastal Inundation	Damage to Amenity/infrastructure	Use beach nourishment or beach scraping to reinforce dune and maintain dune crest heights above 7m at affected locations - Ongoing. Beach scraping has been done and continues to be done at many locations, typically before or after major storm events.	2	U	4	Maj	8	Mod	3	P	4	Maj	12	High	4	L	4	Maj	16	High	4	L	4	Maj	16	High
21	Budgewoi Beach	Coastal Use	Coastal Hazard	Damage to infrastructure and amenity due to lack of dune	Storm Erosion	Damage to Amenity/infrastructure	Conduct dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing. Many dune stabilisation and revegetation works have been done and continue to be done.	2	U	3	Mod	6	Mod	2	U	3	Mod	6	Mod	2	U	4	Maj	8	Mod	4	L	4	Maj	16	High
22	Forresters	Coastal Use	Coastal Hazard	Immediate risk of erosion damage to properties and minor structures	Storm erosion	Damage to foreshore infrastructure and foreshore vegetation	Erosion Protection works to be allowed for Properties (Forresters Beach Dune) Monitor beach for erosion and cliff lines for instability (Forresters Beach Dune)	2	U	3	Mod	6	Mod	2	U	3	Mod	6	Mod	2	U	3	Mod	6	Mod	3	P	3	Mod	9	High
23	Lakes Beach	Coastal Use	Coastal Hazard	Damage to infrastructure and amenity due to lack of dune	Storm Erosion	Damage to Amenity/infrastructure	Conduct dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing. Many dune stabilisation and revegetation works have been done and continue to be done.	2	U	3	Mod	6	Mod	2	U	3	Mod	6	Mod	2	U	3	Mod	6	Mod	3	P	3	Mod	9	High
24	The Entrance North	Coastal Use	Coastal Hazard	Damage to infrastructure and amenity due to inundation/overlapping due to lack of dune height	Coastal Inundation	Damage to Amenity/infrastructure	Use beach nourishment or beach scraping to reinforce dune and maintain dune crest heights above 8m at affected locations - Ongoing. Beach nourishment has been done for the Entrance Beach and The Entrance North Beach every 2 to 3 years with sand dredged from the Entrance Channel. Beach scraping has been done and continues to be done at many locations, typically before or after major storm events.	2	U	3	Mod	6	Mod	2	U	3	Mod	6	Mod	3	P	3	Mod	9	High	3	P	3	Mod	9	High
25	Soldiers Beach	Coastal Use	Coastal Hazard	Damage to infrastructure and amenity due to lack of dune	Storm Erosion	Damage to Amenity/infrastructure	Conduct dune stabilisation works and revegetation to encourage sand accretion and stabilisation of frontal dunes - Ongoing. Many dune stabilisation and revegetation works have been done and continue to be done.	2	U	3	Mod	6	Mod	2	U	3	Mod	6	Mod	3	P	3	Mod	9	High	3	P	3	Mod	9	High



3. Stakeholder Engagement

3.1 Overview

There has been significant community consultation undertaken across the Local Government Area (LGA) during development of the "One – Central Coast", Community Strategic Plan 2018 – 2028 (Central Coast Council, 2018), with many objectives and actions having clear relevance to coast and catchment management. Similarly, there was significant community consultation undertaken during development of each of the existing CZMPs, however this engagement was primarily limited to within the relevant former local government areas. Significant community engagement was undertaken separately from the CMP between 2020 and 2022, as part of the MHL Wamberal Beach project. That consultation included the opportunity for all residents and stakeholders to make a written submission via email and online **through Council's website, as well as eight virtual information sessions** (Central Coast Council, 2022a).

Council have undertaken extensive community and stakeholder engagement throughout Stage 1, 2 and 3 of the CMP process which have informed the management actions presented in this CMP. The engagement activities undertaken are detailed below.

3.2 Stage 1 and 2 Engagement

In Stage 1, Scoping Study, a comprehensive Community and Stakeholder Engagement Plan was prepared for the CMP. It was developed with reference to existing knowledge of interest, issues, concerns and opportunities for coastal management as cited by the community to date. It was designed to provide an overarching framework for subsequent community and stakeholder engagement activities to be undertaken as part of Stages 2 to 5 of CMP development.

Significant community engagement was undertaken as part of the MHL Wamberal Beach project (Central Coast Council, 2022a). Results from phase one of the Community Consultation for Wamberal included:

- 19 people actively participated in online virtual information sessions
- **247 written submissions received through Council's online submission portal**
- 363 emails were sent directly to previously engaged individuals

In parallel with the MHL-led study, Council led a detailed program of community consultation in Stage 1, that aimed to:

- (i) provide baseline information on the CZMP, erosion issue and preferred strategy;
- (ii) understand how the community use and value Wamberal beach; and
- (iii) seek feedback on the range of concept options to guide decision making, going forward.

Community Consultation LGA-wide was and continues to be undertaken. The launch of a dedicated online *Our Coast, Our Waterways* consultation hub from April 2021 enabled community survey and raised awareness ahead of targeted community engagement undertaken as part of Stage 2. Consultation activities included:

- 3,918 visits to the Your Voice Our Coast project page;
- 1,168 survey responses received;
- Over 350 respondents have entered the focus group candidate pool;
- Over 220 stakeholder emails sent;
- 3 focus groups hosted with over 20 participants;
- 403 community members reached at pop up events; and,
- Over 500 postcards distributed.
- Prior to the commencement of Stage 3, council undertook both stakeholder and community engagement during January/February 2024. This engagement comprised:
- Pop up sessions held throughout the LGA (Terrigal, Avoca, Toowoan Bay, The Entrance, Soldiers Beach and Killcare);
- Meetings with key stakeholders including state agencies and different divisions of Council;
- Communication materials to support engagement – Facebook notifications, emails;
- Online input for those unable to attend the pop-up sessions via the interactive maps on the Pinpoint website - <https://centralcoastcouncil.mysocialpinpoint.com/opencoastcmp#/>
- Drop-in sessions/community workshops held at Copacabana and Toowoan Bay.

3.2.1 Social Values

During the consultation undertaken as part of Stages 1 and 2 of the CMP development a number of key issues, concerns and opportunities have been raised as requiring enhanced coastal management. These include, but are not limited to:

- Improvement of local amenities – including improved disability access at coastal locations; scooter racks, increased shade at benches and improved parking.
- Consideration of the creation of a Marine Park near Toowoan Bay and/or Terrigal Haven.
- Improvement and maintenance of water quality at beach locations.
- Improvement of rubbish collection and management across the coast to enhance amenity, reduce pollution and preserve water quality.
- Measures to prevent and manage erosion and coastal inundation in key areas such as Avoca, MacMasters and Copacabana Beach.
- Management of erosion and beach protection at Wamberal: the beach has required emergency protection works to be installed following storm events in 2016 and 2020, and investigations into the design of a terminal protection structure at Wamberal have been ongoing.
- Management of tourism and recreation in a way that prevents overuse and congestion and protects local values and the environment.
- Concerns regarding intensifying land use on the coast from foreshore development, to impact to urban stormwater discharge.

3.3 Agency and Internal Stakeholder Engagement

Prior to the commencement of Stage 3 in November 2023, Council met with Agency stakeholders to obtain input to inform Stage 3 of the CMP.

Agencies involved included:

- Central Coast Council
- Darkinjung Local Aboriginal Land Council (DLALC)
- Department of Planning and Environment (DPE, now DCCEEW)
- Department of Primary Industries Fisheries (DPI Fisheries)
- NSW Crown Lands
- Transport for NSW – Marine Infrastructure Delivery Office (TfNSW MIDO)
- NSW State Emergency Services (SES)
- National Parks and Wildlife Service (NPWS).

In addition to the above, Council undertook eight internal unit sessions to assess particular issues of relevance to the CMP. The sessions covered the following topics:

- Leisure Beach Safety and Community Facilities
- Waste Services
- Community Development
- Environmental Compliance and Systems
- Flooding
- Environmental Management
- Development Assessment
- Water and Sewer Assets

3.3.1 Agency Stakeholder Issues

Key issues of relevance to the CMP raised during this engagement session included:

DLALC (Darkinjung): Issues raised on Darkinjung Land included illegal access (e.g., Soldiers, Pelican, Tuggerah beaches and Tooheys Rd and Lake Munmorah), unauthorised vehicles on the beach, illegal dumping asbestos/syringes which is all resource intensive to manage. Need for reliable (vandal proof) surveillance monitoring to capture issues above. Need for agencies to liaise with DLALC to coordinate controlled burnings/culture burning and ensure this is captured in the cooler months (Jun, July, Aug).

Crown Lands: Issues raised on Crown Land (DPHI) include coastal erosion with hotspots identified at North Entrance Hutton Road, Wamberal, Norah Head, MacMasters and Cabbage Tree Harbour. Places like Mazlan Reserve require a holistic approach in effort to address public access and restrict people from areas of instability. Other issues include residual land parcels (difficulty locating owner/descendants), contaminated lands and unauthorised works.

Crown Lands would like to see emergency sub action plans developed and new developments to be consistent with the CMP and Plans of Management. Crown Lands advised the release of the new Coastal Crown Land Guidelines. CL would like to be advised of CMP actions which impact CL. In terms of management actions, CL advised the need to identify legacy assets such as rock pools.

Transport for NSW (TfNSW MIDO): TfNSW noted any coastal project funding secured should align with Marine estate management strategy guidelines. It was noted that the NSW Maritime Infrastructure Plan is due for review. TfNSW MIDO are receiving enquiries related to perceived impacts to the Entrance Beach associated with the groyne.

National Parks: Issues and feedback raised on National Park land include:

- Implications from land slippages (e.g., Wyrrabalong, Forresters Beach) to adjacent land.
- Need to have a holistic approach to LIDAR/coastal hazard studies.
- Coastal erosion impacting Rushby St (Bateau Bay) threatening access ramp, viewing platform, stormwater, and sewer outfall, exposing asbestos.
- Bouddi National Park is experiencing risk to coastal infrastructure associated with storm debris from the Hawkesbury River. Material along the Hawkesbury River is being trapped in the mangroves and redistributing in line with spring tides. There is a need to capture this material upstream.
- Ongoing issues with unauthorised access and safety.
- Ongoing issues with dogs in the parks. Need for education and stronger compliance.
- Ongoing issues with weeds.
- There is a need for a coordinated approach to fox control and shorebird/sea bird management.

NSW SES: The NSW **SES are the lead agency for coastal erosion events if it's a result of storm** activity not general long/short term erosion. The NSW SES advise the LEOCON what to do. Things NSW SES would like to see included in a CMP emergency sub-action plan to assist the agency include:

- Erosion hotspots identified and mapped out
- Identify hazards and vulnerable communities
- Identify agencies/staff personal and roles

- Identify communications available, how to reach people
- Identify egress and access locations for machinery
- Identify road closures likely required and areas of congestion, need to liaise with NSW Police to move people away (storm event observers)
- Identify priority evacuation areas based on at risk properties within a mapped polygon and not individual properties based on foundation type
- How illegal works taking place during an event will be managed. Specify what works homeowners can legally undertake pre/during/post storm event
- **NSW SES will provide homeowners with a "return with caution" to return to properties** following evacuation. May need to highlight/suggest (in sub – action plan or website) what owners may need to undertake following that order (e.g., engineering advice)
- It was noted that the Reconstruction Authority has replaced the Public Works Authority.

DPI Fisheries: There is a new bank erosion decision support tool now available.

Council mentioned the need for Surf Life Saving Club equipment to be available during the winter months and ensure emergency vehicle accessways are maintained in the event they are required for use.

This report will be provided to Agencies to gain feedback on the proposed management actions, which would then be updated for inclusion in the Draft CMP in Stage 4.

3.3.2 Council Stakeholder Issues

The following issues were raised by internal Council stakeholders for consideration in the CMP:

- Need for a whole of open coast cultural heritage assessment to be undertaken as a **"pre-cultural" assessment**.
- Need for a policy for headland slippages/areas of instability to warn the public of the risk, while avoiding the need for signage.
- Need for an LGA wide action item for reinstating beach access/emergency ways to secure funding following any storm event or related erosion.
- Need for development application assessments to specify that stormwater runoff cannot be discharged over the dunes which causes erosion, and any bushfire related clearing needs to ensure it does not impact on cliff instability areas.
- Minimum floor levels for flooding and coastal wave run up need to be addressed during development application assessment.
- Need to consider coastal processes for installation of stormwater devices in the coastal zone, leading to outfalls causing erosion or structure being undermined. Need to

provide a set of recommendations/specifications from a coastal engineer as a useful guide.

- It is costly for Council to implement long term solutions and in the absence of offshore sand nourishment options, Council cannot place structures with extensive footprints (i.e., rock revetments) on the beach which require sand nourishment to offset.
- Unauthorised coastal protection works occurring across the entire LGA which are not adequately engineered or built to withstand coastal conditions and pose public safety risk and risk of material migrating onto public land/waters, website information and education is required to shine a light on this issue and in effort to control it.
- there is a need to update the coastal chapter in the Development Control Plan (DCP) and discuss required changes or issues that need to be addressed.

3.4 Stage 3 Community Engagement and Outcomes

3.4.1 Methods

During Stage 3, the engagement process aimed to inform, engage and obtain input from stakeholders and the wider community on coastal management actions and their viability and acceptability, including timing.

From December 2023 to March 2024, Council undertook the Stage 3 community consultation and engagement. This phase included:

- Project dedicated website [Your Voice Our Coast – Open Coast Coastal Management Program](#) with project background, FAQ's, links to studies and coastal staff contact email.
- Interactive [Social Pinpoint](#) page
- Six community pop up events
 - Terrigal Boardwalk 12th Jan
 - Avoca Beach SLSC 13th Jan
 - Toowoan Bay SLSC 19th Jan
 - Memorial Park The Entrance 27th Jan
 - Soldiers Beach SLSC 3rd Feb
 - Killcare Beach 10th Feb
- Two targeted community stakeholder sessions:
 - Copacabana SLSC 13th of Feb
 - Toowoan Bay SLSC 15th of Feb

A summary report on the outcomes of consultation for Stage 3 is provided in Appendix B.

3.4.2 Objectives of consultation

The purpose of the Stage 3 consultation for the CMP was to:

- Inform the community of the status of CMP development
- Hear from stakeholders and the community to identify issues in the coastal zone and how they would like to see issues managed
- Provide the community an opportunity to speak directly with project staff
- Report back to the community on the outcomes of community consultation and the next steps.

3.4.3 Community Engagement Outcomes

Community feedback from the six pop up sessions was entered into the Social PinPoint page. Key themes from the pop up and targeted sessions covered the topics of coastal hazards, access, ecological environment, building and encroachment and local amenities, and are presented in detail in Section 2.1.

3.5 Stage 4

The feedback from Stages 1 to 3 was incorporated into the Risk Assessment and draft management actions developed to address the issues raised in the community engagement. Stage 4 community engagement has comprised gaining feedback from the community and Agency stakeholders on the draft management options, during the public exhibition of the draft CMP. These management options will take into consideration feedback already collected on the **community's preferences in regard to management of the coast**.

The CMP was publicly exhibited in July - August 2025, with four community drop-in sessions held to request direct feedback and where community members had the opportunity to discuss issues, gain more information and discuss the CMP management actions directly with the study team. These sessions included:

- North Avoca Surf Life Saving Club, 29 July 2025
- The Entrance Community Centre, 2 August 2025
- Soldiers Beach Surf Life Saving Club, 7 August 2025
- MacMasters Beach, Surf Life Saving Club, 9 August 2025.

During the public exhibition period, Agency stakeholders, including DCCEEW and DPHI Crown Lands, provided feedback in relation to the long-term coastal management strategies to be implemented at areas subject to extreme risk from coastal hazards at Wamberal and The Entrance North, and feedback in relation to some of the management actions for other areas within the CMP study area. Additional detail has been requested to explain and articulate the long-term strategy for these areas, and for this reason additional information and management actions are being included to address these two areas in particular.

Additional management actions have been developed based on this feedback, and additional background information explaining the coastal management strategy to be adopted for Wamberal and The Entrance North has been included in this updated version of the CMP. The updated management actions and background information is provided in Section 4.

Draft

4. Actions to be implemented by the Council or by public authorities

4.1 Overview

Stage 3 of the CMP involved identifying and evaluating management options to select preferred coastal management actions with a focus on achieving the objectives of the CM Act. The management options developed following the Risk Assessment were evaluated through Stage 3 of the CMP (Stage 3 report, Worley Consulting 2024) to determine those actions which would be carried into the final CMP. As per the CM Manual, there are four main steps in completing Stage 3 of the CMP process (Figure 4-1).

Information from Stages 1 and 2 was used to inform Stage 3. This involved:

- Confirming that the strategic direction identified in Stage 1 had not changed
- identifying and collating information on management options
- evaluating potential management actions, considering:
 - feasibility (is it an effective and sustainable way to treat the risks?)
 - viability (economic assessment) and
 - acceptability to stakeholders.
- engaging public authorities about implications for their assets and responsibilities
- evaluating mapping options and implication if a planning proposal is being prepared
- identifying pathways and timing of actions, and
- preparing a business plan for implementation.

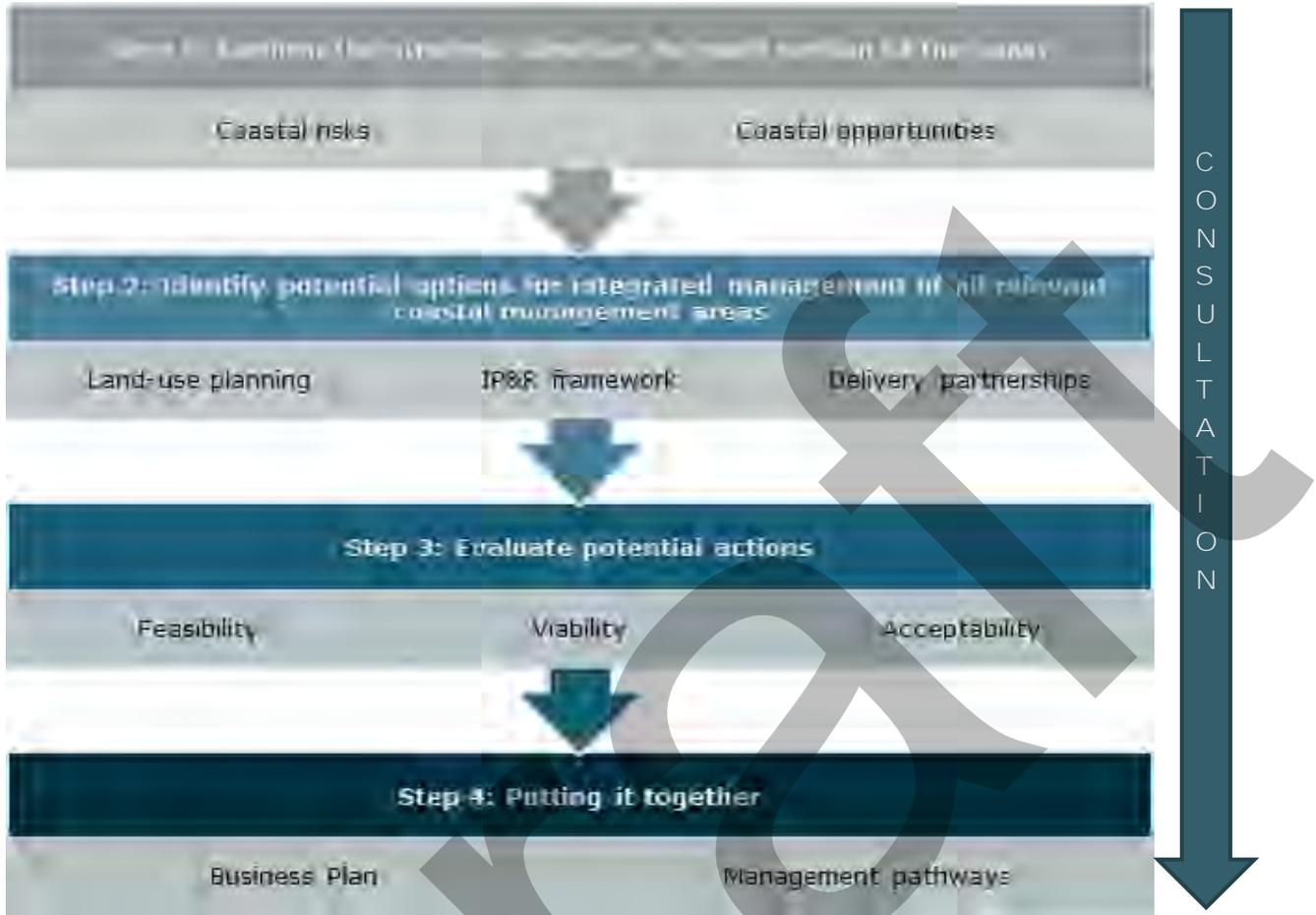


Figure 4-1: Four Main Steps in action identification and evaluation

4.1.1 Step 1 – Confirm Strategic Direction

During Stage 1 of the CMP (Royal Haskoning DHV, 2021), Council developed a purpose, vision and objectives for the program. The vision and purpose are crucial in defining the strategic objectives. The strategic objectives then enable the establishment of specific more detailed objectives that provide a clear path towards fulfilling the strategic objectives.

In Step 1, the strategic direction was reviewed to confirm:

- the character, values and management objectives of the coastal management areas
- the vulnerability and risks to coastal assets and values identified in studies conducted in Stage 2
- opportunities to enhance the environmental, social, cultural and economic wellbeing of coastal communities.

The key issues for the Central Coast Open Coast were identified through Stages 1 and 2 of the CMP process. Many of the proposed actions from the Gosford Beaches Coastal Zone Management Plan (WorleyParsons 2017) and the Wyong Coastal Zone Management Plan (Umwelt 2011) have either been implemented, or are no longer current and require review.

Some of these issues remain relevant today, whereas others have been addressed or are in the process of being addressed.

As discussed in Section 3, the community and Agency engagement that has been carried out throughout the project has enabled the key issues to be identified and risks quantified through a separate Detailed Risk Assessment, documented in the Risk Assessment report and Risk Register (Worley Consulting 2024a).

The Risk Assessment report and Risk Register categorises the main risks for the Central Coast Open Coast in terms of the Coastal Management Areas within the CMP Study Area as referred to in the CM Act and RH SEPP, as detailed in Section 2.5.

The strategic direction of the CMP was confirmed following the detailed assessment of the risks, issues and opportunities, through the community engagement and consultation activities as part of developing the CMP, as discussed in Section 3.

4.1.2 Step 2 - Identify potential options for integrated management

From the Risk Assessment (Worley Consulting 2024a), the Central Coast Recreational Use Study (Vision Environment, 2022) and the outcome of the coastal hazard study (Bluecoast Consulting Engineers, 2024-2025), a suite of potential management actions was developed and categorised in terms of the issues and particular locations which they relate to. As part of this process, the strategic partnerships required to deliver these options were identified, and engagement with relevant stakeholders (including Government Agencies and community) was undertaken to canvass and refine the potential management actions. The actions taken to address this Step are discussed in Section 4.2.

4.1.3 Step 3 – Evaluate Potential Actions

Step 3 involved evaluating the potential management actions in terms of Feasibility, Viability and Acceptability as discussed in detail in Section 4.2.3. This assessment was completed to ensure the final Stage 4 program of management options are appropriate, achievable, and meet the objectives of the CM Act.

4.1.4 Step 4 – Putting it together

In Step 4, a business plan (refer Section 6) was developed which outlined how the proposed coastal management actions will be implemented over time, within an adaptive pathway that includes thresholds and triggers for change. The business plan demonstrates viable funding mechanisms for implementing **proposed CMP actions that are consistent with Council's IP&R framework**, including its resourcing strategy and asset management plan.

4.2 Selection and Assessment of Management Actions

There are five overarching strategies, as detailed in the CM Manual, relevant to different levels of risk and attitudes to risk. The management options can be organised into the five broad strategies as depicted in Figure 4-2.

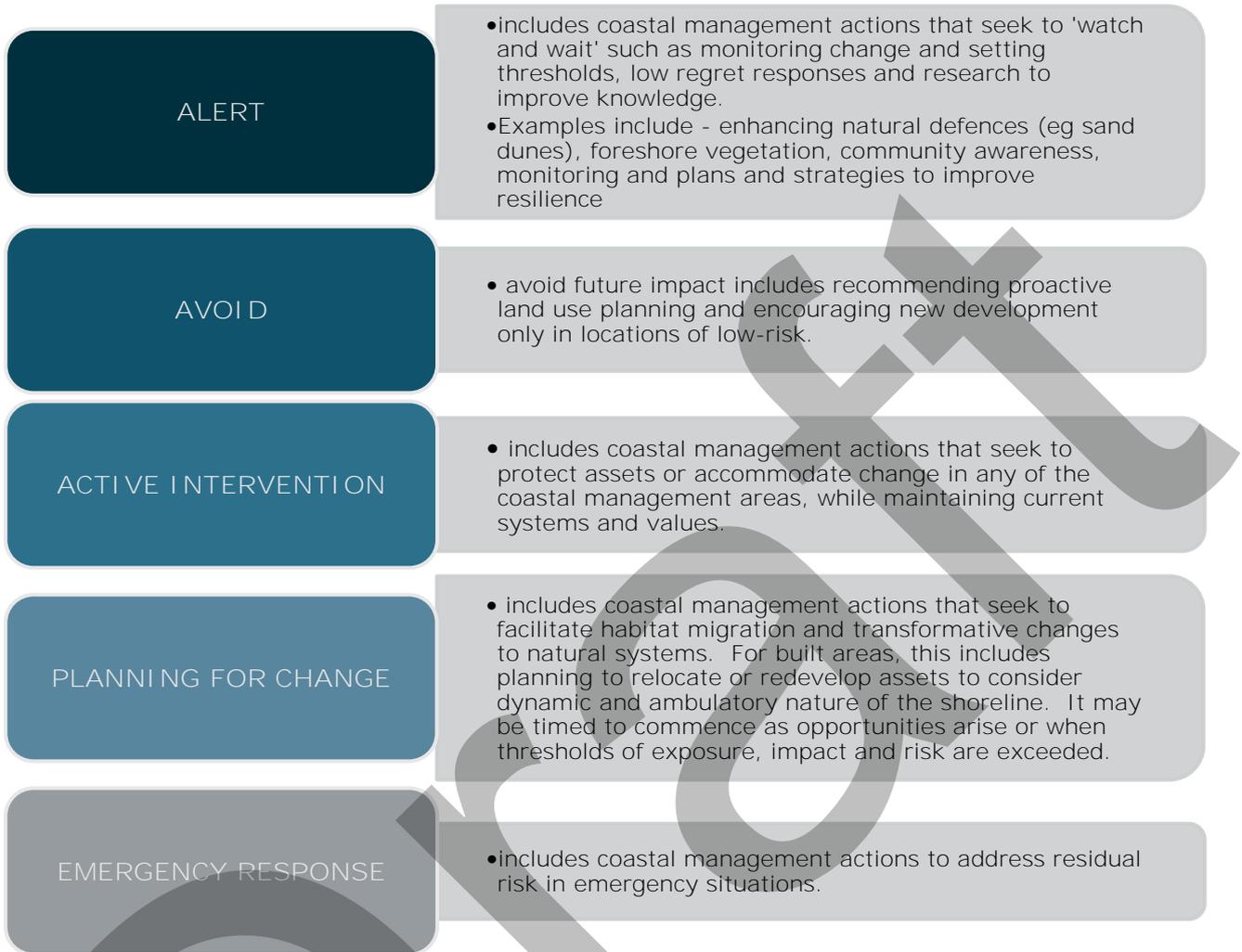


Figure 4-2: Five Strategic Approaches for Coastal Management

Management actions fall under the overarching strategies above and within the risk categories discussed in Section 2.5.

The identification of management options was undertaken with consideration of the strategic approaches to risk detailed in Figure 4-2. In addition, the following strategic outcomes aligned with the objectives of the CM Act were considered in developing the management options:

- Community and Stakeholder Engagement
- Protecting, restoring and enhancing the natural environment of the open coast
- Protecting, enhancing and restoring the cultural heritage of the open coast
- Research and collaboration
- Mitigation and adaptation to current and future risks (including asset management)
- Emergency planning and response

- Recognising the coastal zone as a vital economic zone.

The CMP has also identified actions that meet the objectives of the Central Coast Regional Plan 2041, specifically in relation to **Objective 7 of the Regional Plan, "Reach net zero and increase resilience and sustainable infrastructure"**. The relevant performance outcomes of this Objective and their link to the strategies in Figure 4-2 include:

- 1. Communities are designed and equipped to be safe, hazard-resilient places (i.e. ALERT, AVOID, PLANNING FOR CHANGE, ACTIVE INTERVENTION and EMERGENCY RESPONSE strategies).*
- 2. Neighbourhoods have inbuilt flexibility and adaptability to accommodate new uses and users in the long term (i.e. PLANNING FOR CHANGE strategy).*
- 3. The effects of climate change are managed to optimise safety and resilience for communities and the natural environment (i.e. ACTIVE INTERVENTION, PLANNING FOR CHANGE, EMERGENCY RESPONSE strategies).*
- 4. Development is located away from high-risk areas to avoid community exposure to natural hazards as far as is practical (i.e. AVOID strategy).*

4.2.1 Strategic Direction

The five strategic approaches for Coastal Management as outlined in Figure 4-2 are described below. Elements of each of these strategic approaches have been adopted within this CMP, to address the level of risk that applies both spatially and temporally along the coast. Some of these actions apply on an LGA-wide basis to address issues that are common along the entire coastline, where others have been proposed to address specific issues identified at particular locations.

Actions within the CMP that fall under each of the five strategic approaches described in Figure 4-2 are detailed below.

Strategy 1 - ALERT - Where the risks from coastal hazards are relatively low, 'watch and wait' actions have been adopted, including monitoring change, low regret responses and research to improve knowledge.

This approach has been adopted across much of the CMP area, and broadly includes the following types of no-regrets actions:

- Dune Management/vegetation management
- Stormwater management
- Monitoring, research and data collection
- Community education
- Repair of damaged public infrastructure



Specific management actions that apply across the entire coastal zone of the Central Coast and fall within this strategic category are outlined in Table 4-1.

Figure 4-3: ALERT actions include no-regrets options such as public education, enhancement of natural defences e.g. through dune management

Table 4-1: Actions falling under the ALERT Strategy

CMP Actions falling under the ALERT Strategy
• Monitoring and improvement of coastal stormwater outlets
• Develop and implement an integrated coastal processes and hazards education and awareness program
• Review and implement updated Beach Maintenance Program
• Develop and implement a Coastal Monitoring Program
• Review waste collection assets and servicing in coastal public spaces
• Improve public safety at Mazlin Reserve
• Monitor and manage risk of contamination from closed landfill sites
• Undertake a detailed wave overtopping and inundation assessment for high risk locations
• Continue the role of a coastal, estuary and floodplain management Advisory Committee
• Work with First Nation groups and stakeholders to evaluate arrangements for undertaking beach maintenance operations
• Management of unapproved memorials in public coastal spaces
• Update and maintain Council's website to improve awareness and make information on coastal processes, hazards and issues more accessible
• Knowledge sharing and protection of cultural heritage
• Develop and maintain a coastal geotechnical database
• Conduct geotechnical investigations to improve understanding of underlying geology along the coast
• Develop a coastal assets at risk register and update asset management program
• Improve accessibility and inclusiveness of coastal and foreshore areas
• Review and implement Council's coastal water quality monitoring program
• Develop and implement a Coastal Vegetation and Dune Management Strategy

CMP Actions falling under the ALERT Strategy

- Undertake and support research projects and citizen science initiatives aimed at enhancing and conserving marine biodiversity, science, recreation and education
- Undertake dune management works at the southern carpark of Soldiers Beach
- Undertake a Planning Proposal to update RH SEPP Coastal Wetlands and Littoral Rainforest Mapping
- Undertake geotechnical assessment of Norah Head lighthouse and headland
- Toowoan Bay carpark and foreshore management

Strategy 2 – AVOID – These options seek to avoid the risk, by implementing proactive planning controls and encouraging development only in areas of low risk. This is appropriate where the risk is currently known and well-defined, with planning controls tailored to the changing risk profile over time. The approach recognises that it may not be possible to avoid the risk at some locations in the future and seeks to limit development in areas of high risk. The types of measures that fit into this category include:

- Planning/Development controls
- Infrastructure setbacks
- Building and infrastructure design criteria.

The CMP has included a detailed review of Council’s planning controls, which is documented in the CMP Planning Report (Worley Consulting 2025) and discussed in Section 5. The review includes tailored specific controls that are appropriate for the level of risk as defined by the coastal hazard mapping for different planning horizons, while recognising that there is existing development subject to coastal hazards and reducing the risk to any new development.

The most recent coastal hazard mapping (Bluecoast Consulting Engineers, 2024-2025) provides probabilistic coastal hazard extents for coastal erosion events up to the 100 year ARI (or 1% AEP). In consideration of the risk and probability of exceedance of the mapped coastal hazards, streamlining of coastal hazard planning horizons is recommended for all beaches to provide consistency and simplification. The planning horizon should ideally be consistent across all areas, and adopted based on the level of risk determined at each beach, which is a function of the intensity of existing development in each area, the quantum of development at risk within the coastal hazard zones and community acceptance. This should include adoption of a unified coastal hazard line across the LGA (for example, the Bluecoast Consulting Engineers 2024-2025 2120 1% erosion risk line). To achieve this, Council is to undertake CVA mapping based on the chosen erosion risk line and coastal inundation hazard extents, and adopt the mapping in the LEP and RH SEPP.

Specific management actions that apply across the entire coastal zone of the Central Coast and fall within this strategic category are outlined in Table 4-2.

Table 4-2: Actions falling under the AVOID Strategy

CMP Actions falling under the AVOID Strategy
<ul style="list-style-type: none"> • Develop and implement coastal compliance procedures
<ul style="list-style-type: none"> • Investigate and develop a Coastal Hazard Adaptation Strategy for affected coastal communities
<ul style="list-style-type: none"> • Review and update coastal development planning controls and undertake Planning Proposal to adopt Coastal Vulnerability Area
<ul style="list-style-type: none"> • Prepare a pilot adaptation and options assessment for the Entrance North and The Lakes SLSCs

Strategy 3 – ACTIVE INTERVENTION – These options involve active intervention in an effort to reduce the risk, for example, coastal protection works.

Coastal Protection Works

“Protection” options require physical intervention to slow down or prevent coastal erosion, and provide some degree of protection to public and private property from coastal hazards. Such options may involve construction of engineering works, such as seawalls, groynes and revetments, which can modify coastal processes and allow existing and future property and infrastructure to remain viable into the future by protecting them from damage caused by coastal erosion. Some examples of coastal protection structures are shown in Figure 4-4.

Some types of engineering works may be more effective than others at providing this protection, and all require maintenance. They are designed to protect assets against a storm of a specific magnitude, and have a finite design life.

Some combinations of various engineering structures could be used to provide the dual goals of improvement in beach amenity as well as protection of infrastructure. Other structural interventions may improve protection at the expense of amenity, while still others can improve amenity but provide a lesser degree of protection. Future maintenance will become more costly, and this is a cost that will need to be borne by the community in future generations. Such protection options would in most cases reduce the likelihood of the risk to coastal development, allowing it to persist in the short to medium term. However, future climate change impacts may increase maintenance requirements of structural coastline protection and it may not be viable in the longer term.

Note that coastal protection works are required under the NSW Coastal Management Framework to be strategic and to avoid significant adverse long term environmental or social impacts on other coastal features, assets, processes, resources, access or use. To mitigate these impacts, compensatory beach nourishment may need to be included with the coastal protection construction to match erosion due to long term recession, storm demand and due to the sand that would be locked up behind the structure. Beach nourishment is described in more detail below.



Figure 4-4: Examples of coastal protection structures

The draft CMP proposes that property owners that own properties at risk of coastal erosion, continue to be responsible for the funding and implementation of any coastal protection works for their own properties. This is consistent with the resolution by Council for Wamberal Beach in October 2022.

Private coastal protection works will continue to have a planning pathway under the NSW planning legislation and the NSW Coastal Framework. The CMP does not outline where private residents should or should not lodge development applications for coastal protection works. Regardless of any actions or directions indicated within the CMP regarding private coastal

protection works, private owners remain entitled to lodge a development application for coastal protection works for their properties, i.e. the CMP cannot dictate how private owners manage coastal protection on their land. These development applications will continue to be assessed on their merits by the Regional Planning Panel. The proposed action by Council to develop region wide Engineering Design Requirements for Coastal Protection Works will help guide the preparation and assessment of development applications for coastal protection works.

Even with the completion of the actions in this CMP there will still be a significant residual risk to private property on the Central Coast from coastal hazards over the life of the plan. There is limited scope for Council or other public authorities to mitigate this risk over the life of the plan. The responsibility for private coastal protection ultimately remains with private owners via approved planning pathways (obtaining development consent). In the absence of suitable private coastal protection works, and with continuing coastal erosion impacts occurring in these locations, there will be a continued burden on Council and emergency services when coastal erosion events occur.

Beach Nourishment

Another form of protection works is beach nourishment. Beach nourishment involves placement of sand onto the beach profile, which provides a buffer against erosion. The term beach nourishment usually refers to nourishment of the entire beach profile, including the dune, beach berm and the portion of the active beach below the shoreline. Such nourishment depends on locating a suitable source of sand. It works best when the sand placed on the eroded beach closely matches the grain size and characteristics of the native beach sand, or when the sand is sourced from within the same coastal sediment compartment as the beach.

Examples of beach nourishment work are shown in Figure 4-5.



Figure 4-5: Examples of Sand Nourishment. Left: Jimmys Beach NSW. Right: "Rainbowing" – dredge pumping nourishment sand from offshore into the active beach zone (NSW Reconstruction Authority State Disaster Mitigation Plan, 2023)

Council has undertaken beach nourishment strategically at The Entrance North and The Entrance beach, using sand dredged from the entrance to Tuggerah Lakes. There is an action in the CMP to continue this practice as beneficial reuse of dredge sand to reduce erosion risk at The Entrance North, and to formally implement this practice at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon, sand berm area and other sources as available.

Council is aware of the current action in the NSW State Disaster Mitigation Plan to: “Assess the feasibility of large-scale offshore sand reserves and other sources for beach nourishment including where it might be suitable” and will continue to work with the NSW Government on the outcomes of this study. Wamberal/Terrigal and The Entrance North Beaches were included in the list of beaches that were given a more detailed assessment of feasibility of beach nourishment in the study. Council has included an action in the CMP to work with the NSW Government and stakeholders from adjacent areas (e.g. Northern Beaches Council) on the next stages of this project such as physical testing of potential sand source locations, and to undertake the necessary designs and environmental assessments to secure a mining licence under the NSW *Offshore Minerals Act 1999*.

Active Intervention Strategy Actions

Actions that fall under this category in the CMP are outlined in Table 4-3. These include actions for Coastal Protection Works, as well as enabling actions to allow for the construction and implementation of the works, for example obtaining environmental approvals or the setting up of license agreements.

Table 4-3: Actions falling under the Active Intervention Strategy

CMP Actions falling under the ACTIVE INTERVENTION Strategy
<ul style="list-style-type: none"> Investigate and develop a Coastal Hazard Adaptation Strategy for affected coastal communities
<ul style="list-style-type: none"> Investigate offshore sand nourishment sources and secure mining licence.
<ul style="list-style-type: none"> Develop and implement Coastal Engineering Design Requirements
<ul style="list-style-type: none"> Identify the extent, nature and condition of existing coastal emergency works (including potential removal or remediation)
<ul style="list-style-type: none"> Design and construct Stage 2 of the existing Cabbage Tree Harbour coastal protection works
<ul style="list-style-type: none"> Complete coastal risk and options assessment for Marine Parade at MacMasters Beach
<ul style="list-style-type: none"> Construction of MacMasters Beach temporary coastal protection works
<ul style="list-style-type: none"> Develop engineering design requirements for coastal protection works at The Entrance North
<ul style="list-style-type: none"> Complete detailed design and approvals for coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.
<ul style="list-style-type: none"> Construct coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.
<ul style="list-style-type: none"> Complete design and approvals for coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.
<ul style="list-style-type: none"> Construct coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.
<ul style="list-style-type: none"> Implement sand nourishment at The Entrance North using sand sourced strategically (in accordance with the Entrance Management Strategy and procedures being developed as part of the Tuggerah Lakes Coastal Management Program – Including Entrance Channel Dredging Activities)

CMP Actions falling under the ACTIVE INTERVENTION Strategy
<ul style="list-style-type: none"> Review the structural integrity and extent of the foreshore revetment and embankment protecting Marine Parade, The Entrance, and undertake remedial and/or extension works as required
<ul style="list-style-type: none"> Review and update the Wamberal Beach engineering design requirements so that they may be referred to in future revisions of Council's Coastal Development Control Plan (DCP)
<ul style="list-style-type: none"> Complete design and approvals for coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal.
<ul style="list-style-type: none"> Construct coastal protection works fronting 1 Pacific St to 17 Calais Rd, Wamberal Beach.
<ul style="list-style-type: none"> Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon, sand berm area and other sources as available
<ul style="list-style-type: none"> Purchase residual private land fronting Pacific St Wamberal.
<ul style="list-style-type: none"> Complete the transfer of NSW Government owned lots at Ocean View Drive Wamberal into Council ownership.
<ul style="list-style-type: none"> Enter into licence agreement for private coastal protection works located partly on Council owned land at Wamberal Beach.
<ul style="list-style-type: none"> Options study for replacement of aging seawall at The Haven

Strategy 4 – 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 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.

The key action included in the CMP under the Planning for Change strategy is to:

- Investigate and develop a Coastal Hazard Adaptation Strategy for affected coastal communities

This action recognises that even with active intervention in areas that are currently at the highest risk from coastal hazards (e.g. Wamberal and The Entrance North), the risk will eventually become so great that it cannot be reduced to a tolerable level by interventions such as engineering works, and that some form of retreat or relocation from the high risk area may be necessary in the future (e.g. Planned Retreat or Managed Retreat).

A “retreat” approach recognises that coastal processes and coastline hazards are impacting on the coastline, and that the nature of this impact is likely to worsen in the future. As the impact of coastline hazards worsens, and in the absence of actions to change likelihood of risk, the ability of the community to maintain infrastructure and keep existing properties in their current locations begins to decline. Infrastructure such as water supply, electricity and sewer becomes increasingly exposed to coastal erosion, and eventually it will be more difficult to maintain services for some of the more exposed seaside properties. With future coastal erosion and beach recession due to sea level rise, seaside properties may eventually lose their access, as portions of their access are lost due to future coastal erosion. Eventually, if no action is taken,

loss of structural integrity of seaside buildings themselves may result and the existing housing may become unsuitable for habitation.

A retreat option provides a strategy for gradual movement of infrastructure inland to avoid potential threats. It may in the first instance involve providing temporary access for properties that have lost their road access due to coastal erosion, and restrictions on future development, recognising that the threat to property will increase in the future.

Mechanisms for planned retreat include:

- planning controls (e.g. time limited occupation, re-locatable buildings)
- buy-back of properties at risk (**for example, through the NSW Government's Coastal Lands Protection Scheme**), and
- landward relocation of at-risk infrastructure.

Through limiting development in high-risk areas via **Council's development controls**, urban development becomes less exposed to coastal hazards over time, leading to the development at higher risk gradually retreating from the areas at highest risk as the risk increases with time. However, Council does not have the resources or powers to acquire private properties that are at risk from coastal hazards. For example, buy back of properties alone along Wamberal Beach is estimated at \$500 million to \$1 billion. Other costs would include demolition of buildings, disposal to landfill and dune restoration costs.

Since the early 1970's, five properties have been purchased by the NSW Government through the **NSW Coastal Lands Protection Scheme**. **Today's property values along Wamberal well exceed the Scheme's annual budget of \$3 million.**

Council is aware of the current action in the State Disaster Mitigation Plan to: "*Develop a State policy for large-scale multi-hazard managed relocation*" and will continue to work with the NSW Government on what this means for the Central Coast and coastal hazards.

Strategy 5 – Emergency Response

These coastal management actions address residual risk in emergency situations. The Coastal Zone Emergency Action Subplan (CZEAS) in Appendix B provides a list of management actions for Council to undertake specifically in a coastal emergency. Council has on occasion installed emergency protection works under the provisions of the *State Emergency and Rescue Management Act 1989*, for example at Wamberal in July 2020 (Figure 4-6). However, private landholders are responsible for their own land parcels, and Council does not have an obligation to protect private property from erosion events. Council must, however, consider development applications lodged by property owners for coastal protection works.

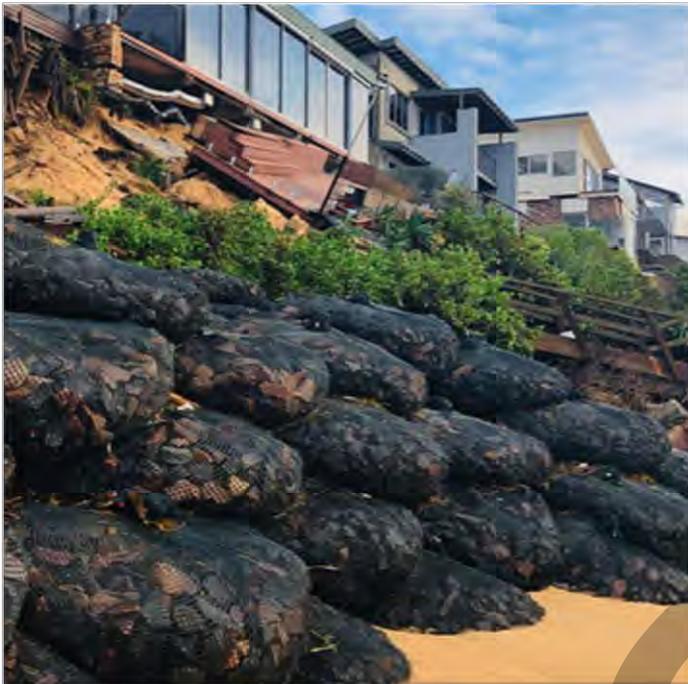


Figure 4-6: Council-installed emergency works at Wamberal Beach in July 2020 under direction of the Local Emergency Operations Controller under provisions of the State Emergency and Rescue Management Act 1989

4.2.2 Option Identification

Council has historically identified and implemented extensive management options/actions for the LGA within the overarching strategies and categories as detailed in Figure 4-2 and as discussed above. At a high level, these actions have included the following:

- Various seawall and shoreline protection structures implemented throughout the LGA (e.g., Avoca)
- Protocols to repair accessways and beaches after coastal erosion/damage – beach scraping etc.
- Terminal Protection Structure Design Requirements - Wamberal
- Ongoing monitoring – e.g. monitoring performance of existing rock structures, erosion monitoring, run up level monitoring, LiDAR surveys typically before and after storm events,
- Development controls – redevelopment requirements e.g., setbacks, floor levels, piled foundations
- Entrance management policies
- Landward relocation
- Investigations into beach nourishment
- Vegetation profiling and works

- Maintenance programs

During Stage 2, an updated coastal hazard assessment (Bluecoast Consulting Engineers, 2024-2025) was undertaken to inform the assessment of the coastal risks used to develop the Detailed Risk Assessment and potential management actions to address the identified risks.

In addition, Council has undertaken an audit of all relevant previous studies, community engagement, technical expertise and actions (Wyong/Gosford CZMP actions). Actions were reviewed to determine their status, appropriateness and whether they could be carried over to this CMP.

With the risks and strategies taken into consideration, along with the Stage 3 Community and Stakeholder engagement outcomes, appropriate management options were developed to address overall LGA wide issues, and then more specific options for individual locations.

This initial list of potential actions was further refined, scored and assessed as detailed in Section 4.2.3. The outcomes from the community engagement are summarised in Section 3.4, with details of community engagement materials provided in the Stage 3 Summary Report (Worley Consulting 2024). A suite of 55 management actions has been prepared to address the risks and issues identified by previous studies, the community and the CMP study team.

The management options were developed to address overall coast-wide issues common to the entire open coast, and then more specific options for individual locations.

4.2.3 Options Assessment

4.2.3.1 Overview

Following on from the identification of management options, the options needed to be assessed and subsequently prioritised. This assessment was completed to ensure the final Stage 4 program of management options are appropriate, achievable, and meet the objectives of the CM Act. A Multi Criteria Analysis (MCA) was implemented based on evaluating the feasibility, viability and acceptability of each potential action as depicted in Figure 4-7.

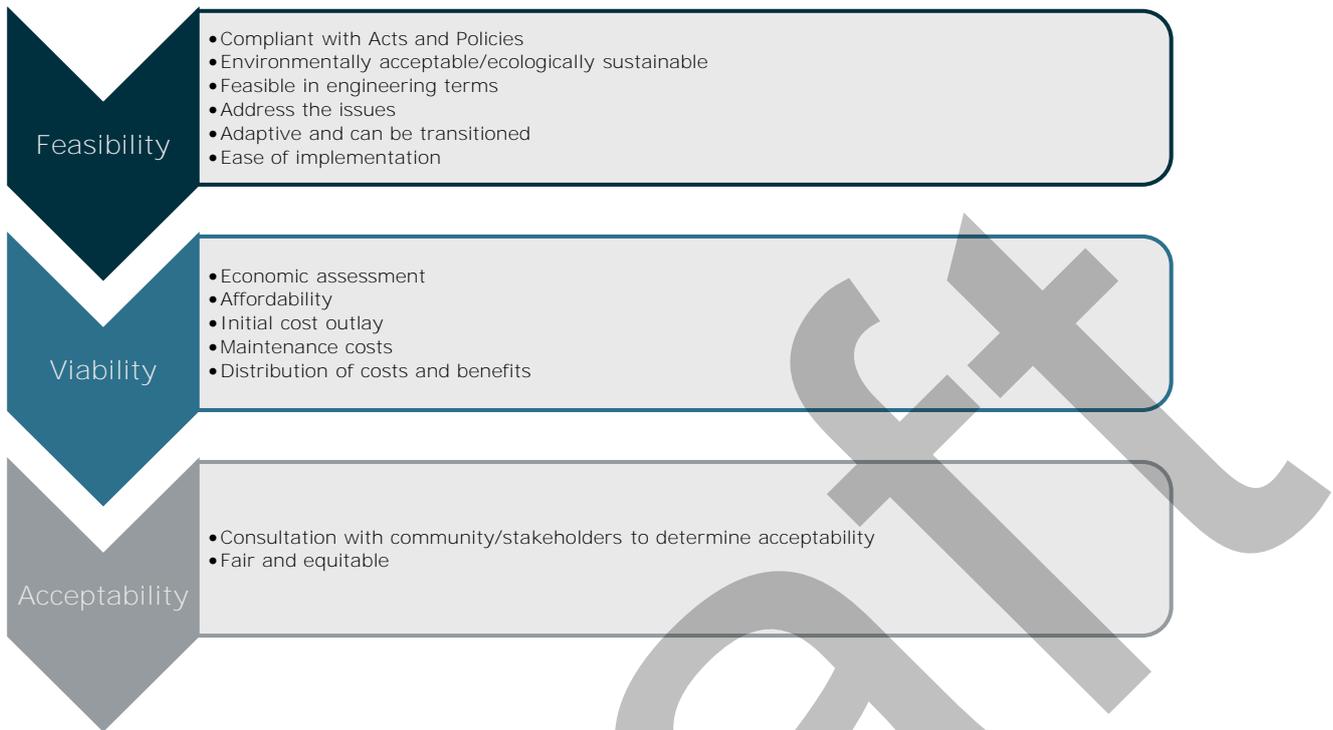


Figure 4-7: Criteria in Evaluating Management Options

4.2.3.2 Multi Criteria Analysis (MCA)

A detailed Multi Criteria Analysis (MCA) was undertaken across a broad range of evaluation criteria to assess the feasibility, viability and acceptability of the options as required by the CM Manual. In evaluating each of the identified options, the criteria based on Figure 4-7 were scored and weighted against the relative importance of each, with a higher overall weighted score representing a more favourable management option. The criteria, definitions and methods for scoring options is shown in Table 4-4. This process was used to rank the options and determine those actions suitable to progress to Stage 4. Table 4-4 provides details of the criteria and definitions for scoring options. A score of zero automatically ruled out the action from further consideration. The evaluation process was developed in conjunction with the Project Team which included expert representatives from Council and DCCEEW, with definitions, scores and weightings assigned, reviewed and agreed by all members of the Team.

The results of the MCA including scores and ranks for each option are provided in the Stage 3 Summary Report (Worley Consulting 2024).

Following the Stage 4 public and stakeholder exhibition of the draft CMP and feedback received from the community and Agencies, additional management actions were developed, in particular at Wamberal and The Entrance North. These were fed into the MCA, with new scores and rankings developed. The results of the updated MCA including all the CMP actions are provided in Appendix E.

Table 4-4: Criteria and Definitions for Scoring Options

		Definition - Score 1-5	Weighting	Definitions	0	0.2	0.4	0.6	0.8	1
Economic	Total estimated cost (implementation & maintenance)	Initial cost outlay plus maintenance cost over 10 years of option. Lower cost = 1, higher cost = 0.2	2	To assign score against actual cost ranges		>\$5million and/or detailed CBA required	\$500k - \$5m	\$100k - \$500k	\$10k - \$100k	<\$10k
Social	Impact on Safety	Does the action improve safety? 1 = yes, 0.2 = no	1	Captures concerns re coastal use area	Action would likely compromise public safety.	No improvement in safety	Action would provide only minor improvement in safety	Action would provide minor to moderate improvement in safety	Action would provide moderate to substantial improvement in safety	Action would provide substantial improvement safety
	Approvals, Statutory and Policy Compliance	How complex are the approvals for the action, will it take a long time to implement? 1 = simple to implement and can be done now, 0.2 = complex approvals required with multiple agencies involved and difficult to implement	1	Is the action legal? Is it a "no-regrets" action or will it be complex to implement? Is it consistent with statutory approvals and current policy settings? Is it consistent with the objects of the Coastal Management Act?	Action is not currently legal, and no legal approvals pathway exists for its implementation.	Potentially inconsistent/lengthy approvals required with detailed environmental assessments necessary	Largely consistent with existing approvals/policy.		Action fully consistent with statutory and policy settings, or with existing approvals in place	
Environment	Impact on coastal processes	Will the action cause a significant disruption to coastal processes? 1 = no, 0.2 = yes	2	Are we enhancing or disrupting the natural coastal processes?	Action is likely to interfere with the natural coastal processes leading to unforeseen or negative outcomes across the area	Action is likely to interfere with the natural coastal processes and is likely to cause a negative impact	Action may interfere with the natural coastal processes and may cause a negative impact	Action may interfere with the local coastal processes by design but is not likely to cause a negative impact	Action is not likely to interfere with the natural coastal processes	Action is likely to enhance or restore the natural coastal processes
	Overall environmental benefit and Ecological Impact	Will the action have an overall environmental benefit? 1 = yes, 0.2 = no	1	Are we improving the resilience of the Coastal Wetland Area, Coastal Environment Area? Is it ecologically sustainable?	Action is likely to have a demonstrated or irreversible negative impact on resilience of the Coastal Wetland Area, Coastal Environment Area.	Action is likely to cause a localised or reversible negative impact on Coastal Wetlands and/or Coastal Environment Area	Action may cause a negative impact on the Coastal Environment or Coastal Wetland areas	Action is not expected to cause a positive or negative impact on the Coastal Environment or Coastal Wetland areas	Action is likely to provide a minor to moderate benefit to the Coastal Environment or Coastal Wetland Areas	Action is likely to provide a substantial benefit to the Coastal Environment and Coastal Wetland Areas
	Effectiveness of Option	How effective is the action in reducing the risk or managing the issue? 1 = very effective, 0.2 = not effective	2	From Risk assessment, would the action address the risk? E.g. would it reduce coastal risk/vulnerability? How well would the risk be addressed by the action?	Action would increase identified risk	Action would only provide minimal reduction in identified risk	Action would provide minor benefits in reducing the identified risk	Action would provide minor to moderate reduction in identified risk	Action would provide moderate to substantial reduction in risk	Action would provide substantial, measurable reduction in identified risk
Social	Social Impact	Does the action enhance the social and cultural values of the coastal zone? 1 = yes, 0 = no	1	Social values e.g. education initiatives, improve scientific and/or traditional knowledge, recreational amenity, visual amenity and natural character	Action would have a negative cultural and social impact	Action does not provide any benefit to social values of the coast, and may have a negative impact, or may not be acceptable to stakeholders		Action provides moderate benefit to social values of the coast		Action provides substantial benefit to social values of the coast, and has a high degree of support from the community

4.2.3.3 Feasibility

As per the details provided in the NSW Coastal Management Manual, feasible coastal management actions are those which:

- are consistent with the objectives of the CM Act
- comply with statutory and policy requirements
- are environmentally acceptable and consistent with the principles of Ecologically Sustainable Development (ESD)
- are feasible in engineering terms i.e. can realistically be built
- can address identified issues
- are adaptive and can transition to alternative approaches
- are broadly able to be implemented
- are likely to contribute new knowledge about effective management.

The feasibility assessment has considered both social and environmental aspects as shown in Table 4-4 and has been undertaken in accordance with the above.

Feasibility scores were assigned against the following criteria:

- Impact on Safety – does the action improve safety?
- Approvals, Statutory and Policy Compliance - Is the action legal? Is it a "no-regrets" action or will it be complex to implement? Is it consistent with statutory approvals and current policy settings? Is it consistent with the objects of the CM Act?
- Impact on coastal processes – will the action enhance or disrupt the natural coastal processes? This criterion was given a weighting of 2 to reflect its importance in defining the management action.
- Overall environmental benefit and ecological impact – will the action have an overall environmental benefit? Will the action improve the resilience of the Coastal Wetland Area, Coastal Environment Area? Is it ecologically sustainable?
- Effectiveness of Option - How effective is the action in reducing the risk or managing the issue? From the Risk assessment, would the action address the risk? e.g. would it reduce coastal risk/vulnerability? How well would the risk be addressed by the action? This criterion was given a weighting of 2 to reflect its importance in defining the management action.

Scores for each individual option were added and multiplied by their weighting to derive an overall MCA score for each option.

Actions that were deemed to fail any of the above criteria were assigned a score of zero, which precluded them from being carried through to Stage 4.

4.2.3.4 Viability

The viability assessment was completed to identify the cost (implementation and maintenance) for the options being assessed. The scope and level of detail of the economic assessment was

proportionate to the nature and scale of the coastal issues. From the CM Manual, Figure 4-8 provides guidance on the method used for selecting the appropriate level of economic assessment.

Coastal management actions operating over long timeframes with potentially larger direct and indirect costs/benefits may warrant a CBA to determine whether the benefits outweigh the costs. However, CBA is not considered warranted for the actions proposed in this CMP given no actions are anticipated to have a capital cost greater than \$5 million, and as limited information is available to be able to accurately quantify tangible benefits to inform a detailed assessment.

The primary purpose of the viability assessment was to determine:

- the cost of the option
- the distribution of costs and benefits
- proposed cost sharing arrangement and funding mechanisms
- whether the proposed management options are affordable and thus viable for progressing through to Stage 4.

For the Stage 3 assessment, an estimate of the capital and maintenance cost has been undertaken for each action, with the Viability score obtained from the capital cost plus the maintenance costs over the 10 year CMP planning period. The Viability score was assigned a weighting of 2 and scores were allocated against each of the options according to the following rules:

Table 4-5: Assignment of Viability scores against total capital and maintenance costs for each action

Score	Criteria for total capital outlay plus maintenance costs over 10 year timeframe
0.2	>\$5million and/or detailed CBA required
0.4	\$500k - \$5m
0.6	\$100k - \$500k
0.8	\$10k - \$100k
1	<\$10k

		Complexity	
		Low	High
Risks and impacts	Low	<ul style="list-style-type: none"> Limited number of stakeholders Little or no quantitative data 	<ul style="list-style-type: none"> Disagreement or conflicting views among stakeholders Difficulty defining beneficiaries or apportioning costs Good quantitative data
	High	<p>Simple economic assessment</p> <p>These assessments ask similar questions as the more complex analysis, but use qualitative analysis and expert opinion rather than quantitative data.</p>	<p>Intermediate level assessment</p> <p>These assessments ask the same questions as the more complex analysis, but may use detailed costings.</p>
		Low	High
		<ul style="list-style-type: none"> Limited spatial scale Low risk and low impact 	<ul style="list-style-type: none"> Addressing high or extreme risks An option involves major investments
		<p>Intermediate level assessment</p> <p>Monte Carlo modelling or significant social analysis may not be necessary, but some detailed costing e.g. for maintenance, is required.</p>	<p>Detailed cost-benefit analysis</p> <p>This may involve a systematic comparison of all foreseeable costs and benefits and the probability that they will arise over the planning period.</p>

Figure 4-8: Matrix of risk and complexity for selecting the level of economic assessment

Costings for the actions are provided in the Business Plan in Section 6. As there are no actions involving investments greater than \$5 million, and the benefits of the actions are largely intangible, a simple assessment has been carried out and is documented in the Stage 3 Summary report (Worley Consulting 2024). The simple assessment identifies:

- the approximate cost of each action, based on costing information from Council’s cost database and the Project Team’s experience with similar works. The derived cost was used to assign the assessment score against each option in the option assessment.
- the information used to derive the costs, and
- a qualitative description of the benefits of each action, with these being intangible and qualitative in nature and thus it was not possible to ascribe a dollar value against the benefit of the actions.

The assessment has been updated to include these aspects for the updated list of management actions, and is included in Appendix E.

4.2.3.5 Acceptability

Acceptability is the final step in selecting which of the actions were to be included in the CMP. This step involves consulting with the community and stakeholders to determine the acceptability of the actions as well as assessing whether the action improves social and cultural

values of the coastal use area. The actions have been directly informed by issues and suggestions raised during the Stage 3 community and stakeholder engagement, which fed into the Detailed Risk Assessment.

Support for the actions from the community and Agency stakeholders will be gauged through public exhibition of the draft CMP and community engagement sessions which will provide an opportunity for the community to better understand and formally comment on the draft management actions.

Scores were assigned for how well the action addresses Social Values of the coastal zone. Social values include aspects such as education initiatives, improvement in scientific/traditional knowledge, recreational amenity, visual amenity and natural character. Actions which do not provide any benefit to social values, and/or may have negative impact were assigned the lowest score against this criterion. Actions which provide substantial benefit to social values were assigned the highest scores. Actions which have a demonstrable negative social impact were assigned a score of zero, which excludes the action from being carried forward to Stage 4.

4.3 Management Strategy and Actions for Extreme Risk locations

Wamberal Beach and The Entrance North Beach are two key locations which have been identified as being at extreme risk from coastal hazards, and require a detailed management strategy to address this risk. The risk at these locations has been acknowledged in previous studies and in the Gosford Beaches CZMP (WorleyParsons 2015, WorleyParsons 2017), with detailed analysis on available management strategies having been undertaken since that time (MHL 2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2022). The risk to private and public infrastructure has increased since the CZMPs were undertaken.

Management strategies that have been considered in detail to date at Wamberal and The Entrance North have included:

- Retreat (options to avoid the risk in accordance with the PLANNING FOR CHANGE strategy discussed in Section 4.2.1) – including landward relocation of infrastructure, planning controls, setbacks, acquisition of at-risk properties, trigger-limited consents
- Protection (options consistent with the ACTIVE INTERVENTION strategy discussed in Section 4.2.1), including beach nourishment, revetments, seawalls, groynes, beach scraping.

The management actions adopted in this CMP combine elements of both of these strategies, as discussed in Section 4.2.

4.3.1 Retreat

The over-arching philosophy of this management strategy is that it assumes natural processes will occur without intervention and that dwelling structures will be successively relocated landward away from the influence of hazards over time. Development approvals and associated controls acknowledge this philosophy, reducing the potential scale of economic

losses, while enabling property owners to use their land for as long as possible until the physical coastal processes have subsumed any safe development margin.

A Retreat approach recognises that it is not ecologically sustainable to modify natural processes to eliminate or reduce the coastline hazards.

Seaside properties such as those along Wamberal Beach are currently at threat from loss of structural integrity of the dwellings, and the existing housing may become unsuitable for habitation if no action is taken.

Such options must take into account social equity principles and adequately compensate property owners for the loss of their property, while at the same time being consistent with the principles of ESD. Such options may also allow property owners to enjoy the attributes of beachside living for the present, as long as they are informed of the long-term risk.

This type of option could be implemented in the following ways:

- Acquisition of properties at greatest risk under *the Land Acquisition (Just Terms Compensation) Act 1991*.
- Implementing development controls through the DCP that stipulate the type of allowable construction on a lot as being lightweight and able to be moved landward as the hazard risk increases – i.e. designating a trigger point at which infrastructure may be moved landward.
- Relocation inland by public authorities of services and public infrastructure such as roads, sewer, water, electricity as the risk increases.

There are a number of key considerations in implementing planned retreat, many of which require assistance and guidance from the NSW and Commonwealth Governments, including:

- Clarification of the processes relating to transition mechanisms and timeframes for staging a strategic approach to managed retreat
- Anticipated public perception and timing for advising property owners of potential future retreat in relation to trigger points
- Provision and amount of land (if any) available for a retreating coastal community
- Existing land-use rights
- Whether financial assistance is available for relocation (e.g. purchase of property, subsidies for relocation)
- Value of property at risk
- Incentives (or disincentives) available for property owners vacating land
- Mechanisms to inform existing or new property owners of future risk
- Whether there is opportunity to redistribute risks, uncertainties, benefits and costs among stakeholder groups to ensure they bear future costs from development.

A retreat type strategy may be staged as the coastline hazard risk increases with time.

The stages involved may include:

1. Informing beachside owners of the coastline hazard risk to their property; (short term)
2. Adoption of planning controls on the type and scale of future beachfront development; (short term)
3. Movement of services and infrastructure landward to accommodate the future coastline hazard; (medium term)
4. Voluntary purchase of affected properties at market value and return of the land to public ownership (or uses compatible with coastline hazards); (medium-long term)
5. Compulsory acquisition of properties that are no longer serviceable. (long term)

Several studies have investigated the viability of retreat as an option, for Wamberal Beach in particular. These included:

- Coastal Zone Management Study (WorleyParsons 2015)
- Wamberal Beach Management Options: Cost Benefit and Distributional Analysis (Marsden Jacobs Associates 2017)
- Stage 6 – Cost-Benefit Analysis of Wamberal Terminal Coastal Protection Options (MHL/WRL/Balmoral Group 2021).

The Coastal Zone Management Study (WorleyParsons, 2015), assessed two types of managed retreat options for Wamberal Beach:

- Planned retreat from this area, through voluntary purchase of properties where buildings are seaward of 2050 Zone of Slope Adjustment. This was found to have a capital cost of \$304 million, Costs PV \$319 million, Benefits PV Up to \$47.5 million, BCR 0.15.
- Voluntary purchase of properties where buildings are seaward of Immediate Zone of Slope Adjustment (i.e. 61 properties). Capital cost \$244 million, Costs PV \$259 million, Benefits PV Up to \$44 million, BCR 0.17.

The issues regarding the practical implementation of retreat as a management strategy for Wamberal as summarised in MHL (2021), and which also apply to The Entrance North, include:

- High capital costs, with low prospect of State Government funding for this option. Costs are likely to be borne by the broader community and also by property owners due to loss of property value.
- Acquisition is predicated on the voluntary nature of the scheme, which property owners may not take up.
- While Councils do have the power to compulsorily acquire land under the *Local Government Act*, the purposes under which it may do so are defined under the Act and relate primarily for infrastructure. The Council would require the consent of the Minister to allow for compulsory acquisition outside the scope of the Act.

- Social and economic impacts on the locality as a result of urban degradation and impacts on investor confidence.
- Loss of rateable income for Council.
- Risk to remaining properties still exists, and road access to/along Wamberal Beach could be lost along Ocean View Drive if a breakthrough into Terrigal Lagoon occurs under future coastal hazards. This has been identified as a risk in the Stage 2 Coastal hazard assessment for the CMP (Bluecoast Consulting Engineers, 2024).

Based on the outcome of the studies done to date, planned retreat as an overarching strategy in the short term has been shown to be not feasible, acceptable or economically viable, and Council has not pursued this strategy further. However, elements of the strategy that are part of the CMP include informing beachside owners of the coastline hazard risk to their property, adoption of planning controls on the type and scale of future beachfront development, and movement of public services and infrastructure landward to accommodate the future coastline hazard as needed.

4.3.2 Protect

Protection options fall into the "ACTIVE INTERVENTION" strategy, with some examples of coastal protection works as discussed in Section 4.2.

4.3.2.1 Wamberal Beach

Protection works in the form of a Terminal Protection Structure have been proposed at Wamberal Beach, with either ongoing large-scale sand nourishment or a terminal protection structure recommended by the Gosford CAMP in 1995. A Seabee terminal protective structure with wave-return crest, covering the whole Wamberal embayment (lagoon to lagoon) was designed by the UNSW Water Research Laboratory (WRL) in 1998 (Couriel *et al.* 1998) and an Environmental Impact Statement (EIS) completed for the proposed structure (MHL 2003). Beach nourishment was identified by the EIS for Wamberal Beach (MHL 2003) as accompanying the potential construction of a terminal protection structure for Wamberal Beach. A discussion on beach nourishment for Wamberal Beach and the other Gosford open coast beaches including potential sand sources and required quantities is provided in MHL (2003). That investigation concluded that the most viable source for sand nourishment of Terrigal/Wamberal Beach is the existing offshore sand reserves. However, the proposed protection works were never implemented, due in part to a lack of funding and the inability to secure suitable beach nourishment sources to accompany the project.

The Gosford Beaches CZMP (2017) included an action "TW11 - Terminal protection - Council to action review, design and funding of terminal protection structure for Wamberal", stating that works may consist of a buried armour seawall. In conjunction with this, the CZMP also included the action "TW14 Investigate sources of sand and feasibility of beach nourishment for Wamberal Beach" to be carried out in the short term, and "TW15 Beach nourishment coupled with a terminal revetment to increase buffer against storm erosion" in the short to medium term. Council undertook a series of investigations to progress these management actions, with six reports produced by MHL (2021), including:

1. Review of previous studies

2. Coastal protection amenity assessment
3. Seawall concept design options
4. Sand nourishment investigation
5. Provision of coastal monitoring (online webpage)
6. Cost benefit analysis and distributional analysis of options

Beach nourishment sources were again explored as part of these investigations, with the most feasible sand source again being identified as the offshore sand reserves, although other sources were explored including local and regional quarries, the entrance areas of Wamberal and Terrigal lagoons, Swansea Channel, spoil from tunnel construction and the lower Hunter River. The most viable source was found to be offshore dredging, with around 10 million m³ available and costs of <\$10/m³ if undertaken as part of a broader regional nourishment campaign (MHL 2021d). However, these offshore resources are currently not available for extraction due to the prohibition on offshore minerals extraction enforced in the *Offshore Minerals Act (1999)* (Withycombe *et al.*, 2009).

Concept design options were explored as part of these investigations, with the following options canvassed:

1. Basalt rock revetment - conventional rubble mound rock seawall with basalt rock armour, buried by sand.
2. Sandstone rock revetment - conventional rubble mound rock seawall with sandstone rock armour, buried by sand.
3. Vertical seawall – piled vertical seawall located at the back of the beach comprising precast concrete panels between supporting H-column and sheet pile toe.
4. Vertical seawall with rock toe - composite seawall arrangement comprising a piled vertical seawall design with a non-rigid rock rubble toe.
5. Tiered vertical seawall with promenade – piled vertical seawall arrangement composed of lower and upper seawall either side of a mid-level promenade along the back of the beach.

These concept options are presented in the Manly Hydraulics Laboratory report on the *Wamberal Terminal Coastal Protection Assessment, Stage 3 – Seawall Concept Design Options* (MHL 2021b). It is important to note that the options presented in that report are concepts only. Should any of the options progress to detailed design the details of element and armour sizing and elevations may differ from the concepts, with the need for the detailed design to consider constructability, availability of materials and cost.

Following the detailed investigations, MHL (2022) developed the Wamberal Beach Terminal Protection Structure Engineering Design Requirements. The Requirements were developed to assist developers, professional engineering designers and Council in the preparation and evaluation of development applications for coastal protection works at Wamberal Beach. The Requirements were adopted by a Council Resolution on 11 October 2022 with the following key criteria for the implementation of terminal protection:

1. The seawall is to be located as far landward as possible, to reduce interaction with coastal processes and maximise available beach width

2. The seawall is to be located wholly on private property where possible
3. The seawall is to be constructed, owned and maintained by property owners
4. The seawall is to have the least sand nourishment requirements practicable to maintain beach amenity, both upfront and over the serviceable life of the structure.
5. The seawall is to include landscaping and materials that blend into the coastal environment and be designed to have a reduced vertical relief following the natural cross section of the foreshore.

Since the adoption of the Engineering Design Requirements, a Development Application has been submitted for the construction of a terminal protection structure at Wamberal, which at the time of writing of this CMP is under assessment by the NSW Regional Planning Panel.

The CMP recognises and acknowledges the significant body of work that has been undertaken to progress a management strategy for Wamberal Beach as well as feedback received to date from the community and stakeholders, with the following overarching Management strategy proposed:

Sand nourishment underpinned by a rock revetment or hybrid rock revetment coastal protection works.

The Management Action acknowledges protection as the key strategy for Wamberal, and that the protection will need to be continuous to encompass the whole embayment to prevent beach impacts due to end effects. It also acknowledges that the whole of embayment solution would need to be approved and implemented in conjunction with an adequately designed and funded beach nourishment program.

In order to achieve this strategy, the following steps will need to be undertaken, with each of these steps assigned its own management action in the CMP. The steps and rationale for each of these are outlined in Table 4-6. A conceptual design of these works is presented below, with the rationale for the conceptual design provided in Appendix D.

Table 4-6: Enabling management actions to allow implementation of overarching coastal management strategy at Wamberal

Management Action	Description	Rationale
Investigate offshore sand nourishment sources and secure mining licence.	Investigate the feasibility of offshore sand nourishment sources through an exploration licence, physical sampling, environmental assessments and a detailed business case. Obtain a mining licence to enable future offshore sand nourishment to be permissible.	In accordance with the NSW Government Offshore Exploration and Mining Policy, under the <i>NSW Offshore Minerals Act 1999</i> , the Government will consider offshore mineral exploration or mining in NSW coastal waters for the purposes of beach nourishment, provided it is for a broader public benefit. Such activity could benefit any local government areas where coastal erosion is an issue and beach remediation activities could be supported by offshore sand mining. To be permitted to apply for an exploration licence, the Minister will need to be satisfied that the application is for beach nourishment purposes and will provide a public benefit. To progress to offshore sand mining, development consent under the NSW planning framework would need to be obtained following the completion of exploration activities and a detailed assessment of environmental issues.

Management Action	Description	Rationale
		This action has been developed to allow beach nourishment to be progressed for Wamberal in parallel with the rock revetment coastal protection works, as well as to allow consideration of offshore nourishment as an option for other areas and to allow for a regional approach with neighbouring council areas.
Review and update the Wamberal Beach engineering design requirements so that they may be referred to in future revisions of Council's Coastal Development Control Plan (DCP)	<p>Review the Wamberal Beach EDR's to include geotechnical engineering design requirements and allow for a design that can be implemented, with a view to being able to include in Council's DCP to ensure all development applications for the Wamberal Beach coastal protection works are in accordance with the guidelines.</p> <p>The purpose and content of the EDRs are to provide guiding key criteria and performance specifications for the preparation and assessment of DA's. They are similar to a Development Control Plan in that they are a performance guideline for development. The EDRs will provide guidance relating to armour sizing, crest and toe elevations, footprint and indicative staging for construction, but ultimately the works will need to be subject to a detailed design, to confirm the design details required under the Stage 5 Implementation phase of the CMP, or as part of the standard development approval process.</p>	<p>The EDRs should be seen as a "living document", a guideline that should be regularly reviewed and updated to keep it up to date with the latest available information and best practice.</p> <p>The EDRs need to be flexible enough to allow various types of coastal protection works designs to be put forward and considered for assessment in a DA.</p>
Complete design and approvals for coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal.	Complete design and approvals for rock revetment and/or hybrid rock revetment coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal.	<p>Detailed design and approvals for the works will be required to enable these to be implemented.</p> <p>Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works, using the updated EDRs as a guide. Council will not seek to protect beach accessways in isolation of adjacent private property protection.</p>
Purchase residual private land fronting Pacific St Wamberal.	NSW DPHI, Crown Lands and Council to work together to acquire residual private land fronting Pacific St Wamberal and transfer into Council ownership.	A parcel of land between the properties on Pacific Street and the Mean High Water Mark is in private ownership, with the owners not able to be located. This land will need to be transferred to Council to enable the works to be constructed on that land.
Complete the transfer of NSW Government owned lots at Ocean View Drive Wamberal into Council ownership.	Council to liaise with the Office of Strategic Lands - Department of Planning, Housing and Infrastructure to transfer the 5 lots to Council ownership to assist in the management of a whole of embayment solution.	To allow Council to effectively manage the construction of the works, the portion of the works proposed to be on public land owned by the Office of Strategic Lands - Department of Planning, Housing and Infrastructure is to be transferred into Council ownership.

Management Action	Description	Rationale
Enter into licence agreement for private coastal protection works located partly on Council owned land at Wamberal Beach.	Where the rock revetment cannot be placed entirely on private land, a licence/lease agreement is required for landowners to have part of the coastal protection works on Council owned land.	This allows the rock revetment to legally occupy Council owned land as well as potentially provide a funding mechanism for ongoing future maintenance of the structure.
Construct coastal protection works fronting 1 Pacific St to 17 Calais Rd, Wamberal Beach.	Construct rock revetment and/or hybrid rock revetment coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal Beach.	Once the works have been designed and approved in accordance with the EDRs, these can then proceed to construction.
Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon, sand berm area and other sources as available	Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon and sand berm area and other sources as available.	This would provide some coastal protection as well as improve beach amenity in the short-term, until a larger-scale sand nourishment source becomes available.

Based on an engineering review of constructability constraints, geometric constraints, cost, design life, adaptability and structural engineering considerations, the following concept design options are considered to be feasible:

- Rock revetment for those areas where it can be accommodated on private property or within the road reserve
- Rock revetment with piled toe wall below 2 m AHD to reduce the horizontal footprint of the structure, for those areas with limited land on private property available to accommodate a structure with wider footprint

The NSW Coastal Crown Land Guidelines apply for parts of the structure that are on Crown Lands.

The constraints on the landward alignment of a structure include:

- The presence of approved structures, including dwellings and ancillary structures, within **the seaward portions of the lots, that cannot be removed (or would require owner's consent to remove)** to accommodate a terminal protection structure
- The limited space available for landward excavation from the seaward boundary of the lots to accommodate the construction of a terminal protection structure.

Concept drawings are provided below, which include typical sections (Figure 4-9) and a plan layout (Figure 4-10 to Figure 4-15) showing the extent of the footprint of the various options.

It is expected that maintenance could be carried out from the seaward side of the structure, although maintenance requirements would be minimal. Maintenance would comprise visual inspections after a storm event, with top-up or replacement of armour only required if this is displaced after a storm.

It should be noted that the design presented here is conceptual only. Detailed design and approvals will be required as part of the Stage 5 implementation of the CMP or as part of standard DA assessment process.

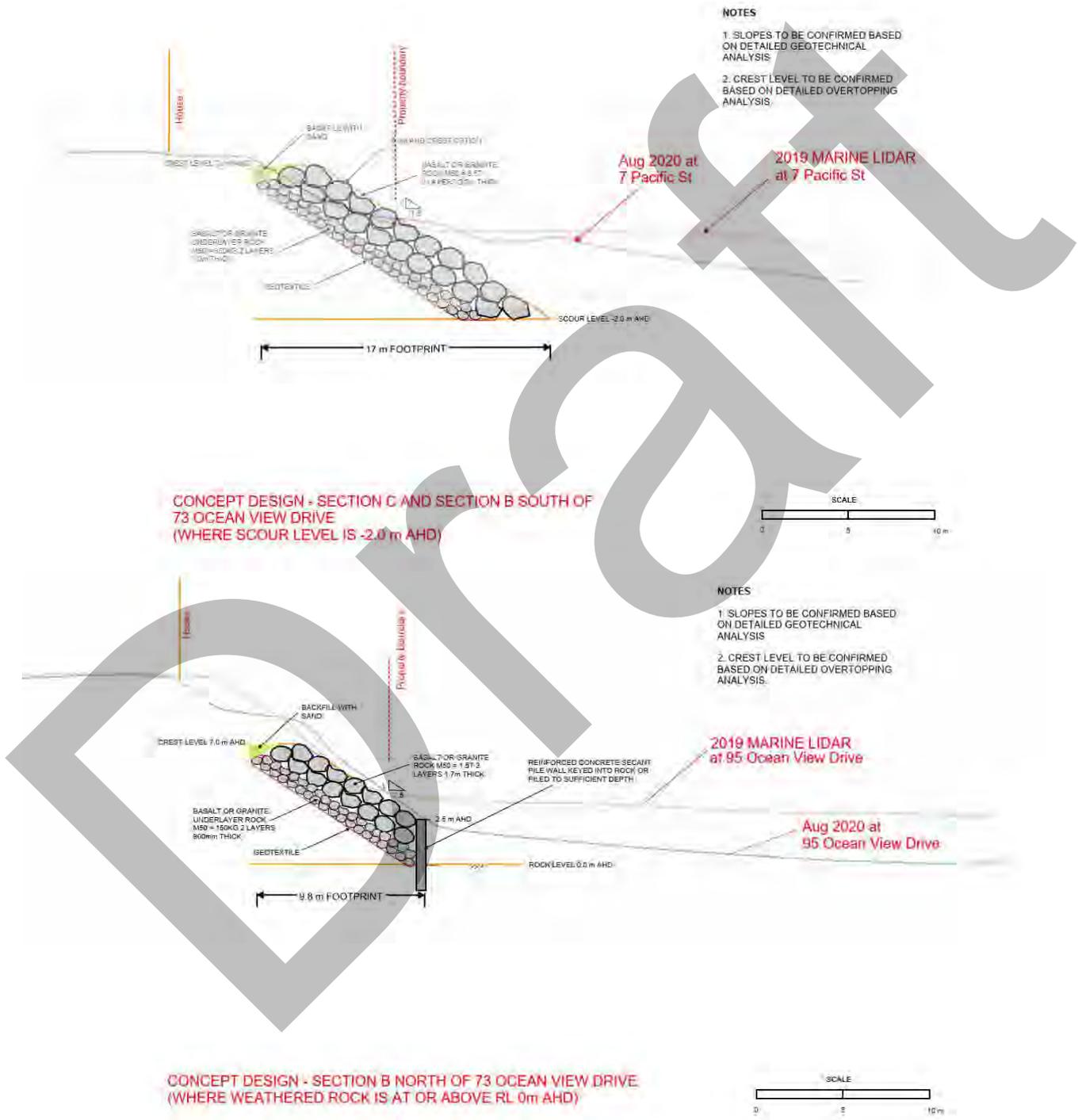


Figure 4-9: Typical sections for rock revetment and hybrid rock revetment for Wamberal Beach

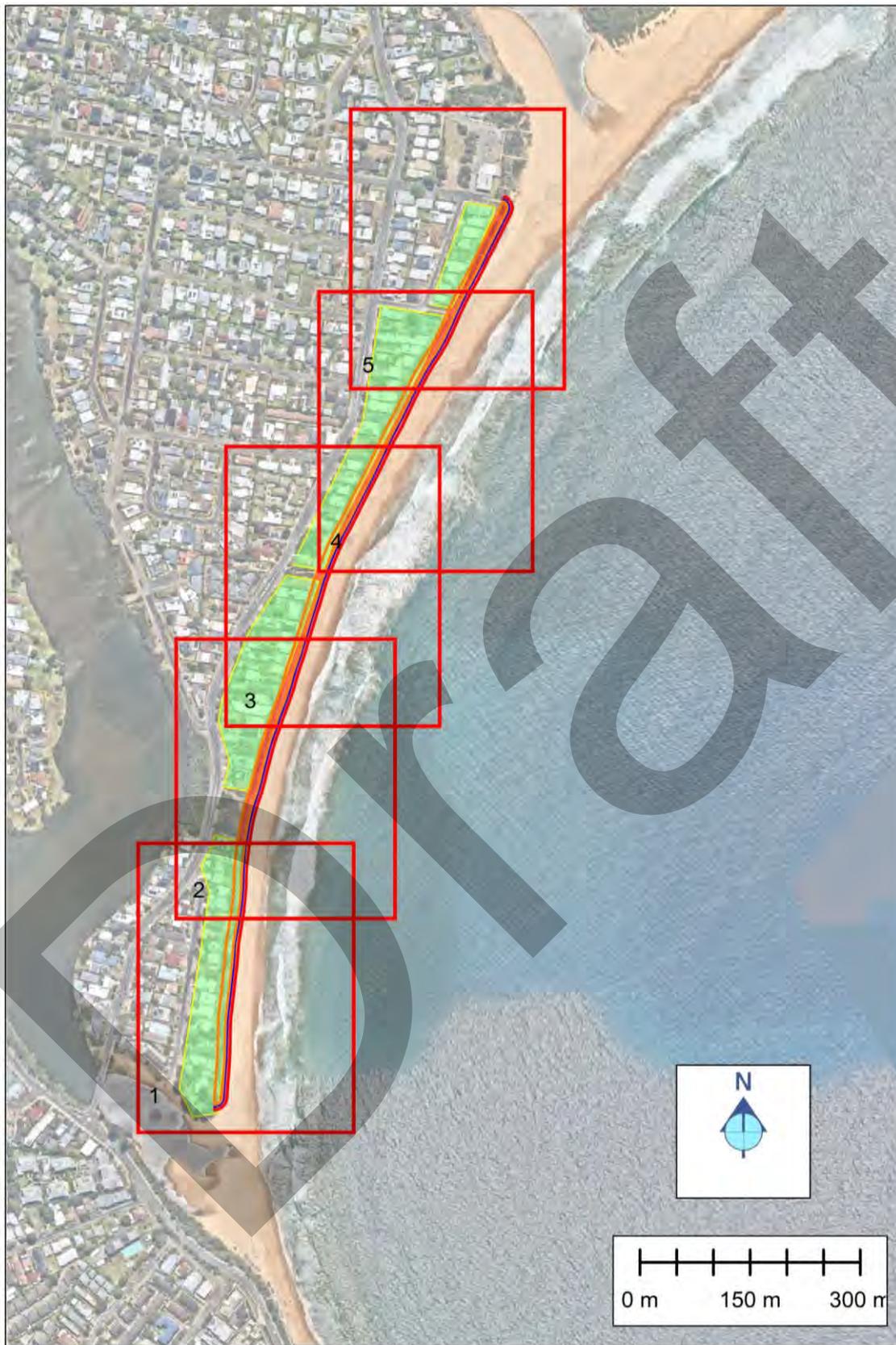


Figure 4-10: Overview map of Wamberal showing extent of works, location of inset maps 1 to 5, private and public land



Figure 4-11: Plan view showing potential extent of coastal protection works at Wamberal (Map 1)



Figure 4-12: Plan view showing potential extent of coastal protection works at Wamberal (Map 2)



Figure 4-13: Plan view showing potential extent of coastal protection works at Wamberal (Map 3)



Figure 4-14: Plan view showing potential extent of coastal protection works at Wamberal (Map 4)

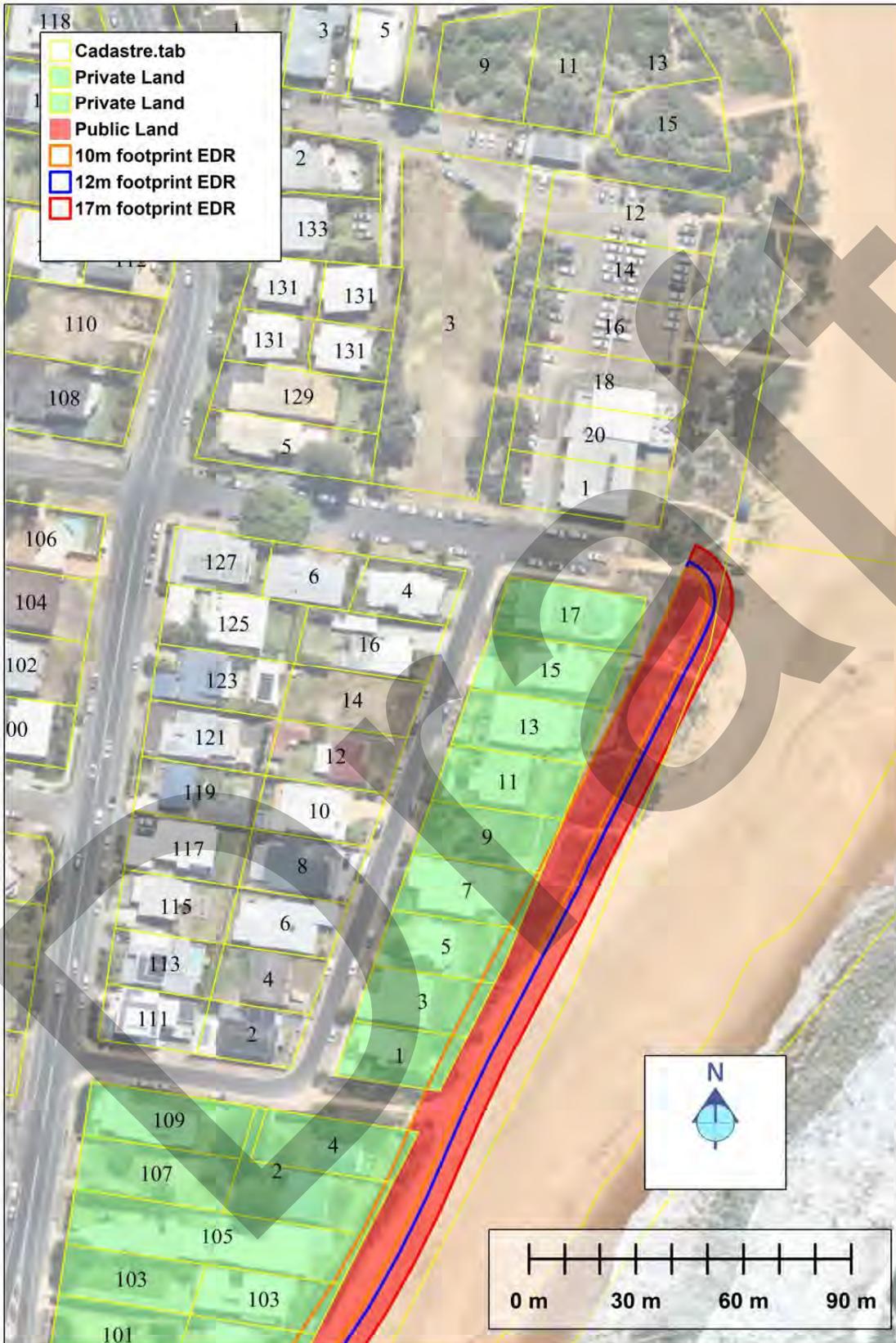


Figure 4-15: Plan view showing potential extent of coastal protection works at Wamberal (Map 5)

4.3.2.2 The Entrance North

The Entrance North is another location that is subject to extreme risk from coastal hazards. This location was considered in the Wyong CZMP (Umwelt 2011), with a Longshore Sand Transport and Tidal Inlet Stability Study for The Entrance and The Entrance North (SMEC 2010a) undertaken to assess local sediment transport pathways and possible locations for sand placement. Council has undertaken beach nourishment strategically at The Entrance North and The Entrance beach, using sand dredged from the entrance to Tuggerah Lakes. There is an action in the CMP to continue this practice as beneficial reuse of dredge sand to reduce erosion risk at The Entrance North.

The Wyong CZMP (Umwelt 2011) included an action (E67) to “Establish a detailed monitoring program to clarify how sand placed on North Entrance beach is redistributed and to facilitate a review to provide more effective sand retention”. In addition, the CZMP included the following actions relevant to The Entrance North:

“Council will work with the NSW and Australian Government to study the feasibility of off shore sand being used for beach nourishment purposes for maintaining beach area, volume and amenity at key locations.”

“Use beach nourishment or beach scraping to reinforce dunes and maintain dune crest heights above 7m at affected locations, and 8 metres at North Entrance.”

“Continue to dredge sand from the active tidal delta in The Entrance channel and place the sand on North Entrance beach. Some sand may also be placed on The Entrance Beach.”

“Council may grant development consent to private landholders to install temporary, but properly engineered structural protection, such as sand filled geotextile bags structures, to protect existing private assets in the immediate coastal risk area.”

Since that time, the erosion at The Entrance North has progressed, as evident in Figure 4-16.



Figure 4-16: Drone footage showing coastal erosion at The Entrance North (11 September 2025 East Coast Low, source DCCEEW)

The Reconstruction Authority (RA) in conjunction with Council have been installing emergency rock protection works for this foreshore in an attempt to reduce the immediate risk to public and private assets, with these works installed in September 2025 (Figure 4-17). Note that the RA conditions of consent highlights that these works are temporary and have a time limited consent associated with them. Any permanent works must align with NSW environmental and planning legislation i.e. the NSW Crown Lands Guidelines and CM Act.



Figure 4-17: Emergency protection works installed at Hutton Road The Entrance North (photo supplied Central Coast Council, December 2025)

As is the case for Wamberal, planned retreat is not considered to be feasible, acceptable or economically viable. There are some 34 private buildings at Hutton Road, Hargraves Street and Curtis Parade that are at immediate risk from coastal erosion. Data from realestate.com shows a beachfront lot sold for \$2.35 million on Hutton Road, and \$5.02 million at Curtis Parade. The median house value for The Entrance North is \$1.2 million (realestate.com, accessed 09/02/2026). Based on these estimates, the capital cost of purchasing these beachfront properties is estimated at between \$80 - \$170 million. As for Wamberal, if retreat is adopted for The Entrance North, risk to remaining properties still exists, and the same issues that apply to implementing retreat at Wamberal equally apply at The Entrance North, with the costs far outweighing the benefits.

For this reason, protection is the adopted strategy for those areas of The Entrance North where public and private assets are at immediate risk from coastal hazards. However, elements of

the planned retreat strategy that are part of the CMP include informing beachside owners of the coastline hazard risk to their property, adoption of planning controls on the type and scale of future beachfront development, and movement of public services and infrastructure landward to accommodate the future coastline hazard as needed. This is to ensure that intensification of development does not occur in areas that are at future risk from coastal hazards. Coastal protection works have a finite lifespan, and protection will not be able to be provided indefinitely as sea level rise will continue to progress and risk from coastal hazards will continue to increase beyond the lifespan of the works. For this reason, it is considered that the Coastal Vulnerability Area will still apply over the land on the landward side of the coastal protection works. In the long term, it is suggested that planning controls will still be necessary to prevent further intensification of development in these areas which are within the Coastal Vulnerability Area and at longer term risk.

The management actions required to enable each of the elements of the protection strategy for Hutton Road and Curtis Parade are outlined in Table 4-7. A conceptual design of these works is presented below, with the rationale for the conceptual design presented in Appendix D. The conceptual design has considered the existing RA emergency works at Hutton Road.

Table 4-7: Enabling management actions to allow implementation of overarching coastal management strategy at The Entrance North

Management Action	Description	Rationale
Investigate offshore sand nourishment sources and secure mining licence.	Investigate the feasibility of offshore sand nourishment sources through an exploration licence, physical sampling, environmental assessments and a detailed business case. Obtain a mining licence to enable future offshore sand nourishment to be permissible.	<p>In accordance with the NSW Government Offshore Exploration and Mining Policy, under the <i>NSW Offshore Minerals Act 1999</i>, the Government will consider offshore mineral exploration or mining in NSW coastal waters for the purposes of beach nourishment, provided it is for a broader public benefit. Such activity could benefit any local government areas where coastal erosion is an issue and beach remediation activities could be supported by offshore sand mining. To be permitted to apply for an exploration licence, the Minister will need to be satisfied that the application is for beach nourishment purposes and will provide a public benefit. To progress to offshore sand mining, development consent under the NSW planning framework would need to be obtained following the completion of exploration activities and a detailed assessment of environmental issues.</p> <p>This action has been developed to allow beach nourishment to be progressed for Wamberal in parallel with the rock revetment coastal protection works, as well as to allow consideration of offshore nourishment as an option for other areas and to allow for a regional approach with neighbouring council areas.</p>
Develop engineering design requirements for coastal protection works at The Entrance North.	Develop engineering design requirements for rock revetment and/or hybrid rock revetment coastal protection works at The Entrance North to assist the preparation and assessment of development applications.	Engineering design requirements (EDRs) for The Entrance North do not currently exist. To provide appropriate guidance for the development of private coastal protection works, EDRs similar to those developed for Wamberal are required. As for Wamberal, the EDRs should be seen as a "living document", a guideline that should be regularly

Management Action	Description	Rationale
	The purpose and content of the EDRs are to provide guiding key criteria and performance specifications for the preparation and assessment of DA's. They are similar to a Development Control Plan in that they are a performance guideline for development. The EDRs will provide guidance relating to armour sizing, crest and toe elevations, footprint and indicative staging for construction, but ultimately the works will need to be subject to a detailed design, to confirm the design details required under the Stage 5 Implementation phase of the CMP, or as part of the standard development approval process.	<p>reviewed and updated to keep it up to date with the latest available information and best practice.</p> <p>The EDRs need to be flexible enough to allow various types of coastal protection works designs to be put forward and considered for assessment in a DA.</p>
Complete detailed design and approvals for coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	Complete detailed design and approvals for rock revetment and/or hybrid rock revetment coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	<p>Public beach accessways and private ocean front properties at high risk of coastal erosion between 11 Wyuna Avenue and 57 Curtis Pde, The Entrance North.</p> <p>Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works.</p> <p>Council will not seek to protect beach accessways in isolation of adjacent private property protection.</p>
Construct coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	Complete construction of rock revetment and/or hybrid rock revetment coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	Once the works have been designed and approved in accordance with the EDRs, these can then proceed to construction.
Complete design and approvals for coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.	<p>Complete design and approvals of rock revetment and/or hybrid rock revetment coastal protection works at Hutton Rd, The Entrance North.</p> <p>Design and approvals to consider the temporary design and approval for the works constructed under the s68 Ministerial Authorisation of the NSW Reconstruction Authority Act.</p>	<p>Note that if a development application is submitted for the existing RA temporary works to remain after the RA authorisation expires, then the Crown Lands Guidelines state that consideration would be given to whether the private coastal protection works are consistent with a relevant CMP.</p> <p>Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works.</p>
Construct coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.	<p>Complete construction of rock revetment and/or hybrid rock revetment coastal protection works at Hutton Rd, The Entrance North.</p> <p>Construction to take into account the temporary works constructed under the s68 Ministerial Authorisation of the NSW Reconstruction Authority Act.</p>	Once the works have been designed and approved in accordance with the EDRs, these can then proceed to construction.
Implement sand nourishment at The Entrance North using sand sourced strategically (in	Continue to implement sand nourishment at The Entrance North using sand sourced strategically from	This would provide some coastal protection as well as improve beach amenity in the short-term, until a larger-scale sand nourishment source becomes available.

Management Action	Description	Rationale
accordance with the Entrance Management Strategy and procedures being developed as part of the Tuggerah Lakes Coastal Management Program – Including Entrance Channel Dredging Activities)	<p>The Entrance channel dredging and sand berm management activities.</p> <p>Note: Sand from the Entrance channel only to be placed south of Hargraves St to keep sand within the sediment compartment.</p> <p>Refer to Appendix D for more information regarding the rationale for this action.</p>	

The two areas at The Entrance North (Hutton Road and Curtis Parade) are at extreme risk from coastal erosion; currently there are ad-hoc protection works in place at some properties, with no protection at others along this frontage. The Reconstruction Authority has constructed temporary works along the Hutton Road frontage.

Based on an engineering review of constructability constraints, geometric constraints, cost, design life, adaptability and structural engineering considerations, the following concept design options are considered to be feasible:

- Rock revetment for those areas where it can be accommodated on private property or within the road reserve
- Rock revetment with piled toe wall below 2 m AHD to reduce the horizontal footprint of the structure, for those areas with limited land on private property available to accommodate a structure with wider footprint

The proposed works are also consistent with the temporary rock revetment works constructed by the Reconstruction Authority (RA). The NSW Coastal Crown Land Guidelines apply for parts of the structure that are on Crown Lands. If a DA is submitted for these temporary works to remain after the RA authorisation expires, then the Crown Lands Guidelines state that they will consider whether the private coastal protections works are consistent with a relevant CMP.

The constraints on the landward alignment of a structure include:

- The presence of approved structures, including dwellings and ancillary structures, within **the seaward portions of the lots, that cannot be removed (or would require owner’s consent to remove)** to accommodate a terminal protection structure
- The limited space available for landward excavation from the seaward boundary of the lots to accommodate the construction of a terminal protection structure.

Concept drawings are provided below (Figure 4-18, Figure 4-19, Figure 4-20), which include typical sections and a plan layout showing the extent of the footprint of the various options. It is expected that maintenance could be carried out from the seaward side of the structure, although maintenance requirements would be minimal. Maintenance would comprise visual inspections after a storm event, with top-up or replacement of armour only required if this is displaced after a storm.

It should be noted that the design presented here is conceptual only. Detailed design and approvals will be required as part of the Stage 5 implementation of the CMP or as part of standard DA assessment process.



Figure 4-18: Plan view of proposed works location Curtis Parade



Figure 4-19: Plan view of proposed works location Hutton Road

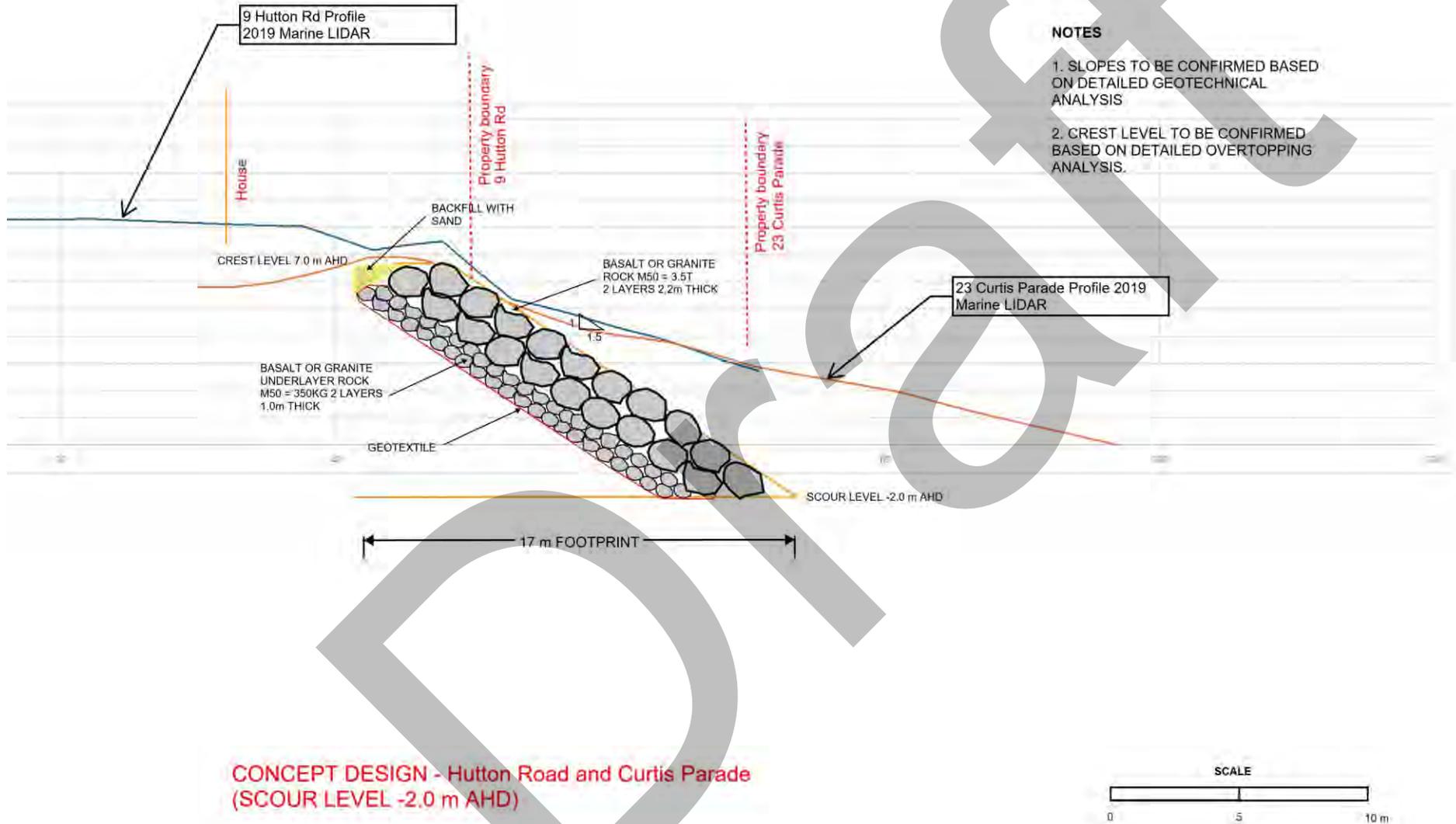


Figure 4-20: Typical section – revetment works Curtis Parade/Wyuna Avenue and Hutton Road

4.3.2.3 MacMasters Beach

The proposed action at MacMasters Beach is the Construction of MacMasters Beach temporary coastal protection works.

Council have prepared draft designs for temporary coastal protection works at the southern end of MacMasters Beach. The primary purpose of the works was to help protect the MacMasters Beach Surf Life Saving Club from coastal hazards, including erosion. The works would assist in mitigating current risk while further investigation into future risk exposure and long-term management can be undertaken.

The draft design details a temporary coastal protection structure comprising of rock bag armour units which would protect and stabilise an 80-metre section in front of the surf club between the steps down to the ocean bath and the vehicle access ramp. Due to site constraints, the structure cannot be positioned further landward and its design has been carefully considered to reduce potential impacts on beach access, amenity and coastal processes.

Currently, informal coastal protection works are present in front of the surf club, including Bulka bags filled with stabilised sand. The bags were placed in June 2016 in an emergency response to erosion after large ocean swell and tides. This structure has since deteriorated and continues to degrade while only providing a very limited level of protection over a small section of the foreshore.

While Council had a draft design for a typical rock revetment previously, in more recent consultation with key stakeholders a preference was identified for a temporary coastal protection structure comprising of rock bag armour units. While other concept options, including vertical seawalls, were investigated and considered, the following advantages of a design using rock bag armour units were key to its selection:

- Provides a reduced footprint, compared to typical rock revetments and the previous design, and reduces beach access and visual impacts.
- Rock bag armour units are flexible and can be easily removed and re-used elsewhere if adverse outcomes are experienced. Additionally, it is easy to raise or modify the structure to adjust to changing conditions.
- This option is cost effective and best mitigates wave reflection impacts at this location.
- It provides appropriate protection to the surf club over a shorter design life while a long-term solution can be investigated and developed.

The action involves the construction of these works, should they be triggered by a coastal emergency under the Coastal Zone Emergency Action Subplan (CZEAS). The design of the works is shown below, with more detail provided in Appendix D.

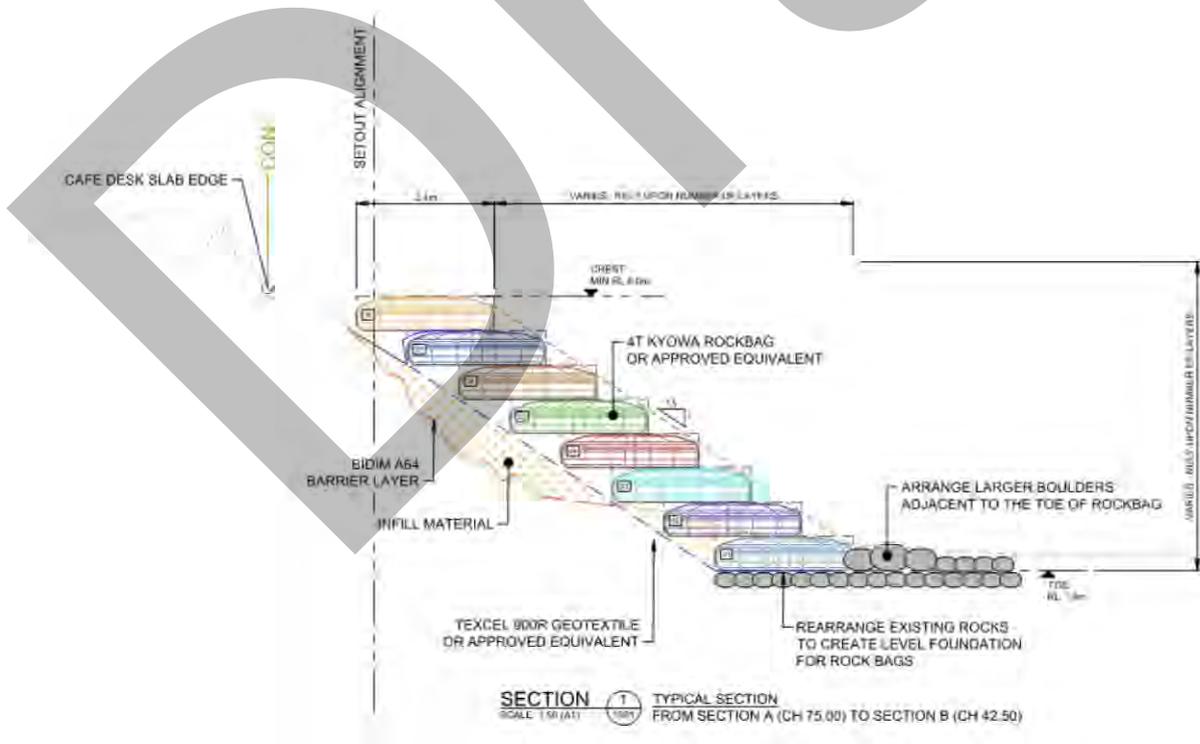
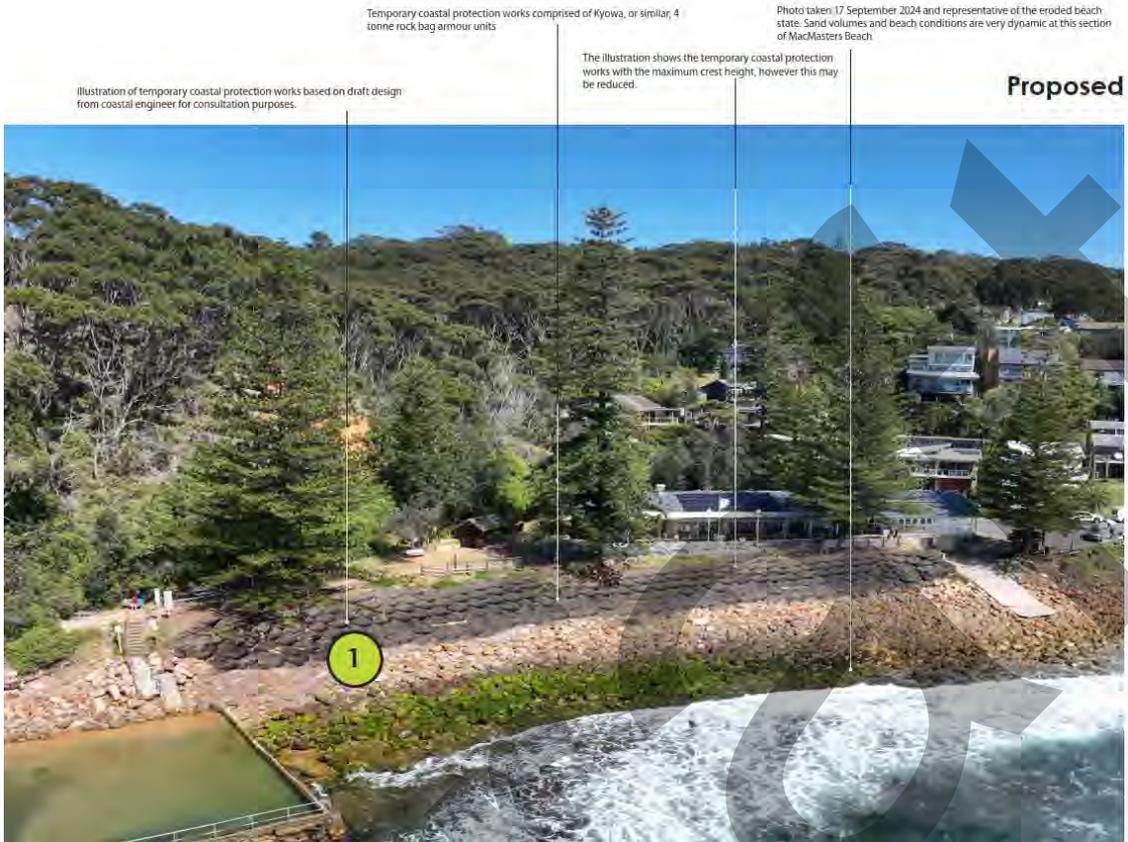


Figure 4-21: Temporary Coastal Protection Works, Render and Design Typical Section (Royal Haskoning 2025)

4.3.2.4 Cabbage Tree Harbour

At Cabbage Tree Harbour, dune stability has been an issue of concern over time. Coastal protection works, termed a “toe drainage structure”, were constructed by the former Wyong Council at the base of the dune in 2011. The design recognised that the design criteria will vary and increase with time, thereby allowing for the provision in the design for staged construction, deferring capital expenditure to a later date when the structure may be strengthened as required to accommodate more severe design criteria.

With the existing structure originally designed for a 15-year design life, the management action provided in this CMP is to design and construct Stage 2 of the existing Cabbage Tree Harbour toe drainage structure, to continue to provide stability to the dune at Cabbage Tree Harbour. Stage 2 of the design is shown below, with further details provided in Appendix D.

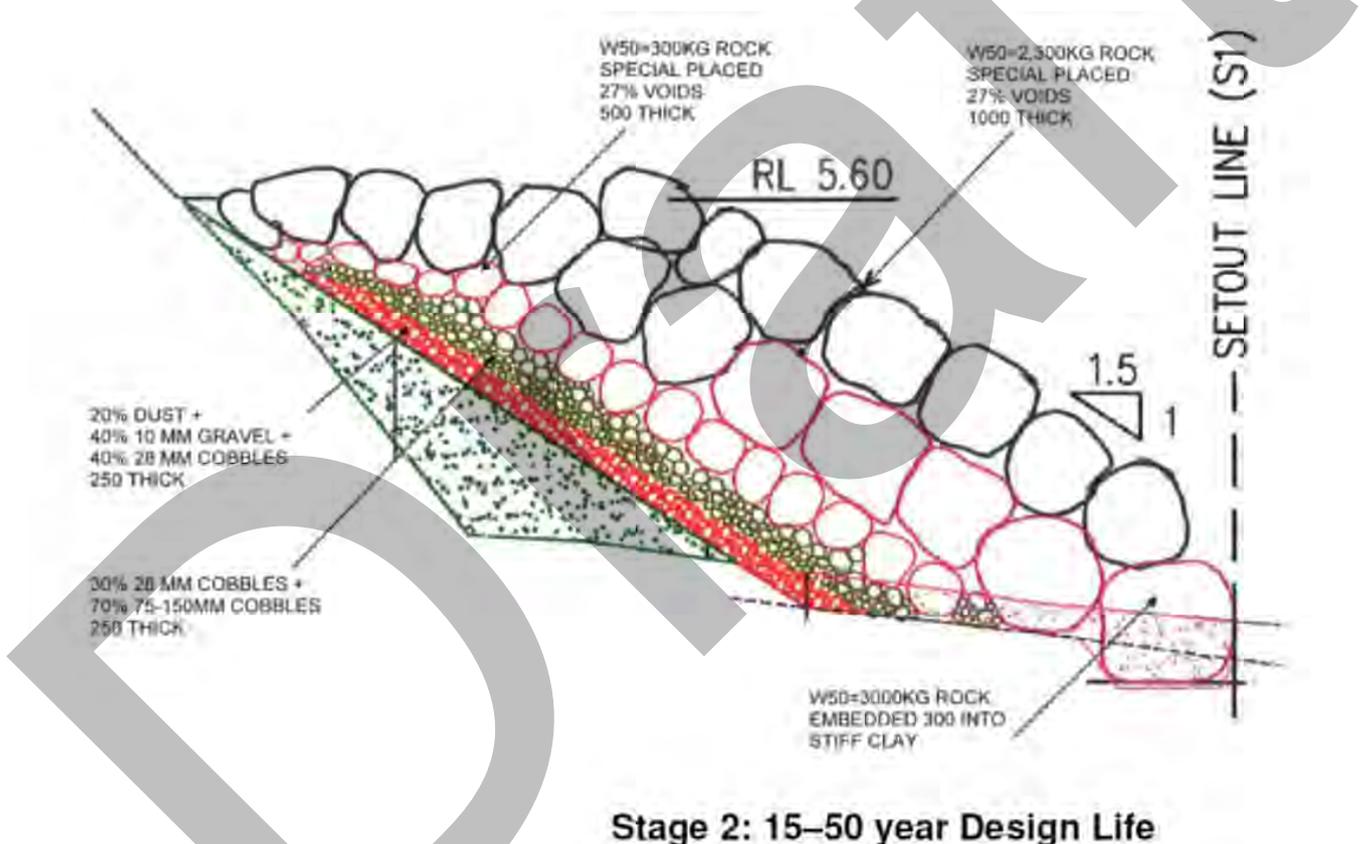


Figure 4-22: Typical section, Stage 2 Cabbage Tree Harbour Toe Drainage Structure (WorleyParsons 2011)

4.4 Option Assessment Outcomes

The potential management actions have been assessed against the Feasibility, Viability and Acceptability criteria as described in Section 4.2, which has allowed for the actions to be assigned a total score out of 10, ranked, and therefore prioritised for inclusion in the CMP. The outcome from this process is presented in Appendix E.

A summary list of each Action, issue addressed, timeframe for implementation, Lead Agency and Supporting Agency is provided in Table 4-8 for both LGA-wide and location-specific actions.

Actions which scored less than 5 out of 10 were considered to be not suitable to be carried forward to Stage 4. A total of 55 actions have been included in the updated Draft CMP.

4.5 Overview of Management Actions

The CMP structure includes:

- Management actions based on the six categories of management issues described in Section 2.1.3.
- Management actions that apply across the entire open coast within the CMP Study Area, and those which apply at particular locations to manage localised risks and opportunities. Actions at specific locations are identified and mapped in Appendix A.
- Management actions are categorised according to the Coastal Management Area (as defined by the RH SEPP) in which they apply.

The CMP structure is illustrated in Figure 4-24:

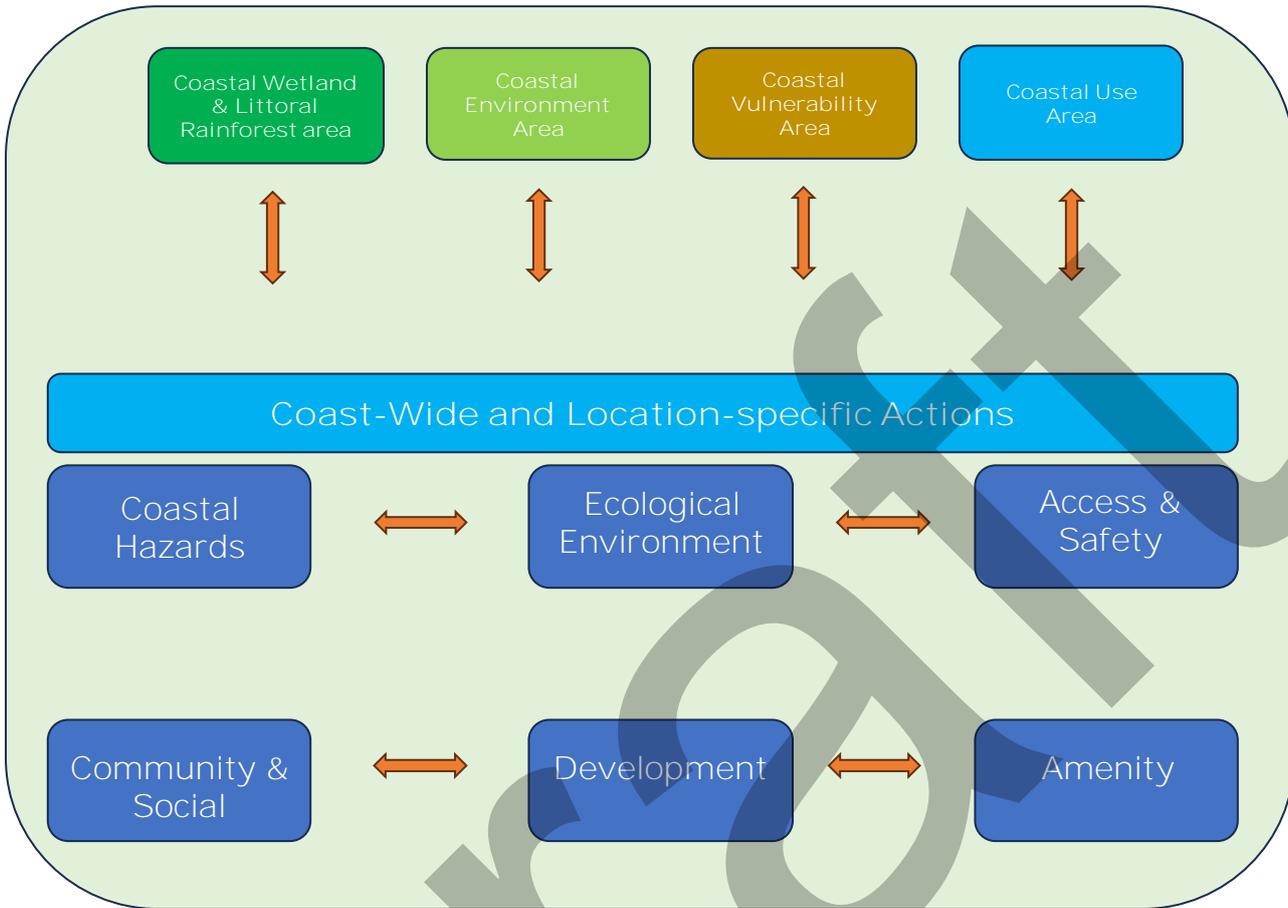


Figure 4-24: Structure of the CMP

4.5.1 Action Timing

The management actions have been designed to be implemented within the 10-year timespan of the CMP, with long-term actions defined that will carry over to subsequent iterations of the CMP at the end of the 10-year cycle.

The timeframes defined against each action within the CMP are:

- Short-term actions – designed to be implemented within 1 – 2 years
- Medium-term actions – designed to be fully implemented within 3 – 6 years i.e. within the 10-year planning period of the CMP
- Long-term actions – designed to be initiated within 7 – 10 years, but which may take longer than 10 years to fully implement and would likely carry over to the next iteration of the CMP.
- Ongoing – designed to be implemented on a continual basis throughout the implementation phase of the CMP.

In the Business Plan in Section 6, the action implementation has been timed to match in with the key Council IP&R documents, as follows:

- Short Term Actions – typically are initiated within Council’s current Operational Plan (which typically extends for one financial year) and completed within the first upcoming Delivery Program cycle (2025 – 2029), assuming that the CMP will take effect in 2025.
- Medium Term Actions – Initiated in Years 3 – 6 to match with the future Delivery Program 2028 – 2032, with completion in the 2027 – 2031 Delivery Program cycle.
- Long Term Actions – Initiated in Years 7 – 10, to match with the future Delivery Program 2031 – 2035.

All recommended actions that have a specific location associated with them are shown on map series in Appendix A. All actions in this CMP only apply to areas within the legally defined coastal zone that exists within the CMP Study Area (i.e., within one of the existing CMAs, refer Section 1.5.2).

The estimated costs associated with these actions – including capital costs and any ongoing maintenance costs – have been provided in the Business Plan table in Section 6.

4.5.2 Action Priority

Given Council’s limited funding and resources, a key element of CMP implementation is the prioritisation and rationalisation of management actions. This is important when considering that Council will need to develop an LGA-wide Action Plan that outlines a prioritisation process for implementing actions across all of its CMPs.

Priority for the management actions has been linked to the level of risk associated with the issue that each action has been designed to address as assigned in the Risk Assessment report (Worley Consulting 2024a), with the action priority indicated in the management action table (Table 4-8).

The action priorities have been set based on the following:

- For actions that address risks rated as “Extreme”, the actions have been assigned a “High” priority, indicating that the action is considered critical for the successful implementation of the CMP.
- For actions that address risks rated as “High”, these have been assigned a “Medium” priority.
- For actions that address risks rated as “Moderate”, these have been assigned a “Low” priority.

For risks that were rated as “Low” in the Risk Assessment report and Risk Register (Worley Consulting 2024a), it was considered that existing management controls to address these risks were adequate, and no additional management actions were required to reduce the risk as the level of risk was considered to be acceptable. These risks should be reassessed through future reviews and iterations of the CMP.

The intention is to undertake or initiate all the actions within the ten-year lifespan of the program, but to consider the priority and urgency of the action when assigning a timeframe, as

the lower priority actions may not need to be (or perhaps may not be able to be) implemented immediately. This could be due to budget or resourcing constraints, or the need to schedule some actions first to allow others to proceed effectively, or by implementing a staged approach for actions that may span multiple Delivery Program cycles or be carried over to the next 10-year CMP cycle.

In considering the action priority, a flexible approach to undertaking works should be adopted as grants and funding opportunities arise from time to time that may allow some options to be **progressed ahead of others. Some actions may be assigned “low” or “medium” priority, but could be implemented in the short term as they are low cost, easy to implement and are consistent with Council’s existing programs and priorities.**

4.5.3 Key Management Actions

Some of the key high profile management actions include:

- Investigate offshore sand nourishment sources and secure mining licence (including working with the NSW Reconstruction Authority, NSW DCCEEW and other Councils on a state-wide project)
- Review and update coastal development planning controls and undertake Planning Proposal to adopt Coastal Vulnerability Area
- Undertake key actions to progress the implementation of a coastal protection strategy for key areas at extreme risk from coastal hazards, including Wamberal Beach, Curtis Parade and 1-55 Hutton Road at The Entrance North.
- Identify the extent, nature, and condition of existing coastal emergency works (including potential removal or remediation)
- Continue to nourish The Entrance North Beach with sand from The Entrance channel berm management or dredging activities when available to increase beach amenity and resilience
- Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon, sand berm area and other sources as available.

4.5.4 Environmental Protection Works

Environmental protection works may include dune revegetation works, beach maintenance works, and monitoring and management of legacy landfill sites. These works will be undertaken in line with the appropriate approvals pathway. No environmental protection works are proposed in any of the mapped Coastal Wetland and Littoral Rainforest Areas within the CMP Study Area.

4.5.5 Private Property Protection

As per the requirements of the CM Manual, the CMP outlines the actions that Council and other public authorities will fund and complete. The Manual does not provide for any actions for

private residents to undertake. Therefore, even with the completion of the actions in this CMP there will still be a significant residual risk to private property on the Central Coast from coastal hazards over the life of this plan.

The draft CMP proposes that property owners that own properties at risk of coastal erosion, continue to be responsible for the funding and implementation of any coastal protection works for their own properties. The updated CMP includes actions for coastal protection works at private properties at The Entrance North and Wamberal. It also outlines that the Engineering Design Requirements are to be updated to support development applications for other private property locations should they be submitted over the life of the plan. Private coastal protection works will continue to have a planning pathway under the NSW planning legislation and the NSW Coastal Framework. The CMP does not outline where private residents should or should not lodge development applications for coastal protection works. These development applications will continue to be assessed on their merits by the Regional Planning Panel.

Table 4-8: Management Actions to be implemented by Council

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
CW-S01	Access & Safety	LGA-wide	Increased erosion/scour associated with stormwater assets. Stormwater assets impacted by coastal inundation	Monitoring and improvement of coastal stormwater outlets	The inspection of all coastal stormwater outlets to identify those at risk from coastal hazards and opportunities where upgrades can be implemented or retrofitted in order to protect assets, reduce erosion from stormwater scour and/or improve public safety. These locations would also be regularly monitored to assess performance and improvements.	Short	High	Council		- program for inspection of stormwater outlets developed, inspections undertaken and concept designs developed - improved public safety, water quality and amenity - reduced erosion at stormwater outlets and reduced impact on surrounding assets
CW-S02	Access & Safety	LGA-wide	Risk to public safety due to wave run up, wave overtopping, cliff instability, rockfalls and coastal erosion	Develop and implement an integrated coastal processes and hazards education and awareness program	The development and implementation of an integrated education program focused on improving community understanding of local coastal hazards, processes and related topics, such as water quality, marine ecology and marine litter, to promote the safe and sustainable use of our coast. This action should include an update to and installation of new coastal hazard and educational signage and the ongoing monitoring of locations that pose a high risk to public safety.	Short	Medium	Council		Program developed and signage installed. Improved community understanding of coastal hazards and coastal environment
CW-S03	Access & Safety	LGA-wide	Informal private access and use damaging vegetation and impacting on recreational amenity for the public	Develop and implement coastal compliance procedures	The procedures would improve public safety and environmental outcomes at our beaches by outlining the actions, processes and responsibilities concerning compliance enforcement and the management of encroachment, illegal dumping, unapproved structures, unlawful activities and vegetation clearing. It will include a review of planning controls and resourcing, provide guidance to homeowners for "steps to remediation", make it easier for the public to "report an issue" and cover signage and monitoring aspects.	Short	Medium	Council	DPHI -Crown Lands, Fisheries, Environmental Protection Authority, NSW Police, National Parks, Local Aboriginal Land Services	Procedures developed, published and implemented. Improved dune environment and recreational amenity
CW-S04	Access & Safety	LGA-wide	- Inaccessible beach accessways impacted by coastal erosion - Damage to dunes and safety concerns due to generation of informal/unauthorised beach accessways - Safety concerns regarding exposure and mobilisation of buried remnants of historic foreshore protection works - Injury to beach users caused by structures mobilising during storm events - Dune instability/steep dune scarp impacted by coastal erosion - Damage to coastal recreational assets from storm events	Review and implement updated Beach Maintenance Program	Council's Beach Maintenance Program would be reviewed and implemented to improve public beach access, amenity and safety. The action would include prioritisation and upgrades to beach accessways in line with the Recreational Use Study and Council's Disability Inclusion Action Plan. The program would outline the management of post-storm beach access and safety, where small-scale works such as beach scraping for amenity purposes may be undertaken and beach and dune fencing. It will also include an audit on beach maintenance operations to maximise inhouse efficiencies to ensure that the necessary plant and equipment is available to effectively implement the program.	Short	Medium	Council		Beach Maintenance Program reviewed, updated and implemented in conjunction with Council's beach maintenance crews. Improved beach access, safety and amenity, improved dune environment
CW-S05	Access & Safety	LGA-wide	Limited or out-dated information available on key indicators of coastal hazards and coastal dynamics	Develop and implement a Coastal Monitoring Program	The coastal monitoring program would use progressive monitoring techniques to collect essential information about coastal processes and hazards to improve the	Short	High	Council	DCCEEW	Development of coastal monitoring program, considering existing initiatives such as

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
					management of our beaches. It would include beach surveys to monitor changes in sand volumes, risk exposure, dune condition and beach amenity. The data collected would allow annual Beach Health Reports to be developed and better inform future coastal hazard studies and investigations. Beach usage should be included in the monitoring to better understand current demand and locations requiring further investment in the future.					CoastScan. Improved understanding of local coastal processes, beach usage
CW-S06	Access & Safety	LGA-wide	Coastal hazards impacting viability of existing and future infrastructure long term, need for long-term coastal adaptation planning	Investigate and develop a Coastal Hazard Adaptation Strategy for affected coastal communities	Develop a Coastal Hazard Adaptation Strategy that will consider future risk to our community from coastal hazards and investigate adaptation measures and pathways to support and enhance the resilience of our coastal communities. This would also include the identification of land in the coastal zone with high community, ecological and/or scenic potential, or otherwise significant risk from coastal hazards, for potential future acquisition to promote public access, preserve scenic qualities and/or protect significant ecological sites. Acquisition would only proceed by Council or public authorities in cases when it is requested and/or supported by the landowner and has broader community and/or environmental benefit. Limited funding is currently available through the NSW Government's Coastal Land Protection Scheme, which began in 1973, aimed at bringing significant coastal lands into public ownership to support the care and management, and improve public access to them. Under this scheme, a public authority or landowner can nominate land that then undergoes an assessment process.	Long	Medium	Council	DCCEEW	Long-term Coastal Hazard Adaptation strategy developed and communicated for high-risk areas. Improved resilience of coastal infrastructure from long term coastal hazards
CW-S07	Access & Safety	LGA-wide	Coastal erosion threatening coastlines and infrastructure	Investigate offshore sand nourishment sources and secure mining licence.	Investigate the feasibility of offshore sand nourishment sources through an exploration licence, physical sampling, environmental assessments and a detailed business case. Obtain a mining licence to enable future offshore sand nourishment to be permissible.	Short	High	Council	Northern Beaches Council, NSW RA and NSW DCCEEW	Approval pathway confirmed, feasible options developed and sand extraction licenses secured for large scale offshore beach nourishment at priority locations
CW-S08	Access & Safety	LGA-wide	Inconsistent standards of SLSC's patrol towers along the coast. Unable to provide sufficient public services.	Prioritise and upgrade beach life guard patrol towers and ancillary structures	This action would involve undertaking an audit of beach life guard patrol towers and ancillary structures to ensure their adequacy, performance and safety from coastal hazards. Necessary upgrades and improvements required would be prioritised and implemented to ensure required functions continue to be performed.	Medium	Medium	Council		Vulnerable life guard patrol towers identified and improvements/upgrades implemented
SB02	Access & Safety	Soldiers Beach / Pebbly Beach	Safety hazard due to unfenced cliff line at southern carpark of Soldiers Beach	Investigate options to improve public safety at Soldiers Point headland	Undertake an assessment of public safety at the Soldiers Point headland and implement options to manage the risks associated from the exposed cliff and instability. Options may include safety infrastructure, such as fencing and signage, amenity improvements such as	Medium	Medium	Council	DPHI -Crown Lands	Public safety hazard assessed and eliminated

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
					viewing areas and/or environmental restoration works.					
CW-A01	Amenities	LGA-wide	Aging or incompatible coastal recreation amenity infrastructure not compliant with engineering standards or industry best practice	Coastal recreation assets and infrastructure renewal program	This action involves the review, prioritisation and delivery of coastal recreation assets, public amenities (including accessible features) and infrastructure upgrades and investigations to support and enhance beach access, visitation and recreational opportunities, now and into the future, guided by the recommendations from the Recreational Use Study.	Short	Medium	Council		Priority locations for coastal recreation assets identified, upgrades designed and delivered
CW-A02	Amenities	LGA-wide	Lack of guidance for implementing and assessing coastal protection works	Develop and implement Coastal Engineering Design Requirements	The Coastal Engineering Design Requirements will help to achieve a more a sustainable and resilient coastline by clarifying expectations to designers, engineers and architects concerning coastal development. It will outline key design principles to ensure that development is appropriately designed for coastal hazards, addresses coastal processes, considers public safety and mitigates environmental impacts.	Short	High	Council		Coastal Engineering Design Requirements developed, reviewed, adopted and implemented for assessment of DAs
CW-A03	Amenities	LGA-wide	Insufficient waste facilities and collection at coastal locations impacting amenity	Review waste collection assets and servicing in coastal public spaces	Work with internal business units and service providers to review the adequacy of waste collection assets and servicing along the coast. The review would be focused on ensuring that infrastructure and assets are sufficient to meet current demands, seasonal and event variations and opportunities for improvement to reduce the environmental and amenity impacts from marine litter and debris. This action should also include the management of post-storm and flood debris.	Medium	Low	Council		Waste collection assets identified and upgraded. Management plan for removal of post-storm debris developed and implemented
CW-H01	Coastal Hazard	LGA-wide	Need for stronger planning controls to manage development in the coastal zone in relation to coastal hazards	Review and update coastal development planning controls and undertake Planning Proposal to adopt Coastal Vulnerability Area	The review, update and implementation of new coastal hazard planning controls within the Development Control Plan, based on the latest available coastal hazard study and information, will ensure a consistent and best-practice approach to protecting the environment and communities from coastal hazards. Council will also prepare and submit a Planning Proposal to adopt a Coastal Vulnerability Area (CVA).	Medium	High	Council	DCCEEW	DCP updated and implemented, Planning Proposal submitted, CVA developed and included in RH SEPP/LEP
CW-H02	Coastal Hazard	LGA-wide	Legacy coastal emergency works on beaches which no longer serve purpose, causing detrimental impacts or timeframe expired.	Identify the extent, nature and condition of existing coastal emergency works	This investigation will identify and document existing emergency, legacy and unauthorised coastal protection works, including the type of works, extent, condition and the risk they pose to public safety and coastal processes. This information will allow these works to be strategically managed, decommissioned, remediated or modified as necessary and at the appropriate time.	Medium	Medium	Council		Legacy and unauthorised coastal protection works identified, assessed and site specific plan developed for each
CT01	Coastal Hazard	Cabbage Tree	Structural integrity/slope stability	Design and construct Stage 2 of the Cabbage Tree Harbour coastal protection works	Design and construct Stage 2 coastal protections works comprising at Cabbage Tree Harbour to further reduce the incidence of landslip and improve beach safety. Toe drainage structure works were originally constructed with a 15 year	Medium	Medium	Council	DCCEEW	Detailed design undertaken and works implemented

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
					design life and Stage 2 is required to add an additional layer and increase the crest height to ensure adequacy for future coastal conditions. Refer Appendix D for concept and further details.					
CT02	Coastal Hazard	Cabbage Tree	Geotechnical hazards exist at Mazlin Reserve	Improve public safety at Mazlin Reserve	This would involve completing an investigation of existing geotechnical condition at Mazlin Reserve and Cabbage Tree Harbour to prioritise and implement improvements aimed at stabilising the cliff along the eastern edge of Mazlin Reserve. The works would aim to reduce the likelihood of further land slip and improve public safety, as identified in the Norah Head Village Centre Masterplan.	Medium	High	Council	DPHI -Crown Lands	Undertake geotechnical investigation and implement improvements
MM01	Coastal Hazard	MacMasters	Coastal erosion impacting Marine Parade	Complete coastal risk and options assessment for Marine Parade at MacMasters Beach	This action will involve completing a local detailed coastal hazard assessment to better understand the erosion and recession risk at this location. The updated information will be used to inform an options assessment which would investigate the most appropriate long-term adaptive management approach.	Long	Medium	Council	DCCEEW, DPHI - Crown Lands	Management options identified, design undertaken and works implemented
MM02	Coastal Hazard	MacMasters	Coastal erosion impacting Marine Parade	Construction of MacMasters Beach temporary coastal protection works	MacMasters Beach Surf Life Saving Club is located on Crown Land and subject to increasing future risk from coastal hazards. A design for temporary coastal protection works comprising of rock bag armour units has been prepared, in consideration of significant site constraints and community feedback, that would provide limited protection to parts of the existing building, heritage and Norfolk Island pines. The works would be limited to an approximately 80m stretch seaward of the building, between the existing steps and ramp and may assist in mitigating risks from coastal hazards until the longer-term management approach for this location is determined (action MM01) and implemented. The temporary coastal protection works may be triggered by geotechnical instability identified as part of regular coastal monitoring. This action is included as resolved during the 22 July 2025 Ordinary Council Meeting.	Medium (or triggered by CZEAS)	Medium	Council	DPHI -Crown Lands	Works implemented if triggered by CZEAS
EN01	Coastal Hazard	Shelly Beach (north)	Unknown impacts associated with legacy landfill sites or other contamination that be become exposed following erosion.	Monitor and manage risk of contamination from closed landfill sites	Monitoring and management of legacy closed landfill sites within the coastal hazard area to reduce the risk of contamination during severe weather events.	Medium	Low	Council		Legacy landfill sites identified, risk of contamination assessed and appropriate management measured/implemented.
EN02-A	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 11 Wyuna Avenue and 57 Curtis Pde, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by	Develop engineering design requirements for coastal protection works at The Entrance North.	Develop engineering design requirements for rock revetment and/or hybrid rock revetment coastal protection works at The Entrance North to assist the preparation and assessment of development applications.	Short	High	Council		Coastal Engineering Design Requirements developed, reviewed, adopted and implemented for assessment of DAS

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
			private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.							
EN02-B	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 11 Wyuna Avenue and 57 Curtis Pde, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Complete detailed design and approvals for coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	Complete detailed design and approvals for rock revetment and/or hybrid rock revetment coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North. Note that the total cost allowance for this action is \$715,000 but Council's share is estimated at \$75,000 based on portion of works on Council-owned land	Short	High	Private Property Owners then Council	DPHI -Crown Lands	Detailed design undertaken in accordance with new Engineering Design Requirements
EN02-C	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 11 Wyuna Avenue and 57 Curtis Pde, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Construct coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	Complete construction of rock revetment and/or hybrid rock revetment coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North. Note that the total cost of this action is \$11,700,000 but Council's share is estimated at \$680,000 based on portion of works on Council-owned land	Short	High	Private Property Owners then Council	DPHI -Crown Lands	Works approved and implemented in full
EN02-D	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 1 and 55 Hutton Rd, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Complete design and approvals for coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.	Complete design and approvals of rock revetment and/or hybrid rock revetment coastal protection works at Hutton Rd, The Entrance North. Design and approvals to consider the temporary design and approval for the works constructed under the s68 Ministerial Authorisation of the NSW Reconstruction Authority Act. Note that the total cost allowance for this action is \$600,000 but Council's share is estimated at \$75,000 based on portion of works on Council-owned land	Short	High	Private Property Owners then Council	DPHI -Crown Lands	Detailed design undertaken in accordance with new Engineering Design Requirements and approvals in place
EN02-E	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 1 and 55 Hutton Rd, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Construct coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.	Complete construction of rock revetment and/or hybrid rock revetment coastal protection works at Hutton Rd, The Entrance North. Construction to take into account the temporary works constructed under the s68 Ministerial Authorisation of the NSW Reconstruction Authority Act. Note that the total cost of this action is \$11,830,000 but Council's share is estimated at \$1,640,000 based on portion of works on Council-owned land	Short	High	Private Property Owners then Council	DPHI -Crown Lands	Works approved and implemented in full
EN02-F	Coastal Hazard	The Entrance North	High risk from beach erosion at North Entrance Beach	Implement sand nourishment at The Entrance North using sand sourced strategically (in accordance with the Entrance Management Strategy and procedures being developed as part of the Tuggerah Lakes	Continue to implement sand nourishment at The Entrance North using sand sourced strategically from The Entrance channel dredging and sand berm management activities. Note: Sand from the Entrance channel only to be placed south of Hargraves St to keep sand within the sediment compartment. Refer to Appendix D for more information regarding the rationale for this action.	Short, ongoing	High	Council	DCCEEW, TfNSW, Fisheries, DPHI - Crown Lands	Sand nourishment placed onto The Entrance North beach

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
				Coastal Management Program – Including Entrance Channel Dredging Activities)						
EN03	Coastal Hazard	The Entrance North, Lakes Beach	High risk from beach erosion at The Entrance North and Lakes Beach SLSCs	Prepare a pilot adaptation and options assessment for the Entrance North and The Lakes SLSCs	Prepare a pilot adaptation and options assessment for the Entrance North and The Lakes SLSCs. This action will involve evaluating the existing assets and coastal risk information to prepare an options assessment and adaptive management approach to address current and future coastal hazard risk.	Medium	Medium	DPHI -Crown Lands	Council, SLSC	Adaptation plans prepared for The Entrance North and Lakes SLSCs
EB01	Coastal Hazard	The Entrance	Structural integrity	Review the structural integrity and extent of the foreshore revetment and embankment protecting Marine Parade, The Entrance, and undertake remedial and/or extension works as required	Review the structural integrity and extent of the foreshore embankment stabilising Marine Parade that extends north from The Entrance Surf Life Saving Club and along the southern foreshore of the entrance channel. Following construction of the groyne on The Entrance Beach by State Government in 2017, the structure has been increasingly exposed and impacted. Modifications, extensions or replacement may be required to ensure structural integrity, public safety and stability of Marine Parade. This action may depend on or incorporate recommendations from TfNSW's review into the impacts from the existing rock groyne expected 2026.	Short	Medium	Council	TfNSW, DPHI - Crown Lands	Foreshore protection works assessed, upgrade designed and implemented
	Coastal Hazard	Wamberal Beach	Coastal erosion threatening private properties and public infrastructure	Review and update the Wamberal Beach engineering design requirements so that they may be referred to in future revisions of Council's Coastal Development Control Plan (DCP)	Review the Wamberal Beach EDR's to include geotechnical engineering design requirements and allow for a design that can be implemented, with a view to being able to include in Council's DCP to ensure all development applications for the Wamberal Beach coastal protection works are in accordance with the guidelines. The purpose of the EDRs are also to provide principals assistance with the preparation and assessment of DA's for coastal protection works for other locations. The EDRs should be seen as a "living document", a guideline that should be regularly reviewed and updated to keep it up to date with the latest available information and best practice. The EDRs need to be flexible enough to allow various types of coastal protection works designs to be put forward and considered for assessment in a DA.	Short	High	Council	DCCEEW	Future DAs compliant with Engineering Design Requirements and able to be supported/approved by the appropriate consent authority. Development and assessment of coastal protection works in accordance with NSW Planning legislation.
WBO2-A	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Complete design and approvals for coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal.	Complete design and approvals for rock revetment and/or hybrid rock revetment coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal. Total cost estimated at \$1 million, Council share = \$110,000 based on proportion protecting Council land	Short	High	Private Property Owners then Council		Detailed design and approvals completed

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
WB02-B	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Construct coastal protection works fronting 1 Pacific St to 17 Calais Rd, Wamberal Beach.	Construct rock revetment and/or hybrid rock revetment coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal Beach. Total cost estimated at \$33.8 million, Council share = \$1.6 million based on proportion protecting Council land	Short	High	Private Property Owners then Council		Coastal protection works implemented
WB02-C	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Loss of public beach amenity	Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon, sand berm area and other sources as available	Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon and sand berm area and other sources as available.	Short	High	Council		Sand nourishment placed onto Wamberal Beach
WB02-D	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Purchase residual private land fronting Pacific St Wamberal.	NSW DPHI, Crown Lands and Council to work together to acquire residual private land fronting Pacific St Wamberal and transfer into Council ownership.	Short	High	NSW DPHI, NSW Crown Land and Council		Council acquisition of residual parcel of land fronting Pacific Street, Wamberal Beach
WB02-E	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Complete the transfer of NSW Government owned lots at Ocean View Drive Wamberal into Council ownership.	Council to liaise with the Office of Strategic Lands - Department of Planning, Housing and Infrastructure to transfer the 5 lots to Council ownership to assist in the management of a whole of embayment solution.	Short	High	NSW DPHI and Council		Council to obtain DPHI lots
WB02-F	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Enter into licence agreement for private coastal protection works located partly on Council owned land at Wamberal Beach.	Where the rock revetment cannot be placed entirely on private land, a licence/lease agreement is required for landowners to have part of the coastal protection works on Council owned land.	Short	High	Council / Private land owners		Lease agreements executed and in place
A01	Coastal Hazard	Avoca	Flat beach profile, no protection from wave overtopping	Undertake a detailed wave overtopping and inundation assessment for high risk locations	Undertake a detailed wave overtopping and inundation assessment at high risk locations identified in the coastal hazard study to improve public safety and better inform coastal planning. The detailed assessment should include analysis of the current and future risk, as well as the consideration of options for managing the risk to public and private assets and public safety. Short term management options may include updating local planning controls and/or soft engineering strategies	Short	High	Council	DCCEEW	Options developed and implemented for management of overtopping at high risk locations

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
EB02	Coastal Hazard	The Entrance	Depletion of sand along southern side of The Entrance channel and undermining of seawall	Investigation and management of adverse groyne impacts	Collaborate and support the TfNSW Marine Infrastructure Delivery Office in the investigation of options, including removal, and management all adverse impacts caused by the construction of the rock groyne at The Entrance beach that was initially installed with the context of a short-term 10-year trial.	Medium	Medium	TfNSW (MI DO)		Discussions held with TfNSW MIDO and agreement on management of future impacts from groyne developed
T02	Coastal Hazard	Terrigal (The Haven)	Structural Integrity of seawall at The Haven	Options study for replacement of aging seawall at The Haven	Undertake an options study to assess feasible foreshore masterplans and design options for the upgrade, or replacement, of the sandstone block seawall at The Haven and surrounding area, with reference to recommendations of the engineering review of the existing structure.	Medium	High	Council	DPHI -Crown Lands	Options study undertaken and seawall upgraded
CW-C01	Community & Social	LGA-wide	Need for community and agency representation to support decision making	Continue the role of a coastal, estuary and floodplain management Advisory Committee	Continue to support the role of an Advisory Committee responsible for providing advice and input on the sustainable management of our coastal, estuarine and flood liable areas.	Short	High	Council		Committee established, terms of reference established, meets regularly and comprises appropriate cross-section of the community and agency representatives
CW-C02	Community & Social	LGA-wide	Lack of detailed cultural and heritage assessments across the LGA. Need for Aboriginal Heritage Impact Permits in areas affected by coastal erosion.	Work with First Nation groups and stakeholders to evaluate arrangements for undertaking beach maintenance operations	Collaborate with First Nation groups and stakeholders to evaluate beach maintenance operations to ensure their appropriateness for works in sensitive areas. This action will include update of protocols to be followed in the event Aboriginal sites or heritage is discovered and/or threatened by erosion during storms, information to be communicated through interpretive signage along the coast and obtaining Aboriginal Heritage Impact Permits where they may be required to support essential works for public safety and access, such as post-storm management of beach accessways.	Medium	Medium	Council	LALC	Culturally sensitive sites identified. Beach maintenance undertaken in accordance with statewide code of practice.
CW-C03	Community & Social	LGA-wide	Unapproved memorial sites	Management of unapproved memorials in public coastal spaces	Work with internal business units to review the appropriateness and/or removal of unapproved memorials installed in public coastal spaces on Council land or Council managed Crown Land.	Medium	Low	Council		Unapproved memorials removed from public areas
CW-C04	Community & Social	LGA-wide	Community awareness of coastal hazards and issues	Update and maintain Council's website to improve awareness and make information on coastal processes, hazards and issues more accessible	Update Council's website to provide accessible information relating to coastal processes, hazards, coastal management issues, educational resources, coastal projects and coastal data. Website to be regularly reviewed and updated as appropriate to ensure relevancy and accuracy of information as new information is obtained or new coastal management issues emerge. Following adoption by Council, the new coastal hazard information will also be made publicly available via Council's online mapping tool to ensure it is more accessible to support informed decision-making by residents, stakeholders and potential developers concerning matters of property, development and insurance. New coastal hazard information should be	Short	High	Council		Website updated and maintained according to regular review schedule, level of public engagement analysed

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
					acquired, as necessary, to ensure this information is accurate and current.					
CW-C05	Community & Social	LGA-wide	Community awareness of cultural issues and practices, lack of understanding of traditional knowledge for managing the coast	Knowledge sharing and protection of cultural heritage	Engage and collaborate with local First Nations groups to share cultural knowledge, understand their concerns and priorities and identify opportunities to acknowledge and protect and preserve cultural heritage sites and values from coastal hazards.	Medium	Medium	Council	LALC	Vulnerable cultural heritage values and assets identified and protected from coastal hazards
CW-D01	Development	LGA-wide	Need for geotechnical information to inform planning decisions	Develop and maintain a coastal geotechnical database	Develop and maintain an internal database of coastal geotechnical information to better understand the underlying geology of the region and inform coastal management and planning decisions. It will involve the collation of all available geotechnical data along our coast from all available sources and include geotechnical and structural constraints. Information to be provided to NSW SES for consideration for use in emergency management.	Medium	Medium	Council	DCCEEW, DPHI - Crown Lands (as necessary)	Database of geotechnical information developed and provided to NSW SES
CW-D02	Development	LGA-wide	Geotechnical investigation	Conduct geotechnical investigations to improve understanding of underlying geology along the coast	Complete a gap analysis to identify where additional or contemporary geotechnical information is required to support improved management, emergency response and planning decisions and conduct investigations as required.	Medium	Medium	Council	DCCEEW, DPHI - Crown Lands (as necessary)	Gaps in geotechnical information identified and geotechnical investigations undertaken
CW-D03	Development	LGA-wide	Infrastructure at risk	Develop a coastal assets at risk register and update asset management program	This action involves auditing coastal assets and infrastructure to inform development of a register identifying those at risk of coastal hazards, now and into the future. This information would be integrated with Council's asset management program to ensure effective maintenance, management and planning of coastal assets to improve amenity, resilience and community safety.	Short	High	Council	DPHI -Crown Lands	Coastal assets register developed, condition inspections undertaken, assets at risk identified and upgrades designed/implemented
CW-D04	Development	LGA-wide	Rock/ocean pools maintenance and accessibility, Accessibility of beaches, foreshore reserves and coastal assets	Improve accessibility of coastal and foreshore areas	As guided by Council's Disability Inclusion Action Plan, this action involves continuing to improve the accessibility and inclusiveness of our beaches and foreshore areas, such as investigating and implementing access upgrades and ensuring that new infrastructure projects consider and incorporate universal design principles.	Medium	Medium	Council	DPHI -Crown Lands	Access upgrade locations identified, designed and implemented
CW-D05	Development	LGA-wide	Lack of awareness of property owners for properties affected by coastal hazards	Review coastal hazard notations and planning certificates	As new coastal hazard mapping and information becomes available, planning certificates should be regularly reviewed to ensure properties potentially affected by coastal hazards contain an appropriate notation.	Medium	Medium	Council	DCCEEW	Planning certificates reviewed and appropriate notations added
CW-E01	Ecological Environment	LGA-wide	Reduced water quality from urban catchments, leading to reduced water quality in open coast receiving waters	Review and implement Council's coastal water quality monitoring program	Council's existing coastal water quality monitoring program will be reviewed, updated and implemented to continue protecting and enhancing the water quality along our coastline. The program will be expanded to include the monitoring of ocean wastewater and stormwater outfalls, improved education	Short	Medium	Council		Water quality program reviewed, updated and implemented. Program integrated with that for the Coastal Lagoons.

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
					and awareness initiatives and public accessibility to water quality information.					
CW-E02	Ecological Environment	LGA-wide	<p>Invasive weeds and pests reducing the diversity and abundance of native species.</p> <p>Lack of guidance for appropriate planting in the coastal zone.</p> <p>Lack of guidance for appropriate fencing/dune stabilisation controls in the coastal zone.</p> <p>Illegal vegetation clearing.</p>	Develop and implement a Coastal Vegetation and Dune Management Strategy	This action would involve surveying existing coastal and dune vegetation to inform the development of a Coastal Vegetation Strategy aimed at supporting and enhancing coastal resilience, ecosystem integrity, beach amenity and conservation outcomes. The strategy will guide and prioritise the on-ground management required to achieve these outcomes and involve elements such as the management of priority weed species, dune stabilisation and planting, tree restoration and succession planting, education opportunities for the public and community groups and remediation actions required in instances of illegal clearing.	Short	Medium	Council		Strategy developed, published and implemented
T01	Ecological Environment	LGA-wide	Would like to see the area from The Anchor to Terrigal beach made into a Marine Park same as what is at Nelson Bay. (Pinpoint)	Undertake and support research projects and citizen science initiatives aimed at enhancing and conserving marine biodiversity, science, recreation and education	Collaborate and support agencies, organisations and community groups undertaking projects or research aimed at enhancing and conserving marine biodiversity, science, recreation and education. This may include initiatives such as shark management, threatened species management, marine protected areas or citizen science projects, such as CoastSnap.	Long	Medium	Council	Council, DPHI - Crown Lands, DPI RD Fisheries	Specific research projects and partnerships identified
SB01	Ecological Environment	Soldiers Beach	Dune blowout at southern carpark	Undertake dune management works at the southern carpark of Soldiers Beach	Undertake works aimed at reducing the volume of wind transported sand into the carpark, including the installation of dune forming fencing, dune revegetation and upgrade/replacement of the dune retaining wall. Also investigate whether the vehicle access from the southern slip rail is still required following completion of the new vehicle access ramp.	Medium	Medium	Council		Dune fencing installed dune vegetated and stabilised
NOR01	Ecological Environment	Norah Head	Coastal Wetlands and Littoral Rainforests not mapped and unprotected	Undertake a Planning Proposal to update RH SEPP Coastal Wetlands and Littoral Rainforest Mapping	<p>A planning proposal will be undertaken to update the Coastal Wetland and Littoral Rainforest Mapping, where relevant, in the NSW Resilience and Hazards State Environmental Planning Policy (RH SEPP). This update would be based on the mapping provided in the Tuggerah Lakes Coastal Wetland Mapping study (ELA, 2022) and additional investigation as required.</p> <p>The Planning Proposal may be submitted in conjunction with the planning proposal for the CVA and/or it may be submitted in conjunction with a proposal for updates to CMA mapping for areas within the Central Coast LGA subject to a CMP</p>	Medium	Low	Council		Complete planning proposal
NOR02	Coastal Hazard	Norah Head	Geotechnical instability at Norah Head Search and Rescue Boat Club	Investigate Options to address geotechnical stability of the Norah Head Search & Rescue Boat Club	<ul style="list-style-type: none"> • Monitor and investigate immediate risks to public safety and infrastructure on site and undertake short term make safe actions/ activities as appropriate. • Investigate stormwater management in the sub-catchment and identify potential offsite mitigation measures to minimise on site impacts. (Council) • Prepare an adaptation and options 	Short-Medium	Medium	Crown Lands		Appropriate options developed and implemented

ID	Category	Location	Issue	Action Name	Action Description	Timeframe	Priority	Lead Agency	Support Agencies	Performance Measures
					assessment for the Norah Head Search & Rescue Boat Club / Marine Rescue building. This action will involve evaluating existing assets and risk information to prepare an options assessment which will consider feasibility and adaptation options (such as retreat) and feasibility of concepts design already prepared. <ul style="list-style-type: none"> • Seek opportunities to proceed with detailed designs, planning assessment and implementation of the preferred outcomes of the adaption and options assessment. 					
NOR03	Coastal Hazard	Norah Head	<ul style="list-style-type: none"> • Cliff stability, Drainage, slumping and geotechnical issues • Beach Access Stairway 	Undertake geotechnical assessment of Norah Head lighthouse and headland	Subject to funding availability this action involves: <ul style="list-style-type: none"> - The preparation of a geotechnical assessment at locations where the public or infrastructure may be at risk; - An audit of existing natural environmental and infrastructure on the Reserve. The audit should prioritise areas/issues for improvement. - Prioritise and implement recommendations of both reports (subject to funding availability) 	Short-Medium	Medium	NSW Crown Holiday Parks (Reflections)	DPHI -Crown Lands	Appropriate options developed and implemented, audit of public infrastructure completed and recommendations made
TOOW01	Community & Social	Toowoona Bay	Safety concerns from unauthorised vehicle access onto beach and sand ingress into carpark	Toowoona Bay carpark and foreshore management	Unauthorised vehicle access onto the beach via the existing ramp at Toowoona Bay carpark is causing safety concerns at this location. Sand ingress from the beach into the carpark is also a management issue. Improvements will be delivered to reduce sand ingress via dune vegetation and installation of a gate across beach ramp to prohibit unauthorised vehicles from accessing the beach via the existing ramp. Access will be permitted only for authorised persons.	Short	Low	Council	Toowoona Bay SLSC	Dune management and gate/barrier completed.

4.6 Implementation of CMP actions

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 LG Act. This framework is illustrated in Figure 4-25: .

Council's future planning documents (including the CMP) are made up of four key components:

1. Community Strategic Plan "One – Central Coast" (CSP, 10 years) – this represents the highest level of strategic planning undertaken by Council and identifies the main priorities and aspirations of the Central Coast community. The CMP must reflect and support implementation of the CSP. Under the CM Act, the objectives and management actions developed as part of CMPs are required to be strategically aligned with the objectives and strategies outlined in the CSP.
2. Delivery Program Objectives (3 years) - Council has developed its 3-year Delivery Program 2022-2025. A new Delivery Program will be developed in financial year 2024-25, which will cover the financial years of 2025-26, 2026-27, 2027-28, and 2028-29. Forthcoming and ongoing CMP actions for the relevant 4-year period must be included in the associated delivery program.
3. Operational Plan & Budget (annual) - The Operational Plan details the actions that Council will take (through projects, programs and other activities) to deliver the CSP. **Forthcoming and ongoing CMP actions are scheduled into each years' operational plan.**
4. **Council's Resourcing Strategy (4 years)** - In order to meet service levels and deliver the projects and actions outlined in the Delivery Program and subsequent Operational Plans, Council needs to allocate its resources - **finances, people and assets**. **Council's Resourcing Strategy** was developed as part of the Delivery Program 2022-2025 and includes a 10-year Long Term Financial Plan, four-year Workforce Management Strategy, and a 10-year Asset Management Strategy.

The IP&R Framework recognises that council plans and policies should not exist in isolation - that they are inter-connected. This framework allows NSW councils to draw their various plans together, understand how they interact and get the maximum leverage from their efforts by planning holistically and sustainably for the future

(<https://www.olg.nsw.gov.au/councils/integrated-planning-and-reporting>).

It is intended that the CMP will fit into the Framework under "Other Strategic Plans".

The timing of the actions as articulated in the Business Plan in Section 6 has been developed to fit in with the timing of each of the elements of the IP&R Framework as indicated above.

4.6.1 Planning Instruments relevant to implementing CMP actions

The following planning instruments are relevant to implementing actions for the CMP:

- Coastal Management Act 2016 (CM Act): provides for the integrated management of the coastal environment of NSW, consistent with the principles of ecologically sustainable development, for the social, cultural, and economic wellbeing of the people of the state.
- The NSW Environmental Planning and Assessment Act 1979 (EP&A Act): Governs land use planning and development in NSW, focusing on sustainable development, environmental protection, community participation, and compliance measures.
- The State Environmental Planning Policy (Resilience and Hazards) 2021 (RH SEPP) provides development controls for each of the management areas (CWLRA, CUA, CEA, CVA, discussed in Section 1.5.2). Chapter 2 of the RH SEPP covers how development proposals are assessed if they are in a coastal zone, and is supported by detailed mapping. Each of the above areas has outcome-oriented management objectives so that councils can apply appropriate management tools and development controls.
- The State Environmental Planning Policy (Transport and Infrastructure) 2021 - also known as the Transport and Infrastructure State Environmental Planning Policy (SEPP) outlines the planning rules for delivering most infrastructure works and facilities **across NSW. 'Chapter 2 – Infrastructure' contains planning rules and controls from the Infrastructure SEPP for infrastructure in NSW, such as for hospitals, roads, railways, emergency services, water supply and electricity delivery. This includes rules for:**
 - providing greater flexibility in the location of infrastructure and services
 - allowing for efficient development of land for infrastructure
 - identifying projects where environmental impacts are likely to be minimal as exempt or complying development
 - outlining the approval process and assessment requirements for infrastructure proposals
 - allowing for consultation with relevant public authorities and communities about infrastructure development.
- The Central Coast Local Environment Plan 2022 (LEP): A Local Environmental Plan (LEP) is the primary legal planning document for guiding land use and planning decisions made by Council. An LEP describes what can be undertaken on land and is supported by mapping (including land use zones, height of building, lot size maps etc.). Through zoning and development controls, the LEP allows Council to manage the way in which land is used to strategically plan for the region and shape and support our local communities. The Central Coast LEP is discussed further in Section 1.6.4.3.
- The Central Coast Development Control Plan 2022 (DCP): aims to unify and develop a consistent approach to planning assessment as it applies to those areas mapped within the coastal zone. **Chapter 3.2 of the DCP, "Coastal Hazard**

Management”, addresses coastal processes, risks and hazard management along the open Pacific Ocean coastline of the Central Coast, between Budgewoi Beach in the North and Patonga Beach in the South. The aims of the existing DCP are:

- o To provide guidelines for development of land having regard to minimising coastal hazard risks to development.
- o To minimise risk to life and property from coastal hazards associated with building on land within the Coastal Vulnerability Area.
- o To maintain and improve public access to public land potentially affected by coastal hazards.
- o To identify relevant assessment considerations for various types of developments within the Coastal Vulnerability Area including minor ancillary structures, new development and community infrastructure.



Figure 4-25: Central Coast Council's Integrated Planning & Reporting Framework (IP&R)

4.6.2 Linkages with Council’s Community Strategic Plan

The Community Strategic Plan (CSP) sits at the top of Council’s planning hierarchy and identifies the community’s main priorities and expectations for the future and ways to achieve these goals. All Councils across NSW are required by the *Local Government Act 1993* to develop a CSP, forming part of an Integrated Planning and Reporting (IP&R) framework.

Council developed the Community Strategic Plan (CSP) “One – Central Coast” which provided an opportunity for Council to understand the aspirations and concerns of the Central Coast Community. “One – Central Coast” provides a 10-year plan that defines priorities of the community and provides a considered and evidence-based roadmap for the future of the Central Coast. “One – Central Coast” provides 17 overarching goals, each with four unique objectives, which the CMP will need to support. The relevant linkages between the CSP and future CMP are shown in Table 4-9 (Royal Haskoning DHV, 2021).

Table 4-9: Linkages Between the CSP and CMP

Linkages between the CMP and “One – Central Coast Community Strategic Plan 2018 – 2028
A1 Work within our communities to connect people, build capacity and create local solutions and initiative
A2 Celebrate and continue to create opportunities for inclusion where all people feel welcome and participate in community life
A4 Enhance community safety within neighbourhoods, public spaces and places
B4 Activate spaces and places to complement activity around town centres, foreshores, lakes and green spaces for families, community and visitors
C1 Target economic development in growth areas and major centres and provide incentives to attract businesses to the Central Coast
C2 Revitalise Gosford City Centre, Gosford Waterfront and town centres as key destinations and attractors for businesses, local residents, visitors and tourists
C3 Facilitate economic development to increase local employment opportunities and provide a range of jobs for all residents
C4 Promote and grow tourism that celebrates the natural and cultural assets of the Central Coast in a way that is accessible, sustainable and eco-friendly
E1 Educate the community on the value and importance of natural areas and biodiversity and encourage community involvement in caring for our natural environment
E2 Improve water quality for beaches, lakes and waterways including minimizing pollutants and preventing litter entering our waterways
E3 Reduce littering, minimise waste to landfill and educate to strength positive environmental behaviours
E4 Incorporate renewable energy and energy efficiency in future design and planning and ensure responsible use of water
F1 Protect our rich environmental heritage by conserving beach, waterways, bushland, wildlife corridors and inland areas and the diversity of local native species

Linkages between the CMP and "One – Central Coast Community Strategic Plan 2018 – 2028	
F2	Promote greening and ensure the wellbeing of communities through the protection of local bushland, urban trees, tree canopies and expansion of the Coastal Open Space System (COSS)
F3	Improve enforcement for all types of environmental non-compliance including littering and illegal dumping and encourage excellence in industry practices to protect and enhance environmental health
F4	Address climate change and its impacts through collaborative strategic planning and responsible land management and consider targets and actions
G1	Build strong relationships and ensure our partners and community share the responsibilities and benefits of putting plans into practice
G2	Communicate openly and honestly with the community to build a relationship based on transparency, understanding, trust and respect
G3	Engage with the community in meaningful dialogue and demonstrate how community participation is being used to inform decisions
I1	Preserve local character and protect our drinking water catchments, heritage and rural areas by concentrating development along transport corridors and town centres east of the M1
I2	Ensure all new developments are well planned with good access to public transport, green space and community facilities and support active transport
I3	Ensure land use planning and development is sustainable and environmentally sound and considers the importance of local habitat, green corridors, energy efficiency and stormwater management
K3	Provide signage, public facilities, amenities and playgrounds to encourage usage and enjoyment of public areas
K4	Repair and maintain wharves, jetties, boat ramps and ocean baths to increase ease of access to and enjoyment of natural waterways and foreshores

In response to the projected impact from climate change, Council has developed a Climate Change Policy (2019). The Policy provides a framework for Council to progress its planning for climate change, providing a set of guiding principles and a framework to help with decision making. Key items in the Climate Change Policy that are relevant to the CMP development are:

Table 4-10: Climate Change Policy Strategic Principles Linking with the CMP

Climate Change Policy Strategic Principles	
C4	Principle 1: Council endorse the Ecologically Sustainable Development values through integrating social, economic and environmental considerations into Council's decision making through the implementation of the four principles a) precautionary principles, b) inter-generational equity, c) conservation of biological diversity and ecological integrity and d) improved valuation, pricing and incentive mechanism.

Climate Change Policy Strategic Principles
C5 Principle 2: Council implement a holistic approach to anticipate and adapt to climate change actions that comprise the time scales such as now and the future as well as the impacts of the complex interactions and interdependencies between the human and the environment systems.
C6 Principle 3: Council implement an evidence-based decision making to respond, to adapt and build resilience to Climate Change.
C8 Principle 5: Council implement a proactive approach and ensure continuity to better anticipate and adapt to complex challenges posed by the changing climate.
C9 Principle 6: Council implement a Place-based approach to enhance Council and community capacity for climate resilience that is context specific, knowledge based and collaborative.
Governance
(D2) Embed climate change planning within Council’s Integrated Planning and Reporting Framework, namely the Community Strategic Plan, Delivery and Operational Plans and Council’s Corporate Plan.
(D4) Develop Place Based Climate Change Action Plans in partnership with the community that establishes regional targets for mitigation and prioritises local adaptation planning (e.g. sea level rise, coastal hazards, disaster management).
Risk Management & Resilience Planning
(D6) Undertake ongoing monitoring and assessment of climate change risks and their impacts on ecological, social, economic and physical built forms systems based on best available science.
(D7) Incorporate climate change risks in strategic and infrastructure planning for the region to maximise local liveability through informed land use planning, development of planning controls and guidelines that facilitates regional urban growth, transport connectivity and utility services.
(D9) Undertake climate change risk assessment and incorporate risks and vulnerabilities to inform asset life cycle analysis for all new and existing infrastructure assets, to meet current and projected demands and develop relevant adaptation and mitigation strategies to ensure climate resilience.
(D10) Support initiatives and education programs to enhance the Central Coast community’s understanding of and build resilience to climate change risks.
(D11) Develop strategies, plans and development controls to protect, conserve and work in partnerships with community and local agencies to enhance resilience of biodiversity across the Central Coast region.

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 Community Strategic Plan (CSP). Those linkages have been provided above and have been aligned with the proposed management actions in this CMP.

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

5.1 Overview

CVA mapping has not been established under the RH SEPP for the Central Coast LGA or CMP Study Area. It is the intent of Council to propose, by way of a planning proposal, the adoption of a map in indicating a CVA as part of Action CW-H01. This will involve the preparation of a planning proposal to seek formal inclusion of a CVA (beach erosion, shoreline recession, cliff and slope instability, coastal inundation) into the RH SEPP based on mapping undertaken in the Stage 2 Coastal Hazard Study (Bluecoast Consulting Engineers, 2024-2025). The Planning Proposal will be submitted in conjunction with a proposal for a CVA for other areas within the Central Coast LGA subject to a CMP. Any updates to the LEP or DCP will be sequenced in **accordance with Council's new land use planning scheme. This is detailed in Action CW-H01.** Note that maps that show the areas subject to coastal hazards in the CMP study area, that may be used to develop a CVA map in the future, are presented in Appendix A2.

The CVA map would consider areas where coastal wetlands and littoral rainforest areas are vulnerable to impacts from future sea level rise or foreshore erosion.

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

It should be noted that the CM Act requires the consideration of future climate change. As such, all extents used in defining the CVA should be based on a suitable forward planning horizon, which incorporates the projected effects of sea level rise on coastal hazards. Note that the coastal and hazard mapping undertaken as part of the Stage 2 Coastal Hazard Study (Bluecoast Consulting Engineers, 2024-2025) has considered a range of scenarios for sea level rise for the 20 year, 50 year and 100 year planning periods as discussed in Section 2.3.

Other CMPs for specific estuaries across the Central Coast LGA are also currently being prepared that are to include mapping of additional coastal hazards such as coastal and tidal inundation, which council may combine as part of a single planning proposal to prepare a CVA once they are also completed.

5.2 Changes to Council Development Control Plan

The CMP provides an opportunity to improve the planning framework for managing the coastal zone areas across the LGA and unifying this approach in a suite of planning instruments that reflect the priorities of the CMP.

The development of the revised coastal hazard assessment provides an opportunity to update planning controls in the coastal zone that can apply to the entire Central Coast.

In light of the review of the existing DCP documents, the following observations are made:

- The former Wyong Council planning controls for the coast adopted a 2050 planning period for new residential development on land already appropriately zoned and a 2100 planning period for major infrastructure, new subdivisions and strategic land use studies.
- The former Gosford Council adopted the 2050 planning period to define a Coastal Building Line that would apply to each lot, and defined the Coastal Hazard Area as the area subject to reduced foundation capacity by 2100, coastal inundation or geotechnical instability.

The two approaches outlined above are not consistent across the LGA, which can lead to difficulties in assessing applications, and inconsistent risks from coastal hazards applying to developments, depending on which assessment criteria are used. A unified approach across the LGA is required to simplify the development assessment process for both applicants and the Council assessment team.

5.2.1 Planning for Coastal Risk

The appropriate risk standard for the update of development controls for the Central Coast is dependent on the level of risk that Council is willing to accept. For example, a 100 year ARI event would have a 40% probability of being exceeded during a design life of 50 years (Figure 5-1). In contrast, a 500 year ARI event would have a 10% chance of being exceeded within the design life (Figure 5-1). The most recent coastal hazard mapping (Bluecoast Consulting Engineers, 2024-2025) provides probabilistic coastal hazard extents for coastal erosion events up to the 100 year ARI (or 1% AEP). With reference to Figure 5-1, it is important to note that such an event has a 1% probability of being exceeded in any one year, or a 40% probability of being exceeded in a given 50 year period.

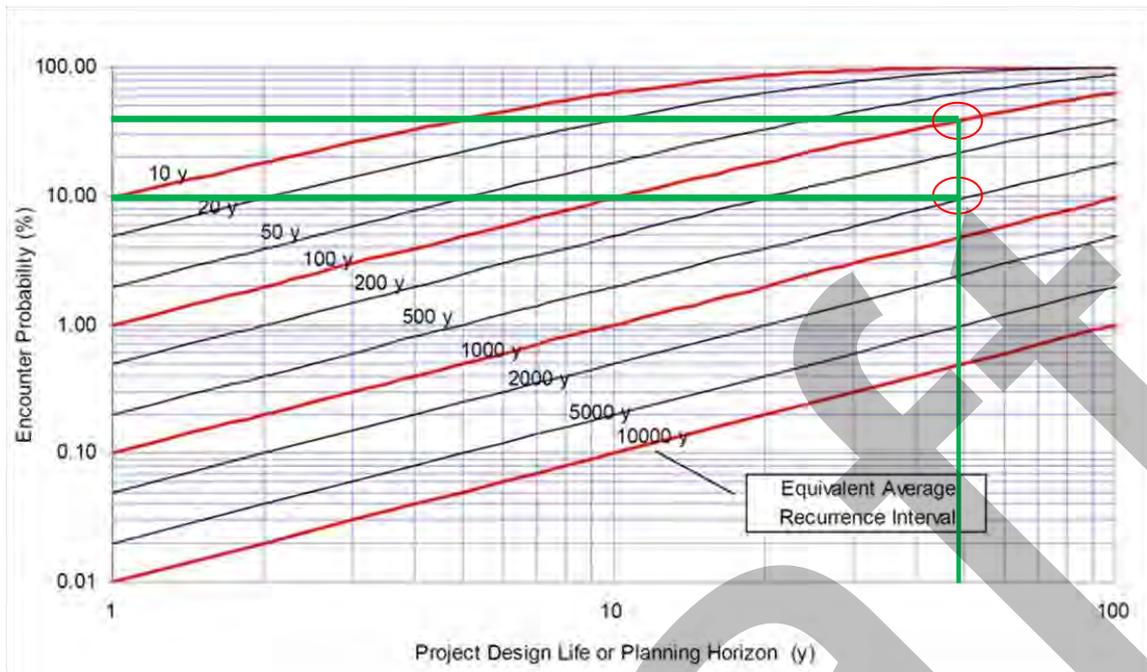


Figure 5-1: Design event encounter probability vs. Project Design life or planning horizon

In consideration of the risk and probability of exceedance of the mapped coastal hazards, streamlining of coastal hazard planning horizons is recommended for all beaches to provide consistency and simplification. The planning horizon should ideally be consistent across all areas, and adopted based on the level of risk determined at each beach, which is a function of the intensity of existing development in each area, the quantum of development at risk within the coastal hazard zones and community acceptance. This should include adoption of a unified coastal hazard line across the LGA (for example, the Bluecoast Consulting Engineers 2024 2120 1% erosion risk line). To achieve this, Council is to undertake CVA mapping based on the chosen erosion risk line and coastal inundation hazard extents, and adopt the mapping in the LEP and RH SEPP.

Recommended changes to the DCP are discussed in detail in the Coastal Hazard Planning Report (Worley Consulting 2025).

6. A Business Plan

6.1 The Benefits of Implementing the CMP

The open coast and beaches of the Central Coast are a major environmental, social and economic asset to the Central Coast community.

The Central Coast's beaches provide visual amenity, recreational opportunities that link closely with community lifestyle choices, indigenous, spiritual and cultural values and heritage, habitat and nursery grounds for many coastal and estuarine plants and animals and sand dunes that have biodiversity values and protect our developments during storms.

The value of the natural environment is a paramount consideration in the sustainable management of the coastline. Sandy beaches are an important ecosystem that links the ecology of sand dunes, the surf zone, intertidal zones, and nearby rocky reefs.

Several natural coastal and marine ecosystems are at risk from human use and coastal hazards now and into the future. They are impacted through landward migration and erosion, recreational activities (i.e. fishing, harvesting), coastal development and construction of protective works, beach cleaning and nourishment. The endangered ecological communities of Umina Sands Coastal Woodland, Coastal Sand Swamp Forest, Coastal Headland Grassland and other forest and wetland vegetation occur in a number of locations within or near the study area. Littoral rainforest occurs at Avoca Beach, along a steep escarpment area on the landward side of Avoca Drive, as mapped in the RH SEPP. Regionally significant vegetation such as coastal sand foreshore scrub, coastal sand banksia scrub, coastal headland shrubland and coastal headland low forest are found at most of the beaches.

The beaches provide substantial economic value to the Central Coast. The economic value of our coastline includes the value of private dwellings, public infrastructure and the income provided through tourism, recreation and fishing. Tourism directly or indirectly employed 11,500 people in 2022/23 (.id 2025). Tourism has added over \$2.5 billion to the local economy in 2022/23 (.id 2025).

There are a range of issues identified in this CMP that currently present a risk to the environmental, social, and economic values of the CMP Study Area. Further, the coastal zone will come under increasing pressure over coming decades from climate change, population growth and associated urban development.

The core objective of this CMP is to address and mitigate threats to the environmental, social, cultural, and economic values of the coast, both in the present and for the future. It encompasses a comprehensive range of initiatives, including physical works, monitoring programs, technical investigations, and educational programs. The CMP will set the long-term strategy for the coordinated management of the coastal zone in the CMP Study Area.

Investment in the CMP provides an opportunity to directly improve and preserve the resilience of the CMP Study Area to coastal hazards, water quality, environmental habitats, cultural

values, and recreational amenity of the coastline – and in doing so, bring significant public benefits.

A range of management actions have been proposed in this CMP to mitigate risks to social, environmental and economic values, for the benefit of the public. For this reason, there are no cost-sharing arrangements in this CMP for funding of actions by private beneficiaries, and there is no provision for implementing a coastal protection service charge. Actions by private beneficiaries are proposed to be funded wholly by those beneficiaries, with only the public benefit portion of those actions proposed for funding under this CMP.

The benefits of implementing the individual management actions have been identified for each management action and are listed in Table 6-1: .

Table 6-1: Benefits of implementing the CMP

Management Action	Benefits
Access & Safety	<ul style="list-style-type: none"> • improved public safety, water quality and amenity • reduced erosion at stormwater outlets and reduced impact on surrounding assets • improved community understanding of coastal hazards and coastal environment • improved dune environment and recreational amenity • improved understanding of local coastal processes, beach usage • improved resilience of coastal infrastructure from long term coastal hazards
Amenities	<ul style="list-style-type: none"> • Improved recreational amenity, flow-on effects from increased tourism revenue due to regularly maintained assets and infrastructure • Improved safety benefits due to assets being maintained in serviceable condition. • Reduced risk of loss of assets from erosion • Improved public amenity and safety • Improved resilience of foreshore development against coastal hazards • Improved safety, water quality, recreational amenity
Coastal Hazard	<ul style="list-style-type: none"> • Improve resilience of coastline against coastal hazards • Improve recreational amenity and safety • Improved resilience of foreshore development against coastal hazards • Improved safety against coastal hazards and resilience of public roads & infrastructure • Improved resilience of foreshore development against coastal hazards

Management Action	Benefits
	<ul style="list-style-type: none"> • Reduced risk of injury and death due to planning and proactive management of risks and clear protocols for emergency response
Community & Social	<ul style="list-style-type: none"> • Improved community and agency communications and participation in coastal management • Improved community understanding of coastal hazards and coastal environment • Improved coastal amenity • Improved First Nations participation in coastal management, protection of cultural heritage values from coastal hazards
Development	<ul style="list-style-type: none"> • Improved understanding of risks to infrastructure from coastal hazards • Reduction in risk to property due to development in areas where coastal hazard impacts are expected to increase in the future. • Improved infrastructure resilience from coastal hazards • Improved accessibility to the coast • Improved resilience of foreshore development against coastal hazards
Ecological Environment	<ul style="list-style-type: none"> • Improved water quality • Improved beach access, safety and amenity, improved dune environment • Improved community and agency communications and participation in coastal management • Improved beach access, safety and amenity, improved dune environment • Improved environmental outcomes through enhancement of environmental values in the coastal zone • Improved environmental outcomes through an improved understanding of environmental and coastal processes

6.2 Potential Funding Mechanisms

A Business Plan has been developed for the CMP which outlines the key components of the funding strategy for the CMP, including the cost of proposed actions, proposed cost-sharing arrangements and other potential funding mechanisms. Delivery of the CMP for the Central Coast Open Coast is estimated to cost \$36.072 million (2025 dollars) over 10 years.

Sustainable funding and financing 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.**

6.2.1 Council Funding

Council funding is allocated based on the Resource Strategy, Long Term Financial Plan, which supports the Delivery Program (3-yearly) and the Operational Plan (yearly) under the IP&R Framework.

Key funding sources for Council are statutory rates and charges (e.g., water, sewer, and waste), which can be applied to private landowners and businesses. Under the LG Act, ordinary rates can be applied to all rateable land within an LGA. Ordinary rates fund a range of Council operations and services, and therefore may also be a key revenue stream to support the implementation of activities recommended in this CMP. According to the Central Coast Council **Operational Plan 2023/24, Council’s annual revenue** from ordinary rates and charges is around \$700 million per year (Central Coast Council, 2023).

6.2.2 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 can take advantage of various state grant programs, as listed in Table 6-2. The value of this funding cannot be accurately quantified until such time as it is awarded through competitive processes. It should be noted that this is not an exhaustive list of all funding opportunities, and that over the ten-year lifecycle of the CMP additional or new funding sources may become available.

Table 6-2: Summary of potential funding sources of the CMP

Funding Source	Description
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 DCCEE. 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. • Four implementation streams – one for each of the Coastal Management Areas. The focus of these streams are projects that manage risks from coastal hazards, and improve the health of estuaries, wetlands and littoral rainforests across NSW. <p>For projects that address a documented action in a certified CMP funding is \$2 from the State Government for every \$1 provided by Council. Certification of</p>

Funding Source	Description
	<p>this CMP will facilitate eligibility for funding of many of the actions proposed in this CMP under the program.</p> <p>This grant funding program is contestable, prioritised to Council applications with certified CMPs and subject to State government funding priorities and allocations.</p>
<p>Marine Estate Management Strategy</p>	<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 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.</p> <p>CMPs are key delivery mechanisms for the MEMS.</p>
<p>NSW Disaster Risk Reduction stream grants</p>	<p>Under two funding pathways, Discovery and Scale, the State Risk Reduction stream aims to reduce or enable the reduction of state-level risks, risks of state significance and systemic risks potentially impacting NSW (NSW Government, 2024).</p> <p>The Discovery Projects pathway offers funding of up to \$500,000, for projects that will test and pilot new approaches to achieve breakthrough disaster risk reduction outcomes. The projects must have potential for state-wide significance or impact.</p> <p>The Scale Projects pathway offers funding of up to \$2.5 million, for projects that aim to generate a new product, technology, platform, or approach that will have state-wide impact at a scale beyond piloting or testing.</p>
<p>Saving our Species program</p>	<p>Administered by DCCEE, the Saving our Species (SoS) sets out the NSW Government's threatened species management plan. The main objectives of SoS are to increase the number of threatened species that are secure in the wild in NSW for 1 year and control the key threats facing the states threatened plants and animals.</p>
<p>NSW Heritage Grants</p>	<p>This program is administered by DCCEE 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

Funding Source	Description
	<ul style="list-style-type: none"> Grants for local government.
NSW Environment Trust Grants	<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> <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 DCCEE. Suitable coastal management grant applications may relate to dune care, for example.</p>
Protecting Our Places Grant	<p>The Protecting Our Places Grant is a NSW Environmental Trust Grant, and is specifically for NSW Aboriginal community organisations or groups and funds protection and rehabilitation for culturally important land and water.</p>
Crown Reserves Improvement Fund Program	<p>Administered by 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.</p>
Disaster Ready Fund (Federal Government)	<p>The Disaster Ready Fund (DRF) is the Australian Government’s flagship disaster resilience and risk reduction initiative which will deliver projects that support Australians to manage the physical, social and economic impacts of disasters caused by climate change and natural hazards (NEMA, 2024). The DRF was established through the <i>Disaster Ready Fund Act 2019</i>. The DRF is intended to be an enduring fund, to provide all levels of government and affected stakeholders the certainty they need to plan for robust investments in resilience projects to reduce the impacts of disasters.</p>
Landcare Grants	<p>Landcare Australia works with governments, corporate and philanthropic organisations, and donors to facilitate funding for good quality, hands on projects and programs that will improve environmental outcomes for the Landcare community (Landcare Australia, 2024).</p>
Coastcare Grants	<p>Coastcare grants support community groups working on projects across Australia. Grants support Landcare and Coastcare groups with projects like dune protection, revegetation of native coastal environments, protection of endangered coastal species habitats, collection and prevention of stormwater pollution, weed and non-native plant removal, and control of human access to sensitive and vulnerable areas (Landcare Australia, 2024).</p>
TfNSW / MI DO Grants	<p>Transport for NSW Maritime administers the Boating Infrastructure and Dredging Scheme (BID Scheme).</p>

Funding Source	Description
	<p>The scheme replaces the previous grants program, providing \$28 million in new funding for the development of new and improved public boating infrastructure and enhanced public access to NSW waterways.</p> <p>The scheme also confirms \$16 million to deliver dredging works along the NSW coast.</p> <p>The BID Scheme consists of five sub-programs:</p> <ul style="list-style-type: none"> • Boating Infrastructure for Communities Grants Program – Replaces the previous Boating Now Program with greater emphasis on enhancing access for aging boaters and those with disabilities. • Boating Infrastructure Maintenance Grants Program – Provides funding for minor repairs and maintenance of public boating infrastructure across NSW. • Boating Infrastructure Emergency Repair Pool Scheme – Supports the repair or replacement of public assets impacted by natural disasters and severe weather events. • Priority Dredging Program – Supports new dredging projects at key sites to ensure safe waterway navigation. • Committed Dredging Projects – Supports committed dredging projects at Swansea, Ettalong, Coffs Harbour and Myall River, plus 10-year planning approvals for 9 high-priority areas
<p>NSW Floodplain Management Grants Program</p>	<p>The Floodplain Management Program provides financial support to local councils and eligible public land managers to help them manage flood risk in their communities. The program supports the implementation of the NSW Government's Flood Prone Land Policy, which is outlined in the Flood Risk Management Manual.</p> <p>Support provided under the programs usually involves \$2 from government for every \$1 provided by the applicant. Grant funding is contestable and subject to State government funding priorities and allocations. Where a management action to mitigate tidal inundation risk also has a benefit with respect to catchment flood mitigation, there may be opportunity to consider this grant program.</p>
<p>Recreational Fishing Trust Grant</p>	<p>All revenue raised by the NSW Recreational Fishing License Fee is placed into the Recreational Fishing Trusts. There are two Trusts – one for freshwater and one for saltwater. Grants are provided from the Trusts to deliver a wide range of programs to boost recreational fishing opportunities in NSW. Projects funded include:</p> <ul style="list-style-type: none"> • Recreational fishing education - fishing workshops and clinics including teaching kids and adults how to fish and fishing for therapy, schools

Funding Source	Description
	<p>education programs, fishing advisory, increasing participation in recreational fishing & other fishing club events to promote fishing</p> <ul style="list-style-type: none"> • Fishing access and facilities - fishing amenities such as platforms, cleaning tables, kayak launching platforms, access upgrades, fishing safety infrastructure, fishing line bins & other angler facilities, enhancement of fishing access • Research on fish and recreational fishing - fishing surveys, biology of popular recreational species, angler catch projects, effectiveness of stocking practices • Enhancement of recreational fishing
<p>Habitat Action Grants / Flagship Habitat Action Grants</p>	<p>The Habitat Action Grants are funded from the Recreational Fishing Trusts which direct revenue generated by the NSW Recreational Fishing Fee towards onground actions to improve fish habitat and recreational fishing in NSW.</p> <p>Angling clubs, individuals, community groups, local councils and organisations interested in rehabilitating fish habitats in freshwater and saltwater areas throughout NSW can apply for grants of up to \$40,000.</p> <p>The “Flagship Fish Habitat Rehabilitation Grant program” (Flagship Grants) builds upon the Habitat Action Grants and offers up to \$400,000 for projects that significantly enhance fish habitat, water quality and fish passage opportunities within the coastal catchments of NSW. Example of on-ground outcomes include:</p> <ul style="list-style-type: none"> • rehabilitation of significant riparian lands / coastal wetlands (river banks, mangrove forests, saltmarsh), including addressing poor water quality from the disturbance of acid sulfate soils • removal or modification of barriers to fish passage including addressing floodgates, road-crossings and construction of fishways • re-snagging of waterways with timber structures • environmentally sensitive bank stabilisation works, including riparian restoration where these works are identified and part of a large scale remediation program.
<p>Conservation Partners Grants</p>	<p>Conservation Partners Grants support landholders working to protect and manage biodiversity on their land.</p> <p>The grants are available on an on-going basis for landholders who are not seeking or are ineligible for conservation management payments under the Biodiversity Conservation Trust’s Conservation Management Program.</p>
<p>National Indigenous Australians</p>	<p>The Australian Government funds and delivers a range of programs specifically for First Nations peoples. Funding is allocated through the Indigenous</p>

Funding Source	Description
Agency (Federal Government)	<p>Advancement Strategy (IAS), National Partnership Agreements, Special Accounts and Special Appropriations.</p> <p>The NIAA administers the IAS and works to improve the way the Australian Government does business with First Nations peoples to ensure funding outcomes improve the lives of First Nations peoples.</p> <p>Grant funding is also available through Indigenous-specific and mainstream programs delivered by other agencies.</p>

Public authorities responsible for supporting Council with the delivery of actions in this CMP have been consulted during its development and have indicated their support. However, delivery of the actions will depend on the availability of funding which is yet to be confirmed. Despite the priority of each action listed in the CMP, the timeframe of implementation will be influenced by the availability of resources and funding.

6.3 Cost-Benefit Distribution

As per the CM Manual (OEH, 2018), an analysis of the distribution of costs and benefits to Council, public authorities, stakeholders and the environment is recommended when preparing a CMP. During Stage 3, a multi-criteria analysis (MCA) was undertaken across a broad range of evaluation criteria to assess the feasibility, viability and acceptability of the options, with the benefits identified for each option.

For clarity, all actions in this CMP to be undertaken by Council and public authorities, will be 100% for public benefit. Public money is not proposed in this CMP to address existing or future coastal risks on private lands. Where works are proposed for protection of private lands, the intent is that each property owner (private and Council) is responsible for the capital and maintenance costs for works protecting their properties. The total cost of management actions that include a benefit to private beneficiaries is provided in the CMP, with the portion to be funded by private beneficiaries outlined in the Business Plan. Potential funding mechanisms for the private portion of these works include service levies on benefiting landowners, or direct funding through private landholders initiating the works for their respective properties through the development application process. Council will not seek to protect public accessways in isolation of adjacent private property protection.

While none of the publicly funded actions provide a direct benefit to private beneficiaries, they may do so indirectly as a result of improved environmental health and natural hazards resilience (e.g., to commercial businesses in the nearby area including tourism operators and hospitality). Council will work with other land managers, where relevant, to drive outcomes for **areas not under Council’s management that are consistent with the principles of the CMP.**

As there are no actions involving public investments greater than \$5 million, and the benefits of the actions are largely intangible, a simple cost-benefit assessment has been carried out

and is documented in the Stage 3 Summary Report (Worley Consulting 2024). The simple assessment identified:

- the approximate cost of each action, based on costing information from Council's cost database and the Project Team's experience with similar works. The derived cost was used to assign the assessment score against each option in the option assessment.
- the information used to derive the costs, and
- a qualitative description of the benefits of each action, with these being intangible and qualitative in nature and thus it was not possible to ascribe a dollar value against the benefit of the actions.

6.4 Implementation Plan

The Business Plan summarised in Table 6-3 provides the following information:

- Action ID and Name.
- Responsibilities – including the lead agency for implementation and any supporting agencies.
- Priority and timeframe for delivery.
- Forward cost estimates – including capital costs, and ongoing implementation and maintenance costs. These costs have been divided into the forthcoming Delivery Program (DP) periods of the Council's IP&R framework. Where an action would only require Council staff time, assets, and services, these are noted in the table. It should be noted that capital costs in Table 6-3 refer to the costs associated with the initial design, development, construction, and renewal of physical assets or facilities, with maintenance costs identified over the 10-year life cycle of the CMP. For many of the management actions, maintenance costs would continue beyond the lifecycle of the CMP.
- Potential funding sources (given a numeric identifier in accordance with the key below):

Funding Source ID	Funding Source
1	Council
2	NSW Coastal and Estuary Grants Program
3	Marine Estate Management Strategy
4	NSW Disaster Risk Reduction stream grants
5	Saving our Species program
6	NSW Heritage Grants
7	NSW Environment Trust Grants
8	Protecting Our Places Grant
9	Crown Reserves Improvement Fund Program
10	Disaster Ready Fund (Federal Government)
11	Landcare Grants
12	Coastcare Grants
13	TfNSW (MIDO) Grants
14	NSW Floodplain Management Grants Program
15	Recreational Fishing Trust Grant
16	Habitat Action Grants / Flagship Habitat Action Grants
17	Conservation Partners Grants
18	National Indigenous Australians Agency (Federal Government)
19	Land Manager (private)
20	Other State or Federal Government sources

Despite the nominated priority and expected timeframe of each action, the implementation of actions will be largely controlled by the availability of resources and the prioritisation across all of Council's functions via the Operational and Delivery Plans.

Table 6-3: Business Plan for actions for Open Coast CMP

ID	Category	Location	Action Name	Capital Cost (public portion) (A)	Operational & Maintenance Cost (B)	Years 1 – 2 (C)	Years 3 – 6 (D)	Years 7 - 10 (E)	Total Cost (public portion) (=A+B) (=C + D + E)	Total Cost (private portion)	Total cost (overall, implementation and maintenance)	Timeframe	Lead Agency	Support Agencies	Funding Source
CW-S01	Access & Safety	LGA-wide	Monitoring and improvement of coastal stormwater outlets	\$100,000	\$1,000,000	\$300,000	\$400,000	\$400,000	\$1,100,000	\$0	\$1,100,000	Short	Council		1, 9
CW-S02	Access & Safety	LGA-wide	Develop and implement an integrated coastal processes and hazards education and awareness program	\$100,000	\$0	\$100,000	\$0	\$0	\$100,000	\$0	\$100,000	Short	Council		1, 2, 14
CW-S03	Access & Safety	LGA-wide	Develop and implement coastal compliance procedures	\$365,000	\$0	\$73,000	\$146,000	\$146,000	\$365,000	\$0	\$365,000	Short	Council	DPHI -Crown Lands, Fisheries, Environmental Protection Authority, NSW Police, National Parks, Local Aboriginal Land Services	1, 9
CW-S04	Access & Safety	LGA-wide	Review and implement updated Beach Maintenance Program	\$1,550,000	\$0	\$350,000	\$600,000	\$600,000	\$1,550,000	\$0	\$1,550,000	Short	Council		1, 9, 12
CW-S05	Access & Safety	LGA-wide	Develop and implement a Coastal Monitoring Program	\$140,000	\$100,000	\$160,000	\$40,000	\$40,000	\$240,000	\$0	\$240,000	Short	Council	DCCEEW	1, 2
CW-S06	Access & Safety	LGA-wide	Investigate and develop a Coastal Hazard Adaptation Strategy for affected coastal communities	\$100,000	\$0	\$0	\$0	\$100,000	\$100,000	\$0	\$100,000	Long	Council	DCCEEW	1, 2, 4, 10
CW-S07	Access & Safety	LGA-wide	Investigate offshore sand nourishment sources and secure mining licence	\$3,000,000	\$0	\$1,000,000	\$1,000,000	\$1,000,000	\$3,000,000	\$0	\$3,000,000	Short	Council	Northern Beaches Council, NSW RA and NSW DCCEEW	1, 2, 4, 10
CW-S08	Access & Safety	LGA-wide	Prioritise and upgrade beach life guard patrol towers and ancillary structures	\$250,000	\$0	\$50,000	\$100,000	\$100,000	\$250,000	\$0	\$250,000	Medium	Council		1
SB02	Access & Safety	Soldiers Beach / Pebbly Beach	Investigate options to improve public safety at Soldiers Point headland	\$80,000	\$0	\$0	\$80,000	\$0	\$80,000	\$0	\$80,000	Medium	Council	DPHI -Crown Lands	1, 7
CW-A01	Amenities	LGA-wide	Coastal recreation assets and infrastructure renewal program	\$1,500,000	\$0	\$300,000	\$600,000	\$600,000	\$1,500,000	\$0	\$1,500,000	Short	Council		1, 9, 20

ID	Category	Location	Action Name	Capital Cost (public portion) (A)	Operational & Maintenance Cost (B)	Years 1 - 2 (C)	Years 3 - 6 (D)	Years 7 - 10 (E)	Total Cost (public portion) (=A+B) (=C + D + E)	Total Cost (private portion)	Total cost (overall, implementation and maintenance)	Timeframe	Lead Agency	Support Agencies	Funding Source
CW-A02	Amenities	LGA-wide	Develop and implement Coastal Engineering Design Requirements	\$90,000	\$0	\$90,000	\$0	\$0	\$90,000	\$0	\$90,000	Short	Council		1
CW-A03	Amenities	LGA-wide	Review waste collection assets and servicing in coastal public spaces	\$0	\$50,000	\$10,000	\$20,000	\$20,000	\$50,000	\$0	\$50,000	Medium	Council		1
CW-H01	Coastal Hazard	LGA-wide	Review and update coastal development planning controls and undertake Planning Proposal to adopt Coastal Vulnerability Area	\$50,000	\$0	\$50,000	\$0	\$0	\$50,000	\$0	\$50,000	Medium	Council	DCCEEW	1, 2
CW-H02	Coastal Hazard	LGA-wide	Identify the extent, nature and condition of existing coastal emergency works	\$1,650,000	\$0	\$150,000	\$600,000	\$900,000	\$1,650,000	\$0	\$1,650,000	Medium	Council		1, 2, 4, 10
CT01	Coastal Hazard	Cabbage Tree	Design and construct Stage 2 of the Cabbage Tree Harbour coastal protection works	\$2,000,000	\$0	\$0	\$2,000,000	\$0	\$2,000,000	\$0	\$2,000,000	Medium	Council	DCCEEW	1, 2
CT02	Coastal Hazard	Cabbage Tree	Improve public safety at Mazlin Reserve	\$100,000	\$0	\$0	\$100,000	\$0	\$100,000	\$0	\$100,000	Medium	Council	DPHI -Crown Lands	1, 2
MM01	Coastal Hazard	MacMasters	Complete coastal risk and options assessment for Marine Parade at MacMasters Beach	\$4,150,000	\$0	\$150,000	\$0	\$4,000,000	\$4,150,000	\$0	\$4,150,000	Long	Council	DCCEEW, DPHI -Crown Lands	1, 2, 9
MM02	Coastal Hazard	MacMasters	Construction of MacMasters Beach temporary coastal protection works	\$750,000	\$75,000	\$0	\$750,000	\$75,000	\$825,000	\$0	\$825,000	Medium	Council	DPHI -Crown Lands	1, 2
EN01	Coastal Hazard	Shelly Beach (north)	Monitor and manage risk of contamination from closed landfill sites	\$2,200,000	\$100,000	\$0	\$1,150,000	\$1,150,000	\$2,300,000	\$0	\$2,300,000	Medium	Council		1, 9
EN02-A	Coastal Hazard	The Entrance North	Develop engineering design requirements for coastal protection works at The Entrance North.	\$100,000	\$0	\$100,000	\$0	\$0	\$100,000	\$0	\$100,000	Short	Council		1
EN02-B	Coastal Hazard	The Entrance North	Complete detailed design and approvals for coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	\$75,000	\$0	\$75,000	\$0	\$0	\$75,000	\$675,000	\$750,000	Short	Private Property Owners then Council	DPHI -Crown Lands	1, 2, 19

ID	Category	Location	Action Name	Capital Cost (public portion) (A)	Operational & Maintenance Cost (B)	Years 1 - 2 (C)	Years 3 - 6 (D)	Years 7 - 10 (E)	Total Cost (public portion) (=A+B) (=C + D + E)	Total Cost (private portion)	Total cost (overall, implementation and maintenance)	Timeframe	Lead Agency	Support Agencies	Funding Source
EN02-C	Coastal Hazard	The Entrance North	Construct coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	\$680,000	\$68,000	\$0	\$680,000	\$68,000	\$748,000	\$12,122,000	\$12,870,000	Short	Private Property Owners then Council	DPHI -Crown Lands	1, 2, 19
EN02-D	Coastal Hazard	The Entrance North	Complete design and approvals for coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.	\$75,000	\$0	\$75,000	\$0	\$0	\$75,000	\$525,000	\$600,000	Short	Private Property Owners then Council	DPHI -Crown Lands	1, 2, 19
EN02-E	Coastal Hazard	The Entrance North	Construct coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.	\$1,640,000	\$164,000	\$0	\$1,640,000	\$164,000	\$1,804,000	\$11,209,000	\$13,013,000	Short	Private Property Owners then Council	DPHI -Crown Lands	1, 2, 19
EN02-F	Coastal Hazard	The Entrance North	Implement sand nourishment at The Entrance North using sand sourced strategically (in accordance with the Entrance Management Strategy and procedures being developed as part of the Tuggerah Lakes Coastal Management Program - Including Entrance Channel Dredging Activities)	\$0	\$1,000,000	\$200,000	\$400,000	\$400,000	\$1,000,000	\$0	\$1,000,000	Short, ongoing	Council	DCCEEW, TfNSW, Fisheries, DPHI -Crown Lands	1, 2, 3, 4, 13
EN03	Coastal Hazard	The Entrance North Lakes Beach	Prepare a pilot adaptation and options assessment for the Entrance North and The Lakes SLSCs.	\$80,000	\$0	\$0	\$80,000	\$0	\$80,000	\$0	\$80,000	Medium	DPHI -Crown Lands	Council, SLSC	1, 2
EB01	Coastal Hazard	The Entrance	Review the structural integrity and extent of the foreshore revetment and embankment protecting Marine Parade, The Entrance, and undertake remedial and/or extension works as required	\$4,400,000	\$100,000	\$500,000	\$4,000,000	\$0	\$4,500,000	\$0	\$4,500,000	Short	Council	TfNSW, DPHI -Crown Lands	1, 9, 13
WB01	Coastal Hazard	Wamberal Beach	Review and update the Wamberal Beach engineering design requirements so that they may be referred to in future revisions of	\$150,000	\$0	\$150,000	\$0	\$0	\$150,000	\$0	\$150,000	Short	Council	DCCEEW	1, 2

ID	Category	Location	Action Name	Capital Cost (public portion) (A)	Operational & Maintenance Cost (B)	Years 1 - 2 (C)	Years 3 - 6 (D)	Years 7 - 10 (E)	Total Cost (public portion) (=A+B) (=C + D + E)	Total Cost (private portion)	Total cost (overall, implementation and maintenance)	Timeframe	Lead Agency	Support Agencies	Funding Source
			Council's Coastal Development Control Plan (DCP)												
WB02-A	Coastal Hazard	Wamberal Beach	Complete design and approvals for coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal.	\$110,000	\$0	\$55,000	\$55,000	\$0	\$110,000	\$890,000	\$1,000,000	Short	Private Property Owners then Council		1, 19
WB02-B	Coastal Hazard	Wamberal Beach	Construct coastal protection works fronting 1 Pacific St to 17 Calais Rd, Wamberal Beach.	\$1,600,000	\$160,000	\$0	\$1,600,000	\$160,000	\$1,760,000	\$35,420,000	\$37,180,000	Short	Private Property Owners then Council		1, 19
WB02-C	Coastal Hazard	Wamberal Beach	Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon, sand berm area and other sources as available	\$0	\$1,000,000	\$200,000	\$400,000	\$400,000	\$1,000,000	\$0	\$1,000,000	Short	Council		1
WB02-D	Coastal Hazard	Wamberal Beach	Purchase residual private land fronting Pacific St Wamberal.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Short	NSW DPHI Crown Lands and Council		1
WB02-E	Coastal Hazard	Wamberal Beach	Complete the transfer of NSW Government owned lots at Ocean View Drive Wamberal into Council ownership.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Short	NSW DPHI and Council		1
WB02-F	Coastal Hazard	Wamberal Beach	Enter into licence agreement for private coastal protection works located partly on Council owned land at Wamberal Beach.	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Short	Council / Private land owners		1, 19
A01	Coastal Hazard	Avoca	Undertake a detailed wave overtopping and inundation assessment for high risk locations	\$50,000	\$100,000	\$70,000	\$40,000	\$40,000	\$150,000	\$0	\$150,000	Short	Council	DCCEEW	1, 2
EB02	Coastal Hazard	The Entrance	Investigation and management of adverse groyne impacts	\$40,000	\$0	\$0	\$40,000	\$0	\$40,000	\$0	\$40,000	Medium	TfNSW (MI DO)		1, 13
T02	Coastal Hazard	Terrigal (The Haven)	Options study for replacement of aging seawall at The Haven	\$150,000	\$0	\$0	\$150,000	\$0	\$150,000	\$0	\$150,000	Medium	Council	DPHI -Crown Lands	1, 9



ID	Category	Location	Action Name	Capital Cost (public portion) (A)	Operational & Maintenance Cost (B)	Years 1 – 2 (C)	Years 3 – 6 (D)	Years 7 - 10 (E)	Total Cost (public portion) (=A+B) (=C + D + E)	Total Cost (private portion)	Total cost (overall, implementation and maintenance)	Timeframe	Lead Agency	Support Agencies	Funding Source
CW-C01	Community & Social	LGA-wide	Continue the role of a coastal, estuary and floodplain management Advisory Committee	\$0	\$10,000	\$2,000	\$4,000	\$4,000	\$10,000	\$0	\$10,000	Short	Council		1
CW-C02	Community & Social	LGA-wide	Work with First Nation groups and stakeholders to evaluate arrangements for undertaking beach maintenance operations	\$20,000	\$300,000	\$80,000	\$120,000	\$120,000	\$320,000	\$0	\$320,000	Medium	Council	LALC	1, 6, 8, 18
CW-C03	Community & Social	LGA-wide	Management of unapproved memorials in public coastal spaces	\$20,000	\$0	\$0	\$20,000	\$0	\$20,000	\$0	\$20,000	Medium	Council		1
CW-C04	Community & Social	LGA-wide	Update and maintain Council's website to improve awareness and make information on coastal processes, hazards and issues more accessible	\$100,000	\$50,000	\$110,000	\$20,000	\$20,000	\$150,000	\$0	\$150,000	Short	Council		1
CW-C05	Community & Social	LGA-wide	Knowledge sharing and protection of cultural heritage	\$50,000	\$0	\$0	\$50,000	\$0	\$50,000	\$0	\$50,000	Medium	Council	LALC	1, 6, 8, 18
CW-D01	Development	LGA-wide	Develop and maintain a coastal geotechnical database	\$100,000	\$0	\$0	\$100,000	\$0	\$100,000	\$0	\$100,000	Medium	Council	DCCEEW, DPHI -Crown Lands (as necessary)	1, 2
CW-D02	Development	LGA-wide	Conduct geotechnical investigations to improve understanding of underlying geology along the coast	\$600,000	\$0	\$120,000	\$240,000	\$240,000	\$600,000	\$0	\$600,000	Medium	Council	DCCEEW, DPHI -Crown Lands (as necessary)	1, 2
CW-D03	Development	LGA-wide	Develop a coastal assets at risk register and update asset management program	\$300,000	\$0	\$140,000	\$80,000	\$80,000	\$300,000	\$0	\$300,000	Short	Council	DPHI -Crown Lands	1, 2, 9
CW-D04	Development	LGA-wide	Improve accessibility of coastal and foreshore areas	\$2,250,000	\$0	\$450,000	\$900,000	\$900,000	\$2,250,000	\$0	\$2,250,000	Medium	Council	DPHI -Crown Lands	1, 2, 9
CW-D05	Development	LGA-wide	Review coastal hazard notations and planning certificates	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Medium	Council	DCCEEW	1, 2
CW-E01	Ecological Environment	LGA-wide	Review and implement Council's coastal water quality	\$0	\$200,000	\$40,000	\$80,000	\$80,000	\$200,000	\$0	\$200,000	Short	Council		1

ID	Category	Location	Action Name	Capital Cost (public portion) (A)	Operational & Maintenance Cost (B)	Years 1 - 2 (C)	Years 3 - 6 (D)	Years 7 - 10 (E)	Total Cost (public portion) (=A+B) (=C + D + E)	Total Cost (private portion)	Total cost (overall, implementation and maintenance)	Timeframe	Lead Agency	Support Agencies	Funding Source
			monitoring program												
CW-E02	Ecological Environment	LGA-wide	Develop and implement a Coastal Vegetation and Dune Management Strategy	\$70,000	\$200,000	\$110,000	\$80,000	\$80,000	\$270,000	\$0	\$270,000	Short	Council		1, 5, 6, 7, 8
T01	Ecological Environment	LGA-wide	Undertake and support research projects and citizen science initiatives aimed at enhancing and conserving marine biodiversity, science, recreation and education	\$100,000	\$0	\$20,000	\$40,000	\$40,000	\$100,000	\$0	\$100,000	Long	Council	Council, DPHI - Crown Lands, DPIRD Fisheries, DCCEEW	1, 2, 5, 7, 9, 11, 12, 16, 21
SB01	Ecological Environment	Soldiers Beach	Undertake dune management works at the southern carpark of Soldiers Beach	\$40,000	\$40,000	\$8,000	\$56,000	\$16,000	\$80,000	\$0	\$80,000	Medium	Council		1
NOR01	Ecological Environment	Norah Head	Undertake a Planning Proposal to update RH SEPP Coastal Wetlands and Littoral Rainforest Mapping	\$50,000	\$0	\$50,000	\$0	\$0	\$50,000	\$0	\$50,000	Medium	Council		1
NOR02	Coastal Hazard	Norah Head	Investigate Options to address geotechnical stability of the Norah Head Search & Rescue Boat Club	\$200,000	\$0	\$100,000	\$100,000	\$0	\$200,000	\$0	\$200,000	Short-Medium	DPHI - Crown Lands		1, 2
NOR03	Coastal Hazard	Norah Head	Undertake geotechnical assessment of Norah Head lighthouse and headland	\$80,000	\$0	\$40,000	\$40,000	\$0	\$80,000	\$0	\$80,000	Short-Medium	NSW Crown Holiday Parks (Reflections)	DPHI - Crown Lands	1, 2, 19
TOOW01	Community & Social	Toowoona Bay	Toowoona Bay carpark and foreshore management	\$50,000	\$0	\$50,000	\$0	\$0	\$50,000	\$0	\$50,000	Short	Council	Toowoona Bay SLSC	1
				\$31,355,000	\$4,717,000	\$5,528,000	\$18,601,000	\$11,943,000	\$36,072,000	\$60,841,000	\$96,913,000				

7. 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 for the Central Coast Open Coast CMP Study Area based on the requirements of the CM Act as outlined in the CM Manual (NSW OEH 2018), for those areas subject to immediate hazards from coastal inundation.

The CMP study area is subject to a high level of risk from coastal hazards (coastal erosion, coastal inundation and cliff/slope instability). Some of these areas are also subject to catchment derived flooding, for which a framework is available for emergency response through the central Coast Council Flood Emergency Subplan (CCC/NSW SES, 2021). Actions from the Flood Plan are relevant for coastal hazards also, but the CZEAS provides actions specific to Council for implementation prior to, during and following a coastal emergency.

Under Section 7 of the CM Act, one of the management objectives for the coastal vulnerability area is *"to prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency"*.

Due to the large area of land affected by coastal inundation, it is not possible or practical to provide emergency protection works that would provide protection against coastal inundation. The NSW SES prepares the NSW State Storm Plan, NSW Flood Plan and State Tsunami Plan, which are subplans to the NSW State EMPLAN 2023. NSW SES is the agency responsible for the coordination of operations to protect property, with protection measures described in the Central Coast Council Flood Emergency Subplan.

The legislative framework for emergency management in NSW and its relationship with coastal management legislation and the CMP is articulated in the Guideline for Preparing a Coastal Zone Emergency Action Subplan (Department of Planning, Industry & Environment 2019).

The CZEAS is included in Appendix C.

The objectives of the CZEAS are to:

- outline measures to reduce the risk to public safety, the coastal environment and public assets arising from the coastal hazards of coastal erosion, inundation and cliff/slope instability brought about by storm activity
- identify key actions to be carried out by Council before, during and following a coastal emergency to reduce the risk to public safety, the coastal environment and public assets
- identify the responsibilities of other public authorities during a coastal emergency
- identify key areas and assets subject to immediate hazards and prioritise actions to reduce the risks to those areas and assets.

8. Monitoring, Evaluation and Reporting Program

8.1 Overview of the Monitoring and Evaluation Process

Monitoring, evaluation, and reporting (MER) is an essential component of any CMP and is a mandatory requirement for CMPs under the CM Act. The purpose of the MER component is to monitor progress towards implementing the coastal management actions outlined in the CMP, and to assess the performance of the CMP in achieving its intended outcomes, and the objects of the CM Act.

“Monitoring” is the planned, systematic and continuous collection and analysis of data and other information, to track the progress of the CMP. Data and other information gathered by monitoring contribute to evaluation: the evaluation process integrates it with other data and information collected periodically. “Evaluation” is defined as “a planned and periodic assessment of the quality and value of a program, where a judgement is made about the achievement of or progress towards the program’s objectives and outcomes” (Markiewicz and Patrick 2016).

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 CM Manual (OEH, 2018), 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 proposed MER program has followed the structure of a **“Program Logic Model”**, that sets out the program’s vision, objectives, activities, outputs and short-term, intermediate and longer-term outcomes. The program logic model supports a systematic and integrated approach to CMP planning, implementation, and evaluation. There is a logical flow to this process, which is summarised in Figure 8-1: below. It comprises:

- Component 1: The implementation status of the CMP actions. The MER should constantly monitor and evaluate the implementation of the management actions – see Section 8.2.
 - **It aims to answer the question: “Were the management actions implemented as planned in the implementation schedule, in terms of content, timing, location, format, quality?”**
- Component 2: Measurement of outcomes through monitoring of environmental indicators. As per Section 1.4, 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 indicators – see Section 8.3.
 - **It aims to answer the question: “Has the implementation of individual management actions, and the CMP more generally, resulted in an improvement in the health of the coastal environment and the social / cultural values of the study area?”.**

- Component 3: 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 – see Section 8.4.
 - It aims to answer the questions – based on the outcomes of Components 1 and 2:
 - “Has the CMP achieved its intended objectives?”
 - “How has the CMP made a difference?” and
 - “Has the level of risk associated with the various stressors and hazards facing the coastline been reduced?”.

The 3 components of the MER are described in more detail in Section 8.2 to 8.4. Specific detail on how Council will monitor and review outcomes regularly to highlight successes and identify issues provided in Table 8-1.

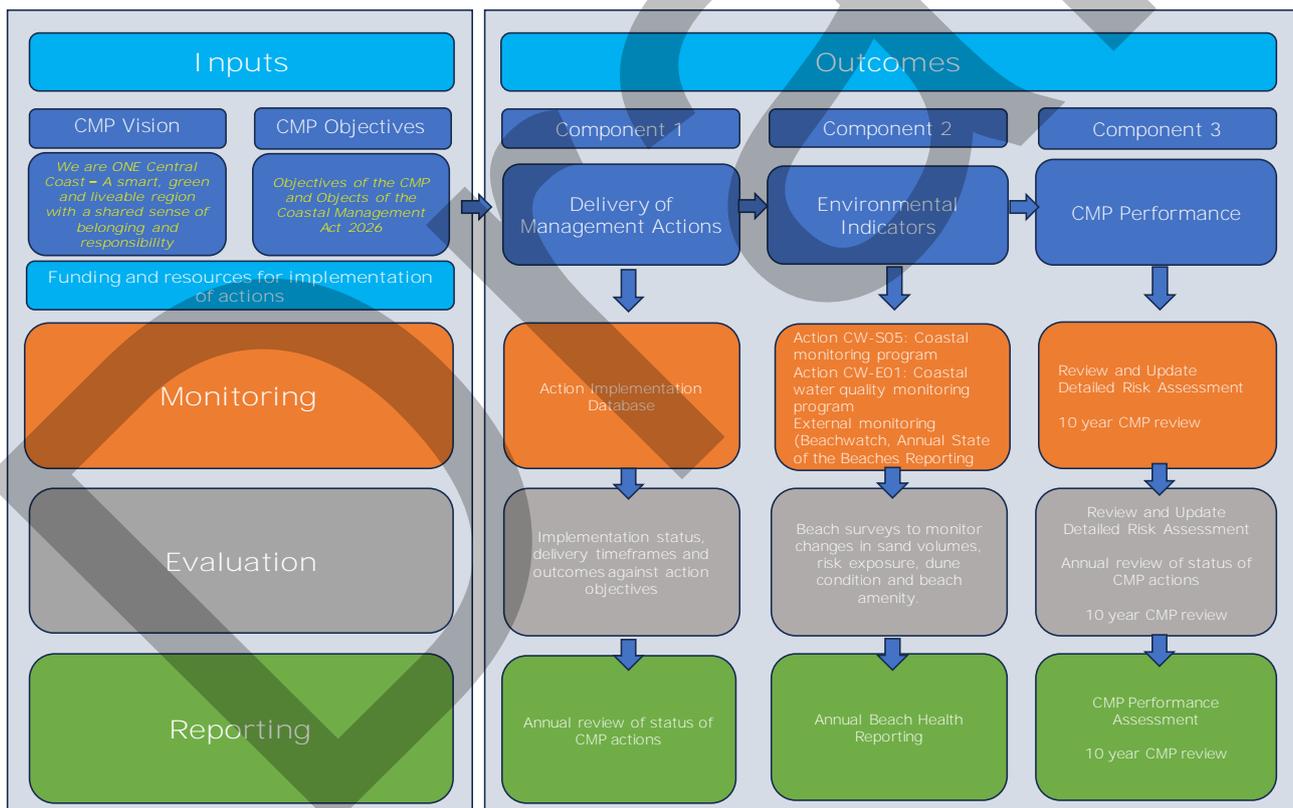


Figure 8-1: Overview of MER program for the CMP

Table 8-1: Evidence required to assess ongoing performance of CMP

MER Component	Timeframe	Performance Indicators	Documentation Required
<p>Component 1 – Delivery of Management Actions</p> <p>Action Implementation Database (AID) to monitor the status of the various CMP actions and support the CMP requirements. The fields include information relating the practical implementation of the works, and the overall status of the action. For each action, a monitoring designation should be provided regarding the current status of that action using one of 5 categories:</p> <ul style="list-style-type: none"> Completed: Where discrete (one-off) action 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 	Annual reporting	Action Implementation Database developed and included in Council's annual Report to document its progress in implementing its 4 Year Delivery Program and Annual Operational Plan activities.	<p>Dates of commencement and practical completion monitored and recorded in the AID, with status provided against each action ID as per monitoring categories specified.</p> <p>Evidence to show progress on the actions including:</p> <ul style="list-style-type: none"> Grant documents, as-built designs/drawings, reports Achievement of or progress against performance measures as documented in Table 4-8, documented in the Annual Report Where actions have not been achieved against the nominated timeframe, evidence to be provided to justify the failure to achieve the nominated timeframe e.g. unsuccessful grant applications or planning approvals, changes in budget etc. Recommended corrective or remedial actions to address identified performance issues Management actions proposed to be implemented in the next reporting period

MER Component	Timeframe	Performance Indicators	Documentation Required
<p>circumstances or superseding actions from other management plans.</p>			
<p>Component 2 – Environmental Indicators</p> <p>There are a number of Actions in the CMP which will provide data that can inform the MER. The primary CMP Action associated with collecting environmental parameters for MER purposes is:</p> <ul style="list-style-type: none"> Action CW-S05: Develop and implement a coastal monitoring program <p>Additional Actions include:</p> <ul style="list-style-type: none"> Action CW-E01: Review and implement Council's coastal water quality monitoring program Action CW-S01: Monitoring and improvement of coastal stormwater outlets Action CW-S02: Develop and implement an integrated coastal processes and hazards education and awareness program Action EN01: Monitor and manage risk of contamination from closed landfill sites <p>There are also a number of monitoring programs external to the CMP process that can provide physical datasets to support the MER, including:</p> <ul style="list-style-type: none"> The NSW Beachwatch Programs. Annual State of the Beaches Reporting (DPI E 2024). 	<p>Annual Beach Health Report</p>	<p>Monitoring of coastal parameters through action CW-S05 (which include shoreline position, beach volume, dune vegetation condition, and water quality)</p> <p>Improvement in environmental health data where this can be directly or indirectly attributed to the management actions in the CMP</p>	<p>Summary of environmental monitoring data provided through Action CW-S05 and the additional monitoring actions, documented in Annual Beach Health Reports, including whether any triggers or thresholds have been exceeded.</p> <p>Recommendations for changes to monitoring techniques or management actions where triggers or thresholds have been exceeded.</p>

MER Component	Timeframe	Performance Indicators	Documentation Required
<p>Component 3</p> <p>The CMP should be viewed as a 'living document' that is reviewed and updated over time. The review of the CMP should be undertaken through a formal process to assess the overall performance of the CMP in meetings its objectives. The review should consider, as a minimum:</p> <ul style="list-style-type: none"> • The extent to which the CMP has achieved its objectives. • The extent to which the CMP has achieved the objectives of the CM Act. • The performance of the CMP as an instrument for improving coastal management. 	<p>Every 10 years on CMP updates, or sooner if annual reporting indicates that there are significant new circumstances which need to be considered.</p>	<p>Undertake repeat of the detailed Risk Assessment (Worley Consulting, 2024a). 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.</p> <p>Performance indicator will be if the updated risk assessment shows that the level of risk has been mitigated in accordance with the expected outcomes documented in the CMP.</p>	<p>The review should be documented within a formal CMP update at the end of the 10-year life of the CMP and include a granular assessment of:</p> <ul style="list-style-type: none"> • 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 the effective implementation. • Where applicable, the identification of possible avenues for increasing the effectiveness of the CMP. • Consideration of any new or updated scientific knowledge, including data collected and compiled from the monitoring programs in the CMP. • The progress of any actions and commitments which continue beyond the original 10-year timeframe.

8.2 Component 1 – Delivery of Management Actions

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

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

- **Completed:** Where discrete (one-off) action 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 also be monitored and recorded, in addition to other supporting documentation.

Each action in this CMP has been assigned a corresponding performance indicator(s). Each CMP action should be evaluated for its performance in achieving its objectives, using the established indicator(s). These should be recorded in the AID.

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

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

8.3 Component 2 – Environmental Indicators

A key component of the MER process will be to use physical datasets that can provide an indication of key physical and environmental parameters and track the progress of the CMP towards key achieving intended outcomes.

The monitoring of environmental indicators provides information on the state of the coastal environment, but cannot necessarily be used to gauge the success of individual management actions. This is because the coastline is subject to short-term variability (due to erosion/recovery processes acting over timeframes of weeks to months), medium-term variability (e.g. due to changes in wave climate and storminess caused by the El Niño Southern Oscillation, acting at inter-decadal scales), and long-term changes (e.g. due to climate change). Longer-term monitoring of environmental indicators is therefore necessary to assess overall trends in environmental health and to monitor the overall success of measures in the CMP. Assessing outcomes over the short to medium term will require consideration of the physical processes context, and expert technical judgement.

A pragmatic approach to monitoring and evaluation is proposed for the CMP. There are a number of Actions in the CMP which will provide data that can inform the MER. The primary CMP Action associated with collecting environmental parameters for MER purposes is:

- Action CW-S05: Develop and implement a coastal monitoring program

Additional Actions include:

- Action CW-E01: Review and implement Council's coastal water quality monitoring program
- Action CW-S01: Monitoring and improvement of coastal stormwater outlets
- Action CW-S02: Develop and implement an integrated coastal processes and hazards education and awareness program
- Action EN01: Monitor and manage risk of contamination from closed landfill sites

There are also a number of monitoring programs external to the CMP process that can provide physical datasets to support the MER, including:

- The NSW Beachwatch Programs.
- Annual State of the Beaches Reporting (DPIE 2024).

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

The 'environmental indicators' proposed to be monitored through action CW-S05 (which include shoreline position, beach volume, dune vegetation condition, and water quality) may be applied to inform and 'trigger' certain management actions such as beach scraping or post storm re-profiling etc. This information may also be applied to facilitate an adaptive approach to defining when coastal protection works are constructed at specific locations.

8.4 Component 3 – Achievement of Objectives of the CMP and CM Act

The CMP should be viewed as a 'living document' that is reviewed and updated over time. While a review of the performance of the actions within the CMP occur on an annual basis (as

per Council's IP&R framework), a key component of the MER process is to undertake a strategic review of the CMP at designated timeframes to assess its overall performance.

The CM Act (Section 18(1)) and CM Manual requires Council to ensure that the CMP is reviewed at least once every 10 years. However, it 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 formal process to assess the overall performance of the CMP in meetings its objectives. The review should consider, as a minimum:

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

8.4.1 Review of Key Issues

The primary mechanism for gauging whether the CMP has been successful should be the re-evaluation of the threats and risks across the study area through a repeat of the Risk Assessment (Worley Consulting, 2024a). 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 3 specific questions to be answered:

- Has the level of risk changed?
- Have the **risks rated as "high" or "extreme"** been adequately managed?
- Are there any new or emerging risks that need to be captured?

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

8.4.2 Assess CMP Performance

This will 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 the effective implementation.**
- Where applicable, the identification of possible avenues for increasing the effectiveness of the CMP.
- Consideration of any new or updated scientific knowledge, including data collected and compiled from the monitoring programs in the CMP.

- The progress of any actions and commitments which continue beyond the original 10-year timeframe.

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

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9. Maps

High level mapping provided in this CMP includes:

- An overview of the CMP Study Area (Figure 1-3).
- Coastal sediment compartment mapping across the CMP Study Area (Figure 1-6:).

A detailed companion mapping set has also been provided in Appendix A. This mapping set includes a suite of local level maps with the following information:

- Locality plan and land tenure – which includes details regarding key coastal features and major townships. It also includes land tenure arrangements such as Council Reserves, Crown Land Reserves and NPWS Estate.
- RH SEPP Coastal Management Areas – including the state government mapping of CUA, CEA, and CWLR areas.
- Mapping of coastal inundation, beach erosion, shoreline recession and coastal cliff and slope instability risk in the present day and with sea level rise across the CMP Study Area.
- Maps of individual management actions for each locality.

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Appendix A. Mapping CMP Maps

Appendix A1: Coastal Management Areas

Maps A1 to A6 – Coastal Management Areas and Land Tenure Maps

Appendix A2: Coastal Hazard Mapping (Bluecoast Consulting Engineers, 2024-2025)

Map A7 Lakes Beach

Map A8 Hargraves Beach

Map A9 Soldiers Beach & Norah Head

Map A10 The Entrance North (Magenta Shores)

Map A11 The Entrance North

Map A12 Toowoan Bay & Blue Bay

Map A13 Shelly Beach

Map A14 Bateau Bay

Map A15 Forresters Beach

Map A16 Terrigal & Wamberal Beach

Map A17 Avoca & North Avoca

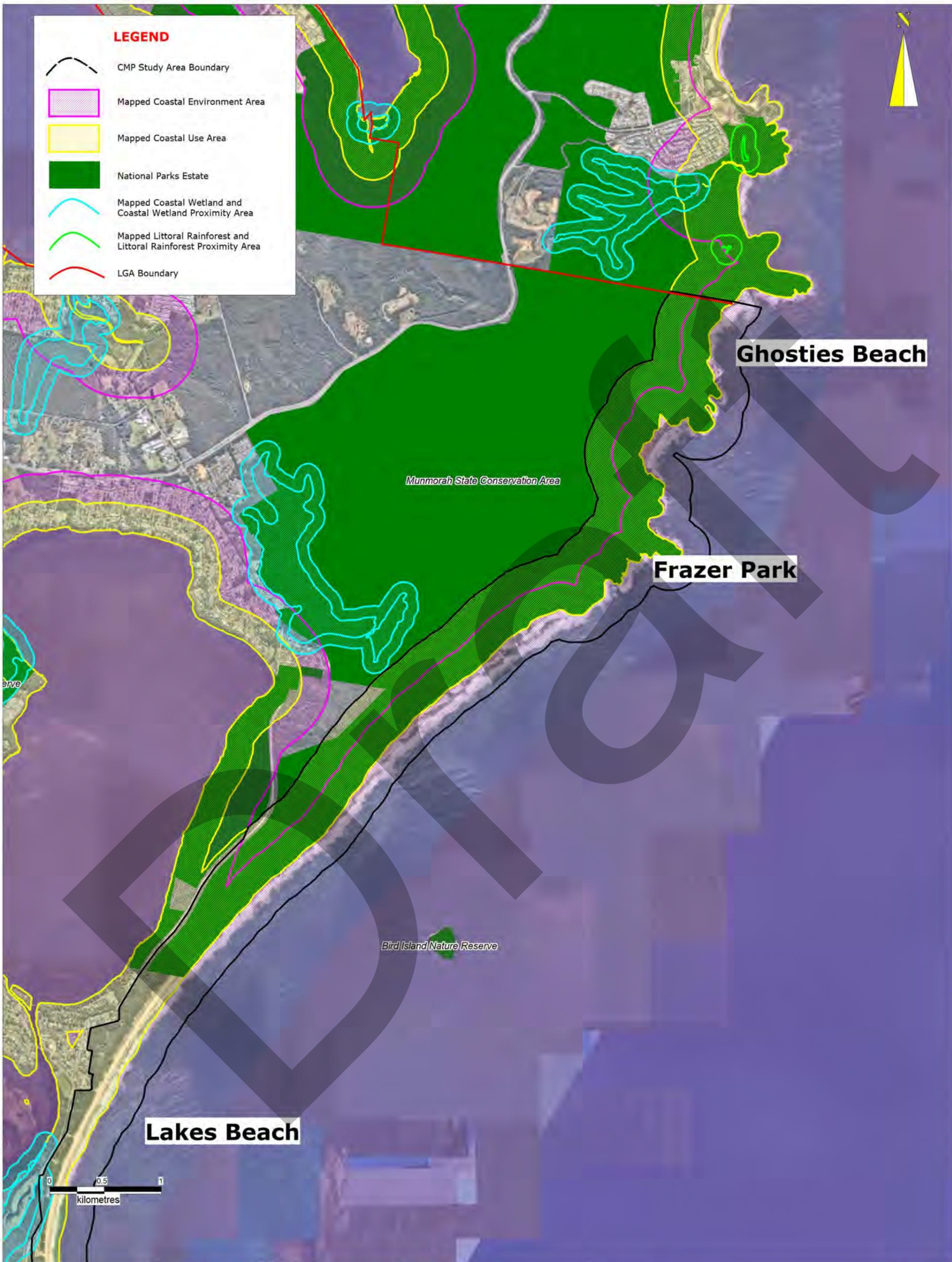
Map A18 MacMasters & Copacabana

Map A19 Killcare

Appendix A3: Location-specific Management Actions

- Map A20 Hargraves Beach and Lakes Beach
- Map A21 Soldiers Beach & Norah Head
- Map A22 The Entrance North
- Map A23 Toowoan Bay, Blue Bay and The Entrance
- Map A24 Bateau Bay and Shelly Beach
- Map A25 Forresters Beach
- Map A26 Terrigal & Wamberal Beach
- Map A27 Avoca & North Avoca
- Map A28 MacMasters & Copacabana
- Map A29 Killcare

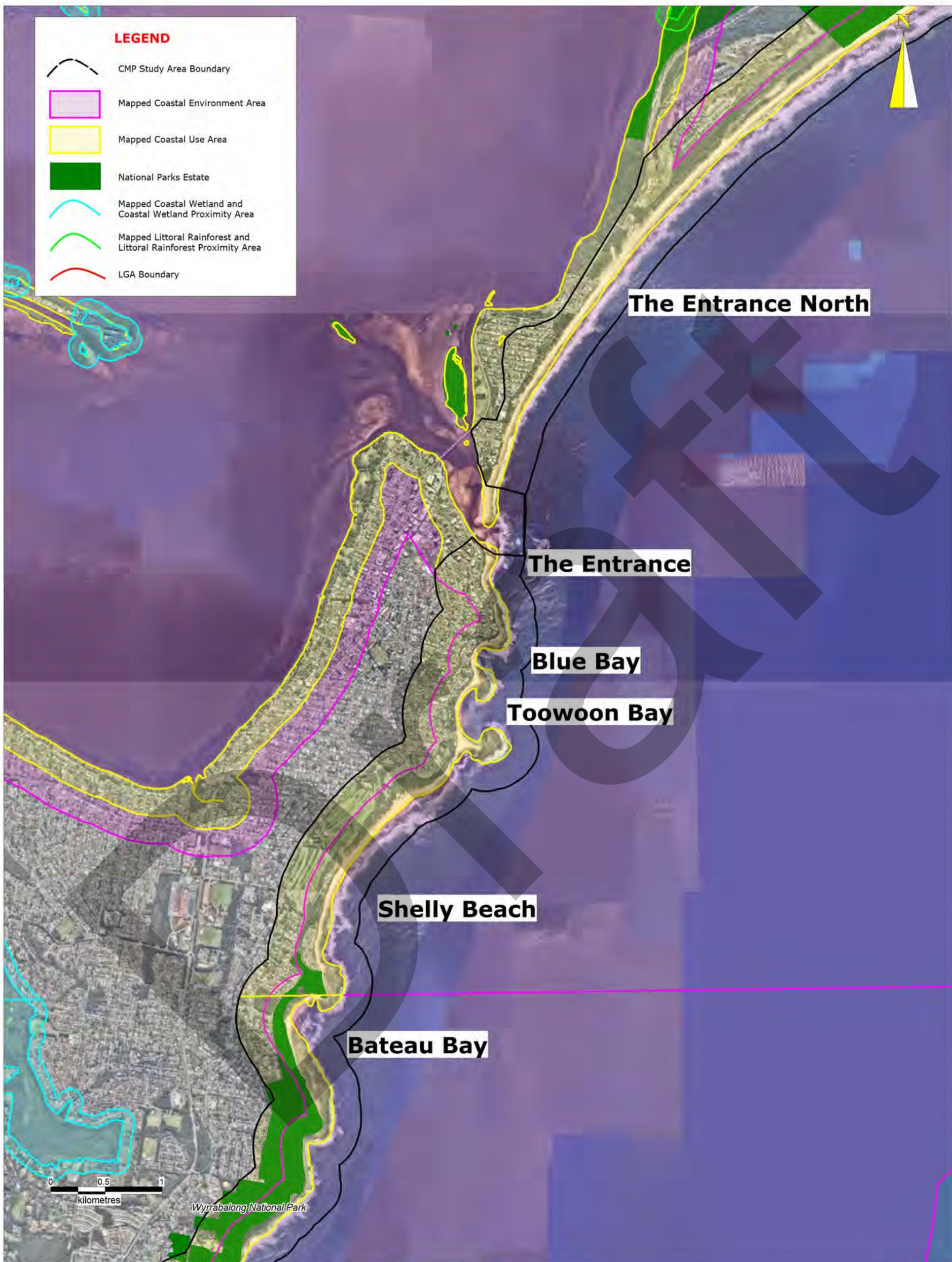
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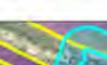
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PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



LEGEND

-  CMP Study Area Boundary
-  Mapped Coastal Environment Area
-  Mapped Coastal Use Area
-  National Parks Estate
-  Mapped Coastal Wetland and Coastal Wetland Proximity Area
-  Mapped Littoral Rainforest and Littoral Rainforest Proximity Area
-  LGA Boundary

The Entrance North

The Entrance

Blue Bay

Toowoan Bay

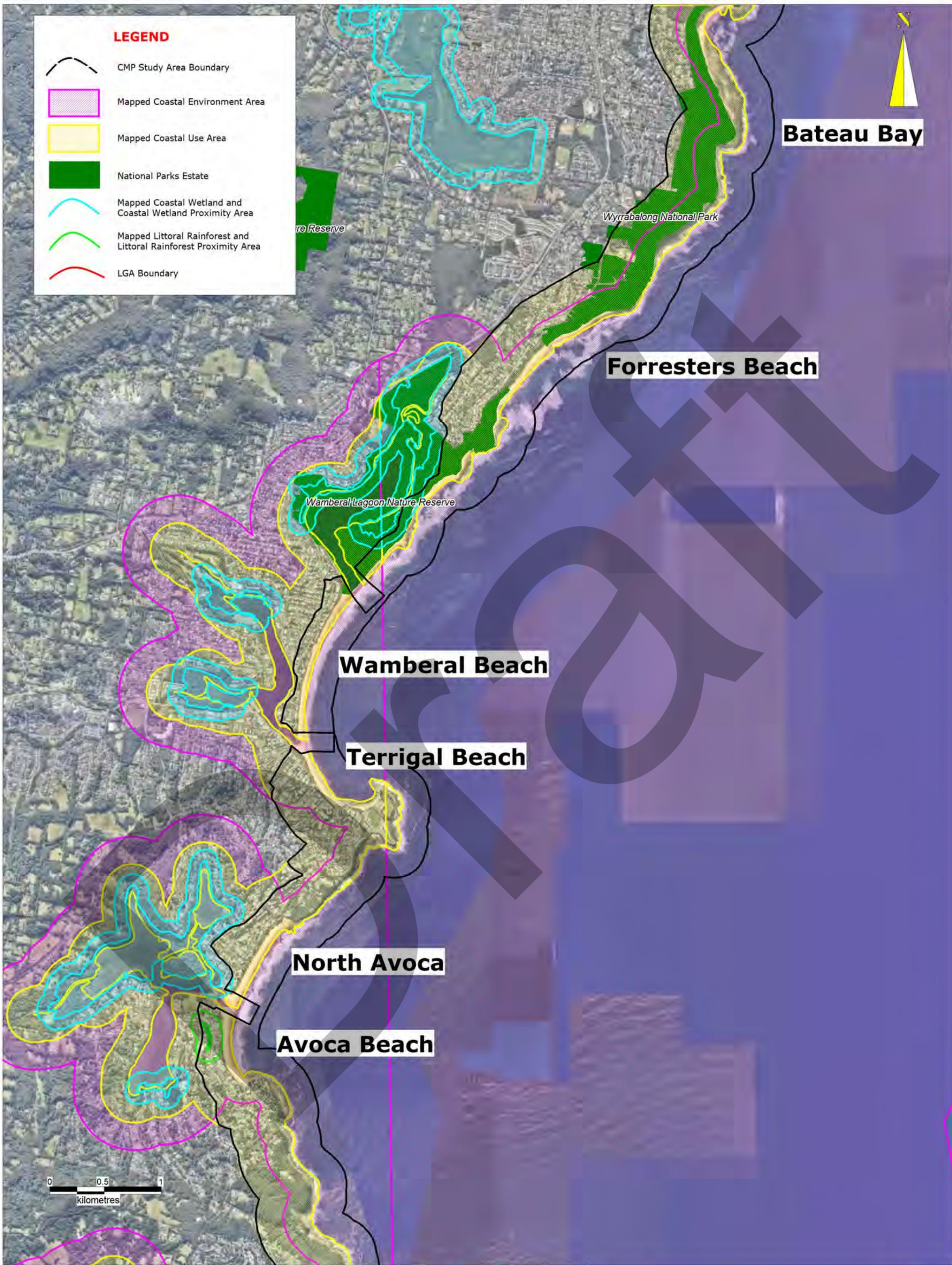
Shelly Beach

Bateau Bay

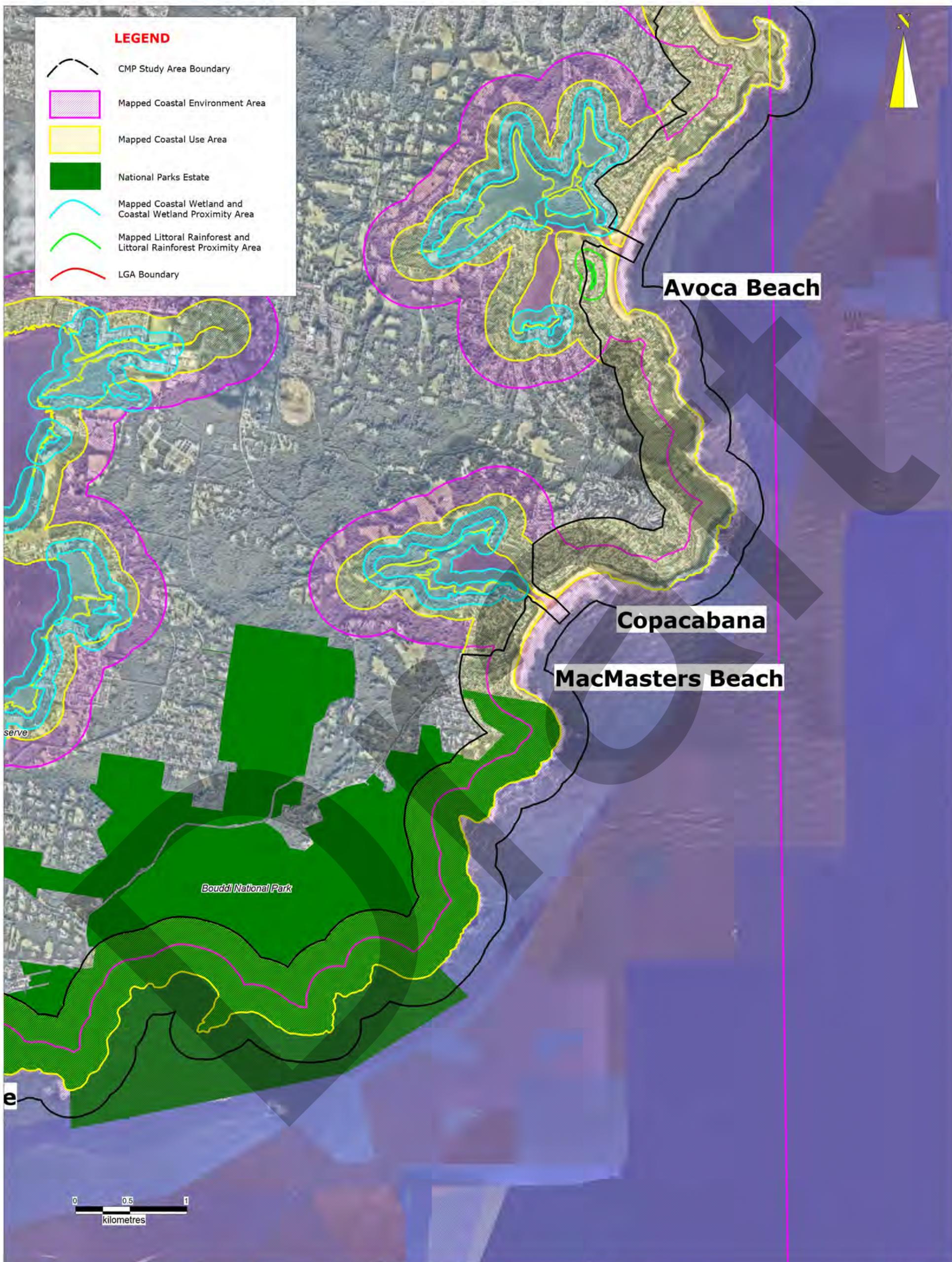
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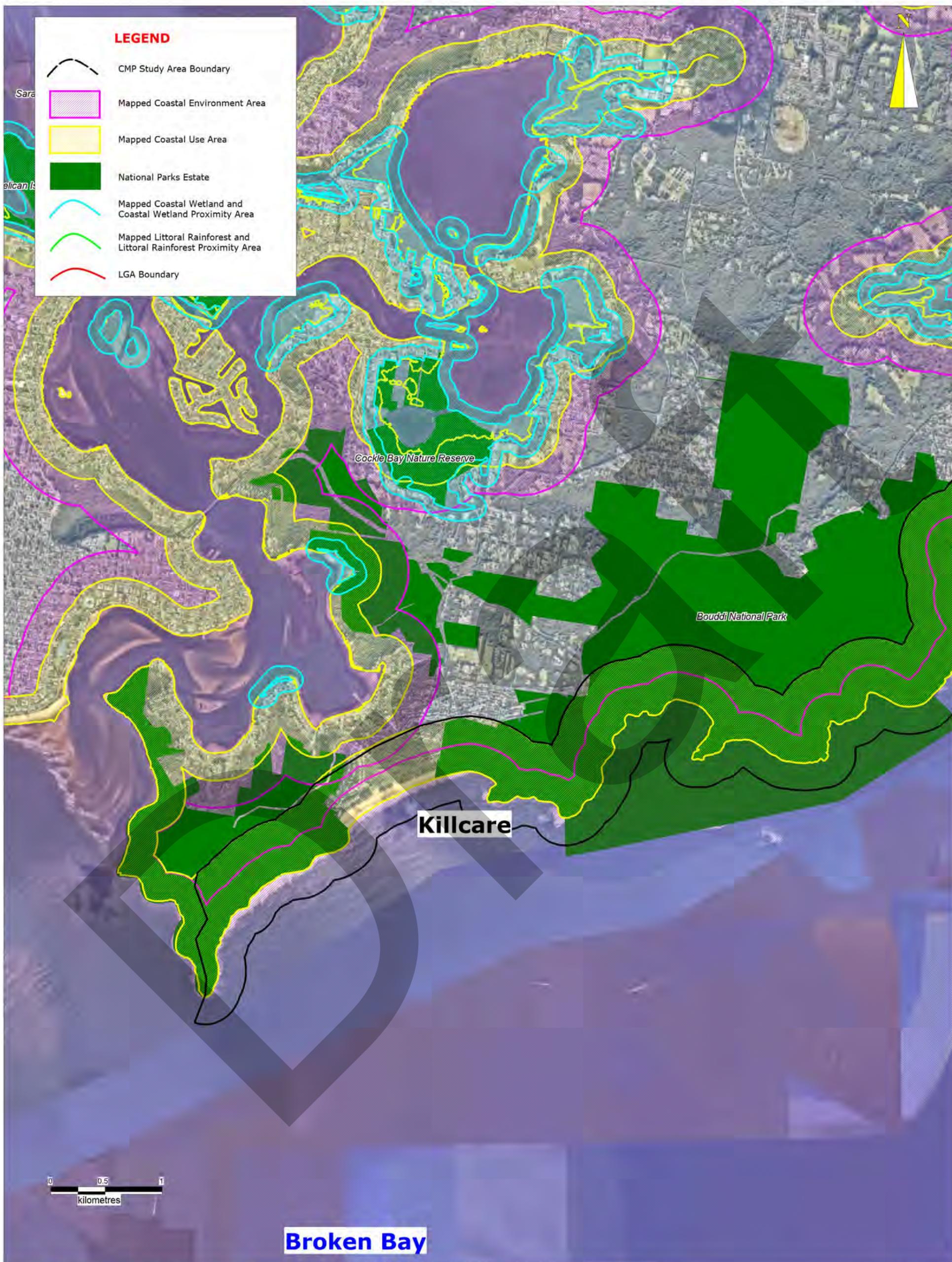
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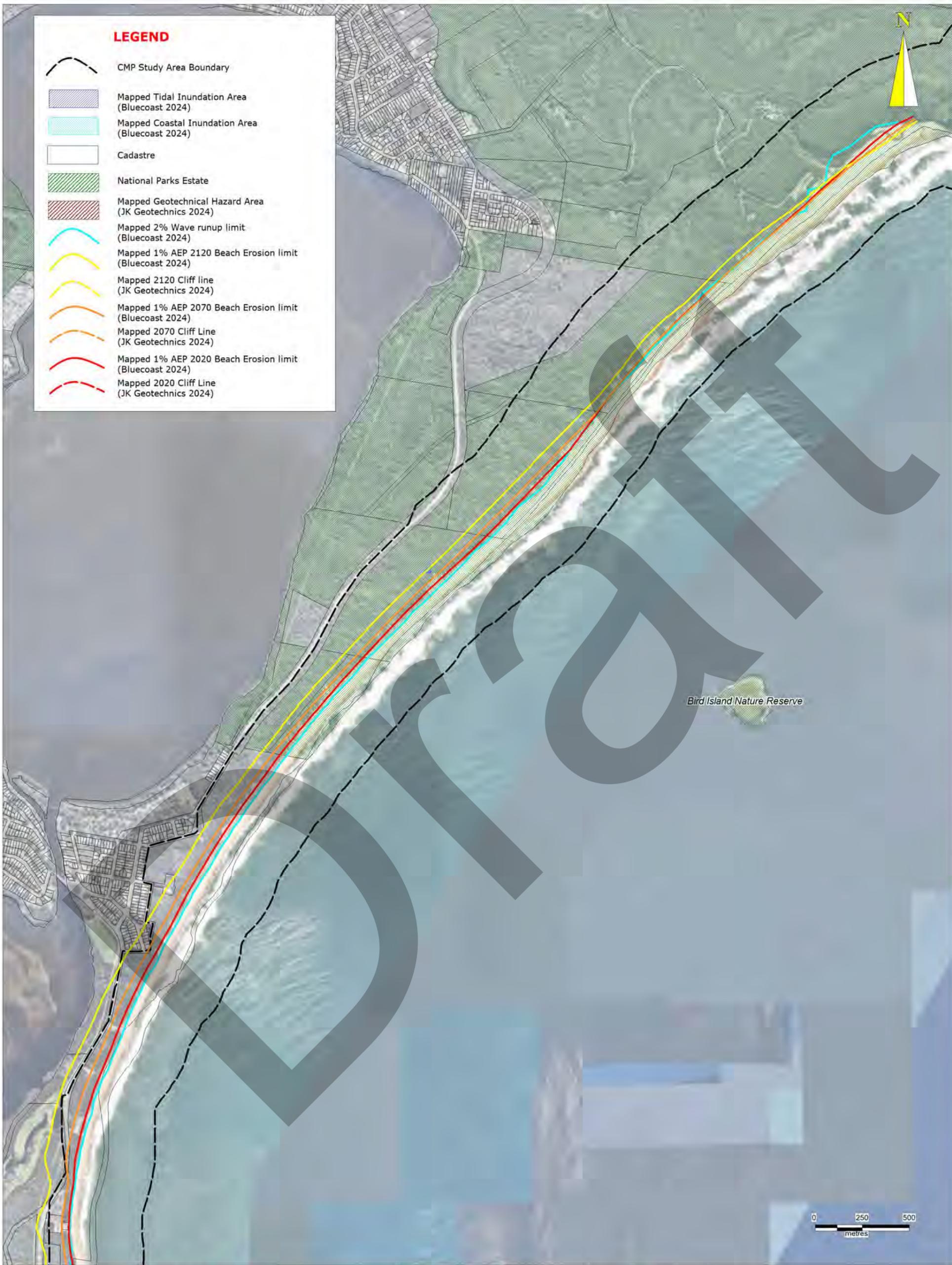


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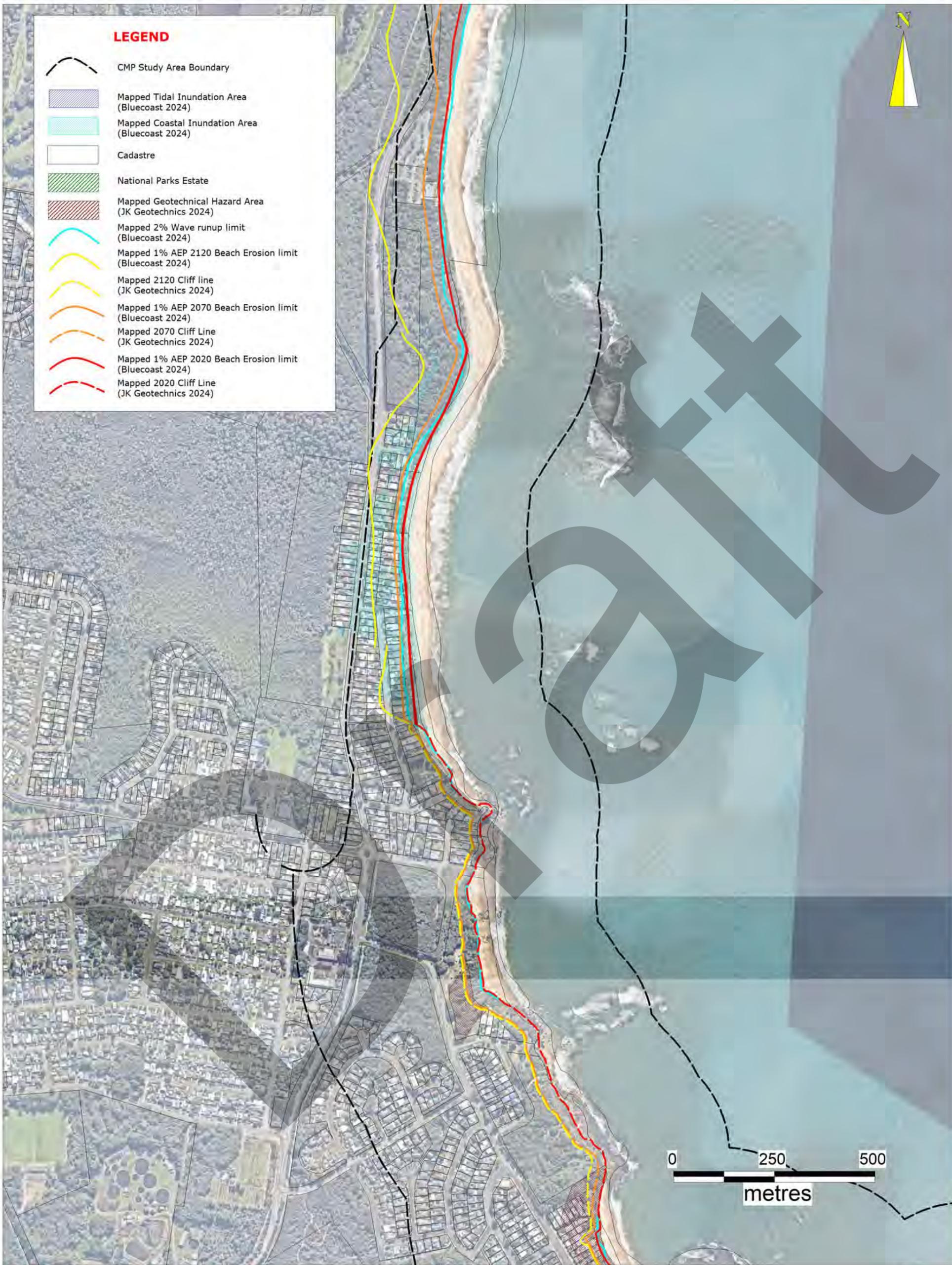


Broken Bay

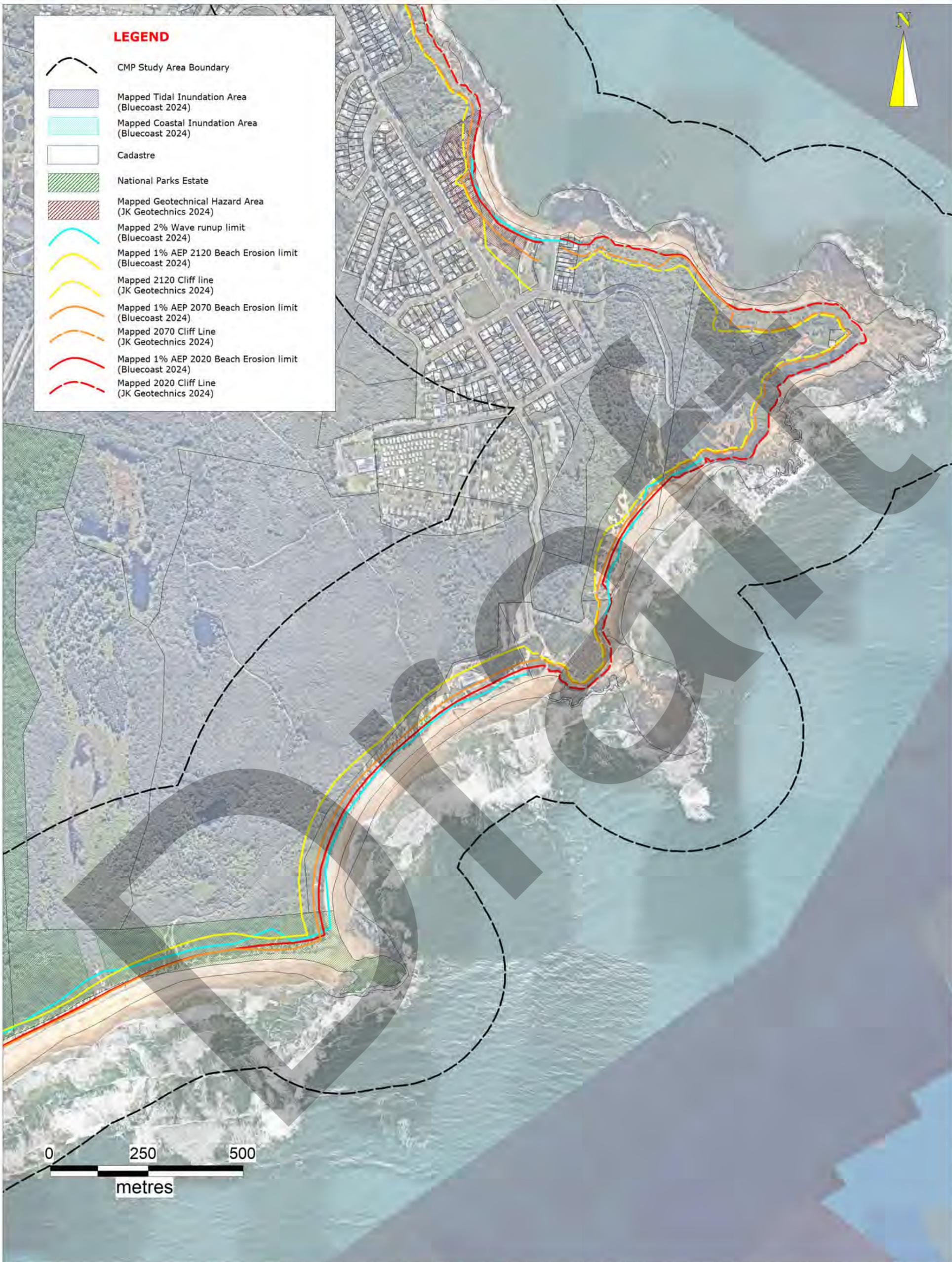
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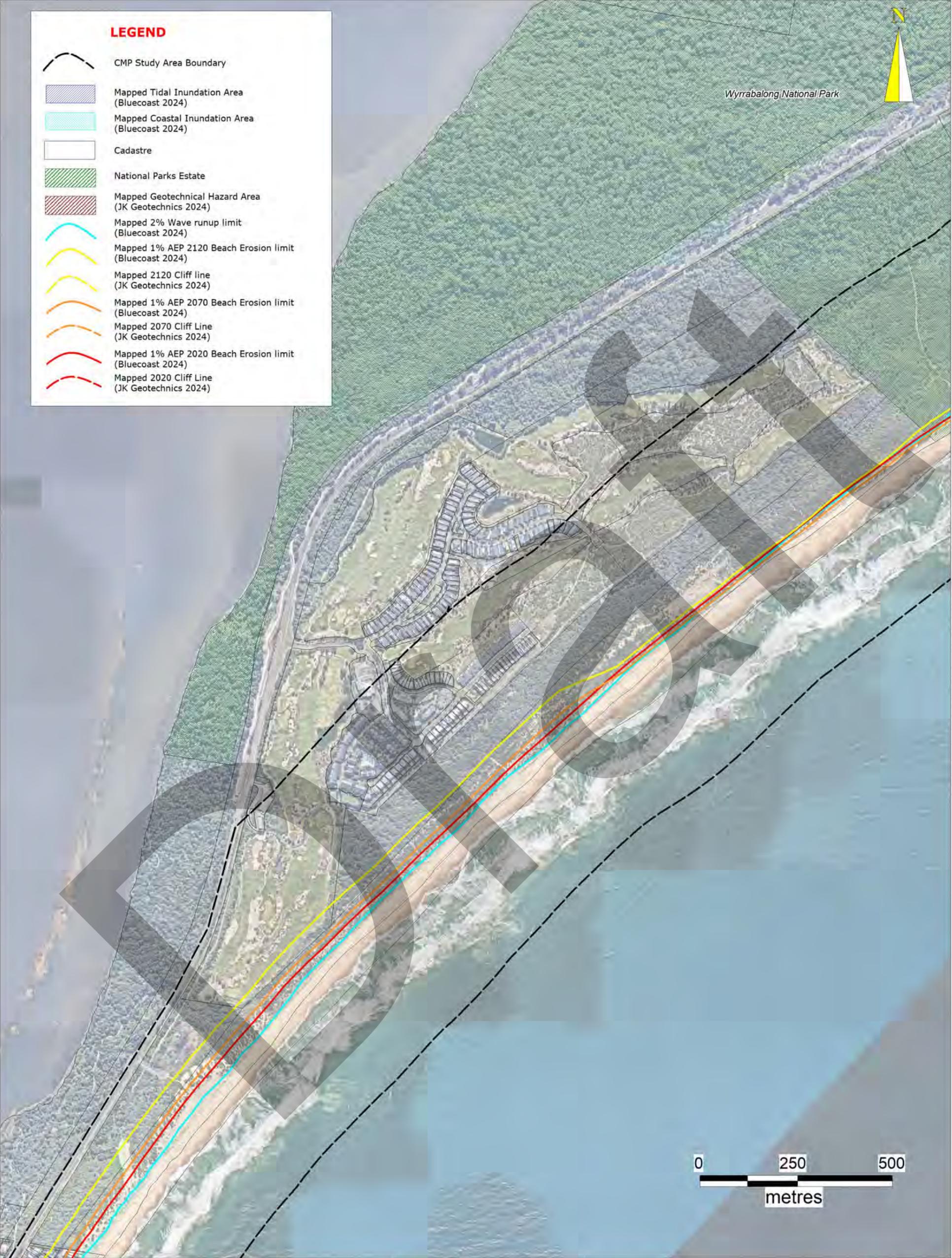
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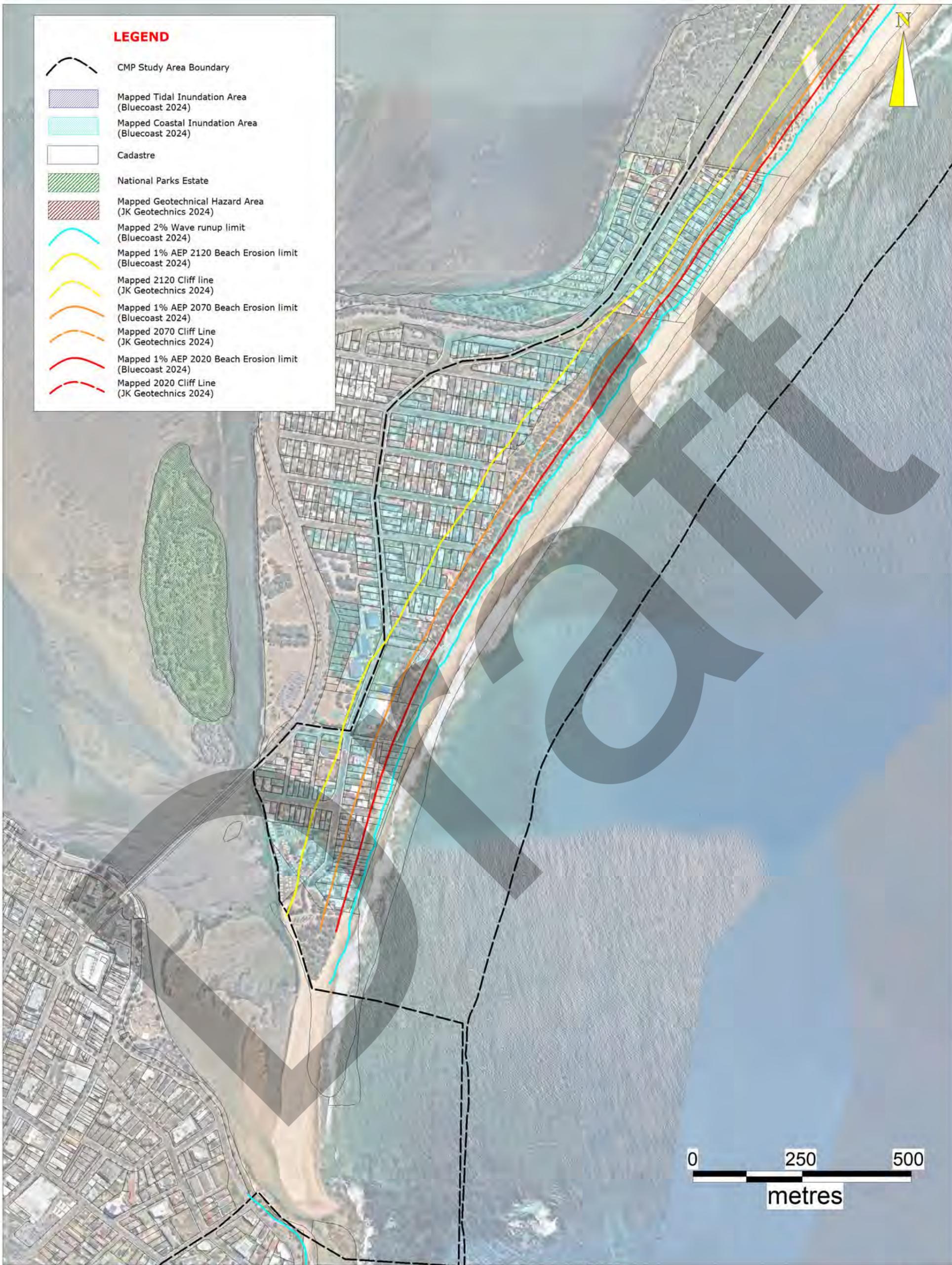
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-  Cadastre
-  National Parks Estate
-  Mapped Geotechnical Hazard Area (JK Geotechnics 2024)
-  Mapped 2% Wave runup limit (Bluecoast 2024)
-  Mapped 1% AEP 2120 Beach Erosion limit (Bluecoast 2024)
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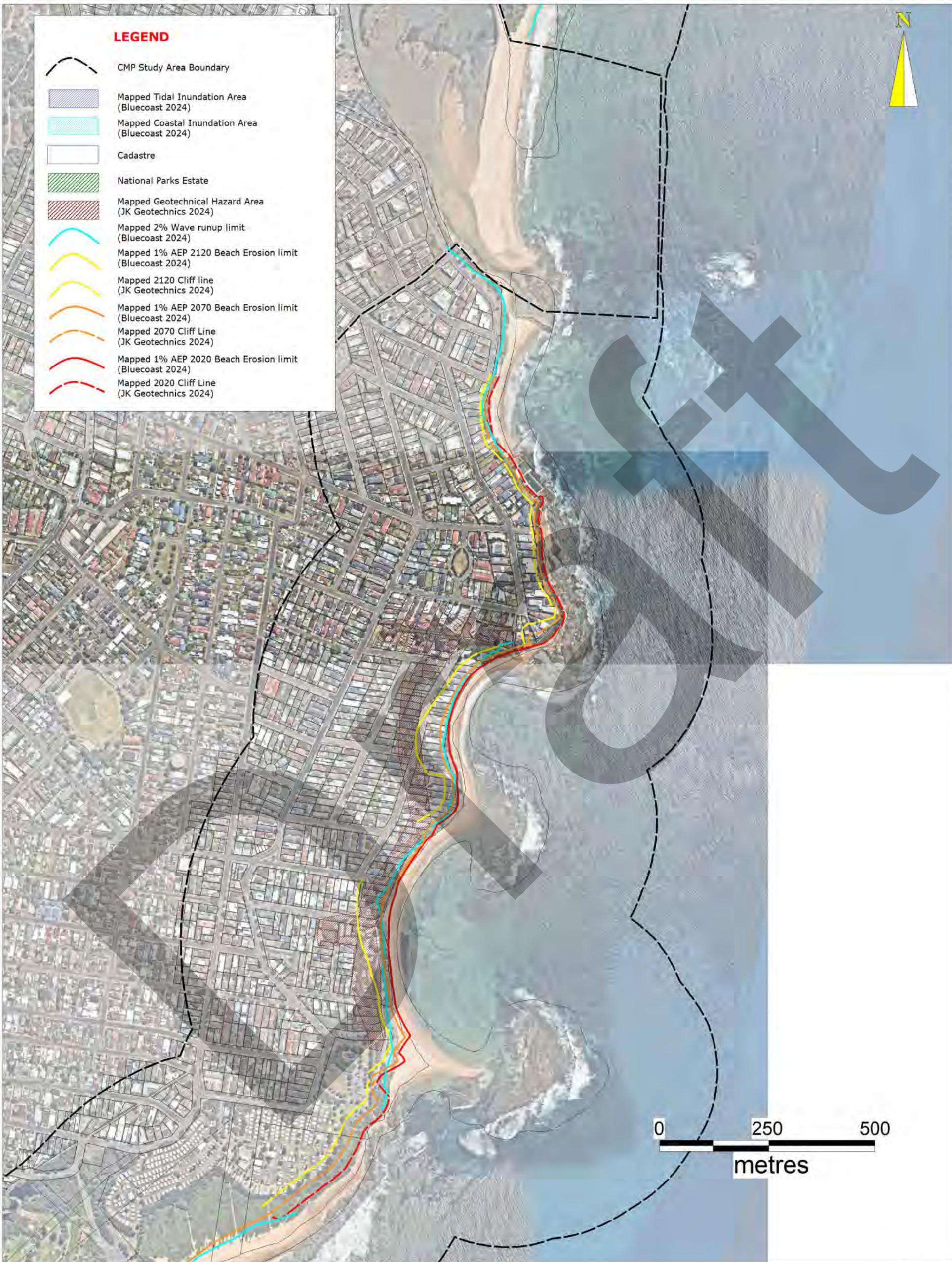
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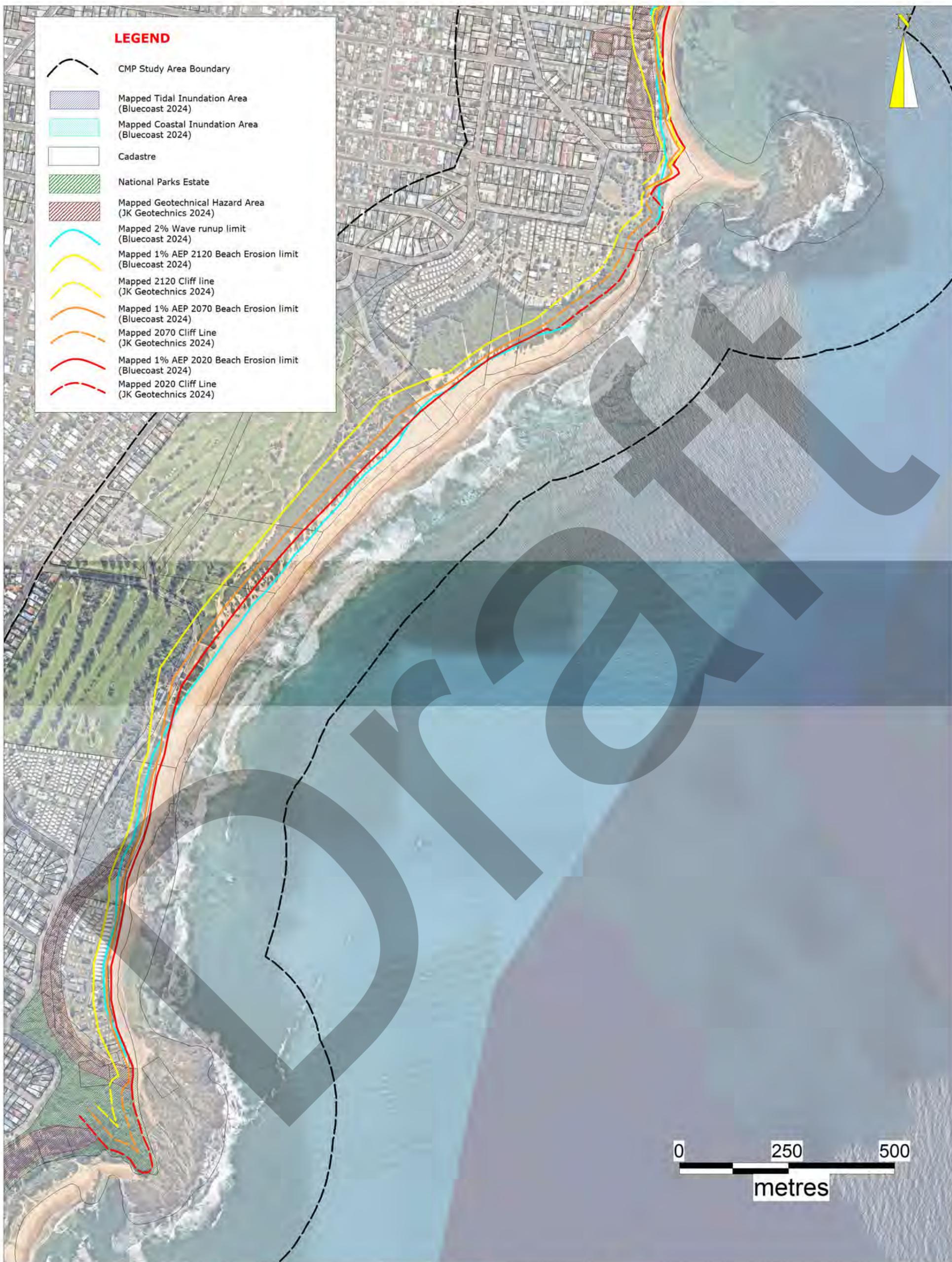
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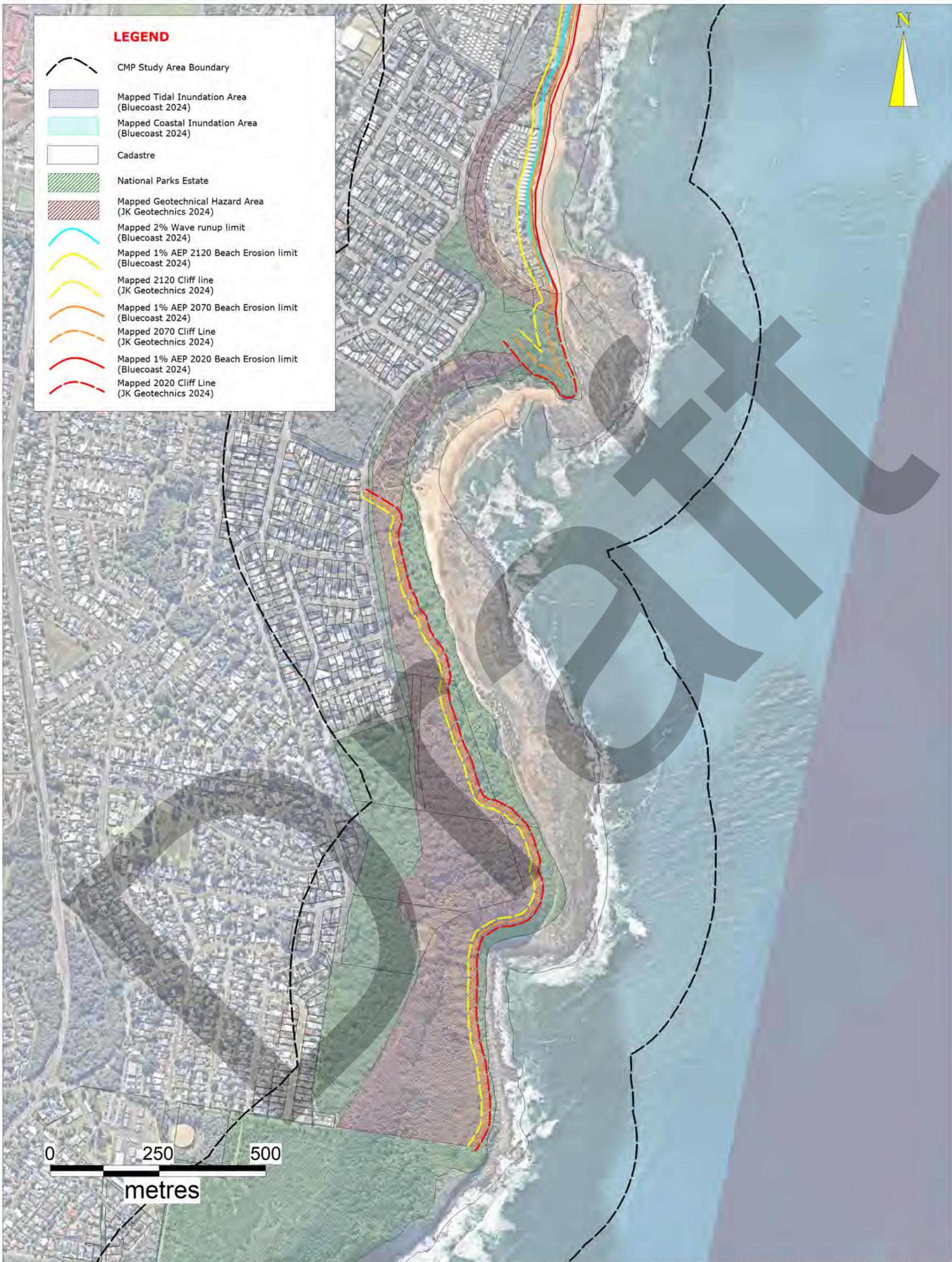


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-  Cadastre
-  National Parks Estate
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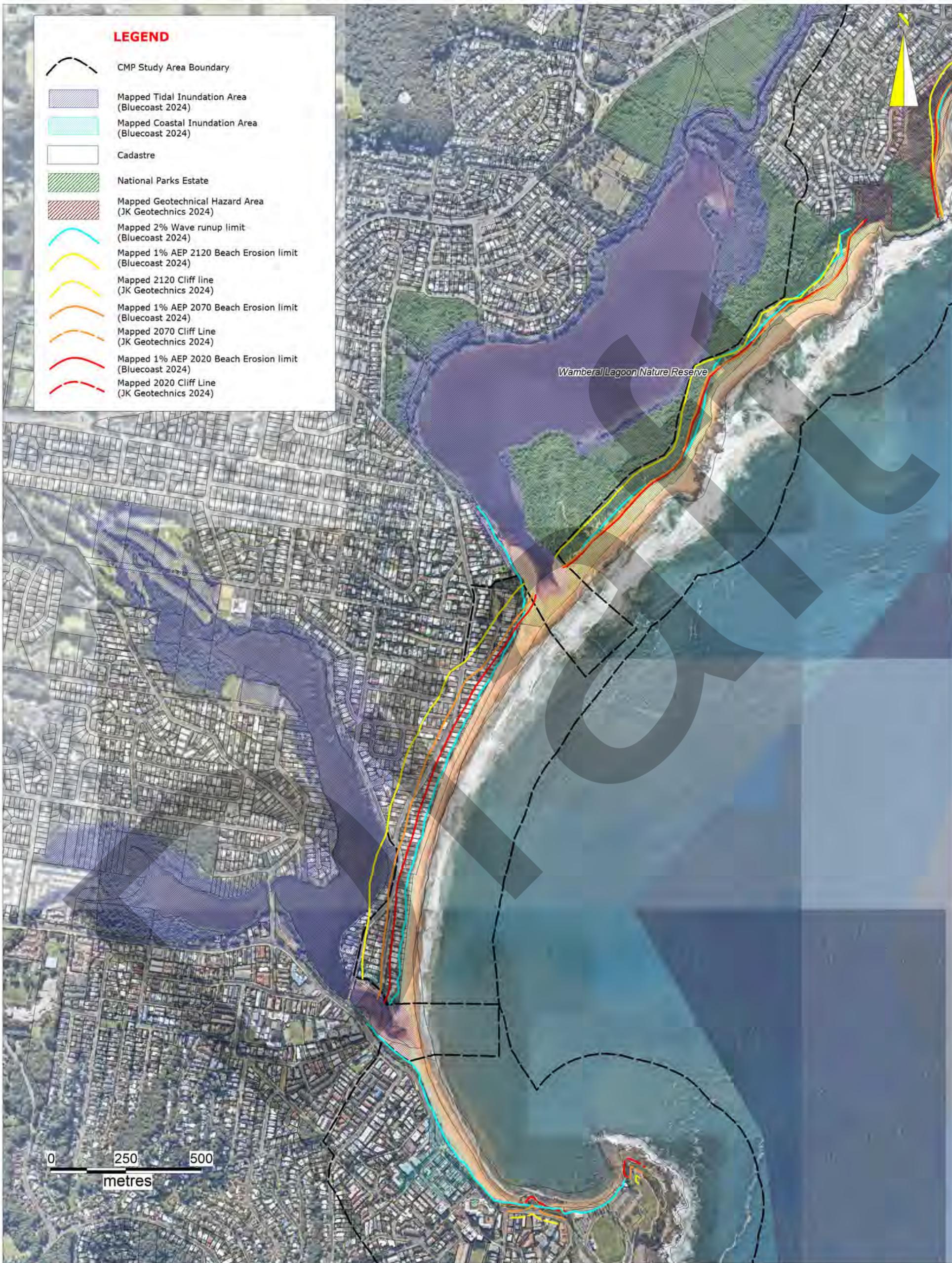
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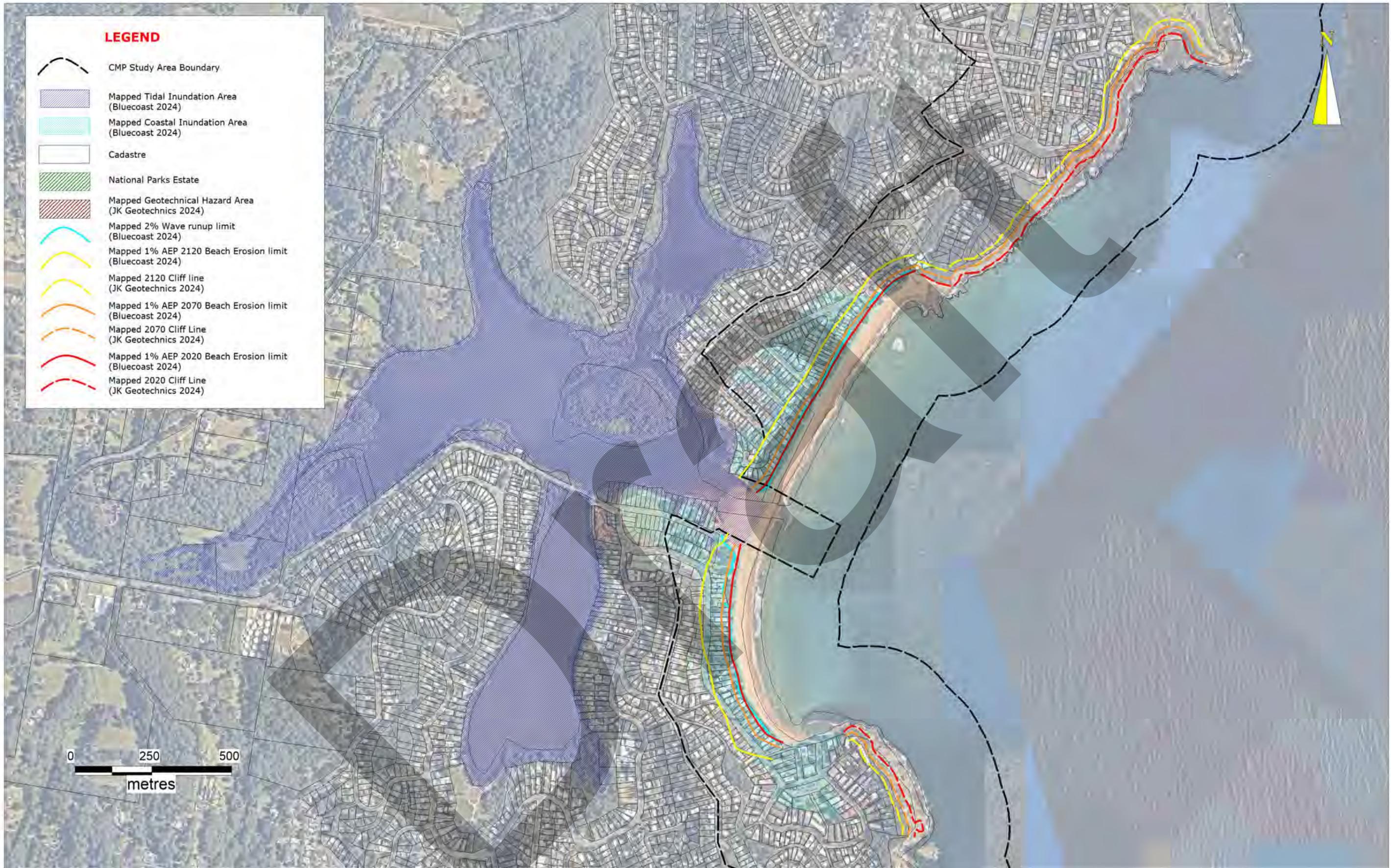
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Wamberal Lagoon Nature Reserve

0 250 500
metres

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COORDINATE SYSTEM
MGA 94 Zone 56

PROJECT NO. 311015-00572

PROJECT TITLE Central Coast Open Coast Coastal Management Program

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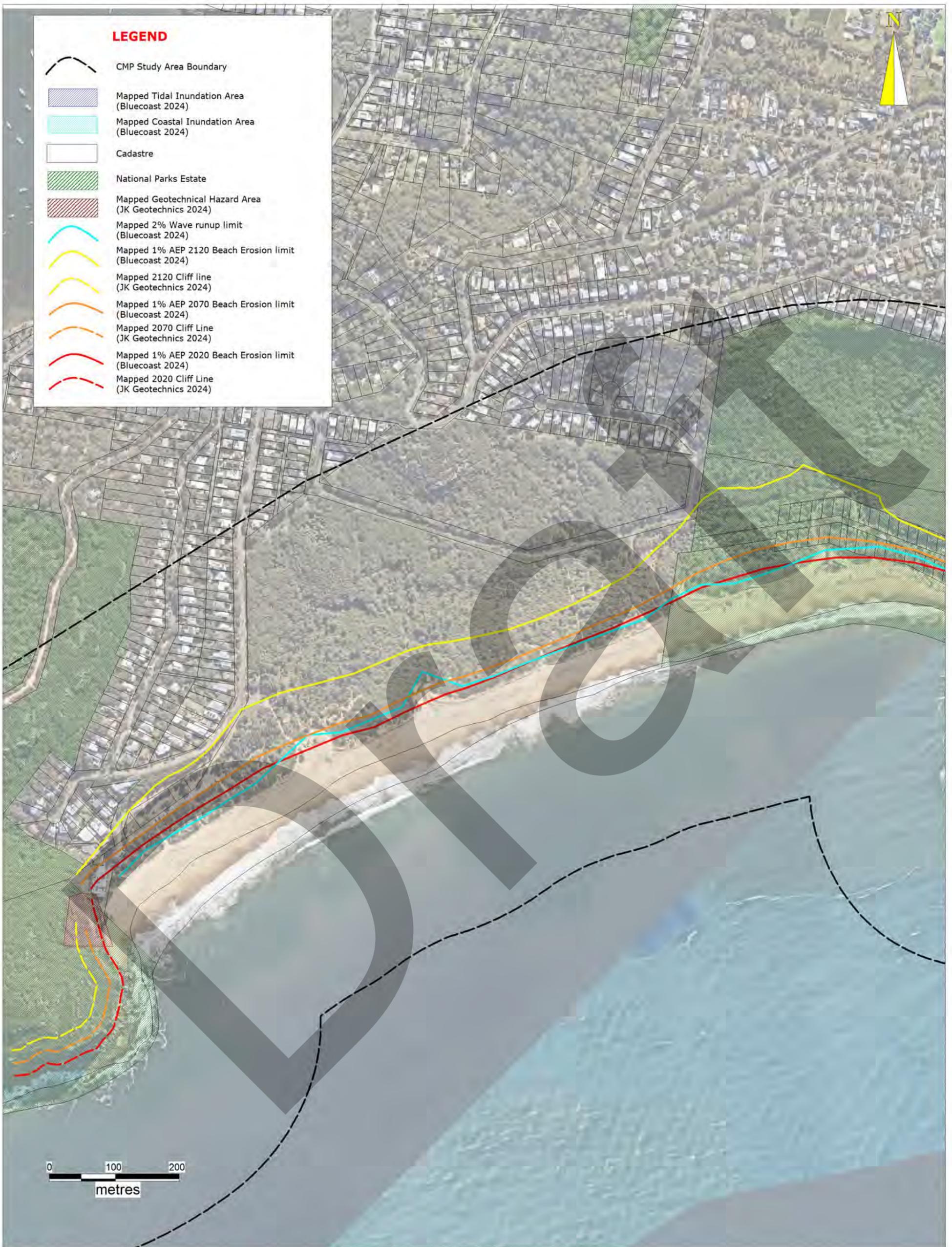
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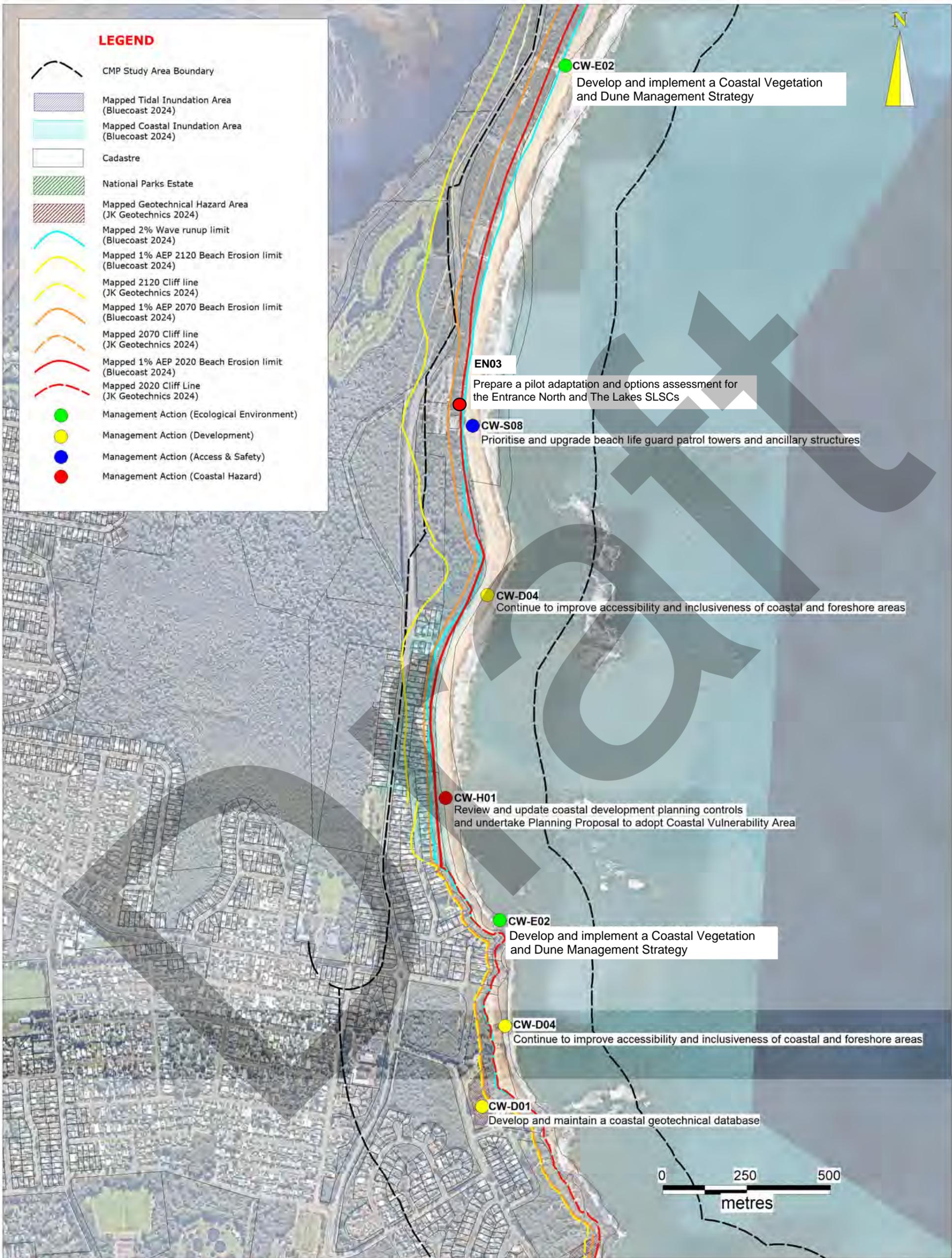
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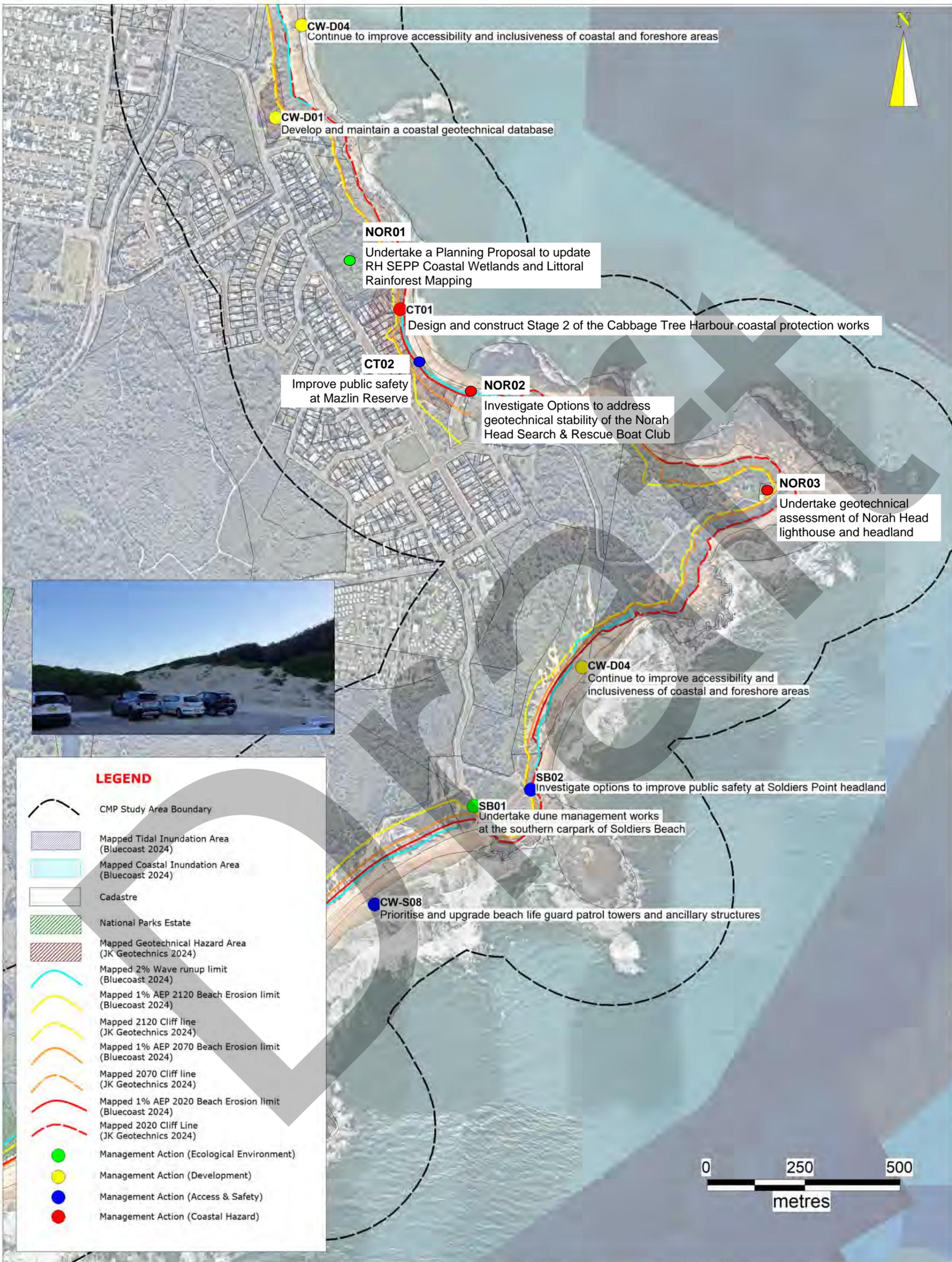




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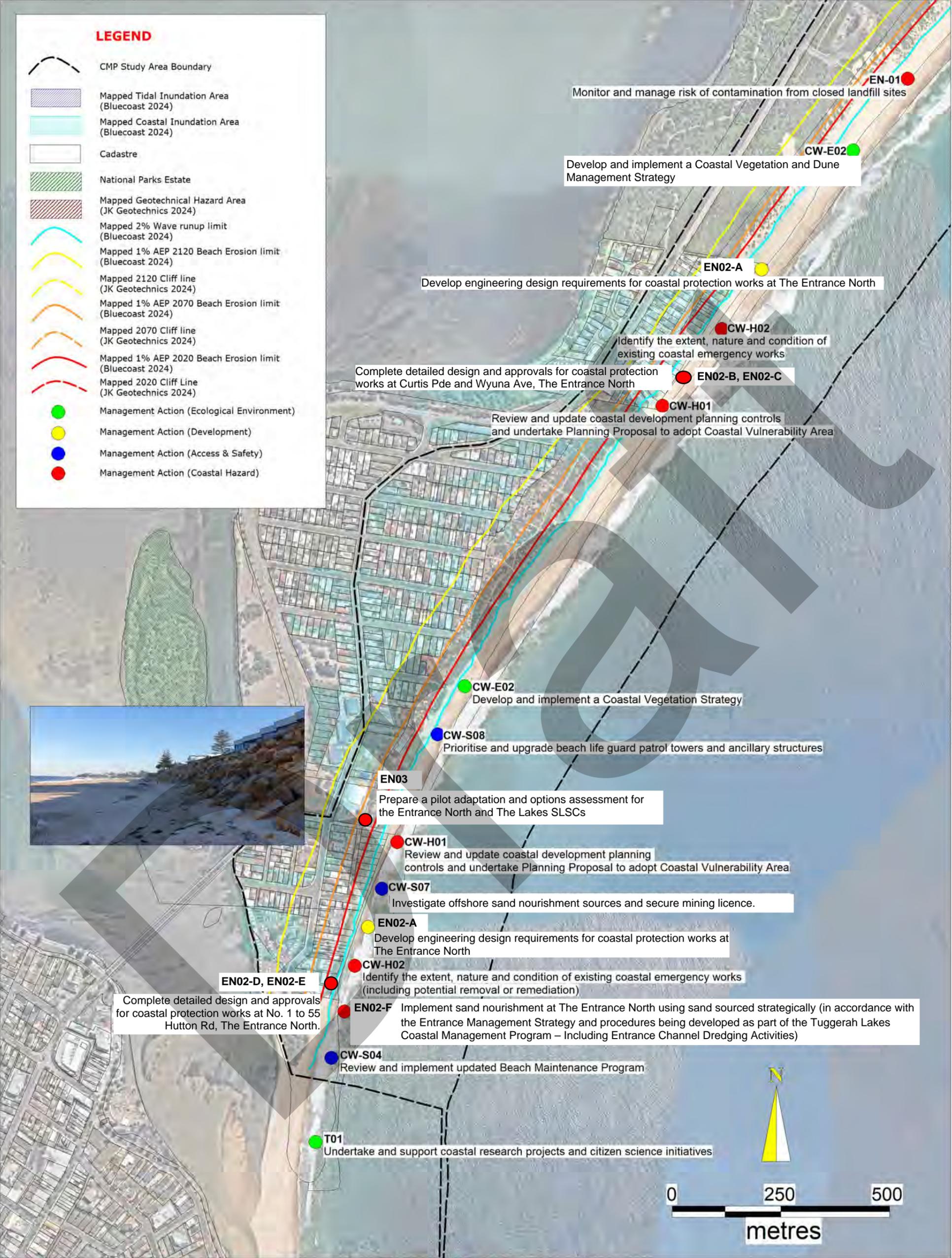
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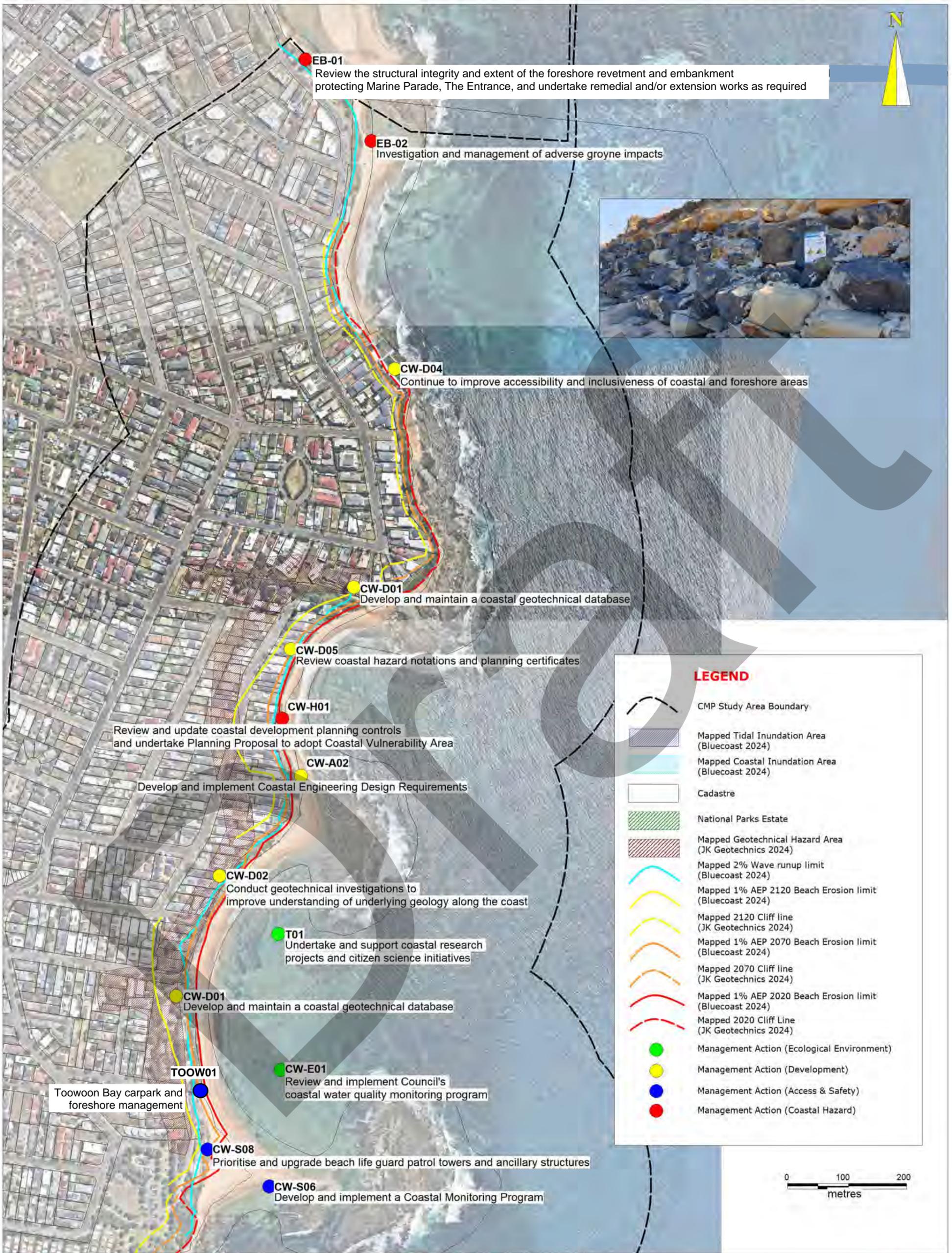
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PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	

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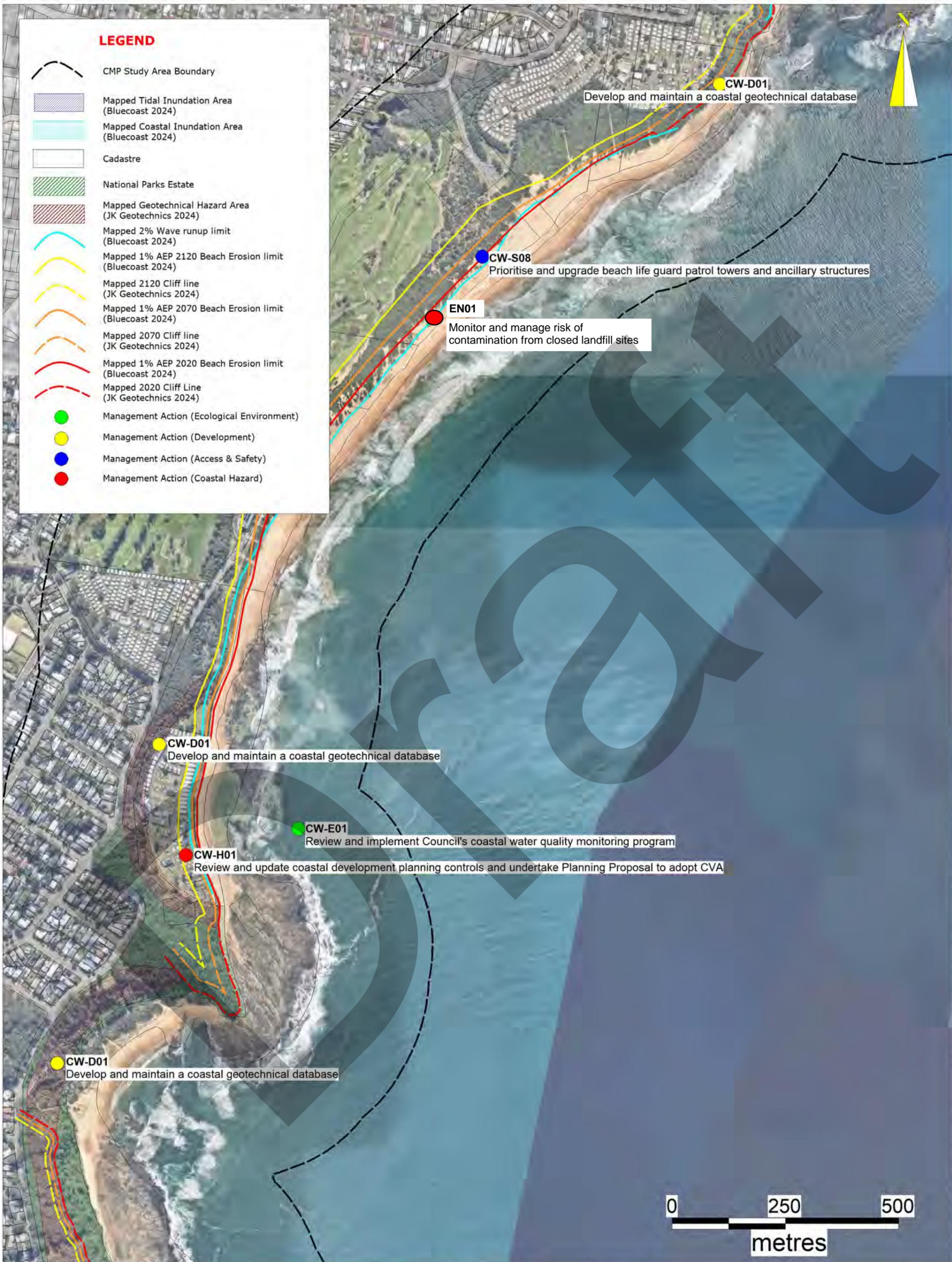
-  CMP Study Area Boundary
-  Mapped Tidal Inundation Area (Bluecoast 2024)
-  Mapped Coastal Inundation Area (Bluecoast 2024)
-  Cadastre
-  National Parks Estate
-  Mapped Geotechnical Hazard Area (JK Geotechnics 2024)
-  Mapped 2% Wave runup limit (Bluecoast 2024)
-  Mapped 1% AEP 2120 Beach Erosion limit (Bluecoast 2024)
-  Mapped 2120 Cliff line (JK Geotechnics 2024)
-  Mapped 1% AEP 2070 Beach Erosion limit (Bluecoast 2024)
-  Mapped 2070 Cliff line (JK Geotechnics 2024)
-  Mapped 1% AEP 2020 Beach Erosion limit (Bluecoast 2024)
-  Mapped 2020 Cliff Line (JK Geotechnics 2024)
-  Management Action (Ecological Environment)
-  Management Action (Development)
-  Management Action (Access & Safety)
-  Management Action (Coastal Hazard)



DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map A22 Coastal Management Actions The Entrance North	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map A23 Coastal Management Actions Toowoon Bay, Blue Bay, The Entrance	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map A24 Coastal Management Actions Bateau Bay and Shelly Beach	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	

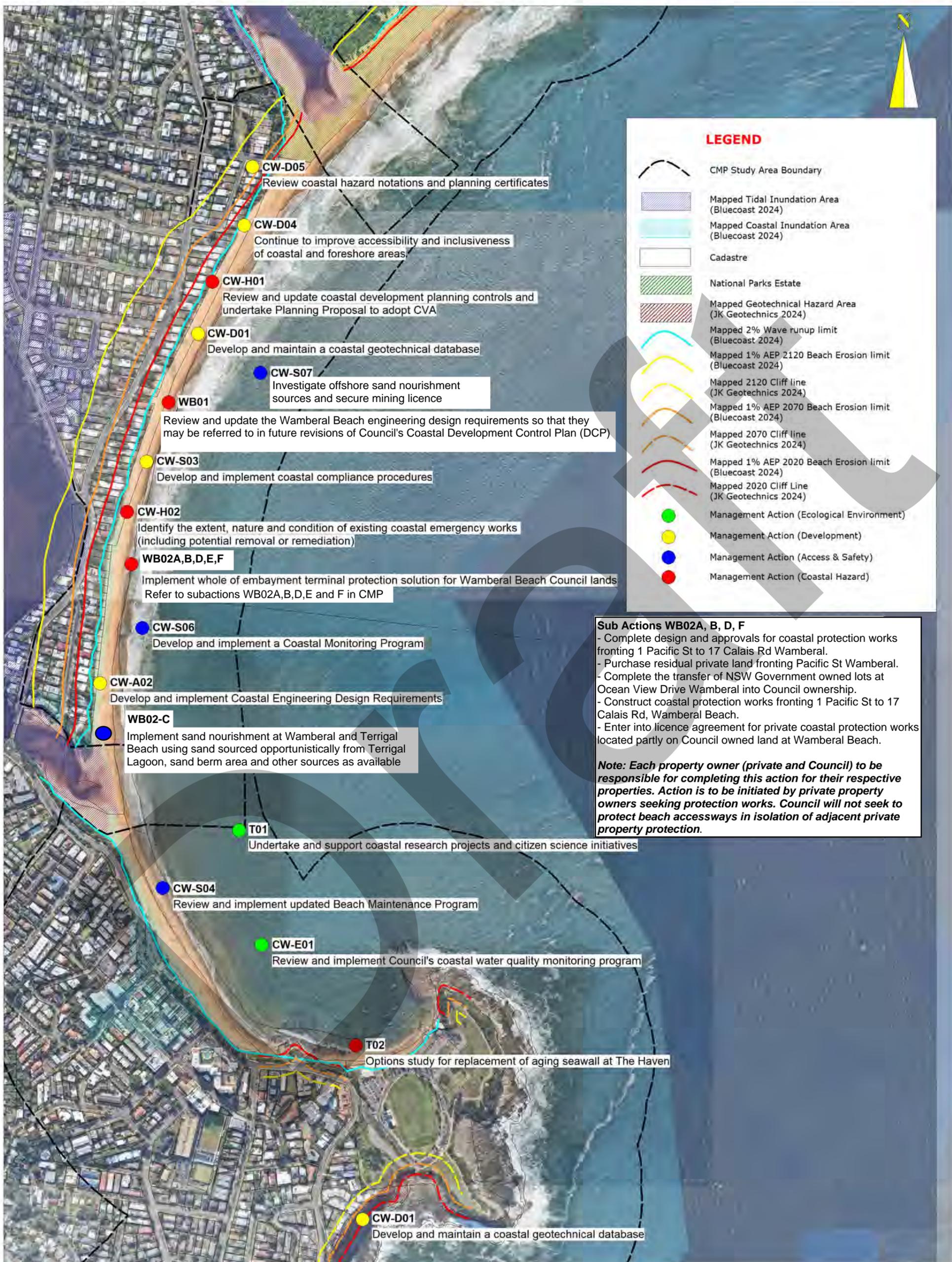


LEGEND

- CMP Study Area Boundary
- Mapped Tidal Inundation Area (Bluecoast 2024)
- Mapped Coastal Inundation Area (Bluecoast 2024)
- Cadastre
- National Parks Estate
- Mapped Geotechnical Hazard Area (JK Geotechnics 2024)
- Mapped 2% Wave runup limit (Bluecoast 2024)
- Mapped 1% AEP 2120 Beach Erosion limit (Bluecoast 2024)
- Mapped 2120 Cliff line (JK Geotechnics 2024)
- Mapped 1% AEP 2070 Beach Erosion limit (Bluecoast 2024)
- Mapped 2070 Cliff line (JK Geotechnics 2024)
- Mapped 1% AEP 2020 Beach Erosion limit (Bluecoast 2024)
- Mapped 2020 Cliff Line (JK Geotechnics 2024)
- Management Action (Ecological Environment)
- Management Action (Development)
- Management Action (Access & Safety)
- Management Action (Coastal Hazard)

DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map A25 Coastal Management Actions Forrester's Beach
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA





Sub Actions WB02A, B, D, F

- Complete design and approvals for coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal.
- Purchase residual private land fronting Pacific St Wamberal.
- Complete the transfer of NSW Government owned lots at Ocean View Drive Wamberal into Council ownership.
- Construct coastal protection works fronting 1 Pacific St to 17 Calais Rd, Wamberal Beach.
- Enter into licence agreement for private coastal protection works located partly on Council owned land at Wamberal Beach.

Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.

DATE	COORDINATE SYSTEM	FIGURE TITLE	Map A26
23.03.2025	MGA 94 Zone 56	Coastal Management Actions Terrigal/Wamberal	
PROJECT NO.	PROJECT TITLE	CREATED BY	
311015-00572	Central Coast Open Coast Coastal Management Program	CA	





DATE
23.03.2025

COORDINATE SYSTEM
MGA 94 Zone 56

PROJECT NO. 311015-00572

PROJECT TITLE
Central Coast Open Coast Coastal Management Program

FIGURE TITLE Coastal Management Actions Avoca/North Avoca Map A27

CREATED BY CA





LEGEND

-  CMP Study Area Boundary
-  Mapped Tidal Inundation Area (Bluecoast 2024)
-  Mapped Coastal Inundation Area (Bluecoast 2024)
-  Cadastre
-  National Parks Estate
-  Mapped Geotechnical Hazard Area (JK Geotechnics 2024)
-  Mapped 2% Wave runup limit (Bluecoast 2024)
-  Mapped 1% AEP 2120 Beach Erosion limit (Bluecoast 2024)
-  Mapped 2120 Cliff line (JK Geotechnics 2024)
-  Mapped 1% AEP 2070 Beach Erosion limit (Bluecoast 2024)
-  Mapped 2070 Cliff line (JK Geotechnics 2024)
-  Mapped 1% AEP 2020 Beach Erosion limit (Bluecoast 2024)
-  Mapped 2020 Cliff Line (JK Geotechnics 2024)
-  Management Action (Ecological Environment)
-  Management Action (Development)
-  Management Action (Access & Safety)
-  Management Action (Coastal Hazard)



Council's Beach Maintenance Program would be reviewed and implemented to improve public beach access, amenity and safety. The action would include prioritisation and upgrades to beach accessways in line with the Recreational Use Study and Council's Disability Inclusion Action Plan. The program would outline the management of post-storm beach access and safety, where small-scale works such as beach scraping for amenity purposes may be undertaken and beach and dune fencing. It will also include an audit on beach maintenance operations to maximise inhouse efficiencies to ensure that the necessary plant and equipment is available to effectively implement the program.

CW-E02
Develop and implement a Coastal Vegetation and Dune Management Strategy

CW-S06
Develop and implement a Coastal Monitoring Program

CW-S08
CW-D04 Prioritise and upgrade beach life guard patrol towers and ancillary structures

CW-S04 Continue to improve accessibility and inclusiveness of coastal and foreshore areas

CW-S04 Review and implement updated Beach Maintenance Program

CW-S01 Monitoring and improvement of coastal stormwater outlets

CW-E01
Review and implement Council's coastal water quality monitoring program



The inspection of all coastal stormwater outlets to identify those at risk from coastal hazards and opportunities where upgrades can be implemented or retrofitted in order to protect assets, reduce erosion from stormwater scour and/or improve public safety. These locations would also be regularly monitored to assess performance and improvements.



DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map A29 CMP Management Actions Killcare	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	

Appendix B. Coastal Zone Emergency Action Subplan
CZEAS

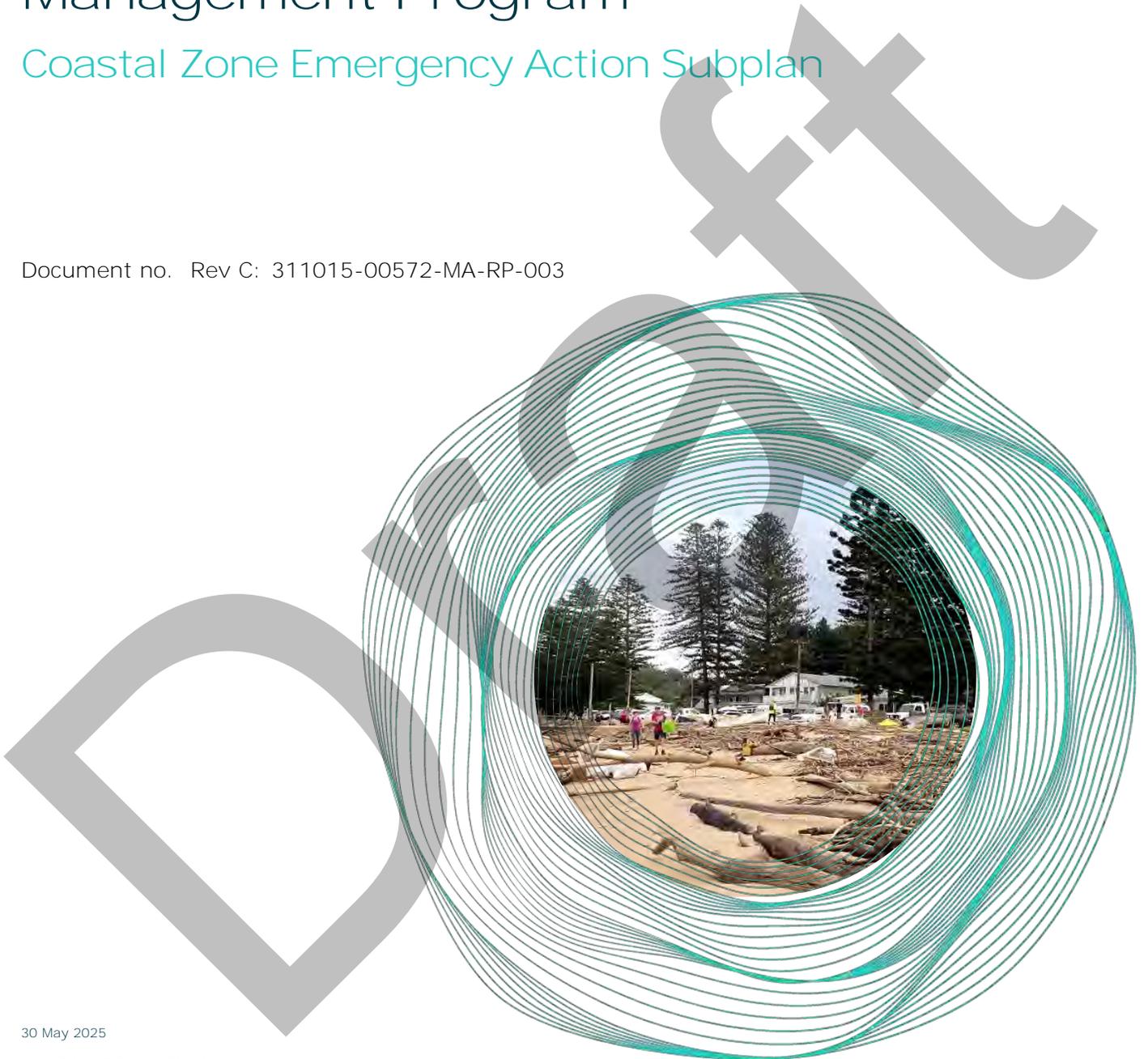


CENTRAL COAST COUNCIL

Central Coast Open Coast Coastal Management Program

Coastal Zone Emergency Action Subplan

Document no. Rev C: 311015-00572-MA-RP-003



30 May 2025

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Synopsis

This report develops a Coastal Zone Emergency Action Subplan (CZEAS) for the Central Coast Open Coast Coastal Management Program (CMP) area based on the requirements of the *Coastal Management Act 2016* as outlined in the Coastal Management Manual (DP&E, 2018), for those areas subject to immediate hazards from coastal hazards.

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PROJECT 311015-00572 - 311015-00572-MA-RP-003: Central Coast Open Coast Coastal Management Program - Coastal Zone Emergency Action Subplan

Rev	Description	Originator	Reviewer	Worley Approver	Revision Date	Customer Approver	Approval Date
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Rev B	Final Draft				01 August 2024		
Rev C	Updated Final Draft				30 May 2025		

30 May 2025

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Draft

Executive Summary

This report develops a Coastal Zone Emergency Action Subplan (CZEAS) for the Central Coast Open Coast Coastal Management Program (CMP) area based on the requirements of the *Coastal Management Act 2016* as outlined in the Coastal Management Manual (DP&E, 2018), for those areas subject to immediate hazards from coastal hazards.

The objectives of the CZEAS are to:

- outline measures to reduce the risk to public safety, the coastal environment and public assets arising from the coastal hazards of coastal erosion, inundation and cliff/slope instability brought about by storm activity
- identify key actions to be carried out by Council before, during and following a coastal emergency to reduce the risk to public safety, the coastal environment and public assets
- identify the responsibilities of other public authorities during a coastal emergency
- identify key areas and assets subject to immediate hazards and prioritise actions to reduce the risks to those areas and assets.

The CZEAS includes actions covering the four phases of emergency management as described in the Coastal Management Manual, namely:

- Prevention
- Preparedness
- Response
- Recovery

The study area for this CZEAS includes all the Coastal Management areas of the Central Coast Open Coast, including the Coastal Wetlands/Littoral Rainforest Areas, Coastal Vulnerability Areas, Coastal Environment Area and Coastal Use Area, as defined in the State Environmental Planning Policy Resilience and Hazards (RH SEPP 2021). The study area is shown in Figure 1-1.

The study area is subject to a high level of risk from coastal hazards (storm erosion, coastal inundation and cliff/slope instability). These areas are also subject to catchment derived flooding, for which a framework is available for emergency response through the central Coast Council Flood Emergency Subplan (CCC/NSW SES, 2021). Actions from the Flood Plan are relevant for coastal hazards also, but this CZEAS provides actions specific to Council for implementation prior to, during and following a coastal emergency.

Due to the large area of land affected by coastal inundation, it is not possible or practical to provide emergency protection works that would provide protection against coastal inundation. NSW SES is the agency responsible for the coordination of operations to protect property, with protection measures described in the Central Coast Council Flood Emergency Subplan.

Note that a CZEAS must not include matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* (such as the NSW State Emergency Service Central Coast Council Flood Emergency Sub Plan), and no such duplication of material (or change in defined roles and responsibilities) has been included herein.

The legislative framework for emergency management in NSW and its relationship with coastal management legislation and the CMP is articulated in the Guideline for Preparing a Coastal Zone Emergency Action Subplan (Department of Planning, Industry & Environment (2019), and is illustrated in Figure 3-1.

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
BoM	Bureau of Meteorology
CM Act	<i>Coastal Management Act 2016</i>
CMP	Coastal Management Program
CZEAS	Coastal Zone Emergency Action Subplan
DCCEEW	Department of Climate Change, Energy, Environment & Water, formerly Department of Planning & Environment
EMPLAN	State Emergency Management Plan
EOC	Emergency Operations Centre
FRNSW	Fire and Rescue NSW
LEMC	Local Emergency Management Committee
EOCON	Emergency Operations Controller
NPWS	National Parks and Wildlife Service
REOCON	Regional Emergency Operations Controller
RH SEPP	State Environmental Planning Policy, Resilience and Hazards
SERM Act	<i>State Emergency and Rescue Management Act 1989</i>
SES	NSW State Emergency Service

1. Introduction

1.1 Background

Coastal communities and local councils are facing difficult issues associated with coastal hazards along the NSW Coastline. NSW has a framework for managing coastal risks through the *Coastal Management Act 2016* and the Coastal Management Manual 2018.

This report develops a Coastal Zone Emergency Action Subplan (CZEAS) for the Central Coast Open Coast Coastal Management Program area based on the requirements of the *Coastal Management Act 2016* as outlined in the Coastal Management Manual for those area subject to immediate hazards from coastal inundation, erosion and cliff instability.

1.2 Purpose and Objectives

According to the statutory provision in the *Coastal Management Act*, a coastal zone emergency action subplan is a plan that outlines the roles and responsibilities of all public authorities (including Council) in response to emergencies immediately preceding or during periods of beach erosion, coastal inundation or coastal cliff and slope instability, where these processes occur through storm activity or an extreme or irregular event. For the purpose of this subsection, these roles and responsibilities include the carrying out works for the protection of property affected or likely to be affected by coastal hazards.

The objectives of the CZEAS are to:

- set a clear definition for what constitutes a coastal emergency, and associated triggers for emergency response actions
- identify key areas and assets subject to immediate hazards from erosion, inundation and/or cliff instability and priorities action to reduce the risks to those areas and assets
- outline the roles and responsibilities of all public authorities, including Central Coast Council, and coordinate their response to emergencies immediately preceding or during periods of beach erosion, coastal inundation and coastal cliff and slope instability
- outline the communication required in the four phases of emergency management
- summarise key actions to be carried out in the four phases of the emergency
- identify approval pathways for CZEAS actions

The Plan includes actions covering the four (4) phases of emergency management as described in the Coastal Management Manual, namely:

- Prevention
- Preparedness
- Response
- Recovery

Note that the emergency action subplan must not include matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* (such as the SES Central Coast Flood Emergency Sub Plan), and no such duplication of material (or change in defined roles and responsibilities) has been included herein.

The legislative framework for emergency management in NSW and its relationship with coastal management legislation and the CMP is articulated in the Guideline for Preparing a Coastal Zone Emergency Action Subplan (Department of Planning, Industry and Environment, 2019), and is illustrated in Figure 3-13-1.

1.3 Consultation

A draft copy of the CZEAS will be provided to those agencies involved in the implementation of the CZEAS, such as NSW Department of Climate Change, Energy, Environment & Water (DCCEEW), NSW State Emergency Service (SES) and approval agencies for review and comment. A final CZEAS will be developed that addresses any feedback received.

1.4 Study Area

The study area for the CZEAS includes the Central Coast open coast areas covered in the Central Coast CMP.

The study area is shown in Figure 1-1.



Figure 1-1: CZEAS Area

2. Establishing the Context

2.1 What is an Emergency?

An “emergency” is defined in the *State Emergency and Rescue Management Act 1989* and the NSW 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, being an emergency which requires a significant and co-ordinated response.*

For the purpose 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.”*

A “coastal emergency” in the context of this emergency action Subplan can therefore be defined as an actual or imminent occurrence of a coastal hazard event which “endangers, or threatens to endanger, the safety or health of persons or animals” or “destroys or damages, or threatens to destroy or damage, any property, being an emergency which requires a significant and co-ordinated response.”

Beach erosion is defined as occurring when wind, waves, currents or elevated ocean water levels are removing sediment that comprises the beach and frontal dune system, landward of the fully accreted condition. Beach erosion can create risks to public and private assets and present public safety risk. Not all beach erosion occurring during a storm event will trigger a coastal emergency.

Coastal inundation is defined in the NSW Coastal Management Manual Part B (DP&E, 2018) as occurring when a combination of marine and atmospheric processes raises ocean water levels above normal elevations, inundating low-lying areas. It is often associated with storms resulting in elevated still water levels (storm surge), wave setup, wave runup and wave overwash flows. For the estuaries, this type of inundation is the result of water levels at the estuary entrances being elevated above normal levels due to coastal storms, with the elevated water levels propagating inside the estuary. For the open coast, it is associated with wave overtopping of beach dunes and the extent of wave runup onto the back-beach area.

Note that the NSW State Flood Plan under the State Emergency and Rescue Management Act 1989 covers emergency actions at the state level for floods, which include “...*coastal inundation* resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences” (NSW State Flood Plan, 2021).

Cliff or slope 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 by surface and groundwater flows. Instability may occur during or following a coastal storm event, but may also occur at other times.

A “coastal emergency” in the context of this CZEAS can therefore be defined as an actual or imminent occurrence of a beach erosion, coastal inundation or cliff/slope instability event which “endangers, or threatens to endanger, the safety or health of persons or animals” or “destroys or damages, or threatens to destroy or damage, any property, being an emergency which requires a significant and co-ordinated response.”

2.2 Emergency Management Measures

The Emergency Management Measures described in this Subplan have been formulated to cover the four phases of emergency management as described in the NSW Coastal Management Manual and the SERM Act, namely:

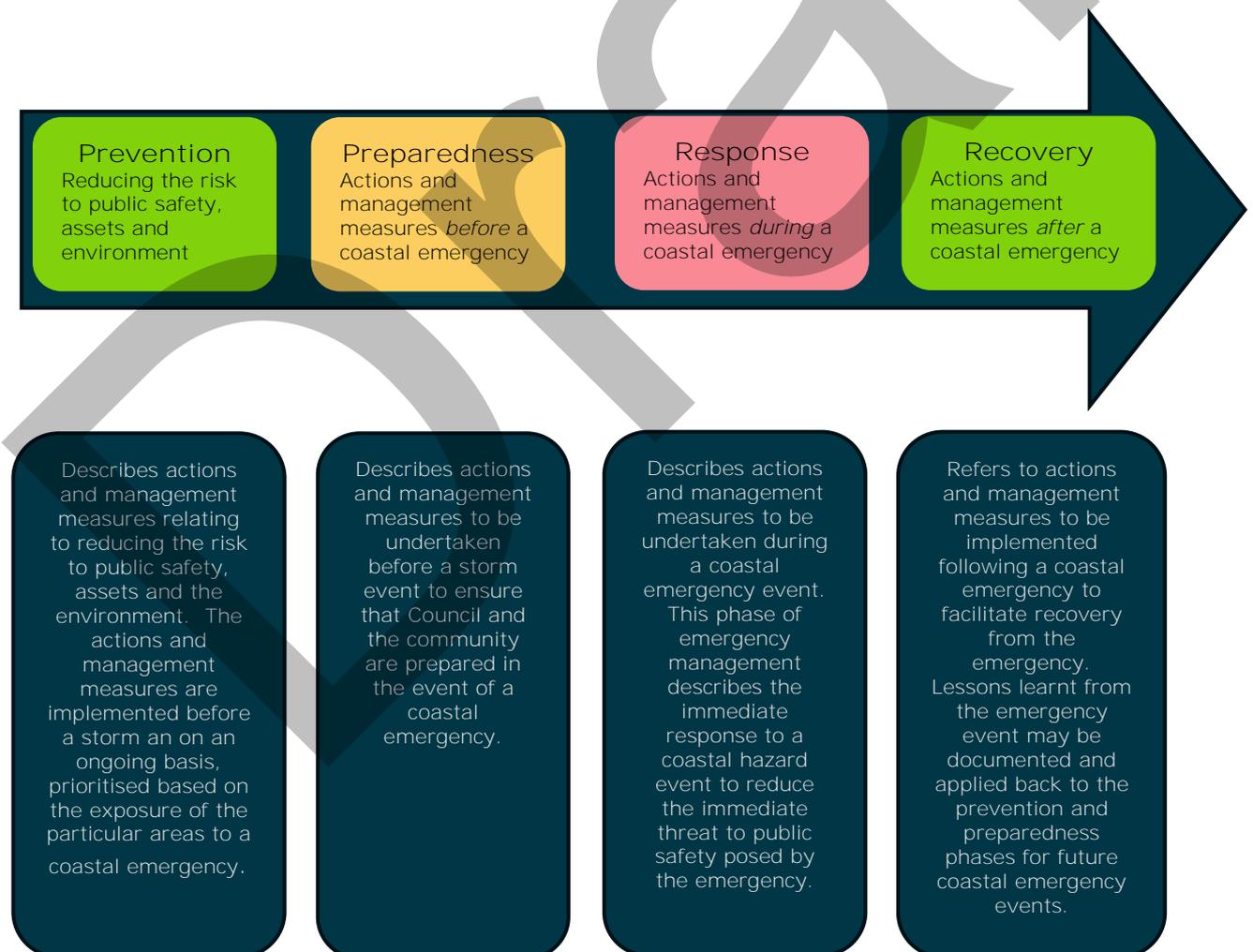


Figure 2-1: The Four Phases of Emergency Management

2.3 Triggers for Action

The actions contained in this CZEAS are triggered by the release of a “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides” from the Bureau of Meteorology. This is the same trigger as that used by the NSW State Emergency Service (NSW SES) as a primary test of whether or not they should be involved in a potential coastal erosion (and/or inundation) event.

The Bureau of Meteorology specifies thresholds when issuing warnings of 'severe' storms. **These are consistent across the range of the Bureau’s warning services (as outlined in the NSW State Storm Plan).** For coastal emergencies, the relevant thresholds are:

- Waves equal to or exceeding 5m in height in the surf zone.
- Sea level higher than 50cm above the Highest Astronomical Tide (Abnormally High Tides and Storm Surge).

In addition to the official warnings from the Bureau of Meteorology, the NSW State Storm Plan stipulates that the response phase of the storm plan is triggered when information processes or intelligence indicates imminent or actual storm impacts to the community. For example, if there is no official warning from the Bureau of Meteorology, other evidence may be used to determine that there is a coastal hazard risk to the community that will trigger the actions in this CZEAS i.e. verbal advice from the Bureau of Meteorology, advice issued from the Department of Climate Change, Energy, Environment & Water (DCCEEW) Coastal Expert.

A prescriptive set of trigger conditions that would be used to initiate individual Council actions in relation to coastal hazard emergencies is difficult to stipulate, as such conditions would be unlikely to cover every situation. Examples of complexities include variability in storm conditions (wave height and period, wave direction, water level, location of rips), state of the tide, state of the beaches/dunes etc. and forecasts. In practice, expert engineering judgement would need to be applied at times of storms to assess when to initiate particular (during-storm) actions as required. This approach relies on regular monitoring of environmental conditions and seeking appropriate advice when required.

A proposed set of conditions for triggering the Preparedness, Response and Recovery phases of the CZEAS is presented in Figure 2-22-1. This includes proposed local triggers. Monitoring data sources that can be used to determine whether trigger levels have been met are provided in Table 2-1.

Table 2-1 Data sources for monitoring for trigger events, LGA-wide and local triggers

Phase	Trigger	Data Sources
Prevention Phase	Prevention actions are to be undertaken as soon as practicable and are independent of the occurrence of a coastal inundation emergency	<p>BoM Interactive Weather and Wave Forecast Maps: http://www.bom.gov.au/australia/charts/viewer/index.shtml</p> <p>NSW Weather and Warnings Summary: http://www.bom.gov.au/nsw/index.shtml?ref=hdr</p>
Preparedness Phase	<p>LGA-wide trigger: Significant wave height at Sydney to exceed 5 m within next 5 days</p> <p>Site specific triggers: Sydney Hs forecast to exceed 3m, direction ESE to NE within next 5 days apply at the following locations, subject to advice/consultation with DCCEEW:</p> <ul style="list-style-type: none"> • MacMasters Beach (south of lagoon) • Avoca (south of lagoon) • Terrigal • Wamberal (south of Wamberal lagoon) • Toowoan Bay • Blue Bay • The Entrance • The Entrance North • Norah Head 	<p>BoM Interactive Weather and Wave Forecast Maps: http://www.bom.gov.au/australia/charts/viewer/index.shtml</p> <p>NSW Weather and Warnings Summary: http://www.bom.gov.au/nsw/index.shtml?ref=hdr</p> <p>Refer also</p> <p>Wave forecasts at NSW Nearshore Wave Tool website: https://nearshore.waves.nsw.gov.au/home/forecast</p>
Response Phase	<p>LGA-wide trigger: Significant wave height at Sydney to exceed 5 m within next 12 hours</p> <p>Site specific triggers: Sydney Hs forecast to exceed 3m, direction ESE to NE within next 12 hours, OR coastal hazards are impacting critical public infrastructure. Site specific triggers apply at the following locations, subject to advice/consultation with DCCEEW:</p> <ul style="list-style-type: none"> • MacMasters Beach (south of lagoon) • Avoca (south of lagoon) • Terrigal • Wamberal (south of Wamberal lagoon) • Toowoan Bay • Blue Bay • The Entrance • The Entrance North • Norah Head 	<p>BoM Interactive Weather and Wave Forecast Maps: http://www.bom.gov.au/australia/charts/viewer/index.shtml</p> <p>NSW Weather and Warnings Summary: http://www.bom.gov.au/nsw/index.shtml?ref=hdr</p> <p>Refer also</p> <p>Wave forecasts at NSW Nearshore Wave Tool website: https://nearshore.waves.nsw.gov.au/home/forecast</p>

Phase	Trigger	Data Sources
Recovery Phase	Wave heights fall below trigger levels for 24 hours, BoM lifts warnings and confirmation that danger has passed received from DCCEEW	BoM Interactive Weather and Wave Forecast Maps: http://www.bom.gov.au/australia/charts/viewer/index.shtml NSW Weather and Warnings Summary: http://www.bom.gov.au/nsw/index.shtml?ref=hdr

2.3.1 Who is the lead Agency?

During an emergency, hazard specific EMPLANS are implemented by the identified lead Combat Agency.

The State Emergency Service (SES) is the lead Combat Agency during a coastal emergency response which triggers an EMPLAN for storm activity (NSW State Storm Plan 2023). Under the NSW State Storm Plan (2023) Action 1.4.3 identifies that the emergency management of coastal erosion not caused by storm activity will be controlled and coordinated by the Emergency operations Controller (EOCON). Council would follow the direction of the Combat Agency and provide support as outlined within the Central Coast Local EMPLAN, Central Coast Flood Emergency Subplan, NSW State Storm Plan 2023 and this CZEAS.

However, CZEASs can be implemented without enforcement of Local, Regional or State EMPLANS. Coastal emergencies which do not trigger the implementation of EMPLANS under the SERM Act will be managed by Council, with assistance from appropriate response agencies for situations where the **coastal emergency exceeds Council's resources and capabilities**. For example, if **Council's** ongoing beach monitoring identifies that the beaches are in a depleted state following recent coastal erosion events, there is a risk of a coastal emergency requiring action by Council being triggered without an EMPLAN for storm activity being triggered.

This relationship is outlined in Figure 2-3.

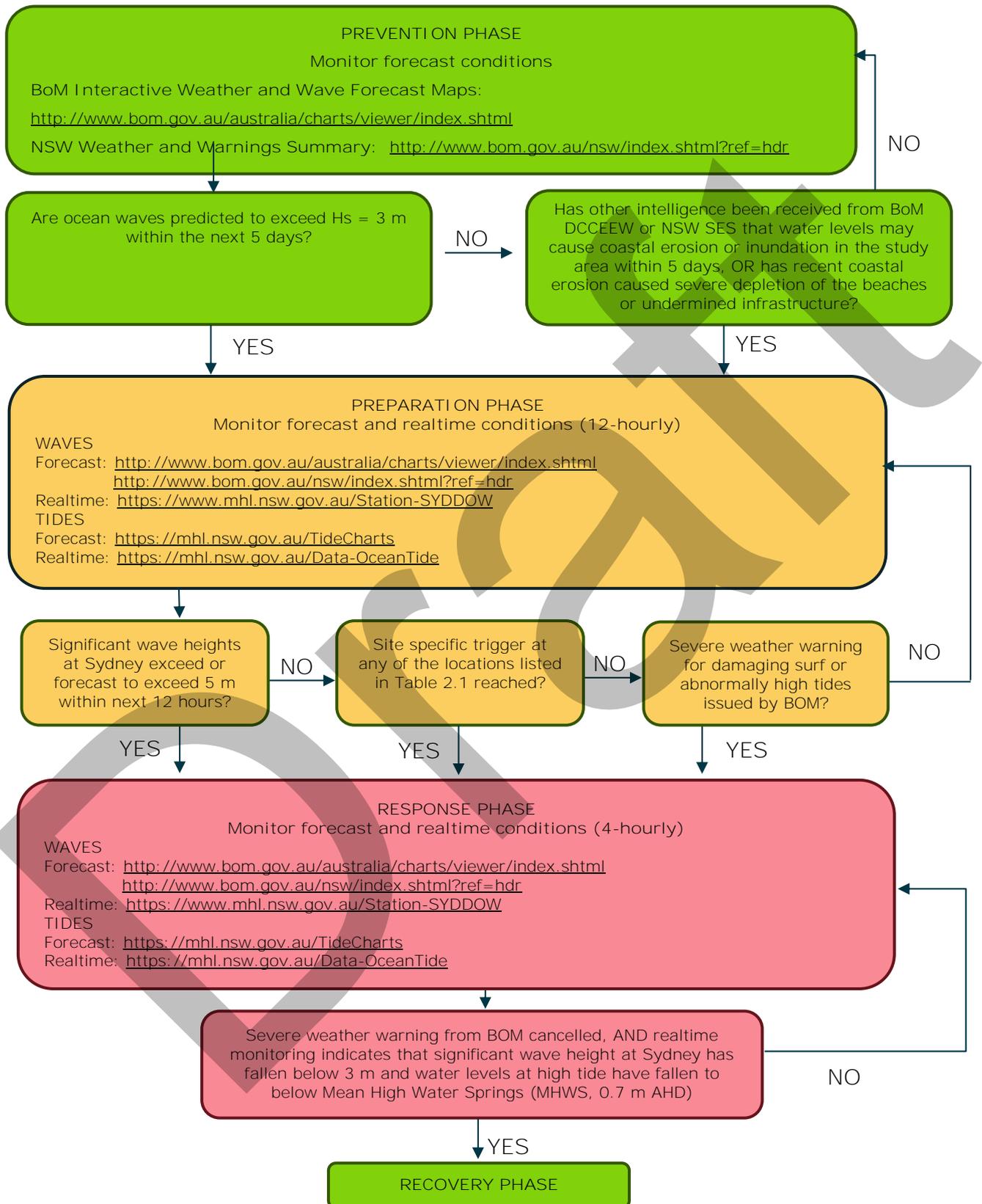


Figure 2-2: Trigger conditions for preparedness, response and recovery phases of CZEAS



Figure 2-3: Lead Agency for Coastal Emergencies

3. Roles and Responsibility in Coastal Emergency Management

3.1 Overview

The roles and responsibilities of the State Emergency Service (SES), Central Coast Council, Department of Climate Change, Energy & Environment (DCCEE), Bureau of Meteorology and NSW Police in coastal emergency management are described below. Further discussion on these matters is provided in the *NSW State Storm Plan (2023)* as well as the Local Emergency Plan, State Flood Plan and Local Flood Plan in relation to flooding (coastal inundation).

3.2 CZEAS Relationship to other State Emergency Plans

The relationship of this CZEAS to other State Emergency Plans is illustrated in Figure 3-13-1. A brief overview of these Plans, which are made under the SERM Act, is described below. As noted in Section 1, a CZEAS must not include matters dealt with in any plan made under the SERM Act and no such duplication of material (or change in defined roles and responsibilities) has been included herein.

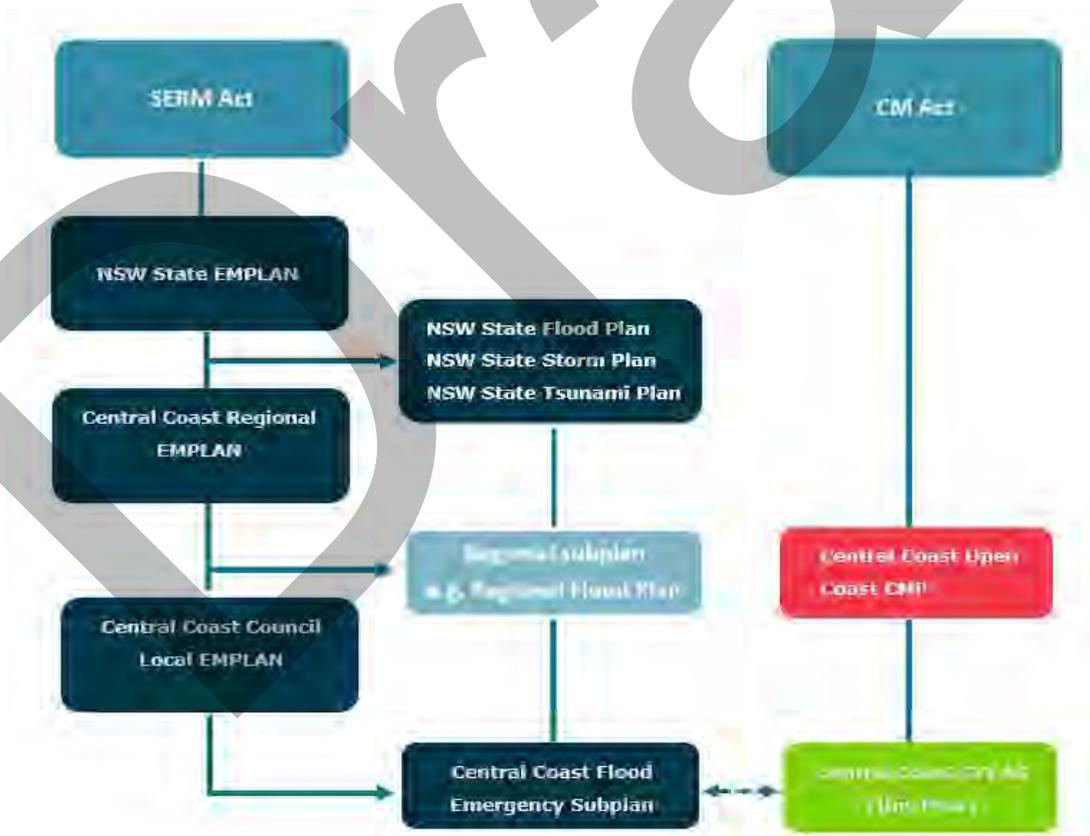


Figure 3-1: Simplified legislative framework for emergency management in NSW and its relationship with coastal management legislation and coastal management programs related to coastal hazards (NSW DPIE, 2019)

Table 3-1 Roles and Responsibilities of Agencies with a role in Emergency Management

Agency	Role
Central Coast Council	<ul style="list-style-type: none"> No protection of private homes or structures is proposed under this CZEAS. Develop and implement this CZEAS within coastal vulnerability areas in accordance with the requirements of the CM Act, and provide the NSW SES with a copy of this CZEAS (NSW SES 2023). Consult with NSW SES in the development of council emergency arrangements including this CZEAS to ensure compatibility with the NSW State Storm Plan (NSW SES 2023). Assist the NSW SES with community awareness programs to ensure people in locations potentially threatened by coastal inundation understand the threat and its management (NSW SES 2023). Subject to the availability of council resources, assist the NSW SES with storm damage operations, including reconnaissance, traffic management on council managed roads, provision of plant, equipment, and personnel, including headquarters staff where able and as requested (NSW SES 2023). Council is the designated coastal authority with responsibility for care of public land within its care, control and management as per the CM Act. The carrying out (or authorising and co-ordinating) of coastal emergency protective works to protect public assets from coastal erosion and inundation is Council's role, if it chooses to undertake such measures. However, works would not be practical or appropriate for the protection of property against coastal hazards within the study area, due to the large number of properties affected. Construction of coastal protection works during a coastal emergency is also unlikely to be effective due to the scale of the area affected, ocean conditions and safety considerations for workers and the public. For these reasons construction of coastal protection works under this CZEAS is not recommended. Implement emergency actions in this CZEAS relating to Prevention & Preparation, Response and Recover phases.
Emergency Operations Controller (EOCON)	<p>Monitor coastal emergency event operations.</p> <p>Coordinate support to the NSW SES Local Incident Controller, if requested to do so.</p>
Regional Emergency Operations Controller (REOCON)	<p>The REOCON is responsible for the overall control and coordination of emergency response operations at Region level for which the REOCON is the designated controller (NSW State Emergency Management Plan 2023).</p> <p>The REOCON is also the designated controller where there is no designated Combat Agency, or where it is necessary to coordinate two or more local level operations which are controlled by Emergency Operations Controllers, or when directed by the SEOCON.</p> <p>The REOCON is responsible, when requested by a combat agency, to co-ordinate the provision of resources support.</p>
State Emergency Operations Controller (SEOCON)	<ul style="list-style-type: none"> Responsible for the control and coordination of emergency response operations at State level, for which the SEOCON is the designated Controller or where there is no designated Combat Agency (NSW State Emergency Management Plan 2023). Provide advice to the Minister regarding emergencies, including whether or not a declaration of a 'State of Emergency' may be necessary. Consider requests for State or Commonwealth assistance. Coordinate the establishment of a Major Evacuation Centre in accordance with Major Evacuation Centre Guidelines if required.
NSW State Emergency Service	<p>NSW State Emergency Service (SES) is responsible for the protection of persons from danger, to their safety and health, and to protect property from destruction or damage arising from storms (SES Act, 1989).</p> <p>Designated Combat Agency for flood, storm and tsunami.</p> <p>Warning and evacuation of residents at risk and coordinating protection of property (e.g., sandbagging to minimise entry of water into buildings and lifting and/or relocating readily moveable household goods and commercial stock and equipment). These activities would</p>

Agency	Role
	<p>be carried out in accordance with the NSW SES Local Flood Sub Plan, NSW Flood Plan and NSW State Storm Plans. NSW SES’s legislated role is to assist in the short-term transition to recovery.</p> <p>NSW SES is <u>not</u> authorised to undertake coastal emergency protective works (such as placement of rocks or sand-filled geotextile containers) of any form.</p> <p>The NSW State Storm Plan (2023) outline specific roles for the NSW SES for storm activity likely to result in coastal erosion and/or inundation.</p> <p>During an emergency event the NSW SES will deliver public information warnings in line with Australian Warning System (AWS) Framework.</p>
<p>Department of Climate Change, Energy, the Environment and Water</p>	<p>DCCEEW is the NSW government authority responsible for advising on coastal zone management.</p> <p>The role of DCCEEW is defined in the NSW State Storm Plan (2023) as:</p> <ul style="list-style-type: none"> • Oversee the delivery of the NSW Coastal legislation including financial support through the CMP and technical advice to Council and state agencies including assistance with the identification of risks in areas which are subject to coastal erosion, the preparation and implementation of management plans and programs and associated mitigation and management actions • Advise the NSW SES about conditions which may lead to coastal erosion. • Provide storm damage response teams to assist the NSW SES and National Parks and Wildlife Service (NPWS). • Provide related advice on coastal hazards to the NSW SES on request. • Support recovery committees as required.
<p>Bureau of Meteorology</p>	<p>The BoM role in relation to storm events including coastal inundation is outlined within the NSW State Storm Plan (2023). This includes:</p> <ul style="list-style-type: none"> • maintaining, coordinating, and delivering operational 24-hour weather forecast and warning services to the NSW community. • Provide weather, wave, and sea level information directly to the NSW SES, SEMC and other relevant agencies. • Provide the NSW SES with intelligence that conveys the development and progression of storm events. • Formulating, issuing, and publishing official forecasts and warnings and including NSW SES safety messages within warnings. <p>A “Severe Weather Warning for Damaging Surf” is issued if waves in the nearshore zone are forecast to exceed a significant wave height of 5 m (irrespective of wave period) in the next 24 hours. A “Severe Weather Warning for Abnormally High Tides” is issued if storm surge, wave setup or and/or outflow from river flooding are expected to raise ocean water levels significantly above Highest Astronomical Tide.</p>
<p>NSW Police Force</p>	<p>The NSW Police Force is the agency responsible for:</p> <ul style="list-style-type: none"> • law enforcement and search and rescue • controlling and coordinating the evacuation of victims from the area affected by the emergency in conjunction with the combat agency being the combat agency for terrorist acts. <p>Some members of the NSW Police may also be appointed as Emergency Operations Controllers.</p> <p>The role of the NSW Police in relation to storms including coastal erosion and coastal inundation are outlined within the NSW State Storm Plan and the NSW Flood Plan. Police would typically become involved in a coastal emergency event as follows:</p> <ul style="list-style-type: none"> • assisting NSW SES where required (for example assisting with warnings and/or evacuations and road and traffic control operations and managing disaster victim registrations/evacuation) <p>The NSW Police Force is <u>not</u> responsible for controlling, coordinating or mitigating any physical mitigation works to protect properties or structures at risk from coastal erosion or inundation, either during or outside the period of storm activity.</p>
<p>NSW Rural Fire Service (RFS)</p>	<p>The role of NSW Rural Fire Service in relation to coastal emergencies is outlined within the State Storm and NSW Flood Plans. They have a Mutual Aid Agreement with the NSW SES</p>

Agency	Role
	<p>and would have a support role assisting the SES during a coastal emergency. In particular, NSW RFS would become involved during a coastal emergency in the following ways:</p> <ul style="list-style-type: none"> • assist the NSW SES in monitoring / reconnaissance of areas potentially damaged by storms • provide storm damage response teams to assist the NSW SES, including strike teams when requested, to assist the NSW SES • assist with the evacuation of at-risk communities • provide staff to support a spatial information group established by the NSW SES.
National Parks and Wildlife Service (NPWS)	<p>Roles and responsibilities are outlined in NSW State Storm Plan (NSW SES, 2023) and NSW State Flood Plan (NSW SES, 2021) and include:</p> <ul style="list-style-type: none"> • Assist the NSW SES with identification of road infrastructure in National Parks at risk from storms. • Close and reopen NPWS managed roads when affected by storms and advise the NSW SES of its status. • Facilitate safe reliable access by emergency resources on NPWS managed roads. • Assist the NSW SES with the communication of warnings and information provision to the public through variable message signs and other appropriate means.
Transport for NSW (TfNSW)	TfNSW (Maritime), following the direction of the NSW Police Force will assist in the identification and recovery of vessels.
Reconstruction Authority	<p>The NSW Reconstruction Authority (RA) was established to proactively reduce the impact of future disasters across NSW and to help communities recover from them faster. When disasters occur, RA work closely with emergency services and community leaders to understand what local communities need to recover. Once the immediate threat has eased, we lead recovery efforts in collaboration with community leaders and other recovery partners.</p>
Other agencies	<p>Other agencies with a role in Emergency Management include:</p> <ul style="list-style-type: none"> • NSW Ambulance • Department of Justice, Office of Emergency Management • Housing NSW • Marine Rescue NSW • NSW Reconstruction Authority • NSW Volunteer Rescue Association • Surf Lifesaving NSW <p>Full details of the role of these Agencies are described in the NSW State Storm Plan (NSW SES 2023) and NSW State Flood Plan (NSW SES, 2021).</p>

4. Coastal Hazards

4.1 Overview

This CZEAS applies to those locations identified as being affected by beach erosion, coastal inundation or cliff and slope instability as noted in the latest Open Coast CMP coastal hazard study (Bluecoast Consulting Engineers, 2024).

It is possible that coastal hazards could affect additional locations not currently identified as being at risk within the open coast of Central Coast LGA. If further locations become at risk, Council should assess these locations and revise this CZEAS to include the new locations.

4.2 Areas Subject to Coastal Hazards

Those private and public assets and infrastructure at risk from beach erosion have been identified using the immediate hazard line mapping **from Council's adopted coastal hazard** mapping dataset (Bluecoast Consulting Engineers, 2024).

The areas identified at immediate risk of beach erosion are shown in Table 4-14-1.

The CM Act defines critical infrastructure as infrastructure for the following purposes: electricity generation, transmission and distribution, telecommunications, rails, roads, gas, sewerage systems, water supply systems of stormwater management systems, airports, ports shipping and harbours. Particular attention should be given to at risk critical infrastructure.

Table 4-1: Locations where roads and infrastructure are impacted by coastal hazards for the 1% AEP, in the present day

Location	Scenario	Infrastructure and property at risk under Present day	Temporary Road Closures/ Triggers for Action
Killcare SLSC (refer Map C1 Appendix A)	1% AEP	Inundation (wave runup/overtopping) of foreshore reserve in front of SLSC Erosion risk to SLSC building and local beach accessways Slope instability risk at cliffs south of SLSC building	<ul style="list-style-type: none"> Close access to SLSC for general public, authorised personnel only allowed Close beach accessways in immediate erosion zone.
MacMasters Beach (refer Map C2 Appendix A)	1% AEP	Inundation (wave runup/overtopping) of Marine Parade and parking spaces on seaward side of Marine Parade Erosion risk to Marine Parade Erosion risk to SLSC Slope instability risk at cliffs south of SLSC building Erosion risk to seaward side of properties at Tudibaring Parade	<ul style="list-style-type: none"> Close access to Marine Parade for general public at Gerda Road, authorised personnel only allowed Close beach accessways in immediate erosion zone.
Copacabana (refer Map C2 Appendix A)	1% AEP	Erosion Risk to Del Monte Place Slope instability risk to private properties and foreshore reserve at top of cliffs to east of Copacabana Beach, Del Monte Place	<ul style="list-style-type: none"> Close access to Del Monte Place for general public between Del Mar Drive and Del Rio Drive; provide local diversion via Del Rio Drive. Close beach accessways in immediate erosion zone.
Avoca Beach (refer Map C3 Appendix A)	1% AEP	Inundation (wave runup/overtopping) of private lots, public reserve, carpark and SLSC building at Avoca Drive Inundation (wave runup/overtopping) of private lots, carpark and Heazlett Park, Ficus Avenue Inundation (wave runup/overtopping) at Burns Street Isolation of beachfront lots along Avoca Drive and Ficus Avenue Coastal erosion at seaward ends of approximately ten private lots at Avoca Drive	<ul style="list-style-type: none"> Avoca Drive, Burns St, Ficus avenue for general public but allow access for emergency services, residents and evacuation. Install local traffic diversions Close beach accessways in immediate erosion zone.
North Avoca (refer Map C3 Appendix A)	1% AEP	Inundation (wave runup/overtopping) of roadway and private lots at Bareena Avenue Inundation (wave runup/overtopping) of roadway and private lots at Lake Street Inundation (wave runup/overtopping) of roadway and private lots at Ocean Street	<ul style="list-style-type: none"> Close access to Lake Street and Bareena Avenue at Lake Street landward of Bareena Avenue intersection, but allow access for emergency services, residents and evacuation. Close access to Ocean Street at Elgata Avenue intersection, but allow access for emergency services, residents and evacuation.

Location	Scenario	Infrastructure and property at risk under Present day	Temporary Road Closures/ Triggers for Action
		<p>Inundation (wave runup/overtopping) of roadway and private lots at North Avoca Parade</p> <p>Inundation (wave runup/overtopping) of roadway and private lots at View Street</p> <p>Inundation (wave runup/overtopping) of roadway and private lots at Elgata Avenue</p> <p>Slope instability risk to private lots and roadway at Scenic Highway</p> <p>Coastal erosion risk at seaward ends of oceanfront lots</p> <p>Coastal erosion risk at approximately six beach accessways</p>	<ul style="list-style-type: none"> • Close access to View Street at Elgata Avenue intersection, but allow access for emergency services, residents and evacuation. • Close access to North Avoca Parade at Bulbabaring Road, but allow access for emergency services, residents and evacuation. • Assess landslip risk at Scenic Drive and close access to at-risk zone shown in Map C3 if required.
<p>Terrigal</p> <p>(refer Map C4 in Appendix A)</p>	<p>1% AEP</p>	<p>Inundation (wave runup/overtopping) of commercial centre at Terrigal Esplanade, Church Street, Campbell Cres.</p> <p>Inundation, wave overtopping and slope instability at the Terrigal Boardwalk</p> <p>Wave overtopping of seawall at Terrigal Haven</p> <p>Slope instability at The Skillion</p> <p>Wave overtopping of seawall at Terrigal Esplanade</p>	<ul style="list-style-type: none"> • Close pedestrian access to Terrigal Boardwalk at either end with barricades • Close access to Terrigal Esplanade between Campbell Crescent and Kurrawyba Avenue for public access, evacuation and emergency services only • Close access to Church Street between Church Street and Kurrawyba Avenue, for public access, evacuation and emergency services only • Install local traffic diversions as required.
<p>Wamberal</p> <p>(refer Map C5 in Appendix A)</p>	<p>1% AEP</p>	<p>Coastal erosion and inundation (wave runup/overtopping) of all private lots seaward of Pacific Street</p> <p>Coastal erosion and inundation (wave runup/overtopping) of all private lots seaward of Ocean View Drive between Pacific Street and Calais Road</p> <p>Coastal erosion and inundation (wave runup/overtopping) of all private lots and SLSC building seaward of Calais Road</p>	<ul style="list-style-type: none"> • Ocean View Drive will be key evacuation route • Monitor ongoing erosion at 25/25B Ocean View Drive for risk of wave overtopping and breakthrough to Terrigal Lagoon. If erosion escarpment reaches trigger distance of 15 m from edge of road and Preparedness phase of CZEAS triggered, install emergency coastal protection

Location	Scenario	Infrastructure and property at risk under Present day	Temporary Road Closures/ Triggers for Action
			works at this location (refer Map C5 and Section 8 for details)
Forresters Beach (refer Map C6 in Appendix A)	1% AEP	Geotechnical hazard affecting land seaward from Kalakau Avenue and North Scenic Road, public land, amenities and private lots	<ul style="list-style-type: none"> Close public beach accessways where impacted by slope instability, monitor and repair damaged infrastructure as required
Bateau Bay (refer Map C7 in Appendix A)	1% AEP	Geotechnical hazard affecting land seaward from Reserve Drive, public land and beach access in hazard zone	<ul style="list-style-type: none"> Close public beach accessways where impacted by slope instability, monitor and repair damaged infrastructure as required
Blue Lagoon (refer Map C7 in Appendix A)	1% AEP	Geotechnical hazard affecting land seaward from Bateau Bay Road (landward of Blue Lagoon Beach Resort) Beach accessways at erosion risk	<ul style="list-style-type: none"> Close beach accessways where unsafe and impacted by coastal erosion Monitor and repair damaged infrastructure as required.
Shelly Beach (refer Map C8 in Appendix A)	1% AEP	Coastal erosion hazard impacting beach accessways	<ul style="list-style-type: none"> Close beach accessways where unsafe and impacted by coastal erosion
Toowoan Bay (refer Map C9 in Appendix A)	1% AEP	Coastal inundation (wave runup and overtopping) impacting Toowoan Bay carpark, SLSC building, foreshore reserve Geotechnical instability hazard impacting private lots behind beach Coastal erosion hazard impacting beach accessways	<ul style="list-style-type: none"> Monitor and repair damaged infrastructure as required.
Blue Bay (refer Map C9 in Appendix A)	1% AEP	Coastal inundation (wave runup and overtopping) impacting seaward end of private lots and beach accessways Geotechnical instability hazard impacting private lots behind beach Coastal erosion hazard impacting seaward end of private lots and beach accessways	<ul style="list-style-type: none"> Close beach accessways where unsafe and impacted by coastal erosion
The Entrance (refer Map C9 in Appendix A)	1% AEP	Coastal inundation impacting seaward end of lots at Marine Parade Slope instability impacting along parts of Marine Parade	<ul style="list-style-type: none"> Monitor and repair damaged infrastructure as required. Monitor The Entrance foreshore coastal protection works for undermining/potential for collapse and

Location	Scenario	Infrastructure and property at risk under Present day	Temporary Road Closures/ Triggers for Action
The Entrance North (refer Map C10 in Appendix A)	1% AEP	Coastal inundation at Hutton Road, Hargraves St., Roberts St., Leonard St., Florida St. Manly Pde., Bondi St., Coogee Ave., Mini St., Curtis Parade, Wyuna Avenue, Central Coast Highway Coastal erosion risk at all oceanfront lots on Hutton Road south of Hargraves St. Coastal erosion risk at all oceanfront lots on Curtis Parade	close access to foreshore reserve/shared pathway if required <ul style="list-style-type: none"> Temporary road closures possible at Hutton Road, Hargraves St., Roberts St., Leonard St., Florida St. Manly Pde., Bondi St., Coogee Ave., Mini St., Curtis Parade, Wyuna Avenue, Central Coast Highway
Soldiers Beach and Norah Head (refer Map C11 in Appendix A)	1% AEP	Coastal inundation Bald St. Norah Head Slope instability at Cabbage Tree Harbour and Jenny Dixon Beach	<ul style="list-style-type: none"> Temporary closure of beach accessways at Soldiers Beach
Hargraves Beach and Lakes Beach (refer Map C12 in Appendix A)	1% AEP	Slope instability at Cabbage Tree Harbour and Jenny Dixon Beach Coastal inundation and erosion risk at Elizabeth Drive, and oceanfront lots at Budgewoi Road, Hargraves Beach Possible coastal erosion and inundation risk at The Lakes SLSC	<ul style="list-style-type: none"> Temporary closure of Elizabeth Drive and/or Budgewoi Road due to wave overtopping/coastal inundation, at locations shown in map.

5. Communication Protocols

As part of the CZEAS, the *Guidelines for Preparing a Coastal Zone Emergency Action Subplan* (NSW DPIE 2019) stipulate that a communication protocol to be used before, during and after a coastal emergency will need to be prepared. The protocol is to outline procedures to:

- engage with landholders in the coastal vulnerability area to raise awareness of coastal emergency events and the dangers these conditions may present
- inform landholders of actions council will take during an emergency, what actions a landholder may need to take and any assistance that may be available to them
- issue safety advice to landowners and the community of the likelihood of an impending emergency that would initiate actions under the CZEAS
- advise Council staff of all emergency management procedures and ensure they have the capacity to respond.

A proposed communications protocol is presented below.

Table 5-1. Communications protocol for this CZEAS

Emergency Phase	Communications
Prevention (sunny-day preparedness)	<ul style="list-style-type: none"> • Share information with NSW SES for incorporation into coastal inundation planning and intelligence for the study area and for updating the Local Flood Plan. • Make a copy of the CZEAS available through Council's existing Emergency website • Provide practical emergency management information to the community through Council's website and in the form of signage and brochures at local community centres. • Inform the community of Council's intended emergency responses under this CZEAS to improve readiness for emergency events. • Contribute to emergency management-related community engagement activities coordinated by the NSW SES and/or the LEMC. • Through the LEMC, provide routine emergency management briefings to communicate the strategy outlined in this plan including coastal emergency triggers, areas at risk, roles and responsibilities and response action plan.
Preparation (before a storm)	<ul style="list-style-type: none"> • Seek advice from NSW SES, BoM or coastal experts from DCCEEW-CPHR to assess potential for occurrence of a coastal emergency and, subject to availability of resources, offer assistance that may be requested by NSW SES (in accordance with the arrangements set out within the NSW State Storm Plan). • Contact authorised personnel responsible for emergency plant and equipment to ensure personnel are on stand-by and sufficient sandbags, sand stockpiles, warning signage and road closure barricades/tape are available for use if required.
Response (during a storm)	<ul style="list-style-type: none"> • If a coastal emergency is as a result of storm/flood/tsunami - NSW SES as the combat agency will coordinate all public information during the response phase. If not, council is responsible for public information. • In consultation with the NSW SES and BoM, provide public information about approaching coastal emergencies where possible through digital means. This would involve updates to Council's emergency website keeping messaging consistent with the national approach outlined in the Australian Warning System Framework (AIDR 2021); i.e. Advice (yellow), Watch and Act (orange), Emergency Warning (red), refer Section 5.1.

Emergency Phase	Communications
	<ul style="list-style-type: none"> Coordinate with the NSW SES to ensure residents are aware of urgent hazards during emergency events and provide assistance with door-to-door communication as necessary Accurately record and report information relevant to Council emergency response activities and any real time coastal inundation information (including road closure information) to the NSW SES Incident Controller. This may be in the form of a combined Emergency Operations Centre (EOC) report, or direct from agencies where an EOC has not been established. Subject to availability of resources, offer assistance that may be requested by NSW SES.
Recovery (after a storm)	<ul style="list-style-type: none"> Document records of decisions made and the reasoning in making those decisions (before, during and after coastal inundation emergencies). Liaise with property owners as required to ensure any private and/or public structures do not pose a risk to the public.

5.1 Australian Warning System Framework

In accordance with the Communications Protocol outlined in this CZEAS, Council is to consult with the NSW SES and BoM, in order to help provide public information about approaching coastal emergencies.

The design of Council’s external messaging during an emergency event should be aligned with the Australian Warning System framework (AIDR, 2021) – which is a national approach to information and warnings during emergencies like bushfire, flood, storm, extreme heat, and severe weather.

There are three warning levels, provided in as per AIDR (2021).

Table 5-2 Warning levels from the Australian Warning System Framework (AIDR 2021)

Alert Level	Description
Advice (Yellow)	An incident has started. There is no immediate danger. Stay up to date in case the situation changes.
Watch and Act (Orange)	There is a heightened level of threat. Conditions are changing and you need to start taking action now to protect you and your family.
Emergency Warning (Red)	An Emergency Warning is the highest level of warning. You may be in danger and need to take action immediately. Any delay now puts your life at risk.

A consistent set of hazard icons has been developed for each warning level. There are icons for cyclone, bushfire, flood, extreme heat, storm, and other. There is a consistent shape and colour scheme, with icons increasing in size as the warning level increases.

For coastal hazards, it is suggested that the most appropriate icon to use is the icon for flood, or “other” as provided below in Figure 5-1.



Figure 5-1 National Hazard Icons under the Australian Warning System Framework.

Table 5-3. Action statements for coastal inundation under each warning level.

Table 5-3 Action statements for coastal inundation under each warning level

Advice	Watch and Act	Emergency Warning
Prepare now	Prepare to leave/evacuate	Leave/evacuate (immediately, by am/pm/hazard timing)
Stay informed	Leave/evacuate now (if you are not prepared)	Seek/take shelter now
Monitor conditions	Prepare to take shelter	Shelter indoors now
Stay informed/threat is reduced	Move/stay indoors	Too late/dangerous to leave
Avoid the area	Stay near shelter	
Return with caution	Walk two or more streets back	
	Monitor conditions as they are changing	
	Move to higher ground (away from creeks/rivers/coast)	
	Avoid the area/avoid the flooded area	
	Stay away from damaged buildings and other hazards	
	Prepare for isolation	
	Do not enter flood water	
	Not safe to return	
	Prepare your property (cyclone/storm)	

6. Emergency Management Measures

6.1 LGA-wide Actions

The following table provides a list of actions for the CZEAS including:

- triggers for implementation of the CZEAS
- the identification of actions that Council should undertake before, during and after a coastal erosion or inundation emergency.

Note that the CZEAS is independent of the Central Coast Local Emergency Subplan but may be triggered at the same time as this CZEAS. Council will need to fulfil its required responsibilities and undertake action under that plan in conjunction with the actions outlined in this CZEAS.

6.2 Site-Specific Actions

In addition to the LGA-wide actions specified in the table below that would apply generally to all areas impacted by a coastal emergency, site-specific emergency actions that would apply to particular locations are outlined in individual site plans in Appendix A.

Table 6-1: Prevention Phase Actions for CZEAS for Central Coast Open Coast CMP

Action	Trigger/Timing	Responsibility
1.1 Make this CZEAS available to all relevant Stakeholders identified in Section 3 of the CZEAS.	Immediate/Ongoing.	Council
1.2 Share information with NSW SES for incorporation into coastal hazard planning and intelligence for the study area. Specifically, this includes the results of the Central Coast Coastal Hazard Study (Bluecoast Consulting Engineers, 2024)	Immediate.	Council, NSW SES
1.3 Inform the community regarding the risk of coastal hazards in the study area and inform the community of the Council's intended emergency responses under the CZEAS. In some areas, private property is within the immediate coastal hazard area and is at risk from coastal erosion or inundation. For those areas, it is important that local landowners: <ul style="list-style-type: none"> • Know what to do, where to go and who to contact for assistance in a coastal emergency. • Are educated and empowered to maintain the foreshore under their control as required to reduce the risk to their property. Council can encourage foreshore residents to maintain preparedness for a coastal hazard events, including maintaining and preparing a home FloodSafe Plan through the NSW SES website. Through Council's website , provide advice to the community, landholders and the NSW SES about the potential for a coastal emergency from coastal hazards, and the types of responses that are permitted and not permitted. Contribute to emergency management-related community engagement activities coordinated by the NSW SES through the LEMC.	Ongoing	Council
1.4 Apply development controls to developments in the coastal hazard areas in accordance with Council's LEP and DCP. The CMP includes an action to develop CVA mapping for the study area, which will formally identify land in the study area subject to coastal inundation . Through development of a Planning Proposal to update Council's DCP and LEP to include mapping of the CVA , Council can reduce the risk to new developments by applying development controls on floor levels and stipulating special conditions for building foundations. Council can also apply existing development controls for new developments for areas identified as flood-prone land, which will be relevant to reducing the risk from coastal inundation also.	As per CMP	Council, DCCEEW
1.5 Maintain a plant and equipment resource list for equipment necessary to enact the actions in this Subplan. This would include maintaining details of equipment location, standard operating procedures for its use, authorised personnel responsible and contact details for the proper use of the plant and equipment. Obtain the necessary permits/approvals to allow post-storm recovery actions to be carried out in those areas where public infrastructure is at risk.	Initiate list as soon as possible and update every six months	Council, NSW SES

Action	Trigger/Timing	Responsibility
<p>Liaise with NSW SES to identify sources of materials potentially held by NSW SES Community Action Teams and where they can be stored. This may include sand and sandbags, signage/barricades for road closures.</p>		
<p>1.6 Develop a communications protocol to be used at all stages of a coastal emergency.</p> <p>The communications protocol would formalise operational activities between Council, NSW SES and EOCON for circumstances where an EOC has not been established.</p> <p>If a coastal emergency is as a result of storm/flood/tsunami - NSW SES as the combat agency will coordinate all Public Information during the response phase. If not, council is responsible for public information..</p>	Ongoing	Council, DCCEEW, NSW SES
<p>1.7 Consult with NSW SES and other Local Emergency Management Committee (LEMC) members, and DCCEEW-CPHR, to ensure this CZEAS remains consistent with the relevant local, regional, and state-based emergency management plans.</p> <ul style="list-style-type: none"> • At LEMC meetings and directly as required • Following update to the relevant local, regional, and state-based emergency management plans 	Upon finalisation of CZEAS, and to be reviewed in accordance with the CMP review process.	Council, LEMC
<p>1.8 Review and update this CZEAS in line with any future CVA mapping or CMP implementation.</p>	In conjunction with CMP preparation and review process. Refer to CMP management action EW-E02 relating to the development of a CVA for the estuaries.	Council, DCCEEW
<p>1.9 Establish internal operational protocol and procedures for all coastal erosion and inundation scenarios in the study area for LEMO, Council’s coastal officers and works crews and communications staff.</p> <p>This would include up-to-date personal contact details for key council staff involved in coordinating actions under the CZEAS (include responsibilities of staff who prepare for, manage and coordinate recovery from a coastal emergency event) and individuals the council may need advice from, such as DCCEEW staff, or to integrate with personnel from other emergency sectors. The procedure would detail resourcing, internal training, testing and periodic review requirements.</p>	Upon finalisation of CZEAS, and to be reviewed in accordance with the CMP review process.	Council, LEMC
<p>1.10 Monitoring of physical environmental conditions to assess potential for occurrence of coastal emergency and seeking appropriate advice when required.</p> <p>Refer to Figure 2-2 for monitoring requirements and Table 2-1 for data sources and site-specific triggers.</p>	As specified in Figure 2-2 and Table 2-1 to assess potential for emergency event to occur within next 5 days	Council, NSW SES, DCCEEW

Table 6-2: Preparedness Phase Actions for CZEAS for Central Coast Open Coast CMP

Action	Trigger/Timing	Responsibility
<p>2.1 Monitoring of physical environmental conditions to assess potential for occurrence of coastal emergency and seeking appropriate advice where required.</p> <p>Refer to Figure 2-2 for monitoring requirements and Table 2-1 for data sources and site-specific triggers. Use this information to assess threats to life and property arising from a coastal emergency.</p> <p>BoM's Interactive Weather and Wave Forecast Maps: http://www.bom.gov.au/australia/charts/viewer/index.shtml</p> <p>New South Wales Weather and Warnings Summary: (http://www.bom.gov.au/nsw/index.shtml?ref=hdr)</p>	<p>Refer to Figure 2-2 for monitoring requirements and Table 2-1 for data sources and site-specific triggers.</p> <p>Twice-daily after Preparedness Phase Trigger</p>	<p>Council, DCCEEW, NSW SES, BoM</p>
<p>2.2 Ensure signage to close Council-managed roads and public areas, and signage warning of coastal hazard risks are available for use during coastal emergencies. Ensure appropriate plant, equipment and experienced personnel are available for protection of assets at risk. Both internal and external personnel will be required based on specific scope of works.</p> <p>Materials needed may include sandbags, sand stockpiles, warning signage and road closure barricades/tape to close off damaged and potentially dangerous roads or access points. Ensure the stockpiles of equipment will be accessible when water levels rise, or sufficient access to equipment is obtained prior to water levels rising.</p> <p>A list of roads and access points to be considered is provided in Section 4.2 and are mapped in Appendix A.</p> <p>Alert affected land managers about access requirements to enable freedom of movement for personnel, plant and equipment during the emergency.</p>	<p>As soon as practicable after Preparedness Phase triggered.</p>	<p>Council</p>
<p>2.3 Initiate communications protocol described in this CZEAS to advise the community of the likelihood of an impending coastal inundation emergency that would initiate actions under the Subplan.</p> <p>This would include consulting with NSW SES and other relevant agencies such as DCCEEW as required. Note that NSW SES would only be communicating AWS products, should community need to be evacuated.</p> <p>Initiate updates to Council's emergency website that provide essential information to the community at https://emergency.centralcoast.nsw.gov.au/dashboard/overview</p> <p>In support of the NSW SES, advise affected landholders to activate their home FloodSafe Plan if they have this in place.</p>	<p>Within 24 hours after Preparedness Phase triggered</p>	<p>Council, NSW SES, DCCEEW</p>
<p>2.4 Inform Council staff about the emergency responses within this plan and ensure relevant personnel have copies of the plan.</p>	<p>Within 24 hours after Preparedness Phase triggered</p>	<p>Council, NSW DPHI Crown Lands</p>

Table 6-3: Response Phase Actions for CZEAS for Central Coast Open Coast CMP

Action	Trigger/Timing	Responsibility
<p>3.1 Monitoring of physical environmental conditions to assess whether trigger conditions for response actions in this CZEAS are reached.</p> <p>Refer to Figure 2-2 for monitoring requirements and Table 2-1 for data sources and site-specific triggers.</p> <p>Use this information to assess threats to life and property arising from a coastal emergency.</p> <p>BoM's Interactive Weather and Wave Forecast Maps: http://www.bom.gov.au/australia/charts/viewer/index.shtml</p> <p>New South Wales Weather and Warnings Summary: (http://www.bom.gov.au/nsw/index.shtml?ref=hdr)</p>	<p>When response phase of this CZEAS triggered in accordance with Figure 2-2 and Table 2-1.</p> <p>Four-times daily monitoring of forecasts and realtime data once Response phase triggered.</p>	<p>Council, DCCEEW, NSW SES, BoM</p>
<p>3.2 The LEMC (inc. Council LEMO) should consider Council advice regarding consider Warnings and Triggers, and advice provided by the NSW BoM. From here SEOCON, REOCON, LEOCON and NSW SES to are decide on the emergency management process (supported by Council). This may include the establishment of an Emergency Operations Centre (EOC).</p>	<p>Once Response phase triggered</p>	<p>SEOCON REOCON LEOCON NSW SES</p>
<p>3.3 I nitiate erection of safety barriers or safety signage across potentially dangerous access points on roads assessed within the CZEAS to be vulnerable to coastal hazards.</p> <p>Refer to the coastal hazard maps in Appendix A and specific locations listed in Section 4.2 of this CZEAS as a guide to assess locations where action such as road closures will be required. Sections of roadway that may be subject to inundation that pose a high public safety risk should be temporarily closed to public access. This can be done through erection of temporary barricades, cyclone fencing and/or signage.</p> <p>Undertake inspection of these areas where it is safe to do so and inform the NSW SES of any intelligence on unforeseen impacts of coastal inundation gathered during the emergency. In a potential emergency event, the foreshore areas listed in Table 4-1 should be inspected daily, particularly at high tide, where resources permit. Work with NSW SES and NSW DCCEEW-CPHR to collect data during and after coastal inundation events (e.g. RTK survey of debris lines, photographs of inundated or eroded areas).</p> <p>Assist the NSW SES to enact closure of access points that the NSW SES Incident Controller has deemed to be unsafe and that may not have been identified as specific locations of coastal erosion or inundation risk within this CZEAS.</p> <p>Council will coordinate the closure and reopening of council managed roads once inspections have been carried out by the relevant authority.</p> <p>Accurately record and report information relevant to Council emergency response activities and any real time coastal</p>	<p>Once Response phase triggered</p> <p>Council may consider minor assets at risk, such as access tracks, viewing platforms or picnic facilities, to be not worthy of protection due to the relatively low cost of the works, which can be reconstructed if damaged following a coastal inundation event.</p> <p>It is not appropriate or practical to attempt to protect minor assets such as dune fencing, bins and signage in any emergency. These could be removed to prevent damage, repaired or replaced as required (where appropriate).</p> <p>Council staff should not attempt to undertake works if conditions are assessed to be too dangerous</p> <p>As soon as practicable after Response Phase being triggered, inspections daily during</p>	<p>Council</p>

Action	Trigger/Timing	Responsibility
<p>inundation information (including road closure information) to the NSW SES Incident Controller. This may be in the form of a combined Emergency Operations Centre (EOC) report, or direct from agencies where an EOC has not been established.</p>	<p>Response Phase only if/when safe to do so.</p>	
<p>3.4 Install temporary fencing and/or signage on council managed land (e.g. foreshore reserves) affected by coastal inundation or erosion resulting from major storm activity or an extreme or irregular event, where this has resulted in unsafe conditions.</p> <p>Note: In an emergency response phase, only limited emergency coastal protection works would be possible within the short time frames available. The only possible activities may include assisting with regular sandbagging of low-lying public infrastructure (such as SLSCs) to mitigate some impacts of coastal inundation only. All other considerations would be on a case-by-case basis and are unlikely to be feasible.</p>	<p>Once Response phase triggered</p> <p>Once identified from monitoring as being required</p>	<p>Council</p>
<p>3.5 Support the NSW SES to advise landholders, residents, public authorities and other organisations that a coastal emergency is likely or is occurring and that actions in the CZEAS are to be implemented.</p> <p>This includes updating Council's emergency website that provides essential information to the community at https://www.centralcoast.nsw.gov.au/plan-and-prepare-emergency and disaster dashboard https://emergency.centralcoast.nsw.gov.au/dashboard/overview</p> <p>Co-ordinate the release of information to the media through the NSW SES Incident Control Centre in accordance with the arrangements in the Central Coast Local EMPLAN.</p>	<p>Once Response phase triggered</p> <p>In accordance with directions from the NSW SES.</p>	<p>Council</p>
<p>3.6 Provide support to NSW SES in accordance with the provisions in the Central Coast Local EMPLAN as required and where resources allow</p> <p>Provision of assistance to NSW SES (plant, equipment, and personnel where able and requested), and technical advice on the impacts of coastal erosion and inundation.</p>	<p>Once Response phase triggered</p> <p>As requested by NSW SES</p>	<p>Council</p>
<p>3.7 Manage Essential Infrastructure under Council control (water supply and sewerage operations).</p> <p>Liaise with utility providers during coastal inundation events about key council managed infrastructure such as sewerage treatment and water supply that are likely to or may become impacted by coastal hazards.</p>	<p>Once Response phase triggered</p> <p>As required</p>	<p>Council</p>
<p>3.8 Liaise with other agencies (e.g., Transport for NSW, NSW DPHI – Crown Lands, National Parks and Wildlife Service) if debris from coastal erosion or inundation creates a safety hazard in adjoining areas (or liaise with road owners to enable closure).</p>	<p>Once Response phase triggered and realtime conditions indicate coastal inundation/coastal erosion is expected to be occurring,</p> <p>As required</p>	<p>Council</p>

Table 6-4: Recovery Phase Actions for CZEAS for Central Coast Open Coast CMP

Action	Trigger/Timing	Responsibility
<p>4.1 Initiate Recovery phase of CZEAS once waves and water levels have fallen below trigger levels.</p> <p>Continue to monitor waves and water levels throughout the event, and initiate the Recovery Phase of the CZEAS 24 hours after the cancellation of the Severe Weather Warning from the Bureau of Meteorology, AND realtime monitoring indicates that significant wave height at Sydney has fallen below 3 m AND water levels at high tide have fallen to below Mean High Water Springs.</p> <p>Monitor physical environmental conditions to assess whether the trigger conditions to initiate the recovery phase have been reached</p>	<p>Initiate the Recovery Phase of the CZEAS 24 hours after the cancellation of the Severe Weather Warning from the Bureau of Meteorology, AND realtime monitoring indicates that significant wave height at Sydney has fallen below 3 m AND water levels at high tide have fallen to below Mean High Water Springs.</p> <p>Once trigger is reached</p>	Council
<p>4.2 Assess and where practical, remove any threats to public safety, such as debris deposited or exposed in public areas.</p> <p>Where required, supporting agencies will assist with clean-up operations after coastal inundation events, where possible when resources and personnel permit. NSW SES will support the short-term transition to recovery as per the State Recovery Plan and NSW Flood Plan.</p>	<p>As soon as possible once Recovery Phase has been initiated.</p> <p>As required</p>	Council, NSW SES
<p>4.3 Assess and reopen Council-managed roads and access points once inspections have been carried out by the relevant authority and deemed safe to do so.</p> <p>Maintain temporary safety fencing and associated warning signage, as necessary. Liaise with NSW-SES as required.</p>	<p>As soon as possible once Recovery Phase has been initiated.</p> <p>As required.</p>	Council, NSW SES, NSW DCCEEW
<p>4.4 Undertake post-storm reconnaissance of affected areas to gather intelligence including recording of maximum erosion or inundation levels, mapping of inundation extents, surveys of debris marks, post-event damage assessments etc.</p> <p>Use the intelligence gathered to improve future CZEAS operations and share resources/work with the NSW SES and NSW DCCEEW to assist in future decision-making.</p>	<p>As soon as possible once Recovery Phase has been initiated.</p> <p>Initiate within 24 hours after Recovery Phase has been triggered</p>	Council

Action	Trigger/Timing	Responsibility
<p>Collate and maintain photographic and written records of events and decision-making processes.</p>		
<p>4.5 Assess, repair and/or replace any essential Council-owned/managed structures that are damaged as a result of a coastal emergency.</p> <p>Assess the structural integrity of unprotected assets affected by or damaged during the emergency event. Geotechnical, structural and/or coastal engineering investigations may be required to understand residual risk following an emergency event. Expert advice to be sought as required.</p> <p>Assess and prioritise structures and access for repair based on public safety, and carry out remedial works to restore safe residential access in accordance with the assessed priority.</p> <p>Timely repair and replacement of any essential Council-owned/managed structures that are damaged as a result of a coastal emergency is required.</p>	<p>As soon as possible once Recovery Phase has been initiated.</p> <p>As required.</p>	<p>Council</p>
<p>4.6 Restore safe foreshore access in public spaces.</p> <p>This may require regrading of eroded steep embankments greater than 1 m in vertical height to 1V:4H at designated public access points to restore foreshore amenity.</p>	<p>As soon as possible once Recovery Phase has been initiated.</p> <p>Initiate within 1 week after Recovery Phase has been triggered.</p>	<p>Council</p> <p>Supporting Role: NSW DPHI Crown Lands, NPWS</p>
<p>4.7 Replenish any emergency materials and supplies for future emergency events.</p> <p>This refers to items that can be stored at Council premises specifically for emergency events, and items that may have a long lead-time to procure e.g. barricades for road closures.</p>	<p>After Recovery Phase has been initiated.</p> <p>Initiate within 1 week after Recovery Phase has been triggered.</p>	<p>Council, NSW SES, NSW DCCEEW</p>
<p>4.8 Remove any temporary coastal protection works placed during the coastal emergency in accordance with the requirements of the CM Act.</p> <p>Obtain expert coastal engineering advice to assess the safety and condition of any temporary coastal protection works placed during the coastal emergency and remove these if required, or seek the appropriate development approval for these to remain in place, based on expert advice.</p>	<p>After Recovery Phase has been initiated.</p> <p>Initiate within 90 days after Recovery Phase has been triggered.</p>	<p>Council, NSW SES, NSW DCCEEW</p>

Action	Trigger/Timing	Responsibility
<p>4.9 Participate in post-event community engagement e.g. community forums, workshops, or other opportunities to provide communities a chance to provide feedback, address any concerns and provide input into the recovery process.</p> <p>These will typically include other agencies such as the Reconstruction Authority and Welfare Services</p>	<p>After Recovery Phase has been initiated.</p> <p>As required</p>	<p>Council, NSW SES, NSW DCCEEW, BoM</p>
<p>4.10 Undertake After Action critical review of the CZEAS in conjunction with NSW SES, DP&E and LEMC to assess its effectiveness.</p> <p>Update this Subplan as required to improve future emergency management operations. Lessons learnt from the emergency event may be documented and applied back to the prevention and preparedness phases for future coastal emergency events.</p>	<p>After Recovery Phase has been initiated.</p> <p>Initiate when practicable after Recovery Phase triggered</p>	<p>Council, NSW SES, NSW DCCEEW</p>
<p>4.11 Monitor unauthorised erosion or inundation protection works through Council development compliance process.</p> <p>Liaise with property owners to ensure any private and/or public structures do not pose a risk to the public. Issue orders under the <i>Local Government Act 1993</i> and/or the <i>Environmental Planning and Assessment Act 1979</i> when properties are deemed structurally unsafe, or where erosion or inundation protection works have been constructed illegally or result in exposure of contamination/landfill, or where structures otherwise pose a risk to the public. Ensure premises are fit and safe for reoccupation and assess any need for demolition.</p>	<p>After Recovery Phase has been initiated.</p> <p>Ongoing</p>	<p>Council</p>

7. Emergency Coastal Protection Works

Emergency coastal protection works are defined in the RH SEPP as:

'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'.

7.1 Approvals Pathway

A public authority may carry out coastal protection works 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
- Coastal protection works that are identified in a coastal zone emergency action sub plan.

If the works are not in accordance with the above, they would need to be assessed for approval by the relevant Regional or Local Planning Panel.

Emergency protection measures are to be undertaken in consultation with a suitably qualified coastal or geotechnical engineer.

Note that in an emergency response phase, only limited emergency coastal protection works would be possible within the short time frames available. The only possible activities may include assisting with regular sandbagging of low-lying public infrastructure (such as SLSCs) to mitigate some impacts of coastal inundation only. All other considerations would be on a case-by-case basis and are unlikely to be feasible.

Locations where emergency protection works may be carried out, the nature of the works and triggers are identified in this CZEAS in Table 7-1 and shown in the maps in Appendix A.

Table 7-1: Locations where emergency coastal protection works may be carried out, nature of works and triggers.

Location	Type of Works	Trigger
Marine Parade, MacMasters Beach between Gerda Road and MacMasters SLSC (Map C2)	<p>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.</p> <p>Emergency protection measures are to be undertaken in consultation with suitably qualified coastal or geotechnical engineer.</p> <p>Temporary access works may include a range of activities e.g. placing sand filled geotextile bags, erecting temporary barriers, emergency vehicle access. Works may include placement of sand on an opportunistic basis from entrance management activities at Cockrone lagoon, beach scraping, or other works with appropriate approvals in place.</p> <p>The CMP identifies this area as requiring long term adaptive management.</p>	<p>Preparedness Phase:</p> <p>Decision made by Council with DCCEEW advice that works are recommended, but will be dependent on availability of materials, resources and potential exposure to coastal hazard</p> <p>Recovery Phase:</p> <p>Placement of sand on an opportunistic basis from entrance management activities at Cockrone lagoon</p> <p>Beach scraping to restore safe pedestrian access to beach</p> <p>Long term adaptive management in accordance with CMP to develop design and approval for proposed adaptive management solution.</p>
Wamberal Beach at publicly owned frontage 25A-A and 25 B Ocean View Drive (Map C5)	<p>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.</p> <p>Emergency protection measures are to be undertaken in consultation with suitably qualified coastal or geotechnical engineer.</p> <p>Temporary access works may include a range of activities e.g. placing sand filled geotextile bags, erecting temporary barriers, emergency vehicle access. Works may comprise placement of sand on an opportunistic basis from entrance management activities at Terrigal or Wamberal lagoons, beach scraping, or other works with appropriate approvals in place.</p>	<p>Preparedness Phase:</p> <p>Works to be considered as a preventative measure for breakthrough of Terrigal Lagoon if erosion scarp reaches 15 m trigger distance from the seaward edge of Ocean View Drive and CZEAS Preparedness Phase triggered.</p> <p>Placement of sand from entrance management activities at Terrigal or Wamberal lagoons if available.</p> <p>Recovery Phase:</p> <p>Beach scraping to encourage onshore sand movement and restore safe beach access. Placement of sand on an opportunistic basis from entrance management activities at Terrigal or Wamberal lagoons.</p>
The Entrance North between Karagi Point Reserve and Hargraves Street (Map C10)	<p>Works comprise opportunistic sand nourishment sourced from entrance management activities at Tuggerah Lakes Entrance, to be placed within the indicated area on Map C10, triggered by the Preparedness Phase of the CZEAS, and at other times if and when available as per management action in the CMP.</p> <p>Post-storm beach scraping at Council managed beach accessways to be carried out to make accessway safe.</p> <p>Other coastal protection works if approved under relevant approval pathway.</p>	<p>Preparedness Phase: if available and with advice from a suitably qualified Coastal Engineer.</p> <p>Recovery Phase: Post-storm beach scraping at Council managed beach accessways to be carried out to make accessway safe.</p> <p>Prevention Phase/Recovery Phase: If and when sand is available as per management action in the CMP.</p>

8. References

AIDR. (2021). The Australian Warning System – Companion Document to Public Information and Warnings. Australian Institute for Disaster Resilience.

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Bureau of Meteorology (2024) Thunderstorm and Severe Weather Service Level Specification, Community Services Group, Season 2023-2024, February.

CCC/NSW SES. (2021). *Central Coast Council Flood Emergency Sub Plan*.

Department of Planning, Industry and Environment. (2019). *Guideline for Preparing a Coastal Zone Emergency Action Subplan*.

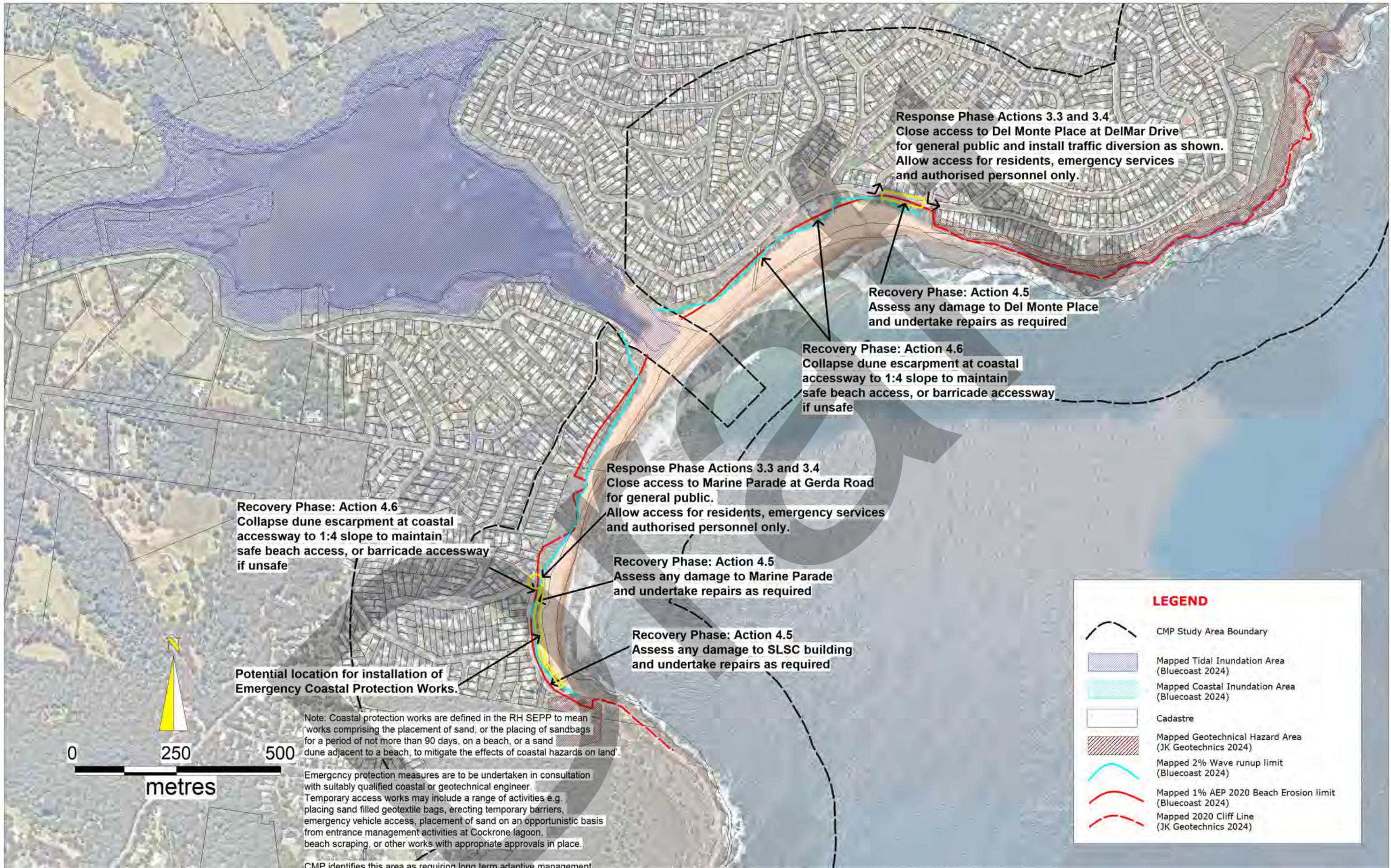
JK Geotechnics. (2023). *Geotechnical Assessment for Central Coast Open Coast and Coastal Lagoons CMP*.

Appendix A. Local Area Emergency Plans
Site-Specific Action Plans and Maps

Draft



DATE 30.05.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map C1 2020 Coastal Hazard Areas Killcare	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



DATE
23.03.2025

COORDINATE SYSTEM
MGA 94 Zone 56

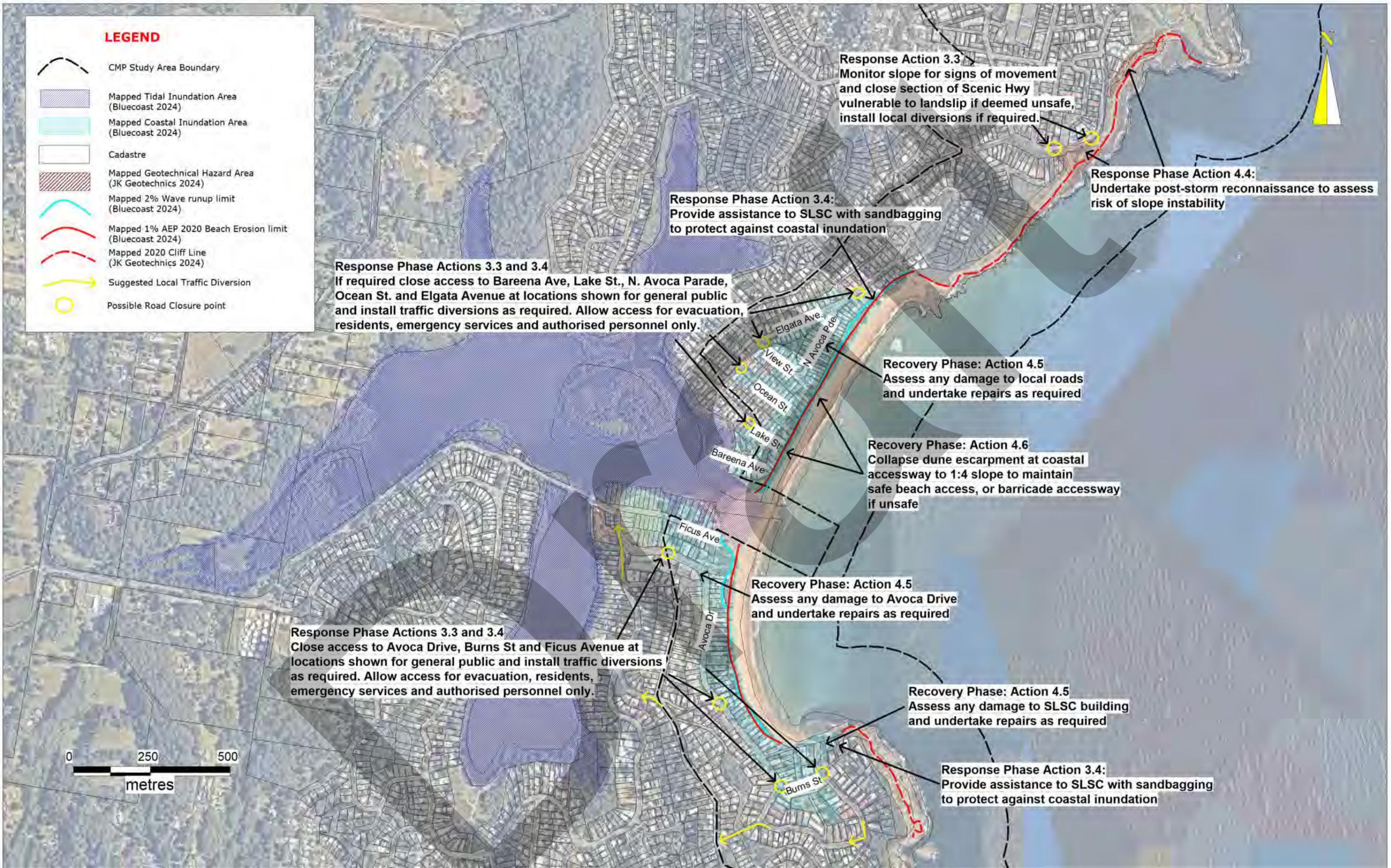
FIGURE TITLE
Map C2
2020 Coastal Hazard Areas
MacMasters/Copacabana

PROJECT NO. 311015-00572

PROJECT TITLE
Central Coast Open Coast
Coastal Management Program

CREATED BY CA





DATE
30.05.2025

COORDINATE SYSTEM
MGA 94 Zone 56

PROJECT NO. 311015-00572

PROJECT TITLE Central Coast Open Coast Coastal Management Program

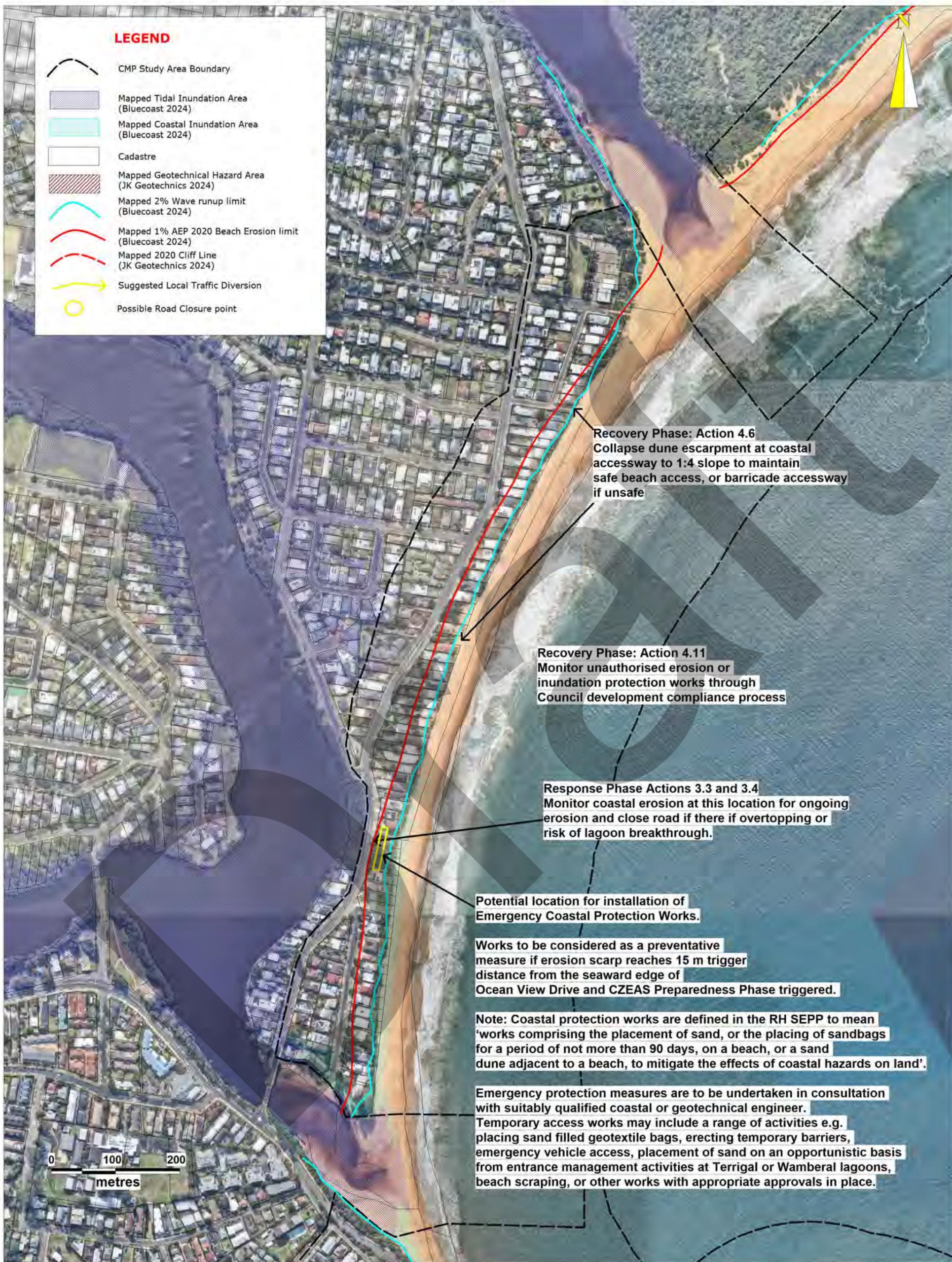
FIGURE TITLE Map C3
2020 Coastal Hazard Areas
Avoca/North Avoca

CREATED BY CA

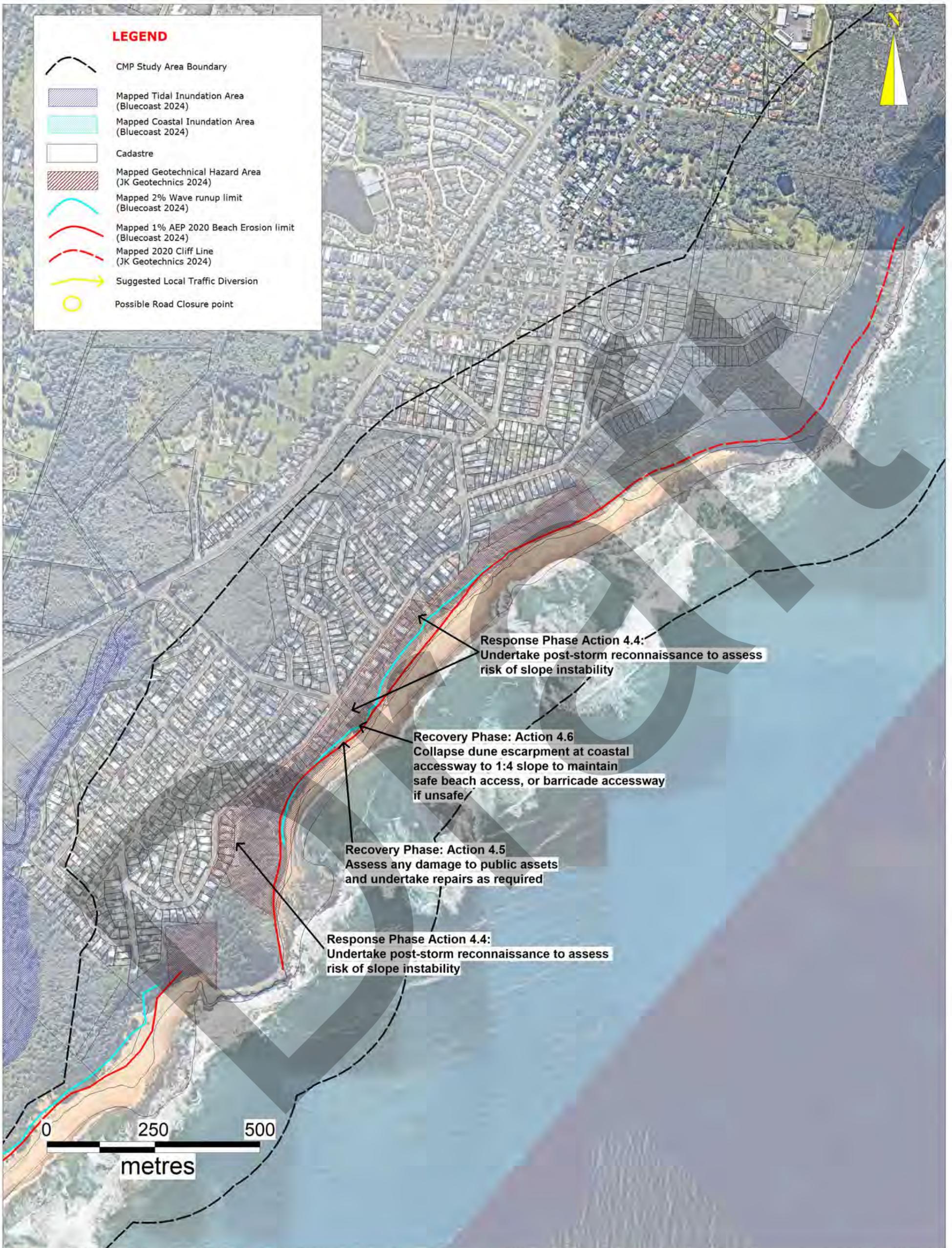




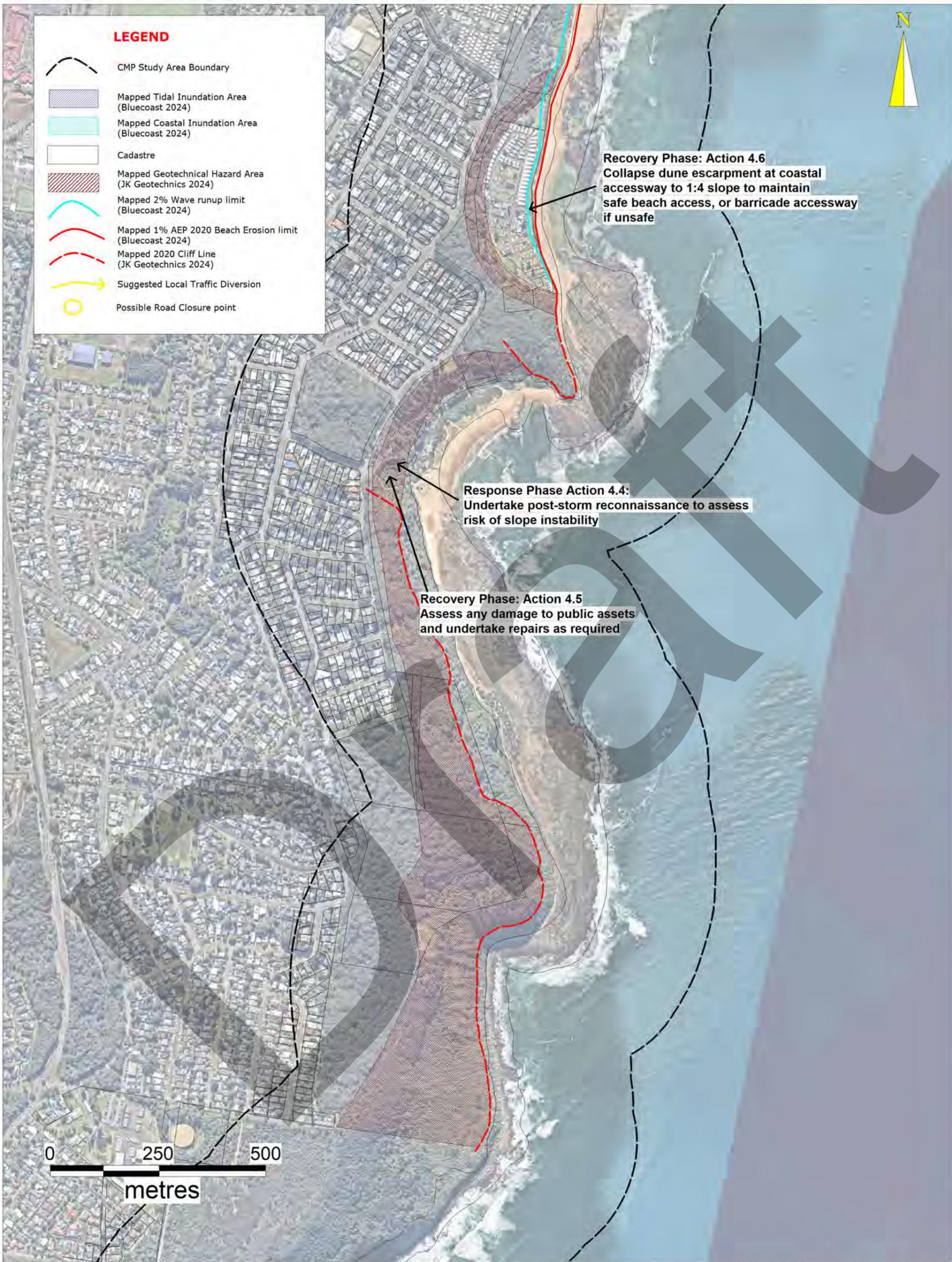
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30.05.2025	MGA 94 Zone 56	Map C4 2020 Coastal Hazard Areas Terrigal	
PROJECT NO.	PROJECT TITLE	CREATED BY	
311015-00572	Central Coast Open Coast Coastal Management Program	CA	



DATE 30.05.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map C5 Wamberal 2020 Coastal Hazards	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



DATE 30.05.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map C6 2020 Coastal Hazard Areas Forrester's Beach	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map C7 2020 Coastal Hazard Areas Bateau Bay	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



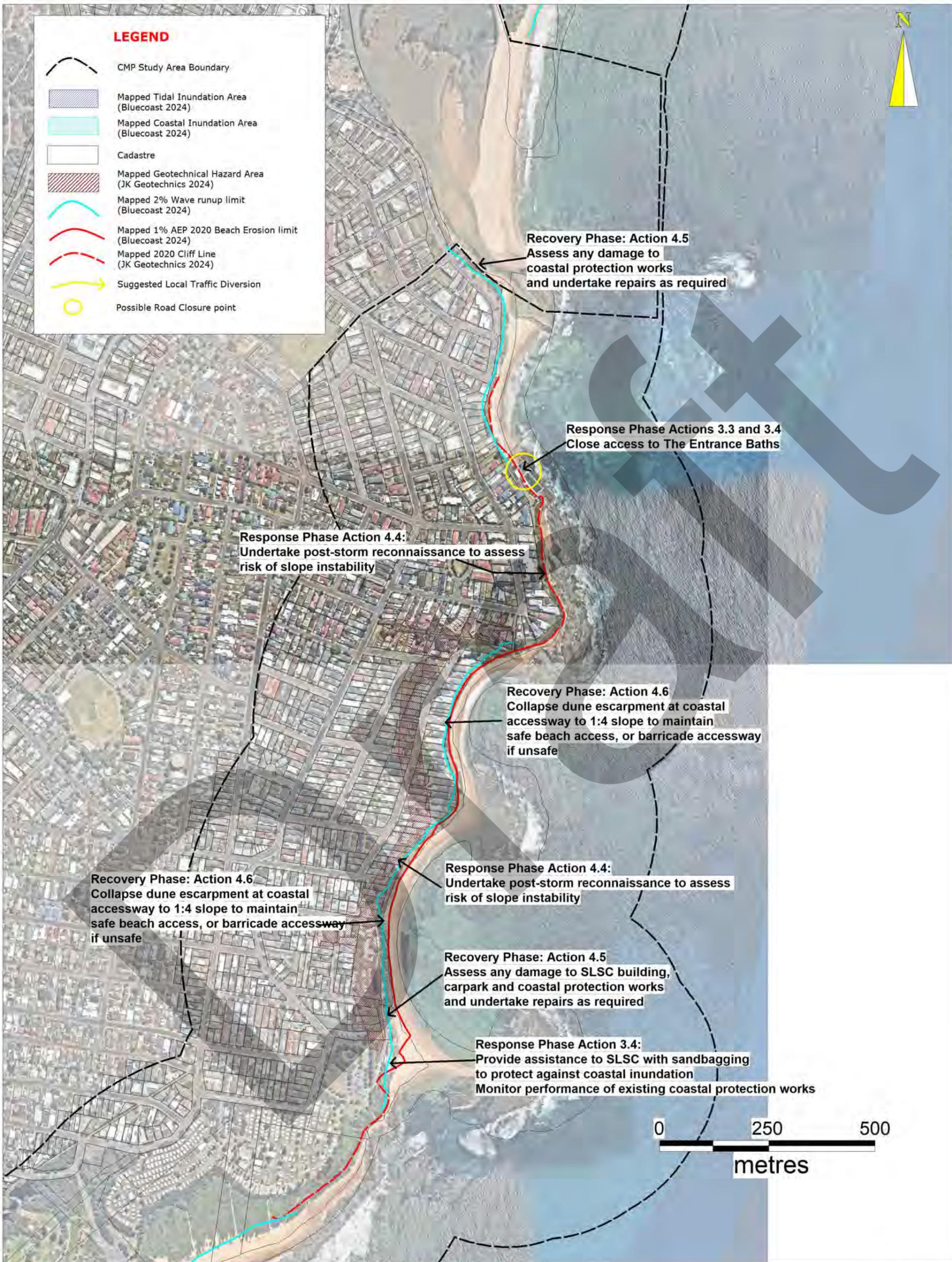
LEGEND

-  CMP Study Area Boundary
-  Mapped Tidal Inundation Area (Bluecoast 2024)
-  Mapped Coastal Inundation Area (Bluecoast 2024)
-  Cadastre
-  Mapped Geotechnical Hazard Area (JK Geotechnics 2024)
-  Mapped 2% Wave runup limit (Bluecoast 2024)
-  Mapped 1% AEP 2020 Beach Erosion limit (Bluecoast 2024)
-  Mapped 2020 Cliff Line (JK Geotechnics 2024)
-  Suggested Local Traffic Diversion
-  Possible Road Closure point

Recovery Phase: Action 4.6
Collapse dune escarpment at coastal accessway to 1:4 slope to maintain safe beach access, or barricade accessway if unsafe



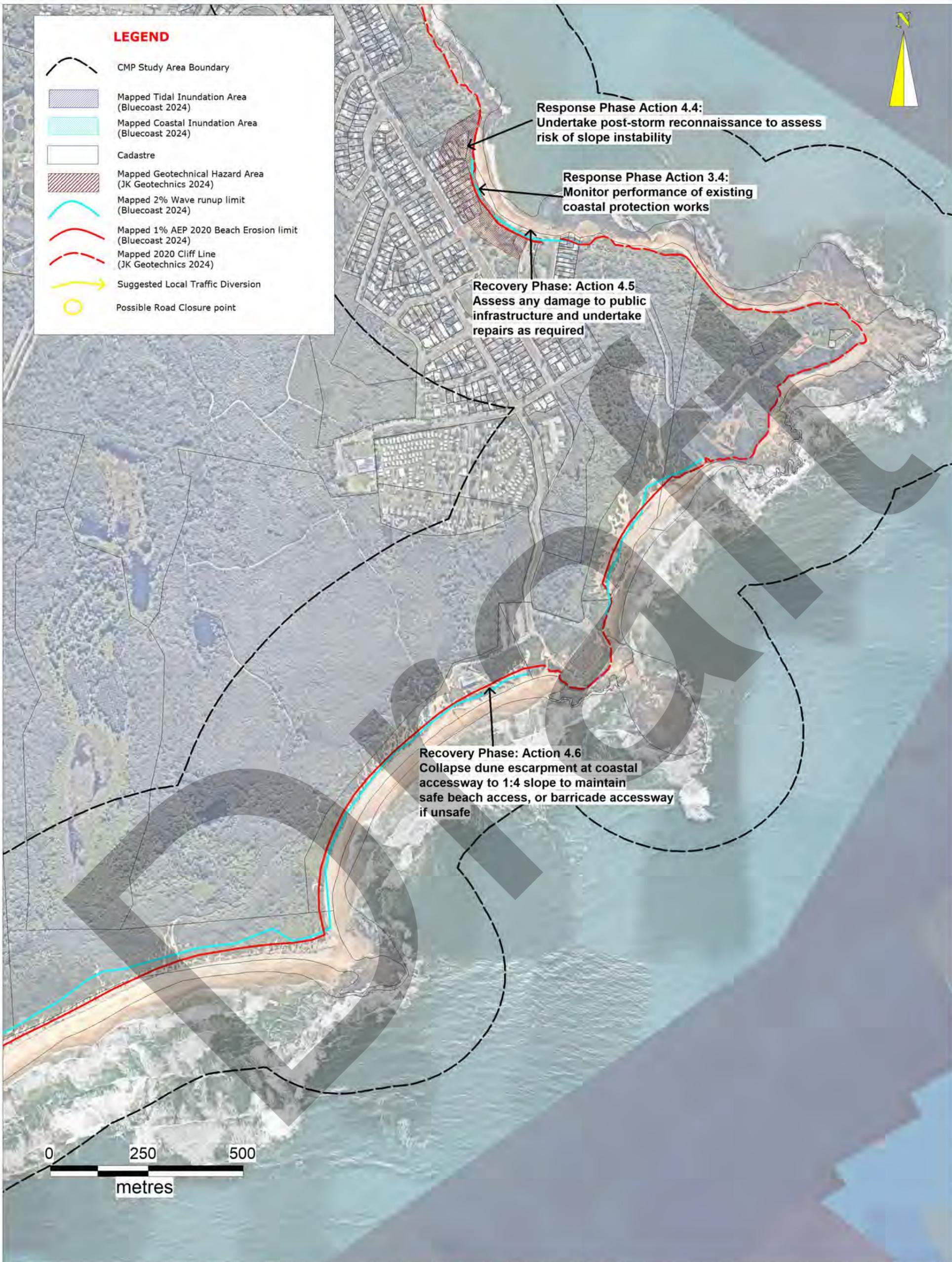
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PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



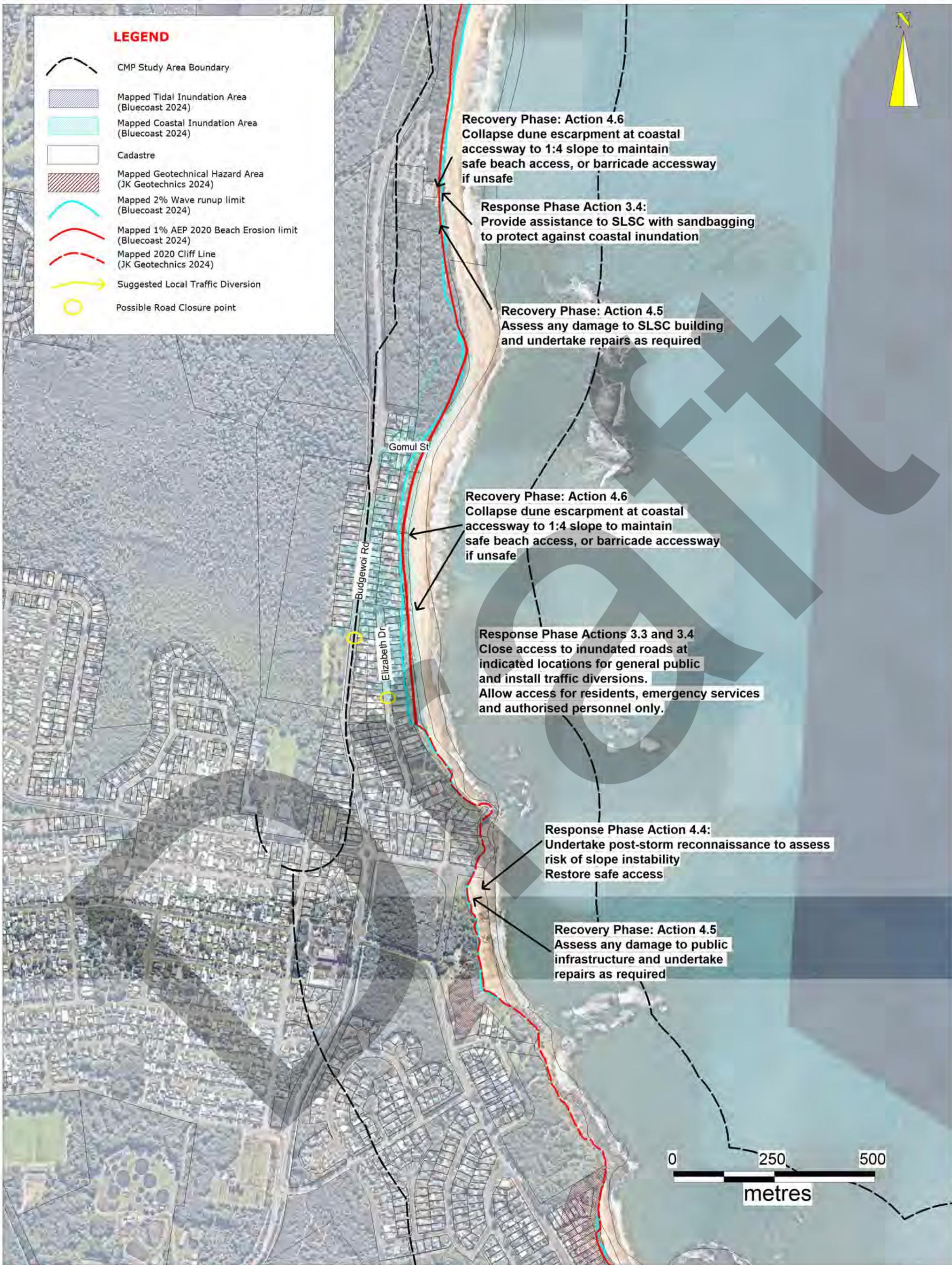
DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map C9 2020 Coastal Hazard Toowoan Bay, Blue Bay The Entrance	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map C10 2020 Coastal Hazard Areas The Entrance North	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map C11 Coastal Hazard Areas 2020 Soldiers Beach and Norah Head	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	



DATE 23.03.2025	COORDINATE SYSTEM MGA 94 Zone 56	FIGURE TITLE Map C12 2020 Coastal Hazard Areas Hargraves Beach, Lakes Beach	  
PROJECT NO. 311015-00572	PROJECT TITLE Central Coast Open Coast Coastal Management Program	CREATED BY CA	

Appendix C. Alignment of CMP with Objects of CM Act and RH SEPP

How the CMP addresses the objects of the CM Act 2016
and management objectives of the RH SEPP

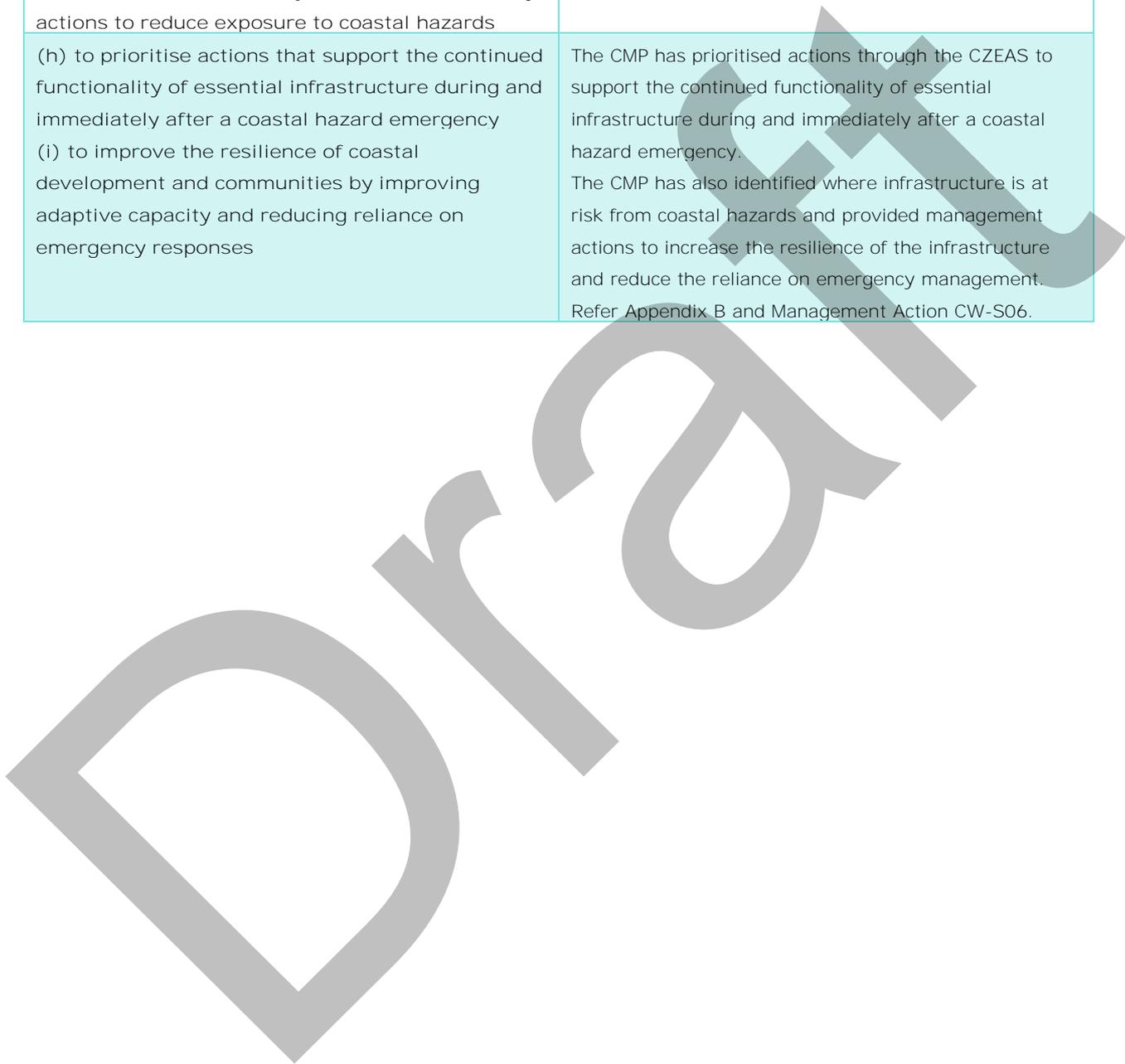
A. Objects of the Coastal Management Act 2016 (Section 3 CM Act)	How this is addressed in the CMP
(a) to protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience	Rigorous assessment of the risks associated with coastal processes and coastal environmental values, as evidenced through the detailed studies undertaken to understand coastal processes and environmental values, the identification of risks associated with these and the identification of management actions to address the risks. Refer to Section 2.55 which details the Risk Assessment.
(b) to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety	Rigorous assessment of the risks associated with social and cultural values, as evidenced through community engagement and the detailed studies undertaken to identify risks associated with these, together with the identification of management actions to address the risks. Refer to Section 2.55 which details the Risk Assessment.
(c) to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone	Specific management actions have been included to specifically acknowledge and protect Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone. Refer to Management Actions CW-C02 and CW-C05
(d) to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies	The importance of the CMP Study Area for recreation, and economic activities associated with recreational activity in the CMP Study Area has been specifically recognised, with a specific risk category developed for amenity and community and social issues, with development of management actions with a focus on improving recreational amenity in the CMP Study Area. Refer to Management Actions CW-A01, CW-A03, CW-D03 and CW-D04
(e) to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making	The CMP has identified actions to promote sustainable land use planning and decision-making, including actions to identify areas which are subject to coastal hazards, as well as environmentally sensitive areas that would require planning controls to facilitate ecologically sustainable development. Refer to Management Actions CW-S03, CW-S06, CW-S07, CW-A02, CW-H01, CW-H02 and CW-C04
(f) to mitigate current and future risks from coastal hazards, taking into account the effects of climate change	The CMP has identified natural and built assets impacted by current and future risks from coastal hazards, and has devised management actions to address these hazards. Refer to Management Actions CW-S05, CW-S06, CW-S07, CW-A02, CW-H01, MM01, WB01, WB02, CW-D01, CWD02, CW-D03, CW-D05
(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	The CMP has identified areas subject to coastal erosion and slope instability, as well as areas subject to coastal inundation with sea level rise, and has identified actions to address the risks posed by loss of coastal land caused by future climate change, including the development of an overarching coastal planning framework to guide future coastal development in the Central Coast open coast coastal zone. Refer to Coastal Hazard Mapping in Appendix A, and Management Actions CW-S05, CW-S06, CW-S07, CW-A02, CW-H01, MM01, WB01, WB02, CW-D01, CWD02, CW-D03, CW-D05

A. Objects of the Coastal Management Act 2016 (Section 3 CM Act)	How this is addressed in the CMP
(h) to promote integrated and co-ordinated coastal planning, management and reporting	The CMP actions and timeframes have been developed in accordance with the NSW Integrated Management & Reporting Framework, with responsible and partner agencies identified for each management action. Refer to Section 8 for details.
(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	The CMP has provided actions that include strategies to improve the resilience of coastal natural and built assets to impacts of an uncertain climate future, including recognising the need for long-term adaptation planning for land subject to coastal erosion, slope instability and inundation. Refer to Coastal Hazard Mapping in Appendix A, and Management Actions CW-S05, CW-S06, CW-S07, CW-A02, CW-H01, MM01, WB01, WB02, CW-D01, CWD02, CW-D03, CW-D05, A01
(j) to ensure coordination 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	CMP actions have been reviewed and discussed with partner Agencies to obtain their support prior to inclusion in the CMP. Refer to Section 3 for details of the process for stakeholder consultation.
(k) to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions	The CMP includes management actions that specifically solicit public participation in coastal management and planning, and improve education, awareness and understanding of coastal processes. The CMP has been developed with input from the public through each stage of the process. Refer to Section 3 for details of the process for stakeholder consultation, and Management Actions CW-C04, CW-C05
(l) to facilitate the identification of land in the coastal zone for acquisition by public or local authorities to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone	The CMP recognises the need for the protection of sensitive environmental communities in the coastal zone, and has identified management actions to facilitate the preservation of these communities. Refer Management Actions CW-E02, T01, CW-S03, CW-S04
(m) to support the objects of the Marine Estate Management Act 2014	<p>The CMP promotes a biologically diverse, healthy and productive marine estate by specifically including management actions which enhance:</p> <ul style="list-style-type: none"> • economic opportunities for regional communities (by improving local recreational facilities) • the cultural, social and recreational use of the marine estate (by improving local recreational amenity) • the maintenance of ecosystem integrity (by including actions to enhance ecological integrity) • the use of the marine estate for scientific research and education (by including actions for public education, monitoring and scientific research/collaboration). <p>Refer to Management Action T01</p>

B. Management objectives for the coastal wetlands and littoral rainforests area (Section 6 CM Act)	How this is addressed in the CMP
(a) to protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity	The CMP maps and identifies these locations and has identified issues, threats and opportunities, and management actions specifically for these areas. Refer Appendix A.
(b) to promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests	The CMP has included management actions to promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests within the CMP Study Area. Refer Action CW-E02 and specific locations mapped in Appendix A.
(c) to improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration	The CMP has identified and mapped through the Stage 2 Coastal Hazard Studies (Bluecoast Consulting Engineers 2024) the coastal hazard risks to these areas. Opportunities for migration of these communities within the Central Coast Open Coast are limited due to coastal squeeze and lack of appropriate land available for migration. Refer Action CW-E02 and specific locations mapped in Appendix A.
(d) to support the social and cultural values of coastal wetlands and littoral rainforests	The CMP has specifically developed management actions to promote cultural awareness and cultural practices in managing these areas. Refer to Management Actions CW-C05, CW-E02.
(e) to promote the objectives of State policies and programs for wetlands or littoral rainforest management	The CMP has developed management actions in conjunction with State Government Agencies that promote the objectives and programs for wetland and littoral rainforest management within the CMP Study Area. Refer Action CW-E02, T01 and specific locations mapped in Appendix A.

C. Management objectives for coastal vulnerability area (Section 7 CM Act)	How this is addressed in the CMP
(a) to ensure public safety and prevent risks to human life	The CMP has developed a Coastal Zone Emergency Action Subplan (CZEAS) which details actions and responsibilities to ensure public safety and prevent risks to human life. Refer Appendix B.
(b) to mitigate current and future risk from coastal hazards by taking into account the effects of coastal processes and climate change	The CMP has mapped areas of current and future risk from coastal hazards taking account of the effects of coastal processes and climate change, and developed management actions to mitigate those risks. Refer Appendix A and management actions CW-S05, CW-S06, CW-S07, CW-A02, CW-H01, MM01, WB01, WB02, CW-D01, CWD02, CW-D03, CW-D05, A01.
(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	The CMP has mapped areas impacted by foreshore erosion, and developed management actions to assist in maintaining the presence of the natural features of the foreshores within the CMP Study Area. Refer mapping in Appendix A.
(d) to maintain public access, amenity and use of beaches and foreshores	The CMP has developed management actions to assist in maintaining public access, amenity and use of foreshores within the CMP Study Area. Refer mapping in Appendix A.
(e) to encourage land use that reduces exposure to risks from coastal hazards, including through siting, design, construction and operational decisions	The CMP has identified land that is subject to coastal hazards, and has identified the need for planning controls for those lands to reduce exposure to risk from coastal hazards. Refer Management Action CW-H01
<p>(f) to adopt coastal management strategies that reduce exposure to coastal hazards:</p> <ul style="list-style-type: none"> i. in the first instance and wherever possible, by restoring or enhancing natural defences including coastal dunes, vegetation and wetlands ii. if that is not sufficient, by taking other action to reduce exposure to those coastal hazards <p>(g) if taking that other action to reduce exposure to coastal hazards:</p> <ul style="list-style-type: none"> i. to avoid significant degradation of biological diversity and ecosystem integrity ii. to avoid significant degradation of or disruption to ecological, biophysical, geological and geomorphological coastal processes iii. to avoid significant degradation of or disruption to beach and foreshore amenity and social and cultural values iv. to avoid adverse impacts on adjoining land, resources or assets 	The CMP has identified actions to preserve the natural features of the coast. All potential options in Stage 3 were assessed, based on their impact on the coastal environment, public safety, social and recreational amenity. Actions that have progressed to the final stage of the CMP are those which emphasise natural coastline defences, or otherwise have neutral or beneficial impacts on the coastal environment. Refer mapping in Appendix A and management actions CW-S06, CW-S07, CW-H01, CT01, MM01, EB01, WB01, WB02, CW-E02

C. Management objectives for coastal vulnerability area (Section 7 CM Act)	How this is addressed in the CMP
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	
<p>(h) to prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency</p> <p>(i) to improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses</p>	<p>The CMP has prioritised actions through the CZEAS to support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency.</p> <p>The CMP has also identified where infrastructure is at risk from coastal hazards and provided management actions to increase the resilience of the infrastructure and reduce the reliance on emergency management. Refer Appendix B and Management Action CW-S06.</p>



D. Management objectives for coastal environment area (Section 8 CM Act)	How this is addressed in the CMP
(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	Rigorous assessment of the risks specifically associated with the coastal environment area and coastal environmental values, as evidenced through the detailed studies undertaken to understand environmental values, the identification of risks associated with these and the identification of management actions to address the risks. Refer management action CW-E02.
(b) to reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change	The CMP has identified threats to the resilience of coastal waters, including in response to climate change, and proposed management actions to specifically mitigate these threats. Refer Management Actions CW-E01, CW-S01.
(c) to maintain and improve water quality and estuary health	The CMP has defined management actions specifically aimed at maintaining and improving water quality, by assessing the risks specific to this category and providing mitigation measures. Refer management actions Refer Management Actions CW-E01, CW-S01.
(d) to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons	The CMP has defined community and social values as a specific category for risk assessment and has developed management actions aimed at addressing the identified risks. Refer management actions CW-C01 to CW-C05.
(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	The CMP has mapped areas impacted by coastal hazards, and developed management actions to assist in maintaining the presence of the natural features of the beaches and dunes within the CMP Study Area. Refer management actions CW-S01 to CW-S08, and corresponding area-specific actions in Appendix A.
(f) to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms	The CMP has developed management actions to assist in maintaining public access, amenity and use of beaches, foreshores, headlands and rock platforms within the CMP Study Area. Refer management action CW-A01 and corresponding area-specific actions in Appendix A.

E. Management objectives for coastal use area (Section 9 CM Act)	How this is addressed in the CMP
<p>(a) to protect and enhance the scenic, social and cultural values of the coast by ensuring that:</p> <ul style="list-style-type: none"> i. the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast ii. adverse impacts of development on cultural and built environment heritage are avoided or mitigated iii. urban design, including water sensitive urban design, is supported and incorporated into development activities iv. adequate public open space is provided, including for recreational activities and associated infrastructure v. the use of the surf zone is considered 	<p>The CMP has developed management actions, including concepts for upgrading public infrastructure in accordance with contemporary best practice, minimising any impacts of development on cultural or built heritage, and has considered urban design, including water sensitive urban design. There are management actions aimed at improving access and amenity to public areas of the foreshore.</p> <p>Refer management actions CW-A01 and corresponding area-specific actions in Appendix A.</p>
<p>(b) to accommodate both urbanised and natural stretches of coastline</p>	<p>The CMP recognises both the urbanised and natural values of the coast by providing management actions to balance these two values, for example; combining protection of infrastructure and high-use public areas from coastal erosion with enhancement of environmental values and foreshore access.</p> <p>Refer examples including management action CW-E02, CW-D03 and area-specific actions in Appendix A.</p>

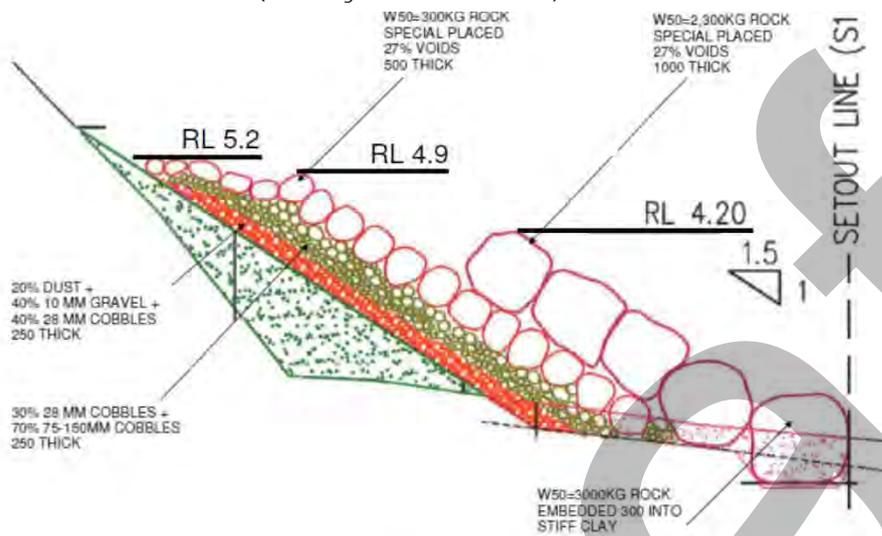
Appendix D. Specific Management Actions Details and Rationale

1. Cabbage Tree Harbour
2. The Entrance North
3. Wamberal
4. MacMasters Beach

1. Cabbage Tree Harbour

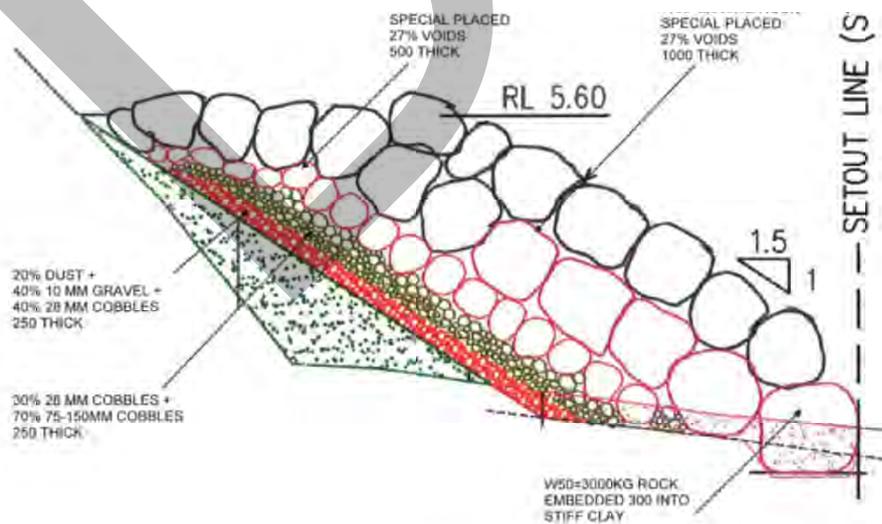
Action CT01 – Design and construct Stage 2 of the existing Cabbage Tree Harbour toe drainage structure

- Stage 1 already constructed, designed for a 0 – 15 year design life, see typical cross section below (WorleyParsons, 2011)

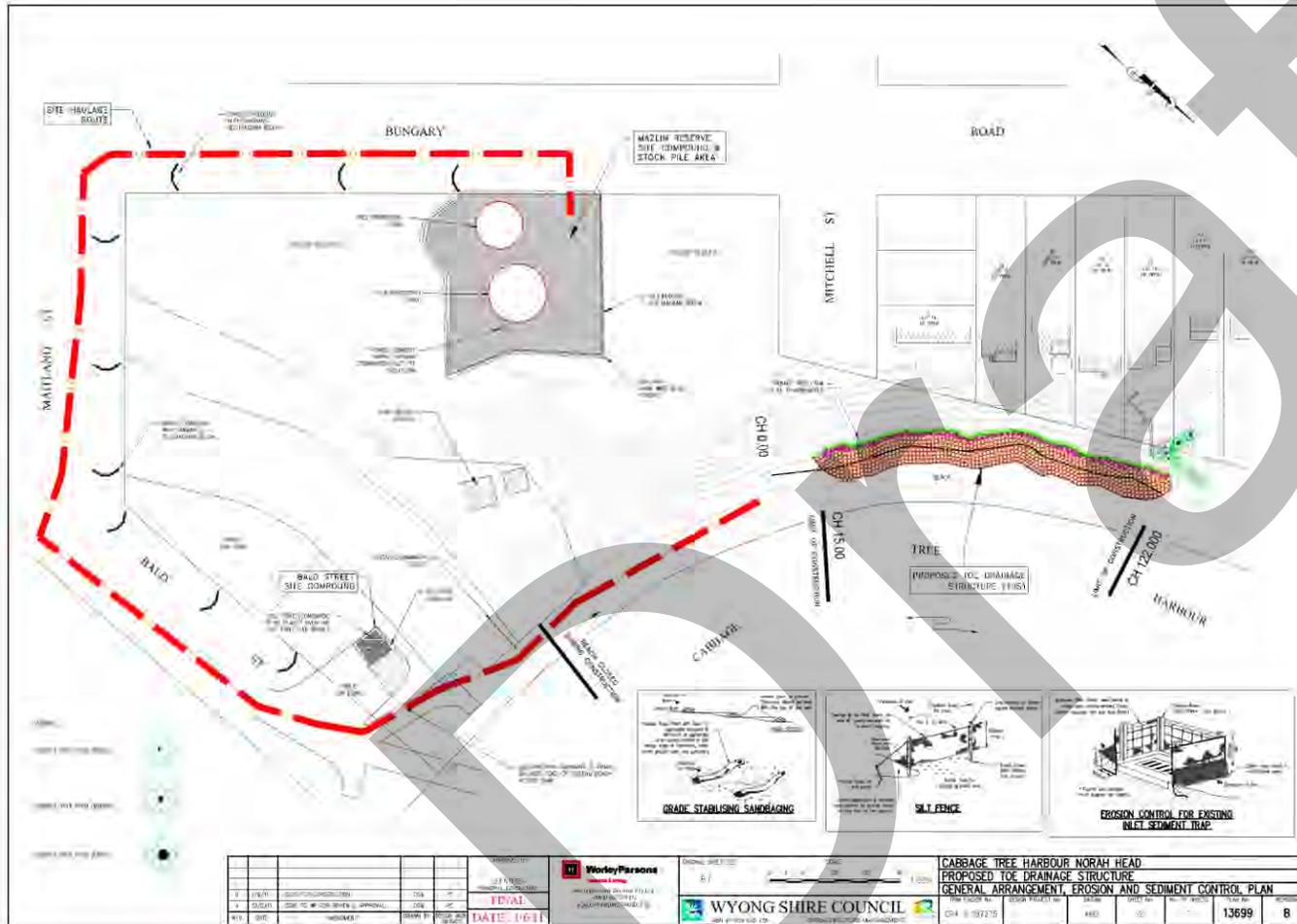


Stage 1: 0–15 year Design Life

- Stage 2 involves topping up the armour with a second layer of armour rock as shown in the typical section below (WorleyParsons 2011)
- The staging recognises that the design criteria will increase with time as projected climate change impacts on sea levels progress and, in extending the design life of the structure, the design storm event becomes more intense for the same level of risk of damage (WorleyParsons 2011).
- Layout Plan for the existing structure is shown below.



Stage 2: 15–50 year Design Life



Cabbage Tree Harbour Toe Drainage Structure – Layout Plan (WorleyParsons 2011)

2. The Entrance North

Action EN02-A Develop engineering design requirements for coastal protection works at The Entrance North.

Action EN02-B Complete detailed design and approvals for coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.

Action EN02-C Construct coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.

Action EN02-D Complete design and approvals for coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.

Action EN02-E Construct coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.

The two areas at The Entrance North (Hutton Road and Curtis Parade) are at extreme risk from coastal erosion; currently there are ad-hoc protection works in place at some properties, with no protection at others along this frontage. The Reconstruction Authority has constructed temporary works along the Hutton Road frontage.

Based on an engineering review of constructability constraints, geometric constraints, cost, design life, adaptability and structural engineering considerations, the following concept design options are considered to be feasible:

- Rock revetment for those areas where it can be accommodated on private property or within the road reserve
- Rock revetment with piled toe wall below 2 m AHD to reduce the horizontal footprint of the structure, for those areas with limited land on private property available to accommodate a structure with wider footprint

The proposed works are also consistent with the temporary rock revetment works constructed by the Reconstruction Authority (RA). The NSW Coastal Crown Land Guidelines apply for parts of the structure that are on Crown Lands. If a DA is submitted for these temporary works to remain after the RA authorisation expires, then the Crown Lands Guidelines state that they will consider whether the private coastal protections works are consistent with a relevant CMP.

The constraints on the landward alignment of a structure include:

- The presence of approved structures, including dwellings and ancillary structures, within **the seaward portions of the lots, that cannot be removed (or would require owner's consent to remove)** to accommodate a terminal protection structure
- The limited space available for landward excavation from the seaward boundary of the lots to accommodate the construction of a terminal protection structure.

The concept design of the rock revetment option allows for the following:

- Scour at the toe of the structure to -2 m AHD for areas subject to erodible seabed conditions (i.e. where bedrock depth has been interpreted to be below -2 m AHD)
- Depth-limited waves breaking directly onto the structure. The breaking wave height will be limited by the depth in front of the structure, which is controlled by the nearshore water levels, beach scour levels and the quantum of sea level rise allowed for within the design life of the structure.

Crest and Toe Elevations

Crest levels are set by the allowable level of wave overtopping that can occur in a storm, with toe levels set by the scour depth. Typical 1% AEP wave runup levels along The Entrance North Beach have been shown to be 7 m to 8 m AHD in the most recent coastal hazard assessments (Bluecoast Consulting Engineers, 2024), which provides a nominal crest elevation for the structure. Crest levels can be refined by physical modelling or detailed wave overtopping assessment during detailed design.

The toe should be constructed deep enough to accommodate the scour, which would allow the toe of the structure to be buried below the beach berm most of the time. An alternative would **be to allow for a toe berm, or a falling "dutch" self-healing toe** if foundation depths cannot be reached during excavation for construction. The self-healing toe option would result in a larger structure footprint and greater visible portion of the structure on the beach, than if the structure is constructed to sufficient depth but without a toe berm.

Structure Slope

Geotechnical analysis of the slope stability should be undertaken as part of the detailed design process, to confirm the allowable slope at which the revetment should be placed to achieve an acceptable factor of safety for the design against slip failure. The concept design has adopted a slope of 1V:1.5H for the structure slope, but this will need to be confirmed with a geotechnical slope stability analysis. Typical friction angles for sand range from 32° to 35°, which indicates that a structure constructed at a slope of 1V:1.5H would have marginal stability against slip failure.

Armour Design

A preliminary armour design for the criteria discussed above is presented in Table 1, for toe scour elevation of -2m AHD. The hydrodynamic stability of armour for the concept design has been assessed in accordance with the Hudson equation in CEM (USACE, 2006). The Hudson formula is based on comprehensive physical model investigations at the U.S. Army Corps of Engineers.

Armour sizing is based on the following assumptions, which would need to be confirmed during detailed design:

- Depth-limited breaking wave height assessment
- Igneous armour rock (bulk density 2600 kg/m³)
- Individual special placement of armour rock to maximise interlocking – this provides greater armour stability than random placement, which allows the use of smaller

armour rock than for randomly placed armour and is considered to be achievable for the construction at the site. Similar construction techniques have been used for the construction of the emergency rock revetment at The Entrance North.

- Crest level of 7 m AHD.
- Structure slope of 1V: 1.5H.

Table 1 – Preliminary armour design for The Entrance North rock revetment

Case	Scour -2m AHD
	100 yr ARI swell 0 - 5% damage
Type of Unit	Rough Angular Quarrrystone
Unit Wt Armour Stone (kg/m ³)	2,600
Design Wave H _b (m)	3.05
Stability Coefficient (KD)	3.9
Cotan Structure Slope	1.50
No. Units Comprising Layer	2
	Cover Layer
D _{min} (m)	1.15
D ₅₀ (m)	1.27
D _{max} (m)	1.37
Layer Thickness (m)	2.21
W _{min} (kg)	2,624
W ₅₀ (kg)	3,499
W _{max} (kg)	4,374
	Underlayer
D _{min} (m)	0.52
D ₅₀ (m)	0.59
D _{max} (m)	0.64
W _{min} (kg)	245
W ₅₀ (kg)	350
W _{max} (kg)	455

Concept Drawings

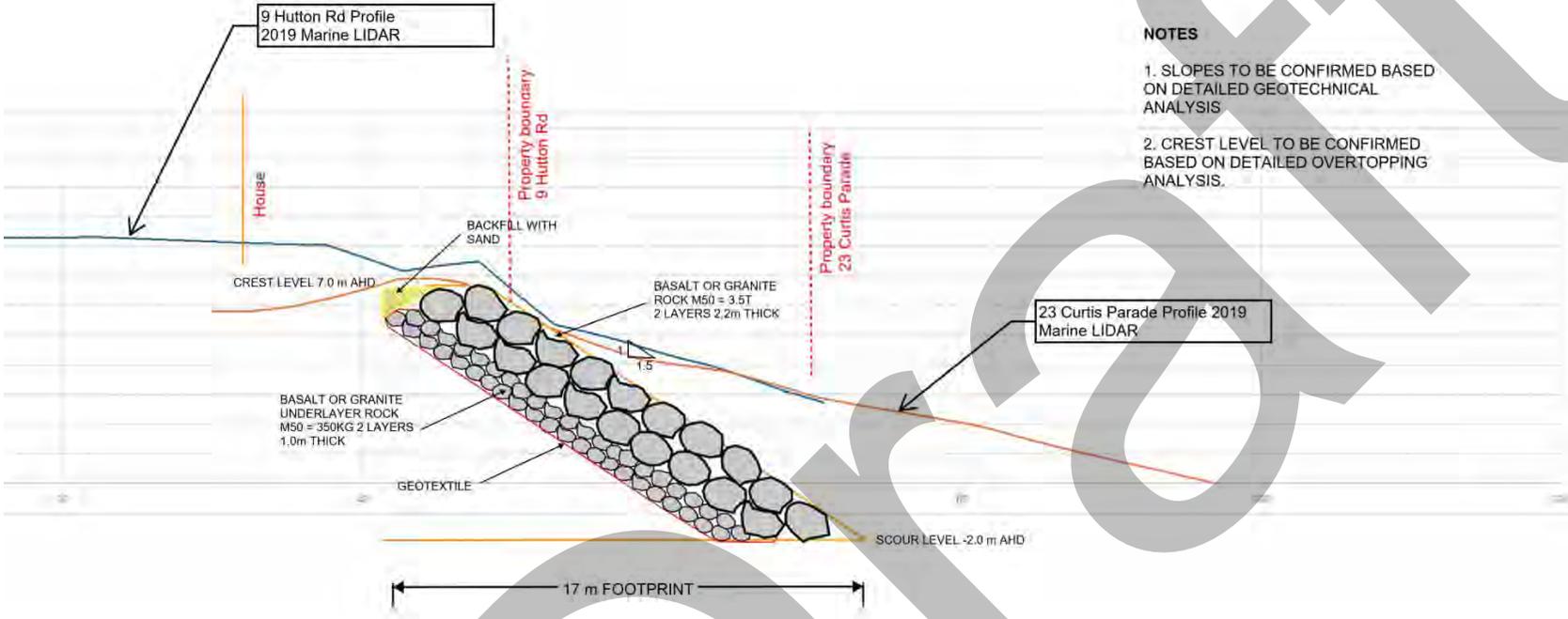
Concept drawings are provided below, which include typical sections and a plan layout showing the extent of the footprint of the various options. It is expected that maintenance could be carried out from the seaward side of the structure, although maintenance requirements would be minimal. Maintenance would comprise visual inspections after a storm event, with top-up or replacement of armour only required if this is displaced after a storm.



Plan view of proposed works location Curtis Parade

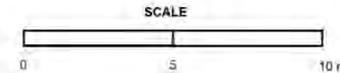


Plan view of proposed works location Hutton Road



- NOTES**
1. SLOPES TO BE CONFIRMED BASED ON DETAILED GEOTECHNICAL ANALYSIS
 2. CREST LEVEL TO BE CONFIRMED BASED ON DETAILED OVERTOPPING ANALYSIS.

**CONCEPT DESIGN - Hutton Road and Curtis Parade
(SCOUR LEVEL -2.0 m AHD)**



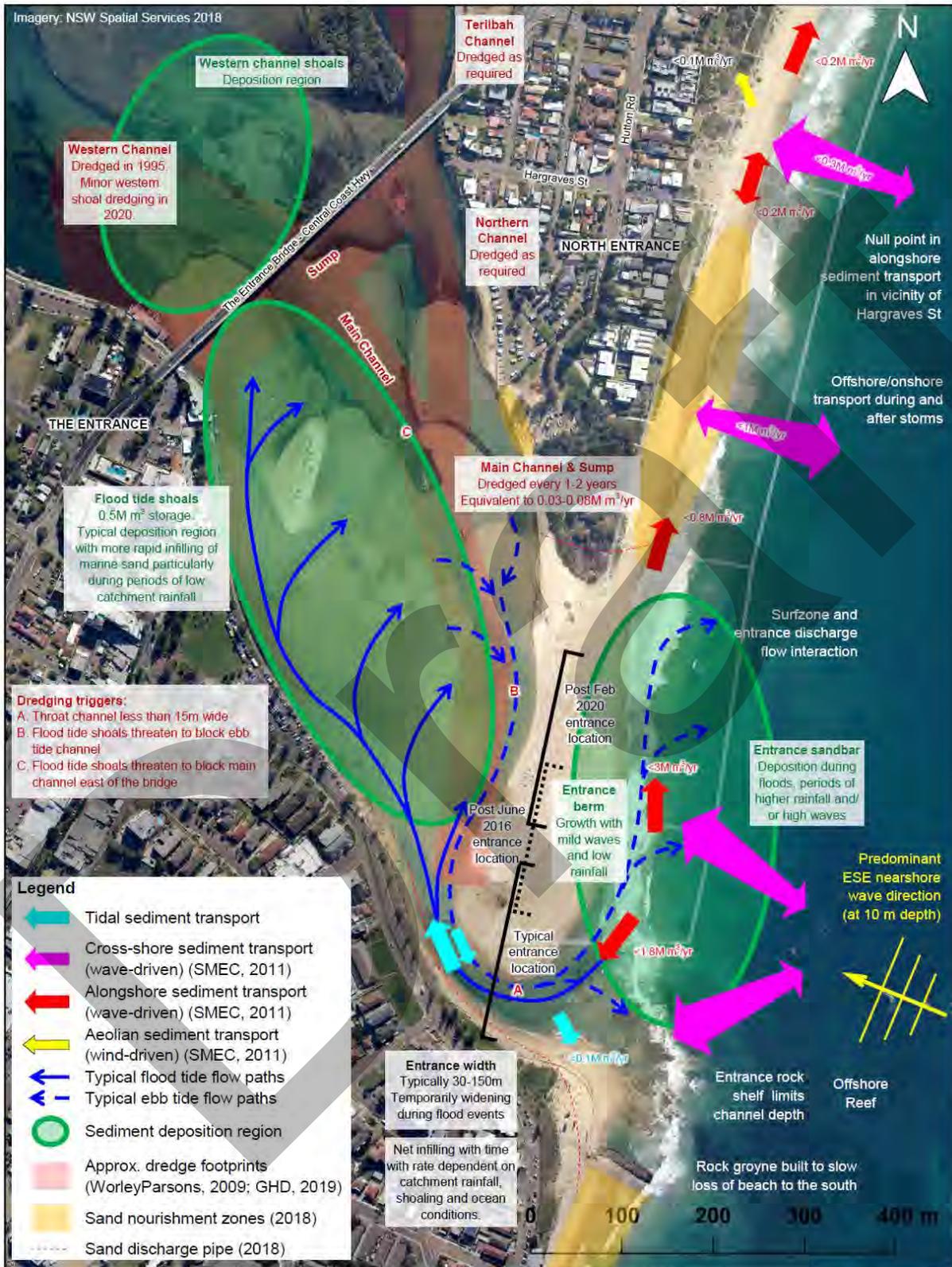
Typical section – revetment works Curtis Parade/Wyuna Avenue and Hutton Road

Action EN02-F – Implement sand nourishment at The Entrance North using sand sourced strategically (in accordance with the Entrance Management Strategy and procedures being developed as part of the Tuggerah Lakes Coastal Management Program – Including Entrance Channel Dredging Activities)

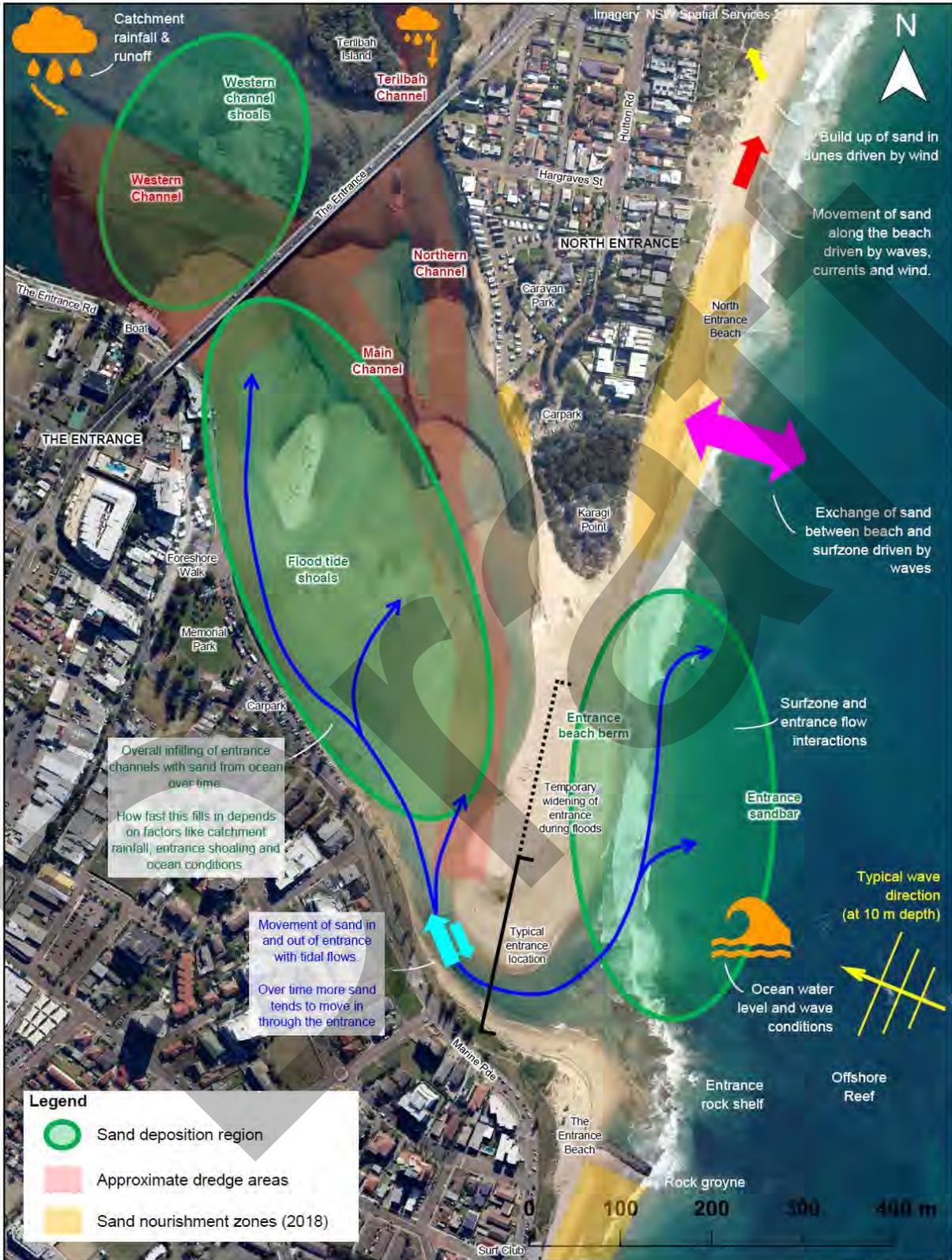
This action involves the strategic placement of sand dredged from The Entrance during maintenance operations onto The Entrance North Beach, which serves to reduce the impact of beach erosion by beneficially reusing the sand. The dredging strategy is shown below in conjunction with an overview of the entrance processes at Tuggerah Lakes (Manly Hydraulics Laboratory 2022a). Sand is to be placed south of Hargraves Street so that sand is kept within the same sediment compartment.

Along The Entrance North Beach, swell generates a northward sediment transport. This northward sand movement potential is reduced closer to the tidal inlet, with southward transport occurring at the entrance and along the entrance spit.

Sand should be placed within the zone of the change in sediment transport direction (shown in the hatched blue area in the conceptual sediment pathway model below (SMEC 2010, Manly Hydraulics Laboratory 2022a)). This would allow the sand to provide maximum benefit against beach erosion without it being lost to the littoral system.



	CONCEPTUAL MODEL OF ICOLL ENTRANCE PROCESSES AT TUGGERAH LAKES ENTRANCE	Manly Hydraulics Laboratory
		Report MHL2781 Figure 2.9
		Figure2.9.pdf

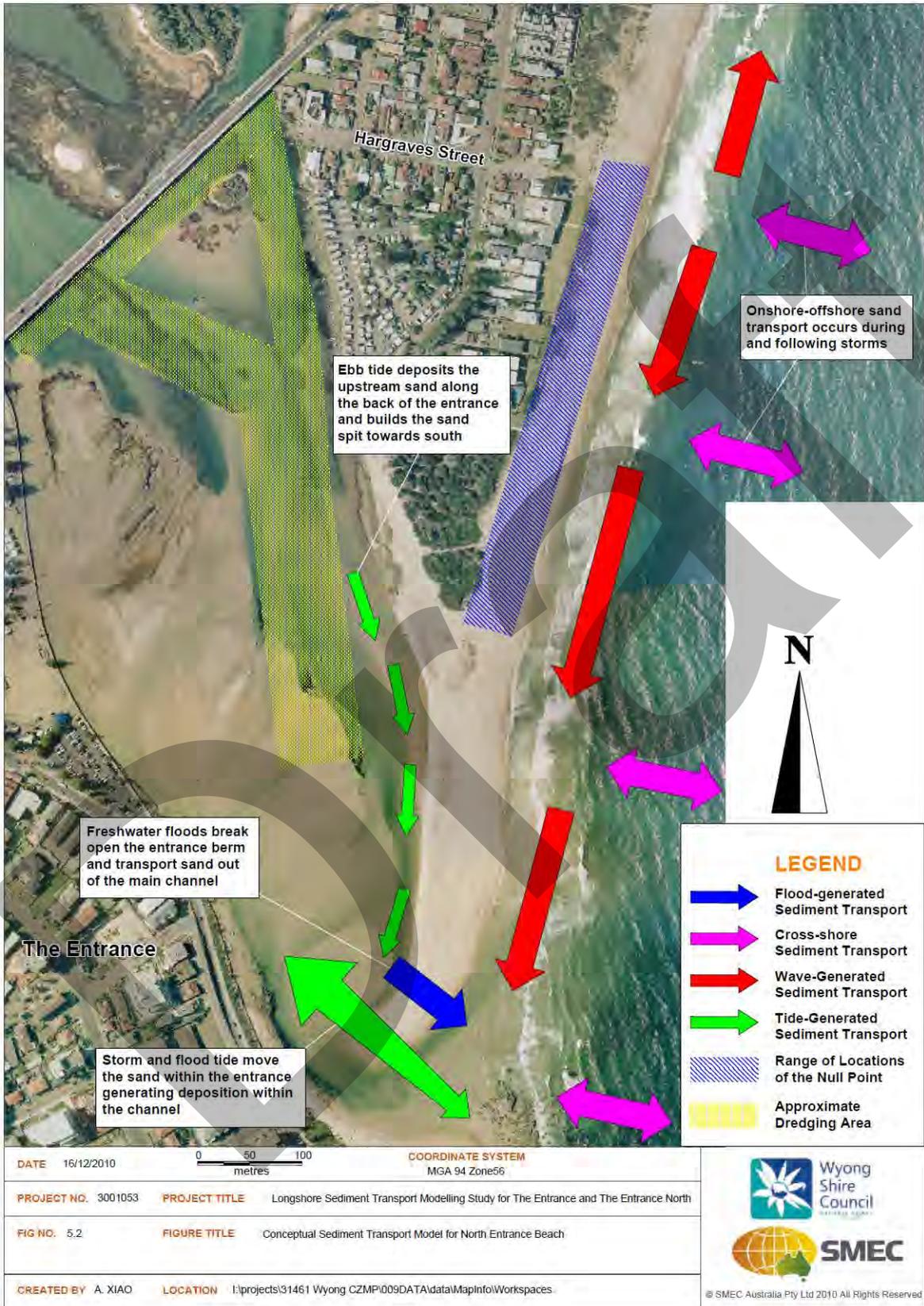


OVERVIEW OF PROCESSES AT TUGGERAH LAKES ENTRANCE

Manly Hydraulics Laboratory

Report MHL2781
Figure 2.8

Figure2.8.pdf



Conceptual sediment transport pathways at The Entrance North (SMEC 2010a)

3. Wamberal

Action WB02-A: Complete design and approvals for coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal

Action WB02-B: Construct coastal protection works fronting 1 Pacific St to 17 Calais Rd, Wamberal Beach.

Action WB02-D: Purchase residual private land fronting Pacific St Wamberal.

Based on an engineering review of constructability constraints, geometric constraints, cost, design life, adaptability and structural engineering considerations, the following concept design options are considered to be feasible:

- Rock revetment for those areas where it can be accommodated on private property or within the road reserve
- Rock revetment with piled toe wall below 2 m AHD to reduce the horizontal footprint of the structure, for those areas with limited land on private property available to accommodate a structure with wider footprint

The NSW Coastal Crown Land Guidelines apply for parts of the structure that are on Crown Lands.

The constraints on the landward alignment of a structure include:

- The presence of approved structures, including dwellings and ancillary structures, within **the seaward portions of the lots, that cannot be removed (or would require owner's consent to remove)** to accommodate a terminal protection structure
- The limited space available for landward excavation from the seaward boundary of the lots to accommodate the construction of a terminal protection structure.

The concept design of the rock revetment option allows for the following:

- Scour at the toe of the structure to -2 m AHD for areas subject to erodible seabed conditions (i.e. where bedrock depth has been interpreted to be below -2 m AHD)
- Depth-limited waves breaking directly onto the structure. The breaking wave height will be limited by the depth in front of the structure, which is controlled by the nearshore water levels, beach scour levels and the quantum of sea level rise allowed for within the design life of the structure.

Crest and Toe Elevations

Crest levels are set by the allowable level of wave overtopping that can occur in a storm, with toe levels set by the scour depth. Typical 1% AEP wave runup levels along Wamberal Beach have been shown to be 7 m to 8 m AHD in the most recent coastal hazard assessments (WorleyParsons 2014, Bluecoast Consulting Engineers, 2024), which provides a nominal crest elevation for the structure. Crest levels can be refined by physical modelling or detailed wave overtopping assessment during detailed design.

The toe should be constructed deep enough to accommodate the scour, which would allow the toe of the structure to be buried below the beach berm most of the time. An alternative would **be to allow for a toe berm, or a falling "dutch" self-healing toe** if foundation depths cannot be reached during excavation for construction. The self-healing toe option would result in a larger structure footprint and greater visible portion of the structure on the beach, than if the structure is constructed to sufficient depth but without a toe berm.

Structure Slope

Geotechnical analysis of the slope stability should be undertaken as part of the detailed design process, to confirm the allowable slope at which the revetment should be placed to achieve an acceptable factor of safety for the design against slip failure. The concept design has adopted a slope of 1V: 1.5H for the structure slope, but this will need to be confirmed with a geotechnical slope stability analysis. Typical friction angles for sand range from 32° to 35°, which indicates that a structure constructed at a slope of 1V: 1.5H would have marginal stability against slip failure.

Armour Design

A preliminary armour design for the criteria discussed above is presented in Table , for two cases with toe scour elevations of -2m AHD and 0m AHD (where bedrock elevation is at 0 m AHD). The hydrodynamic stability of armour for the concept design has been assessed in accordance with the Hudson equation in CEM (USACE, 2006). The Hudson formula is based on comprehensive physical model investigations at the U.S. Army Corps of Engineers.

Armour sizing is based on the following assumptions, which would need to be confirmed during detailed design:

- Depth-limited breaking wave height assessment
- Igneous armour rock (bulk density 2600 kg/m³)
- Individual special placement of armour rock to maximise interlocking – this provides greater armour stability than random placement, which allows the use of smaller armour rock than for randomly placed armour and is considered to be achievable for the construction at the site. Similar construction techniques have been used for the construction of the emergency rock revetment at The Entrance North.
- Crest level of 7 m AHD.
- Structure slope of 1V:1.5H.

Table 1 – Preliminary armour design for Wamberal rock revetment

Case	Scour -2m AHD	Scour = 0m AHD
	100 yr ARI swell 0 - 5% damage	100 yr ARI swell 0 - 5% damage
Type of Unit	Rough Angular Quarrrystone	
Unit Wt Armour Stone (kg/m ³)	2,600	2,600
Design Wave H _b (m)	3.05	2.29
Stability Coefficient (KD)	3.9	3.9
Cotan Structure Slope	1.50	1.50
No. Units Comprising Layer	2	2
	Cover Layer	Cover Layer
D _{min} (m)	1.15	0.87
D ₅₀ (m)	1.27	0.95
D _{max} (m)	1.37	1.03
Layer Thickness (m)	2.21	1.66
W _{min} (kg)	2,624	1,107
W ₅₀ (kg)	3,499	1,476
W _{max} (kg)	4,374	1,845
	Underlayer	Underlayer
D _{min} (m)	0.52	0.39
D ₅₀ (m)	0.59	0.44
D _{max} (m)	0.64	0.48
W _{min} (kg)	245	103
W ₅₀ (kg)	350	148
W _{max} (kg)	455	192

Concept Drawings

Concept drawings are provided below, which include typical sections and a plan layout showing the extent of the footprint of the various options. It is expected that maintenance could be carried out from the seaward side of the structure, although maintenance requirements would be minimal. Maintenance would comprise visual inspections after a storm event, with top-up or replacement of armour only required if this is displaced after a storm.

Purchase of residual land

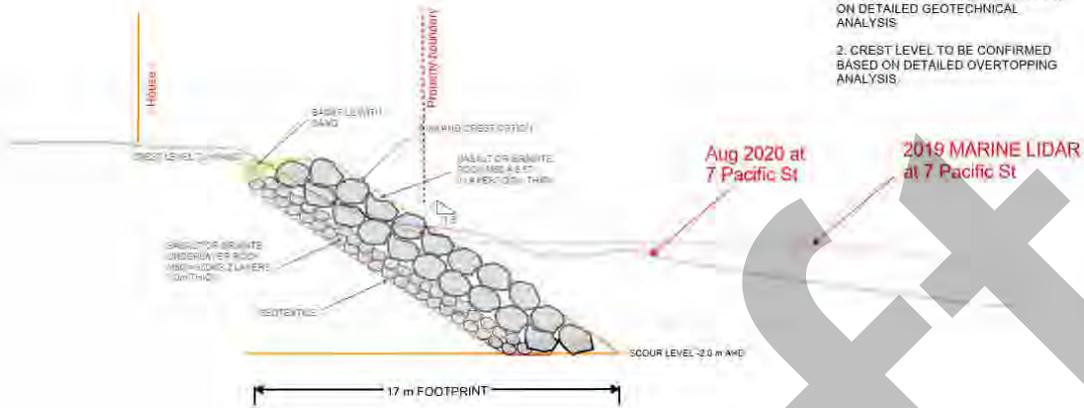
The parcel of residual land shown in the image below covers the area seaward of the private properties at Pacific Street and landward of the Mean High Water Mark. This land has been shown to be in private ownership but the owners have not been located. The land would need to be transferred to Council to allow works to be managed and constructed on that land parcel. NSW DPHI, Crown Lands and Council to work together to acquire residual private land fronting Pacific St Wamberal and transfer into Council ownership.



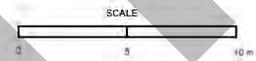
Residual private land between private lots and Mean High Water Mark, south of The Ruins

NOTES

- 1. SLOPES TO BE CONFIRMED BASED ON DETAILED GEOTECHNICAL ANALYSIS
- 2. CREST LEVEL TO BE CONFIRMED BASED ON DETAILED OVERTOPPING ANALYSIS.

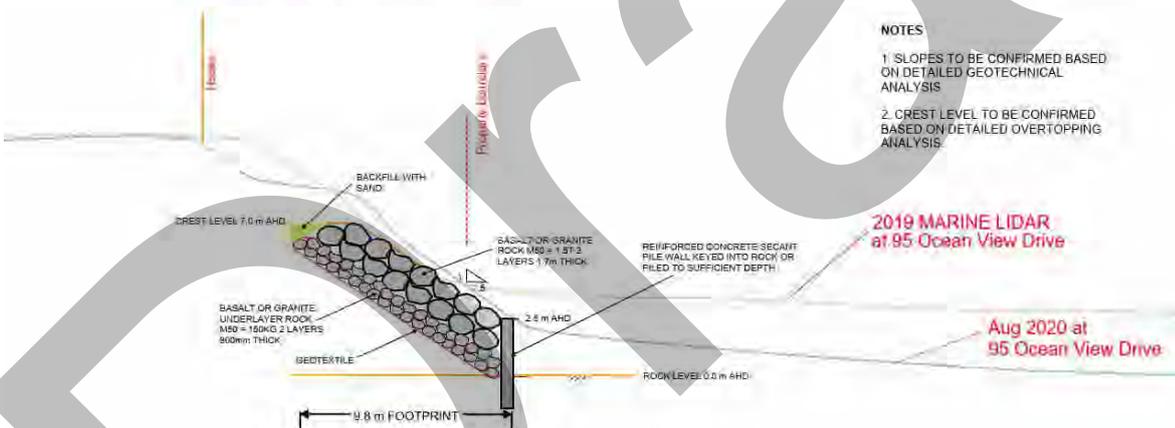


CONCEPT DESIGN - SECTION C AND SECTION B SOUTH OF 73 OCEAN VIEW DRIVE (WHERE SCOUR LEVEL IS -2.0 m AHD)



NOTES

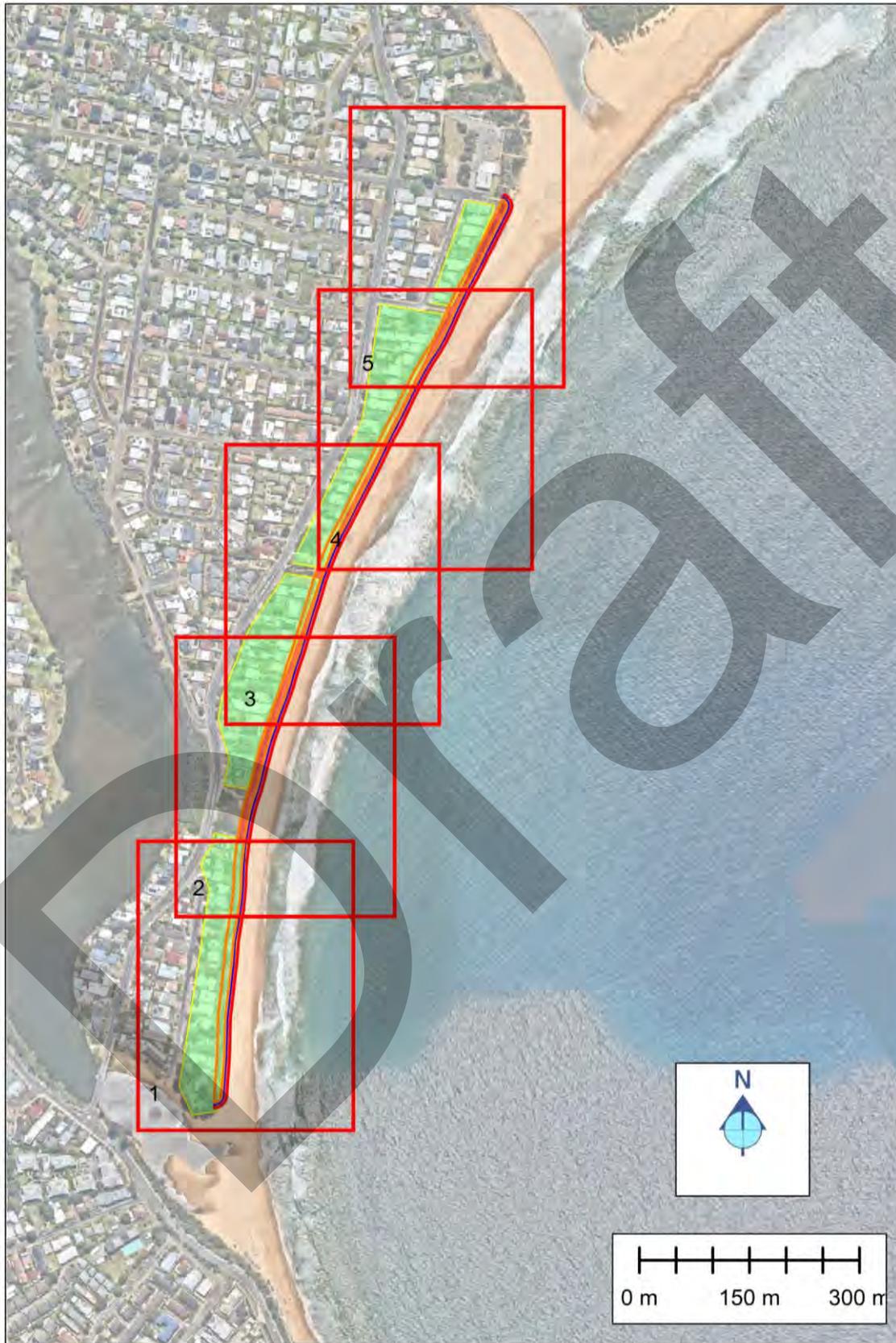
- 1. SLOPES TO BE CONFIRMED BASED ON DETAILED GEOTECHNICAL ANALYSIS
- 2. CREST LEVEL TO BE CONFIRMED BASED ON DETAILED OVERTOPPING ANALYSIS.



CONCEPT DESIGN - SECTION B NORTH OF 73 OCEAN VIEW DRIVE (WHERE WEATHERED ROCK IS AT OR ABOVE RL 0m AHD)



Typical sections for rock revetment and hybrid rock revetment for Wamberal Beach



Overview map of Wamberal showing extent of works, location of inset maps 1 to 5, private and public land.



Plan view showing potential extent of coastal protection works at Wamberal (Map 1)



Plan view showing potential extent of coastal protection works at Wamberal (Map 2)



Plan view showing potential extent of coastal protection works at Wamberal (Map 3)



Plan view showing potential extent of coastal protection works at Wamberal (Map 4)



Plan view showing potential extent of coastal protection works at Wamberal (Map 5)

4. MacMasters Beach

Action MM02: Construction of MacMasters Beach temporary coastal protection works

Central Coast Council have prepared draft designs for temporary coastal protection works at the southern end of MacMasters Beach. The primary purpose of the works was to help protect the MacMasters Beach Surf Life Saving Club from coastal hazards, including erosion. The works would assist in mitigating current risk while further investigation into future risk exposure and long-term management can be undertaken.

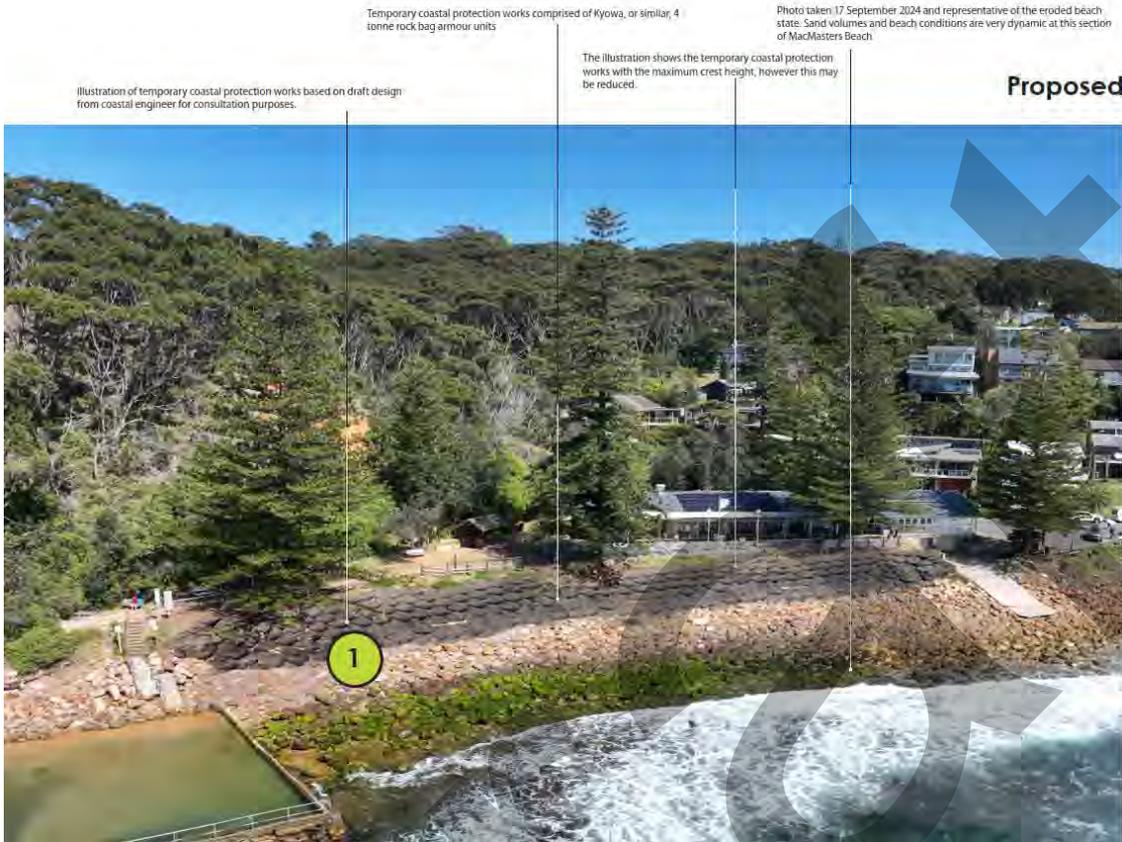
The draft design details a temporary coastal protection structure comprising of rock bag armour units which would protect and stabilise an 80-metre section in front of the surf club between the steps down to the ocean bath and the vehicle access ramp. Due to site constraints, the structure cannot be positioned further landward and its design has been carefully considered to reduce potential impacts on beach access, amenity and coastal processes.

Currently, informal coastal protection works are present in front of the surf club, including Bulka bags filled with stabilised sand. The bags were placed in June 2016 in an emergency response to erosion after large ocean swell and tides. This structure has since deteriorated and continues to degrade while only providing a very limited level of protection over a small section of the foreshore.

While Council had a draft design for a typical rock revetment previously, in more recent consultation with key stakeholders a preference was identified for a temporary coastal protection structure comprising of rock bag armour units. While other concept options, including vertical seawalls, were investigated and considered, the following advantages of a design using rock bag armour units were key to its selection:

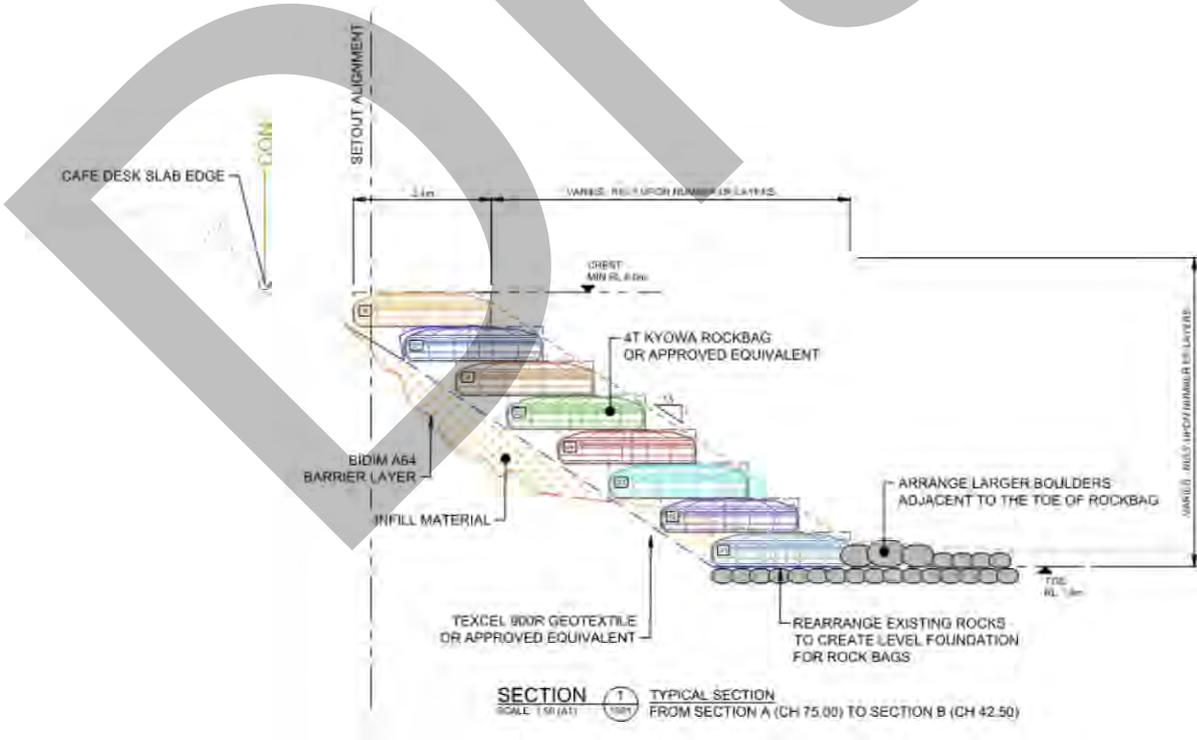
- Provides a reduced footprint, compared to typical rock revetments and the previous design, and reduces beach access and visual impacts.
- Rock bag armour units are flexible and can be easily removed and re-used elsewhere if adverse outcomes are experienced. Additionally, it is easy to raise or modify the structure to adjust to changing conditions.
- This option is cost effective and best mitigates wave reflection impacts at this location.
- It provides appropriate protection to the surf club over a shorter design life while a long-term solution can be investigated and developed.

The action involves the construction of these works, should they be triggered by a coastal emergency under the Coastal Zone Emergency Action Subplan (CZEAS). The design of the works is shown below.

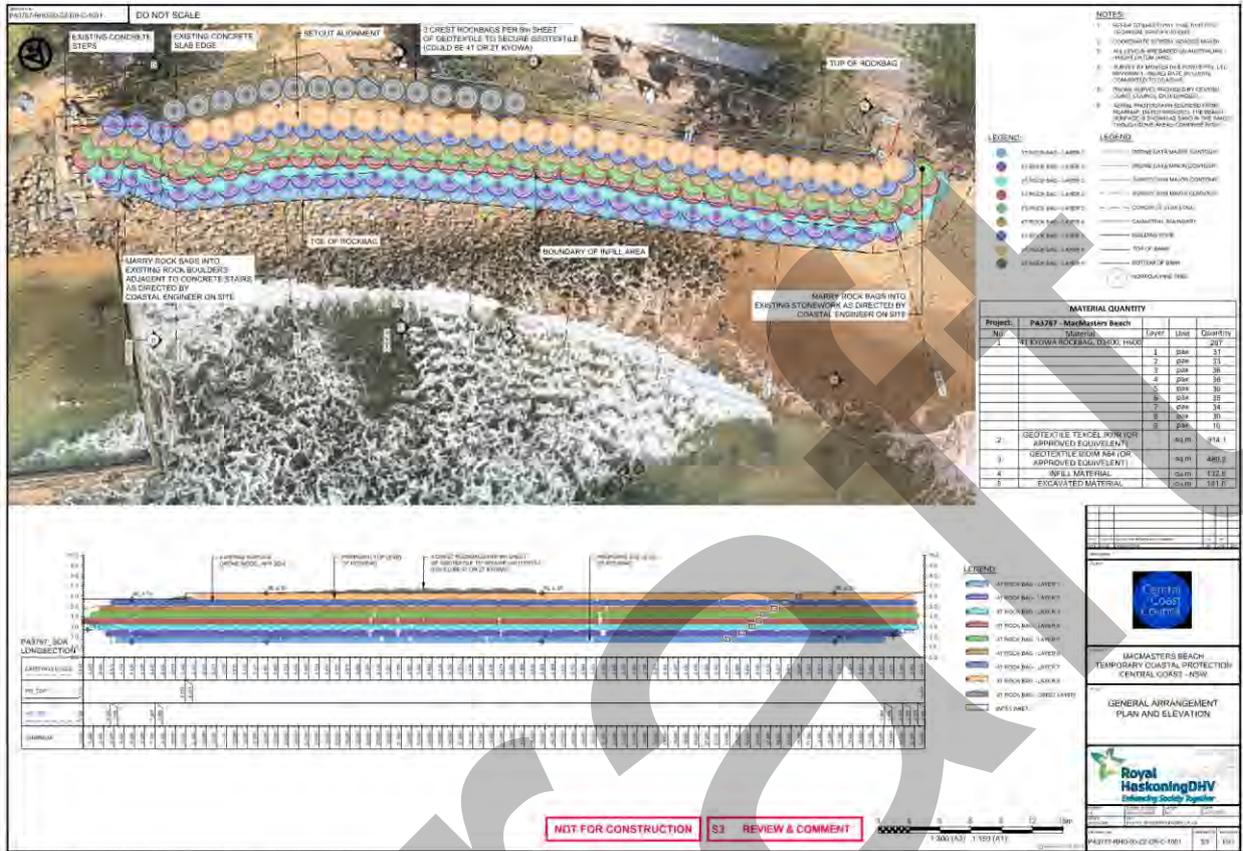


MacMasters Beach Project (Consultation)
 Coastal Protection Works
 Central Coast L3/L4
 100
 MacMasters Beach
 Surf Lifesaving Club
 MacMasters Beach NSW
 2260
 Central Coast Council
 Date: 2024
 SWR 01102204
 15557.5 103

 TERRAS LANDSCAPE ARCHITECTS
 100/100 WILSON STREET, SYDNEY NSW 1585



Temporary Coastal Protection Works, Render and Design Typical Section (Royal Haskoning 2025)



Temporary Coastal Protection Works Design Layout (Royal Haskoning 2025)

Appendix E. Action Multicriteria Assessment
Management Action MCA results, scores and ranking

Draft

ID	Category	Location	Issue	Action Name	Action Description	Benefit	Viability		Feasibility				Acceptability		Weighted Total Score	Rank	Timeframe	Priority	Lead Agency	Support Agencies
							Economic	Social	Environmental		Effectiveness of Option	Social Impact								
							2	1	1	2	1	2	1							
CW-S01	Access & Safety	LGA-wide	Increased erosion/scour associated with stormwater assets. Stormwater assets impacted by coastal inundation	Monitoring and improvement of coastal stormwater outlets	The inspection of all coastal stormwater outlets to identify those at risk from coastal hazards and opportunities where upgrades can be implemented or retrofitted in order to protect assets, reduce erosion from stormwater scour and/or improve public safety. These locations would also be regularly monitored to assess performance and improvements.	- improved public safety, water quality and amenity - reduced erosion at stormwater outlets and reduced impact on surrounding assets	0.4	0.8	1	0.6	0.8	1	0.6	7.2	35	Short	High	Council		
CW-S02	Access & Safety	LGA-wide	Risk to public safety due to wave run up, wave overtopping, cliff instability, rockfalls and coastal erosion	Develop and implement an integrated coastal processes and hazards education and awareness program	The development and implementation of an integrated education program focused on improving community understanding of local coastal hazards, processes and related topics, such as water quality, marine ecology and marine litter, to promote the safe and sustainable use of our coast. This action should include an update to and installation of new coastal hazard and educational signage and the ongoing monitoring of locations that pose a high risk to public safety.	improved community understanding of coastal hazards and coastal environment	0.6	1	1	0.8	0.6	0.8	1	8	15	Short	Medium	Council		
CW-S03	Access & Safety	LGA-wide	Informal private access and use damaging vegetation and impacting on recreational amenity for the public	Develop and implement coastal compliance procedures	The procedures would improve public safety and environmental outcomes at our beaches by outlining the actions, processes and responsibilities concerning compliance enforcement and the management of encroachment, illegal dumping, unapproved structures, unlawful activities and vegetation clearing. It will include a review of planning controls and resourcing, provide guidance to homeowners for "steps to remediation", make it easier for the public to "report an issue" and cover signage and monitoring aspects.	improved dune environment and recreational amenity	0.4	0.8	1	1	1	1	1	8.6	6	Short	Medium	Council	DPHI-Crown Lands, Fisheries, Environmental Protection Authority, NSW Police, National Parks, Local Aboriginal Land Services	
CW-S04	Access & Safety	LGA-wide	- Inaccessible beach accessways impacted by coastal erosion - Damage to dunes and safety concerns due to generation of informal/unauthorised beach accessways - Safety concerns regarding exposure and mobilisation of buried remnants of historic foreshore protection works - Injury to beach users caused by structures mobilising during storm events - Dune instability/steep dune scarp impacted by coastal erosion - Damage to coastal recreational assets from storm events	Review and implement updated Beach Maintenance Program	Council's Beach Maintenance Program would be reviewed and implemented to improve public beach access, amenity and safety. The action would include prioritisation and upgrades to beach accessways in line with the Recreational Use Study and Council's Disability Inclusion Action Plan. The program would outline the management of post-storm beach access and safety, where small-scale works such as beach scraping for amenity purposes may be undertaken and beach and dune fencing. It will also include an audit on beach maintenance operations to maximise inhouse efficiencies to ensure that the necessary plant and equipment is available to effectively implement the program.	Improved beach access, safety and amenity, improved dune environment	0.4	0.8	1	0.6	0.6	0.8	1	7	40	Short	Medium	Council		
CW-S05	Access & Safety	LGA-wide	Limited or out-dated information available on key indicators of coastal hazards and coastal dynamics	Develop and implement a Coastal Monitoring Program	The coastal monitoring program would use progressive monitoring techniques to collect essential information about coastal processes and hazards to improve the management of our beaches. It would include beach surveys to monitor changes in sand volumes, risk exposure, dune condition and beach amenity. The data collected would allow annual Beach Health Reports to be developed and better inform future coastal hazard studies and investigations. Beach usage should be included in the monitoring to better understand current demand and locations requiring further investment in the future.	Improved understanding of local coastal processes, beach usage	0.6	0.6	1	0.8	0.6	0.6	0.6	6.8	45	Short	High	Council	DCCEE	
CW-S06	Access & Safety	LGA-wide	Coastal hazards impacting viability of existing and future infrastructure long term, need for long-term coastal adaptation planning	Investigate and develop a Coastal Hazard Adaptation Strategy for affected coastal communities	Develop a Coastal Hazard Adaptation Strategy that will consider future risk to our community from coastal hazards and investigate adaptation measures and pathways to support and enhance the resilience of our coastal communities. This would also include the identification of land in the coastal zone with high community, ecological and/or scenic potential, or otherwise significant risk from coastal hazards, for potential future acquisition to promote public access, preserve scenic qualities and/or protect significant ecological sites. Acquisition would only proceed by Council or public authorities in cases when it is requested and/or supported by the landowner and has broader community and/or environmental benefit. Limited funding is currently available through the NSW Government's Coastal Land Protection Scheme, which began in 1973, aimed at bringing significant coastal lands into public ownership to support the care and management, and improve public access to them. Under this scheme, a public authority or landowner can nominate land that then undergoes an assessment process.	Improved resilience of coastal infrastructure from long term coastal hazards	0.6	0.6	1	0.8	0.6	0.6	0.6	6.8	45	Long	Medium	Council	DCCEE	
CW-S07	Access & Safety	LGA-wide	Coastal erosion threatening coastlines and infrastructure	Investigate offshore sand nourishment sources and secure mining licence.	Investigate the feasibility of offshore sand nourishment sources through an exploration licence, physical sampling, environmental assessments and a detailed business case. Obtain a mining licence to enable future offshore sand nourishment to be permissible. Following completion of this action and subject to favourable feasibility and viability outcomes, Council to complete a delivery framework that includes the locations, sand requirements, timing, triggers and funding models for delivering sand to Central Coast beaches.	Long term resilience to coastal hazards	0.4	1	0.2	0.8	1	1	1	7.6	28	Short	High	Council	Northern Beaches Council, NSW RA and NSW DCCEE	
CW-S08	Access & Safety	LGA-wide	Inconsistent standards of SLSC's patrol towers along the coast. Unable to provide sufficient public services.	Prioritise and upgrade beach life guard patrol towers and ancillary structures	This action would involve undertaking an audit of beach life guard patrol towers and ancillary structures to ensure their adequacy, performance and safety from coastal hazards. Necessary upgrades and improvements required would be prioritised and implemented to ensure required functions continue to be performed.	Improved safety for beach users	0.6	1	1	0.8	0.6	1	1	8.4	7	Medium	Medium	Council		
SB02	Access & Safety	Soldiers Beach / Pebble Beach	Safety hazard due to unfenced cliff line at southern carpark of Soldiers Beach	Investigate options to improve public safety at Soldiers Point headland	Undertake an assessment of public safety at the Soldiers Point headland and implement options to manage the risks associated from the exposed cliff and instability. Options may include safety infrastructure, such as fencing and signage, amenity improvements such as viewing areas and/or environmental restoration works.	Improved public safety	0.8	1	0.8	0.6	0.6	1	0.6	7.8	25	Medium	Medium	Council	DPHI-Crown Lands	
CW-A01	Amenities	LGA-wide	Aging or incompatible coastal recreation amenity infrastructure not compliant with engineering standards or industry best practice	Coastal recreation assets and infrastructure renewal program	This action involves the review, prioritisation and delivery of coastal recreation assets, public amenities (including accessible features) and infrastructure upgrades and investigations to support and enhance beach access, visitation and recreational opportunities now and into the future, guided by the recommendations from the Recreational Use Study.	Improved public amenity and safety	0.4	1	1	0.8	0.8	0.8	1	7.8	23	Short	Medium	Council		
CW-A02	Amenities	LGA-wide	Lack of guidance for implementing and assessing coastal protection works	Develop and implement Coastal Engineering Design Requirements	The Coastal Engineering Design Requirements will help to achieve a more sustainable and resilient coastline by clarifying expectations to designers, engineers and architects concerning coastal development. It will outline key design principles to ensure that development is appropriately designed for coastal hazards, addresses coastal processes, considers public safety and mitigates environmental impacts.	Improved resilience of foreshore development against coastal hazards	0.8	0.8	0.6	0.6	0.8	1	1	8	15	Short	High	Council		
CW-A03	Amenities	LGA-wide	Insufficient waste facilities and collection at coastal locations impacting amenity	Review waste collection assets and servicing in coastal public spaces	Work with internal business units and service providers to review the adequacy of waste collection assets and servicing along the coast. The review would be focused on ensuring that infrastructure and assets are sufficient to meet current demands, seasonal and event variations and opportunities for improvement to reduce the environmental and amenity impacts from marine litter and debris. This action should also include the management of post-storm and flood debris.	Improved safety, water quality, recreational amenity	0.8	0.6	1	0.8	0.6	0.4	1	7.2	34	Medium	Low	Council		
CW-H01	Coastal Hazard	LGA-wide	Need for stronger planning controls to manage development in the coastal zone in relation to coastal hazards	Review and update coastal development planning controls and undertake Planning Proposal to adopt Coastal Vulnerability Area	The review, update and implementation of new coastal hazard planning controls within the Development Control Plan, based on the latest available coastal hazard study and information, will ensure a consistent and best-practice approach to protecting the environment and communities from coastal hazards. Council will also prepare and submit a Planning Proposal to adopt a Coastal Vulnerability Area (CVA).	Improve resilience of coastline against coastal hazards	0.8	1	1	1	1	1	1	9.6	1	Medium	High	Council	DCCEE	
CW-H02	Coastal Hazard	LGA-wide	Legacy coastal emergency works on beaches which no longer serve purpose, causing detrimental impacts or timeframe expired.	Identify the extent, nature and condition of existing coastal emergency works	This investigation will identify and document existing emergency, legacy and unauthorised coastal protection works, including the type of works, extent, condition and the risk they pose to public safety and coastal processes. This information will allow these works to be strategically managed, decommissioned, remediated or modified as necessary and at the appropriate time.	Improve recreational amenity and safety	0.4	0.8	0.6	1	0.8	1	1	8	15	Medium	Medium	Council		
CT01	Coastal Hazard	Cabbage Tree	Structural integrity/slope stability	Design and construct Stage 2 of the Cabbage Tree Harbour coastal protection works	Design and construct Stage 2 coastal protection works comprising at Cabbage Tree Harbour to further reduce the incidence of landslip and improve beach safety. Toe drainage structure works were originally constructed with a 15 year design life and Stage 2 is required to add an additional layer and increase the crest height to ensure adequacy for future coastal conditions. Refer Appendix D for concept and further details.	Improved resilience of foreshore development against coastal hazards	0.4	0.8	1	0.6	0.6	0.8	0.6	6.6	49	Medium	Medium	Council	DCCEE	
CT02	Coastal Hazard	Cabbage Tree	Geotechnical hazards exist at Mazin Reserve	Improve public safety at Mazin Reserve	This would involve completing an investigation of existing geotechnical condition at Mazin Reserve and Cabbage Tree Harbour to prioritise and implement improvements aimed at stabilising the cliff along the eastern edge of Mazin Reserve. The works would aim to reduce the likelihood of further land slip and improve public safety, as identified in the Norah Head Village Centre Masterplan.	Improved public safety at Mazin Reserve	0.8	1	1	0.6	0.8	0.8	0.8	8	22	Medium	High	Council	DPHI-Crown Lands	
MM01	Coastal Hazard	MacMasters	Coastal erosion impacting Marine Parade	Complete coastal risk and options assessment for Marine Parade at MacMasters Beach	This action will involve completing a local detailed coastal hazard assessment to better understand the erosion and recession risk at this location. The updated information will be used to inform an options assessment which would investigate the most appropriate long-term adaptive management approach.	Improved resilience of Marine Parade	0.4	1	0.6	0.8	0.8	1	0.6	7.4	33	Long	Medium	Council	DCCEE, DPHI-Crown Lands	

ID	Category	Location	Issue	Action Name	Action Description	Benefit	Viability		Feasibility				Acceptability		Weighted Total Score	Rank	Timeframe	Priority	Lead Agency	Support Agencies
							Economic	Social	Environmental		Effectiveness of Option	Social Impact								
							2	1	1	2	1	2	1							
MM02	Coastal Hazard	MacMasters	Coastal erosion impacting Marine Parade	Construction of MacMasters Beach temporary coastal protection works	MacMasters Beach Surf Life Saving Club is located on Crown Land and subject to increasing future risk from coastal hazards. A design for temporary coastal protection works comprising of rock bag armour units has been prepared, in consideration of significant site constraints and community feedback, that would provide limited protection to parts of the existing building, heritage and Norfolk Island pines. The works would be limited to an approximately 80m stretch seaward of the building, between the existing steps and ramp and may assist in mitigating risks from coastal hazards until the longer-term management approach for this location is determined (action MM01) and implemented. The temporary coastal protection works may be triggered by geotechnical instability identified as part of regular coastal monitoring. This action is included as resolved during the 22 July 2025 Ordinary Council Meeting.	Improved resilience of Marine Parade	0.4	1	0.8	0.6	0.6	0.8	0.6	6.6	49	Medium (or triggered by CZEAS)	Medium	Council	DPHI-Crown Lands	
EN01	Coastal Hazard	Shelly Beach (north)	Unknown impacts associated with legacy landfill sites or other contamination that become exposed following erosion.	Monitor and manage risk of contamination from closed landfill sites	Monitoring and management of legacy closed landfill sites within the coastal hazard area to reduce the risk of contamination during severe weather events.	Improved safety and water quality	0.4	0.8	1	0.6	0.8	0.8	1	7.2	35	Medium	Low	Council		
EN02-A	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 11 Wyuna Avenue and 57 Curtis Pde, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Develop engineering design requirements for coastal protection works at The Entrance North.	Develop engineering design requirements for rock revetment and/or hybrid rock revetment coastal protection works at The Entrance North to assist the preparation and assessment of development applications.	Improved resilience of foreshore development against coastal hazards at Curtis Parade	0.8	1	1	0.8	0.6	0.8	0.6	8	15	Short	High	Council		
EN02-B	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 11 Wyuna Avenue and 57 Curtis Pde, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Complete detailed design and approvals for coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	Complete detailed design and approvals for rock revetment and/or hybrid rock revetment coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North. Note that the total cost allowance for this action is \$715,000 but Council's share is estimated at \$75,000 based on portion of works on Council-owned land	Improved resilience of foreshore development against coastal hazards at Curtis Parade	0.8	1	1	0.8	0.6	0.8	0.6	8	15	Short	High	Private Property Owners then Council	DPHI-Crown Lands	
EN02-C	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 11 Wyuna Avenue and 57 Curtis Pde, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Construct coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North.	Complete construction of rock revetment and/or hybrid rock revetment coastal protection works at Curtis Pde and Wyuna Ave, The Entrance North. Note that the total cost of this action is \$1,700,000 but Council's share is estimated at \$680,000 based on portion of works on Council-owned land	Improved resilience of foreshore development against coastal hazards at Curtis Parade	0.4	1	1	0.8	0.6	1	0.6	7.6	28	Short	High	Private Property Owners then Council	DPHI-Crown Lands	
EN02-D	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 1 and 55 Hutton Rd, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Complete design and approvals for coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.	Complete design and approvals of rock revetment and/or hybrid rock revetment coastal protection works at Hutton Rd, The Entrance North. Design and approvals to consider the temporary design and approval for the works constructed under the s68 Ministerial Authorisation of the NSW Reconstruction Authority Act. Note that the total cost allowance for this action is \$600,000 but Council's share is estimated at \$75,000 based on portion of works on Council-owned land	Improved resilience of foreshore development against coastal hazards at Hutton Road	0.8	1	1	0.8	0.6	0.8	0.6	8	15	Short	High	Private Property Owners then Council	DPHI-Crown Lands	
EN02-E	Coastal Hazard	The Entrance North	Public beach accessways and private ocean front properties at high risk of coastal erosion between 1 and 55 Hutton Rd, The Entrance North. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Construct coastal protection works fronting No. 1 to 55 Hutton Rd, The Entrance North.	Complete construction of rock revetment and/or hybrid rock revetment coastal protection works at Hutton Rd, The Entrance North. Construction to take into account the temporary works constructed under the s68 Ministerial Authorisation of the NSW Reconstruction Authority Act. Note that the total cost of this action is \$1,830,000 but Council's share is estimated at \$1,640,000 based on portion of works on Council-owned land	Improved resilience of foreshore development against coastal hazards at Hutton Road	0.4	1	1	0.8	0.6	1	0.6	7.6	28	Short	High	Private Property Owners then Council	DPHI-Crown Lands	
EN02-F	Coastal Hazard	The Entrance North	High risk from beach erosion at North Entrance Beach	Implement sand nourishment at The Entrance North using sand sourced strategically (in accordance with the Entrance Management Strategy and procedures being developed as part of the Tuggerah Lakes Coastal Management Program –including Entrance Channel Dredging Activities)	Continue to implement sand nourishment at The Entrance North using sand sourced strategically from The Entrance channel dredging and sand berm management activities. Note: Sand from the Entrance channel only to be placed south of Hargraves St to keep sand within the sediment compartment. Refer to Appendix D for more information regarding the rationale for this action.	Improve beach amenity and resilience against beach erosion	0.4	0.8	1	1	1	0.6	0.8	7.6	28	Short, ongoing	High	Council	DCCEEW, TNSW, Fisheries, DPHI-Crown Lands	
EN03	Coastal Hazard	The Entrance North, Lakes Beach	High risk from beach erosion at The Entrance North and Lakes Beach SLSCs	Prepare a pilot adaptation and options assessment for the Entrance North and The Lakes SLSCs	Prepare a pilot adaptation and options assessment for the Entrance North and The Lakes SLSCs. This action will involve evaluating the existing assets and coastal risk information to prepare an options assessment and adaptive management approach to address current and future coastal hazard risk.	Improve resilience of SLSCs against beach erosion	0.8	1	1	0.6	0.6	0.8	1	8	15	Medium	Medium	DPHI-Crown Lands	Council, SLSC	
EB01	Coastal Hazard	The Entrance	Structural integrity	Review the structural integrity and extent of the foreshore revetment and embankment protecting Marine Parade, The Entrance, and undertake remedial and/or extension works as required	Review the structural integrity and extent of the foreshore embankment stabilising Marine Parade that extends north from The Entrance Surf Life Saving Club and along the southern foreshore of the entrance channel. Following construction of the groyne on The Entrance Beach by State Government in 2017, the structure has been increasingly exposed and impacted. Modifications, extensions or replacement may be required to ensure structural integrity, public safety and stability of Marine Parade. This action may depend on or incorporate recommendations from TNSW's review into the impacts from the existing rock groyne expected 2026.	Improved safety against coastal hazards and resilience of public road & infrastructure	0.4	1	1	0.6	0.8	0.8	0.6	7	40	Short	Medium	Council	TNSW, DPHI-Crown Lands	
WB01	Coastal Hazard	Wamberal Beach	Coastal erosion threatening private properties and public infrastructure	Review and update the Wamberal Beach engineering design requirements so that they may be referred to in future revisions of Council's Coastal Development Control Plan (DCP)	Review the Wamberal Beach EDR's to include geotechnical engineering design requirements and allow for a design that can be implemented, with a view to being able to include in Council's DCP to ensure all development applications for the Wamberal Beach coastal protection works are in accordance with the guidelines. The purpose of the EDRs are also to provide principals assistance with the preparation and assessment of DA's for coastal protection works for other locations. The EDRs should be seen as a "living document", a guideline that should be regularly reviewed and updated to keep it up to date with the latest available information and best practice. The EDRs need to be flexible enough to allow various types of coastal protection works designs to be put forward and considered for assessment in a DA.	Improved resilience of foreshore development against coastal hazards	0.6	1	0.8	0.8	0.6	1	0.6	7.8	27	Short	High	Council	DCCEEW	
WB02-A	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Complete design and approvals for coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal.	Complete design and approvals for rock revetment and/or hybrid rock revetment coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal. Total cost estimated at \$1 million, Council share = \$110,000 based on proportion protecting Council land	Improved resilience of foreshore development against coastal hazards	0.6	1	0.6	0.8	0.6	0.8	0.6	7.2	35	Short	High	Private Property Owners then Council		

ID	Category	Location	Issue	Action Name	Action Description	Benefit	Viability		Feasibility				Acceptability		Weighted Total Score	Rank	Timeframe	Priority	Lead Agency	Support Agencies
							Economic	Social	Environmental		Effectiveness of Option	Social Impact								
							2	1	1	2	1	2	1							
WB02-B	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Construct coastal protection works fronting 1 Pacific St to 17 Calais Rd, Wamberal Beach.	Construct rock revetment and/or hybrid rock revetment coastal protection works fronting 1 Pacific St to 17 Calais Rd Wamberal Beach. Total cost estimated at \$33.8 million, Council share = \$1.6 million based on proportion protecting Council land	Improved resilience of foreshore development against coastal hazards	0.4	1	0.6	0.8	0.6	1	0.6	7.2	35	Short	High	Private Property Owners then Council		
WB02-C	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Loss of public beach amenity	Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon, sand berm area and other sources as available	Implement sand nourishment at Wamberal and Terrigal Beach using sand sourced opportunistically from Terrigal Lagoon and sand berm area and other sources as available.	Improved resilience of foreshore development against coastal hazards, improvement in beach amenity	0.4	1	0.8	0.8	0.8	0.6	0.8	7	40	Short	High	Council		
WB02-D	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Purchase residual private land fronting Pacific St Wamberal.	NSW DPPI, Crown Lands and Council to work together to acquire residual private land fronting Pacific St Wamberal and transfer into Council ownership.	Enable coastal protection works to be undertaken on this land and return areas of the beach to public ownership	1	1	0.8	0.8	0.8	0.6	0.8	8.2	8	Short	High	NSW DPPI, NSW Crown Land and Council		
WB02-E	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Complete the transfer of NSW Government owned lots at Ocean View Drive Wamberal into Council ownership.	Council to liaise with the Office of Strategic Lands - Department of Planning, Housing and Infrastructure to transfer the 5 lots to Council ownership to assist in the management of a whole of embayment solution.	Enable coastal protection works to be undertaken on this land and return areas of the beach to public ownership	1	1	0.8	0.8	0.8	0.6	0.8	8.2	8	Short	High	NSW DPPI and Council		
WB02-F	Coastal Hazard	Wamberal Beach	Public beach accessways, public land and private ocean front properties at high risk of coastal erosion from 1 Pacific Street to 17 Calais Rd, Wamberal Beach. Note: Each property owner (private and Council) to be responsible for completing this action for their respective properties. Action is to be initiated by private property owners seeking protection works. Council will not seek to protect beach accessways in isolation of adjacent private property protection.	Enter into licence agreement for private coastal protection works located partly on Council owned land at Wamberal Beach.	Where the rock revetment cannot be placed entirely on private land, a licence/lease agreement is required for landowners to have part of the coastal protection works on Council owned land.	Enable portion of coastal protection works extending onto public land to be undertaken on this land and for land to be leased to allow for the future maintenance and upkeep of the works	1	1	0.8	0.8	0.8	0.6	0.8	8.2	8	Short	High	Council / Private land owners		
A01	Coastal Hazard	Avoca	Flat beach profile, no protection from wave overtopping	Undertake a detailed wave overtopping and inundation assessment for high risk locations	Undertake a detailed wave overtopping and inundation assessment at high risk locations identified in the coastal hazard study to improve public safety and better inform coastal planning. The detailed assessment should include analysis of the current and future risk, as well as the consideration of options for managing the risk to public and private assets and public safety. Short term management options may include updating local planning controls and/or soft engineering strategies.	Improved resilience of foreshore development against coastal hazards	0.6	1	0.8	0.6	0.6	0.8	0.6	7	40	Short	High	Council	DCCEE	
EB02	Coastal Hazard	The Entrance	Depletion of sand along southern side of The Entrance channel and undermining of seawall	Investigation and management of adverse groyne impacts	Collaborate and support the TNSW Marine Infrastructure Delivery Office in the investigation of options, including removal, and management all adverse impacts caused by the construction of the rock groyne at The Entrance beach that was initially installed with the context of a short-term 10-year trial.	Improved resilience of foreshore development against coastal hazards	0.8	1	0.6	0.8	0.8	0.8	0.8	8	14	Medium	Medium	TNSW (MIDO)		
T02	Coastal Hazard	Terrigal (The Haven)	Structural integrity of seawall at The Haven	Options study for replacement of aging seawall at The Haven	Undertake an options study to assess feasible foreshore masterplans and design options for the upgrade, or replacement, of the sandstone block seawall at The Haven and surrounding area, with reference to recommendations of the engineering review of the existing structure.	Improved resilience of foreshore development against coastal hazards	0.6	1	0.6	0.8	0.8	1	0.6	7.8	25	Medium	High	Council	DPPI-Crown Lands	
CW-C01	Community & Social	LGA-wide	Need for community and agency representation to support decision making	Continue the role of a coastal, estuary and floodplain management Advisory Committee	Continue to support the role of an Advisory Committee responsible for providing advice and input on the sustainable management of our coastal, estuarine and flood liable areas.	Improved community and agency communications and participation in coastal management	1	1	1	0.8	0.6	1	1	9.2	2	Short	High	Council		
CW-C02	Community & Social	LGA-wide	Lack of detailed cultural and heritage assessments across the LGA. Need for Aboriginal Heritage Impact Permits in areas affected by coastal erosion.	Work with First Nation groups and stakeholders to evaluate arrangements for undertaking beach maintenance operations	Collaborate with First Nation groups and stakeholders to evaluate beach maintenance operations to ensure their appropriateness for works in sensitive areas. This action will include update of protocols to be followed in the event Aboriginal sites or heritage is discovered and/or threatened by erosion during storms, information to be communicated through interpretive signage along the coast and obtaining Aboriginal Heritage Impact Permits where they may be required to support essential works for public safety and access, such as post-storm management of beach accessways.	Improved First Nations participation in coastal management	0.6	0.6	1	0.8	0.6	0.6	0.6	6.8	45	Medium	Medium	Council	LALC	
CW-C03	Community & Social	LGA-wide	Unapproved memorial sites	Management of unapproved memorials in public coastal spaces	Work with internal business units to review the appropriateness and/or removal of unapproved memorials installed in public coastal spaces on Council land or Council managed Crown Land.	Improved coastal amenity	0.8	0.6	1	0.8	0.6	0.4	0.6	6.8	45	Medium	Low	Council		
CW-C04	Community & Social	LGA-wide	Community awareness of coastal hazards and issues	Update and maintain Council's website to improve awareness and make information on coastal processes, hazards and issues more accessible	Update Council's website to provide accessible information relating to coastal processes, hazards, coastal management issues, educational resources, coastal projects and coastal data. Website to be regularly reviewed and updated as appropriate to ensure relevancy and accuracy of information as new information is obtained or new coastal management issues emerge. Following adoption by Council, the new coastal hazard information will also be made publicly available via Council's online mapping tool to ensure it is more accessible to support informed decision-making by residents, stakeholders and potential developers concerning matters of property, development and insurance. New coastal hazard information should be acquired, as necessary, to ensure this information is accurate and current.	Improved community and agency communications and participation in coastal management	0.6	0.8	0.8	0.8	0.8	0.8	1	7.8	23	Short	High	Council		
CW-C05	Community & Social	LGA-wide	Community awareness of cultural issues and practices, lack of understanding of traditional knowledge for managing the coast	Knowledge sharing and protection of cultural heritage	Engage and collaborate with local First Nations groups to share cultural knowledge, understand their concerns and priorities and identify opportunities to acknowledge and protect and preserve cultural heritage sites and values from coastal hazards.	Improved First Nations participation in coastal management, protection of cultural heritage values from coastal hazards	0.8	0.6	1	1	1	0.8	1	8.8	3	Medium	Medium	Council	LALC	
CW-D01	Development	LGA-wide	Need for geotechnical information to inform planning decisions	Develop and maintain a coastal geotechnical database	Develop and maintain an internal database of coastal geotechnical information to better understand the underlying geology of the region and inform coastal management and planning decisions. It will involve the collation of all available geotechnical data along our coast from all available sources and include geotechnical and structural constraints. Information to be provided to NSW SES for consideration for use in emergency management.	Improved understanding of risks to infrastructure from coastal hazards	0.6	0.6	0.8	0.8	0.6	0.8	0.6	7	44	Medium	Medium	Council	DCCEE, DPPI-Crown Lands (as necessary)	
CW-D02	Development	LGA-wide	Geotechnical investigation	Conduct geotechnical investigations to improve understanding of underlying geology along the coast	Complete a gap analysis to identify where additional or contemporary geotechnical information is required to support improved management, emergency response and planning decisions and conduct investigations as required.	Improved understanding of risks to infrastructure from coastal hazards	0.4	0.4	1	0.8	0.6	0.4	0.4	5.6	52	Medium	Medium	Council	DCCEE, DPPI-Crown Lands (as necessary)	
CW-D03	Development	LGA-wide	Infrastructure at risk	Develop a coastal assets at risk register and update asset management program	This action involves auditing coastal assets and infrastructure to inform development of a register identifying those at risk of coastal hazards, now and into the future. This information would be integrated with Council's asset management program to ensure effective maintenance, management and planning of coastal assets to improve amenity, resilience and community safety.	Improved infrastructure resilience from coastal hazards	0.6	1	1	0.8	0.6	0.8	0.6	7.6	28	Short	High	Council	DPPI-Crown Lands	
CW-D04	Development	LGA-wide	Rock/ocean pools maintenance and accessibility, Accessibility of beaches, foreshore reserves and coastal assets	Improve accessibility of coastal and foreshore areas	As guided by Council's Disability Inclusion Action Plan, this action involves continuing to improve the accessibility and inclusiveness of our beaches and foreshore areas, such as investigating and implementing access upgrades and ensuring that new infrastructure projects consider and incorporate universal design principles.	Improved accessibility to the coast	0.4	0.8	0.6	0.4	0.6	0.8	1	6.2	51	Medium	Medium	Council	DPPI-Crown Lands	

ID	Category	Location	Issue	Action Name	Action Description	Benefit	Viability		Feasibility				Acceptability		Weighted Total Score	Rank	Timeframe	Priority	Lead Agency	Support Agencies
							Economic	Social	Environmental		Effectiveness of Option	Social Impact								
							2	1	1	2	1	2	1							
CW-D05	Development	LGA-wide	Lack of awareness of property owners for properties affected by coastal hazards	Review coastal hazard notations and planning certificates	As new coastal hazard mapping and information becomes available, planning certificates should be regularly reviewed to ensure properties potentially affected by coastal hazards contain an appropriate notation.	Improved resilience of foreshore development against coastal hazards	1	0.8	0.8	0.6	0.8	1	0.6	8.2	11	Medium	Medium	Council	DCCEEW	
CW-E01	Ecological Environment	LGA-wide	Reduced water quality from urban catchments, leading to reduced water quality in open coast receiving waters	Review and implement Council's coastal water quality monitoring program	Council's existing coastal water quality monitoring program will be reviewed, updated and implemented to continue protecting and enhancing the water quality along our coastline. The program will be expanded to include the monitoring of ocean wastewater and stormwater outfalls, improved education and awareness initiatives and public accessibility to water quality information.	Improved water quality	0.6	1	1	1	1	0.8	1	8.8	3	Short	Medium	Council		
CW-E02	Ecological Environment	LGA-wide	Invasive weeds and pests reducing the diversity and abundance of native species. Lack of guidance for appropriate planting in the coastal zone. Lack of guidance for appropriate fencing/dune stabilisation controls in the coastal zone. Illegal vegetation clearing.	Develop and implement a Coastal Vegetation and Dune Management Strategy	This action would involve surveying existing coastal and dune vegetation to inform the development of a Coastal Vegetation Strategy aimed at supporting and enhancing coastal resilience, ecosystem integrity, beach amenity and conservation outcomes. The strategy will guide and prioritise the on-ground management required to achieve these outcomes and involve elements such as the management of priority weed species, dune stabilisation and planting, tree restoration and succession planting, education opportunities for the public and community groups and remediation actions required in instances of illegal clearing.	Improved beach access, safety and amenity, improved dune environment	0.6	0.6	1	1	1	1	1	8.8	3	Short	Medium	Council		
T01	Ecological Environment	LGA-wide	Would like to see the area from The Anchor to Terrigal beach made into a Marine Park same as what is at Nelson Bay (Pinpoint)	Undertake and support research projects and citizen science initiatives aimed at enhancing and conserving marine biodiversity, science, recreation and education	Collaborate and support agencies, organisations and community groups undertaking projects or research aimed at enhancing and conserving marine biodiversity, science, recreation and education. This may include initiatives such as shark management, threatened species management, marine protected areas or citizen science projects, such as CoastSnap.	Improved community and agency communications and participation in coastal management	0.6	0.6	0.6	0.6	1	1	0.6	7.2	35	Long	Medium	Council	Council, DPHI-Crown Lands, DPIRD Fisheries, DCCEEW	
SB01	Ecological Environment	Soldiers Beach	Dune blowout at southern carpark	Undertake dune management works at the southern carpark of Soldiers Beach	Undertake works aimed at reducing the volume of wind transported sand into the carpark, including the installation of dune forming fencing, dune revegetation and upgrade/replacement of the dune retaining wall. Also investigate whether the vehicle access from the southern slip rail is still required following completion of the new vehicle access ramp.	Improved beach access, safety and amenity, improved dune environment	0.8	0.6	1	1	0.8	0.8	0.6	8.2	11	Medium	Medium	Council		